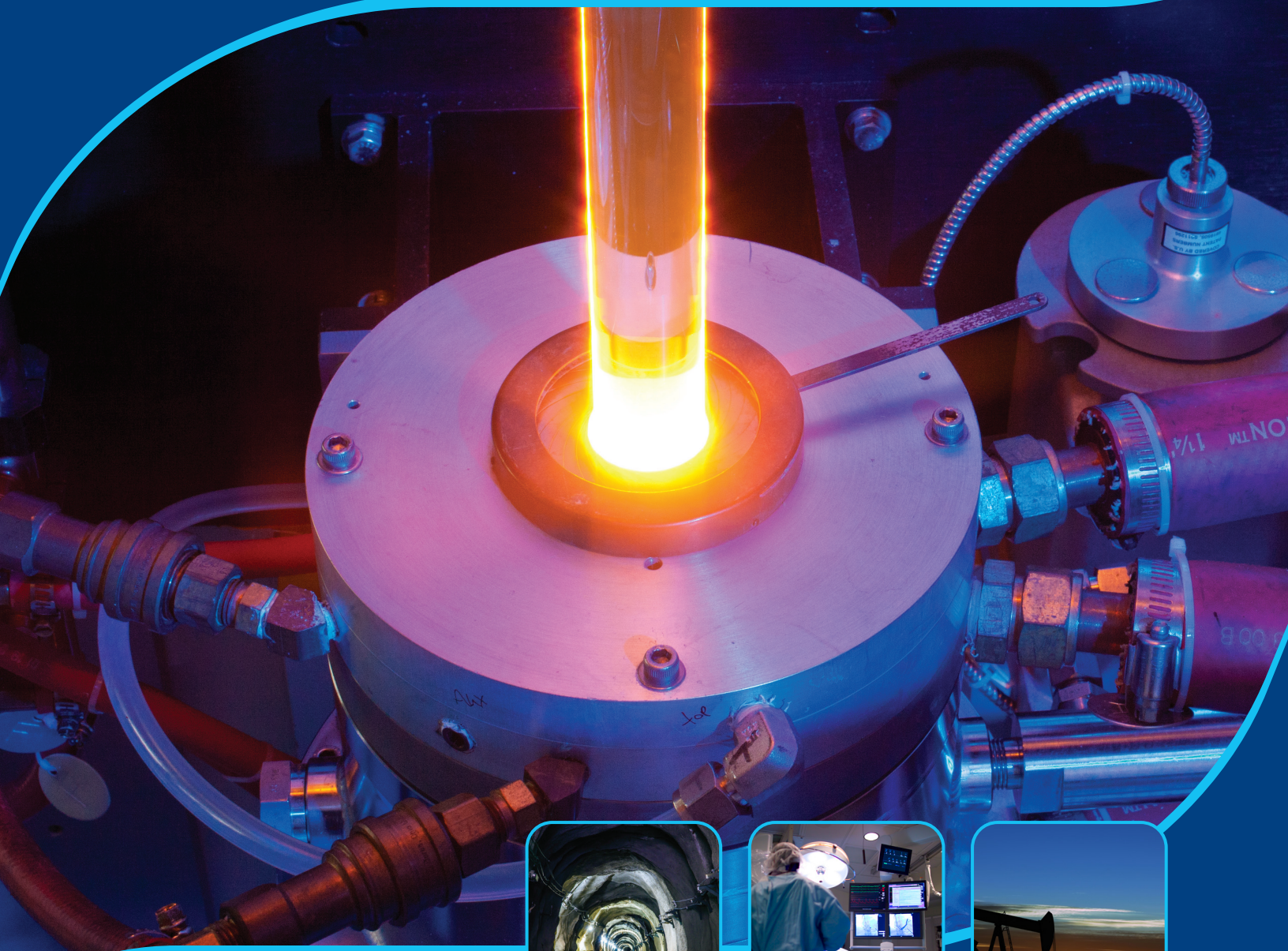


# **F AFL**



## **VERRILLON® SPECIALTY OPTICAL FIBER**

Harsh Environments | Medical Applications  
Polarization Management | Industrial Applications

Founded in 1984, AFL is an international manufacturer providing end-to-end solutions to the energy, service provider, enterprise, hyperscale and industrial markets as well as several emerging markets.

AFL's products are in use in over 130 countries and include fiber optic cable and hardware, transmission and substation accessories, outside plant equipment, connectivity, test and inspection equipment, and fusion splicing systems.

AFL also offers a wide variety of services supporting data center, enterprise, wireless and outside plant applications.

AFL is dedicated to bringing our customers a quality product as well as delivering superior value.



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**Verrillon®**  
**Specialty Optical Fiber**

Verrillon® Specialty Optical Fiber





## Verrillon® VHS100 Series Harsh Environment Fibers

Verrillon VHS100 Series of single-mode fibers are suitable for low to mid-temperature harsh environment applications. VHS100 has the best performance in hydrogen when coated with our hermetic coating. Depending on the specific application, VHS100 is available with a diverse range of coatings including Carbon Mid-temp Dual Acrylates (CMTDA), Carbon Silicone Mid-temp Acrylates (CSMTA), Carbon Silicone-PFA and Carbon Polyimide.

### Features

- Highly compatible with standard single-mode fibers for ease of spliceability
- Combined with carbon coating, VHS100 exhibits very high resistance to hydrogen and moisture in the mid-range of temperatures
- Available with all Verrillon® Harsh Environments coatings
- VHS100 is designed to operate at both 1310 and 1550 nm wavelengths
- Typically used with single-mode DTS and DAS sensing interrogators

### Specifications

PART NO.	SMF-1-P-125-2	SMF-1-P-125-3	SMF-1-CP-125-3
Description	125/155 μm Polyimide, Single-mode fiber, 0.12NA, 150 kpsi	125/155 μm Polyimide, Single-mode fiber, 0.12NA, 100 kpsi	125/155 μm Carbon/Polyimide, Single-mode fiber, 0.12NA, 100 kpsi
<b>PARAMETER</b>	<b>VALUE</b>		
<b>Material</b>			
Hermetic Coating	—	—	Carbon
Coating	Polyimide	Polyimide	Polyimide
<b>Geometry</b>			
Clad Diameter (μm)	125 ± 2	125 ± 2	125 ± 2
Core/Clad Offset (μm)	≤ 0.5	≤ 0.5	≤ 0.5
Coating Diameter (μm)	155 ± 5	155 ± 5	155 ± 5
Polyimide Coating Concentricity <sup>1</sup> (%)	≥ 80	≥ 80	≥ 80
<b>Optical</b>			
NA (nominal)	0.12	0.12	0.12
Attenuation <sup>2</sup> @ 1310 nm (dB/km)	≤ 0.7	≤ 0.7	≤ 0.7
Attenuation <sup>2</sup> @ 1550 nm (dB/km)	≤ 0.6	≤ 0.6	≤ 0.6
Cutoff Wavelength (nm)	1250 ± 50	1250 ± 50	1250 ± 50
Mode Field Diameter <sup>3</sup> @ 1310 nm (μm)	9.2 ± 0.6	9.2 ± 0.6	9.2 ± 0.6
Mode Field Diameter <sup>3</sup> @ 1550 nm (μm)	10.4 ± 0.8	10.4 ± 0.8	10.4 ± 0.8
<b>Mechanical</b>			
Proof Test (kpsi)	≥ 150	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300	-65 to +300

<sup>1</sup> Measured as (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on Zero Tension spool

<sup>3</sup> Petermann II Definition

# Verrillon®

## VHS100 Series Harsh Environment Fibers

### Specifications

<b>PART NO.</b>	<b>SMF-1-CMTDA-125-1</b>
Description	125/245 μm Carbon/ Mid-Temp Dual Acrylate coated, Single-mode fiber 0.12NA, 100 kpsi
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Hermetic Coating	Carbon
Coating	Mid-Temp Dual Acrylate
<b>Geometry</b>	
Clad Diameter (μm)	125 ± 2
Core/Clad Offset (μm)	≤ 0.5
Coating Diameter (μm)	245 ± 15
<b>Optical</b>	
NA (nominal)	0.12
Attenuation <sup>1</sup>	
@ 1310 nm (dB/km)	≤ 0.5
@ 1550 nm (dB/km)	≤ 0.3
Cutoff Wavelength (nm)	≤ 1250 ± 50
Mode Field Diameter <sup>2</sup>	
@ 1310 nm (μm)	9.2 ± 0.6
@ 1550 nm (μm)	10.4 ± 0.8
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +150

<sup>1</sup> Measured on loose coil

<sup>2</sup> Petermann II Definition

### Specifications

<b>PART NO.</b>	<b>SMF-1-MTDA-125-1</b>
Description	125/245 μm Mid-Temp Dual Acrylate coated, Single-mode fiber, 0.12NA, 100 kpsi
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Coating	Mid-Temp Dual Acrylate
<b>Geometry</b>	
Clad Diameter (μm)	125 ± 2
Core/Clad Offset (μm)	≤ 0.5
Coating Diameter (μm)	245 ± 5
<b>Optical</b>	
NA (nominal)	0.12
Attenuation	
@ 1310 nm (dB/km)	≤ 0.40
@ 1550 nm (dB/km)	≤ 0.25
Cutoff Wavelength (nm)	1250 ± 50
Mode Field Diameter <sup>1</sup>	
@ 1310 nm (μm)	9.2 ± 0.6
@ 1550 nm (μm)	10.4 ± 0.8
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +150

<sup>1</sup> Petermann II Definition

# Verrillon®

## VHS100 Series Harsh Environment Fibers

### Specifications

PART NO.	SMF-1-CA-125-2	SMF-1-CA-125-3
Description	125/245 μm Carbon/Acrylate coated, Single-mode Fiber, 0.12 NA, 200 kpsi	125/245 μm Carbon/Acrylate coated, Single-mode Fiber, 0.12 NA, 100 kpsi
PARAMETER	VALUE	
<b>Material</b>		
Hermetic Coating	Carbon	Carbon
Coating	UV Acrylate	UV Acrylate
<b>Geometry</b>		
Clad Diameter (μm)	125 ± 2	125 ± 2
Core/Clad Offset (μm)	≤ 0.5	≤ 0.5
Coating Diameter (μm)	245 ± 15	245 ± 15
<b>Optical</b>		
NA (nominal)	0.12	0.12
Attenuation <sup>1</sup>		
@ 1310 nm (dB/km)	≤ 0.6	≤ 0.6
@ 1550 nm (dB/km)	≤ 0.5	≤ 0.5
Cutoff Wavelength (nm)	≤ 1250 ± 50	≤ 1250 ± 50
Mode Field Diameter <sup>2</sup>		
@ 1310 nm (μm)	9.2 ± 0.6	9.2 ± 0.6
@ 1550 nm (μm)	10.4 ± 1.0	10.4 ± 1.0
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 200	≥ 100
Operating Temperature (°C)	-40 to +85	-40 to +85

<sup>1</sup> Measured on loose coil

<sup>2</sup> Petermann II Definition



## Verrillon® VHS700 Series Bend-Insensitive Fibers

With their optimized optical design, VHS700 fibers are engineered to operate under extremely small bend radii down to 7.5 mm with minimal bend loss at 1550 nm. This low bend loss performance represents more than a 20X improvement over standard single-mode fiber. VHS700's bend loss exceeds the specifications outlined in the ITU-T G.657.A2 bend loss standard. The ultra-low bend loss provided by VHS700 Series makes it the fiber to use in tight bend applications. It also is designed to be used in cabling applications where there are EFL constraints.

Compatible with standard dual-wavelength single-mode fiber, the VHS700 cutoff is <1290 nm and MFD is similar to standard single-mode fiber. This compatibility makes the fiber easy to splice, with minimal splice loss.

VHS700 is available with polyimide, silicone-PFA, silicone-MTA, MTA and carbon coatings which allow it to withstand high temperatures and hydrogen-containing atmospheres. Carbon coating can be applied to provide hermeticity against water and hydrogen in downhole applications and for fatigue resistance in long-term deployments.

VHS700 is available at proof test levels of 100 kpsi and 200 kpsi, with other levels available upon request.

### Features

- Optimized for 1310/1550 nm Dual Wavelength Operation
- Optimized Refractive Index Profile to minimize bend loss
- Greater than 20x bend loss improvement at 1550 nm over standard SMF
- MFD compatible with standard SMF for ease of splicing and minimal splice loss

### Specifications

PART NO.	SMF-12-CMTDA-125-2	SMF-12-MTDA-125-1	SMF-12-CMTDA-125-1
Description	125/245 μm Carbon/Mid-Temp Dual Acrylate Bend Insensitive, Single-mode Fiber, 0.12NA, 200 kpsi	125/245 μm Mid-Temp Dual Acrylate Bend Insensitive, Single-mode Fiber, 0.12NA, 100 kpsi	125/245 μm Carbon/Mid-Temp Dual Acrylate Bend Insensitive, Single-mode Fiber, 0.12NA, 100 kpsi
PARAMETER		VALUE	
<b>Material</b>			
Hermetic Coating	Carbon	—	Carbon
Coating	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate
<b>Geometry</b>			
Clad Diameter (μm)	125 ± 1	125 ± 1	125 ± 1
Core/Clad Offset (μm)	≤ 0.5	≤ 0.5	≤ 0.5
Coating Diameter (μm)	245 ± 10	245 ± 10	245 ± 10
<b>Optical</b>			
NA (nominal)	0.12	0.12	0.12
Attenuation <sup>1</sup> @ 1310 nm (dB/km), 1550 nm (dB/km)	≤ 0.4, ≤ 0.25	≤ 0.4, ≤ 0.25	≤ 0.4, ≤ 0.25
Cutoff Wavelength (nm)	≤ 1290	≤ 1290	≤ 1290
Mode Field Diameter <sup>2</sup> @ 1310 nm (μm), 1550 nm (μm)	8.6 ± 0.4, 9.8 ± 0.6	8.6 ± 0.4, 9.8 ± 0.6	8.6 ± 0.4, 9.8 ± 0.6
Bend Loss <sup>3</sup> @ 1550 nm (dB)	≤ 0.5	≤ 0.5	≤ 0.5
<b>Mechanical</b>			
Proof Test (kpsi)	200	100	100
Operating Temperature (°C)	-40 to +150	-40 to +150	-40 to +150

<sup>1</sup> Measured on Zero Tension Spool

<sup>2</sup> Petermann II Definition

<sup>3</sup> One turn on 7.5 mm radius mandrel





## Verrillon® VHS400 Series Harsh Environment Fibers

Verrillon VHS400 Fiber Series is a pure silica core single-mode fiber designed to operate at both 1310 and 1550 nm. These Harsh Environment Fibers from AFL are available in a broad range of coatings including Mid-Temp Dual Acrylates, Polyimide and Carbon. Typically, these fibers are used in sensing applications such as DTS, DSS and DAS.

### Features

- Dual-wavelength (1310/1550 nm) single-mode design
- Optical properties matching standard SMF for low splice loss
- Pure silica core provides excellent resistance to H<sub>2</sub> and moisture in harsh environments
- Wide range of protective coatings available, depending on application requirements

### Specifications

PART NO.	SMF-400-CP-125-1	SMF-400-P-125-1
Description	125/155 μm Carbon/Polyimide Pure Silica Core, Single-mode fiber, 0.12NA, 100 kpsi, 1310/1550 nm Dual Window Operating Wavelength	125/155 μm Polyimide Pure Silica Core, Single-mode fiber, 0.12NA, 100 kpsi, 1310/1550 nm Dual Window Operating Wavelength
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Hermetic Coating	Carbon	—
Coating	Polyimide	Polyimide
<b>Geometry</b>		
Clad Diameter (μm)	125 ± 2	125 ± 2
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5
Coating Diameter (μm)	155 ± 5	155 ± 5
Polyimide Coating Concentricity <sup>1</sup> (%)	≥ 80	≥ 80
<b>Optical</b>		
NA (nominal)	0.12	0.12
Attenuation <sup>2</sup> @ 1310 nm (dB/km)	≤ 0.8	≤ 0.8
Attenuation <sup>2</sup> @ 1550 nm (dB/km)	≤ 0.8	≤ 0.8
Cutoff Wavelength (nm)	1250 ± 50	1250 ± 50
Mode Field Diameter <sup>3</sup> @ 1310 nm (μm)	9.2 ± 0.6	9.2 ± 0.6
Mode Field Diameter <sup>3</sup> @ 1550 nm (μm)	10.4 ± 0.8	10.4 ± 0.8
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

<sup>1</sup> Measured as (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on loose coil    <sup>3</sup> Petermann II Definition

# Verrillon®

## VHS400 Series Harsh Environment Fibers

### Specifications

PART NO.	SMF-400-MTDA-125-1	SMF-400-CMTDA-125-1
Description	125/245 μm Mid-Temp Dual Acrylate coated, Single-mode fiber, 0.12NA, 100 kpsi, 1310/1550 nm Dual Window Operating Wavelength	125/245 μm Carbon/Mid-Temp Dual Acrylate coated, Single-mode fiber, 0.12NA, 100 kpsi, 1310/1550 nm Dual Window Operating Wavelength
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Hermetic Coating	—	Carbon
Primary Coating	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate
Secondary Coating	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate
<b>Geometry</b>		
Clad Diameter (μm)	125 ± 2	125 ± 2
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5
Coating Diameter (μm)	245 ± 10	245 ± 10
<b>Optical</b>		
NA (nominal)	0.12	0.12
Attenuation <sup>1</sup> @ 1310 nm (dB/km)	≤ 0.8	≤ 0.8
Attenuation <sup>1</sup> @ 1550 nm (dB/km)	≤ 0.8	≤ 0.8
Cutoff Wavelength (nm)	1250 ± 50	1250 ± 50
Mode Field Diameter <sup>2</sup> @ 1310 nm (μm)	9.2 ± 0.6	9.2 ± 0.6
Mode Field Diameter <sup>2</sup> @ 1550 nm (μm)	10.4 ± 0.8	10.4 ± 0.8
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-40 to +150	-40 to +150

<sup>1</sup> Measured on loose coil    <sup>2</sup> Petermann II Definition

Specialty optical Fiber



## Verrillon® VHS500 Series Harsh Environment Fibers

Verrillon VHS500 is a pure silica core single-mode design with entirely fluorinated cladding available with all Verrillon harsh environment coating combinations, including Polyimide, Silicone-PFA, Silicone-MTA, MTDA and Carbon, which can be applied in conjunction with any of these polymeric coatings. Typically, these fibers are used in downhole distributed sensing techniques for temperature, pressure, acoustics and seismic, as well as in data logging and imaging applications.

Our carbon-coated optical fibers provide exceptionally high levels of hermeticity compared to commercial fibers. We provide extensive data that demonstrates the performance of our fiber in simulated well conditions.

Consistent with our founding principles, we specialize in application-optimized fibers, providing our customers unmatched flexibility in their system design and performance.

### Features

- Optimized for 1550 nm Single Wavelength Operation
- Pure Silica Core chemistry for improved performance in hydrogen-rich environments
- Greater than 50x bend loss improvement at 1550 nm over standard SMF
- MFD compatible with standard SMF for ease of splicing and minimal splice loss
- Available with all Verrillon harsh environment coatings

### Applications

- Downhole in Oil and Gas Industry
- Cabling processes with tight bending requirements
- Harsh environment, hydrogen-rich applications
- Tight bend fiber installations

### Specifications

PART NO.	SMF-60-CP-125-1	SMF-60-P-125-1
Description	125/155 μm Carbon/Polyimide coated Single-mode fiber, 0.12 NA, 100 kpsi, 1550 nm Operating Wavelength	125/155 μm Polyimide coated Single-mode fiber, 0.12 NA, 100 kpsi, 1550 nm Operating Wavelength
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Hermetic Coating	Carbon	—
Coating	Polyimide	Polyimide
<b>Geometry</b>		
Clad Diameter (μm)	125 ± 2	125 ± 2
Clad Non-Circularity (%)	≤ 3	≤ 3
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5
Coating Diameter (μm)	155 ± 5	155 ± 5
Polyimide Coating Concentricity <sup>1</sup> (%)	≥ 80	≥ 80
<b>Optical</b>		
NA (nominal)	0.12	0.12
Attenuation <sup>2</sup> @ 1550 nm (dB/km)	≤ 0.8	≤ 0.8
Cutoff Wavelength (nm)	≤ 1530	≤ 1530
Mode Field Diameter <sup>3</sup> @ 1550 nm (dB/km)	10.0 ± 0.7	10.0 ± 0.7
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

<sup>1</sup> (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on loose coil

<sup>3</sup> Petermann II Definition

# Verrillon®

## VHS500 Series Harsh Environment Fibers

### Specifications

PART NO.	SMF-60-CSPFA-125-3	SMF-60-CSPFA-125-7
Description	125/700 μm Carbon/Silicone/PFA coated Single-mode fiber, 0.12 NA, 100 kpsi, 1550 nm Operating Wavelength	125/250 μm Carbon/Silicone/PFA coated Single-mode fiber, 0.12 NA, 150 kpsi, 1550 nm Operating Wavelength
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Hermetic Coating	Carbon	Carbon
Primary Coating	Silicone	Silicone
Secondary Coating	PFA	PFA
<b>Geometry</b>		
Clad Diameter (μm)	125 ± 2	125 ± 2
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5
Combined Coating Diameter (μm)	700 ± 50	250 ± 50
<b>Optical</b>		
NA (nominal)	0.12	0.12
Attenuation @ 1550 nm (dB/km)	≤ 0.8	≤ 0.8
Cutoff Wavelength (nm)	≤ 1530	≤ 1530
Mode Field Diameter <sup>1</sup> @ 1550 nm (dB/km)	10.0 ± 0.7	10.0 ± 0.7
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 150
Operating Temperature (°C)	-40 to +200	-40 to +200

<sup>1</sup> Petermann II Definition

### Specifications

PART NO.	SMF-60-CMTDA-125-1
Description	125/245 μm Carbon Mid-Temp Dual Acrylate, Pure Silica Core, Single-mode fiber, 0.12 NA, 100 kpsi, 1550 nm Operating Wavelength
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Hermetic Coating	Carbon
Coating	Mid-Temp Dual Acrylate
<b>Geometry</b>	
Clad Diameter (μm)	125 ± 2
Core/Clad Offset (μm)	≤ 1.5
Coating Diameter (μm)	245 ± 15
<b>Optical</b>	
NA (nominal)	0.12
Attenuation @ 1550 nm (dB/km)	≤ 0.8
Cutoff Wavelength (nm)	≤ 1530
Mode Field Diameter <sup>1</sup> @ 1550 nm (dB/km)	10.0 ± 0.7
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +150

<sup>1</sup> Petermann II Definition





## Verrillon® VHM2000 Series Harsh Environment Fibers

Verrillon VHM2000 Series fibers are designed for mid-temperature range applications. In addition to the glass performance, VHM2000 coated with our hermetic carbon show an exceptional performance in hydrogen-containing applications. VHM2000 is available with a variety of coatings and coating combinations, including Polyimide, Silicone-MTDA and Carbon. Typically, these fibers are used in down-hole temperature and acoustic monitoring, data logging, distributed sensing and imaging applications.

### Features

- 50/125 graded-index multimode fiber for use in harsh environments
- Available with a wide range of protective coatings, depending on application requirements
- Suitable for use in mid temperature range applications, VHM2000 with carbon coating provides exceptional resistance to H<sub>2</sub> and moisture ingress
- High bandwidth (>300 MHz\*km) allow DTS measurements with extremely short spatial resolution

### Specifications

PART NO.	MMF-50-3-CP-125-3	MMF-50-3-P-125-3
Description	50/125/155 μm Carbon/Polyimide coated, Graded Index, Multimode Fiber	50/125/155 μm Polyimide coated, Graded Index, Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Hermetic Coating	Carbon	—
Coating	Polyimide	Polyimide
<b>Geometry</b>		
Core Diameter (μm)	50 ± 2.5	50 ± 2.5
Clad Diameter (μm)	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5
Coating Diameter (μm)	155 ± 5	155 ± 5
Polyimide Coating Concentricity <sup>1</sup>	≥ 80	≥ 80
<b>Optical</b>		
NA (nominal)	0.20	0.20
Attenuation <sup>2</sup> @ 850 nm (dB/km)	≤ 3.0	≤ 3.0
Attenuation <sup>2</sup> @ 1300 nm (dB/km)	≤ 1.2	≤ 1.2
Bandwidth @ 850 nm (MHz-km)	≥ 300	≥ 300
Bandwidth @ 1300 nm (MHz-km)	≥ 300	≥ 300
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

<sup>1</sup> Measured as (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on loose coil

# Verrillon®

## VHM2000 Series Harsh Environment Fibers

### Specifications

PART NO.	MMF-50-3-MTDA-125-3	MMF-50-3-CSMTA-125-3	MMF-50-3-CMTDA-125-3	MMF-50-3-CMTDA-125-4
Description	50/125/245 µm Mid-Temp Dual Acrylate coated, Graded Index, Multimode Fiber	50/125/245 µm Carbon/Si/ Mid-Temp Dual Acrylate, Graded Index, Multimode Fiber	50/125/245 µm Carbon/ Mid-Temp Dual Acrylate coated, Graded Index, Multimode Fiber	50/125/245 µm Carbon/ Mid-Temp Dual Acrylate, Graded Index, Multimode Fiber, 200 kpsi
<b>PARAMETER</b>	<b>VALUE</b>			
<b>Material</b>				
Hermetic Coating	—	Carbon	Carbon	Carbon
Primary Coating	Mid-Temp Dual Acrylate	Silicone	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate
Secondary Coating	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate
<b>Geometry</b>				
Core Diameter (µm)	50 ± 2.5	50 ± 2.5	50 ± 2.5	50 ± 2.5
Clad Diameter (µm)	125 ± 2	125 ± 2	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1	≤ 1	≤ 1
Core/Clad Offset (µm)	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
Combined Coating Diameter (µm)	245 ± 5	245 ± 20	245 ± 5	245 ± 5
<b>Optical</b>				
NA (nominal)	0.20	0.20	0.20	0.20
Attenuation @ 850 nm (dB/km)	≤ 2.5	≤ 3.0	≤ 2.5	≤ 2.5
Attenuation@ 1300 nm (dB/km)	≤ 0.7	≤ 1.2	≤ 0.7	≤ 0.7
Bandwidth @ 850 nm (MHz-km)	≥ 300	≥ 300	≥ 300	≥ 300
Bandwidth@ 1300 nm (MHz-km)	≥ 300	≥ 300	≥ 300	≥ 300
<b>Mechanical</b>				
Proof Test (kpsi)	≥ 100	≥ 100	≥ 100	≥ 200
Operating Temperature (°C)	-40 to +150	-40 to +150	-40 to +150	-40 to +150

### Specifications

PART NO.	MMF-50-3-SPFA-125-1	MMF-50-3-SPFA-125-6	MMF-50-3-CSPFA-125-5
Description	50/125/700 µm Silicone/PFA coated, Graded Index, Multimode Fiber	50/125/250 µm Silicone/PFA coated, Graded Index, Multimode Fiber	50/125/400 µm Carbon/Silicone/PFA coated, Graded Index Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>		
<b>Material</b>			
Hermetic Coating	—	—	Carbon
Primary Coating	Silicone	Silicone	Silicone
Secondary Coating	PFA	PFA	PFA
<b>Geometry</b>			
Core Diameter (µm)	50 ± 2.5	50 ± 3	50 ± 2.5
Clad Diameter (µm)	125 ± 2	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1	≤ 1
Core/Clad Offset (µm)	≤ 1.5	≤ 1.5	≤ 1.5
Combined Coating Diameter (µm)	700 ± 50	250 ± 50	400 ± 50
<b>Optical</b>			
NA (nominal)	0.20	0.20	0.20
Attenuation <sup>1</sup> @ 850 nm (dB/km)	≤ 3.0	≤ 3.0	≤ 3.0
Attenuation <sup>1</sup> @ 1300 nm (dB/km)	≤ 1.2	≤ 0.8	≤ 1.2
Bandwidth @ 850 nm (MHz-km)	≥ 300	≥ 300	≥ 300
Bandwidth@ 1300 nm (MHz-km)	≥ 300	≥ 300	≥ 300
<b>Mechanical</b>			
Proof Test (kpsi)	≥ 100	≥ 100	≥ 100
Operating Temperature (°C)	-40 to +200	-40 to +200	-40 to +200

<sup>1</sup> Measured on loose coil

Specialty optical fiber



## Verrillon® VHM7000 Series Fibers

AFL's Verrillon VHM7000 Series graded-index, bend-insensitive multimode fiber is suitable for mid-range temperatures where the carbon coating is a true barrier against hydrogen diffusion that causes undesirable optical absorption in the operating spectral region of most optical sensors. It has the added benefit of low bend loss for use in tight bend applications.

With their optimized optical design, VHM7000 fibers are engineered to operate under extremely small bend radii down to 7.5 mm. The low bend loss provided by VHM7000 Series fiber makes it the fiber to use in tight bend applications.

VHM7000 is available with polyimide, silicone-PFA, silicone-MTA, MTDA and carbon coatings which allow it to withstand high temperatures and hydrogen-containing atmospheres. Carbon coating can be applied to provide hermeticity against water and hydrogen in downhole applications and for fatigue resistance in long-term deployments.

VHM7000 is available at proof-test levels of 100 kpsi and 200 kpsi.

### Features

- 50/125 µm graded-index multimode fiber
- Suitable for use in low/mid-temperature, low hydrogen environments
- Highly bend-insensitive for tight bend applications
- Carbon coating provides exceptional resistance to H<sub>2</sub> and moisture ingress
- Wide range of protective coatings available, depending on application requirements

### Specifications

PART NO.	MMF-50-7-CMTDA-125-2	MMF-50-7-CMTDA-125-7
Description	50/125/245 µm Carbon/Mid-Temp Dual Acrylate Bend Insensitive, Multimode Fiber, 200 kpsi	50/125/245 µm Carbon/Mid-Temp Dual Acrylate Bend Insensitive, Multimode Fiber, 100 kpsi
PARAMETER	VALUE	VALUE
<b>Material</b>		
Hermetic Coating	Carbon	Carbon
Coating	Mid-Temp Dual Acrylate	Mid-Temp Dual Acrylate
<b>Geometry</b>		
Core Diameter (µm)	50 ± 2.5	50 ± 2.5
Clad Diameter (µm)	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1
Core/Clad Offset (µm)	≤ 1.5	≤ 1.5
Coating Diameter (µm)	245 ± 10	245 ± 10
<b>Optical</b>		
NA (nominal)	0.20	0.20
Attenuation <sup>1</sup> @ 850 nm (dB/km), @ 1300 nm (dB/km)	≤ 2.5, ≤ 0.7	≤ 2.5, ≤ 0.7
Bandwidth @ 850 nm (MHz-km), @ 1300 nm (MHz-km)	≥ 500, ≥ 500	≥ 500, ≥ 500
Bend Loss <sup>2</sup> @ 850 nm (dB), @ 1300 nm (dB)	≤ 0.2, ≤ 0.5	≤ 0.2, ≤ 0.5

continued  
→

# Verrillon® VHM7000 Series Fibers

## Specifications (cont.)

PART NO.	MMF-50-7-CMTDA-125-2	MMF-50-7-CMTDA-125-7
Description	50/125/245 μm Carbon/Mid-Temp Dual Acrylate Bend Insensitive, Multimode Fiber, 200 kpsi	50/125/245 μm Carbon/Mid-Temp Dual Acrylate Bend Insensitive, Multimode Fiber, 100 kpsi
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 200	≥ 100
Operating Temperature (°C)	-40 to +150	-40 to +150

<sup>1</sup> Measured on loose coil

<sup>2</sup> Two turns on 7.5 mm radius mandrel

## Specifications

PART NO.	MMF-50-7-P-125-7	MMF-50-7-CP-125-7
Description	50/125/155 μm Polyimide coated Bend Insensitive, Multimode Fiber	50/125/155 μm Carbon/Polyimide coated Bend Insensitive, Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Hermetic Coating	—	Carbon
Coating	Polyimide	Polyimide
<b>Geometry</b>		
Core Diameter (μm)	50 ± 2.5	50 ± 2.5
Clad Diameter (μm)	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5
Coating Diameter (μm)	155 ± 5	155 ± 5
Polyimide Coating Concentricity <sup>1</sup> (%)	≥ 80	≥ 80
<b>Optical</b>		
NA (nominal)	0.20	0.20
Attenuation <sup>2</sup> @ 850 nm (dB/km), @ 1300 nm (dB/km)	≤ 3.0, ≤ 1.2	≤ 3.0, ≤ 1.2
Bandwidth @ 850 nm (MHz-km), @ 1300 nm (MHz-km)	≥ 500, ≥ 500	≥ 500, ≥ 500
Bend Loss <sup>3</sup> @ 850 nm (dB), @ 1300 nm (dB)	≤ 0.2, ≤ 0.5	≤ 0.2, ≤ 0.5
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

<sup>1</sup> Measured as (Min Wall/Max Wall) x 100

<sup>2</sup> Measured on loose coil

<sup>3</sup> Two turns on 7.5 mm radius mandrel



# Verrillon®

## VHM7000 Series Fibers

### Specifications

<b>PART NO.</b>	<b>MMF-50-7-MTDA-125-7</b>
Description	50/125/245 μm Mid-Temp Dual Acrylate coated Bend Insensitive, Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Coating	Mid-Temp Dual Acrylate
<b>Geometry</b>	
Core Diameter (μm)	50 ± 2.5
Clad Diameter (μm)	125 ± 2
Core Non-Circularity (%)	≤ 5
Clad Non-Circularity (%)	≤ 1
Core/Clad Offset (μm)	≤ 1.5
Coating Diameter (μm)	245 ± 10
<b>Optical</b>	
NA (nominal)	0.20
Attenuation <sup>1</sup> @ 850 nm (dB/km), @ 1300 nm (dB/km)	≤ 2.5, ≤ 0.7
Bandwidth @ 850 nm (MHz-km), @ 1300 nm (MHz-km)	≥ 500, ≥ 500
Bend Loss <sup>2</sup> @ @ 850 nm (dB), @ 1300 nm (dB)	≤ 0.2, ≤ 0.5
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +150

<sup>1</sup> Measured on loose coil

<sup>2</sup> Two turns on 7.5 mm radius mandrel



## Verrillon® VHM5000 Series Ultimate Performance Fibers

Verrillon® Harsh Environment Fibers from AFL are available in a wealth of designs. The VHM5000 product is a multimode graded-index optical fiber with optimized glass chemistry for high resistance to hydrogen darkening. VHM5000 Series is available with coatings and coating combinations, including Polyimide, high temperature acrylates, Silicone-PFA and hermetic Carbon. Typically, these fibers are used in down-hole data logging, distributed sensing and imaging applications where the temperature and hydrogen partial pressures are extreme.

Verrillon coated fibers provide exceptionally high levels of hermeticity compared to commercial fibers. We provide extensive data that demonstrates the performance of our fiber. In addition, we provide one-stop shopping for customers requiring multi-count cabled hermetic fibers, if required, in metal jacketing tubes.

Consistent with our founding principles, we specialize in application-optimized fibers, providing our customers unmatched flexibility in their system design and performance.

### Features

- Best glass resistance to hydrogen at high temperatures and pressures in the entire industry
- Wide range of protective coatings available, depending on application requirements
- Suitable for use in high pressure, high temperature and corrosive environments
- Carbon coating provides exceptional resistance to H<sub>2</sub> and moisture ingress
- Predicted lifetime for hermetic fiber under typical operating conditions exceeds most requirements
- Extensive test and measurement data for optical fiber performance under "harsh conditions" provided with fiber

### Specifications

<b>PART NO.</b>	<b>MMF-50-4-P-125-4</b>
Description	50/125/155 μm Polyimide coated, Graded Index, Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Coating	Polyimide
<b>Geometry</b>	
Core Diameter (μm)	50 ± 2.5
Clad Diameter (μm)	125 ± 2
Core Non-Circularity (%)	≤ 5
Clad Non-Circularity (%)	≤ 1
Core/Clad Offset (μm)	≤ 1.5
Coating Diameter (μm)	155 ± 5
Polyimide Coating Concentricity <sup>1</sup>	≥ 80
<b>Optical</b>	
NA (nominal)	0.20
Attenuation <sup>2</sup> @ 850 nm (dB/km)	≤ 3.0
Attenuation <sup>2</sup> @ 1300 nm (dB/km)	≤ 1.2
Bandwidth @ 850 nm (MHz-km)	≥ 300
Bandwidth @ 1300 nm (MHz-km)	≥ 300
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-65 to +300

<sup>1</sup> Measured as (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on loose coil

# Verrillon® VHM5000 Series Fibers

## Specifications

PART NO.	MMF-50-4-CP-125-2	MMF-50-4-CP-125-3	MMF-50-4-CP-125-4
Description	50/125/155 μm Carbon/Polyimide coated, Graded Index Multimode Fiber, 200 kpsi	50/125/155 μm Carbon/Polyimide Graded Index, Multimode Fiber, 150 kpsi	50/125/155 μm Carbon/Polyimide coated, Graded Index Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>		
<b>Material</b>			
Hermetic	Carbon	Carbon	Carbon
Coating	Polyimide	Polyimide	Polyimide
<b>Geometry</b>			
Core Diameter (μm)	50 ± 2.5	50 ± 2.5	50 ± 2.5
Clad Diameter (μm)	125 ± 2	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1	≤ 1
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5	≤ 1.5
Coating Diameter (μm)	155 ± 5	155 ± 5	155 ± 5
Polyimide Coating Concentricity <sup>1</sup>	≥ 80	≥ 80	≥ 80
<b>Optical</b>			
NA (nominal)	0.20	0.20	0.20
Attenuation <sup>2</sup> @ 850 nm (dB/km)	≤ 3.0	≤ 3.0	≤ 3.0
Attenuation <sup>2</sup> @ 1300 nm (dB/km)	≤ 1.2	≤ 1.2	≤ 1.2
Bandwidth @ 850 nm (MHz-km)	≥ 300	≥ 300	≥ 300
Bandwidth @ 1300 nm (MHz-km)	≥ 300	≥ 300	≥ 300
<b>Mechanical</b>			
Proof Test (kpsi)	≥ 200	≥ 150	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300	-65 to +300

<sup>1</sup> Measured as (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on loose coil

## Specifications

PART NO.	MMF-50-4-CSPFA-125-1	MMF-50-4-CSPFA-125-5	MMF-50-4-CSPFA-125-6	MMF-50-4-CSPFA-125-7
Description	50/125/750 μm Carbon/Silicone/PFA, Graded Index, Multimode Fiber, 150 kpsi	50/125/400 μm Carbon/ Silicone/PFA coated, Graded Index, Multimode Fiber	50/125/250 μm Carbon/ Silicone/PFA coated, Graded Index, Multimode Fiber	50/125/250 μm Carbon/ Silicone/PFA coated, Graded Index, Multimode Fiber, 150 kpsi
<b>PARAMETER</b>	<b>VALUE</b>			
<b>Material</b>				
Hermetic	Carbon	Carbon	Carbon	Carbon
Primary Coating	Silicone	Silicone	Silicone	Silicone
Secondary Coating	PFA	PFA	PFA	PFA
<b>Geometry</b>				
Core Diameter (μm)	50 ± 2.5	50 ± 2.5	50 ± 2.5	50 ± 2.5
Clad Diameter (μm)	125 ± 2	125 ± 2	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1	≤ 1	≤ 1
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
Combined Coating Diameter (μm)	750 ± 25	400 ± 50	250 ± 50	250 ± 50
<b>Optical</b>				
NA (nominal)	0.20	0.20	0.20	0.20
Attenuation <sup>1</sup> @ 850 nm (dB/km)	≤ 3.0	≤ 3.0	≤ 3.0	≤ 3.0
Attenuation <sup>1</sup> @ 1300 nm (dB/km)	≤ 1.0	≤ 1.2	≤ 1.2	≤ 1.2
Bandwidth @ 850 nm (MHz-km)	≥ 300	≥ 300	≥ 300	≥ 300
Bandwidth @ 1300 nm (MHz-km)	≥ 300	≥ 300	≥ 300	≥ 300
<b>Mechanical</b>				
Proof Test (kpsi)	≥ 150	≥ 100	≥ 100	≥ 150
Operating Temperature (°C)	-40 to +200	-40 to +200	-40 to +200	-40 to +200

<sup>1</sup> Measured on loose coil



## Verrillon® VHM4000 Series Harsh Environment Fibers

Verrillon® VHM4000 product is a multimode step-index with a pure silica core for high resistance to hydrogen darkening. This product is available in both 50/125 and 62.5/125 versions. This design is available in a variety of coatings including Polyimide, high temperature acrylates, Silicone-PFA and hermetic Carbon. Typically, these fibers are used in down-hole distributed sensing and imaging applications where the temperature and hydrogen partial pressures are extreme. Due to its step index design, the VHM4000 product is suitable for short distance applications where the spatial resolution requirements are not extreme.

### Features

- Step-index multimode fiber with pure silica core
- Suitable for applications in hydrogen-rich environments
- Wide range of protective coatings available, depending on application requirements
- Excellent for deployment in shallow wells where extremely short spatial resolution is not required

### Specifications

PART NO.	MMF-50-5-P-125-5	MMF-62.5-5-P-125-5
Description	50/125/155 µm Polyimide coated, Step Index, Multimode Fiber	62.5/125/155 µm Polyimide coated, Step Index, Multimode Fiber
PARAMETER	VALUE	
<b>Material</b>		
Coating	Polyimide	Polyimide
<b>Geometry</b>		
Core Diameter (µm)	50 ± 3.0	62.5 ± 3.0
Clad Diameter (µm)	125 ± 2	125 ± 2
Core Non-Circularity (%)	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1
Core/Clad Offset (µm)	≤ 1.5	≤ 1.5
Coating Diameter (µm)	155 ± 5	155 ± 5
Polyimide Coating Concentricity <sup>1</sup>	≥ 80	≥ 80
<b>Optical</b>		
NA (nominal)	0.20	0.22
Attenuation <sup>2</sup> @ 850 nm (dB/km)	≤ 3.0	≤ 3.0
Attenuation <sup>2</sup> @ 1060 nm (dB/km)	≤ 1.3	≤ 1.3
Attenuation <sup>2</sup> @ 1300 nm (dB/km)	≤ 1.0	≤ 1.0
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

<sup>1</sup> Measured as (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on loose coil



# Verrillon®

## VHM4000 Series Harsh Environment Fibers

### Specifications

<b>PART NO.</b>	<b>MMF-50-5-CP-125-5</b>
Description	50/125/155 µm Carbon/Polyimide coated, Step Index, Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Hermetic	Carbon
Coating	Polyimide
<b>Geometry</b>	
Core Diameter (µm)	50 ± 3.0
Clad Diameter (µm)	125 ± 2
Core Non-Circularity (%)	≤ 5
Clad Non-Circularity (%)	≤ 1
Core/Clad Offset (µm)	≤ 1.5
Coating Diameter (µm)	155 ± 5
Polyimide Coating Concentricity <sup>1</sup> (%)	≥ 80
<b>Optical</b>	
NA (nominal)	0.20
Attenuation <sup>2</sup> @ 850 nm (dB/km)	≤ 3.0
Attenuation <sup>2</sup> @ 1060 nm (dB/km)	≤ 1.3
Attenuation <sup>2</sup> @ 1300 nm (dB/km)	≤ 1.0
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-65 to +300

<sup>1</sup> Measured as (Min. Wall/Max. Wall) x 100

<sup>2</sup> Measured on loose coil

### Specifications

<b>PART NO.</b>	<b>MMF-50-5-CMTDA-125-5</b>
Description	50/125/245 µm Carbon/Mid-Temp Dual Acrylate, Step Index, Multimode Fiber
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Hermetic Coating	Carbon
Primary Coating	Mid-Temp Dual Acrylate
Secondary Coating	Mid-Temp Dual Acrylate
<b>Geometry</b>	
Core Diameter (µm)	50 ± 2.5
Clad Diameter (µm)	125 ± 2
Core Non-Circularity (%)	≤ 5
Clad Non-Circularity (%)	≤ 1
Core/Clad Offset (µm)	≤ 1.5
Coating Diameter (µm)	245 ± 5
<b>Optical</b>	
NA (nominal)	0.20
Attenuation <sup>1</sup> @ 850 nm (dB/km)	≤ 3.0
Attenuation <sup>1</sup> @ 1300 nm (dB/km)	≤ 1.0
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +150

<sup>1</sup> Measured on loose coil

# Verrillon®

## VHM4000 Series Harsh Environment Fibers

### Specifications

PART NO.	MMF-105-1-P-125-150-2	MMF-110-1-P-121-140-1
Description	105/125/150 μm Polyimide coated, Low OH, Step Index, Multimode Fiber, 0.15 NA	110/121/140 μm Polyimide coated, Low OH, Step Index, Multimode Fiber, 0.22 NA
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Coating	Polyimide	Polyimide
<b>Geometry</b>		
Core Diameter (μm)	105 ± 5	110 ± 7
Clad Diameter (μm)	125 ± 3	121 ± 5
Core/Clad Offset (μm)	≤ 3.0	≤ 3.0
Coating Diameter (μm)	150 ± 5	140 ± 5
<b>Optical</b>		
NA (nominal)	0.15	0.22
Attenuation <sup>1</sup> @ 808 nm (dB/km)	≤ 15	≤ 15
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

<sup>1</sup> Measured on loose coil

### Specifications

PART NO.	MMF-105-5-CA-125-250-22	MMF-105-5-CA-125-250-15
Description	105/125/250 μm Carbon/Acrylate coated, Low OH, Silica Core, Step Index, Multimode Fiber, 0.22 NA	105/125/250 μm Carbon/Acrylate coated, Low OH, Silica Core, Step Index, Multimode Fiber, 0.15 NA
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Hermetic Coating	Carbon	Carbon
Coating	Dual UV Acrylate	Dual UV Acrylate
<b>Geometry</b>		
Core Diameter (μm)	105 ± 5	105 ± 5
Clad Diameter (μm)	125 ± 3	125 ± 3
Core/Clad Offset (μm)	≤ 3.0	≤ 3.0
Coating Diameter (μm)	250 ± 10	250 ± 10
<b>Optical</b>		
NA (nominal)	0.22	0.15
Attenuation <sup>1</sup> @ 808 nm (dB/km)	≤ 20	≤ 20
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-40 to +85	-40 to +85

<sup>1</sup> Measured on loose coil

# Verrillon®

## VHM4000 Series Harsh Environment Fibers

### Specifications

<b>PART NO.</b>	<b>MMF-200-1-A-240-400-1</b>
Description	200/240/400 Acrylate coated, Low OH, Silica Core, Step Index Multimode Fiber, 0.22 NA, 100 kpsi Proof Test
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Hermetic Coating	UV Acrylate
Coating	UV Acrylate
<b>Geometry</b>	
Core Diameter (µm)	200 ± 8
Clad Diameter (µm)	240 ± 6
Core/Clad Offset (µm)	≤ 3.0
Combined Coating Diameter (µm)	400 ± 25
<b>Optical</b>	
NA (nominal)	0.22
Attenuation @ 850 nm (dB/km)	≤ 10
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +85



# Verrillon®

## VHT500 Ultra-High Temperature Single-mode Series

Verrillon VHT500 is a pure silica core single-mode design with a protective metal coating that allows it to operate at temperatures up to 500°C. Typically, these fibers are used in down-hole data logging for enhanced supercritical geothermal applications, high-temperature oil/gas downhole monitoring using acoustic, strain and temperature sensing, and downstream oil process monitoring.

### Features

- Metal coating protects the fiber at temperatures up to 500°C
- Optimized for 1550 nm operation
- Pure Silica Core chemistry for improved performance in hydrogen-rich environments
- Greater than 50x bend loss improvement at 1550 nm over standard SMF
- MFD compatible with standard SMF for ease of splicing and minimal splice loss
- Patent-pending process prevents fibers from “cold bonding” to metal tubes or other metallic-coated fibers
- Available in long lengths (multi-kilometers)
- Industry-standard 125 µm clad diameter

### Specifications

<b>PART NO.</b>	<b>VHS-60-CM-125-1</b>
Description	Ultra-High temperature metal-coated Single-Mode fiber with low-loss suitable for use up to 500°C. Available in multi-kilometer continuous lengths and proof-tested at 50 kpsi.
<b>PARAMETER</b>	
<b>Material</b>	
Core	Pure Silica
Cladding	F-doped Silica
Coating	Carbon / Metal
<b>Geometry</b>	
Core Diameter (µm)	-
Clad Diameter (µm)	125 ± 2
Clad Non-Circularity (%)	≤ 3
Core/Clad Offset (µm)	≤1.5
Coat Diameter (µm)	131 +5 / -2
<b>Optical</b>	
NA (nominal)	0.12
Attenuation @ 1550nm (dB/km)	≤ 5
Cutoff Wavelength (nm)	≤ 1530
Mode Field Diameter (µm)	10.0 ± 0.7
<b>Mechanical</b>	
Proof test (kpsi)	≥ 50
Operating Temperature (°C)	-65 to +500
Continuous Length Available	Multi-kilometers



# Verrillon®

## VHT5000 Ultra-High Temperature Multimode Series

Verrillon Harsh Environment Fibers from AFL are available in a wealth of designs. The VHT5000 product is a multimode graded-index optical fiber with optimized glass chemistry for high resistance to hydrogen darkening, coupled with a gold-based metal coating that allows the fiber to perform well at temperatures up to 500°C. Typically, these fibers are used in down-hole data logging for enhanced supercritical geothermal applications, high-temperature oil/gas downhole sensing and in downstream oil processing.

### Features

- Metal coating protects the fiber at temperatures up to 500°C
- Best glass resistance to hydrogen at high temperatures and pressures available in the entire industry
- High bandwidth 50/125 graded-index multimode design for extremely short spatial resolution in sensing applications
- Patent-pending process prevents fibers from “cold bonding” to metal tubes or other metallic-coated fibers
- Suitable for use in high pressure, high temperature and corrosive environments
- Available in long lengths (multi-kilometers)
- Industry-standard 125 µm cladding diameter
- Extensive test and measurement data for optical fiber performance under “harsh conditions” provided with fiber

### Specifications

<b>PART NO.</b>	<b>VHM-50-4-CM-125-4</b>
Description	Ultra-High temperature metal-coated Graded-Index Multimode fiber with low-loss, suitable for use up to 500°C. Available in multi-kilometer continuous lengths and proof-tested at 50 kpsi.
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Core	Silica-based
Cladding	F-doped Silica
Coating	Carbon / Metal
<b>Geometry</b>	
Core Diameter (µm)	50 ± 2.5
Clad Diameter (µm)	125 ± 2
Core Non-Circularity (%)	≤ 5
Clad Non-Circularity (%)	≤ 1
Core/Clad Offset (µm)	≤ 1.5
Coat Diameter (µm)	131 +5 / -2
<b>Optical</b>	
NA (nominal)	0.2
Attenuation @ 850 nm (dB/km)	≤ 5
Attenuation @ 1300 nm (dB/km)	≤ 5
Bandwidth @ 850 nm (MHz*km)	≥ 300
Bandwidth @ 1300 nm (MHz*km)	≥ 300
<b>Mechanical</b>	
Proof test (kpsi)	≥ 50
Operating Temperature (°C)	-65 to +500
Continuous Length Available	Multi-kilometers



## Verrillon® Medical Sensing Fibers

Verrillon® Medical Sensing Series is a family of multimode and single-mode optical fibers designed for advanced devices used in a variety of atraumatic medical procedures such as diagnostic, visualization and tissue ablation applications. These fibers are offered with polyimide coating, as well as other coatings for use in a broader range of temperatures. Additionally, Verrillon Medical Sensing Fibers are available in 80 μm and 125 μm cladding diameters with numerical apertures (NA) from 0.10 to 0.30, as well as custom index profiles.

### Features

- Available in reduced diameter for Small Form Factor medical devices used in minimally-invasive interventions
- High numerical apertures provide extremely low bend-loss for tight bend requirements in small footprint, compact packaging
- Multimode and Single-Mode designs available
- Custom index profiles and cladding diameters available

### Specifications

PART NO.	MEDICAL SENSING OPTICAL FIBERS			
	MMF-62.51P801001	MMF-50-3-P-125-1	SMF-37-P-125-3	F-124-A-245
Description	62.5/80/100, 0.29 NA, Graded-Index, Polyimide-coated, reduced cladding diameter for small form factor devices	50/125/155, 0.20 NA, Graded-Index, Polyimide-coated Multimode Fiber	9/125/155 Highly Bend-Insensitive Singlemode Fiber, 0.21 NA, Polyimide-coated	125 OD Pure Silica Coreless Dual-Acrylate coated
<b>PARAMETER</b>				
<b>Material</b>				
Core	Ge-doped Silica	Ge-doped Silica	Ge-doped Silica	Pure Silica
Cladding	Pure Silica	Pure Silica	Pure Silica	N/A
Coating	Polyimide	Polyimide	Polyimide	Dual-Acrylate
<b>Geometry</b>				
Core Diameter (μm)	62.5 ± 3	50 ± 3	-	124 ± 1
Clad Diameter (μm)	79 ± 1	125 ± 2	125 ± 2	245 ± 5
Core Non-Circularity (%)	≤ 5	≤ 5	-	-
Clad Non-Circularity (%)	≤ 1	≤ 1	≤ 2	-
Core/Clad Offset (μm)	≤ 1.5	≤ 1.5	≤ 1.0	-
Coat Diameter (μm)	100 ± 7	155 ± 5	155 ± 5	-
Coating Concentricity * (%)	-	≥ 80	≥ 80	-
<b>Optical</b>				
NA (nominal)	0.29	0.2	0.21	-
Attenuation (dB/km) @ 850 nm	≤ 5.0	≤ 3	-	-
Attenuation (dB/km) @ 1310 nm	≤ 1.5	≤ 1.2	≤ 1.2	-
Attenuation (dB/km) @ 1550 nm	-	-	≤ 0.9	-
Bandwidth (MHz*km) @ 850 nm	≥ 100	-	-	-
Bandwidth (MHz*km) @ 1310 nm	≥ 200	-	-	-
Cutoff Wavelength (nm)	-	-	≤ 1290	-
Mode Field Diameter @ 1310 nm (μm)	-	-	5.1 ± 1.0	-
Mode Field Diameter @ 1550 nm (μm)	-	-	5.8 ± 1.0	-
Short-Term / Long-Term Bend Radius (mm)	-	-	≥ 10 / ≥ 17	-
<b>Mechanical</b>				
Proofstress (kpsi)	≥ 100	≥ 100	≥ 100	-
Operating Temperature (°C)	-65 to +300	-65 to +300	-65 to +300	-



## Verrillon® Near-Infrared (NIR) Medical Laser Delivery Fibers

Verrillon® NIR Medical Laser Delivery Fibers consist of a family of multimode low-OH pure-silica core fibers designed for laser power delivery in minimally-invasive surgical procedures. This family of fibers is suitable for lasers operating in the near-infrared spectral region from 500 to 2200nm, such as Nd:YAG and Ho:YAG.

### Features

- Step-Index multimode pure silica core designs
- Core diameters from 50  $\mu\text{m}$  to 2000  $\mu\text{m}$
- Biocompatible fibers are suitable for laser surgery
- Polyimide coating allows for use up to 300°C
- High radiation resistance

### Specifications

LARGE DIAMETER MEDICAL LASER DELIVERY OPTICAL FIBERS - POLYIMIDE - NIR SPECTRUM (LowOH)			
PART NO.	MMF50125P15520-1	MMF-100-P-110-140-22	MMF-200-1-P-220-245-1
Description	50/125/155 Pure Silica Core, Polyimide coated, Step-Index Multimode Fiber, 0.20 NA, 100 kpsi Proof Test	100/110/140 Low OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100 kpsi Proof Test	200/220/245 Low OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100 kpsi Proof Test
<b>PARAMETER</b>			
<b>Material</b>			
Core	Pure Silica	Low-OH Pure Silica	Low-OH Pure Silica
Cladding	F-doped Silica	F-doped Silica	F-doped Silica
Coating	Polyimide	Polyimide	Polyimide
<b>Geometry</b>			
Core Diameter (mm)	50 $\pm$ 3	100 $\pm$ 5	200 $\pm$ 8
Clad Diameter (mm)	125 $\pm$ 2	110 $\pm$ 5	220 $\pm$ 6
Core Non-Circularity (%)	$\leq$ 5	-	$\leq$ 5
Clad Non-Circularity (%)	$\leq$ 1	-	$\leq$ 1
Core/Clad Offset (mm)	$\leq$ 1.5	$\leq$ 3.0	-
Coat Diameter (mm)	155 $\pm$ 5	140 $\pm$ 5	245 $\pm$ 10
Coating Concentricity (%)	$\geq$ 80		$\geq$ 80
<b>Optical</b>			
NA (nominal)	0.2	0.22	0.22
Attenuation	See Low-OH full preform spectrum on next page		
<b>Mechanical</b>			
Proof test (kpsi)	$\geq$ 100	$\geq$ 100	$\geq$ 100
Operating Temperature (°C)	-65 to +300	-65 to +300	-65 to +300

Continued >

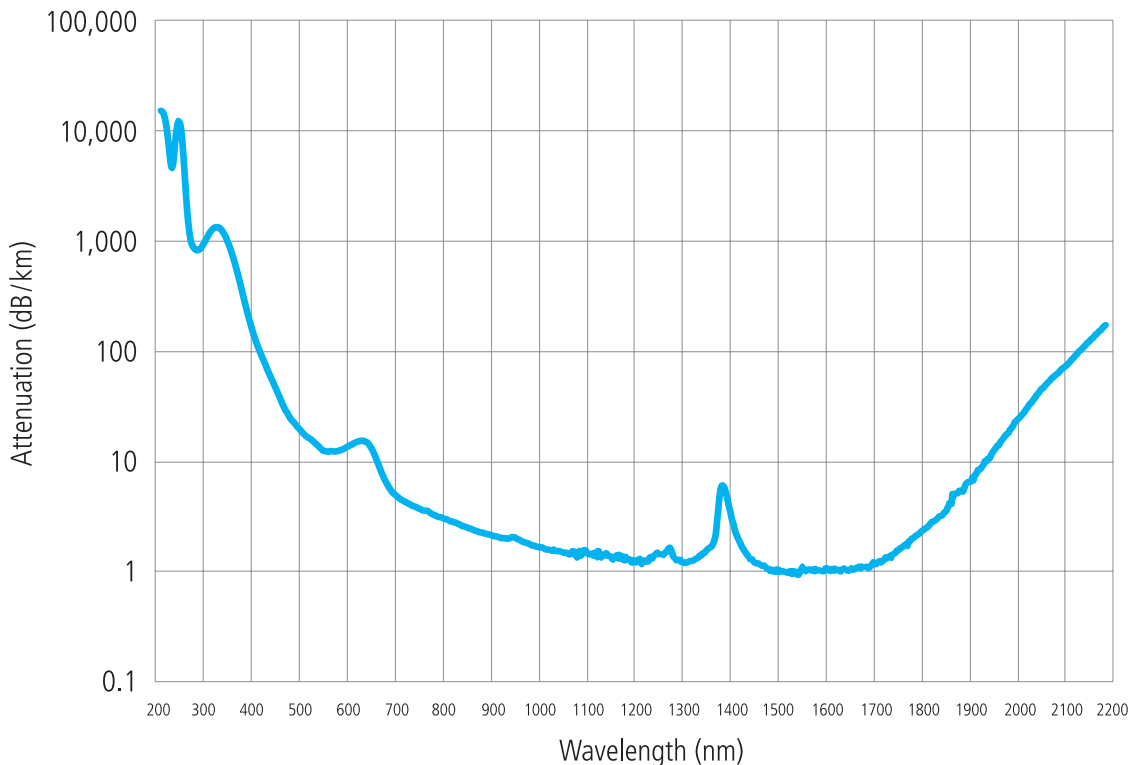


# Verrillon® Near-Infrared (NIR) Medical Laser Delivery Fibers

## Specifications

PART NO.	LARGE DIAMETER MEDICAL LASER DELIVERY OPTICAL FIBERS - POLYIMIDE - NIR SPECTRUM (LowOH)		
	M400440P470L22-1	M600660P690L22-1	M900990P1020L22-1
Description	400/440/470 Low OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100kpsi Proof Test	600/660/690 Low OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100kpsi Proof Test	900/990/1020 Low OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100kpsi Proof Test
<b>PARAMETER</b>			
<b>Material</b>			
Core	Low-OH Pure Silica	Low-OH Pure Silica	Low-OH Pure Silica
Cladding	F-doped Silica	F-doped Silica	F-doped Silica
Coating	Polyimide	Polyimide	Polyimide
<b>Geometry</b>			
Core Diameter (mm)	400 ± 10	600 ± 10	900 ± 10
Clad Diameter (mm)	440 ± 10	660 ± 10	990 ± 10
Core Non-Circularity (%)	-	-	-
Clad Non-Circularity (%)	-	-	-
Core/Clad Offset (mm)	≤ 3.0	≤ 3.0	≤ 3.0
Coat Diameter (mm)	470 ± 10	690 ± 10	1020 ± 10
Coating Concentricity (%)	-	-	-
<b>Optical</b>			
NA (nominal)	0.22	0.22	0.22
Attenuation	See Low-OH full preform spectrum below		
<b>Mechanical</b>			
Proof test (kpsi)	≥ 100	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300	-65 to +300

NIR Laser Delivery Fiber (Low-OH) Attenuation Curve



Specialty optical fiber



## Verrillon® UV-Visible (UV-Vis) Medical Laser Delivery Fibers

Verrillon® UV-Vis Medical Laser Delivery Fibers are designed with high-OH pure-silica core multimode waveguides for applications requiring the transmission of laser energy in the Ultra-Violet and Visible spectral regions. This family of fibers is suitable for coupling with typical medical lasers operating in the 300 to 1150 nm, such as KTP, Argon and Excimer lasers.

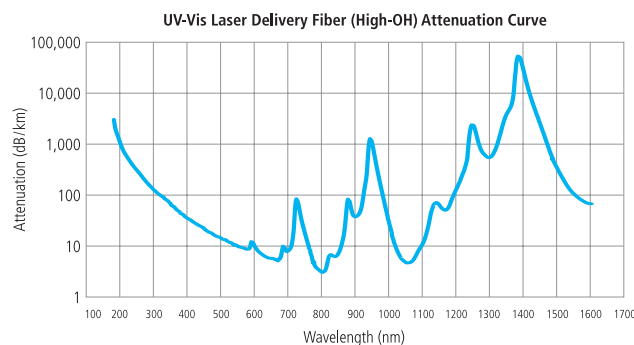
In addition to the typical UV lasers, Verrillon also offers a suite of Solarization-Resistant Fibers (SRF) with high transmission in the Deep UV (DUV) spectrum for applications requiring low optical absorption in the 190 to 300 nm. The optical attenuation chart below shows that Verrillon's SRF is completely immune to DUV radiation even at the ArF laser wavelength of 193 nm.

### Features

- Step-Index multimode high-OH pure silica core designs
- Core diameters from 50  $\mu\text{m}$  to 2000  $\mu\text{m}$  available
- Biocompatible coating make these fibers suitable for laser surgery and other medical procedures
- Available for typical UV-Visible lasers as well as DUV applications

### Specifications

LARGE DIAMETER MEDICAL LASER DELIVERY OPTICAL FIBERS - POLYIMIDE - UV-VIS MEDICAL (HOH)			
PART NO.	MMF-100-110-P-135-22	MMF-200-5-P-220-22	M400440P470H22-1
Description	100/110/135 High OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100 kpsi Proof Test	200/220/245 High OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100 kpsi Proof Test	400/440/470 High OH, Pure Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100 kpsi Proof Test
<b>PARAMETER</b>			
<b>Material</b>			
Core	High-OH Pure Silica	High-OH Pure Silica	High-OH Pure Silica
Cladding	F-doped Silica	F-doped Silica	F-doped Silica
Coating	Polyimide	Polyimide	Polyimide
<b>Geometry</b>			
Core Diameter ( $\mu\text{m}$ )	100 $\pm$ 4	200 $\pm$ 4	400 $\pm$ 10
Clad Diameter ( $\mu\text{m}$ )	110 $\pm$ 3	220 $\pm$ 5	440 $\pm$ 10
Core/Clad Offset ( $\mu\text{m}$ )	$\leq$ 3.0	$\leq$ 3.0	$\leq$ 3.0
Coat Diameter ( $\mu\text{m}$ )	135 $\pm$ 5	245 $\pm$ 5	470 $\pm$ 10
Coating Concentricity (%)	$\geq$ 80	$\geq$ 75	-
<b>Optical</b>			
NA (nominal)	0.22	0.22	0.22
Attenuation	See High-OH full preform spectrum below		
<b>Mechanical</b>			
Proofstest (kpsi)	$\geq$ 100	$\geq$ 100	$\geq$ 100
Operating Temperature ( $^{\circ}\text{C}$ )	-65 to +300	-65 to +300	-65 to +300

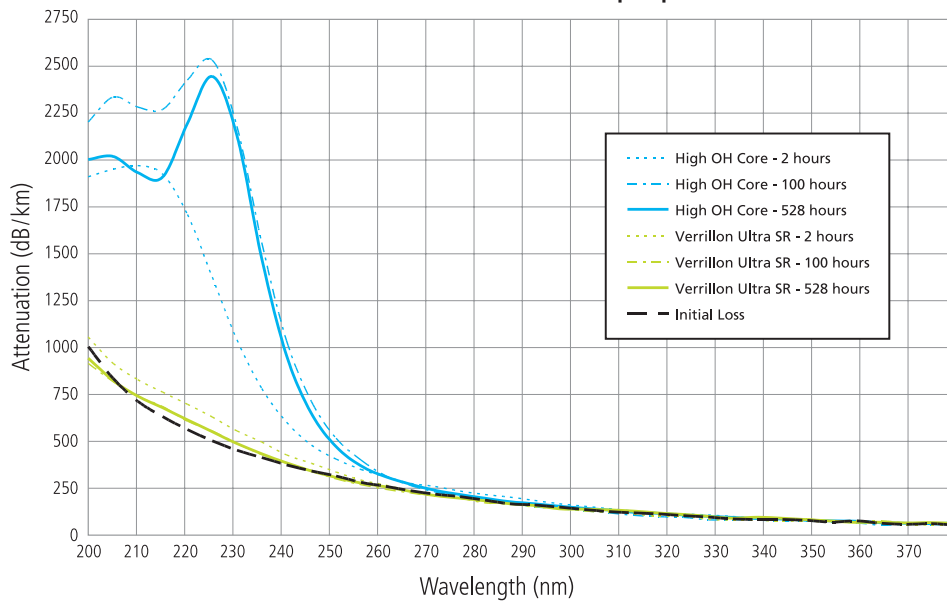


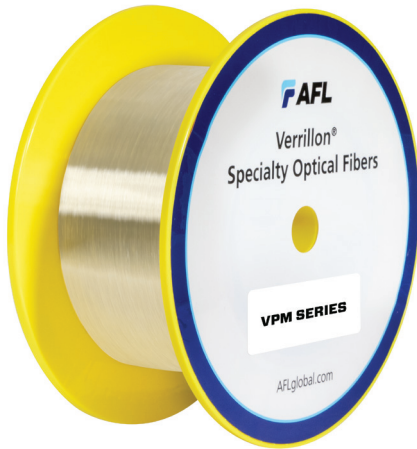
# Verrillon® UV-Visible (UV-Vis) Medical Laser Delivery Fibers

## Specifications

DEEP UV (DUV) LASER DELIVERY OPTICAL FIBERS		
<b>PART NO.</b>	<b>M100110CP140SR22-1</b>	<b>M400440CP465SR22-1</b>
Description	100/110 Ultra-High Solarization-Resistant Step-Index Multimode, Carbon-Polyimide coated fiber designed for Low-Loss Deep UV (DUV) applications.	400/440 Ultra-High Solarization-Resistant Step-Index Multimode, Carbon-Polyimide coated fiber designed for Low-Loss Deep UV (DUV) applications.
<b>PARAMETER</b>		
<b>Material</b>		
Core	Pure Silica	Pure Silica
Cladding	F-doped Silica	F-doped Silica
Coating	Carbon / Polyimide	Carbon / Polyimide
<b>Geometry</b>		
Core Diameter (µm)	100 ± 3	400 ± 8
Clad Diameter (µm)	110 ± 3	440 ± 9
Core/Clad Offset (µm)	≤ 3.0	≤ 3.0
Coat Diameter (µm)	140 ± 5	465 ± 7
Polyimide Coating Concentricity (%)	≥ 80%	≥ 80%
<b>Optical</b>		
NA (nominal)	0.22	0.22
Operating Wavelength (nm)	180nm - 850 nm	180nm - 850 nm
<b>Mechanical</b>		
Proof test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

**Verrillon Ultra Solarization-Resistant Fiber vs. Standard Solarization-Resistant Fiber  
Attenuation @ Different Deuterium Lamp Exposure Times**





## Verrillon® VPM400 Series Fibers

Verrillon® VPM400 Series is a family of Polarization-Maintaining (PM) Optical Fibers based on the Elliptical-Clad stress technology. These fibers exhibit extremely high birefringence resulting in beat lengths shorter than 2 mm at 1550 nm. VPM400 fibers show significantly lower attenuation at 1550 nm than other PM fiber designs. These fibers are available in various designs and operating wavelengths, as well cladding dimensions including 50, 80 and 125 microns.

### Features

- Optimized for 1550 nm Single Wavelength Operation
- Round core
- Elliptical Clad designs provide high birefringence allowing the fiber to have an extremely short beat-length, excellent for high-precision gyroscopes
- Radiation-Resistant “Rad-Hard”
- Available in 80 µm clad diameter

### Applications

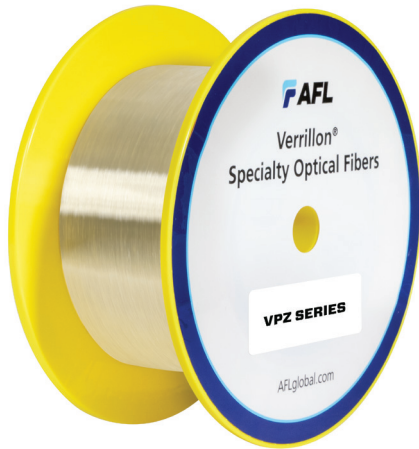
- Fiber optic gyroscopes
- Fiber lasers
- Current sensors

### Specifications

PART NO.	PMF-9-A-80-1	PMF-12-A-80-1
Description	80 µm Elliptical Clad Polarization maintaining Single-mode Fiber, 1550 nm Operational Wavelength	80 µm Elliptical Clad Polarization maintaining Single-mode Fiber, 1550 nm Operational Wavelength
<b>PARAMETER</b>	<b>VALUE</b>	
<b>Material</b>		
Coating	Dual UV Acrylate	Acrylate
Stress-inducing Design	Elliptical Clad	Elliptical Clad
<b>Geometry</b>		
Clad Diameter (µm)	80 ± 2	80 ± 2
Core/Clad Concentricity (µm)	≤ 1.0	≤ 1.0
Coating Diameter (µm)	165 ± 10	160 ± 10
<b>Optical</b>		
NA (nominal)	0.20	0.20
Attenuation (dB/km) @ 1550 nm	≤ 0.5	≤ 1.5
Mode Field Diameter <sup>1</sup> (µm) @ 1550 nm	7.0 ± 1.0	6.5 ± 0.5
Operational Wavelength (nm)	1550	1550
Cutoff Wavelength (nm)	≤ 1480	< 1520
Beat Length (mm) @ 1550 nm	≤ 2.00	≤ 2.2
Bend Loss <sup>2</sup> (dB/turn) @ 1550 nm	≤ 0.05	—
H-Parameter	—	≤ 5.0 x 10 <sup>-5</sup>
<b>Mechanical</b>		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-10 to +70	-60 to +80

<sup>1</sup> Gaussian Definition

<sup>2</sup> 12 mm diameter mandrel



## Verrillon® VPZ600 Series Fibers

Single-Polarization (PZ) fibers propagate one, and only one polarization state of the fundamental mode. As opposed to standard and polarization-maintaining single-mode fibers, PZ fibers do not suffer from polarization cross-talk, which makes them highly desirable for applications such as fiber optic gyroscopes, current sensors, coherent communications, polarizers and fiber lasers. AFL's unique patented PZ Fiber design offers very broad polarizing bandwidth (~200 nm), high extinction ratio (>30 dB), low attenuation and does not require bending to operate. Because of its circular core design, users can routinely splice, connect and integrate AFL's PZ fiber into their sensing and communications applications.

### Features

- 1550 nm polarizing wavelength, > 30 dB extinction ratio
- Round core
- Elliptical Clad design is unique among the few polarizing fibers available.
- Available in 125 μm clad diameter
- MFD compatible with standard SMF for minimal splice loss
- Replace expensive polarizing optics with a small coil of PZ fiber
- Other polarizing wavelengths available

### Applications

- Fiber optic gyroscopes
- In-line polarizers
- Fiber lasers
- Current sensors
- Super luminescent sources
- Fiber pigtailed

### Specifications

<b>PART NO.</b>	<b>PZF-1-A-125-2</b>
Description	125/245 Dual UV Acrylate coated, Single Polarization Single-mode Fiber, 1550 nm Operating Wavelength
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Coating	Dual UV Acrylate
Stress-inducing Design	Elliptical Clad
<b>Geometry</b>	
Clad Diameter (μm)	125 ± 2
Core/Clad Offset (μm)	≤ 1.5
Combined Coating Diameter (μm)	245 ± 15
<b>Optical</b>	
NA (nominal)	0.12
Attenuation @ 1550 nm (dB/m)	≤ 0.05
Mode Field Diameter <sup>1</sup> @ 1550 nm (μm)	10 ± 1.0
Polarization Extinction Ratio <sup>2</sup> (dB)	≥ 30
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100

<sup>1</sup> Petermann II Definition    <sup>2</sup> Measured on a 5 m loose coil



# Verrillon® VSS200 Series Single-mode Fiber

Verrillon VSS200 Series 125/155 μm Polyimide Fiber is a high numerical aperture (NA) single-mode fiber designed for a wide range of applications including sensing, illumination and communications. The high-temperature polyimide coating allows this fiber to be used in applications up to 300°C. Due to its 0.21 numerical aperture, this fiber exhibits exceptionally low bend-loss. The high germanium content also provides photosensitivity to UV light, useful in Fiber Bragg Grating (FBG) writing for sensing applications. In addition to polyimide, this fiber is also available in all Verrillon coatings and coating combinations for low and mid-temperature range.

### Features

- High Numerical Aperture
- Extremely low bend loss
- High temperature coating up to 300°C
- Available in low and mid-temperature coatings
- Suitable for FBG writing due its high photosensitivity

### Applications

- Communications Networks
- Optical fused devices
- Illumination
- Sensors
- Fiber pigtails

### Specifications

<b>PART NO.</b>	<b>SMF-37-P-125-3</b>
Description	125/155 μm Polyimide Single-mode Fiber, 0.21 NA, 100 kpsi
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Coating	Polyimide
<b>Geometry</b>	
Clad Diameter (μm)	125 ± 2
Clad Non-Circularity (%)	≤ 2.0
Core/Clad Offset (μm)	≤ 1.0
Coat Diameter (μm)	155 ± 5
Polyimide Coating Concentricity (%) <sup>1</sup>	≥ 80
<b>Optical</b>	
NA (nominal)	0.21
Attenuation @ 1310 nm (dB/km) <sup>2</sup>	≤ 1.2
Attenuation @ 1550 nm (dB/km) <sup>2</sup>	≤ 0.9
Cutoff Wavelength (nm)	≤ 1290
Mode Field Diameter @ 1310 nm (μm) <sup>3</sup>	5.1 ± 1.0
Mode Field Diameter @ 1550 nm (μm) <sup>3</sup>	5.8 ± 1.0
Short-term Bend Loss (mm)	≥ 10
Long-term Bend Loss (mm)	≥ 17
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-65 to + 300

<sup>1</sup> Measured as (Min Wall / Max Wall ) x 100

<sup>2</sup> Measured on Zero Tension spool

<sup>3</sup> Petermann II Definition



# Verrillon® VSS200 Series Erbium Doped Fiber

Verrillon Erbium Doped Fiber (EDF) from AFL is a high NA single-mode, highly doped with erbium and optimized for 980 nm pumping in erbium-doped fiber amplifiers (EDFA). The high erbium content in this fiber allows for high efficiency and short device length, while the high NA allows for tight bend radii in compact EDFA packaging. The VSS200-EDF Series has been widely incorporated in EDFAs in the telecommunications industry over the last two decades.

### Features

- High numerical aperture design for low bend loss
- Reduced noise figure
- Excellent for use in EDFAs
- Superior run-to-run consistency
- Widely used in EDFAs by the telecom industry

### Applications

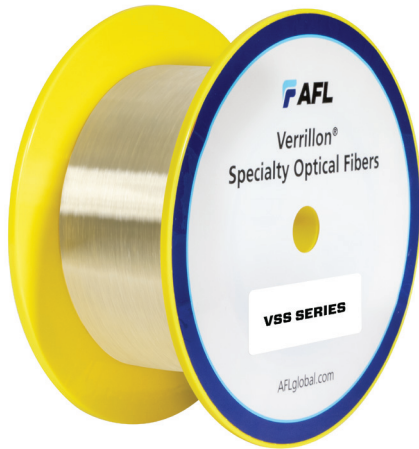
- Telecommunications Optical Networks
- Erbium-Doped Fiber Amplifiers (EDFAs)
- Light sources
- Signal amplification in sensing systems

### Specifications

PART NO.	EDF-1-125
Description	Erbium Doped Fiber
PARAMETER	VALUE
Material	
Coating	Dual UV Acrylate
Geometry	
Clad Diameter (µm)	125 ± 1
Core/Clad Offset (µm)	≤ 0.3
Coat Diameter (µm)	250 ± 10
Optical	
Absorption @ 1550 nm (dB/m)	6.0 ± 1.0
Absorption @ 980 nm (dB/m)	4.2 ± 1.0
Cutoff Wavelength (nm)	920 ± 40
MFD <sup>1</sup> @ 1550 nm (µm)	5.5 ± 0.7
NA (nominal)	0.23
Attenuation @ 1200 nm (dB/m)	≤ 7.0
Proof Test	
Tensile Strength (kpsi)	≥ 200

<sup>1</sup> Petermann II Definition





## Verrillon® VSS200 Series Coupler Fiber

Verrillon VSS200 Coupler Fiber products consist of a family of single-mode fibers designed for fused devices manufacturing such as couplers, splitters, WDMs, tap couplers and add/drop filters for communications and sensing applications. These fibers exhibit exceptionally low optical loss, low excess loss, low insertion loss, as well as low bend-loss due to their high numerical apertures. These coupler fibers are available in all Verrillon coatings and coating combinations and in numerical apertures from 0.13 to 0.20.

### Features

- Exhibits lower excess loss in couplers and splitters
- High numerical aperture design for low bend loss
- Ideal for 980nm pumping of EDFAs
- Fully qualified to Telcordia GR-20
- Available Numerical Apertures: 0.20, 0.16, 0.13 and others.

### Applications

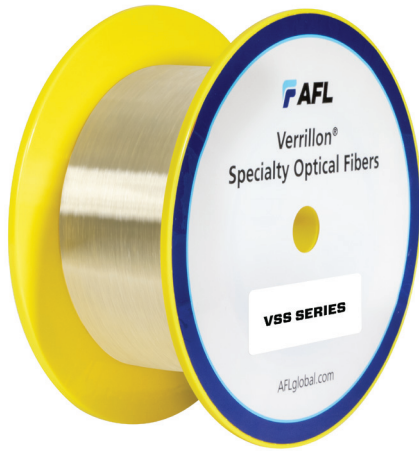
- Communications Networks
- Optical fused couplers and splitters
- Wavelength Division Multiplexing devices (WDMs)
- Tap couplers
- Optical Add/Drop filters
- Fiber pigtails
- Erbium-Doped Fiber Amplifiers (EDFAs)

### Specifications

PART NO.	CF-2-125-0	CF-4-125-20-1	CF-5-125-2
Description	980 nm Acrylate coated, Coupler Fiber, 0.16 NA, 200 kpsi	980 nm Acrylate Coated, Coupler Fiber, 0.20 NA, 200 kpsi	1310/1550 nm Acrylate Coated, Coupler Fiber, 0.13 NA, 200 kpsi
<b>PARAMETER</b>	<b>VALUE</b>		
<b>Material</b>			
Coating	Dual UV Acrylate	Dual UV Acrylate	Dual UV Acrylate
<b>Geometry</b>			
Clad Diameter (µm)	125 ± 1	125 ± 1	125 ± 1
Clad Non-Circularity (%)	—	≤ 2	—
Core/Clad Offset (µm)	≤ 0.3	≤ 0.3	≤ 0.5
Coat Diameter (µm)	245 ± 15	245 ± 15	245 ± 15
<b>Optical</b>			
NA (nominal)	0.16	0.20	0.13
Attenuation @ 980 nm (dB/m)	≤ 3.0	≤ 3.5	—
Attenuation@ 1310 nm (dB/km)	—	—	≤ 0.5
Attenuation@ 1550 nm (dB/km)	—	—	≤ 0.5
Cutoff Wavelength (nm)	≤ 960	≤ 960	1250 ± 40
Mode Field Diameter <sup>1</sup> @ 980 nm (µm)	5.0 ± 0.3	4.2 ± 0.3	—
Mode Field Diameter <sup>1</sup> @ 1310 nm (µm)	—	—	8.6 ± 0.5
Mode Field Diameter <sup>1</sup> @ 1550 nm (µm)	—	—	9.7 ± 0.5
Bend Loss <sup>2</sup> @ 1310 nm (µm)	—	—	≤ 0.25
Bend Loss <sup>2</sup> @ 1550 nm (µm)	—	—	≤ 0.25
<b>Mechanical</b>			
Tensile Strength (kpsi)	≥ 200	≥ 200	≥ 200
Operating Temperature (°C)	-40 to +85	-40 to +85	-40 to +85

<sup>1</sup> Petermann II Definition

<sup>2</sup> 10 turns of fiber on a 30 mm diameter mandrel



## Verrillon® VSS200 Series Photosensitive Fiber

VSS200 Photosensitive Fiber is a single-mode fiber with modified glass chemistry designed to enhance the sensitivity of the glass core to UV light, which allows for high efficiency, high quality Fiber Bragg Grating (FBG) writing with extremely short UV exposure. The high glass sensitivity of this fiber allows for FBG writing 5 times faster than with standard single-mode fibers, which significantly increases productivity in mass production of FBGs. This fiber is also suitable for FBG arrays used in quasi-distributed sensing applications.

### Features

- Designed to provide high level of cladding mode suppression
- High level photosensitivity reduces time needed to write gratings
- Acrylate coating strips easily to simplify FBG processing
- Mode-field compatible with standard SMF to decrease splice loss
- Excellent for high-quality Fiber Bragg Gratings (FBGs)

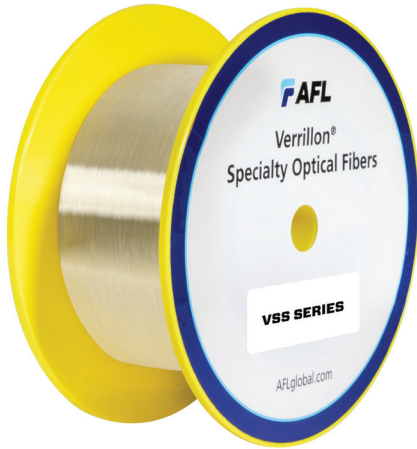
### Applications

- Fiber Bragg Gratings (FBGs)
- Telecommunication networks
- Quasi-distributed sensing
- Optical add/drop filters
- Pigtails in telecom devices
- Gain-flattening filters (GFF) for EDFAs

### Specifications

<b>PART NO.</b>	<b>PSF-1-A-125-1</b>
Description	125/243 μm Acrylate coated, Single-mode Fiber, 0.14 NA, 100 kpsi
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Coating	Dual UV Acrylate
<b>Geometry</b>	
Clad Diameter (μm)	125 ± 1
Core/Clad Offset (μm)	≤ 0.3
Combined Coating Diameter (μm)	243 ± 3
<b>Optical</b>	
NA (nominal)	0.14
Cutoff Wavelength (nm)	≤ 1300
Mode Field Diameter <sup>1</sup> @ 1550 nm (μm)	9.5 ± 0.2
<b>Mechanical</b>	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +85

<sup>1</sup> Petermann II Definition



## Verrillon® VSS700-BI80 Reduced Diameter Bend-Insensitive Single-mode

This 80 µm Reduced-Diameter fiber is a Bend-Insensitive Single-Mode fully compatible with standard single-mode fibers for ease of splicing and low splice loss. This product is designed to offer Small Form Factor (SFF) and low macro-bend loss for applications requiring compact packaging with tight bending configurations.

### Features

- Attenuation < 0.3 dB/km @ 1550 nm
- Extremely low bend-loss
- MFD compatible with standard 125 µm SMF for low-loss splicing
- Tight clad diameter tolerance +/- 1µm
- Available with standard acrylate coating for telecom applications
- Available with high temperature coatings

### Specifications

<b>PART NO.</b>	<b>SMF-12-A-80-4</b>
Description	Small Form Factor Bend-Insensitive, reduced cladding single-mode. Fully matching standard single-mode MFD for reduced splice loss
<b>PARAMETER</b>	
<b>Material</b>	
Core	Silica-based
Cladding	Pure Silica
Coating	Dual-Acrylate
<b>Geometry</b>	
Core Diameter (µm)	-
Clad Diameter (µm)	80 ± 1
Core/Clad Offset (µm)	≤ 0.5
Coat Diameter (µm)	165 ± 10
<b>Optical</b>	
NA (nominal)	0.12
Attenuation @ 1310 nm (dB/km)	≤ 0.55
Attenuation @ 1550 nm (dB/km)	≤ 0.30
Cutoff Wavelength (nm)	1250 ± 50
Mode Field Diameter @ 1310 nm (dB/km)	8.8 ± 0.8
Mode Field Diameter @ 1550 nm (dB/km)	10 ± 1.0
Bend Loss (dB/wrap)* @1550 nm	≤ 0.1
<b>Mechanical</b>	
Proofstest (kpsi)	≥ 200
Operating Temperature (°C)	-40 to +85

\* 5 wraps on 5 mm radius mandrel



## Verrillon® VMM1000 Series Multimode Fibers

Verrillon Fibers from AFL are available in a number of designs. Starting with fiber design, we offer multimode optical fibers having coatings and coating combinations, including Polyimide, Silicone-PFA and Carbon, which can be applied in conjunction with any of these outer coatings.

### Features

- Low and High OH concentration optimizes fibers for power transmission from UV through near-IR wavelengths
- Laser delivery and imaging applications
- All-silica based construction creates a high damage threshold and high-performance optical properties for pumping systems

### Specifications

PART NO.	MMF-100-1-P-105-125-1	MMF-100-2-P-140-2	MMF-105-1-P-125-150-3
Description	100/105/125 High OH, Silica Core, Polyimide coated, Multimode Fiber, 0.22 NA, 100 kpsi Proof Test	100/140/172 Polyimide Coated, Graded Index, Multimode Fiber, 0.29 NA, 200 kpsi	105/125/150 Low OH Silica Core, Polyimide coated, Step Index Multimode Fiber, 0.22 NA, 100 kpsi Proof Test
<b>PARAMETER</b>	<b>VALUE</b>		
<b>Material</b>			
Coating	Polyimide	Polyimide	Polyimide
<b>Geometry</b>			
Core Diameter (µm)	100 ± 4	100 ± 3	105 ± 5
Clad Diameter (µm)	105 ± 3	140 ± 3	125 ± 3
Core/Clad Offset (µm)	—	≤ 6.0	≤ 3.0
Coat Diameter (µm)	125 ± 3	172 ± 2	150 ± 5
<b>Optical</b>			
NA (nominal)	0.22 ± 0.02	0.29	0.22
Attenuation @ 308 nm (dB/m) <sup>1</sup>	≤ 200	—	—
Attenuation @ 808 nm (dB/m) <sup>2</sup>	—	—	≤ 15
Attenuation @ 850 nm (dB/m) <sup>2</sup>	—	≤ 5.0	—
Bandwidth @ 850 nm (MHz/km)	—	≤ 100	—
<b>Mechanical</b>			
Proof Test (kpsi)	≥ 100	≥ 200	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300	-65 to +300

<sup>1</sup> Nominal value taken from preform specifications    <sup>2</sup> Measured on Zero Tension Spool

# Verrillon®

## VMM1000 Series Multimode Fibers

### Specifications

PART NO.	MMF-200-1-P-220-240-1	MMF-200-1-P-220-245-1
Description	200/220/240 High OH, Pure Silica Core, Polyimide coated, Step Index Multimode Fiber, 0.22 NA, 100 kpsi Proof Test	200/220/245 Low OH Silica Core, Polyimide coated, Step Index Multimode Fiber, 0.22 NA, 100 kpsi Proof Test
PARAMETER	VALUE	
Material		
Buffer	Polyimide	Polyimide
Geometry		
Core Diameter (µm)	200 ± 5	200 ± 8
Clad Diameter (µm)	220 ± 5	220 ± 6
Core Non-Circularity (%)	≤ 5	≤ 5
Clad Non-Circularity (%)	≤ 1	≤ 1
Coat Diameter (µm)	240 ± 5	245 ± 10
Polyimide Coating Concentricity <sup>1</sup> (%)	≥ 75	≥ 80
Optical		
NA (nominal)	0.22	0.22
Attenuation @ 808 nm (dB/m)	≤ 10	≤ 15
Mechanical		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 to +300	-65 to +300

<sup>1</sup> Measured as (Min Wall / Max Wal) x 100

### Specifications

PART NO.	MMF-200-1-A-220-400-1
Description	200/220/400 Acrylate coated, Low OH, Silica Core, Step Index Multimode Fiber, 0.22 NA, 100 kpsi Proof Test
PARAMETER	VALUE
Material	
Primary Coating	UV Acrylate
Secondary Coating	UV Acrylate
Geometry	
Core Diameter (µm)	200 ± 8
Clad Diameter (µm)	220 ± 6
Core/Clad Offset (µm)	≤ 3.0
Combined Coat Diameter (%)	400 ± 25
Optical	
NA (nominal)	0.22
Attenuation <sup>1</sup> @ 808 nm (dB/m)	≤ 20
Mechanical	
Proof Test (kpsi)	≥ 100
Operating Temperature (°C)	-40 to +85

<sup>1</sup> Measured on Zero Tension Spool



# Verrillon®

## VHT500 Ultra-High Temperature Single-mode Series

Verrillon VHT500 is a pure silica core single-mode design with a protective metal coating that allows it to operate at temperatures up to 500°C. Typically, these fibers are used in down-hole data logging for enhanced supercritical geothermal applications, high-temperature oil/gas downhole monitoring using acoustic, strain and temperature sensing, and downstream oil process monitoring.

### Features

- Metal coating protects the fiber at temperatures up to 500°C
- Optimized for 1550 nm operation
- Pure Silica Core chemistry for improved performance in hydrogen-rich environments
- Greater than 50x bend loss improvement at 1550 nm over standard SMF
- MFD compatible with standard SMF for ease of splicing and minimal splice loss
- Patent-pending process prevents fibers from “cold bonding” to metal tubes or other metallic-coated fibers
- Available in long lengths (multi-kilometers)
- Industry-standard 125 µm clad diameter

### Specifications

<b>PART NO.</b>	<b>VHS-60-CM-125-1</b>
Description	Ultra-High temperature metal-coated Single-Mode fiber with low-loss suitable for use up to 500°C. Available in multi-kilometer continuous lengths and proof-tested at 50 kpsi.
<b>PARAMETER</b>	
<b>Material</b>	
Core	Pure Silica
Cladding	F-doped Silica
Coating	Carbon / Metal
<b>Geometry</b>	
Core Diameter (µm)	-
Clad Diameter (µm)	125 ± 2
Clad Non-Circularity (%)	≤ 3
Core/Clad Offset (µm)	≤1.5
Coat Diameter (µm)	131 +5 / -2
<b>Optical</b>	
NA (nominal)	0.12
Attenuation @ 1550nm (dB/km)	≤ 5
Cutoff Wavelength (nm)	≤ 1530
Mode Field Diameter (µm)	10.0 ± 0.7
<b>Mechanical</b>	
Proof test (kpsi)	≥ 50
Operating Temperature (°C)	-65 to +500
Continuous Length Available	Multi-kilometers



# Verrillon®

## VHT5000 Ultra-High Temperature Multimode Series

Verrillon Harsh Environment Fibers from AFL are available in a wealth of designs. The VHT5000 product is a multimode graded-index optical fiber with optimized glass chemistry for high resistance to hydrogen darkening, coupled with a gold-based metal coating that allows the fiber to perform well at temperatures up to 500°C. Typically, these fibers are used in down-hole data logging for enhanced supercritical geothermal applications, high-temperature oil/gas downhole sensing and in downstream oil processing.

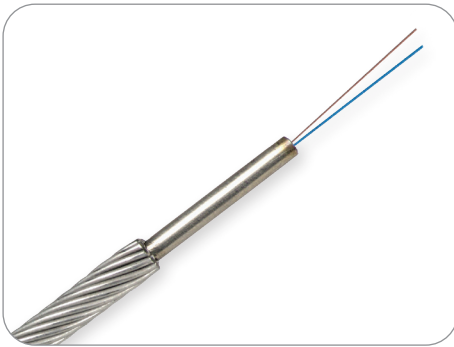
### Features

- Metal coating protects the fiber at temperatures up to 500°C
- Best glass resistance to hydrogen at high temperatures and pressures available in the entire industry
- High bandwidth 50/125 graded-index multimode design for extremely short spatial resolution in sensing applications
- Patent-pending process prevents fibers from “cold bonding” to metal tubes or other metallic-coated fibers
- Suitable for use in high pressure, high temperature and corrosive environments
- Available in long lengths (multi-kilometers)
- Industry-standard 125 µm cladding diameter
- Extensive test and measurement data for optical fiber performance under “harsh conditions” provided with fiber

### Specifications

<b>PART NO.</b>	<b>VHM-50-4-CM-125-4</b>
Description	Ultra-High temperature metal-coated Graded-Index Multimode fiber with low-loss, suitable for use up to 500°C. Available in multi-kilometer continuous lengths and proof-tested at 50 kpsi.
<b>PARAMETER</b>	<b>VALUE</b>
<b>Material</b>	
Core	Silica-based
Cladding	F-doped Silica
Coating	Carbon / Metal
<b>Geometry</b>	
Core Diameter (µm)	50 ± 2.5
Clad Diameter (µm)	125 ± 2
Core Non-Circularity (%)	≤ 5
Clad Non-Circularity (%)	≤ 1
Core/Clad Offset (µm)	≤ 1.5
Coat Diameter (µm)	131 +5 / -2
<b>Optical</b>	
NA (nominal)	0.2
Attenuation @ 850 nm (dB/km)	≤ 5
Attenuation @ 1300 nm (dB/km)	≤ 5
Bandwidth @ 850 nm (MHz*km)	≥ 300
Bandwidth @ 1300 nm (MHz*km)	≥ 300
<b>Mechanical</b>	
Proof test (kpsi)	≥ 50
Operating Temperature (°C)	-65 to +500
Continuous Length Available	Multi-kilometers





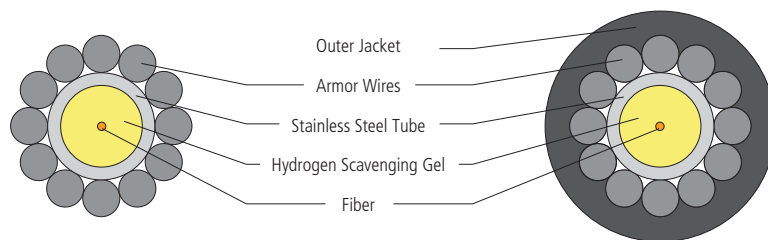
## Armored Stainless Steel Tubes

Armored Stainless Steel Cables from AFL are based on our patented tube technology which provides for a hermetic seal. The armor wires provide improved crush and tensile performance while maintaining good flexibility. Armored Stainless Steel Tubes can be used in a variety of applications such as temperature sensing and surface cable.

### Features

- Hermetic Stainless Steel Tube
- High Strength Wire
- Jacket Options
- Gel Options
- Flexible
- Rugged

### Cable Components



### Options and Specifications

FIBER COUNT	TUBE O.D. (mm)	FINAL O.D. (mm)	WEIGHT (kg/km)	BREAKING STRENGTH (kg)	BEND RADIUS (mm)
4	1.32	2.12	16	222	132
6	2.00	3.20	38	526	200
12	2.40	3.60	45	619	240

Based on 200 kpsi Gips wire, gel filled tube

### Encapsulation Option

PARAMETER	VALUE
Materials	Polypropylene, Nylon, PVDF, Hytrel™
Diameter	To customer specifications
Cable markings	To customer specifications



## Stainless Steel Fiber Optic Tubes

As the inventor and owner of the technology for placing optical fibers into stainless steel tubes, AFL offers a range of tube sizes and fiber counts for a variety of applications. Each tube is flooded with a thixotropic filling compound and hermetically sealed to protect the enclosed fibers from environmental degradation. This product is sometimes referred to as FIST (Fiber in Steel Tube) or FIMT (Fiber in Metal Tube).

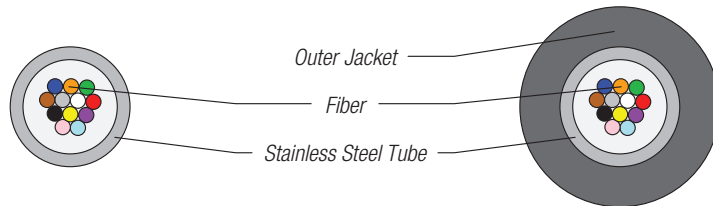
### Jacket Options

AFL can encapsulate any of our stainless steel tubes with any of the following polymers:

- Hytrel™
- Santoprene™
- Polyethylene
- Polypropylene
- Nylon
- PVDF



### Cable Components



### Applications

- Umbilical Cables
- Downhole Cables for Oil & Gas
- Towed Arrays
- High Temperature Cables
- Hybrid Cables
- Sensor Cable
- OPGW

### Specifications (without jacketing)

OPTION NUMBER	MAXIMUM FIBER COUNT	OUTSIDE DIAMETER inches (mm)	INSIDE DIAMETER inches (mm)	WALL THICKNESS inches (mm)
1	3	0.046 (1.17)	0.036 (0.91)	0.005 (0.127)
2	4	0.052 (1.32)	0.042 (1.07)	0.005 (0.127)
3	4	0.055 (1.40)	0.039 (1.00)	0.008 (0.200)
4	6	0.065 (1.65)	0.049 (1.25)	0.008 (0.200)
5	6	0.071 (1.80)	0.055 (1.40)	0.008 (0.200)
6	8	0.074 (1.88)	0.058 (1.47)	0.008 (0.200)
7	8	0.078 (1.98)	0.062 (1.57)	0.008 (0.200)
8	8	0.079 (2.00)	0.063 (1.60)	0.008 (0.200)
9	12	0.092 (2.33)	0.076 (1.93)	0.008 (0.200)
10	16	0.094 (2.38)	0.078 (1.98)	0.008 (0.200)
11	16	0.095 (2.40)	0.079 (2.00)	0.008 (0.200)
12	16	0.098 (2.49)	0.082 (2.08)	0.008 (0.200)
13	16	0.106 (2.69)	0.090 (2.29)	0.008 (0.200)
14	24	0.118 (3.00)	0.102 (2.60)	0.008 (0.200)
15	36	0.125 (3.20)	0.109 (2.80)	0.008 (0.200)
16	48	0.134 (3.40)	0.119 (3.00)	0.008 (0.200)
17	60	0.142 (3.60)	0.126 (3.20)	0.008 (0.200)
18	72	0.150 (3.80)	0.134 (3.40)	0.008 (0.200)
19	72	0.156 (3.96)	0.140 (3.56)	0.008 (0.200)
20	72	0.158 (4.00)	0.142 (3.60)	0.008 (0.200)
21	72	0.165 (4.20)	0.150 (3.80)	0.008 (0.200)
22	96	0.189 (4.80)	0.165 (4.20)	0.012 (0.300)

Available in Stainless Steel 304, 316 and Incoloy 825. Others sizes and materials available on request.



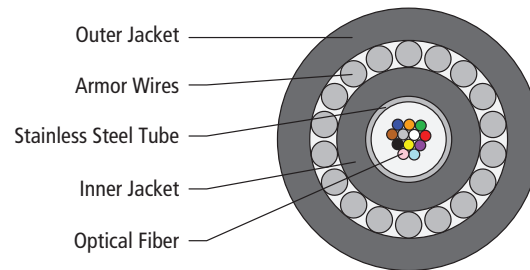
## Fiber Optic Component for Umbilical Cable

AFL's Fiber Optic Component for Umbilical Cable is designed for subsea umbilical applications. AFL is the technology owner for hermetic stainless steel tubes which are the key building block for subsea cables. AFL provides customized designs to meet the most stringent requirements. AFL's Fiber Optic Component is suitable for depths of 10,000 feet and beyond.

### Features

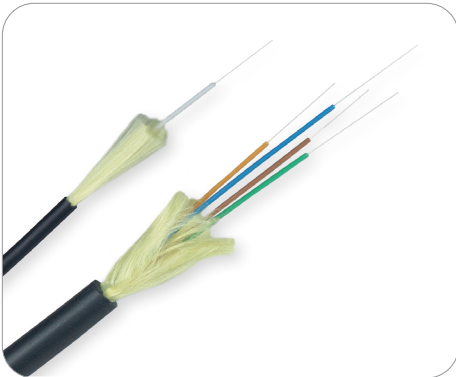
- Hermetic Stainless Steel Tube
- High Strength Wire
- Polyethylene Jacketed
- Hydrogen scavenging gel
- Long lengths
- In-line splice technology
- Proven technology
- Long life expectancy
- Custom Jacket Colors

### Cable Components



### Options and Specifications

PARAMETER	VALUE
Number of Fibers	Up to 96
Fiber	Single-mode, Multimode, 100 or 200 kpsi proof test
Stainless Steel Tube Sizes	2.4 mm to 4.8 mm
Stainless Steel Tube Types	304 or 316L Stainless Steel
Armor	Stranded wires, a range of tensile specifications are available
Fiber Colors	TIA/EIA 598 or customer specification
Unit Weight	150 to 300 kg/km
Overall Diameter	7 mm to 16 mm
Storage Temperature Range	-40 to +85°C
Operating Temperature Range	-40 to +85°C
Breaking Load	Up to 25 kN (dependant on armor selection)
Bend Radius (design dependent)	120 mm to 320 mm
Cable Marking	To customer specification



## Tactical Tight Buffered Cable

AFL Tactical Tight Buffered Cables are ideal for use in installations where extreme environmental conditions are present. Designed to be deployed and retrieved in the field, AFL's Tactical Tight Buffered Cables are highly resistant to damage caused by repeated impacts crushing forces, abrasion and extreme temperatures.

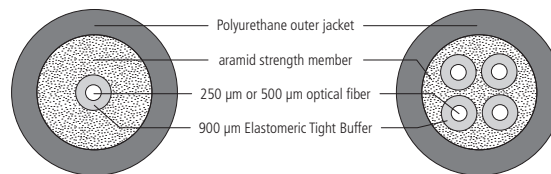
### Features

- Cut resistant, fire retardant, LSZH polyurethane jacket
- Highly flexible construction allows for multiple deployments
- All aramid strength members
- Performance in wide temperature range
- UV, Fungus and water resistant
- High impact and crush resistance
- Durable in high traffic areas
- MIL-PRF-49291 qualified fiber available (-RH designation)

### Applications

- Field deployment in abusive environments
- Temporary installation of critical communications lines where quick retrieval and re-use is necessary
- High Traffic areas
- Security and Sensing applications
- Broadcast deployments
- Installations in harsh environments

### Cable Components



### Specifications

CHARACTERISTIC	TEST PROCEDURE	PERFORMANCE
Tensile and elongation	EIA/TIA-455-33	
Operating tensile strength	EIA/TIA-455-33	
Low-temp flexibility	EIA/TIA-455-37	
Cyclic flexing	EIA/TIA-455-104	2000
Crush resistance	EIA/TIA-455-41	1800 N/cm or greater
Impact	EIA/TIA-455-25	200
Temperature cycling	EIA/TIA-455-3	-46°C to 85°C
Temperature/humidity cycling	EIA/TIA-455-5 Method B	
Life aging	EIA/TIA-455-4	
Freezing water immersion	EIA/TIA-455-98	

## Tactical Tight Buffered Cable

### Mechanical Data

AFL NO.	FIBER COUNT	NOMINAL DIAMETER		NOMINAL WEIGHT		MAXIMUM TENSILE LOAD		MINIMUM BEND RADIUS	
		INCHES	(MM)	LBS/1000FT	(KG/KM)	LBS (N)		INCHES (CM)	
						INSTALLATION	LONG TERM	INSTALLATION	LONG TERM
X5002*551#0H	2	0.22	(5.5)	16.2	(25)	400 (1780)	130 (578)	2.2 (5.5)	1.1 (2.8)
X5004*551#0H	4	0.22	(5.5)	16.2	(25)	400 (1780)	130 (578)	2.2 (5.5)	1.1 (2.8)
X5002*581#0H	2	0.23	(5.8)	21.5	(32)	400 (1780)	130 (578)	3.4 (8.7)	2.3 (5.8)
X5004*581#0H	4	0.23	(5.8)	21.5	(32)	400 (1780)	130 (578)	3.4 (8.7)	2.3 (5.8)
X5006*611#0H	6	0.24	(6.1)	22.2	(33)	400 (1780)	130 (578)	3.6 (9.2)	2.4 (6.1)
X5008*641#0H	8	0.25	(6.4)	28.8	(44)	470 (2090)	160 (712)	2.5 (6.4)	1.3 (3.2)
X5012*641#0H	12	0.25	(6.4)	30.8	(47)	470 (2090)	160 (712)	2.5 (6.4)	1.3 (3.2)

Note: Diameter and weight subject to change without notice

**500 µm primary coated fiber available, replace H in AFL number with number corresponding below.**

G = 500 µm Coated Optical Fiber

H = 250 µm Coated Optical Fiber

**Replace asterisk (\*) in AFL No. with corresponding fiber type below.**

5 = 50/125 µm multimode GIGA-Link™ 600

6 = 62.5/125 µm multimode GIGA-Link™ 300

9 = Bend Insensitive G.657A1 single-mode

L = 50/125 µm OM3

C = 50/125 µm OM4

**Replace hashtag (#) in AFL No. with jacket color. See Tactical Cable Ordering Guide.**

**Customer specified print available.**

**See Tactical Cable Ordering Guide AFL No. designations.**

### Qualifications

GOVERNING BODY	STANDARD CODE	COMPONENT
EIA/TIA	EIA/TIA-455-33, EIA/TIA-455-37, EIA/TIA-455-104, EIA/TIA-455-41, EIA/TIA-455-25, EIA/TIA-455-3, EIA/TIA-455-5 Method B, EIA/TIA-455-4, EIA/TIA-455-98	Fiber Optic Cable
U.S. Department of Defense	MIL-PRF-49291 MIL-PRF-85045	Optical Fiber Fiber Optic Cable

### Temperature Specifications

TEMPERATURE RANGE	
<b>INSTALLATION</b>	-46°C to +85°C
<b>OPERATION</b>	-46°C to +85°C
<b>STORAGE</b>	-55°C to +85°C

**Contact AFL for further details.**



 Bluetooth®

90S+

## Fujikura 90S+ Fusion Splicer

The Fujikura 90S+ core alignment fusion splicer solves common problems seen in the field—from splicing poor quality legacy fiber to automated equipment maintenance and upkeep. The Fujikura 90S+ can be use in multiple field splicing applications including bend-insensitive fibers in drop cables, long-haul terrestrial and submarine LEAF® fibers, loose buffer fiber, splice-on connectors, and the list goes on. The speed and accuracy of the 90S+ make it suitable for certain production and specialty environments where high output, tight packaging, and low loss requirements are required.

Regardless of your scenario, the Fujikura 90S+ is designed to keep you in the field with an extended battery life of 300 splice and heat cycles. With its multiple automated and easy-to-use features, the 90S+ alleviates the need for traditional operation tasks such as frequent arc calibrations, cleaver blade rotations, cleaver usage tracking, and manual splicing operations. A redesigned work tray, cooling tray, and optional cable clamp make the 90S+ kit more versatile than its predecessors in adapting to varying work conditions and environments.

When splicing loose buffer fiber, additional sheath clamps are not needed. The standard universal sheath clamp now handles both loose and tight buffer fibers. The new Active Fusion Control (AFC) technology improves splice losses for fibers that possess a poor cleave angle. Combined with Active Blade Management between the splicer and cleaver, the Fujikura 90S+ contains a robust set of splicing features that will reduce the likelihood of poor splice installations or repairs.



In Work Tray



Wind Protector Open

### Features

- Cleaver tracking and upkeep with wireless communication
- Improved real-time arc control for fibers with poor cleave angles
- Automated wind protector, sheath clamps and splice operation
- Loose and tight buffer with same sheath clamp
- Lithium-ion battery with 300 splices/shrinks per charge
- PC software and 90S+ manual downloaded from splicer
- Multi-function transit case with integrated workstation

### Applications

- Distribution fiber repair
- Long-haul network installation
- Field termination with splice-on connectors
- Access network installation
- Fanout kits, pigtailed and splice cassettes
- OSP cable installation and repair
- Optical modules – splitters, couplers, MUXs, EDFAs and attenuators

**STOCK ITEM**

## Fujikura 90S+ Fusion Splicer

### Ordering Information

DESCRIPTION	AFL NO.
<b>90S+ Fusion Splicer (machine only)</b> <b>Includes:</b> ADC-20 AC Adapter, ACC-14 AC Cord, BTR-15 Battery, ELCT2-16B Spare Electrodes (pair), Sheath Clamps, SP-03 Fiber Holder Set Plates, USB-01 Cable, Alcohol Dispenser, Screwdriver, Splicer Carrying Strap, Quick Reference Guide, TS-03 Tripod Screw, Work Tray J-Plate, SS03 single fiber stripper, CC39 Transit Case with Carrying Strap and Two Year Warranty	S017519
<b>90S+ Fusion Splicer Kit (with cleaver)</b> <b>Includes:</b> CT50 Cleaver, ADC-20 AC Adapter, ACC-14 AC Cord, BTR-15 Battery, ELCT2-16B Spare Electrodes (pair), Sheath Clamps, SP-03 Fiber Holder Set Plates, USB-01 Cable, Alcohol Dispenser, Screwdriver, Splicer Carrying Strap, Quick Reference Guide, TS-03 Tripod Screw, Work Tray J-Plate, SS03 single fiber stripper, CC39 Transit Case with Carrying Strap and Two Year Warranty	S017521
<b>90S+ Fusion Splicer without Bluetooth (machine only)</b> <b>Includes:</b> ADC-20 AC Adapter, BTR-15 Battery, ACC-14 AC Cord, ELCT2-16B Spare Electrodes (pair), Sheath Clamps, SP-03 Fiber Holder Set Plates, USB-01 Cable, Alcohol Dispenser, Screwdriver, Splicer Carrying Strap, Quick Reference Guide, TS-03 Tripod Screw, Work Tray J-Plate, SS03 Single Fiber Stripper, CC39 Transit Case with Carrying Strap and Two Year Warranty	S017520
One Year Extended Warranty	S012996
Two Year Extended Warranty	S013000

### Recommended Products for the 90S+

DESCRIPTION	AFL NO.
<b>Cleavers</b>	
CT-16 Cleaver	S018330
CT-50 Cleaver	S017030
<b>Fiber Holders (pair)</b>	
FH-70-250 (250 µm coated fiber)	S017111
FH-70-900 (900 µm jacketed fiber)	S017113
FH-70-160 (160 µm coated fiber)	S017095
FH-70-200 (200 µm coated fiber)	S017711
FH-60-LT900 (Loose buffer 900 µm fiber)	S015181
<b>FUSEConnect® Accessories</b>	
FH-FC-20 (900 µm within 2.0 mm sheathing) (each)	S014696
FH-FC-30 (900 µm within 3.0 mm sheathing) (pair)	S014695
FH-FC-900 (900 µm cable) (each)	S014697
CLAMP-FC-2000 (pair)	S014705
CLAMP-FC-3000 (single holder)	S014704
<b>Power Supply Options and Equipment</b>	
ADC-20 AC Adapter	S017513
ACC-14 AC Power Cord	S014536
BTR-15 Battery	S017512
DCC-20 Power Cord (connects AC Adapter to cigarette lighter socket)	S017527
DCC-21 Power Cord (connects AC Adapter to power source via alligator clips)	S017528

DESCRIPTION	AFL NO.
<b>Miscellaneous</b>	
SS03 Single fiber stripper (3 hole)	S017098
SS01 Single fiber stripper (1 hole)	S017099
ELCT2-16B Electrodes	S017103
SP-03 Fiber Holder Set Plates	S017518
S90 Universal Sheath Clamps	S017696
Portable Tripod Workstation (see product profile for more detail)	S014773
ASW-02 Splicing Workstation (see product profile for more detail)	S010532
WT-09R Work Tray Right	S017515
WT-09L Work Tray Left	S017516
JP-09 Work Tray J-Plate	S017517
JP-10 J-Plate (Cooling tray attaches to splicer)	S017522
JP-10-FC J-Plate with Fiber Clamps	S017523
TS-03 Tripod Screw (90 Series)	S017524
ST-02 Fusion Splicer Strap	S017525
CLAMP-DC-12 (Drop cable clamp for work tray)	S017550
USB-01 Cable	S014777
CC39 Transit Case	S017514
Splicer V-Groove Cleaning Kit	S014397
ST-03 Case and Work Tray Strap	S017549



#### Fiber Holders

- Wide range of sizes for various applications
- Loose & Tight Buffer options available



#### Portable Tripod Work Station

- Sturdy work tray supports the splicer, cleaver and accessories
- Tripod supports a load capacity of up to eleven pounds



#### V-Groove Cleaning Kit

- Removes environmental contamination from the v-groove of the splicer
- Maintains performance and ensures fiber alignment



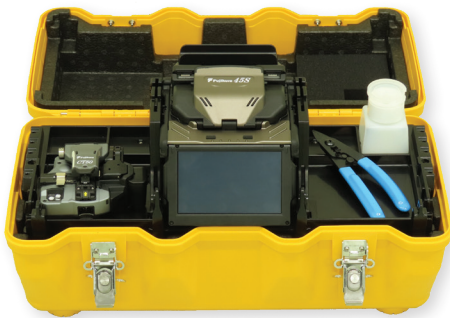
## Fujikura 90S+ Fusion Splicer

### Specifications

PARAMETER		VALUE
Fiber Alignment Method		Active core alignment
Fiber Count Can Be Spliced		Single fiber
Applicable Fiber	Fiber Type	Single-mode optical fiber Multimode optical fiber
	Cladding Diameter	80 to 150 $\mu\text{m}$
Applicable Coating	Sheath Clamp	Coating dia.: Max. 3,000 $\mu\text{m}$ Cleave length: 5 to 16 mm
	Splice Loss	ITU-T G.652: Avg. 0.02 dB ITU-T G.651: Avg. 0.01 dB ITU-T G.653: Avg. 0.04 dB ITU-T G.654: Avg. 0.04 dB ITU-T G.655: Avg. 0.04 dB ITU-T G.657: Avg. 0.02 dB
Fiber Splice Performance	Splice Time	SM FAST mode: Avg. 8 to 10 sec. SMAUTO mode: Avg. 11 to 13 sec. AUTO mode: Avg. 14 to 16 sec.
	Sleeve Type	Heat-shrinkable sleeve
Applicable Protection Sleeve	Sleeve Length	Max. 66 mm
	Sleeve Dia.	Max. 6.0 mm before shrinking
Sleeve Heat Performance	Heat Time	60 mm slim mode: Avg. 9 to 10 sec. 60 mm mode: Avg. 13 to 15 sec.
Fiber Tensile Test Force		Approx. 2.0 N
Electrode Life		Approx. 5,000 splices
Physical Description	Dimensions W	Approx. 170 mm without projection
	Dimensions D	Approx. 173 mm without projection
	Dimensions H	Approx. 150 mm without projection
	Weight	Approx. 2.8 kg including battery
Environmental Condition	Temperature	Operate: -10 to 50°C Storage: -40 to 80°C
	Humidity	Operate: 0 to 95% RH non-condensing Storage: 0 to 95% RH non-condensing
	Altitude	Max. 5,000 m
AC Adaptor	Input	AC100 to 240 V, 50/60 Hz, Max. 1.5 A
Battery Pack	Type	Rechargeable Lithium Ion
	Output	Approx. DC14.4V / 6,380 mAh
	Capacity	Approx. 300 splice and heat cycles
	Temperature	Recharge: 0 to 30°C Storage: -20 to 30°C
	Battery Life	Approx. 500 recharge cycles
Display	Recharge Time	Approx. 5-8 hours from empty
	LCD Monitor	TFT 5 inches with touch screen
Illumination	Magnification	200 to 320x
	V-Grooves	LED lamp
Interface	PC	USB2.0 Mini B type
	External Led Lamp	USB2.0 A type, Approx. DC5V, 500 mA
	Ribbon Stripper	Mini DIN 6 pin, DC12V, Max. 1A
	Wireless	Bluetooth 4.1 LE
Data Storage	Splice Mode	100 splice modes
	Heat Mode	30 heat modes
	Splice Result	20,000 splices
	Splice Image	100 images
Screw Hole For Tripod		1/4-20 UNC
Other Features	Automatic Functions	Splice mode select by fiber type analysis
		Discharge power calibration
		Wind protector: open/close
		Sheath clamp: open
		Heater lid: open/close
Reference Guide	Sheath Clamp	Heater clamp: open/close
		Video and PDF file stored in splicer
		Easy sleeve positioning clamp
Electrode		Replaceable without tool



45S



45S Standard Kit



45S on Tripod

## Fujikura 45S Fusion Splicer

The 45S cladding alignment fusion splicer is changing the way people splice fiber in small to mid-fiber count applications. This Fujikura splicer debuts a landmark improvement to the fusion splicing process with the ability to prepare and load both fibers simultaneously. The hand-held fiber coating stripper, the SS-05, is capable of stripping two 250 μm coated fibers in the same pass, along with the CT-16A cleaver adapter plate which can likewise accommodate two bare fibers for cleaving. After preparation, the 45S patented sheath clamps enable loading both fibers simultaneously into the splicer with one fiber in each hand. The user can press down on the sheath clamp base to close it while positioning the fiber in the v-grooves. This enables one-handed operation.

Furthermore, the 45S sheath clamps are mechanically linked to the wind protector, so after splicing is finished, opening the wind protector also opens both sheath clamps for quick sleeve positioning and transfer to the tube heater. The 45S tube heater shrinks sleeves much faster than its predecessor with a nominal ~20 second heat time for 60 mm sleeves down from ~26 seconds. The simultaneous fiber preparation capability, automated sheath clamp opening, and a faster tube heater, combine to lower the overall fusion splicing cycle time by ~30% or more.

The 45S continues to benefit the user experience with improvements to fiber placement, battery access, and machine ergonomics. Previously, when using sheath clamps, if the cleaved fiber was accidentally set past the electrode centerline, the machine would send an error and require manual intervention. The 45S will now accept this mistake and reverse the fiber to correct position automatically. With a cube form factor, the 45S is easily transported and operated in space-constrained environments. The adjustable screen can alleviate glare from the sun and adjust with abnormal splicer positions confronted in challenging splice locations.

Backed by the best service team in the industry, the Fujikura 45S is the ideal splicer to use when portability, ruggedness, speed, and reliability are needed. If you'd like to see the 45S capabilities first-hand, please contact us at 1-800-235-3423 to arrange a product demonstration at your earliest convenience.

### Applications

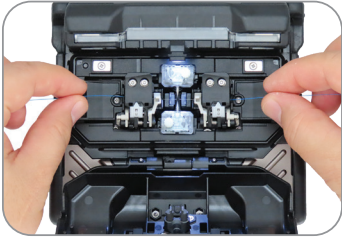
- 5G Small Cell Site
- FTTx drops and terminations
- MDF/IDF splices and terminations
- Rural fiber deployments and restorations

### Features

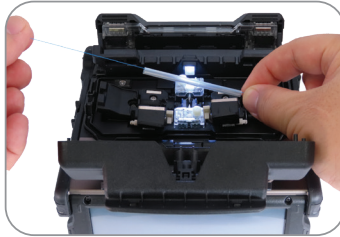
- Simultaneous fiber preparation with newly patented sheath clamp design
- Sheath clamps automatically opened with the wind protector
- Automatic fiber placement correction
- Active Fusion Control for arc optimization with every splice
- Active Blade Management for cleave quality monitoring and correction
- Easy-access battery, screen position adjustments, and ergonomic adaptations
- Fully ruggedized for shock, moisture and dust resistance

## Fujikura 45S Fusion Splicer

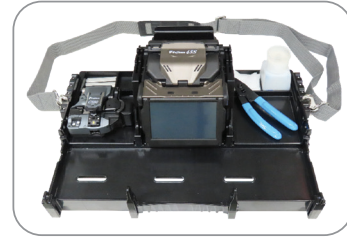
### Features



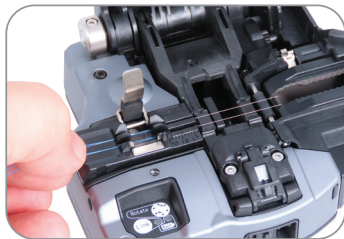
Simultaneous Fiber Loading



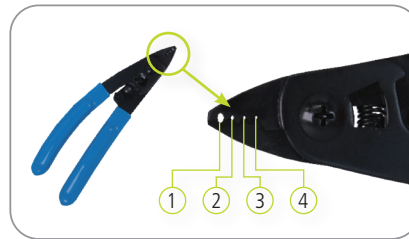
Sleeve Positioning



Work Tray with Neck Strap



CT-16A Adapter Plate on CT-50



Fiber stripper SS-05

- ① For 2.3 mm
- ② For 900  $\mu$ m
- ③ For 250  $\mu$ m
- ④ For 250  $\mu$ m

### Ordering Information

DESCRIPTION	AFL NO.
<b>Fujikura 45S Standard Kit</b> <b>Includes:</b> CT-50 cleaver, SS-05 single fiber stripper, 1 pair each FH-70-250 and FH-70-900 fiber holders, SP-04 set plates, ELCT2-16B Spare Electrodes (Pair), ADC-21 AC Adapter, BTR-17 Battery Pack (installed), ACC-09 Power Cord, USB-01 USB Cable, AP-02 Alcohol Container, WT-10 work tray, ST-03 carrying case strap, TS-03 tripod screw, CC-45 Transit Case, 1 year factory warranty, and instruction manual downloaded from splicer	S018318
<b>Fujikura 45S Kit without Cleaver</b> <b>Includes:</b> SS-05 single fiber stripper, 1 pair each FH-70-250 and FH-70-900 fiber holders, SP-04 set plates, ELCT2-16B Spare Electrodes (Pair), ADC-21 AC Adapter, BTR-17 Battery Pack (installed), ACC-09 Power Cord, USB-01 USB Cable, AP-02 Alcohol Container, WT-10 work tray, ST-03 carrying case strap, TS-03 tripod screw, CC-45 Transit Case, 1 year factory warranty, and instruction manual downloaded from splicer	S018319
One Year Extended Warranty	S012996
Two Year Extended Warranty	S013000

### Recommended Accessories

DESCRIPTION	AFL NO.
<b>Cleavers AND STRIPPERS</b>	
CT-50 Fiber Cleaver	S017030
CT-16 Fiber Cleaver	S018330
SS-05 Dual Fiber Stripper	S018327
<b>Fiber Holders</b>	
CLAMP-S35B Loose Buffer Sheath Clamp	S018333
FH-70-250 (250 $\mu$ m single fiber)	S017111
FH-70-200 (200 $\mu$ m single fiber)	S017711
FH-70-900 Fiber Holders (900 $\mu$ m single fiber)	S017113
FH-60-LT900 (900 $\mu$ m loose buffer tube)	S015181
<b>FUSEConnect® Accessories</b>	
FH-FC-20 (900 $\mu$ m within 2.0 mm sheathing) (each)	S014696
FH-FC-30 (900 $\mu$ m within 3.0 mm sheathing) (pair)	S014695
FH-FC-900 (900 $\mu$ m cable) (each)	S014697
CLAMP-FC-2000 (pair)	S014705
CLAMP-FC-3000 (pair)	S014704

DESCRIPTION	AFL NO.
<b>Power Supply Options</b>	
BTR-17 Battery Pack	S018324
ADC-21 AC Adapter	S018168
ACC-09 Power Cord	S014390
<b>Miscellaneous</b>	
WT-10 Work Tray	S018336
TS-03 Tripod Screw	S017524
ST-03 Carrying Case and Work Tray Strap	S017549
CLAMP-DC-12 drop cable clamp on work tray	S017550
ELCT2-16B Electrodes	S017103
CC-45 Transit Case	S018326
Splicer V-Groove Cleaning Kit	S014397
USB-01 USB Cable	S014777
SP-04 Fiber Holder Set Plates	S018332
AD-16A Adapter Plate (CT-50 and CT-16 up to 900 $\mu$ m)	S018328
Portable Tripod Workstation (see web listing for more detail)	S014773

## Fujikura 45S Fusion Splicer

### Specifications

PARAMETER		VALUE
Fiber alignment method		Active cladding alignment
Fiber count can be spliced		Single fiber
Applicable fiber	Fiber type	Single-mode optical fiber Multimode optical fiber
	Cladding dia.	Approx. 125 μm
Applicable coating	Sheath Clamp	Coating diameter: Max. 3,000 μm Cleave length: 5 to 16 mm <sup>*1</sup>
	Fiber Holder	Coating diameter: 160 μm – 3,000 μm based on available fiber holder options Cleave length: Approx. 10 mm
Fiber splice performance	Splice loss <sup>*2</sup>	ITU-T G.652: Avg. 0.03dB
		ITU-T G.651: Avg. 0.01dB
ITU-T G.653: Avg. 0.05dB		
ITU-T G.655: Avg. 0.05dB		
ITU-T G.657: Avg. 0.03dB		
	Splicing time <sup>*3</sup>	SM FAST mode: Avg. 6 to 7 sec. SM AUTO mode: Avg. 8 to 10 sec.
Applicable protection sleeve	Sleeve type	Heat shrinkable sleeve
	Sleeve length	Max. 66 mm
	Sleeve dia.	Max. 6.0 mm before shrinking
Sleeve heat performance	Heat time <sup>*4</sup>	60 mm mode: Avg. 15 to 22 sec.
		60 mm slim mode: Avg. 15 to 17sec.
Fiber tensile test force		Approx. 2.0 N
Electrode life <sup>*5</sup>		Approx. 6,000 splices
Physical description	Dimensions W	Approx. 131 mm without projection
	Dimensions D	Approx. 123 mm without projection
	Dimensions H	Approx. 121 mm without projection
	Weight	Approx. 1.4 kg including battery
Environmental condition	Temperature	Operate : -10 to 50°C Storage : -40 to 80°C
	Humidity	Operate : 0 to 95% non-condensing Storage : 0 to 95% non-condensing
	Altitude	Max. 5,000 m
AC adaptor	Input	AC100 to 240V, 50/60Hz, Max. 1A
	Output	Approx. DC 19V, Max. 2.1A
Battery pack	Type	Rechargeable Lithium Ion
	Output	Approx. DC 14.4V / 3,190mAh
	Capacity <sup>*6</sup>	60 mm heat mode: Approx. 200 splice & heat cycles
		60 mm slim heat mode: Approx. 230 splice & heat cycles
	Temperature	Operate: -10 to 50°C
Recharge : 0 to 40°C		
Short term storage of 30 days: -20 to 50°C Long term storage: -20 to 30°C		
Battery life <sup>*7</sup>	Approx. 500 recharge cycles	
Display	LCD monitor	TFT 4.95 inches with touch screen
	Magnification	Approx. 132 to 300X
Illumination	V-grooves	LED lamp
Interface	PC	USB2.0 MINI B type
	External LED lamp	USB 2.0 A type
		Approx. DC5V, 500mA
	Wireless <sup>*8</sup>	Bluetooth® 5.2

## Fujikura 45S Fusion Splicer

### Specifications

PARAMETER		VALUE
Data storage	Splice mode	100 splice modes
	Heat mode	30 heat modes
	Splice result	20,000 splices
	Fiber image	100 images
Screw hole for tripod		1/4-20UNC
Other features	Automatic functions	Fusion control
		Blade management and control
		Splice start
		Heater start
	Reference guide	PDF file stored on splicer
	Sheath clamp	Open with/without wind protector
		Close when setting fiber
		Easy sleeve positioning design
	Electrode	Tool-less replacement
	PC Software	Splicer firmware update via internet
Parameter Upload and download		

#### NOTES:

- \*1 Cleave length range depending on fiber type
  - 5 – 16 mm: 125  $\mu$ m cladding dia. And 250  $\mu$ m coating dia.
  - 10 – 16 mm: 125  $\mu$ m cladding dia. And 400 or 900  $\mu$ m coating dia.
- \*2 Measured with cut-back method relevant to ITU-T and IEC standard after splicing Fujikura identical fibers. The average splice loss changes depending on the environmental condition and fiber characteristics.
- \*3 Measured at room temperature. The definition of splice time is from the fiber image appearing on the LCD monitor to the estimated splice loss. The average splice time changes depending on the environmental conditions, fiber type, and fiber characteristics.
- \*4 Measured at room temperature with the AC adapter. The heat time is defined from the start beep sound to the finish beep sound. The average heat time changes depending on the environmental conditions, sleeve type, and battery pack condition. In addition, since the heating operation is constantly optimized, the average heating time changes depending on the usage conditions of the fusion splicer.
- \*5 The electrode life changes depending on the environmental conditions, fiber type, and splice modes used.
- \*6 Test Conditions
  - Splice and heat time: 1 minute cycle
  - Using the splicer power save settings, subject to our testing condition
  - Using a new battery
  - Room temperature
  - The battery capacity changes when testing in different conditions than above
- \*7 The battery capacity decreases to half after approx. 500 discharge and recharge cycles. The battery life is shortened further when using outside of the storage and operating temperature ranges, or if completely discharged when stored for an extended period without recharging.
- \*8 Bluetooth mark and logos are registered trademarks of Bluetooth SIG, Inc.





LZM -100

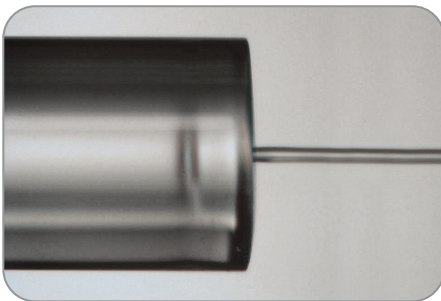
## LAZERMaster® LZM-100 Splicing System

The LZM-100 LAZERMaster is a glass processing and splicing system that uses a CO<sub>2</sub> laser heat source to perform splicing, adiabatic tapering (to create MFAs or pump combiners), lensing, or other glass shaping operations with glass diameters of 2.3 mm or more. The high resolution optical analysis system works in conjunction with on-board firmware for fully automatic splicing, tapering and other glass shaping processes.

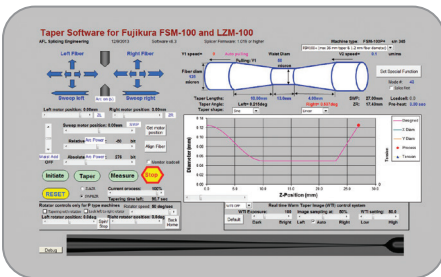
High precision glass processing is enabled by the intuitive and user-friendly on-board firmware (virtually identical to that of the Fujikura FSM-100 ARCMaster splicers). Operations may also be performed manually and by PC control. An FPS PC control GUI is supplied with the LZM-100 to provide additional features, greater flexibility and finer control. The FPS GUI is pre-installed on the All-in-one computer. Customers can also create proprietary PC control algorithms using a complete set of PC control commands.

### Features

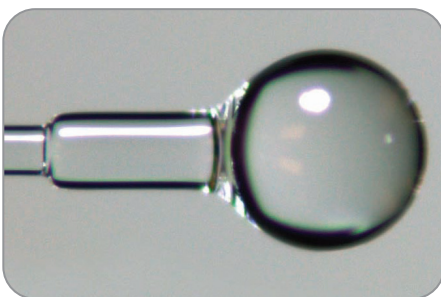
- CO<sub>2</sub> laser heat source eliminates electrode or filament maintenance, provides extremely stable operation and greatly reduces the need for periodic calibration
- Automated laser beam diameter control to fine tune the size of the heating area
- An advanced configurable system capable of producing tapers, ball lenses, combiners, MFAs, glass shaping and splicing
- Excellent performance for dissimilar diameter fiber splicing
- Ultra high strength splicing
- Redundant automated laser safety features
- 2.3 mm maximum fiber diameter (larger fibers may be spliced manually)
- Long travel / high resolution Z motion for long adiabatic tapers
- Automatic operation by on-board LZM-100 splicer firmware, manual operation or operation by PC (PC and FPS GUI included with the LZM-100 system)
- Intuitive FPS PC GUI: Easy to understand, navigate and operate
- Complete set of PC command codes enables users to develop proprietary processes



2 mm to 125 µm Splice



Advanced Adiabatic Tapering



Ball Lens 320 µm with  
125 µm Splice to 80 µm Fiber

### Ordering Information

DESCRIPTION	ITEM NO.
<b>LAZERMaster LZM-100 Glass Processing &amp; Splicing System</b> (Standard baseline LZM-100 system. Includes AC adapters & cords and SpliceLab PC software)	S015871
<b>LAZERMaster LZM-100</b> (with dual theta motors)	S015872
<b>All-in-one Computer</b> (includes keyboard and mouse, monitor stand for mounting all-in-one computer. SpliceLab software pre-installed.) (required)	S015242
<b>End-View Observation &amp; Alignment Option</b>	S015244
<b>Side Table Work Surface Option</b> (Work surface to provide additional area for accessories such as fiber preparation equipment. May be attached to the left or right side of the LZM-100 or both. Folds down against the side of the LZM-100 chassis when not needed or to allow easy movement through narrow doorways.)	S015247
<b>Cylindrical Lens &amp; Lens Holder</b> (optional)	S015251
<b>LZM-100 Training</b> (USA)	S015867
<b>LZM-100 Training</b> (International)	S015868
<b>Splicer V-Groove Cleaning Kit</b>	S014397

## LAZERMaster<sup>®</sup>

### LZM-100 Splicing System

#### Specifications

Fiber Heating and Splicing Method	CO <sub>2</sub> Laser
CO <sub>2</sub> Laser Power	30 W standard (Lasers expected lifetime is 20,000 hrs / 2.3 years before service is required.)
Laser Safety Features	<ul style="list-style-type: none"> <li>• Metal cover with interlock, class 1 enclosure</li> <li>• Automatic actuation of safety shutter</li> <li>• Automatic laser power cutoff</li> <li>• Triple redundancy</li> </ul>
Laser Beam Control	Proprietary feedback system assures laser beam power stability Laser beam size and shape may be customized to meet specific user requirements
Typical Splice Loss	0.02 dB for SMF (ITU-T G.652)
Typical Splice Strength	100 kpsi observed for SMF (ITU-T G.652) using appropriate fiber preparation equipment
Visible Field of View	2.5 mm (H) X 2.0 mm (W)
Fiber Observation Methods	<ul style="list-style-type: none"> <li>• PAS (Profile Alignment System) via transverse fiber observation.</li> <li>• WSI (Warm Splice Image) and WTI (Warm Taper Image)</li> <li>• End-view observation (Optional)</li> </ul>
Applicable Fiber Diameter	80 μm to 2300 μm for automatic alignment by PAS Larger diameter fibers may be aligned manually or by power meter feedback
V-Groove Clamping System	<ul style="list-style-type: none"> <li>• Infinitely variable from 80 μm up to 2300 μm</li> <li>• Clamping bare fiber or fiber coating</li> <li>• Patented “split V-groove” system</li> </ul>
Fiber Handling	Fujikura FSM-100, FSM-45 and FSM-40 splicer fiber holders Custom fixtures to meet specific customer requirements
Alignment Methods	<ul style="list-style-type: none"> <li>• PAS (Profile Alignment System, automatic alignment by camera observation)</li> <li>• Manual</li> <li>• Other methods by PC control</li> <li>• Power meter feedback via GPIB (Optional)</li> <li>• End-view (Optional)</li> </ul>
X/Y Alignment Resolution	Sub-micron
Maximum Z Travel Length	150 mm (both left and right Z units)
Z Travel Resolution	Sub-micron
Maximum Taper Length	130 mm
Maximum Taper Ratio	10:1 standard (For uniform direction, one-pass tapering) Dual direction tapering offers greatly increased taper ratios, as does tapering with more than one tapering pass.
Maximum Taper Speed	1 mm/sec standard (Optional 5 mm/sec)
Splicing Control	Internal firmware or operation by PC
Fiber Tapering & Glass Shaping Control	Internal firmware or operation by PC
PC Control	SpliceLab software will be provided Complete command set for PC control
PC Option	An all-in-one computer is required. Use of the SpliceLab software on a PC provides finer control and additional features compared to the LZM-100 internal firmware. Using another software application, the PC interface also allows for advanced maintenance functions such as the ability to confirm laser beam alignment, and align if required.
Interface Ports	USB 2.0 (For PC communications, data and image download, etc.) GPIB (Optional, for power meter feedback)
Electrical Power	100-240 VAC
Operating/Storage Conditions	+10° to +30°C / +5° to +40°C
Rotation Motors	Optional: Provides theta rotational motion for PM alignment for both left and right sides
PM Fiber Alignment Methods	<ul style="list-style-type: none"> <li>• PAS (For PANDA and other PM fibers)</li> <li>• IPA (Interrelation Profile Alignment, applicable to almost all PM fibers. Three distinct IPA methods available.)</li> <li>• End-view (Optional)</li> <li>• Power meter feedback (Requires polarizer and analyzer, as well as optional GPIB interface)</li> <li>• Manual</li> <li>• Other methods by PC control</li> </ul>
End-View Observation & Alignment	Optional internal end-view system

Preliminary Specifications, subject to revision and refinement



FSM-100M



FSM-100P

## Features

- Split V-groove clamping system
- “Plasma Zone” fiber positioning
- PAS and WSI
- New IPA alignment method for PM fibers
- Enhanced sweep arc technology
- Zero degree fiber handling for LDF
- Special functions for glass processing capability
- Fiber profile memory function
- New arc calibration technology
- Short cleave length capability
- Fast and accurate PANDA splice mode
- Ergonomic, production friendly design
- User selectable display on dual LCD monitors
- Internet firmware updates

# ARC Master™

## FSM-100M and FSM-100P Fusion Splicers

Whether splicing similar fiber types or double clad LDF fibers for high power lasers, the ARCMaster series splicers provide multiple solutions for diverse production needs. With State of the ARC™ technology, the ARCMaster sets the standard for fusion splicing with a multitude of new features designed to make splicing easier.

The patent-pending “split V-groove” fiber clamping system accommodates optical fiber ranges from 60 to 2,000 μm for cladding or coating without changing V-grooves or fiber clamps. The “Plasma Zone” fiber positioning system incorporates multiple fiber and electrode positioning techniques to provide unprecedented versatility for splicing LDF, heat sensitive or small diameter fibers.

With a new fiber imaging technology, Interrelation Profile Alignment (IPA), alignment and splicing capabilities are possible with virtually any PM fiber type. Longer fiber tapering application is possible with Fujikura’s Sweep Arc technology. Incorporating PAS (cold fiber image) and WSI (warm image) technologies, the optical analysis system provides a number of advanced features including improved loss estimation capabilities, fiber image performance with both LDF, small or heat sensitive fibers.

Users can program multi-step glass processing operations to include non-splicing operations such as generating tapers or lenses. Dual LCD monitors provide enhanced data and graphical information that is user-selectable during each stage of the splicing process. Both units are designed with the needs for production in mind and are suitable for the most popular production workstations.

## Ordering Information

DESCRIPTION	AFL NO.
<b>ARC Master FSM-100M Fusion Splicer</b> (machine only) <b>Includes:</b> FH-100-250 fiber holders (pair), FH-100-900 fiber holders (pair), spare electrodes (pair), ADC-15 AC adapter, ACC-02 AC power cord, USB cable, dust cleaning swab set, operation manual and software on CD, transit case, and One year factory warranty	S014821
<b>ARC Master FSM-100M Fusion Splicer Kit *</b>	S014822
<b>ARC Master FSM-100P Fusion Splicer</b> (machine only) <b>Includes:</b> FH-100-250 fiber holders (pair), FH-100-400 fiber holders (pair), FH-100-900 fiber holders (pair), spare electrodes (pair), ADC-15 AC adapter, ACC-02 AC power cord, USB cable, dust cleaning swab set, operation manual and software on CD, transit case, and One year factory warranty	S014823
<b>ARC Master FSM-100P Fusion Splicer Kit *</b>	S014824
One year extended warranty (extends factory warranty by one year)	S012996
Two year extended warranty (extends factory warranty by two years)	S013000

\* Each splicer kit includes an RS01 Thermal Stripper, a CT52 Cleaver and a SPA-RS02-08 Spacer for RS01 in addition to the items listed above.





## ARC Master™

### FSM-100M and FSM-100P Fusion Splicers

#### Specifications

PARAMETER	VALUE
Applicable Fiber	Silica based Single-mode and Multimode glass fiber: SMF (G.652), MMF (G.651), NZDSF (G.655), EDF, DCF, LDF and PMF, etc.
Fiber Dimension	Cladding diameter: 60 to 500 µm Coating diameter: 100 to 2,000 µm
Cleave Length	Glass clamping: 8 to 10 mm (standard 9 mm) Coating clamping: 3 to 5 mm (standard 4 mm)
Typical Splice Loss	SMF: 0.03 dB MMF: 0.02 dB NZDSF/LDF: 0.05 dB PMF: 0.06 dB (FSM-100P)
Splicing Time	SMF/MMF: 15 sec. NZDSF/LDF: 25 sec. PMF (PANDA): 35 to 50 sec. (FSM-100P) PMF (IPA): 90 to 300 sec. (FSM-100P)
Polarization Cross-Talk	PMF (PANDA): -40 dB / 0.6 degree (FSM-100P) PMF (IPA): -32 dB / 1.4 degree (FSM-100P)
Return Loss	60 dB or more
Heating Time	FP-40: 30 sec. FP-60: 35 sec. Micro sleeves: 55 sec.
Sweep Length	±5 mm
Electrode Life	2,500 Arc Discharges (SMF G.652 splicing at 1mm gap)
Electrode Gap	1 to 3 mm
Electrode Offset	-0.3 to +0.1 mm
Proof Test	1.96 N to 2.45 N
Dimensions (mm)	311W x 232D x 160H
Weight (excluding AC adapter)	FSM-100M: 7.5 kg FSM-100P: 8.0 kg
Operation Temperature	0°C to 40°C at 0 to 95% RH (Non-Dew)
Storage Temperature	-40°C to 80°C
Monitor Type	Dual 4.1 inch TFT color LCD monitors
Magnification	125 µm: 187 to 300 X 250 µm: 58 to 300 X 400 µm: 58 to 93 X

#### Accessories for the FSM-100M and FSM-100P

DESCRIPTION	AFL NO.
<b>High Strength Accessories</b>	
High Strength Preparation Kit Includes: USC-02, AFL PowerStrip and AFL PowerCleave	S013632
Ultrasonic Cleaner (USC-02)	S014783
HTS-12 High Tensile Stripper - includes 250 µm blades (400 µm available)	S012094
AFL PowerStrip High Tensile Stripper	S012808
AFL PowerCleave High Strength Cleaver	S009972
<b>Strippers</b>	
RS01 Thermal Stripper	S016815
RS03-80 Thermal Stripper	S016842
SPA-RS02-08 Spacer	S016818
<b>Electrodes</b>	
ELCT2-25 Spare Electrodes (pair)	S002068
<b>Cleavers</b>	
CT52 Cleaver	S017078
CT58 Cleaver ( for 80 µm cladding)	S017097
<b>Fiber Holders (Pairs)</b>	
FH-110-60 Fiber Holder	S018215
FH-110-100 Fiber Holder	S018216
FH-110-125 Fiber Holder	S018217
FH-110-150 Fiber Holder	S018218
FH-110-180 Fiber Holder	S018219
FH-110-210 Fiber Holder	S018220
FH-110-250 Fiber Holder	S018221
FH-110-300 Fiber Holder	S018222
FH-110-350 Fiber Holder	S018223
FH-110-400 Fiber Holder	S018224
FH-110-500 Fiber Holder	S018225
FH-110-600 Fiber Holder	S018226
FH-110-700 Fiber Holder	S018227
FH-110-800 Fiber Holder	S018228
FH-110-900 Fiber Holder	S018229
<b>Power and Cords</b>	
ADC-15 AC Adapter (FSM-100M/P)	S014826
ACC-02 AC Power Cord	S001171
ADC-09A AC Adapter (RS01)	S016820
ACC-09 AC Power Cord (for ADC-09)	S014390
<b>Miscellaneous</b>	
CC-27 Transit Case (100 M/P)	S014825
DCS-01 Dust Cleaning Swab	S014827
HP Power Meter Coupling Adapter	S012180
ILX Power Meter Coupling Adapter	S012184
Fiber Holder Adapter for HP/ILX PM	S012188
Splicer V-Groove Cleaning Kit	S014397

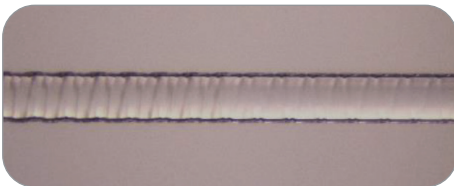


# LAZERMasteR<sup>®</sup>

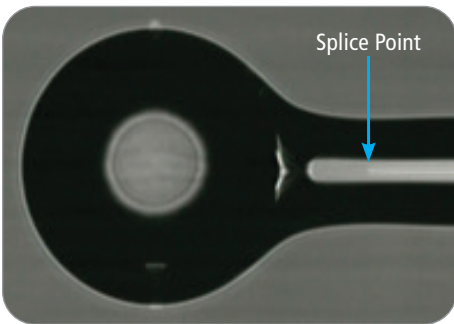
## LZM-125A+ Splicing System

The LAZERMasteR LZM-125A+ is a splicing and glass processing system that uses a CO<sub>2</sub> laser heat source to perform splicing, tapering (to create MFAs), lensing, or other glass shaping operations with glass diameters of 2.0 mm or less. The high-resolution optical analysis system works in conjunction with on-board firmware for fully automatic splicing, tapering and other glass shaping processes.

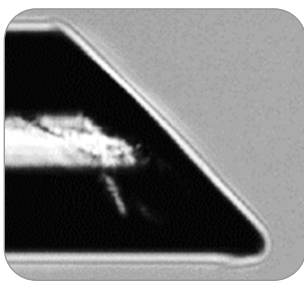
High precision glass processing is enabled by the intuitive and user-friendly on-board firmware (virtually identical to that of the Fujikura FSM-100 splicers). Operations may also be performed manually and by PC control. The FPS PC control GUI is supplied with the LZM-125A+ to provide additional features, greater flexibility, and finer control. The FPS GUI may be used on a PC chosen by the customer. Customers can also create proprietary PC control algorithms using a complete set of PC control commands.



Ablated Fiber Surface



Coreless Ball Lens to Collimate SMF Fiber



Ablated Fiber Surface

### Features

- Fiber Ablation that can be used for cleaving, shaping, or custom mode stripping
- Splices and glass processing of fibers with 80 μm up to 2.0 mm diameter
- High resolution motion for precise control during splicing and glass processing operations
- Extensive library of applications which are transferable between the LZM and FSM family
- FPS PC GUI provides additional measurement capabilities and glass shaping control
- Clean modular laser heat source: Absolutely no deposits on fiber surface as might occur with filaments or electrodes.
- Substantially reduces maintenance and calibration requirements
- Proprietary feedback system ensures heating power stability
- No need for external process gas (as required with filament systems) or Vacuum systems
- Class 1 System with redundant automated laser safety features
- Motorized mirrors to automatically adjust the beam path

### Ordering Information

DESCRIPTION	AFL NO.
<b>LAZERMasteR LZM-125A+ Glass Processing and Splicing System</b> (Standard baseline LZM-125 system. Includes AC adapters and cords and FPS PC software.)	S017800
Optional Tablet PC (includes FPS software pre-installed) (recommended)	S016772
LZM Training (Optional US based at customer locations)	S015867
LZM Training (Optional International)	S015868
Splicer V-groove Cleaning Kit	S014397

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# LAZERMaster®

## LZM-125A+ Splicing System

### Specifications

PARAMETER	CO <sub>2</sub> LASER
Fiber Heating and Splicing Method	30 W standard
CO <sub>2</sub> Laser Power	Metal cover with multiple interlocks, class 1 enclosure, automatic actuation of shutter, automatic laser power cutoff
Laser Safety Features	Proprietary feedback system assures laser beam power stability
Laser Beam Control	Standard beam size is 4.5 mm X 2 mm and a minimum spot of 30 µm for ablations)
Typical Splice Loss	0.02 dB for SMF (ITU-T G.652)
Typical Splice Strength	100 kpsi for SMF (ITU-T G.652) using appropriate fiber preparation equipment
Camera Field of View	2.3 mm
Fiber Observation Methods	PAS (Profile Alignment System) via transverse fiber observation WSI (Warm Splice Image) and WTI (Warm Taper Image) End-view observation
Applicable Fiber Diameter	End-view observation
V-Groove Clamping System	80 µm to 2000 µm for automatic alignment by PAS Larger diameter endcaps may be aligned manually
Fiber Handling	Infinitely variable from 80 µm up to 2000 µm Clamping bare fiber or fiber coating in the "split V-groove" system
Alignment Methods	<ul style="list-style-type: none"> <li>• PAS (Profile Alignment System, automatic alignment by camera observation)</li> <li>• Manual</li> <li>• PC control with Power Meter feedback via GPIB/USB</li> <li>• End-view</li> </ul>
Endless Theta Rotation	360° endless rotation, angle resolution 0.1°
X/Y Alignment Resolution	Sub-micron
Maximum Z Travel Length	18 mm (both left and right Z units) as well as sweep with a total of 36 mm
Z Travel Resolution	0.125 µm theoretical
Maximum Taper Length	32 mm
Maximum Taper Ratio	10:1 standard (For uniform direction, one-pass tapering) Dual direction tapering offers greatly increased taper ratios, as does tapering with more than one tapering pass.
Maximum Taper Speed	1 mm/sec standard
Splicing Control	Internal firmware or operation by PC
Fiber Tapering and Glass Shaping Control	Internal firmware or operation by PC
PC Control	FPS software will be provided Complete command set for PC control
PC Option	Optional Tablet PC (includes FPS software pre-installed). Use of the FPS software on a PC provides finer control and additional features compared to the LZM-110 internal firmware
Interface Ports	USB 2.0 (For PC communications, data and image download, etc.) GPIB/USB (for power meter feedback)
Electrical Power	100-240 VAC
Operating Conditions / Storage Conditions	10 to 40°C / 5 to 60°C
Rotation Motors	For LZM-125A+, theta rotational motion is available for PM fiber alignment.
PM Fiber Alignment Methods	<ul style="list-style-type: none"> <li>• PAS (For PANDA and other PM fibers)</li> <li>• IPA (Interrelation Profile Alignment, applicable to almost all PM fibers. Three distinct IPA methods available.)</li> <li>• End-view</li> <li>• Power meter feedback (Requires polarizer and analyzer, as well as GPIB interface)</li> <li>• Manual</li> <li>• Other methods by PC control</li> </ul>
End-View Observation and Alignment	Internal end-view system
Flexibility for Customer Design Input	Customizable platform

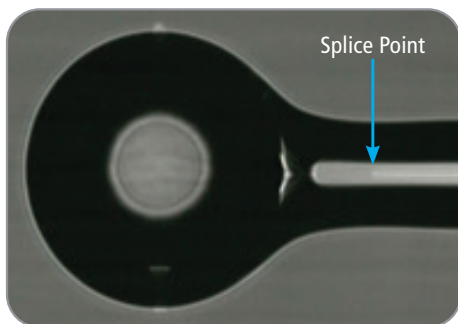


# LAZERMasteR<sup>®</sup>

## LZM-125M/LZM-125P Splicing System

The LAZERMasteR LZM-125M/LZM-125P is a splicing and glass processing system that uses a CO<sub>2</sub> laser heat source to perform splicing, tapering (to create MFAs), lensing, or other glass shaping operations with glass diameters of 2.0 mm or less. The high-resolution optical analysis system works in conjunction with on-board firmware for fully automatic splicing, tapering and other glass shaping processes.

High precision glass processing is enabled by the intuitive and user-friendly on-board firmware (virtually identical to that of the Fujikura FSM-100 splicers). Operations may also be performed manually and by PC control. The FPS PC control GUI is supplied with the LZM-125M/LZM-125P to provide additional features, greater flexibility, and finer control. The FSP GUI may be used on a PC chosen by the customer. Customers can also create proprietary PC control algorithms using a complete set of PC control commands.



Coreless Ball Lens to Collimate SMF Fiber



Tapered Probe with Small Ball End

### Features

- Splices and glass processing of fibers with 80 μm up to 2.0 mm diameter
- High resolution motion for precise control during splicing and glass processing operations
- Extensive library of applications which are transferable between the LZM and FSM family
- FPS PC GUI provides additional measurement capabilities and glass shaping control
- Clean modular laser heat source: Absolutely no deposits on fiber surface as might occur with filaments or electrodes.
- Substantially reduces maintenance and calibration requirements
- Proprietary feedback system ensures heating power stability
- No need for external process gas (as required with filament systems) or Vacuum systems
- Class 1 System with redundant automated laser safety features
- Motorized mirrors to automatically adjust the beam path

### Ordering Information

DESCRIPTION	AFL NO.
<b>LAZERMasteR LZM-125M Glass Processing and Splicing System</b> (Standard baseline LZM-125 system. Includes AC adapters, cords and FPS PC software)	S017801
<b>LAZERMasteR LZM-125P Glass Processing and Splicing System</b> (Standard baseline LZM-125 system. Includes AC adapters, cords and FPS PC software)	S017803
Optional Tablet PC (includes FPS software pre-installed) (recommended)	S016772

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# LAZERMaster®

## LZM-125M/LZM-125P Splicing System

### Specifications

PARAMETER	VALUE
Fiber Heating and Splicing Method	CO <sub>2</sub> Laser
CO <sub>2</sub> Laser Power	30 W standard
Laser Safety Features	Metal cover with multiple interlocks, class 1 enclosure, automatic actuation of safety shutter, automatic laser power cutoff
Laser Beam Control	Proprietary feedback system assures laser beam power stability
Typical Splice Loss	0.02 dB for SMF (ITU-T G.652)
Typical Splice Strength	100 kpsi for SMF (ITU-T G.652) using appropriate fiber preparation equipment
Camera Field of View	2.3 mm
Fiber Observation Methods	PAS (Profile Alignment System) via transverse fiber observation WSI (Warm Splice Image) and WTI (Warm Taper Image)
Applicable Fiber Diameter	80 μm to 2000 μm for automatic alignment by PAS Larger diameter endcaps may be aligned manually
V-groove Clamping System	Infinitely variable from 80 μm up to 2000 μm Clamping bare fiber or fiber coating Patented “split V-groove” system
Fiber Handling	Fujikura FSM-100, FSM-45, and FSM-40 splicer fiber holders
Alignment Methods	3 methods for PM alignment: <ul style="list-style-type: none"> <li>• PAS (Profile Alignment System, automatic alignment by camera observation) Manual</li> <li>• Other methods by PC control</li> <li>• Power meter feedback via GPIB</li> </ul>
Endless Theta Rotation	360° endless rotation for 125P model, angle resolution 0.1°
X/Y Alignment Resolution	0.1 μm
Maximum Z Travel Length	5 mm (both left and right Z units) as well as sweep with a total of 10 mm
Z Travel Resolution	0.125 μm theoretical
Maximum Taper Length	8 mm
Maximum Taper Ratio	10:1 standard (For uniform direction, one-pass tapering) Dual direction tapering offers greatly increased taper ratios, as does tapering with more than one tapering pass.
Maximum Taper Speed	1 mm/sec standard
Splicing Control	Internal firmware or operation by PC
Fiber Tapering and Glass Shaping Control	Internal firmware or operation by PC
PC Control	FPS software will be provided complete command set for PC control
PC Option	Tablet computer is available as an option. Use of the FPS software on a PC provides finer control and additional features compared to the LZM-125 internal firmware.
Interface Ports	USB 2.0 (For PC communications, data and image download, etc.) GPIB (for power meter feedback)
Electrical Power	100-240 VAC
Operating/Storage Conditions	10 to 40°C / 5 to 60°C
Rotation Motors	Optional (Provides theta rotational motion for PM fiber alignment in the LZM-125P model)
PM Fiber Alignment Methods	<ul style="list-style-type: none"> <li>• PAS (For PANDA and other PM fibers)</li> <li>• IPA (Interrelation Profile Alignment, applicable to almost all PM fibers. Three distinct IPA methods available.)</li> <li>• Power meter feedback (Requires polarizer and analyzer, as well as GPIB interface)</li> <li>• Manual</li> <li>• Other methods by PC control</li> </ul>
Flexibility for Customer Design Input	Customizable platform



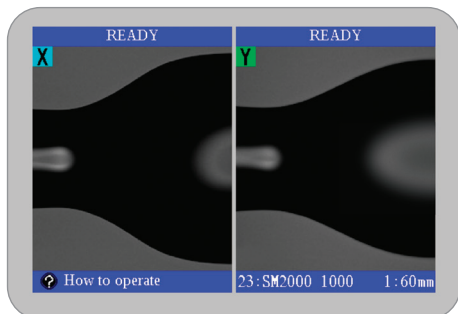


# LAZERMasteR<sup>®</sup>

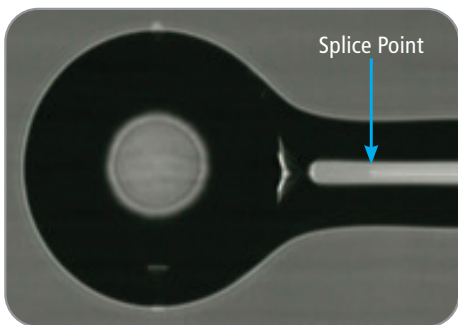
## L2M-125M+/L2M-125P+ Splicing System

The LAZERMasteR L2M-125M+/L2M-125P+ is a splicing and glass processing system that uses a CO<sub>2</sub> laser heat source to perform splicing, tapering (to create MFAs), lensing, or other glass shaping operations with glass diameters of 2.0 mm or less. The high-resolution optical analysis system works in conjunction with on-board firmware for fully automatic splicing, tapering and other glass shaping processes.

High precision glass processing is enabled by the intuitive and user-friendly on-board firmware (virtually identical to that of the Fujikura FSM-100 splicers). Operations may also be performed manually and by PC control. The FPS PC control GUI is supplied with the L2M-125M+/L2M-125P+ to provide additional features, greater flexibility, and finer control. The FSP GUI may be used on a PC chosen by the customer. Customers can also create proprietary PC control algorithms using a complete set of PC control commands.



Coreless Ball Lens to Collimate SMF Fiber



Coreless Ball Lens to Collimate SMF Fiber



Tapered Probe with Small Ball End

### Features

- Splices and glass processing of fibers with 80 μm up to 2.0 mm diameter
- High resolution motion for precise control during splicing and glass processing operations
- Extensive library of applications which are transferable between the L2M and FSM family
- FPS PC GUI provides additional measurement capabilities and glass shaping control
- Clean modular laser heat source: Absolutely no deposits on fiber surface as might occur with filaments or electrodes.
- Substantially reduces maintenance and calibration requirements
- Proprietary feedback system ensures heating power stability
- No need for external process gas (as required with filament systems) or Vacuum systems
- Class 1 System with redundant automated laser safety features
- Motorized mirrors to automatically adjust the beam path

### Ordering Information

DESCRIPTION	AFL NO.
<b>LAZERMasteR L2M-125M+ Glass Processing and Splicing System</b> (Standard baseline L2M-125 system. Includes AC adapters, cords and FPS PC software)	S017802
<b>LAZERMasteR L2M-125P+ Glass Processing and Splicing System</b> (Standard baseline L2M-125 system. Includes AC adapters, cords and FPS PC software)	S017804
Optional Tablet PC (includes FPS software pre-installed) (recommended)	S016772

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# LAZERMaster®

## LZM-125M+/LZM-125P+ Splicing System

### Specifications

PARAMETER	VALUE
Fiber Heating and Splicing Method	CO <sub>2</sub> Laser
CO <sub>2</sub> Laser Power	30 W standard
Laser Safety Features	Metal cover with multiple interlocks, class 1 enclosure, automatic actuation of shutter, automatic laser power cutoff
Laser Beam Control	Proprietary feedback system assures laser beam power stability
Typical Splice Loss	0.02 dB for SMF (ITU-T G.652)
Typical Splice Strength	100 kpsi for SMF (ITU-T G.652) using appropriate fiber preparation equipment
Camera Field of View	2.3 mm
Fiber Observation Methods	PAS (Profile Alignment System) via transverse fiber observation WSI (Warm Splice Image) and WTI (Warm Taper Image) End-view observation
Applicable Fiber Diameter	80 μm to 2000 μm for automatic alignment by PAS; Larger diameter endcaps may be aligned manually
V-groove Clamping System	Infinitely variable from 80 μm up to 2000 μm Clamping bare fiber or fiber coating Patented "split V-groove" system
Fiber Handling	Fujikura FSM-100, FSM-45, and FSM-40 splicer fiber holders
Alignment Methods	4 methods for PM alignment: <ul style="list-style-type: none"> <li>• PAS (Profile Alignment System, automatic alignment by camera observation) Manual</li> <li>• Other methods by PC control</li> <li>• Power meter feedback via GPIB</li> <li>• End-view</li> </ul>
Endless Theta Rotation	360° endless rotation for 125P+ model, angle resolution 0.1° (LZM-125P+ only)
X/Y Alignment Resolution	0.1 μm
Maximum Z Travel Length	18 mm (both left and right Z units) as well as sweep with a total of 36 mm
Z Travel Resolution	0.125 μm theoretical
Maximum Taper Length	32 mm
Maximum Taper Ratio	10:1 standard (For uniform direction, one-pass tapering) Dual direction tapering offers greatly increased taper ratios, as does tapering with more than one tapering pass
Maximum Taper Speed	1 mm/sec standard
Splicing Control	Internal firmware or operation by PC
Fiber Tapering and Glass Shaping Control	Internal firmware or operation by PC
PC Control	FPS software will be provided complete command set for PC control
PC Option	Tablet computer is available as an option. Use of the FPS software on a PC provides finer control and additional features compared to the LZM-125 internal firmware.
Interface Ports	USB 2.0 (For PC communications, data and image download, etc.) GPIB (for power meter feedback)
Electrical Power	100-240 VAC
Operating/Storage Conditions	10 to 40°C / 5 to 60°C
Rotation Motors	Optional (Provides theta rotational motion for PM fiber alignment) Available for both left and right fibers, or one side only (depending upon customer requirements)
PM Fiber Alignment Methods	<ul style="list-style-type: none"> <li>• PAS (For PANDA and other PM fibers)</li> <li>• IPA (Interrelation Profile Alignment, applicable to almost all PM fibers. Three distinct IPA methods available.)</li> <li>• End-view</li> <li>• Power meter feedback (Requires polarizer and analyzer, as well as GPIB interface)</li> <li>• Manual</li> <li>• Other methods by PC control</li> </ul>
End-View Observation and Alignment	Internal end-view system
Flexibility for Customer Design Input	Customizable platform



FSR-115



FSR-116



FSR-117

## FSR-115, FSR-116 and FSR-117 Optical Fiber Recoaters

AFL offers a complete lineup of high-quality optical fiber recoaters to reconstitute the primary coating of an optical fiber. In applications with flexible packaging requirements, high strength and high reliability splices, softer coatings for gyroscope splices, low-index coatings for power delivery and more.

The latest recoaters from Fujikura improve on their respective predecessors in numerous ways. The time to inject recoat material has been reduced by over 50% due to an improved pumping mechanism and new glass mold design. While still utilizing quartz glass, the new mold design improves both pump time and recoat length accuracy, especially for longer recoats, by improving the flow rate of material across the entire mold. The mold also features a unique RFID capability, enabling the FSR to automatically limit selectable recoat modes in the UI, based on mold size installed and recoat mode parameters. This feature speeds up application changeover and can serve as a production control measure. Further enabling ease of changeover, this FSR series includes user exchangeable inserts for different sizes and combinations of fiber coating and mold. To maintain concentricity of the fiber relative to the mold, the height of the fiber must change in the clamping system outside of the mold. This process is a simple exchange of metal inserts in the fiber clamps. For fine-tuned height adjustments, spare shims are included in every recoater shipment. Like their predecessors, the FSR-115 has no proof tension, the FSR-116 has a linear proof tester up to 2 kgf, and the FSR-117 has mandrel wraps for up to 10 kgf of tension or proof to failure for most fibers.

This generation of recoaters brings exciting benefits to the specialty fiber optic industry. Fujikura continues to lead with innovation and value in the quality solutions they develop. Put our recoaters to the test by contacting us at 1-800-235-3423.

### Features

- RFID mold identification for simple recoat mode selection
- Easy user exchangeable mold, inserts and shims for precise concentricity in any application
- Consistent, accurate recoat lengths
- Fast pumping mechanism for cycle time reduction
- Laser light illumination of recoat mold for ease of viewing during injection
- 2 kgf or 10 kgf proof tension depending on model
- Touchscreen graphical UI

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## FSR-115, FSR-116 and FSR-117 Optical Fiber Recoaters

### Specifications

PARAMETER	FSR-115	FSR-116	FSR-117
Applicable optical fiber	Single Fiber		
Applicable fiber coating diameters	90-970 $\mu\text{m}$		
Recoat diameters	195 $\mu\text{m}$ , 255 $\mu\text{m}$ , 280 $\mu\text{m}$ , 320 $\mu\text{m}$ , 330 $\mu\text{m}$ , 450 $\mu\text{m}$ , 600 $\mu\text{m}$ , 660 $\mu\text{m}$ , 670 $\mu\text{m}$ , 850 $\mu\text{m}$ , 1000 $\mu\text{m}$ Custom sizes available		
Recoat length	4 to 50 mm <sup>1</sup> Recoat Length Accuracy $\pm 20\%$ <sup>2</sup>		
Resin injection time	DSM 950-200: Injection 17 sec. <sup>2</sup> PC-373LD: 20 sec. <sup>2</sup>		
Resin curing time	DSM 950-200: 4 sec. <sup>2</sup> PC-373LD: 10 sec. <sup>2</sup>		
UV LEDs	UV LEDs are placed on top and bottom. Individual control of light emitting position, intensity and time are possible. UV Center Emission Wavelength Approx: 365 nm		
Mold material	Quartz		
Load application and mechanism	—	Linear Flat Clamp	Mandrel Wrap
Tension	—	0.2-2.0 kgf (1.96 N-19.61 N)	0.2-10.0 kgf (1.96 N-98.07 N)
Dimensions	252 mm (W) x 135 mm (D) x 169 mm (H)	252 mm (W) x 175 mm (D) x 169 mm (H)	
Weight	3.3 kg	4.8 kg	5.0 kg
Storage conditions	-40°C to 80°C, 0 to 95% RH non-condensing		
Operating conditions	10°C to 30°C, 0 to 95% RH non-condensing		
AC Adapter	Input power	AC 100 V to 240 V, 50/60 Hz Max, 1.5 A (ADC-21A)	
	Output power	DC 19 V, Max 2.1 A	
LCD monitor	TFT 4.95" touchscreen		
PC interface	USB 2.0 Type B mini		
Firmware update	Firmware downloaded from Fujikura servers via "Data Connection" PC Software		
Data storage	Recoating	100 programmable modes 5000 finished recoats	
	Proof testing	—	30 programmable modes 5000 finished proof test results
Wireless communication	RFID, ISO 15693 compliant		
Proof test calibration	—	Requires FGA-02 and FGP-20 force gauge <sup>3</sup>	

#### NOTES:

- Exact recoat length dependent on combination of recoat diameter, fiber coating, ambient temperature, and other environmental factors.
- Test Conditions
  - UV recoat resin: DSM 950-200 or Luvantix ADM Ltd. PC-373LD
  - Recoat diameter: 280  $\mu\text{m}$
  - Recoat length: 20 mm
  - Fiber: 125  $\mu\text{m}$  cladding with transparent UV acrylate 250  $\mu\text{m}$  coating diameter, strip length 16 mm
  - Temperature: 25°C
- FGP-20 is manufactured by Nidec-Shimpo Co. Ltd. and not provided by AFL.

## FSR-115, FSR-116 and FSR-117 Optical Fiber Recoaters

### Ordering Information — Recoaters

For a fully operable recoater, required components are: FSR-115/116/117 recoater body (1), FSR-115/116/117 mold (1) and FSR-115/116/117 insert pair (1).

Part numbers below with “Kit” in the description include all three components.

DESCRIPTION	AFL NO.
<b>FSR-115 Recoater Body</b> Includes: FSR-115, ADC-21 AC adapter, ACC-09 AC power cord, FSR-115/116/117 insert shim set, FSR-115/116/117 insert set screws, HEX-04 hex wrench, USB-01 USB Cable, QRG-08-E quick reference guide, and One year factory warranty	S018142
<b>FSR-116 Recoater Body</b> Includes: FSR-116, ADC-21 AC adapter, ACC-09 AC power cord, PC-02 protection cover, FSR-115/116/117 insert shim set, FSR-115/116/117 insert set screws, HEX-04 hex wrench, USB-01 USB Cable, QRG-08-E quick reference guide, and One year factory warranty	S018143
<b>FSR-117 Recoater Body</b> Includes: FSR-117, ADC-21 AC adapter, ACC-09 AC power cord, PC-03 protection cover, FSR-115/116/117 insert shim set, FSR-115/116/117 insert set screws, HEX-04 hex wrench, USB-01 USB Cable, QRG-08-E quick reference guide, and One year factory warranty	S018144
<b>FSR-115 Kit with 280 µm mold and 225-275 µm inserts</b> Includes: FSR-115, 280 µm mold, 225-275 µm inserts, ADC-21 AC adapter, ACC-09 AC power cord, FSR-115/116/117 insert shim set, FSR-115/116/117 insert set screws, HEX-04 hex wrench, USB-01 USB Cable, QRG-08-E quick reference guide, and One year factory warranty	S018170
<b>FSR-116 Kit with 280 µm mold and 225-275 µm inserts</b> Includes: FSR-116, 280 µm mold, 225-275 µm inserts, ADC-21 AC adapter, ACC-09 AC power cord, PC-02 protection cover, FSR-115/116/117 insert shim set, FSR-115/116/117 insert set screws, HEX-04 hex wrench, USB-01 USB Cable, QRG-08-E quick reference guide, and One year factory warranty	S018171
<b>FSR-117 Kit with 280 µm mold and 225-275 µm inserts</b> Includes: FSR-117, 280 µm mold, 225-275 µm inserts, ADC-21 AC adapter, ACC-09 AC power cord, PC-03 protection cover, FSR-115/116/117 insert shim set, FSR-115/116/117 insert set screws, HEX-04 hex wrench, USB-01 USB Cable, QRG-08-E quick reference guide, and One year factory warranty	S018172

### Accessories

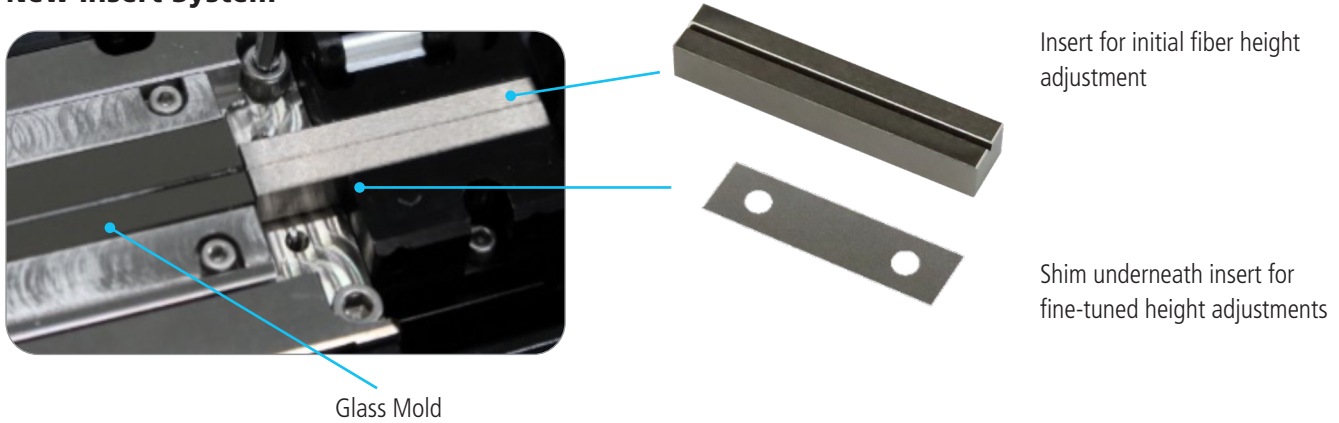
DESCRIPTION	AFL NO.
<b>MOLDS</b>	
FSR-115/116/117 195 µm Mold	S018146
FSR-115/116/117 255 µm Mold	S018147
FSR-115/116/117 280 µm Mold	S018145
FSR-115/116/117 320 µm Mold	S018148
FSR-115/116/117 330 µm Mold	S018149
FSR-115/116/117 450 µm Mold	S018150
FSR-115/116/117 600 µm Mold	S018151
FSR-115/116/117 650 µm Mold	S018152
FSR-115/116/117 670 µm Mold	S018153
FSR-115/116/117 850 µm Mold	S018154
FSR-115/116/117 1000 µm Mold	S018155
<b>INSERTS</b>	
FSR-115/116/117 Inserts (90-110 µm fiber coating)	S018156
FSR-115/116/117 Inserts (110-140 µm fiber coating)	S018157
FSR-115/116/117 Inserts (140-180 µm fiber coating)	S018158
FSR-115/116/117 Inserts (180-225 µm fiber coating)	S018159
FSR-115/116/117 Inserts (225-275 µm fiber coating)	S018160
FSR-115/116/117 Inserts (250-350 µm fiber coating)	S018161
FSR-115/116/117 Inserts (350-450 µm fiber coating)	S018162
FSR-115/116/117 Inserts (450-550 µm fiber coating)	S018163
FSR-115/116/117 Inserts (540-660 µm fiber coating)	S018164
FSR-115/116/117 Inserts (660-810 µm fiber coating)	S018165
FSR-115/116/117 Inserts (810-970 µm fiber coating)	S018166

DESCRIPTION	AFL NO.
<b>MISCELLANEOUS</b>	
Protection cover for FSR-116: PC-02	S016107
Protection cover for FSR-117: PC-03	S016108
FSR-115/116/117 Insert Set Screws (QTY: 5)	S018169
FSR-115/116/117 Insert Shim Set	S018167
UV resin bottle: FSR-05-BTL-01	S016112
Force gauge adaptor: FGA-02	S016113
AC adapter ADC-21	S018168
AC power cord ACC-09	S014390

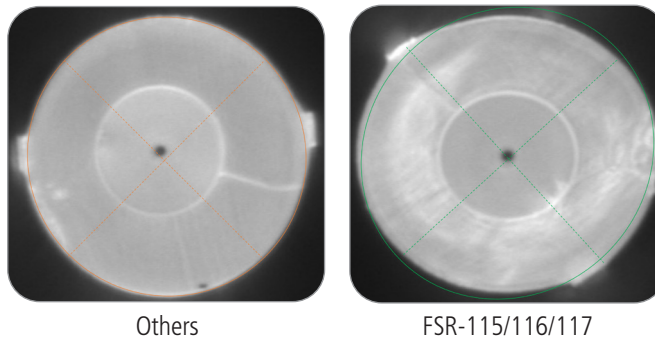
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## FSR-115, FSR-116 and FSR-117 Optical Fiber Recoaters

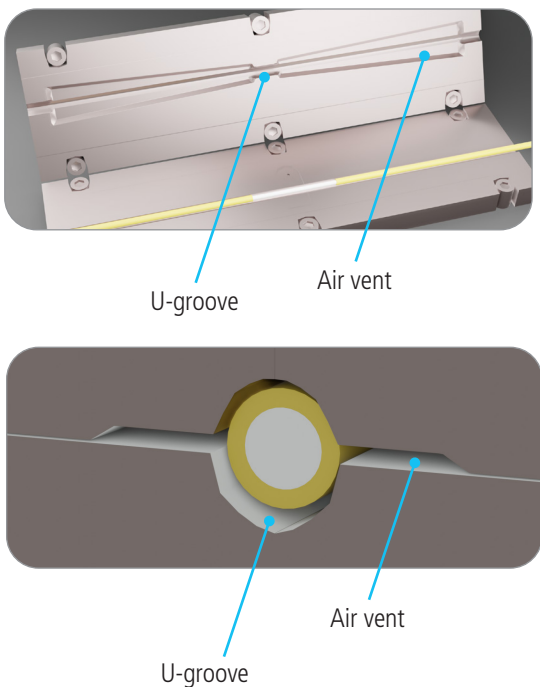
### New Insert System



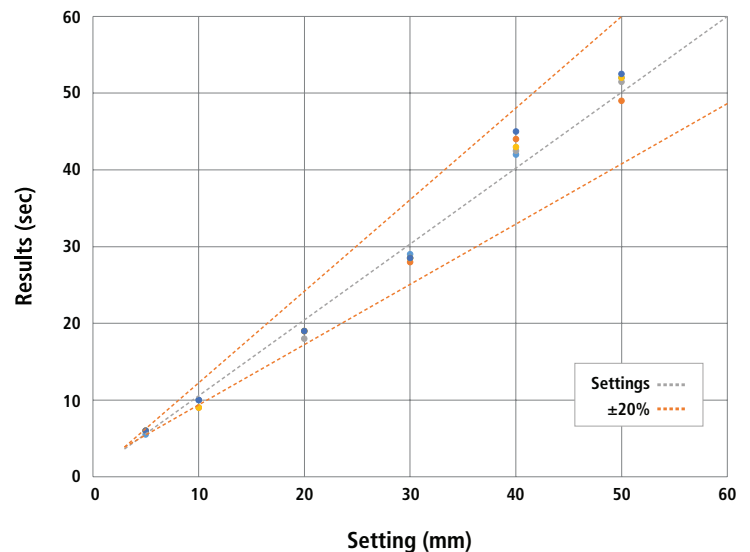
**Simple. Repeatable. Concentric.**



### Improved Mold Design



### Comparison Recoat Length Settings vs. Results<sup>1</sup>

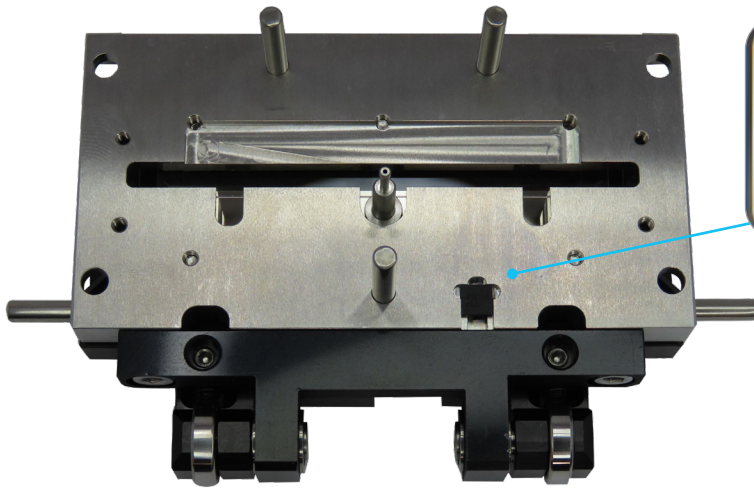


1. The table does not guarantee the recoat length accuracy. Test conditions: (1) UV recoat Resin: Japan Fine Coatings Co., Ltd. 950Y200; (2) Recoat diameter: 280 μm; (3) Recoat Length: 10-50 mm; (4) Fiber: Clad Diameter 125 μm/Transparent UV 250 μm Coating Diameter, Coating Stripping length 60 mm; and (5) Environmental Condition: 25°C

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## FSR-115, FSR-116 and FSR-117 Optical Fiber Recoaters

### RFID for Mold Identification by the FSR



Underside of Mold

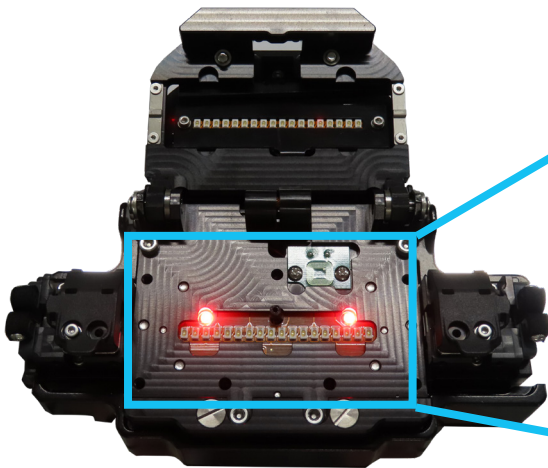


RFID Chip

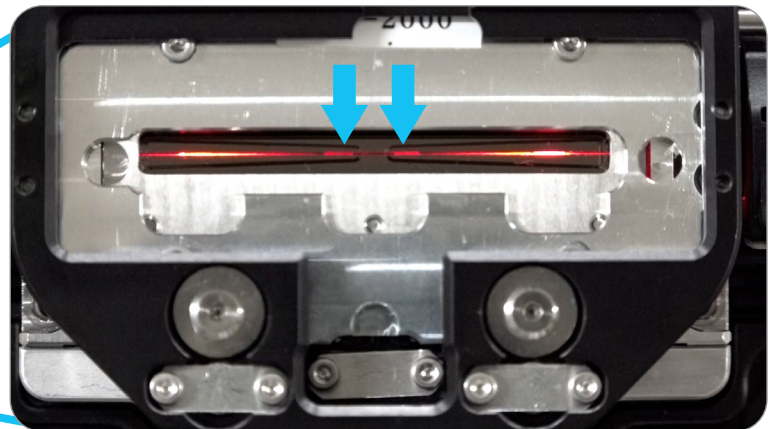
Select Recoat Mode		
19: BASIC 280HI	L=20mm	⚙️
20: SPECIAL 280	L=20mm	⚙️
21: BASIC 280LI	L=20mm	⚙️
22: BASIC 450HI	L=20mm	⚙️
23: BASIC 450HI	L=34mm	⚙️
24: BASIC 450HI	L=12mm	⚙️
25: BASIC 450LI	L=34mm	⚙️

Suggests suitable programs

### Improved Viewing During Injection



Mold Removed



Mold Viewing Window



## CT16 Fiber Cleaver

The CT16 fiber cleaver from Fujikura was designed for FTTH or other space constrained applications where ergonomics and durability are key. It is compact, can be operated ambidextrously, and features a unique fiber adapter, allowing users to cleave two bare fibers simultaneously when paired with the dual fiber stripper, the SS-05. The scrap collector and fiber adapter side can be swapped by the user for left or right-handed preference, or as environmental constraints dictate. Furthermore, the thumbwheel on the bottom of the cleaver is utilized for blade rotations as opposed to previous tedious processes to rotate a cleaver blade. The top lever opens past vertical allowing for easy viewing, cleaning, and adjustment of the cleave length. The blade is retracted when the top lever is opened and the blade activates to score the fiber when it is closed, making this a true one-step cleaver. Like its predecessor, this cleaver can withstand a 30" drop from any of six different orientations and still maintain factory specified cleave angle performance. The cleaver blade and fiber clamping mechanisms are easy to replace in the field, mitigating the need to send this cleaver in for service.



### Features

- Dual fiber adapter plate for single or two fiber cleaving
- Ambidextrous operation available
- Field replaceable fiber clamp pads and cleaver blade
- Shock resistant for drops up to 30" in any of six different orientations
- Compact form factor and tool-less blade rotations

### Applications

- Small cell site
- FTTH drops and terminations
- MDF/IDF splices and terminations
- Rural fiber deployments and restorations

### Ordering Information

DESCRIPTION	AFL NO.
<b>CT16 Fiber Cleaver</b> includes: FDB-06 scrap collector, AD-16A fiber adapter, HEX-01 hex wrench (1.5 mm), M-CT16-E instruction manual, CC-46 carrying case	S018330
FDB-06 Scrap Collector	S018329
CB-09 Replacement Cleaver Blade	S018335
ARM-CT16-01 Replacement Fiber Clamp Pads	S018373
AD-16A Fiber Adapter (up to 900um coating)	S018328
AD-16B Fiber Adapter (up to 3.0mm jacket)	S018331
CC-46 Carrying Case	S018374

*continued*  
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## CT16 Fiber Cleaver

### Specifications

PARAMETER		VALUE
Applicable Fiber	Fiber type	Single-mode optical fiber Multimode optical fiber
	Fiber count	2 single fibers
	Cladding diameter	Approx. 125 $\mu\text{m}$
Applicable Coating	Adapter plate	AD-16A: Max 900 $\mu\text{m}$ coating diameter single fiber or 250 $\mu\text{m}$ coating diameter for two fibers AD-16B: Max. 3 mm jacket diameter
	Fiber holders	FH-60 and FH-70 series – coating diameter dictated by specific fiber holder
Cleave Length	Adapter plate	AD-16A: 5 – 20 mm* <sup>1</sup> AD-16B: Coating diameter – 250 $\mu\text{m}$ or less: 5-20 mm* <sup>1</sup> 251 $\mu\text{m}$ -900 $\mu\text{m}$ : 10-20 mm 901 $\mu\text{m}$ -3 mm: 14-20 mm
	Fiber holder	Approx. 10 mm
Cleave Angle* <sup>2</sup>	Single fiber	Avg. 0.3 to 0.9 degrees
Blade Life* <sup>3</sup>		Approx. 48,000 fiber cleaves
Physical description	Dimensions W	Approx. 106 mm without projection* <sup>4</sup>
	Dimensions D	Approx. 95.5 mm without projection* <sup>4</sup>
	Dimensions H	Approx. 49 mm without projection* <sup>4</sup>
	Weight	Approx. 190 g including AD-16A
Environmental condition	Temperature	Operate: -10 to 50°C Storage: -40 to 80°C
	Humidity	Operate: 0 to 95%RH non-condensing Storage: 0 to 95%RH non-condensing
Other features	Blade rotation	Manual dial underneath cleaver
	Replaceable items	Cleaver blade Fiber clamp pads
	Fiber adapter base and scrap collector	Can be swapped position for ambidextrous operation
	Cleave count	Up to two individual bare fibers

### Notes

1. When the cleave length is less than 10 mm, the coating diameter should be 250  $\mu\text{m}$  or less. Also, a blade height adjustment is required before cleaving. The average cleave angle is worse than the specification above when the cleave length is less than 10 mm.
2. Measured with an interferometer at room temperature, not with a splicer. A new blade was used to cleave the single fibers. The average cleave angle changes depending on the environmental conditions, blade condition, operating method, and cleanliness.
3. The blade life changes depending on the environmental conditions, operating method, and the fiber type cleaved.
4. Measured with the top lever closed.





Bluetooth



Shown in CC-37 Carrying Case

### Features

- Motorized blade rotation
- Bluetooth communication
- Shock resistant
- Simple one-step operation
- 60,000 cleave blade life
- Field serviceable



## CT50 Fiber Cleaver

The CT50 features automated blade rotation, unprecedented durability, and simplistic maintenance unseen with any other cleaver. Paired with a Bluetooth enabled Fujikura splicer, cleaver blade positions can be automatically advanced when needed based on cleave count or cleave quality. If automated rotation is not desired, the blade position can be advanced at the touch of a button, no tools required. The easy to read blade position indicator clearly displays the selected position. The Bluetooth® feature, along with simplified mechanical operation, increases overall productivity and reliability. The fiber clamp opens beyond 90 degrees and readies the blade for cleaving in the same motion. This allows easy viewing of the distance scale used to gauge cleave length. The 16-position blade yields 60,000 single-fiber cleaves, or 5,000 12-fiber ribbon cleaves. The built-in scrap collector conveniently stores fiber shards until they can be safely discarded.

The CT50 is an industry first cleaver ruggedized to withstand severe shock, including drops up to 30 inches. If needed, the CT50 is field serviceable with all precision components easily replaced in the field.

### Specifications

ITEM	VALUE	
Applicable Fiber	Fiber type	Single-mode optical fiber
	Fiber count	Multimode optical fiber
	Cladding dia.	Single up to 16 fibers
Applicable Coating	Fiber plate	Approx. 125 μm
	Fiber holder	AD-10-M24 : Max. 900 μm coating diameter AD-50 : Max. 3 mm coating diameter
Cleave Length	Fiber plate	FH- 50, FH-60, FH-70, FH-100 and FH-110 series holders
	Fiber holder	AD-10-M24 : 5 to 20 mm for CD ≤ 250 μm AD-50 [CD = coating diameter] CD= 250μm or less : 5 to 20 mm 250 μm < CD < 1000μm : 10 to 20 mm 1000 μm < CD < 3 mm : 14 to 20 mm
Cleave Angle	Single fiber	Approx. 10 mm
	Fiber ribbon	Avg. 0.3 to 0.9 degrees
Blade Life		Avg. 0.3 to 1.2 degrees
Physical description	Dimensions W	Approx. 60,000 fiber cleaves
	Dimensions D	Approx. 120 mm when closing the lever
	Dimensions H	Approx. 95 mm when closing the lever
	Weight	Approx. 58 mm when closing the lever
Environmental condition	Temperature	Approx. 305 g including battery and AD-10-M24
	Humidity	Operate : -10 to 50°C Storage : -40 to 80°C
Battery		Operate : 0 to 95% non-condensing Storage : 0 to 95% non-condensing
Wireless interface <sup>1</sup>		2 pieces of LR03/AAA dry battery
Screw hole for tripod		Bluetooth 4.1 LE
Other features	Blade rotation	1/4-20UNC
	Replaceable parts	Motorized rotation
		Manual rotation dial
	Blade	
	Clamp arm	

1. The CT50 No Bluetooth option has the wireless interface permanently disabled.

continued  
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## CT50 Fiber Cleaver

### Ordering Information

DESCRIPTION	APPLICATION	FIBER HANDLING SYSTEM	CLEAVE LENGTH	AFL NO.
<b>CT50</b>	Single or Ribbon Fiber	AD-10-M24 adapter plate for single fibers or fiber holders for ribbons	See Specifications table on previous page	S017030
<b>CT50 No Bluetooth</b>	Single or Ribbon Fiber	AD-10-M24 adapter plate for single fibers or fiber holders for ribbons	See Specifications table on previous page	S018020

### Accessories

DESCRIPTION	AFL NO.
CB-08 Replacement Blade	S017076
FDB-05 Scrap Collector Box	S017121
AD-50 Adapter Plate	S017010
AD-10-M24 Fiber Plate	S017335
ARM-CT50-01 Replacement Arm Set	S017122
BRW-CT08-01 Blade Rotary Wheel	S017110
SC-CT50-01 Side Cover	S017108
CC-37 Transit Case	S017077
SPA-CT-08-10 Spacer	S017011

**Splice+** is a smartphone application that works in cooperation with Fujikura's splicers, cleavers and ribbon fiber strippers which have Bluetooth capability.

Get the **Splice+** app at the Apple App store or at Google Play.







## CT-101 and CT-102 Fiber Cleavers

Precise cleaving is required for photonic splicing applications as the types of optical fiber become more diversified to meet new applications. In addition, angled cleaving is often required for low back-reflection fiber end preparation. The CT-101 and CT-102 have been developed to offer adjustability and versatility for these various fiber types and applications while offering superior tension cleaving performance beyond conventional cleavers that utilize a scribe and bend cleaving method. The CT-101 and CT-102 are equipped with a motorized diamond blade that touches the fiber after tension has been applied providing high-strength cleaving capability. The CT-101 is designed to accommodate the Fujikura FH-100 fiber holders while the CT-102 has been designed to accommodate the FH-70 fiber holders.

### Features

- Diamond blade with long blade life
- Large diameter fiber cleaving capability (fiber diameter range 80 to 250  $\mu\text{m}$ )
- Angle cleaving capability (0 to 15 degrees)
- Cleave counter
- Adjustable cleave length
- Dual power sources (4 "AA" batteries or AC adapter)

### Specifications

PARAMETER	VALUE
Applicable Fiber	Conventional silica optical fiber
Cleaving Performance	Typical 0.3 degrees (125 $\mu\text{m}$ SMF)
Cladding Diameter	80 to 250 $\mu\text{m}$
Coating Diameter	160 to 2000 $\mu\text{m}$
Cleave Angle Capability	0 to 15 degrees (adjustable)
Cleave Length	3 to 40 mm with Fiber Holder, FH-100 series or FH-70 series
Dimensions	140 mm (W) x 110 mm (D) x 95 mm (H)
Weight	900 g or less (excluding batteries)
Blade Lifetime	200,000 fibers (10,000 fibers x 20 positions for 125 $\mu\text{m}$ cladding fiber)
DC Power Supply	4 AA batteries (approx. 1,000 cleaves)
AC Power Supply	100 to 240 VAC / 50 to 60 Hz using ADC-16
Operating Conditions	Temperature: 0 to 40°C, Humidity: 0 to 95% RH (Non-dew)
Storage Conditions	Temperature: -40 to 80°C, Humidity: 0 to 95% RH (Non-condensing)

### Ordering Information

DESCRIPTION	AFL NO.
CT-101 Advance Optical Fiber Cleaver Compatible with FH-100 Fiber Holders	S016287
CT-102 Advance Optical Fiber Cleaver Compatible with FH-70 Fiber Holders	S016288

### Accessories

DESCRIPTION	AFL NO.
ADC-16 AC Adapter	S015017
ACC-09 AC Power Cord	S014390
CB-06 Cleaver Blade	S016078



## CT-114, CT-115 and CT-116 Fiber Cleavers

Fujikura’s lineup of high-quality, large diameter optical fiber cleavers is built to achieve low cleave angles with pristine end-faces for a vast array of fiber types. These cleavers are heavily utilized in fiber preparation for fusion splicing of standard data communication fibers, octagonal or round large diameter fibers (LDF), polarization maintaining fibers, photonic crystal fibers and even component manufacturing with capillary tubes, ball lenses, end caps and more.

Automation was a key theme during design of these products. The aim was to enable smarter, faster and more reliable decisions than previously capable via operator trial and error. Leveraging the success of their predecessors, the CT-115 and CT-116 fiber clamps will automatically adjust the clamping force to provide the most optimal cleave angle for any fiber in the machine. The fiber backstop position is newly automated to find the optimum location for best cleave angle performance. Microns adjustments can make the difference in achieving required cleave angles for many fibers. As a manual process, this is very difficult to optimize, but this new automation removes this painstaking process. With the unheard-of long blade life of all three cleavers, blade position changes are infrequent, but when needed, the blade will index to the next position automatically, driven by a motorized blade assembly.



CT-115

As an industry first, this generation LDF cleaver has an RFID sensor which matches the RFID tag on every FH-110 series fiber holder. These cleavers have a new fiber holder management menu where users can pair a fiber holder to a cleave mode. In this menu, each fiber holder has a unique RFID and a user defined name for simple setup of fiber holder and cleave mode combinations. The cleaver utilizes the pairings in this menu to automatically change the cleave mode based on the fiber holder recognized by the cleaver’s RFID sensor. This can be used as either a process control measure, or to aid in cleave optimization.



CT-116

This line of LDF cleavers brings exciting benefits to the specialty fiber optic industry, which promise to yield tangible benefits to its users. Fujikura continues to lead with innovation and value in the quality solutions they develop. Put our LDF cleavers to the test by contacting us at 1-800-235-3423.

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## CT-114, CT-115 and CT-116 Fiber Cleavers

### CT-114 Features

- 80-660  $\mu\text{m}$  cladding diameter
- Automatic blade position change
- RFID fiber holder identification
- Manual fiber clamping and backstop adjustment
- 200,000 cleaves per blade for 250  $\mu\text{m}$  fiber
- PC software and manual downloadable via USB

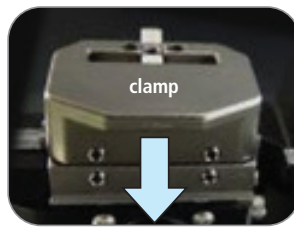


### Angled Cleaving

Angled cleaving up to 15° (only CT-116)

### CT-115 Features

- 80-1,250  $\mu\text{m}$  cladding diameter
- Automatic fiber clamping, backstop adjustment and blade position change
- RFID fiber holder identification
- 200,000 cleaves per blade for 250  $\mu\text{m}$  fiber
- PC software and manual downloadable via USB

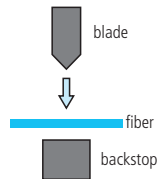
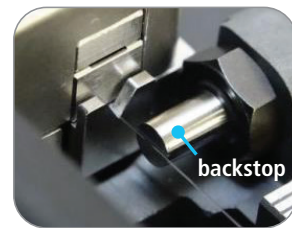


### Automatic Clamp Function

CT-115 and CT-116 self-optimizes and applies the clamp force automatically for best cleave results without trial and error.

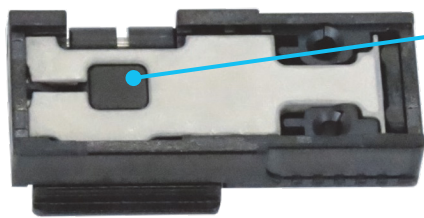
### CT-116 Features

- 80-1,250  $\mu\text{m}$  cladding diameter
- Automatic fiber clamping, backstop adjustment and blade position change
- RFID fiber holder identification
- 200,000 cleaves per blade for 250  $\mu\text{m}$  fiber
- Angled cleaving function (up to 15°)
- PC software and manual downloadable via USB



### Backstop

CT-115 and CT-116 automated backstop prevents time and fiber waste with self-optimized positioning for best cleave results.



RFID Tag

### RFID Fiber Holder System

RFID identification with FH-110 series fiber holders improves quality control in manufacturing and when changing applications in an R&D environment.



### Automatic Blade Position Change

Cleaver blade position indexing driven by a motor to remove user error from this critical process.

## CT-114, CT-115 and CT-116 Fiber Cleavers

### Specifications

PARAMETER	CT-114	CT-115	CT-116
Fiber type	Silica optical fibers and capillary tubes		
Fiber count	Single		
Cladding diameter	80-660 $\mu\text{m}$	80-1,250 $\mu\text{m}$	
Coating diameter	81-3,182 $\mu\text{m}$		
Fiber clamping	Manual <sup>1</sup>	Automatic via motor	
Backstop adjustment	Manual	Automatic via motor	
Tension range <sup>2</sup>	0 to 3,000 gf (29.4 N)	0 to 10,000 gf (98.1 N)	
Cleaving length <sup>3</sup>	30-75 mm		
Cleaving angle	Average 0.2° (Cladding diameter 125 $\mu\text{m}$ )		
	Average 0.3° (Cladding diameter 400 $\mu\text{m}$ )		
	Average 0.4° (Cladding diameter 660 $\mu\text{m}$ ) <sup>5</sup>	Average 1.0° (Cladding diameter 1,000 $\mu\text{m}$ ) <sup>5</sup>	
Angled cleaving	–	–	0-15° (0 to 180° on cleaver rotator) <sup>6</sup>
Blade life <sup>7</sup>	200,000 fibers (10,000 fibers x 20 positions for 250 $\mu\text{m}$ cladding fiber)		
Dimensions (WxDxH)	240 x 133 x 142 mm without projections		240 x 133 x 151 mm without projections
Weight	3.6 kg without inserts and with fiber holder adapter	3.9 kg without inserts and with fiber holder adapter	4.2 kg without inserts and with fiber holder adapter
Humidity	0 to 95% RH, non-condensing (operation and storage)		
Temperature	0°C to 40°C (operation) -40°C to 80°C (storage)		
Number of cleaving modes	Maximum 100		
Cleave results	10,000 cleave data		
AC Adapter	Input: AC 100 V to 240 V (50 or 60 Hz) (max. 1.5 A) Output: DC 19 V, Max. 2.1 A		
Display	TFT 4.95" touch screen LCD monitor		
Interface	PC	USB 2.0 (Mini-B type) for PC communication	
	Ground point	Applicable by M3 size truss screw	
Wireless communication	RFID	Compliant with ISO 15693	
Other Features	Automatic Functions	Automatic cleave mode selection via RFID tag	
		Motorized blade position change	
		Automatic tension adjustment	
PC Software	Firmware update via internet		
	Cleave mode and parameter upload and download		

#### Notes:

1. For cladding diameter less than 400  $\mu\text{m}$ , use magnets. For cladding diameter 400-660  $\mu\text{m}$ , use both magnets and clamp lid screw. Clamp lid screw may be necessary depending on the fiber type when it is also under 400  $\mu\text{m}$ .
2. There are some cases where the set tension is different from the actual tension.
3. Cleave length is defined as the distance between the left-side fiber clamp and the end-face of the cleaved fiber.
4. Measured with an interferometer at room temperature. A new blade was used to cleave each fiber. The average cleave angle changes depending on operational conditions such as blade condition, operation method and cleanliness.
5. Measured with an FSM-100P+ splicer at room temperature. A new blade was used to cleave each fiber. The average cleave angle changes depending on operational conditions such as blade condition, operating method and cleanliness.
6. Maximum angled cleave changes depending on the fiber type cleaved and clamp position.
7. The blade life changes depending on the operational conditions such as blade condition, operating method, cleanliness and fiber type cleaved.

continued  
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## CT-114, CT-115 and CT-116 Fiber Cleavers

### Ordering Information

DESCRIPTION	AFL NO.
<b>CT-114 LDF Cleaver</b> includes: ADC-21 AC adapter; ACC-09 AC power cord; FHA-CT115 fiber holder adapter; CM-CT115 fiber height mirror; x3 each SPA-CT105-30, 50 and 100 shims; x15 set screws for inserts; HEX-01 hex wrench; USB-01 USB Cable; TR-CT115-E Technical reference manual; and One year factory warranty	S018182
<b>CT-115 LDF Cleaver</b> includes: ADC-21 AC adapter; ACC-09 AC power cord; FHA-CT115 fiber holder adapter; CM-CT115 fiber height mirror; x3 each SPA-CT105-30, 50 and 100 shims; x15 set screws for inserts; HEX-01 hex wrench; USB-01 USB Cable; TR-CT115-E Technical reference manual; and One year factory warranty	S018183
<b>CT-116 Angled LDF Cleaver</b> includes: ADC-21 AC adapter; ACC-09 AC power cord; FHA-CT115 fiber holder adapter; CM-CT115 fiber height mirror; x3 each SPA-CT105-30, 50 and 100 shims; x15 set screws for inserts; HEX-01 hex wrench; USB-01 USB Cable; TR-CT115-E Technical reference manual; and One year factory warranty	S018184

### Accessories

DESCRIPTION	AFL NO.
<b>Fiber Holder Inserts</b>	
Master fiber holder insert kit (includes upper and lower inserts from 80-1750)	S016098
INSERT-L-80	S016085
INSERT-L-125	S016086
INSERT-L-160	S016087
INSERT-L-250	S016088
INSERT-L-400	S016089
INSERT-L-500-750	S016090

DESCRIPTION	AFL NO.
<b>Fiber Holder Inserts (continued)</b>	
INSERT-L-1000-1250	S016091
INSERT-L-1500-1750	S016092
INSERT-L-2000-2250	S016093
INSERT-L-2500-3000	S016094
INSERT-U-80-400	S016079
INSERT-U-500-750	S016080
INSERT-U-1000-1250	S016081
INSERT-U-1500-1750	S016082
INSERT-U-2000-2250	S016083
INSERT-U-2500-3000	S016084

DESCRIPTION	AFL NO.
<b>Height adjusting shim (10-piece pack)</b>	
SPA-CT105-30 (30 μm)	S016095
SPA-CT105-50 (50 μm)	S016096
SPA-CT105-100 (100 μm)	S016097
<b>Miscellaneous Items</b>	
FHA-CT115 Fiber holder adapter	S018211
CM-CT115 Fiber height mirror	S018212
TD-01 Torque Driver	S016738
CB-06A Replacement Blade	S016078
AC adapter ADC-21	S018168
AC power cord ACC-09	S014390

### Fiber Holders

DESCRIPTION	AFL NO.
FH-110-60 Fiber Holder	S018215
FH-110-100 Fiber Holder	S018216
FH-110-125 Fiber Holder	S018217
FH-110-150 Fiber Holder	S018218
FH-110-180 Fiber Holder	S018219
FH-110-210 Fiber Holder	S018220
FH-110-250 Fiber Holder	S018221
FH-110-300 Fiber Holder	S018222
FH-110-350 Fiber Holder	S018223
FH-110-400 Fiber Holder	S018224
FH-110-500 Fiber Holder	S018225
FH-110-600 Fiber Holder	S018226
FH-110-700 Fiber Holder	S018227

DESCRIPTION	AFL NO.
FH-110-800 Fiber Holder	S018228
FH-110-900 Fiber Holder	S018229
FH-110-1000 Fiber Holder	S018230
FH-110-1100 Fiber Holder	S018231
FH-110-1200 Fiber Holder	S018232
FH-110-1300 Fiber Holder	S018233
FH-110-1400 Fiber Holder	S018234
FH-110-1500 Fiber Holder	S018235
FH-110-1600 Fiber Holder	S018236
FH-110-1700 Fiber Holder	S018237
FH-110-1800 Fiber Holder	S018238
FH-110-1900 Fiber Holder	S018239
FH-110-2000 Fiber Holder	S018240

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## CT-114, CT-115 and CT-116 Fiber Cleavers

### Insert Selection Guide

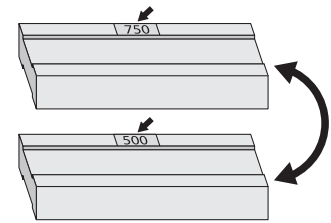
LOWER INSERT	UPPER INSERT												
	INSERT-U-80-400	INSERT-U-500-750 <sup>1</sup>		INSERT-U-1000-1250 <sup>1</sup>		INSERT-U-1500-1750 <sup>1</sup>		INSERT-U-2000-2250 <sup>1</sup>		INSERT-U-2500-3000 <sup>1</sup>			
		500	750	1000	1250	1500	1750	2000	2250	2500	3000		
INSERT-L-80	54-107												
INSERT-L-125	84-167												
INSERT-L-160	115-213												
INSERT-L-250	167-333												
INSERT-L-400	267-533	400-533											
INSERT-L-500-750 <sup>1</sup>	500	334-667	467-667	550-667									
	750		634-868	717-1000	787-1000								
INSERT-L-1000-1250 <sup>1</sup>	1000			884-1118	954-1188	1037-1272							
	1250					1120-1355	1204-1438	1287-1522					
INSERT-L-1500-1750 <sup>1</sup>	1500						1370-1605	1454-1688	1537-1772				
	1750							1620-1855	1704-1938	1780-2015			
INSERT-L-2000-2250 <sup>1</sup>	2000								1870-2115	1947-2288	2030-2265		
	2250									2114-2348	2197-2432	2280-2515	
INSERT-L-2500-3000 <sup>1</sup>	2500										2364-2598	2447-2682	2614-2848
	3000											2780-3015	2947-3182

**Note:**

1. Each side of this insert is equipped with a groove that is marked with the size of the fiber diameter on the table.

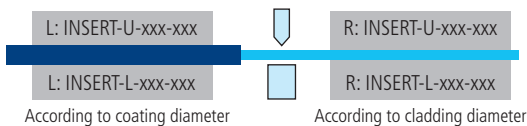
### Upper and lower inserts can be changed up or down depending on required fiber fit into the V-groove.

Inserts 500 μm and above are double-sided. Therefore, the visible label when inserted indicates the size of the insert you are using.



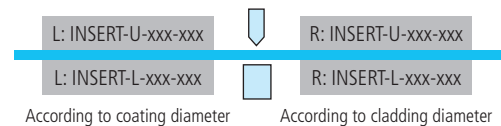
### Upper and lower inserts are necessary for both left and right side clamps.

Case 1: Cleaving coating-stripped fiber



Inserts according to both coating diameter and cladding diameter are necessary.

Case 2: Cleaving glass rod



Two insert pairs of the same size according to rod diameter are necessary.



## PowerCleave®

To complement the line of world class splicing systems, AFL’s PowerCleave combines the precision of an ultrasonic cleaver with the ease and improved fiber management of the Fujikura fiber holder system. The PowerCleave utilizes the tensile stress method to avoid touching or damaging the bare glass surface during cleaving, ensuring highly robust, reliable and durable splice results. The PowerCleave provides consistent flat ends even at cleave lengths as short as 3 mm. Specially designed for use with Fujikura’s specialty market splicers, this advanced cleaving system allows for more reliability and greater splicing consistency with less dependence on operator technique.

### Features

- Tensile cleaving with ultrasonic blade
- Consistent, low-angle cleaves of short cleave-length fibers
- Fiber holder system reduces fiber handling
- Clean, reliable quality

### Specifications

PARAMETER	VALUE
Fibers Cleaved	80 μm - 200 μm (cladding diameter)
Minimum Cleave Length	3 mm
Cleave Angle	<0.6 typical
Blade	Diamond with an estimated life of over 20,000 cleaves
Clamping System	Compatible with Fujikura specialty market fiber holder systems
Case	ABS impact resistant with non-slip feet and a 6.25 mm (.24 inch) BSW thread tripod mount for hard mounting to a workstation
Battery	9V alkaline (MN 1604), battery life approximately 10,000 cleaves
Dimensions (L x W x D)	75 mm x 153 mm x 150 mm (3.0 x 6.0 x 5.9 inches)
Weight	1.1 kg (2.4 lbs)
Operating Temperature	0°C to 45°C (32°F to 113°F)
Storage Temperature	-20°C to 60°C (-4°F to 140°F)

### Ordering Information

DESCRIPTION	AFL NO.
<b>PowerCleave Kit</b> Includes: PowerCleave, Instruction manual, 2.5 mm x 60 mm Screwdriver and 2 mm Allen wrench	S009972





Included Accessories

## USC-03 Ultrasonic Cleaner

The Fujikura ultrasonic cleaner model USC-03 provides a simple and cost effective method for cleaning optical fibers when high strength fusion splices are required. This ultrasonic cleaner readily accepts all FH-40-XXX, FH-50-XXX, FH-70-XXX and FH-100-XXX series fiber holders. The Universal Fiber Holder Adapter, available as an optional accessory, enables the use of FH-XXX series fiber holders.

The high frequency ultrasonic action cleans debris and coating residue without damaging the exposed cladding and a built-in timer ensures that the required cleaning time is consistently used for all fibers processed. This cleaner, when used in conjunction with high strength stripping and cleaving accessories, produces outstanding results for the most demanding high strength applications.

### Features

- Built-in timer assures correct cleaning time
- Adjustable high intensity vibratory cleaning action
- Adjustment knob allows fine-tuning of fiber submersion depth
- Alcohol bath lid prevents cleaning fluid evaporation when machine is idle

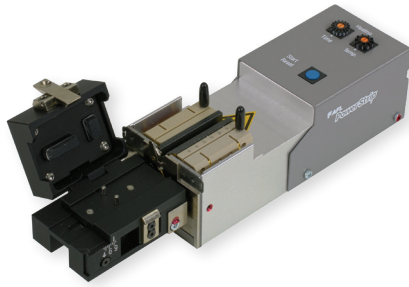
### Specifications

PARAMETER	VALUE
Applicable Fibers	Single optical fiber
Applicable Fiber Holders	FH-40, 50, 70 and 100 series
Recommended Fluid	≥99% Ethyl alcohol or Isopropyl alcohol
Tank Capacity	43 - 53 cm <sup>3</sup>
Ultrasonic Frequency	50 kHz
Fiber Cleaning Length	49 mm (max), adjustable
Output Power	3.0 W (max)
Timer Range	1 to 99 seconds
Power Requirement	AC 100 to 240 V / 50 Hz to 60 Hz
Operating Environment	0°C to 40°C, 0 to 95% RH, non-condensing
Storage Environment	-20°C to 60°C, non-condensing humidity
Dimensions (W x D x H)	95 x 190 x 162 (mm) / 3.74 x 7.48 x 6.38 (inches)
Weight	1 kg / 2.2 lbs

### Ordering Information

DESCRIPTION	AFL NO.
USC-03	S014783
Universal Fiber Holder Adapter	S013568
ADC-10 Power Adapter	S012548
ACC-09 Power Cord	S014390





## AFL PowerStrip®

AFL PowerStrip is a thermal stripper used in high strength splicing. Using the proven blade and centering design of the Schleuniger FiberStrip 7030 in addition to the fiber holder system, the AFL PowerStrip automatically centers the fiber, heats the buffer or coating and strips the buffer at a controlled rate with perfect alignment. The fiber holder system reduces fiber handling, making this tool ideal for any production environment.

### Features

- 250 µm and 900 µm fiber capability
- Short cycle time
- Lightweight and portable

### Specifications

PARAMETER	VALUE
Fibers Stripped - Single Buffered Fiber	Cladding diameter: 125 µm standard, 80 µm optional Coating diameter: 250 µm and 900 µm standard, 160 µm and 400 µm optional
Clamping System	Fujikura fiber holder clamp; compatible with FSM-45F/PM and 100 series fiber holders
Stripping Length	Up to 35 mm
Heater Temperature Range	110°C to 150°C (230°F to 302°F)
Heating Time	1.5 to 13 seconds
Cycle Time	Approximately 5 seconds/cycle (after heating)
Power Supply	Input: 100 to 240 V AC, 50/60 ± 3 Hz; Output: 12 V DC, 12 W, 1 A
Dimensions (L x W x D)	209 mm x 57 mm x 45 mm (8.25 x 2.25 x 1.8 inches)
Weight	0.7 kg (1.5 lbs)

### Ordering Information

DESCRIPTION	AFL NO.
<b>AFL PowerStrip Kit</b> Carrying case, fiber holder clamping system, blades and centralizers for 125/250 µm and 125/900 µm fiber, power supply 230 V AC or 100/120 V AC, power cord 2 m (6.5 feet), cleaning brush and tool set (hex keys, adjustment screwdriver)	S012808
<b>Coating Blades</b>	
80/125 µm	S014859
80/160 µm	S012656
125/250 µm	S012596
125/400 µm	S012628
125/500 µm	S014865
125/900 µm	S012604
204/360 µm	S014734
220/350 µm	S017002
230/500 µm	S014863
250/400 µm	S014400
250/900 µm	S014866
400/600 µm	S014719
420/550 µm	S018023
500/615 µm	S017003
600/800 µm	S014736
660/800 µm	S017086
1000/1400 µm	S014737

#### Blade Removal Tool

PowerStrip Blade Removal Tool	S012704
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Centralizers	
125 µm	S014860
160 µm	S012652
200 µm	S017889
250 µm	S012600
360 µm	S014738
400 µm	S012624
450 µm	S014739
500 µm	S014864
600 µm	S014718
680 µm	S017009
800 µm	S014740
900 µm	S012608
1400 µm	S014741

#### Power Supply

12 V DC W/PLUG ADPT	S015185
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\* Custom blades and centralizers available on request.



## PCS-100 Polyimide Coating Stripper

Polyimide coated optical fiber are now widely used in the oil and gas and medical industries. The polyimide coating has superior heat and chemical resistance to conventional UV curable coating material, but the coating requires additional care to remove. Dangerous chemical stripping using hot sulfuric acid or burning the coating off are common methods to strip the fiber due to the thin coating and strong coating adhesion to the fiber cladding. AFL's PCS-100 Polyimide Fiber Coating Stripper is the first tool that uses a mechanical stripping method, providing a safe, consistent and quick stripping solution.

### Features

- Quick stripping** – A razorblade is applied to the fiber with specific tension and the coating is precisely planed along the fiber automatically. The process requires less time than the conventional methods of acid or heat. For a 125 µm fiber, 4 stripping passes at 90° rotational positions are typically required, and complete stripping is accomplished within 25 seconds. Larger fiber sizes require more stripping passes (at smaller rotational angle increments).
- Safe, high quality stripping** – Because hot acid is not used, the operation is much safer. In addition, the fiber quality degradation is kept at a minimum as the glass surface is not damaged by oxidization of the coating during burning or arcing.
- Flexible** – Many parameters, such as the razor blade position and stroke, and fiber rotation angle are all adjustable for various fiber sizes and coating materials.

### Specifications

STRIPPING PERFORMANCE	
Applicable Fiber	Silica based Single-mode and Multimode glass fiber
Fiber Count	Single
Applicable Coating	Polyimide coating and UV curable resin coating
Cladding Diameter Range	60 to 1200 µm
Coating Diameter Range	60 to 1,500 µm
Fiber Clamping	Adaptable to range of fiber/coating sizes by selection of applicable pair of FH-100-XXX series fiber holders
Strip Length	1 to 35 mm (Window stripping: 1 to 33 mm)
Stripping Time	4 stripping passes: 20 seconds
	8 stripping passes: 35 seconds
	12 stripping passes: 50 seconds
Blade Life	350 fibers / blade (In the case of 4 strips per fiber)
Stripping Modes	30 user-programmable modes
Proof Modes	30 user-programmable modes
PROOF TEST FUNCTION	
Maximum Proof Test Force	2 kgf
Typical Proof Test Cycle Time	3 seconds
DIMENSIONAL DATA	
Dimensions	230 mm (W) x 214 mm (D) x 151 mm (H)
Weight	5.0 kg excluding AC adapter
POWER SOURCE	
Power Input	AC100 to 240 V (50 Hz to 60 Hz)
OPERATION AND STORAGE CONDITIONS	
Operating Conditions	Temperature: 0 to 40°C, Humidity: 0 to 95% RH (Non-condensing)
Storage Conditions	Temperature: -40 to 80°C, Humidity: 0 to 95% RH (Non-condensing)

### Ordering Information

DESCRIPTION	AFL NO.
PCS-100 Polyimide Coating Stripper Includes: FH-100-150, ADC-15 AC Adapter, ACC-02, Instruction manual and PCB-01 replacement blades	S014973

### Accessories

DESCRIPTION	AFL NO.
FH-100-150	S014861
ADC-15	S014826
ACC-02	S001171
PCB-01 (Box of 50)	S015018

## Splice Protection Sleeves

AFL offers a wide selection of fiber protection sleeves to meet any application. The FP series is the industry standard for durable and lasting protection of single fiber splices in field installations, while the FP-04(T) and FP-05 provide the same durable protection for 8 and 12 fiber ribbon respectively.

The FPS01 and FPS04 series are specially designed for optical components, where small packaging is a priority. These micro sleeves provide the known reliability of Fujikura sleeves in the smallest possible lengths. This easy and cost effective method is a great alternative to recoating. The FPS01 and FPS04 series offer a wide range of options to accommodate various coating sizes, and are manufactured in a variety of lengths. This gives great flexibility in designing optical modules.

### Standard Sleeves: Dimensions & Applicable Fiber

#### SLEEVES FOR SINGLE FIBERS 250 MICRONS TO 900 MICRONS

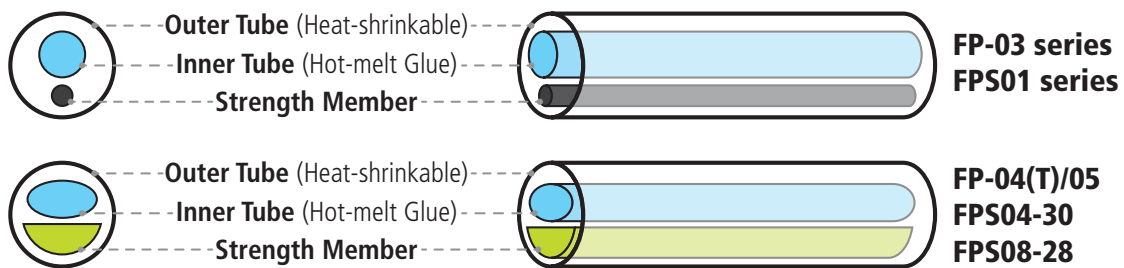
DESCRIPTION	SLEEVE LENGTH	FIBER CLEAVE LENGTH	SLEEVE DIAMETER AFTER SHRINK	MOQ & MOM	AFL NO.
FP-40 Slim Protection Sleeve	40 mm	10 mm	2.3 mm (max.)	1,000 & 100	S018262
FP-60 Slim Protection Sleeve	60 mm	10 mm	2.3 mm (max.)	1,000 & 100	S018263
FP-60	60 mm	10 mm	3.1 mm (max.)	1,000 & 100	S015915
FP-40	40 mm	10 mm	3.1 mm (max.)	1,000 & 100	S015916

#### SLEEVES FOR UP TO 250 MICRON COATED RIBBON

DESCRIPTION	FIBER COUNT	SLEEVE LENGTH	FIBER CLEAVE LENGTH	SLEEVE DIAMETER AFTER SHRINK	MOQ & MOM	AFL NO.
FP-04(T)	Up to 8 fibers	40 mm	10 mm	4.0 mm (max.)	250 & 250	S002105
FP-05	Up to 12 fibers	40 mm	10 mm	4.5 X 4.0 mm (max.)	250 & 250	S003027
FP-05-28	Up to 12 fibers	28 mm	10 mm	4.5 mm (max.)	5,000 & 250	S014720
FPS04-30	Up to 4 fibers	30 mm	10 mm	2.4 mm (max.)	250 & 250	S010848
FPS08-28	Up to 8 fibers	28 mm	10 mm	3.3 X 2.7 mm (max.)	500 & 500	S013560
FPS24-40	Up to 24 fibers	40 mm	10 mm	8.0 X 4.0 mm (max.)	200 & 200	S013004

### Specifications

PARAMETER	DESCRIPTION	VALUE
Outer tube	FP-60/40/03 series	Polyolefin based on Polyethylene
	FPS-04(T) / FP-05	Ethylene-Vinyl Acetate
Inner Tube	ALL	Ethylene-Vinyl Acetate
Strength member	FP-60/40/03 series	Stainless steel
	FP-04(T) / FP-05	Heat-resistant glass
Operation condition (after shrink)		-10 to 50°C, 0 to 95% RH (Non dew)
Storage condition (before shrink)		-40 to 60°C, Non dew



## Splice Protection Sleeves

### Micro Sleeves: Dimensions & Applicable Fiber

#### FPS01-400 SERIES FOR SINGLE FIBERS UP TO 400 MICRON FIBER

DESCRIPTION	SLEEVE LENGTH	FIBER CLEAVE LENGTH	SLEEVE DIAMETER AFTER SHRINK	PACKAGING	AFL NO.
FPS01-400-12	12 mm	4 mm	1.5 mm	50 Pack	S014088
FPS01-400-15	15 mm	5 mm	1.5 mm	50 Pack	S012668
FPS01-400-20	20 mm	8 mm	1.5 mm	50 Pack	S012672
FPS01-400-25	25 mm	10 mm	1.5 mm	50 Pack	S012676
FPS01-400-34	34 mm	15 mm	1.5 mm	50 Pack	S012680
FPS01-400-40	40 mm	16 mm	1.5 mm	1,250 Box	S011914

#### FPS01-900 SERIES FOR SINGLE FIBERS UP TO 900 MICRON FIBER

DESCRIPTION	SLEEVE LENGTH	FIBER CLEAVE LENGTH	SLEEVE DIAMETER AFTER SHRINK	PACKAGING	AFL NO.
FPS01-900-15	15 mm	4 mm	2.3 mm	50 Pack	S012684
FPS01-900-20	20 mm	6 mm	2.3 mm	50 Pack	S012688
FPS01-900-25	25 mm	6 mm	2.3 mm	50 Pack	S011954
FPS01-900-34	34 mm	13 mm	2.3 mm	50 Pack	S012692
FPS01-900-45	45 mm	16 mm	2.3 mm	50 Pack	S012696

### Specifications

PARAMETER	DESCRIPTION	VALUE
Outer tube	FPS01 series / FPS04-30 / FPS08-28 / FPS24-40	Polyolefin based on Polyethylene
Inner Tube	ALL	Ethylene-Vinyl Acetate
Strength member	FPS01 series	Stainless steel
	FPS04-30 / FPS08-28 / FPS24-40	Heat-resistant glass
Operation condition (after shrink)		-10 to 50°C, 0 to 95% RH (Non dew)
Storage condition (before shrink)		-40 to 60°C, Non dew

### Type Variations



**FULL SCALE**

**Please contact your AFL Sales Representative for information about our other products or services.**

**FIBER OPTIC CABLE  
(OPGW, ADSS, Loose Tube)**



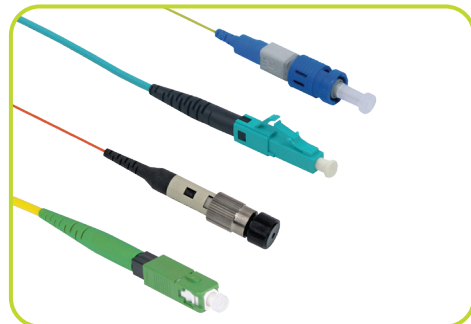
**TEST AND INSPECTION  
EQUIPMENT**



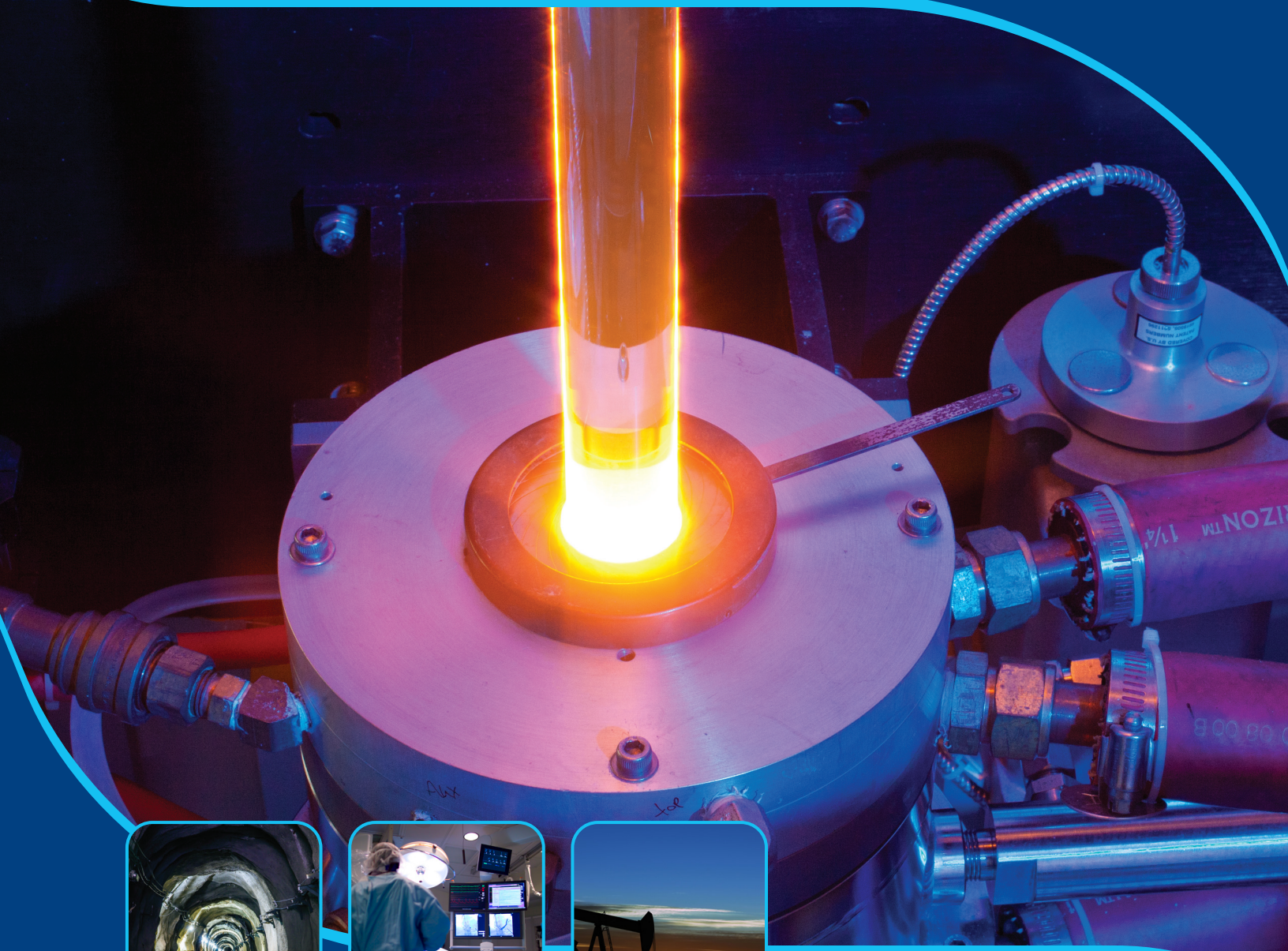
**FUSION SPLICING  
SYSTEMS AND ACCESSORIES**



**FIELD-INSTALLABLE  
CONNECTORS**







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