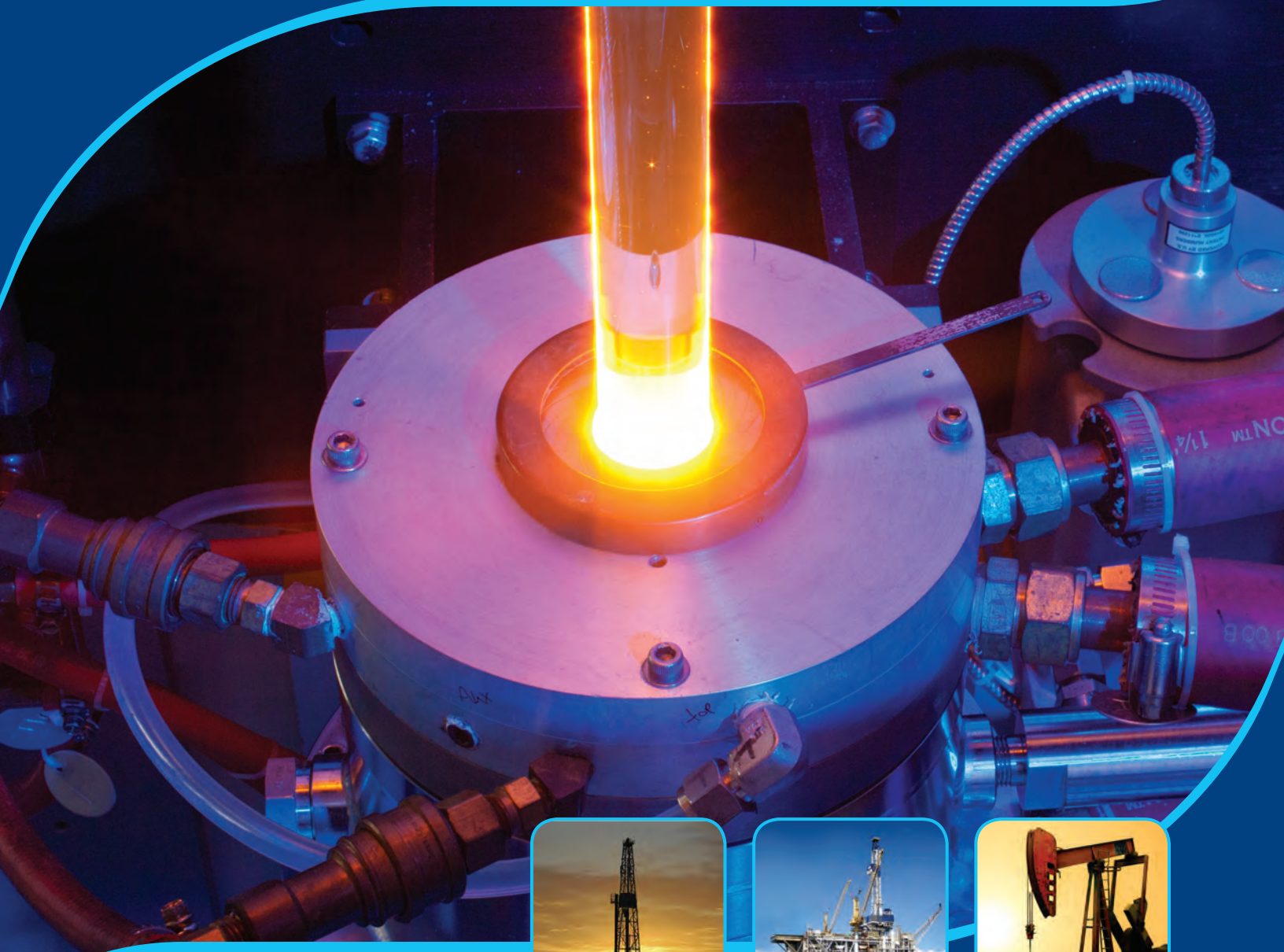
AFL



SPECIALTY FIBER OPTIC CABLE

Downhole | Subsea | Sensing | Equipment

Founded in 1984, AFL is a global leader providing fiber optic products, equipment and engineering services to the telecommunications, electric utility, wireless, energy, private network and OEM markets. AFL also serves a diverse mix of industry segments that include service providers, military and defense, mining, oil and gas and biomedical.

AFL brings years of experience in developing solutions for customers, fostering a creative culture to drive and deploy innovative technologies that will improve communications for years to come. Our product line consists of fiber optic cable, optical connectivity, fusion splicers and test equipment as well as fiber management systems, closures and accessories.

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

For more information about specialty fiber optic cables, fusion splicers, test equipment, fiber management systems, closures and accessories contact:
Brian Herbst at **864-433-5361** or **Brian.Herbst@AFLglobal.com**

AFL

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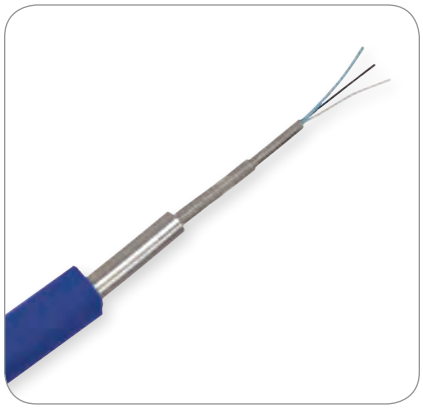


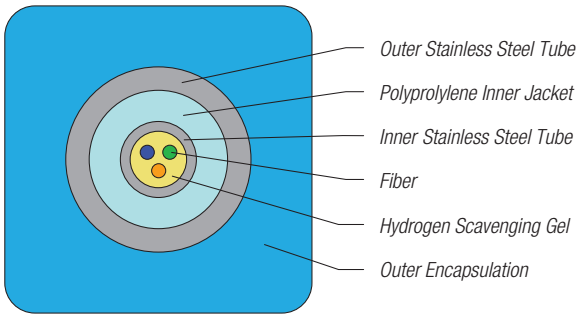
Traditional Downhole Cable

Traditional Downhole cable from AFL is designed to perform in the well and withstand elevated temperatures, high pressure and corrosive environments. The cable is customized to the customer's specifications in order to maximize performance at the best possible price. AFL's Traditional Downhole cable is targeted to ≤ 150°C offshore and land-based wells where ruggedness is essential.

Features

- Customized to customer specifications
- Up to 150°C
- Up to 20,000 psi operating pressure
- Loose tube design
- Hydrogen scavenging gel

Cable Components



Options and Specifications

PARAMETER	VALUE
Inner Stainless Steel Tube Diameter	0.125"
Outer Tube Diameter	0.250"
Outer Tube Wall Thickness	0.028", 0.035", 0.049"
Outer Tube Material	Stainless Steel 316L, Incoloy™ 825
Fiber Coating	Carbon Polyimide, Silicon/PFA, Pure Silica Core and others
Gel Types	No gel, standard gel, hydrogen scavenging gel
Diameter	11 mm x 11 mm square, 11 mm round
Polymer Options	Polypropylene, PVDF, Nylon, Santoprene™
Operating Temperature	-40°C to 150°C
Operating Pressure Limit	0 to 20,000 psi

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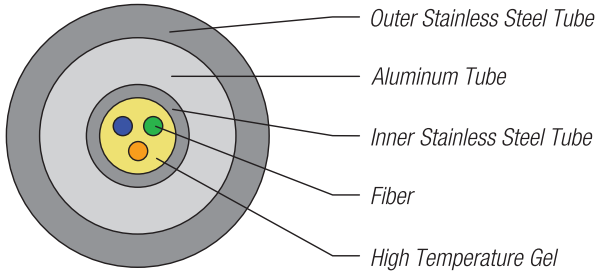
High Temperature Downhole Cable

AFL's unique solution for applications > 150°C is a three-layer design with the secondary layer being 0.040" thick aluminum. Research indicates hydrogen permeability through aluminum is 100 times less than stainless steel resulting in an extended life for the optical fiber. The all metal design eliminates concerns with polymers at elevated temperatures and provides for stable, predictable performance.

Features

- Hydrogen resistant
- All metal construction
- Tight tolerances
- 300°C temperatures and beyond
- Loose tube design
- Patent pending

Cable Components



Options and Specifications

PARAMETER		VALUE
Inner Stainless Steel Tube Diameter		0.094"
Outer Tube Diameter		0.250"
Outer Tube Wall Thickness		0.028"
Outer Tube Material		Stainless Steel 316L, Incoloy™ 825
Weight	Stainless Steel 316L Incoloy™ 825	142 kg/km 144 kg/km
Fiber Types		Single-mode, Multimode, Pure Silica Core Single-mode
Fiber Coating		Polyimide, Carbon Polyimide, Silicon/PFA, Gold, Aluminum, Copper
Gel Types		No gel, high temperature gel, hydrogen scavenging gel
Polymer Options		Polypropylene, PVDF, Nylon, Santoprene™
Operating Temperature		-40°C to 300°C, higher upon request
Operating Pressure Limit		0 to 20,000 psi

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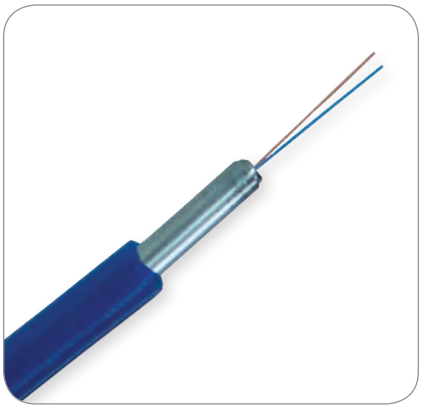


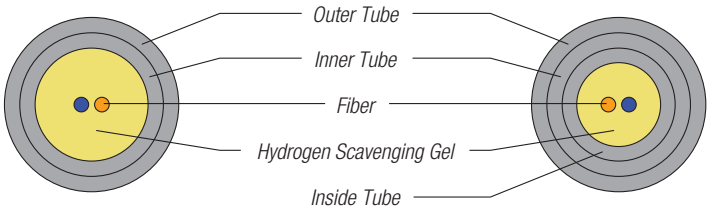
Low Profile Downhole Cable

AFL's unique offering for shallow, land-based wells provides the best combination of ruggedness and size for the price. With its unique combination of size and strength, AFL's Low Profile Downhole Cable has been successfully deployed in coiled tubing (CT) applications where temperatures approach 300ºC. AFL will customize the design to meet the customer's needs in order to maximize their return on investment.

Features

- Small diameter
- Low weight
- Redundant hermetic seal
- Encapsulation options
- Lower cost
- Patent pending

Cable Components



Options and Specifications

PARAMETER	VALUE	
	DOUBLE TUBE	TRIPLE TUBE
Outer Tube Diameter	0.125"	0.125"
Tube Wall Thickness	0.016"	0.024"
Tube Material	Stainless Steel 316L, Incoloy™ 825	
Fiber Coating	Carbon Polyimide, Silicon/PFA, Pure Silica Core and others	
Gel Types	No gel, high temperature gel, hydrogen scavenging gel	
Polymer Options	Polypropylene, PVDF, Nylon, Santoprene™	

STAINLESS STEEL 316L OPTION

Weight	21 lbs / 1,000 ft	28 lbs / 1,000 ft
Tensile	760 lbs	1,060 lbs
Collapse Pressure	30,000 psi	44,000 psi
Bend Radius (dynamic)	12.6"	12.6"

INCOLOY™ 825 OPTION

Weight	22 lbs / 1,000 ft	28 lbs / 1,000 ft
Tensile	814 lbs	1,134 lbs
Collapse Pressure	21,000 psi	32,000 psi
Bend Radius (dynamic)	12.6"	12.6"

ENCAPSULATION OPTION

Diameter	1/4"
Weight	
Santoprene™	15 lbs / 1,000 ft
Polypropylene	14 lbs / 1,000 ft
PVDF	28 lbs / 1,000 ft
Nylon	16 lbs / 1,000 ft

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MiniBend™

For Downhole Double-ended Systems and Optical Connectivity

The MiniBend miniature fiber optic component employs a revolutionary technology that will change the way you plan and engineer the fiber management in your oil or gas well. This patented technology allows for a single strand of multimode or single-mode fiber to be formed at a 180° bend with a 1 mm fiber bend diameter, saving valuable real estate.

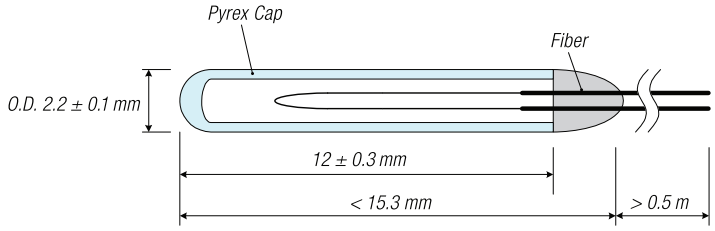
Features

- Elegant, low profile solution for achieving downhole fiber optic double-ended system
- Provides low-loss sub-millimeter bends for miniaturizing fiber components and circuits
- No stress with the small bend radii
- Bi-directional
- Mechanically and environmentally robust
- Small and protective package

Applications

- Downhole fiber optic turnaround
- Fiber management systems
- Modulators, splitters, circulators, connectors and polarizers
- Circuit boards and back planes
- Compact test instrumentation and sensors

Dimensions



Specifications

PARAMETER	VALUE			
Item Number	DNS-1574	DNS-1575	DNS-1885	DNS-1890
Fiber Coating Type	50 µm multimode carbon mid-temperature acrylate	50 µm multimode carbon/polyimide	single-mode carbon mid-temperature acrylate	single-mode carbon/polyimide
Operation Wavelength Range	900 to 1340 nm, 1430 to 1600 nm		1280 to 1340 nm, 1430 to 1600 nm	
Insertion Loss	< 0.2 dB at 1310 nm of wavelength at room temperature		< 0.3 dB at 1550 nm of wavelength at room temperature	
Operating Temperature	0 to 150°C	0 to 200°C	0 to 150°C	0 to 200°C
Storage Temperature	-60 to 85°C			
Body Size	Outside Diameter = 2.2 mm +/-0.1, Length = 15 mm +/-0.3			
Fiber Tail Length	> 0.5 m			
Straight Pull	500 g			

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Verrillon®
Harsh Environment Fibers

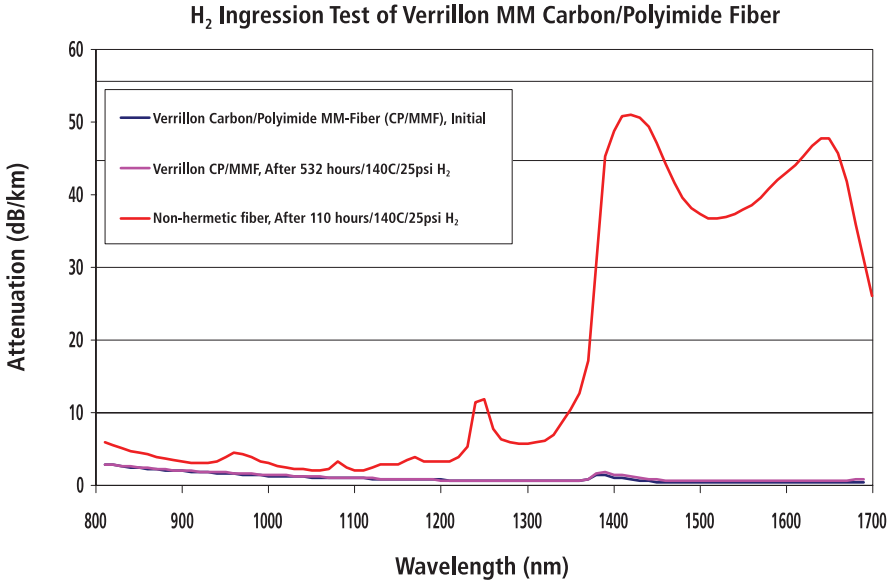
Verrillon Harsh Environment Fibers from AFL are available in a number of designs. Starting with fiber design, we offer both single-mode and multimode optical fibers having coatings and coating combinations, including Polyimide, Silicone-PFA, Silicone-MTA, MTA and Carbon, which can be applied in conjunction with any of these outer coatings. Typically, these fibers are used in downhole data logging, distributed sensing and imaging applications.

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 the their system design and performance.

Features

- Wide range of protective coatings available, depending on application requirements
- Suitable for use in high pressure, high temperature and corrosive environments
- Carbon fiber provides exceptional resistance to H2 and moisture ingression
- Predicted lifetime for hermetic fiber under typical operating conditions that exceed most requirements
- Extensive test and measurement data for optical fiber performance under "harsh conditions" provided with fiber



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Verrillon®
Harsh Environment Fibers

Verrillon offers the broadest range of specialty fibers for oil and gas sensors of all types:

- Distributed Temperature Sensors – **DTS**
- Distributed Pressure Sensors – **DPS**
- Distributed Strain Sensors – **DSS**
- Distributed Acoustic Sensors – **DAS**
- Ocean Bottom Seismic - **OBS**

Verrillon Optical Fiber Selection Matrix

MAXIMUM TEMPERATURE	CONDITIONS	SINGLE-MODE	MULTIMODE
85°C	Hydrogen Present	VHS100-CA	VHM2000-CA
150°C	No Hydrogen	VHS100-MTDA VHS100-SMTA	VHM2000-MTDA VHM2000-SMTA
	Hydrogen Present	VHS100-CMTDA VHS100-CSMTA	VHM2000-CMTDA VHM2000-CSMTA
200°C	All Conditions	VHS300-CSPFA VHS300-P VHS300-CP	VHM3000-CSPFA VHM3000-P VHM3000-CP
300°C	All Conditions	VHS300-P VHS300-CP	VHM3000-P VHM5000-P VHM3000-CP VHM5000-CP

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Verrillon®
VHM5000 Series
Harsh Environment Fibers

Specifications – VHM5000 Series

AFL NO.	MMF-50-4-CP-125-4	MMF-50-4-P-125-4	MMF-50-4-CSPFA-125-5
Description	50/125 Carbon/Polyimide coated Ultimate Performance Graded Index, Multimode Fiber	50/125 Polyimide coated Ultimate Performance Graded Index, Multimode Fiber	50/125/400 Carbon/Silicone PFA Ultimate Performance Graded Index, Multimode Fiber
PARAMETER	**VALUE**		
Material			
Hermetic Coating	Carbon	—	Carbon
Primary Coating	Polyimide	Polyimide	Silicone
Secondary Coating	—	—	PFA
Geometry			
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
Coat Diameter (µm)	155 ± 5	155 ± 5	—
Polyimide Coating Concentricity* (%)	> 80	> 80	—
Combined Coating Diameter (µm)	—	—	400 ± 50
Optical			
NA (nominal)	0.20	0.20	0.20
Attenuation @ 850 nm (dB/km) @ 1300 nm (dB/km)	 ≤ 3.0** ≤ 1.2	 ≤ 3.0** ≤ 1.2	 ≤ 3.0 ≤ 1.2
Bandwidth @ 850 nm (MHz-km) @ 1300 nm (MHz-km)	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300
Mechanical			
Proof Test (kpsi)	≥ 100	≥ 100	≥ 100
Operating Temperature (°C)	-65 ≤ °C ≤ 300	-65 ≤ °C ≤ 300	-40 ≤ °C ≤ 200

* Measured as (Minimum Wall/Maximum Wall) x 100

** Measurement on Zero Tension Spool

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Verrillon®
VHM3000 Series
Harsh Environment Fibers

Specifications – VHM3000 Series

AFL NO.	MMF-50-6-CSPFA-125-3	MMF-50-6-CP-125-6	MMF-50-6-P-125-6	MMF-50-6-CSMTA-125-6
Description	50/125/700 Carbon/Silicone/PFA Elite Performance Graded Index, Multimode Fiber	50/125/155 Carbon/Polyimide Elite Performance Graded Index, Multimode Fiber	50/125/155 Polyimide Coated Elite Performance Graded Index, Multimode Fiber	50/125/200/245 - Carbon/Silicone/MTA Elite Performance Graded Index, Multimode Fiber
PARAMETER	**VALUE**			
Material				
Hermetic Coating	Carbon	Carbon	—	Carbon
Primary Coating	Silicone	Polyimide	Polyimide	Silicone
Secondary Coating	PFA	—	—	Mid-Temp Acrylate
PFA Color	Clear	—	—	—
Geometry				
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
Coat Diameter (µm)	—	155 ± 5	155 ± 5	200 ± 25
Secondary Coating Diameter (µm)	—	—	—	245 ± 20
Polyimide Coating Concentricity* (%)	—	> 80	> 80	—
Combined Coating Diameter (µm)	—	—	—	—
Optical				
NA (nominal)	0.20	0.20	0.20	0.20
Attenuation @ 850 nm (dB/km) @ 1300 nm (dB/km)	 ≤ 3.0 ≤ 1.2	 ≤ 3.0** ≤ 1.2	 ≤ 3.0** ≤ 1.2	 ≤ 3.0 ≤ 1.2
Bandwidth @ 850 nm (MHz-km) @ 1300 nm (MHz-km)	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300
Mechanical				
Proof Test (kpsi)	≥ 100	≥ 100	≥ 100	≥ 100
Operating Temperature (°C)	-40 ≤ °C ≤ 200	-65 ≤ °C ≤ 300	-65 ≤ °C ≤ 300	-40 ≤ °C ≤ 150

* Measured as (Minimum Wall/Maximum Wall) x 100

** Measurement on Zero Tension Spool

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Specifications are subject to change without notice.

Verrillon®
VHM2000 Series
Harsh Environment Fibers

Specifications – VHM2000 Series

AFL NO.	MMF-50-3-CP-125-3	MMF-50-3-P-125-3	MMF-50-3-SMTA-125-3	MMF-50-3-CSPFA-125-5
Description	50/125/155 Carbon/Polyimide Enhanced Performance Graded Index, Multimode Fiber	50/125/155 Polyimide Coated Enhanced Performance Graded Index Multimode Fiber	50/125/200/245-Silicone/Mid-Temp Acrylate Enhanced Performance Graded Index Multimode Fiber	50/125/400-Carbon/Silicone/PFA Enhanced Performance Graded Index Multimode Fiber
PARAMETER	**VALUE**			
Material				
Hermetic Coating	Carbon	—	—	Carbon
Primary Coating	Polyimide	Polyimide	Silicone	Silicone
Secondary Coating	—	—	Mid-Temp Acrylate	PFA
PFA Color	—	—	—	Clear
Geometry				
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
Coat Diameter (µm)	155 ± 5	155 ± 5	200 ± 20	200 ± 25
Secondary Coating Diameter (µm)	—	—	245 ± 20	—
Polyimide Coating Concentricity* (%)	≥ 80	≥ 80	—	—
Combined Coating Diameter (µm)	—	—	—	400 ± 50
Optical				
NA (nominal)	0.20	0.20	0.200	0.20
Attenuation @ 850 nm (dB/km) @ 1300 nm (dB/km)	 ≤ 3.0 ≤ 1.2	 ≤ 3.0** ≤ 1.2	 ≤ 3.0** ≤ 1.2	 ≤ 3.0 ≤ 1.2
Bandwidth @ 850 nm (MHz-km) @ 1300 nm (MHz-km)	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300	 ≥ 300 ≥ 300
Mechanical				
Proof Test (kpsi)	≥ 100	≥ 100	≥ 100	≥ 100
Operating Temperature (°C)	-65 ≤ °C ≤ 300	-65 ≤ °C ≤ 300	-40 ≤ °C ≤ 150	-40 ≤ °C ≤ 200

* Measured as (Minimum Wall/Maximum Wall) x 100

** Measurement on Zero Tension Spool

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Verrillon®
VHS100 Series
Harsh Environment Fibers

Specifications – VHS100 Series

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

* Measured as (Minimum Wall/Maximum Wall) x 100
** Measurement on Zero Tension Spool
*** Petermann II Definition

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Verrillon®
VHS300 Series
Harsh Environment Fibers

Specifications – VHS300 Series

AFL NO.	SMF-40-CP-125-1	SMF-40-P-125-1
Description	125/155 Carbon-Polyimide Pure Silica Core, Single-mode Fiber	125/155, Polyimide Coated Pure Core, Single-mode Fiber
PARAMETER	**VALUE**	
Material		
Hermetic Coating	Carbon	—
Primary Coating	Polyimide	Polyimide
Secondary Coating	—	—
Geometry		
Clad Diameter (µm)	125 ± 2	125 ± 2
Core/Clad Offset (µm)	≤ 0.5	≤ 0.5
Coat Diameter (µm)	155 ± 5	155 ± 5
Polyimide Coating Concentricity* (%)	≥ 80	≥ 80
Optical		
NA (nominal)	0.12	0.12
Attenuation @ 1310 nm (dB/km) @ 1550 nm (dB/km)	 ≤ 0.8** ≤ 0.8	 ≤ 0.8** ≤ 0.8
Cutoff Wavelength (nm)	1250 ± 50	1250 ± 50
Mode Field Diameter*** @ 1310 nm (µm) @ 1550 nm (µm)	 9.2 ± 0.6*** 10.4 ± 0.8	 9.2 ± 0.6*** 10.4 ± 0.8
Mechanical		
Proof Test (kpsi)	≥ 100	≥ 100
Operating Temperature (°C)	-65 ≤ °C ≤ 300	-65 ≤ °C ≤ 300

* Measured as (Minimum Wall/Maximum Wall) x 100
** Measurement on Zero Tension Spool
*** Petermann II Definition

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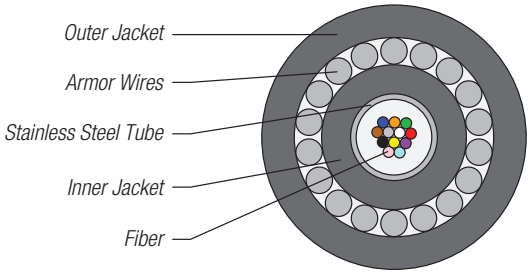
Fiber Optic Component for Umbilical Cable

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	1.8 mm to 3.8 mm
Stainless Steel Tube Types	304 or 316L Stainless Steel
Armor	16 x 1.02 mm (0.040") wires, a range of tensile specifications are available
Fiber Colors	EIA 598 or customer specification
Unit Weight	150 to 300 kg/km
Overall Diameter	6 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

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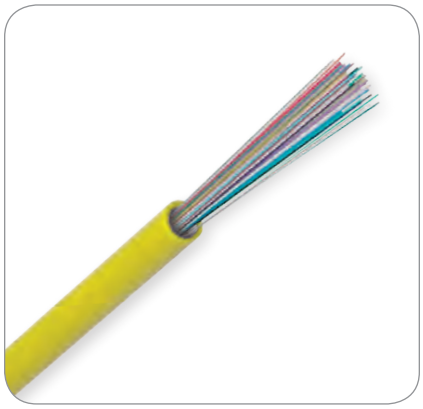

Specialty Fiber Optic Plastic Buffer Tubes

AFL provides fiber optic plastic buffer tubes in a variety of sizes with various fiber counts. These tubes can be used in multiple applications as subcomponents in Umbilical Cables, Gas, Sewer and Water Line Fiber Optic Cables, Optical Ground Wire and Sensor Cables.

Anywhere there is a need for a fiber optic cable or component, AFL can provide or engineer the appropriate solution.

Applications

- Umbilical Cables
- Gas, Sewer and Water Line Fiber Optic Cables
- Optical Ground Wire
- Sensor Cables

Specifications

ITEM NUMBER	OUTSIDE DIAMETER (INCHES)	INSIDE DIAMETER (INCHES)	WALL THICKNESS (INCHES)	MAXIMUM FIBER COUNT	OUTSIDE DIAMETER (MM)	INSIDE DIAMETER (MM)
1	0.063	0.047	0.008	4	1.60	1.20
2	0.079	0.055	0.012	6	2.00	1.40
3	0.083	0.059	0.012	8	2.10	1.50
4	0.087	0.067	0.010	12	2.20	1.70
5	0.098	0.075	0.012	12	2.50	1.90
6	0.106	0.077	0.015	12	2.70	1.95
7	0.118	0.087	0.016	18	3.00	2.20
8	0.140	0.106	0.017	24	3.55	2.70

Available in PBT. Others sizes and materials available on request.

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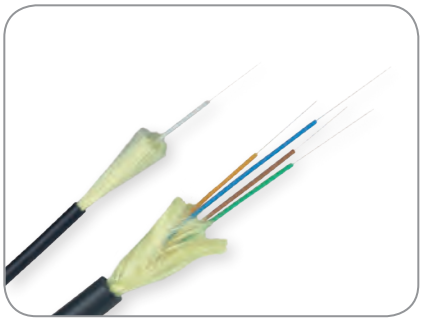
Specifications are subject to change without notice.



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 or harsh conditions.

Features

- Cut resistant, Flame Retardant Polyurethane outer jacket
- Highly flexible construction allows for multiple deployments
- All aramid strength members
- Performance in wide temperature range
- High impact and crush resistance
- Durable in high traffic areas
- MIL-PRF-46291 qualified fiber available (-RH designation)
- Tested to meet or exceed EIA/TIA 568-B3, Telecordia GR-409-CORE, ANSI/ICEA S-83-596, and ANSI/ICEA S-104-696
- Two- and four-fiber cables designed to meet MIL-PRF-85045

Temperature Range

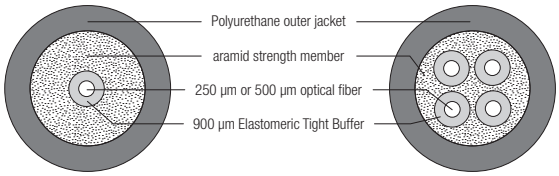
Operating: -56ºC to +85ºC

Installation: -20ºC to +85ºC

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	2000 N/cm
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	

Ordering Information

AFL NO.	FIBER COUNT	NOMINAL DIA.		NOMINAL WT.		MAXIMUM TENSILE LOAD LBS (N)		MINIMUM BEND RADIUS INCHES (CM)	
		INCHES	(MM)	LBS/1000FT	(KG/KM)	INSTALLATION	LONG TERM	INSTALLATION	LONG TERM
XU001✶30180G	1	0.12	(2.9)	5.4	(8)	250 (1112)	75 (334)	1.5 (3.8)	1.25 (3.2)
XU002✶58180G	2	0.23	(5.8)	21.5	(32)	375 (1668)	150 (667)	3.25 (8.3)	2.25 (5.7)
XU004✶58180G	4	0.23	(5.8)	21.5	(32)	375 (1668)	150 (667)	3.25 (8.3)	2.25 (5.7)

Note: Diameter and weight subject to change without notice

Replace asterisk (✶) in AFL number with number corresponding below.
5 = 50/125 µm multimode GIGA-Link™ 600
6 = 62.5/125 µm multimode GIGA-Link™ 300
9 = Single-mode
K = SM Futureguide SR-15e Bend Insensitive

Fiber Notes/Options
G = Elastomer over 500 µm
– RH = Indicates Radiation Hardened Fiber

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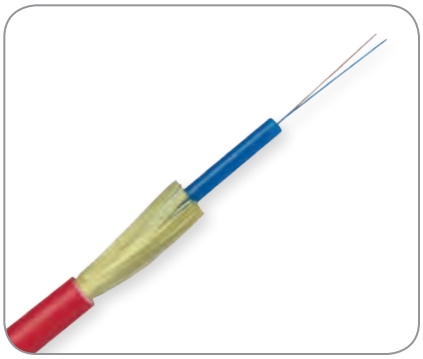


Distributed Temperature Sensing LSZH Fiber Optic Cable

Fiber Optic Distributed Temperature Sensing Cables from AFL are customized to suit the specific needs of the customer's application. AFL cables are specially designed for durability and reliability and are used in varying applications and environments. Suitable for outdoor applications with its UV stabilized jacket and limited indoor applications with its LSZH jacket (IEC 60332-1-2:2004 qualified). Quick and easy to install without special equipment or know how, these cables are an ideal solution and can be used with any DTS manufacturers' equipment.

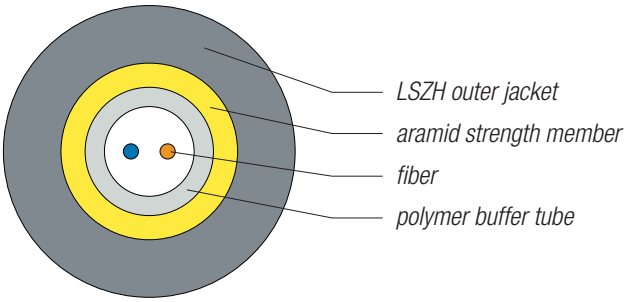
Features

- Low Smoke Zero Halogen Jacket
- UV Light stabilizer
- High Tensile Performance
- Small Outside Diameter
- Flexible

Benefits

- Cost effective solution compared with steel tube alternatives
- Easy installation
- Installations up to 12 km continuous length
- No specialized installation knowledge or equipment needed
- Jacket coloring and printing available to customer specification

Cable Components



Specifications

PARAMETER	VALUE
Jacket Material	Low Smoke Zero Halogen
Cable Weight	18 ± 1 kg / km
Minimum Bend Radius	80 mm
Fiber Colors	Blue, Orange
Standard	Cable is Designed, manufactured and tested in accordance with ISO 9001 IEC 60332-1-2:2004, Tests on electric and optical fiber cables under fire conditions – Part 1-2: Test for vertical flame propogation for a single-insulated wire or cable – Procedure for 1 kW premixed flame

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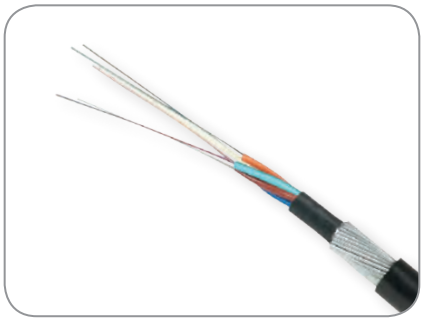
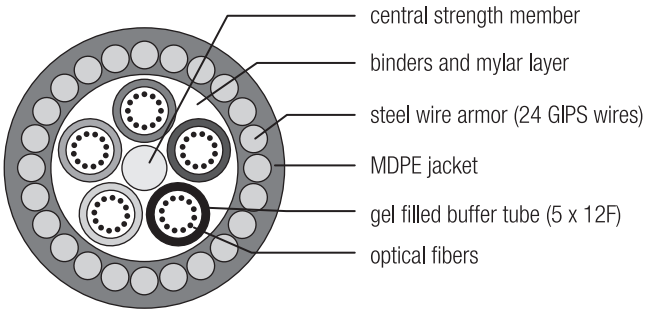


High Strength Steel Wire (HSSW) Armored Fiber Optic Cable

AFL's High Strength Steel Wire (HSSW) Armored Fiber Optic Cable provides the reliability needed for network backbones in harsh environment conditions. The high strength, galvanized plow steel armor is enhanced and offers a significant improvement in mechanical performance as compared to traditional steel tape armored cables. With a near ten-fold improvement in tensile performance, a two-fold improvement in crush resistance and a three-fold improvement in impact energy resistance, AFL's HSSW Armored Fiber Optic Cable provides the strength and durability needed for the most extreme conditions. Ideal for use as a direct buried cable in heavy construction zones including wind farm developments, pipelines, oil and gas fields, heavy industrial sites and a variety of additional harsh environments, AFL's HSSW Armored Cable meets or exceeds all requirements specified in Telcordia GR-20-Core.

Cable Components



Physical Properties

PARAMETER	VALUE
Fiber Count	1-60 *
Nominal Diameter	0.65 inches / 16.5 mm
Nominal Weight	335 lbs/1000 ft. / 500 kg/km
Maximum Tensile Load	5,000 lbs/ 22.2 kN **
Minimum Bend Radius	13 inches / 33 cm
Termperature Range	Installation: -40ºC to + 70ºC Operation: -50ºC to + 70ºC ***

* Any combination of up to 60 fibers available

** Higher strength options available upon request

*** Expanded temperature ranges available upon request

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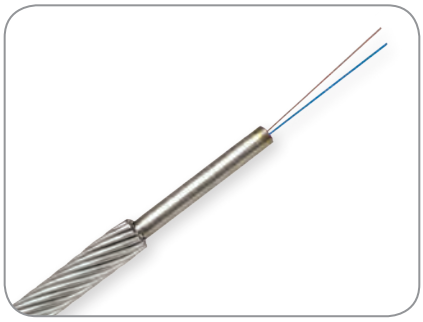


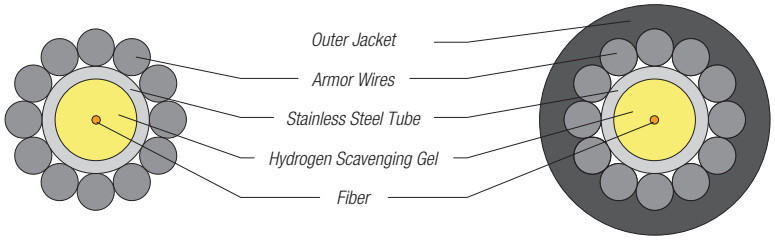
Armored Stainless Steel Tubes

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	2.10	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

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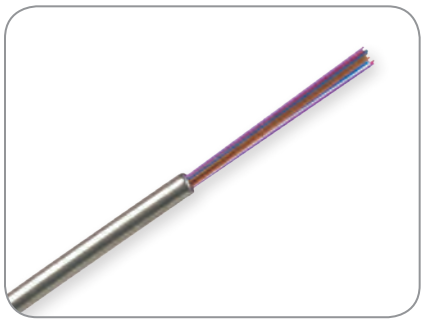


Applications

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

Stainless Steel Fiber Optic Tubes

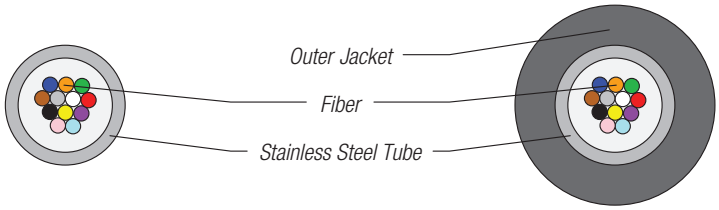
As the inventor and owner of the technology for placing optical fibers into stainless steel tubes, AFL offers a range of tube sizes and fiber counts for a variety of applications. Each tube is flooded with a thixotropic filling compound and hermetically sealed to protect the enclosed fibers from environmental 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



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	6	0.071 (1.80)	0.055 (1.40)	0.008 (0.200)
4	8	0.074 (1.88)	0.058 (1.47)	0.008 (0.200)
5	8	0.078 (1.98)	0.062 (1.57)	0.008 (0.200)
6	8	0.079 (2.01)	0.063 (1.60)	0.008 (0.200)
7	8	0.082 (2.08)	0.066 (1.68)	0.008 (0.200)
8	12	0.092 (2.34)	0.076 (1.93)	0.008 (0.200)
9	16	0.094 (2.39)	0.078 (1.98)	0.008 (0.200)
10	16	0.098 (2.49)	0.082 (2.08)	0.008 (0.200)
11	16	0.106 (2.69)	0.090 (2.29)	0.008 (0.200)
12	24	0.118 (3.00)	0.102 (2.59)	0.008 (0.200)
13	36	0.125 (3.18)	0.109 (2.77)	0.008 (0.200)
14	48	0.134 (3.40)	0.119 (3.02)	0.008 (0.200)
15	60	0.142 (3.61)	0.126 (3.20)	0.008 (0.200)
16	72	0.150 (3.81)	0.134 (3.40)	0.008 (0.200)
17	72	0.156 (3.96)	0.140 (3.56)	0.008 (0.200)

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

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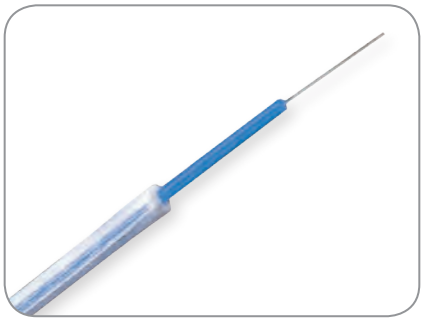


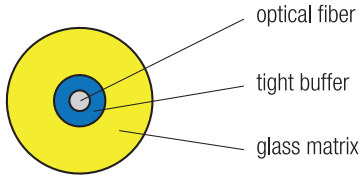
Fiber Rod

AFL's Fiber Rod takes an optical fiber of the customer's choice and encases it in a glass re-enforced matrix. The diameter of the structure is adjusted to provide the characteristics needed for the specific application. The performance of the optical fiber is retained in this structure providing for a very ruggedized fiber suitable for many harsh applications. Fiber Rod is best suited for high tensile or compressive requirements where the glass structure provides the rigidity to protect the optical fiber from harm. Additionally, AFL's Fiber Rod does not exhibit the typical curvature coming off the payoff reel like that of most cables. This makes deployments in applications such as pipelines and oil wells simpler. Applications such as strain sensing and temperature sensing in a host of environments up to 200°C are ideal for this product.

Features/Options

- **Strength** – Variable as glass matrix diameter can be increased which increases strength
- **Bend Diameter** – 50x the outer diameter
- **Temperature Performance** – Standard is 100°C (200°C option)
- **Ruggedized Option** – Product can be jacketed with various polymers such as PVDF, Hytrel, Polyethylene, Nylon, PVC, Fire Retardant PE, Polyurethane and others
- Available in lengths of up to 6 kilometers

Cable Components



Specifications

PARAMETER	VALUE		
	OD (mm)	ID (mm)	TOLERANCE (+/-mm)
100°C Version			
Optical Fiber	0.245	n/a	0.005
Tight Buffer	0.600	.245	0.030
200°C Version			
Optical Fiber	0.125	n/a	0.001
Coating (Silicone/PFA)	0.700	0.125	0.100
Glass Matrix	Application Dependent		

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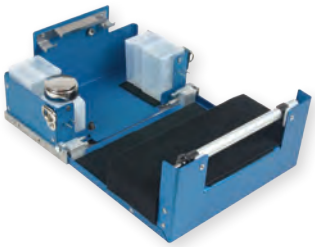

Portable Workstation

SpliceMate shown with Portable Workstation

SpliceMate™ FSM-11S Fusion Splicer

SpliceMate (FSM-11) is the world's smallest and most portable fusion splicer and is designed to meet the challenges posed by today's fiber networks. SpliceMate fits in the palm of your hand, yet it's smart and reliable enough to be used with confidence by inexperienced operators.

SpliceMate's advanced intelligence features include two-camera fiber inspection to ensure the splice is right and Auto Arc Calibration...an industry first. It's easy to operate and quickly makes low loss splices with all common types of optical fibers. SpliceMate is available with a variety of powering options including a battery pack and adapters to work with AC or DC power sources.

A workstation, specifically designed for the SpliceMate, is available for simplified splicing in the field. Whether splicing on a pole, in a bucket, or in a neighborhood...SpliceMate is the friend to have along on the job!

Features

- Highly portable
- Dual camera inspection
- 3.5" dual direction monitor
- 40 second tube heater
- Auto arc calibration
- 30 mph wind protector

Specifications

PARAMETER	VALUE
Model	FSM-11S Fusion Splicer
Applicable Fibers	Single-mode (G.652 & G.657), Multimode (G.651), DS (G.653), NZDS (G.655)
Number of Fiber	Single fiber
Cladding Diameter	125 µm
Coating Diameter	250 µm and 900 µm
Typical Average Splice Loss	SMF = 0.05 dB / MMF = 0.02 dB
Splicing Time	15 seconds
Arc Calibration Method	Automatic and manual methods
Splicing Modes (40)	Auto SM / NZ / DS Auto MM SM, MM, NZ-DSF, DSF
Splice Loss Estimate	Based on dual camera inspection
Monitor	3.5", adjustable monitor angle (front or top selectable)
Tube Heating Time	40 seconds
Number of Splice / Heat with Battery	30
Power Supply	AC, DC, Battery
Terminals	USB
Wind Protection	30 mph
Dimensions	110W x 80D x 100H (mm) / 4.33W x 3.14D x 3.94H (inches)
Weight with Battery	0.80 kg / 1.76 lbs.

SpliceMate™
HANDHELD FUSION SPLICER

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SpliceMate™
FSM-11S Fusion Splicer

Ordering Information

DESCRIPTION	ITEMS INCLUDED	AFL NO.
FSM-11S Fusion Splicer Kit	- FSM-11S Fusion Splicer - FH-50-250 Fiber Holders - BTC-04 Battery Charger - BTR-07 Battery - ADC-10 Adapter (for BTC-04) - ACC-09 Power Cord (for ADC-10) - Spare Electrodes (Pair) - Operation Manual - Transit Case	S013956
FSM-11S Fusion Splicer Kit with Cleaver	- FSM-11S Fusion Splicer - CT-30 Cleaver - FH-50-250 Fiber Holders - BTC-04 Battery Charger - BTR-07 Battery - ADC-10 Adapter (for BTC-04) - ACC-09 Power Cord (for ADC-10) - Spare Electrodes (Pair) - Operation Manual - Transit Case	S013988

Accessories & Supplies

DESCRIPTION	AFL NO.
Cleavers	
CT-30 Cleaver	S014076
FC-02 Fiber Collector	S014092
FDB-02 Fiber Collector Scrap Box	S014104
FDB-03 Large Fiber Collector Scrap Box	S014483
Batteries and Power Cords	
BTC-04 Battery Charger for SpliceMate (charges BTR-07)	S014000
BTR-07 Battery for SpliceMate	S014004
ACC-09 Power Cord (for ADC-10)	S014390
DCA-02 DC Adaptor for SpliceMate (needed for AC operation)	S014008
ADC-10 AC Adapter (for BTC-04)	S012548
Miscellaneous	
FH-50-250 Fiber Holders (250 µm single fiber)	S013800
FH-50-900 Fiber Holders (900 µm single fiber)	S013804
SpliceMate Portable Workstation	S014052
NID Mounting Kit	S014108
LC-01 Leather Case for SpliceMate	S014024
Electrodes: FSM-11S/R	S014028
Data Download Software	S014415
CC-17 Transit Case for SpliceMate	S013984

SpliceMate™
HANDHELD FUSION SPLICER

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FSM-60S

Detachable Work Table

FSM-60S Fusion Splicer

The FSM-60S fusion splicer sets the standard for core alignment fusion splicing by incorporating a user-friendly interface with enhanced features to provide the most rugged and reliable fusion splicer in the market today. The new rugged construction adds improved reliability by resisting shock, dust, and rain, and can withstand a 30" drop test.

The FSM-60S splices a fiber in 9 seconds and heats a 60 mm splice sleeve in 30 seconds, for a total cycle time of only 39 seconds. New features, such as automatic tube heater operation, user-selectable clamping method (sheath clamp or fiber holder system), automated monitor image orientation and battery charge capability during splicer operation provide the end user a productivity tool they can count on.

New software included provides the ability to download splice data to a PC for splice data reporting, download splicer operating software via the internet to maintain peak performance, and download video images from the splicer to enhance technical support.

Features

- Rugged construction providing shock, dust and moisture resistance
- Dual monitor position with automatic image orientation
- Automatic arc calibration and fiber identification
- User-selectable fiber clamping method – sheath clamp or fiber holders
- Auto-start tube heater feature
- Color LCD display with anti-reflective coating for excellent visibility in bright sunlight
- Simultaneous battery charge and splicer operation
- Long life battery (up to 160 splice/heat cycles per charge)
- Detachable work table incorporated into the transit case
- Data and video download software and splicer upgrade software included; software upgrades through PC application via the internet
- Green friendly – RoHS and WEEE compliant

Ordering Information

DESCRIPTION	AFL NO.
FSM-60S Fusion Splicer (machine only) **Includes:** ADC-13 AC Adapter, ACC-14 AC Cord, Spare Electrodes (pair), S60A Sheath Clamp, USB Cable, Splicer Carrying Strap, Quick Reference Guide, Video Instruction Manual, JP-05 Splice Sleeve Cooling Tray, and Transit Case with Carrying Strap	S014531
FSM-60S Fusion Splicer Kit (with cleaver) **Includes:** CT30A Cleaver, ADC-13 AC Adapter, ACC-14 AC Cord, Spare Electrodes (pair), S60A Sheath Clamp, USB Cable, Splicer Carrying Strap, Quick Reference Guide, Video Instruction Manual, JP-05 Splice Sleeve Cooling Tray, and Transit Case with Carrying Strap	S014532
FSM-60S Fusion Splicer Kit (with cleaver, battery and cord) **Includes:** BTR-08 Battery, DCC-14 Battery Charge Cord, CT30A Cleaver, ADC-13 AC Adapter, ACC-14 AC Cord, Spare Electrodes (pair), S60A Sheath Clamp, USB Cable, Splicer Carrying Strap, Quick Reference Guide, Video Instruction Manual, JP-05 Splice Sleeve Cooling Tray, and Transit Case with Carrying Strap	S014562

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FSM-60S Fusion Splicer

Accessories Recommended for the FSM-60S

DESCRIPTION	AFL NO.
Cleavers	
CT-30A Cleaver	S014080
Fiber Holders (pairs)	
FH-60-250 Fiber Holder	S014548
FH-60-900 Fiber Holder	S014549
Batteries and Power Cords	
ADC-13 AC Adapter	S014535
BTR-08 Battery (160 splice/heat cycles)	S014540
DCC-14 Battery Charge Cord (BTR-08)	S014541
DCC-12 Power Cord (connects ADC-13 to cigarette lighter socket)	S013552
DCC-13 Power Cord (connects ADC-13 to power source via alligator clips)	S013556
ACC-14 AC Power Cord	S014536

DESCRIPTION	AFL NO.
Miscellaneous	
ELCT2-20A Electrodes	S013532
Portable Tripod Workstation (see product profile for more detail)	S014773
ASW-02 Splicing Workstation (see product profile for more detail)	S010532
JP-05 Splice Sleeve Cooling Tray	S014537
CLAMP-S60A Sheath Clamp (8 mm min. cleave for 250 µm, 16 mm min. cleave for 900 µm)	S014550
CLAMP-S60B Sheath Clamp (8 mm min. cleave for 250 µm and 900 µm)	S014551
CLAMP-S60C Sheath Clamp (16 mm cleave for 900 µm loose tube fiber)	S014552
CLAMP-S60D Sheath Clamp (8 mm - 16 mm cleave for 900 µm loose tube fiber)	S014750
CC-24-60S Transit Case (fits only FSM-60S)	S014559
One Year Extended Warranty	S012996
Two Year Extended Warranty	S013000

Specifications

PARAMETER	VALUE
Model	FSM-60S Fusion Splicer
Applicable Fibers	Single-mode (G.652 & G.657), Multimode (G.651), DS (G.653), NZDS (G.655)
Cladding Diameter	80 µm to150 µm
Coating Diameter	100 µm to 1,000 µm
Fiber Cleave Length	8 to 16 mm with 250 µm coating diameter, 16 mm with 900 µm coating diameter
Typical Average Splice Loss	0.02 dB with SM, 0.01 dB with MM, 0.04 dB with DS, 0.04 dB with NZDS, measured by cut-back method relevant to ITU-T and IEC standards
Splicing Time	Typical 9 seconds with standard single-mode fiber
Arc Calibration Method	Automatic, real-time and by using results of previous splice when in AUTO mode, manual arc calibration function available
Splicing Modes	100 preset and user programmable modes
Splice Loss Estimate	Based upon dual camera core alignment data
Storage of Splice Result	Last 2000 results to be stored in the internal memory
Fiber Display	X or Y, or both X and Y simultaneously. Front or rear monitor display options with automated image orientation
Magnification	300X for single X or Y view, or 187X for X and Y view
Viewing Method	Dual cameras with 4.1 inch TFT color LCD monitor
Operating Condition	0 to 5,000 m above sea level, 0 to 95%RH and -10 to 50°C respectively
Mechanical Proof Test	1.96 to 2.25N
Tube Heater	Built-in tube heater with 30 heating modes; auto-start function
Tube Heating Time	Typical 30 seconds with FP-03 sleeve, 35 seconds with FP3 (40), 35-55 seconds with Fujikura micro sleeves
Protection Sleeve Length	60 mm, 40 mm, micro
Splice/Heat Cycles with Battery	Typical 160 cycles with power save functions activated
Power Supply	Auto voltage selection from 100 to 240 V AC or 10 to 15 V DC with ADC-11, 13.2 V DC with BTR-08 battery
Terminals	USB 1.1 (USB-B type) for PC communication. Mini-DIN (6-pin) for HJS-02/03 and SH-8 tube heater
Wind Protection	Maximum wind velocity of 15 m/s. (34 mph)
Dimensions	136W x 161D x 143H (mm) / 5.3W x 6.3D x 5.6H (inches)
Weight	2.3 kg (5.1 lbs) with AC adapter ADC-11; 2.7 kg (5.9 lbs) with BTR-08 battery

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Specifications are subject to change without notice.

FSM-100M

FSM-100P

ARCMaster™

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 2000 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.

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

Ordering Information

DESCRIPTION	AFL NO.
ARCMaster™ FSM-100M Fusion Splicer (machine only) **Includes:** 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, and transit case	S014821
ARCMaster™ FSM-100M Fusion Splicer Kit *	S014822
ARCMaster™ FSM-100P Fusion Splicer (machine only) **Includes:** 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, and transit case	S014823
ARCMaster™ FSM-100P Fusion Splicer Kit *	S014824

* Each splicer kit includes an HJS-02 Hot Jacket Stripper, a CT-32 Cleaver and a SPA-HJS-030 Spacer for HJS-02 in addition to the items listed above.

State of the ARC™

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ARCMaster™

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
Fiber Length	3, 4, 5, 8, 9, 10 mm (standard) (bare fiber length after cleaving)
Splice Loss	SMF: 0.01 to 0.03 dB MMF: 0.00 to 0.02 dB NZDSF/LDF: 0.02 to 0.05 dB PMF: 0.03 to 0.06 dB
Splicing Time	SMF/MMF: 15 to 20 sec. NZDSF/LDF: 25 to 30 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-03 (40 mm): 30 sec. FP-03 (60 mm): 35 sec. Micro sleeves: 55 sec.
Dimensions (mm)	311W x 232D x 160H
Weight (excluding AC adapter)	FSM-100M: 7.7 kg FSM-100P: 7.9 kg
Operation Temperature	0°C to 40°C
Humidity	0 to 95 % RH (non-dew)
Storage Temperature	-40°C to 80°C
Humidity	0 to 95 % RH (non-dew)
Monitor Type	Dual 4.1 inch TFT color LCD monitors
Monitor Features	Equipped with a scratch-proof transparent protector. Monitor image is automatically set to correct orientation when the monitor angle is adjusted from the front to rear monitor position. Fiber image and data information display on the monitors is user selectable for each step of the splicing process.
Magnification	125 µm: 187 to 300 X 250 µm: 93 to 150 X 400 µm: 58 to 93 X

* Splice loss depends on fiber type, wave length, clamping method and alignment method.
* Sleeve heater data at room temperature.
* Micro sleeve heating time depends on type.
* Monitor and wind protector included in dimensional data, protruding parts excluded.

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

DESCRIPTION	AFL NO.
High Strength Accessories	
Ultrasonic Cleaner (USC-01A)	S012732
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
Strippers	
HJS-02 Hot Jacket Stripper	S010340
HJS-02-80 Hot Jacket Stripper (80 µm cladding)	S013264
JS-02-900 (900 µm)	S010908
Electrodes	
ELCT2-25 Spare Electrodes (pair)	S002068
Cleavers	
CT-32 Cleaver	S014348
CT-38 Cleaer (for 80 µm cladding)	S014349
Fiber Holders (Pairs)	
FH-100-100 Fiber Holder (94 µm - 117 µm)	S014828
FH-100-125 Fiber Holder (118 µm - 139 µm)	S014829
FH-100-150 Fiber Holder (140 µm - 169 µm)	S014861
FH-100-180 Fiber Holder (170 µm - 199 µm)	S014830
FH-100-210 Fiber Holder (200 µm - 239 µm)	S014831
FH-100-250 Fiber Holder (240 µm - 289 µm)	S014832
FH-100-300 Fiber Holder (290 µm - 339 µm)	S014833
FH-100-350 Fiber Holder (340 µm - 389 µm)	S014834
FH-100-400 Fiber Holder (390 µm - 489 µm)	S014835
FH-100-500 Fiber Holder (490 µm - 589 µm)	S014836
FH-100-600 Fiber Holder (590 µm - 689 µm)	S014837
FH-100-700 Fiber Holder (690 µm - 789 µm)	S014838
FH-100-800 Fiber Holder (790 µm - 889 µm)	S014839
FH-100-900 Fiber Holder (890 µm - 989 µm)	S014840
FH-40-LT900 Fiber Holder	S013584
Power and Cords	
ADC-15 AC Adapter (FSM-100M/P)	S014826
ACC-02 AC Power Cord	S001171
ADC-09 AC Adapter for HJS-02	S014389
ACC-09 AC Power Cord (for ADC-09)	S014390
Miscellaneous	
CC-27 Transit Case (100 M/P)	S014825
DCS-01 Dust Cleaning Swab	S014827
One year extended warranty (extends factory warranty by one year)	S012996
Two year extended warranty (extends factory warranty by two years)	S013000

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FSR-02 Fiber Recoater

To meet the small package requirements of OEMs, AFL offers the FSR-02 fiber recoater. The FSR-02 eliminates the need for splice protection sleeves by automatically recoating a colored or non-colored fiber back to the original coating diameter after a splice is complete. Programmable for recoating lengths from 4 to 50 mm and proof testing from 4 to 20 Newtons, this unit stores data for 100 cycles which are easily downloadable to a PC. For splices that may fail the proof test, the breaking load is displayed. A compact and low profile design makes for comfortable benchtop operation in the factory environment. New, Chrome Spattering technology improves the long-term durability of the mold surface.

Features

- Automatic, easy operation
- Colored and non-colored fiber recoating capability
- Compact and low profile design for bench-top operation
- Programmable proof test capability with breaking load display function
- Programmable resin injection quantity
- PC interface with RS-232C
- Data storage for the last 100 cycles
- Easy-to-exchange molds for all common coating sizes (165 µm, 250 µm, 400 µm and 900 µm)
- Compatible with special recoating compound to provide higher stiffness recoating of 900 µm jacketed fibers
- Complete set of LabVIEW® drivers for simplified automated production-line control and integration

Specifications

PARAMETER	VALUE
Dimensions (W x D x H)	255 mm x 150 mm x 130 mm
Weight	3.8 kg
Power supply	AC 100 to 240 V, 50 to 60 Hz
Recoating time	Injection 15 sec / Curing 15 sec
Proof test	4 to 20 N (0.4 to 2 kgf), 0 to 60 seconds, programmable
Data storage	100 recoat cycles, PC downloadable
Fiber coating diameter	165 µm, 250 µm, 400 µm and 900 µm
Recoat diameter	195 µm, 280 µm, 450 µm, and 1000 µm
Recoat length	4 to 50 mm
UV curable material capacity	53 cc
Recoat and proof modes	30 programmable modes
Operating conditions	10° to 30°C, 0 to 90% humidity, non-condensing
Storage conditions	-40° to 60°C, 0 to 90% humidity, non-condensing

Ordering Information

DESCRIPTION	AFL NO.
FSR-02 Fiber Recoater The FSR-02 Fiber Recoater comes with ADC-10 AC Adapter, AC Cord, fiber protection cover and operation manual (mold sold separately).	S012728

Accessories

DESCRIPTION	AFL NO.
FSR-02-MOLD-195 Mold for recoating 165 µm coated fiber	S013272
FSR-02-MOLD-280 Mold for recoating 250 µm coated fiber	S012972
FSR-02-MOLD-450 Mold for recoating 400 µm coated fiber	S012976
FSR-02-MOLD-1000 Mold for recoating 900 µm jacketed fiber	S013212
Force gauge for calibrating proof tester	S013092
Force gauge mounting table (required with gauge)	S013088
Spare UV lamp	S013012

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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. PowerCleave's tensile cleaving method includes a tension clamping system and a diamond-tipped ultrasonic blade, allowing for consistently flat ends even at cleave lengths as short as 3 mm. Specially designed for the FSM-45F/PM fiber holders, 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	3mm
Cleave Angle	<0.6 typical (95% of cleaves)
Blade	Diamond with an estimated life of over 20,000 cleaves
Clamping System	Compatible with Fujikura 40F/PM fiber holders
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)
CE Conformity	Fully complies with all EC equipment guidelines according to the CE declaration of conformity

Ordering Information

DESCRIPTION	AFL NO.
PowerCleave® Kit Includes: PowerCleave, Instruction manual, 2.5 mm x 60 mm screwdriver, 2 mm Allen wrench	S009972

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USC-01A Ultrasonic Cleaner

The Fujikura ultrasonic cleaner model USC-01A provides a simple and cost effective method for cleaning optical fibers when high strength fusion splices are required. This ultrasonic cleaner readily accepts the fiber holders used with the FSM-45F and FSM-45PM. The high frequency ultrasonic action cleans debris and coating residue without damaging the exposed cladding and a built-in timer assures 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
- High intensity vibratory cleaning action
- Adjustment knob allows fine-tuning of fiber submersion depth
- Readily accepts fiber holders for the FSM-45F and FSM-45PM
- Alcohol bath lid prevents cleaning fluid evaporation when machine is idle
- Ergonomic design matches working height of FSM-45F and FSM-45PM

Specifications

PARAMETER	VALUE
Maximum Fiber Length Cleaned	54 mm
Cleaning Liquid	Ethyl Alcohol
Cleaning Tank Capacity	24 cc to 34 cc
Vibration Unit	50 kHz Langevin Type
Output Power	6 W
Timer Range	0 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	95W x 173D x 157H (mm) / 3.74W x 6.81D x 6.18H (inches)
Weight	1 kg / 2.2 lbs

Ordering Information

DESCRIPTION	AFL NO.
USC-01A	S012732
Universal Fiber Holder Adapter for USC-01A	S013568

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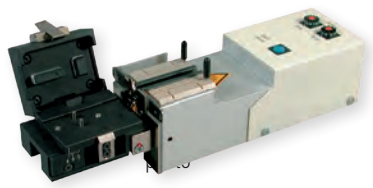

AFL PowerStrip™

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 and100 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)
CE Conformity	Complies with all CE equipment guidelines

Ordering Information

DESCRIPTION	AFL NO.
AFL PowerStrip™ Kit 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
Coating Blades	
80/160 µm	S012656
125/250 µm	S012596
125/400 µm	S012628
125/900 µm	S012604
250/400 µm	S014400
Centralizers	
160 µm	S012652
250 µm	S012600
400 µm	S012624
900 µm	S012608

* Custom blades and centralizers available on request.

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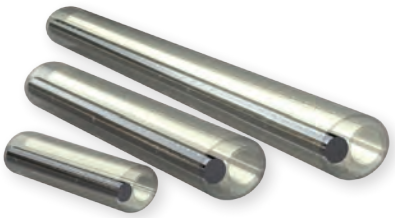

Splice Protection Sleeves

AFL offers a wide selection of fiber protection sleeves to meet any application. The FP-03 Series is the industry standard for durable and lasting protection of single fiber splices in field installations, while the FP-04(T)/05 Series provides these same performance levels for 8/12 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 and Applicable Fiber

FP-03 AND FP-03 (L=40) FOR SINGLE FIBERS UP TO 900 MICRONS

DESCRIPTION	SLEEVE LENGTH	FIBER CLEAVE LENGTH	SLEEVE DIAMETER AFTER SHRINK	AFL NO.
FP-03	60 mm	16 mm	3.1 mm (max.)	S000065
FP-03(M)	60 mm	16 mm	3.1 mm (max.)	S000066
FP-03(34)	34 mm	10 mm	3.1 mm (max.)	S000453
FP-03(40)	40 mm	10 mm	3.1 mm (max.)	S000206

SLEEVES DESIGNED SPECIFICALLY FOR RIBBON FIBERS

DESCRIPTION	FIBER COUNT	SLEEVE LENGTH	FIBER CLEAVE LENGTH	SLEEVE DIAMETER AFTER SHRINK	AFL NO.
FP-04(T)	Up to 8 fibers	40 mm	10 mm	4.1 mm (max.)	S002105
FP-05	Up to 12 fibers	40 mm	10 mm	4.5 mm (max.)	S003027
FPS04-30	Up to 4 fibers	30 mm	10 mm	2.4 mm (max.)	S010848
FPS08-28	Up to 8 fibers	28 mm	10 mm	3.4 mm (max.)	S013560
FPS24-40	Up to 24 fibers	40 mm	10 mm	8 mm (max.)	S013004

Specifications

PARAMETER	DESCRIPTION	VALUE
Outer Tube	FP-03 Series FP-04(T) / FP-05	Poliolefin based on Polyethylene Ethylene-Vinyl Acetate (Polyolefin Copolymer)
Inner Tube		Ethylene-Vinyl Acetate (Polyolefin Copolymer)
Strength Member	FP-03 Series FP-04(T) / FP-05	Stainless steel Quartz glass
Operation Condition (after shrink)		-10ºC to 50ºC, 0 to 95%RH(Non dew)
Storage Condition (before shrink)		-40ºC to 60ºC, Non dew

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Splice Protection Sleeves

Micro Sleeves: Dimensions and Applicable Fiber

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

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

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

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

Specifications

PARAMETER	MODEL	VALUE
Outer Tube	FPS01 Series / FPS04-30	Poliolefin based on Polyethylene
Inner Tube		Ethylene-Vinyl Acetate (Polyolefin Copolymer)
Strength Member	FPS01 Series FPS04-30 / FPS08-28	Stainless steel Quartz glass
Operation Condition (after shrink)		-10ºC to 50ºC, 0 to 95%RH(Non dew)
Storage Condition (before shrink)		-40ºC to 60ºC, Non dew

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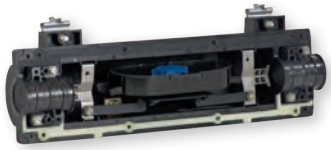


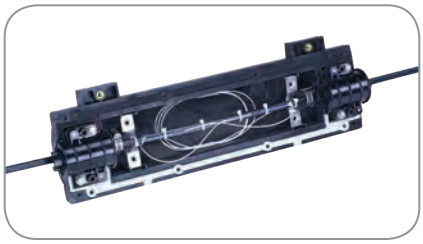
LightGuard™ 55 Sealed Fiber Optic Splice Closure

Designed with versatility in mind, the LightGuard (LG) 55 sealed closure from AFL offers a variety of solutions including repair and distribution splicing, grounding for Fiber-in-the-Loop applications, and for use as an isolation gap with armored cables. This closure accepts stranded loose tube, Uniflex® or ribbon fiber cables in either armored or dielectric configurations and can be utilized in a butt or in-line configuration.

The LG-55 closure incorporates a unique cable clamp design sealing the cable, allowing both of the cover halves to be removed without disturbing the contents. In addition, AFL's Peel & Seal Grommet System™ is incorporated to ensure a tight fit on various cable diameters, fully sealing the closure and protecting the fiber while eliminating cumbersome tape and washers – making installation fast and easy.

Features

- Accommodates cables to 0.77" O.D. for splicing and grounding / bonding
- Incorporates the Peel & Seal Grommet System, fully sealing the closure
- Includes removable, integral central splicing module and individual cable retention clamps



Inline Repair Closure (IRC) for repair of flat or round drop cables

Specifications

PARAMETER	VALUE
Splice Capacity (Max.) – Single, Mass, Mechanical	24, n/a, n/a
Number of Splice Trays (Max.) – Single, Mass, Mechanical	1, n/a, n/a
Cable Entrance Configuration	In-line / Butt
Cable Ports	2 (3 using dual cable entry port kit)
Cable Sizes (Max. O.D.)	2 @ 0.60" (for in-line splice configuration) 2 @ 0.77" (for in-line ground / bond configuration) 2 @ 0.45" (for butt splice configuration)
Dimensions – (L x D) in. (cm)	14 x 4 (34.30 x 10.16)
Weight – lbs. (kg)	3.0 (1.36)

Ordering Information

DESCRIPTION	MODEL NO.	AFL NO.
LG-55 Sealed Fiber Optic Splice Closure – 24 fusion splice capable and includes (2) cable kits for sealing / retention, (2) Cable Grounding Kits, (1) Dual Cable Entry Port Kit and a grounding terminal. Splice tray not included.	LG-55-U-0	FC000034-PS
LG-55 In-line Repair Closure	LG-55-IRC	FC000793-PS
LG-55 with Stainless Steel Hardware for Harsh Environments	LG-55-U-SS	FC000711
LG-55 Splice Tray – Stores 24 single fusion splices and includes base, cover, (3) eight-position splice holders and tie-wraps. Maximum of (1) tray in the LG-55.	LL-2425	FC000247
Dual Cable Entry Port Kit – Allows two cables to enter closure from each cable port. Includes one dual port cable grommet to increase the closure to four ports.	Dual Cable Entry Port Kit	FC000337
Cable Grounding Kit – Includes harness and hose clamp (one kit required per cable entry)	CGH-1	FC000003
Cable Grounding Harness Kit – Includes (4) 8" long ground harnesses constructed of #6 AWG conductor.	CGH-4	FC000024

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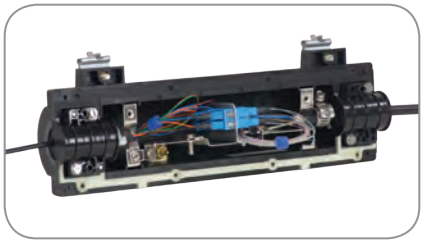

LightGuard™ 55-SC
Sealed Fiber Optic Splice Closure

AFL's LightGuard (LG) 55-SC sealed closure retains all the features of the LG-55, but includes a unique patching system that utilizes pre-terminated SC fiber assemblies or field installable connectors such as the FAST™ SC.

An innovative solution that can be used to facilitate a link between traffic control cabinets and entrance cables, the LG-55-SC closure allows for rapid restoration and minimal damage to a fiber optic cable should an impact disable the cabinet. A breakable tie wrap secures the pre-connectorized cable to one side of the closure (traffic control cabinet), while the main entrance cable is secured with a more rugged cable clamp, allowing the system to separate during a damaging impact.

Features

- Durable cover assembly that provides protection for all internal components and acts as an interface / anchor to the cable clamps
- Unique cable clamp seal to anchor the cable to the cover assembly
- Movable sheath retention bracket keeps cable bends at a minimum
- Accommodates up to four SC/UPC connectors
- Utilizes AFL's Peel & Seal Grommet System™, ensuring a tight fit on various cable diameters while eliminating cumbersome tape and washers

Specifications

PARAMETER	VALUE
Maximum Cable Diameter	0.65"
Minimum Cable Diameter	0.30"
Maximum Cable Entry	2 ports (one each end)
Overall Dimensions	14" Length x 4" Diameter

Ordering Information

MODEL NO.	AFL NO.
LG-55-SC	FC000481-PS
Dual Cable Entry Port Kit – Allows two cables to enter closure from each cable port. Includes one dual port cable grommet to increase the closure to four ports.	FC000337
Cable Grounding Kit – Includes harness and hose clamp (one kit required per cable entry).	FC000003
Cable Grounding Harness Kit – Includes (4) 8" long ground harnesses constructed of #6 AWG conductor.	FC000024

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LL-500

LL-500 with LL-2450 installed

LightLink™ 500 Optical Splicing and Distribution Enclosure

The LightLink (LL) 500 Optic Splicing and Distribution Enclosure provides for organizing, splicing, and interconnecting fibers in broadband, distribution, and building entrance applications. The enclosure features a scratch and corrosion resistant powder paint coating base and a fully gasketed hinged cover. A unique self-sizing grommet design allows for express and pre-terminated cable installation. The LL-500 supports up to five LL-2450 splice trays for up to 60 single fusion splices or three LL-4850 splice trays (not included in base unit) and an optional 12 fiber, hinged Interconnect Module.

Features

- NEMA 3 rated enclosure
- Independent cable strain relief system
- Cable entry/exit grommet seals
- Fiber routing system
- Splice tray support system
- Hinged cover
- Supports optional Interconnect Modules
- Interconnect Module supports up to 12 SC bulkhead adapters
- Secured with a standard padlock
- 4 cable ports with standard grommets
- 8 cable ports with optional expansion kits

Specifications

PARAMETER	VALUE
Material	Steel
Coatings	Electrostatically applied, powder coat
Color	Antique white
Dimensions (H x W x D) in. (cm)	17.5 x 9.0 x 4.0 (44.45 x 22.86 x 10.16)
Weight lbs. (kg)	6.5 (2.95)

Ordering Information

DESCRIPTION	AFL NO.
LL-500-U-0	FM000326
LL-500 Interconnect Kit with SC UPC adapters	FM000385
LL-500 Interconnect Kit with SC APC adapters	FM000407
LL-500 Interconnect Kit without adapters	FM000408
LL-500 with Multi-port Grommets	FM000659
LL-2450 Single Fusion Splice Tray (stores 12 single fusion splices)	91957-00
LL-4850 Mass Fusion Splice Tray (stores 8 mass fusion sleeves - 96 fibers)	91958-00
Dual Cable Expansion Kit (includes dual grommet and hardware)	FM002636
LL-400/LL-500 Multi-port Grommet Kit	FM001563

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LightLink™ Optical Entrance Enclosures

The Optical Entrance Enclosures (OEE) are designed to provide a convenient splicing and interconnection location for outside plant cabling entering a Central Office (CO), Controlled Environmental Vault (CEV) or customer location. Each unit is designed to allow the entrance and management of up to 60 cables for splicing and interconnecting. Cables from termination locations and the outside plant are easily installed and managed. Access to individual fiber splices and fiber bundles are made easy by splice tray and fiber management designs.

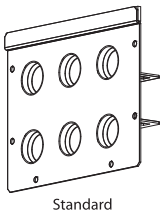
Features

- Manages multiple cable enter and exit facilities
- Each splice tray handles up to 48 single fusion or 144 mass fusion splices
- Enclosures for indoor or outdoor NEMA 3 applications
- Internal ground bar and pass through ground lugs
- Rated NEMA Type 3

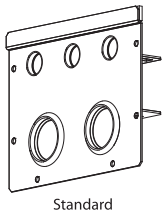
Specifications

PARAMETER	VALUE
Material	Aluminum or steel
Coatings	Electrostatically applied, powder coat
Color	Granite
Dimensions	See Detail Drawings

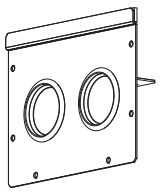
Accessories - Shingle Kits



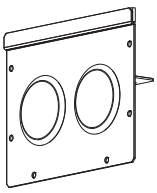
Standard Footprint 6 Ports



Standard Footprint 5 Ports



Standard Footprint 2 Ports – XL



Standard Footprint 2 Ports – XXL

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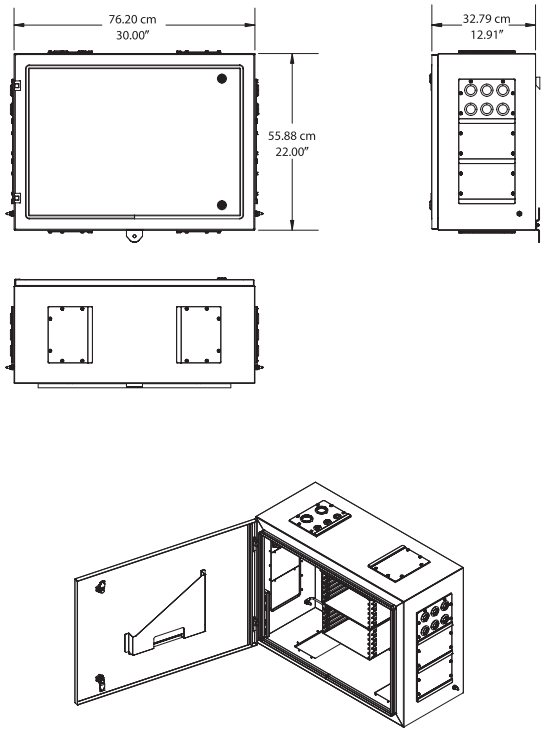
LightLink™ Optical Entrance Enclosures

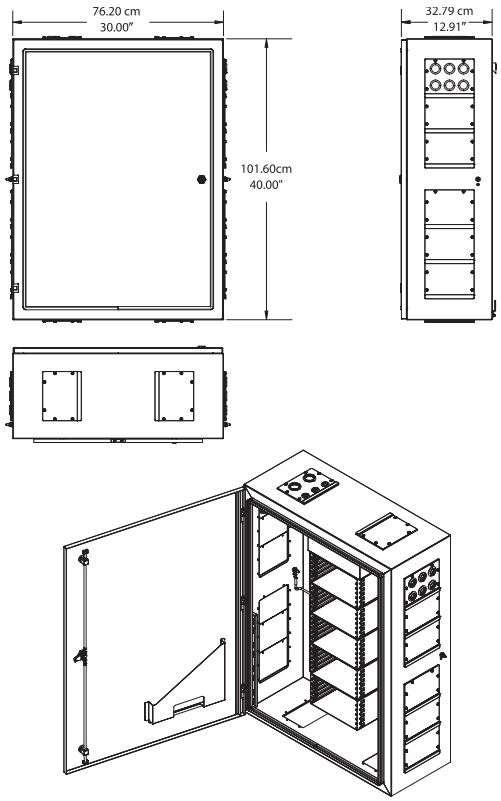
Ordering Information

DESCRIPTION	MODEL NO.	AFL NO.
OPTICAL ENTRANCE ENCLOSURE 576 Single Fusion or 1728 Mass Fused Splice Capacity, up to 60 Cable Entry Ports Includes: (2) 6-Port Standard Shingles (Each port Accepts a 0.472-0.7089" Cable) (1) 5-Port Shingles (2 Port Accepts a 0.708-0.988" Cable, and 3 small Ports Accepting a Cable 0.236-0.473") (4) Medium Sealing and Retention Kits (each supporting a 0.472-0.708" Cable) (1) Large Sealing and Retention Kit (Each Supporting a 0.708-0.988" Cable) (3) Metallic Cable Bonding Kits (1) Wall-Mount Hardware (1) OEE Locking Key	OEE-288/576	911309-00-05
OPTICAL ENTRANCE ENCLOSURE 720 Single Fusion or 4320 Mass Fused Splice Capacity, up to 60 Cable Entry Ports Includes: (2) 6-Port Standard Shingles (Each port Accepts a 0.472-0.7089" Cable) (1) 5-Port Shingles (2 Port Accepts a 0.708-0.988" Cable, and 3 small Ports Accepting a Cable 0.236-0.473") (4) Medium Sealing and Retention Kits (each supporting a 0.472-0.708" Cable) (1) Large Sealing and Retention Kit (Each Supporting a 0.708-0.988" Cable) (3) Metallic Cable Bonding Kits (1) Wall-Mount Hardware (1) OEE Locking Key	OEE-720/1440	911275-00-05

OEE 288/576



OEE 720/1440



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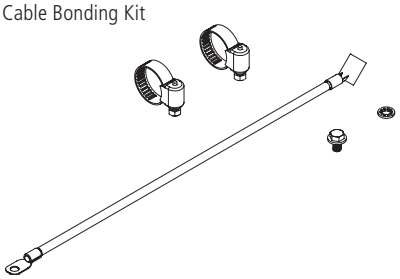
LightLink™ Optical Entrance Enclosures

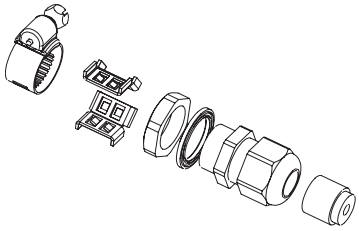
Accessories

DESCRIPTION	MODEL NO.	AFL NO.
OEE Fiber Splice Tray	STF-48	911442-00-00
Metallic Cable Bonding Kit	MBK-1	911260-00-01
Work Shelf	OEE-WS	911262-00
Cable Retention and Sealing Kit – Small (Accepts 0.236-0.473" O.D. Cable)	CRSK236-473	911310-00-00
Cable Retention and Sealing Kit – Medium (Accepts 0.472-0.708" O.D. Cable, four included with OEE)	CRSK472-708	911310-01-00
Cable Retention and Sealing Kit – Large (Accepts 0.708-0.988" O.D. Cable, one included with OEE)	CRSK708-988	911310-02-00
Cable Retention and Sealing Kit – XLarge (Accepts 0.866-1.25" O.D. Cable)	CRSK866-1250	911310-03-00
Cable Retention and Sealing Kit – XXLarge (Accepts 1.25-1.49" O.D. Cable)	CRSK1250-1490	911310-04-00
Shingle Kit – Standard, 6-Ports (Accepts Six Cables From 0.472-0.708" O.D., two included with OEE)	SK-STD	911261-00-00
Shingle Kit – Standard, 5-Ports (2) Large (0.708-0.988" O.D. Cable Ports) (3) Small (0.236-0.472" O.D. Cable Ports) (One Included with OEE)	SK-LS	911261-01-00
Shingle Kit, Two X-Large, (2) Cable Ports (0.866-1.25" O.D.)	SK-XL	911261-02-00
Shingle Kit, Two XX-Large, (2) Cable Ports (1.25-1.49" O.D.)	SK-XXL	911261-03-00

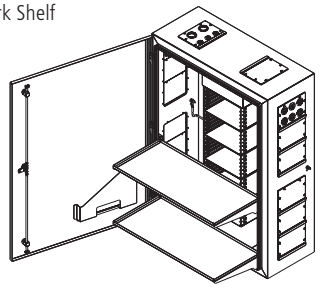
Cable Bonding Kit



Cable Retention and Sealing Kit



Work Shelf



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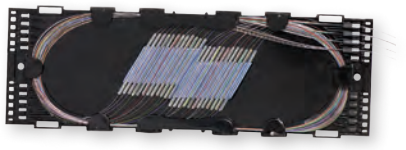

LightLink™ Fiber Optic Splice Trays

AFL's LightLink series of Fiber Optic Splice Trays offers a variety of unique and flexible splice and storage possibilities. They are available in industry standard configurations (single, mass).

Features

- In-line or butt splice capability (see model descriptions)
- Pre-formed radiuses maintain bend requirements
- Interlocking base and cover provides tray stability without the use of a bolt
- Extended finger guides easily store and route loose fiber or ribbon

Ordering Information – Splice Trays for Sealed Fiber Optic Splice Closures

DESCRIPTION	MODEL NO.	AFL NO.	LG-55-U	LG-150-U	LG-250-U	LG-350-U	LG-350-AC	LG-350XL-U
For LG-55 only - Stores 24 single fused fibers, base, cover, (3) eight position splice holders, tie-wraps. 	LL-2425	FC000247	(1 tray max.) 24 Single	N/A	N/A	N/A	N/A	N/A
Stores 12 single fused fibers, base, cover, (2) six position splice holders, tie-wraps. 	LL-2450	91957-00	N/A	(3 trays max.) 36 Single	N/A	N/A	N/A	N/A
Stores 8 mass fusion sleeves, base, deep cover, (2) four position ribbon sleeve holders, tie-wraps. 	LL4850	91958-00	N/A	(3 trays max.) 144 Mass	N/A	N/A	N/A	N/A
Stores 12 single fused fibers or 4 mass fusion sleeves (48 fibers), base, cover, sleeve holders, tie-wraps. 	LL-1248	911221-00-00	N/A	(3 trays max.) 36 Single or 48 Mass	N/A	N/A	N/A	N/A
Stores 24 single fused fibers, base, cover, (1) twenty-four position sleeve holder, base, cover, tie-wraps. 	LL-2400	91710-06	N/A	N/A	(4 trays max.) 96 Single	(12 trays max.) 288 Single	N/A	(16 trays max.) 384 Single

NOTES: * Recommended no more than two trays in the LG-250 due to unique ribbon to ribbon application.
** This tray designed for LG-350 and LG-350XL only. The LG-350 requires special tray support bracket (either 911975 Standard or 911974 High Capacitiy)
*** Five trays can be installed in the LG-350 but it requires a 911974 High Capacity Support Bracket to allow for stacking all trays and not interfering with the dome.

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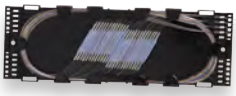
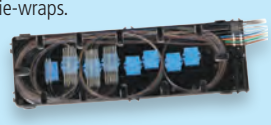
LightLink™ Fiber Optic Splice Trays (cont.)

Ordering Information – Splice Trays for Sealed Fiber Optic Splice Closures

DESCRIPTION	MODEL NO.	AFL NO.	LG-55-U	LG-150-U	LG-250-U	LG-350-U	LG-350-AC	LG-350XL-U
Stores 36 single fused fibers or 12 mass fusion sleeves (144 Fibers), sleeve holders, base, cover, tie-wraps. 	LL-4808L-R	FA000037	N/A	N/A	N/A	N/A	(4 trays max.) 144 Single (3 trays max.) 432 Mass	N/A
Stores 24 single fused fibers, 4 mass fusion sleeves (48 Fibers) or 12 mechanical splices, base, deep cover, tie-wraps). 	LL-2448	911289-00-02	N/A	N/A	(3 trays max.) 72 Single or 144 Mass	(8 trays max.) 192 Singl or 384 Mass	N/A	(10 trays max.) 240 Single or 480 Mass
High density. Stores 48 single fused fibers, base, cover, (2) twenty-four position sleeve holders, tie-wraps. 	LL-2448-48S	FA000045	N/A	N/A	(2 trays max.) 96 Single	(6 trays max.) 288 Single	N/A	(18 trays max.) 864 Single
Stores 12 mass fusion sleeves (144 fibers), base, deep cover, (1) 12 position sleeve holder, tie-wraps. 	LL-4848	911437-00-02	N/A	N/A	(2 trays max.) 288 Mass*	(8 trays max.) 1152 Mass	N/A	(10 trays max.) 1440 Mass
High Density. Stores 96 single fused fibers or 24 mass fusion sleeves (288 Fibers), base, cover, (16) six position sleeve holders, (6) four position mass sleeve holders, tie-wraps. 	LL-4896	911676-00-02	N/A	N/A	N/A	(4 trays max.) 384 Single or 576 Mass** (5 trays max.) 480 Single 720 Mass***	N/A	(9 trays max.) 864 Single or 2592 Mass**
Stores 60 single fused fibers, base, cover, (10) splice holders, tie-wraps. 	LL-7060	FA000042	N/A	N/A	N/A	(5 trays max.) 144 Single	N/A	(15 trays max.) 864 Single

NOTES: * Recommended no more than two trays in the LG-250 due to unique ribbon to ribbon application.
** This tray designed for LG-350 and LG-350XL only. The LG-350 requires special tray support bracket (either 911975 Standard or 911974 High Capacitiy)
*** Five trays can be installed in the LG-350 but it requires a 911974 High Capacity Support Bracket to allow for stacking all trays and not interfering with the dome.

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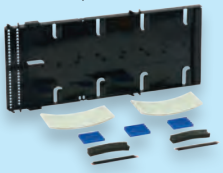
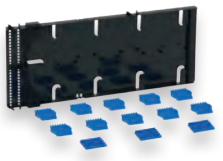
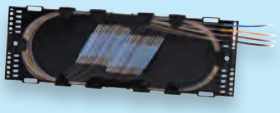
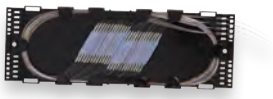
LightLink™ Fiber Optic Splice Trays (cont.)

Ordering Information – Splice Trays for LG-350 and LG-350XL-U Sealed Fiber Optic Splice Closures

DESCRIPTION	MODEL NO.	AFL NO.	LG-55-U	LG-150-U	LG-250-U	LG-350-U	LG-350-AC	LG-350XL-U
Stores 12 mass fusion sleeves (144 fibers), base, cover, mass splice holders, tie-wraps. 	LL-7144	FA000043	N/A	N/A	N/A	(2 trays max.) 432 Mass	N/A	(9 trays max.) 1296 Mass
Stores 60 single fused fibers or 12 mass fusion sleeves (144 fibers) or in combination, base, cover, splice holders, tie-wraps. 	LL-7644	FA000044	N/A	N/A	N/A	(5 trays max.) 144 Single (2 trays max.) 432 Mass	N/A	(15 trays max.) 864 Single (9 trays max.) 1296 Mass

Ordering information – Splice Trays for Aerial Weathertight Fiber Optic Splice Closures

DESCRIPTION	MODEL NO.	AFL NO.	LG-410-U	LG-420-U	LG-500-U	LG-600-U
Single Fusion Splice Tray - Stores 24 single fused fibers, base, cover, (1) twenty-four position fusion splice holder, tie-wraps. 	LL-2400	91710-06	(3 trays max.) 96 Single	N/A	(3 trays max.) 72 Single	(12 trays max.) 288 Single
Universal Splice Tray - Stores 24 single fused fibers or 4 mass fusion sleeves (48 fibers), base, deep cover, tie-wraps). 	LL-2448	911289-00-02	(2 trays max.) 48 Single or 96 Mass	N/A	(2 trays max.) 48 Single or 96 Mass	(8 trays max.) 192 Single or 384 Mass
Mass Fusion Splice Tray - Stores 12 mass fusion sleeves (144 fibers) Base, deep cover, (1) 12 position mass sleeve holder, tie-wraps. 	LL-4848	911437-00-02	(2 trays max.) 288 Mass	N/A	(2 trays max.) 288 Mass	(8 trays max.) 1152 Mass

Ordering Information – Splice Tray for Splicing Cabinets and Shelves

DESCRIPTION	MODEL NO.	AFL NO.
Telescoping Splice Tray - Stores up to 48 single fusion sleeves or 12 mass fusion sleeves (144 fibers). For use in the following products; LL-300, LL-288/576, LL-720/1440, OTSS-SYS1, OSS-SYS2 and OSS-SYS1. 	STF-48	911442-00-00

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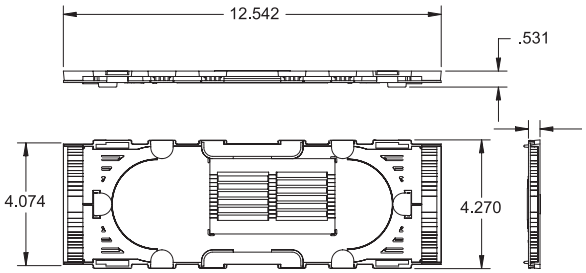
LightLink™ Fiber Optic Splice Trays (cont.)

Ordering Information – Splice Tray Accessories

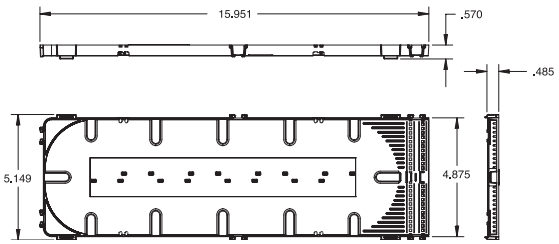
DESCRIPTION	MODEL NO.	AFL NO.
40 mm Fiber Protection Fusion Splice Sleeves, Telcordia® compliant (50 pcs. per bag)	FP-03(40)	S000206
60 mm Fiber Protection Fusion Splice Sleeves, Telcordia compliant (50 pcs. per bag)	FP-03	S000065
Core Tube Cable Fiber Router for routing fiber up to 8 directions. For all central core tube sizes.	1X8-CTR	911167-02
Loose Tube or Ribbon Router for routing fiber up to 6 directions. For all Loose Tube and up to 12 fiber Ribbon.	1X6-LRR	912085-00-00
FTTx Splice Tray Kit (2-4 SF splices)		DM000110

Dimensions

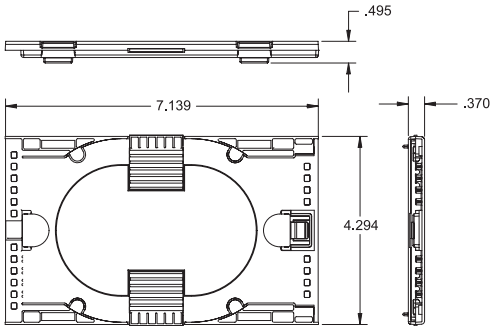
LL-2448 and LL-4848 Splice Trays



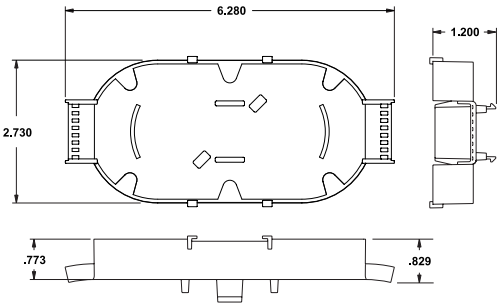
LL-4896 Splice Tray



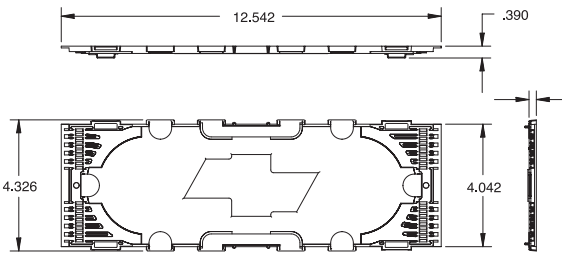
LL-1248, LL-2450 and LL-4850 Splice Trays



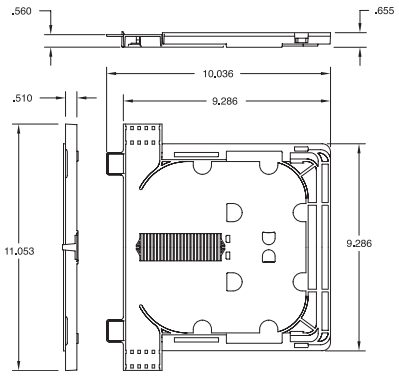
LL-2425 Splice Tray



LL-2400 Splice Tray



OEE Splice Tray



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M200 OTDR with new User Interface

M200 OTDR iwith DFS1 Digital FiberScope

NOYES®
M200 Hand-held OTDR

The NOYES M200 OTDR from AFL combines ease of use (Touch and Test™) and functionality in a field-rugged, hand-held package. With single-mode dynamic ranges of up to 26 dB and multimode dynamic ranges of 22 dB, the M200 is ideal for testing and troubleshooting enterprise, LAN/WAN, metro and service provider networks. Testing at 1310 and 1550 nm is normally sufficient to certify single-mode point-to-point fibers and allows the detection of macrobends. The M200 supports Full Auto, Expert (manual) and Real-Time OTDR test modes, precision event analysis and multi-wavelength testing.

The M200 new User Interface, version 2.0, enables the user to set Pass/Fail thresholds compliant with TIA/ISO/user-defined values to alert test operators of failing or marginal events. Version 2.0 features improved file management and results review via Results Manager and a New Job creation editor with detailed job/file naming. General settings improvements include Date/Time/Number format options and an Auto Off feature. OTDR settings improvements include enhanced event measurements with various manual LSA methods available in Expert mode. The addition of a simple toggle function enables fast and logical storage of trace results from both ends of a fiber/cable. These capabilities simplify the user experience, reduce training time and testing errors enabling even novices to get the job done quickly and accurately.

The M200 with new User Interface supports visual inspection per IEC 61300-3-35 using the DFS1 Digital FiberScope allowing users the ability to view and document connector end-face images with their OTDR traces.

Thousands of OTDR test results may be saved as standard .SOR files, which can be stored internally or on the supplied USB drive. Test results are transferable via a USB cable or USB drive to a computer for viewing, printing, and analyzing with the supplied Windows® compatible software, Test Results Manager (TRM™). Acceptance reports generated using TRM can include OTDR traces with summary and event information with or without pass/fail indication, event maps, and end-face images. With a full set of testing and troubleshooting tools including OTDR, VFL and end-face inspection capability, the M200 is a complete solution for fiber network owners and installers.

Features

- Hand-held, lightweight - 0.9 kg (2 lb)
- 22 dB (MM), 26 dB (SM) dynamic range
- Inspection capable with DFS1
- Integrated VFL (650 nm)
- >8 hours battery life
- Touch and Test™ user interface
- TRM™ reporting software
- Automatic Pass/Fail analysis (TIA/ISO)
- Internal and USB storage (1000s of tests)
- USB host and function ports

Applications

Test, troubleshoot, Tier 2 certify:

- Full Auto OTDR - document installation and fault locate
- Expert OTDR - document and fault locate using Auto or Auto Once
- Real-Time OTDR - locate faults and verify splices
- Visibly Fault Locate - locate bends and breaks and verify polarity

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NOYES®
M200 Hand-held OTDR

Specifications [a]

OTDR	MULTIMODE	SINGLE-MODE
Emitter Type	Laser	Laser
Safety Class	Class I FDA 21 CFR 1040.10 and 1040.11; IEC 60825-1:2007-03	Class I FDA 21 CFR 1040.10 and 1040.11; IEC 60825-1:2007-03
Center Wavelengths	850/1300 nm	1310/1550 nm
Wavelength Tolerance	±20/±30 nm	±20/±30 nm
Dynamic Range (SNR = 1)	22 dB	26 dB
Event Dead Zone [b]	1.5 m	1.5 m
Attenuation Dead Zone [c]	9 m	9 m
Pulse Widths [d]	10, 30, 100, 300 ns, 1, 3 µs	10, 30, 100, 300 ns, 1, 3, 10 µs
Range Settings	250 m to 32 km	250 m to 208 km
Sampling Points	Up to 16,000	Up to 16,000
Minimum Data Point Spacing	0.25 m	0.25 m
Group Index of Refraction (GIR)	1.4000 to 1.6000	1.4000 to 1.6000
Distance Uncertainty (m) [e]	±(1 + 0.005 % x distance + data point spacing)	±(1 + 0.005 % x distance + data point spacing)
Linearity [f]	±0.05 dB/dB (typical)	±0.05 dB/dB (typical)
Loss Threshold	0.02 dB	0.02 dB
Loss Resolution	0.01 dB	0.01 dB
Reflectance Resolution	0.01 dB	0.01 dB
Reflectance Accuracy [g]	±2 dB	±2 dB
Trace File Format	Bellcore GR-196 Version 1.1	
Trace File Storage Medium	Internal non-volatile memory, removable CompactFlash Card (not included), and USB Flash Drive	
Trace File Storage Capacity	>100 internal; thousands on CompactFlash or USB Flash Drive	
Trace File Transfer to PC	USB Flash Drive Type 1.1, CompactFlash or Mini USB Cable with ActiveSync	
VISUAL FAULT LOCATOR		
Emitter Type	Laser	
Safety Class	Class II FDA 21 CFR 1040.10 and 1040.11; IEC 825-1:1993, 60825-1:2007-03	
Wavelength	650 nm ±20 nm	
Output Power (nominal)	0.8 mW	
GENERAL		
Size (in boot)	23 x 11 x 7 cm (8.8 x 4.3 x 2.8 in)	
Weight	0.9 kg (2 lb)	
Operating Temperature	-10 °C to +50 °C	
Storage Temperature	-20 °C to +60 °C	
Relative Humidity	0 to 95 % RH (non-condensing)	
Power	Removable Li-Ion or 110/220 VAC power adapter	
Battery Life [h]	8 hours	
Recharge Time [j]	3 hours	

Notes:

a. All specifications valid at 23 °C ±2 °C (73.4 °F ±3.6 °F) unless otherwise specified.
b. Typical distance between the two points 1.5 dB down each side of a reflective spike caused by a -40 dB (multimode) or -45 dB (single-mode) event using 10 ns pulse width.
c. Typical distance from event location to point where trace is within 0.5 dB of backscatter.
d. 3 µs pulse width not available at 850 nm.
e. Does not include GIR uncertainty.
f. Typical.
g. For a non-saturated event.
h. New battery.
j. Typical, from fully discharged to fully charged state, unit may be operating.

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Specifications are subject to change without notice.

M200 OTDR in a soft case

M200 OTDR in a hard case

NOYES®
M200 Hand-held OTDR

Ordering Information

The M200 OTDR with new User Interface works with the DFS1 Digital FiberScope.

The M200 hand-held OTDR comes with a soft carry case, USB Flash drive, trace analysis software - TRM™, AC adapter and UCI switchable test port adapters.

The NOYES M200 OTDR is also available in a tough injection molded ABS carry case (available as an option - HC). The rugged transit case has a full length hinge, padlock loops, secure snap latches and an O-ring seal to protect the contents from dust and water. In addition to the OTDR, the custom case has room for cleaning products, launch and receive rings, documentation and more.

M200 Models

WAVELENGTHS (NM)				DYNAMIC RANGE (DB)	INCLUDED OTDR PORT ADAPTERS	POWER, INTERNAL CHARGING	TRACE STORAGE		AFL NO.
850	1300	1310	1550				CF*	USB	
		◆	◆	26/26	SC, FC	Li-ion, AC	◆	◆	M200-20
◆	◆			22/22	SC, ST	Li-ion, AC	◆	◆	M200-22
◆	◆	◆	◆	22/22/26/26	(2) SC, FC, ST	Li-ion, AC	◆	◆	M200-25

* CompactFlash memory card

When placing an order, select options as follows:
Optical Configuration (NN), OTDR port ferrule (F), and Language (LL).
Select (HC) only if ordering the hard case option.

Example:

M200-25U-01 -> this model number indicates M200 QUAD with UPC OTDR port ferrule and English language option in soft case.

M200-25U-01-HC -> this model number indicates M200 QUAD with UPC OTDR port ferrule and English langue option in hard case.

M200 — NN F — LL — HC

Optical Configuration (NN)

20 = 1310/1550 nm SM
22 = 850/1300 nm MM
25 = QUAD: 850/1300 nm MM and 1310/1550 nm SM

OTDR port ferrule (F)

U = UPC

Hard Case option (HC)

(Select "HC" only if ordering hard case option)

Language (LL)

All (LL) options support English language

01 = English
02 = French
03 = German
04 = Italian
05 = Spanish
11 = Portuguese
14 = Polish

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Specifications are subject to change without notice.

M200 OTDR Hard Case Kit for Mining

DFS1-00-04XU

One-Click Mini-100 SC, ST, FC and LC/MU

One-Click Cleaner SC, ST, FC and LC/MU

One-Click Cleaner Ultra 2.5 SC, ST, FC

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M200 OTDR Hard Case Kit for Mining

For ordering information, refer to the table below.

DESCRIPTION	AFL NO.
850/1300 nm multimode and 1310/1550 nm single-mode M200 OTDR in Hard Case	M200-MNG
Wet Cleaning Kit (shown) for SC/FC/ST/LC connectors. Includes: 8500-10-0016MZ, Cletop-SB CCTS-25-0900MZ, Connector Cleaning Tips for 2.5 mm ferrule in adapters or sockets (SC, FC, ST in adapters). Blue (40 sticks per tube). Qty = 1 tube CCTS-12-0900MZ, Connector Cleaning Tips for 1.25 mm ferrule in adapters or sockets (LC, MU in adapters). Green (40 sticks per tube). Qty = 1 tube FCC2-00-0900, optical quality Cleaning Fluid for fiber connector end faces	
One-Click Cleaner SC	
One-Click Cleaner LC/MU	
SC-ST 150 m SM Fiber Ring	
SC-ST 150 m 62.5 µm Fiber Ring	
ST/SC mating adapter	

OTDR, Inspection, and Cleaning Accessories

DESCRIPTION	AFL NO.
DFS1 Digital FiberScope PC/UPC Inspection Kit	DFS1-00-04XU
DFS1 Digital FiberScope APC Inspection Kit	DFS1-00-04XA
DFS1 USB Digital Fiber Inspection Kit without Adapters	DFS1-00-04XN
M200 Software upgrade from v 1.X to v 2.0.X	M200-001-LL [a]
Fiber Ring, standard, 1 fiber, 50/125 µm multimode, 150 m	FR1-M5-150-x1-x2 [b]
Fiber Ring, standard, 1 fiber, Laser Optimized, 50 µm multimode, 150 m	FR1-L5-150-x1-x2 [b]
Fiber Ring, standard, 1 fiber, 62.5/125 mm multimode, 150 m	FR1-M6-150-x1-x2 [b]
Fiber Ring, standard, 1 fiber, single-mode, 150 m	FR1-SM-150-y1-y2 [b]
Wet Cleaning Kit (shown) for SC/FC/ST/LC connectors	8500-20-0900
Dry Cleaning Kit	8500-20-0901
One-Click Cleaner SC, ST, FC (500+ cleans)	8500-05-0001MZ
One-Click Cleaner LC/MU (500+ cleans)	8500-05-0002MZ
One-Click Mini-100 SC, ST, FC (100+ cleans)	8500-05-0005MZ
One-Click Mini-100 LC/MU (100+ cleans)	8500-05-0006MZ
One-Click Cleaner Ultra 2.5 SC, ST, FC (enlarged cleaning)	8500-05-0007MZ

Note:

a. See language options (LL) on page 45.

b. When ordering Fiber Rings, specify connector types (x1, x2, y1, y2).

NOYES FIBER SYSTEMS ISO 9001 CERTIFIED CE RoHS 2002/95/EC

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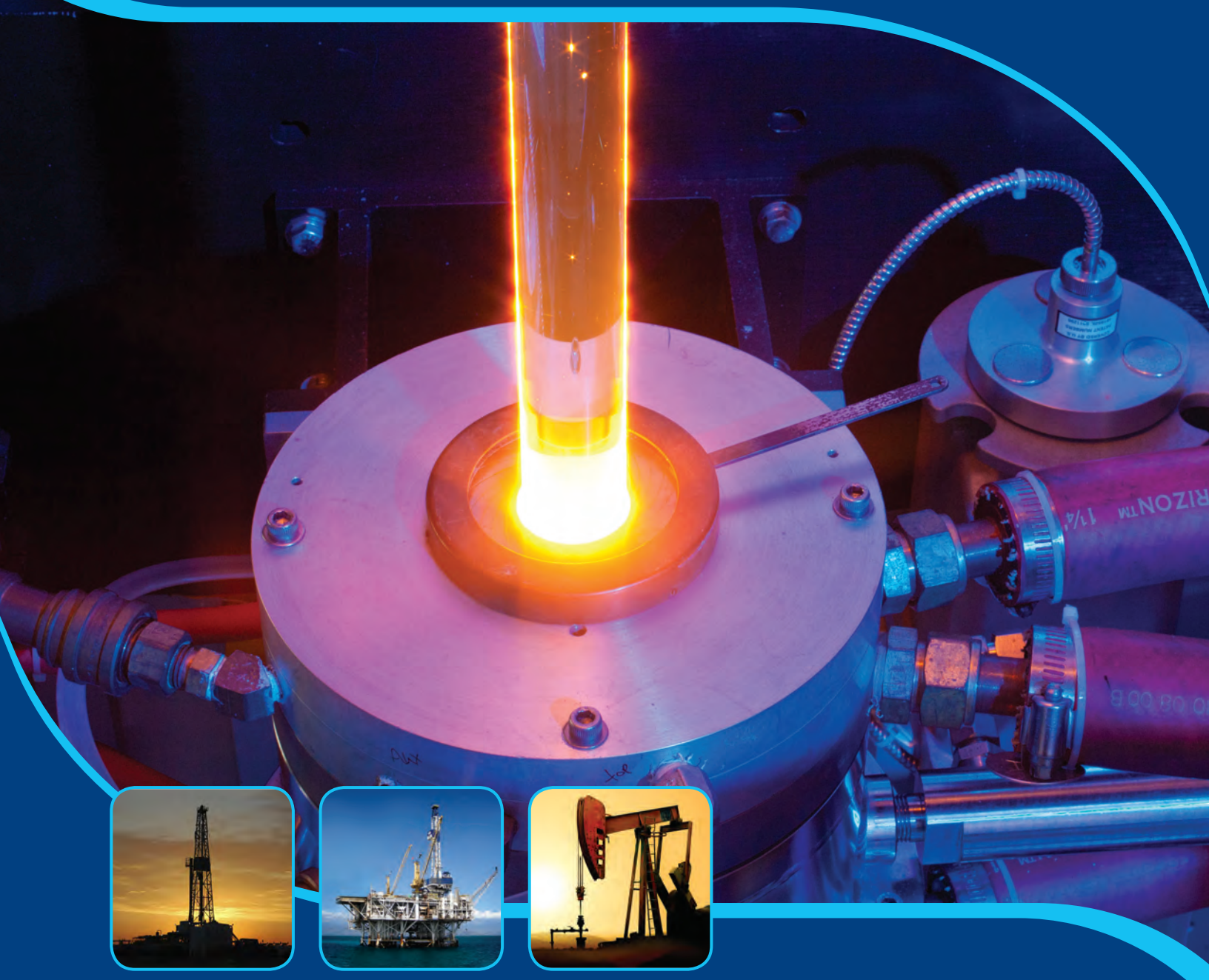
Notes

Notes

For more information about specialty fiber optic cables, fusion splicers, test equipment, fiber management systems, closures and accessories, contact:
Brian Herbst at **864-433-5361** or **Brian.Herbst@AFLglobal.com**

AFL



AFL

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