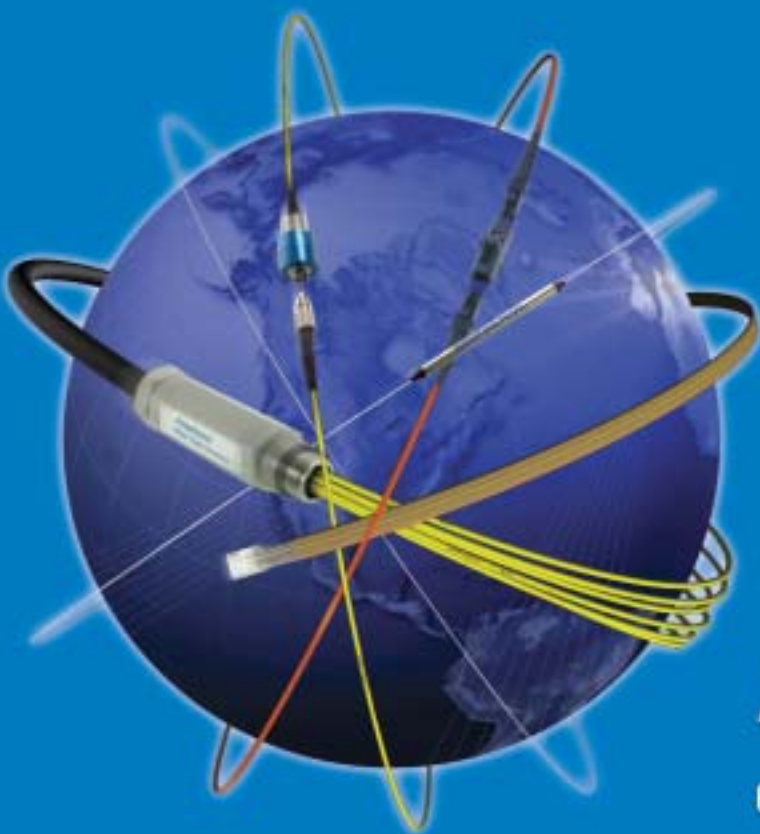


Cable Assemblies

FIBER OPTIC CATALOG



Amphenol[®]
FIBER OPTIC PRODUCTS
60 Years of Interconnect Knowledge

Cable Assemblies

Experience

Amphenol's cable assembly expertise dates back to the first industry standard connector (SMA), over 25 years ago. As new fiber optic connectors have entered the industry, Amphenol has carefully selected the most robust and reliable connectors to participate in their design and development. Our in depth understanding of connector design, and the complete control of connector materials, make Amphenol cable assemblies one of the best in the industry.

Product Breadth

Amphenol offers a comprehensive line of single mode and multimode cable assemblies in a variety of cable configurations with SC, FC, LX.5^{®*}, LC, ST[†], SMA, MTRJ, and MTP^{††} (MPO) type connectors. Both standard and custom assemblies are available for a wide variety of applications. From simplex jumpers to multi-fiber drop cables to ribbon breakouts to optical fabric assemblies, Amphenol can design and supply all of your cable assembly needs.

Consistent Quality

High quality polishing processes have been developed to meet and exceed industry standards specifications for insertion loss, return loss, and endface geometry. Attention to process control ensures high-yield processes and consistent quality. Additionally, all assemblies are designed to intermateability standards for optical and physical performance criteria, as dictated by EIA/TIA, IEC, JIS, NTT, ANSI, and Telcordia (where applicable).

Complete Testing

Performance testing is one of Amphenol's fundamental strengths. Connector and cable materials are extensively inspected prior to assembly. Every cable receives 100% inspection for both insertion loss and visual defects (under 1200X video magnification). Interferometers are used for accurate endface geometry testing.

Creative and Functional Designs

You specify the functionality of the cable assembly and our talented, enthusiastic, and friendly mechanical and optical engineers develop an "end-to-end" solution. Design creativity, experience and a deep understanding of your application ensure a functional and manufacturable design.

Manufacturing Expertise & Delivery Precision

Amphenol delivers. Meticulous attention to capacity and material planning allow Amphenol to meet our committed ship dates on time. Every time. Amphenol knows volume manufacturing. Rapid ramp-up of challenging new products is one of our strengths.

* LX.5 is a registered trademark of ADC Telecommunications, Inc.

† ST is a registered trademark of AT&T.

†† MTP is registered trademark of US Conec, Ltd.



Single Mode Cables: Page 3



Multimode Cables: Page 4



Duplex Cables: Page 5



Multi-fiber Cables: Page 6



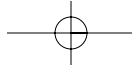
Ribbon Cables: Page 7



Service Cables: Page 9

Amphenol

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Customer Service 800-944-6446



In order to produce high quality, reliable cable assemblies, there are a number of physical characteristics that must be addressed. Many of these issues have been thoroughly outlined in IEC, EIA/TIA, JIS and Telcordia standards. They include acceptable parameters for intermateability, insertion loss, return loss, radius of curvature, apex offset and fiber height. Other issues that attribute to long term reliability are ferrule/fiber fit, ferrule concentricity, and ferrule surface defects. The following diagrams illustrate some critical components of a fiber optic cable assembly.

Misalignment - Fiber core alignment is critical to a cable assembly's ability to transmit light. Main causes of misalignment are typical mechanical issues associated with low quality connectors or fiber: ferrule concentricity, hole tolerances, fiber eccentricity, and variations in core diameter.

Surface Defects - Visual defects are one of the most common causes of latent failures. Scratches, pits, and chips in the ferrule end-face can change over time, becoming more pronounced and migrating to critical areas of the fiber core, thus affecting performance. They are also a prime source for deposits of dust, moisture, and other contaminants.

Radius of Curvature - The endface of the connector is given a specific radius during the polishing process. This radius provides the basis for ensuring that both fibers make contact. Both the apex offset and fiber heights are dependent on the radius of curvature being within the predetermined parameters.

Fiber Height - Physical contact of the fiber is necessary for proper light transfer. The end-face geometry has strict fiber protrusion limits, as well as fiber undercut limits. These limits are based exclusively on a mathematical calculation of the radius of curvature. If the fiber is too high, damage to the endface may occur. If the fiber is too low, the physical contact may never occur, causing increased attenuation and reflectance.

Apex Offset - Physical contact connectors feature a radius on the endface. The peak of the radius is known as the apex. The relationship from the apex to the 'perfect' center of the ferrule, is known as the apex offset. Strict control of this specification is mandatory in order to precisely control the distance of each fiber from the surface of the connector and to ensure physical contact upon mating.

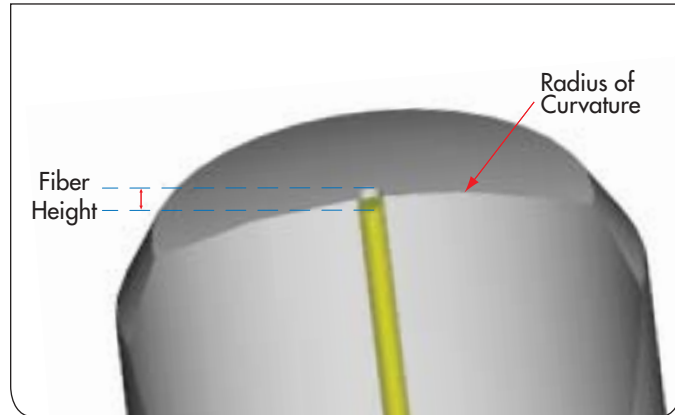


Photo not to scale. Features exaggerated.

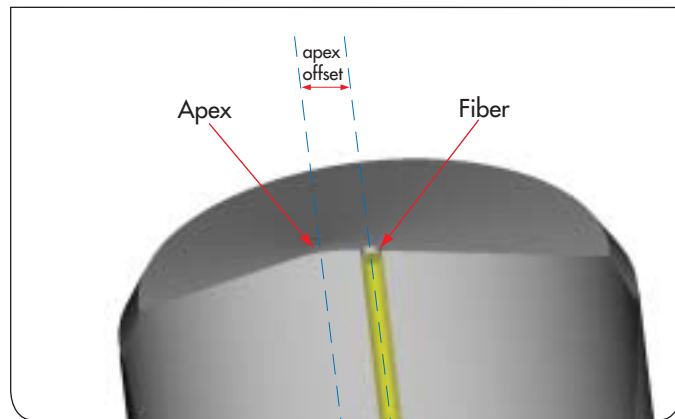


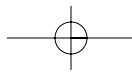
Photo not to scale. Features exaggerated.

Conversion Chart

1 meter	=	3.281 feet
1 meter	=	39.37 inches
1 cm	=	0.0328 feet
1 cm	=	0.3937 inches
1 foot	=	0.3048 meter
1 inch	=	25.4 mm

SINGLE MODE		IL typical	IL maximum	RL typical	RL maximum
SC, FC, LX.5, LC & ST	super (SPC)	0.18dB	0.50dB	-52dB	-45dB
	ultra (UPC)	0.14dB	0.30dB	-61dB	-55dB
	angle (APC)	0.23dB	0.50dB	-70dB	-65dB
MTRJ	ultra (UPC)	0.20dB	0.50dB	N/A	-35dB
MPO	angle (APC)	0.25dB	0.75dB	-55dB	-55dB
	premium angle (PAPC)	0.15dB	0.35dB	-55dB	-55dB
MULTIMODE					
SC, FC, LX.5, LC, & ST	super	0.35dB	0.50dB		
	905 & 906 SMArt	ceramic ferrule	0.56dB	1.00dB	
	SMA	stainless steel ferrule	0.77dB	1.50dB	
MTRJ & MPO	super	0.35dB	0.75dB		

Note: Optical tuning is available for specific connectors, providing lower insertion loss 'typicals'.



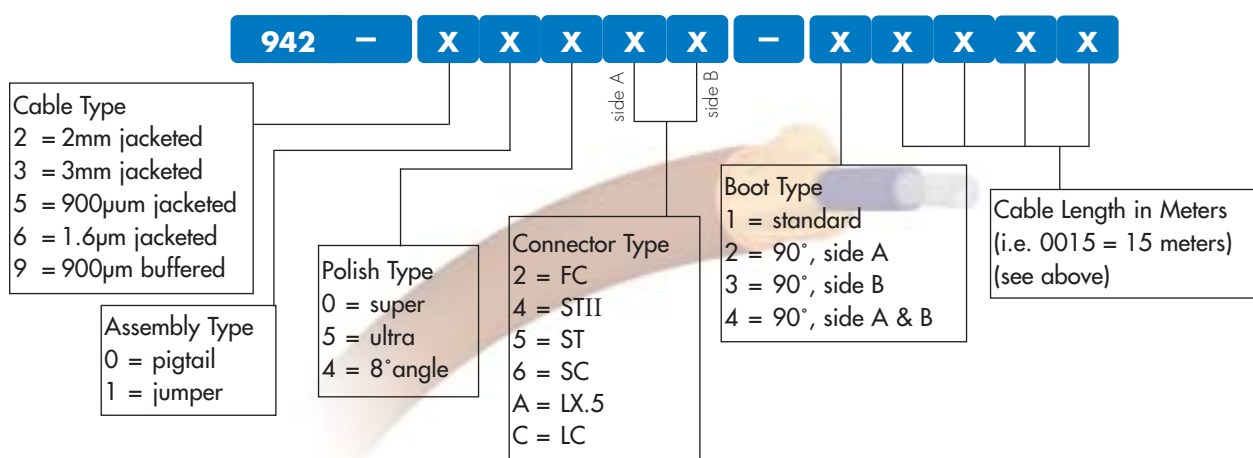
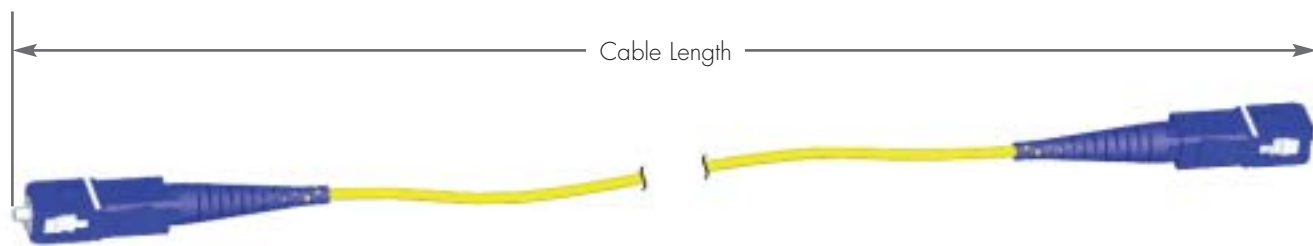
Single Mode Assemblies

Amphenol is a premier manufacturer of simplex, single mode patch cords in the telecommunications industry, consistently meeting or exceeding many of the industry standard requirements for optical transmission loss, reflectance, visual end-face specifications and endface geometry.

Amphenol offers standard patch cords in a variety of configurations, demonstrated in the diagrams below. Custom cable assemblies are available with ultra-tight optical specifications, precise length tolerances, or custom labeling and packaging. For custom patch cord requirements, please contact our Customer Service Department.



Single Mode Cable Assembly Family



Note: For pigtailed, connector type side A and side B are identical (i.e. SC pigtail: connector type = 66).
 For hybrid jumpers, use the lowest number first (i.e. SC to FC : connector type = 26).
 LX.5 and LC cable assemblies not available with 3mm cable.
 90° Boots are not available with 900µm fiber and certain connectors.

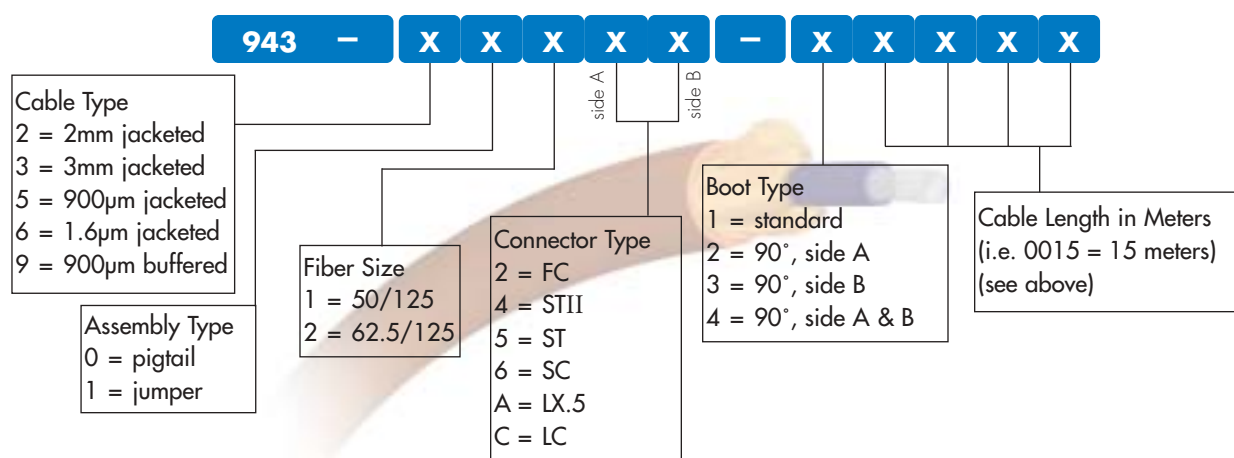
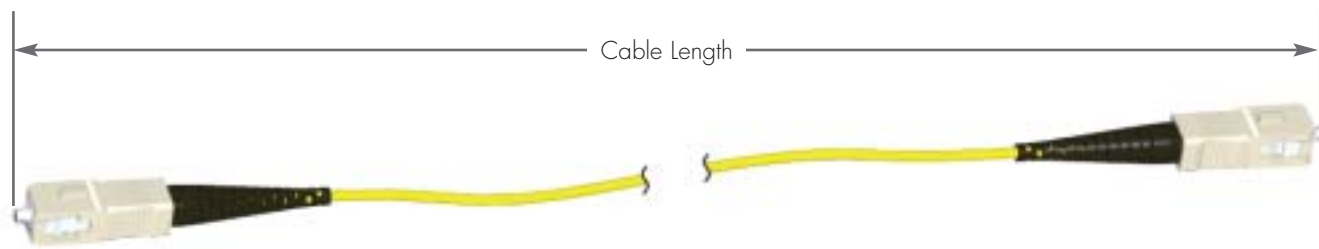
Multimode Assemblies

Amphenol's multimode patch cords offer the convenience of high quality factory terminations using premium multimode and proven low-loss Amphenol connectors. The multimode cable assemblies feature excellent reliability, high performance, and are 100% optically and visually tested to the highest industry standards.

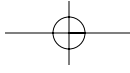
Cable assemblies are available in a variety of standard configurations. Frequently used assemblies can be determined using the part number schematic below. Custom cable assemblies are available upon request. For SMA cable assemblies, please contact our Customer Service Department.



Multimode Cable Assembly Family



Note: For pigtail, connector type side A and B are identical (i.e. SC pigtail: connector type = 66).
 For hybrid jumpers, use the lowest number first (i.e. SC to FC: connector type = 26).
 LX.5 and LC jumpers not available for 3mm jacketed cable.
 90° Boots are not available with 900µm fiber and certain connectors.



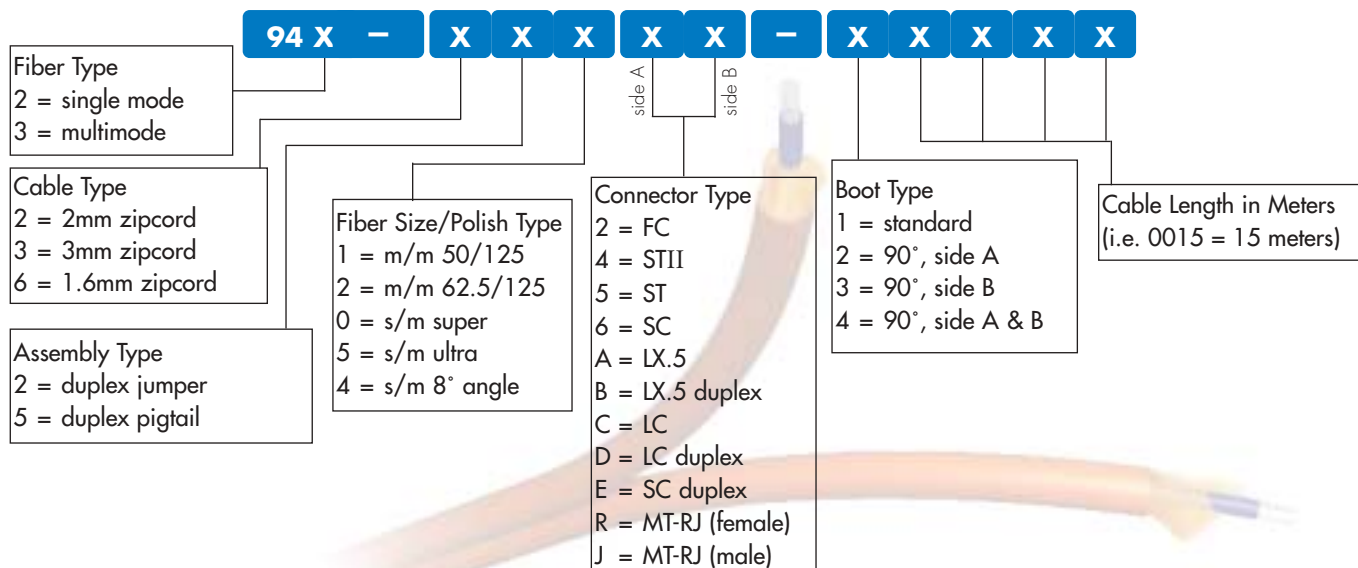
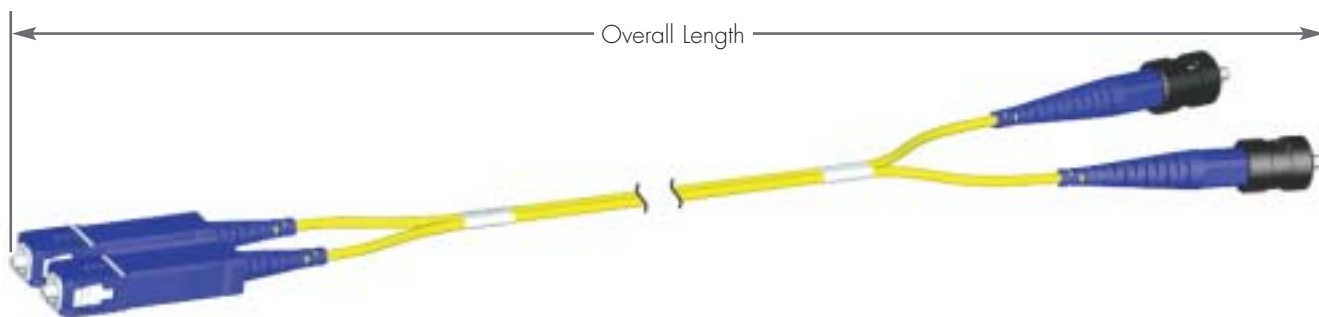
Duplex Assemblies

Duplex cable assemblies provide significant advantages in applications where high speed data transfer is necessary. The permanent association of two fibers, typically one Tx and one Rx, simplifies cable management, fiber organization and maintenance by establishing a standard orientation between Tx and Rx, while unifying the fibers in zipcord cable.

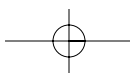
Amphenol's duplex cables are available with either simplex connectors (fanned out) or with duplex connectors (SC, LX.5 and LC applications). The duplex connectors utilize the same time-proven internal components as the simplex connectors, with the added feature of coupling them together. Duplex cable assemblies can be configured in a variety of configurations and layouts.



Duplex Cable Assembly Family



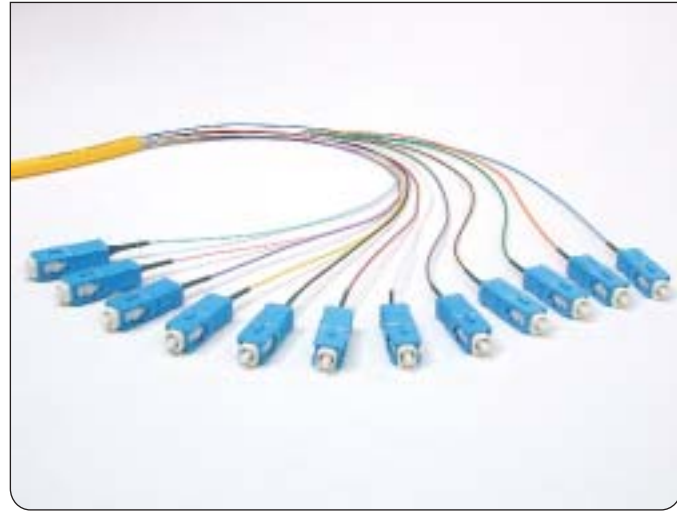
Note: For pigtail, connector type side A and B are identical (i.e. SC pigtail: connector type = 66).
For hybrid jumpers, use the lowest number first (i.e. SC to FC: connector type = 26).
LX.5, LC and MT-RJ jumpers not available for 3mm jacketed cable.
90° boots are not available with 900µm fiber and certain connectors.



Engineered Multi-fiber Assemblies

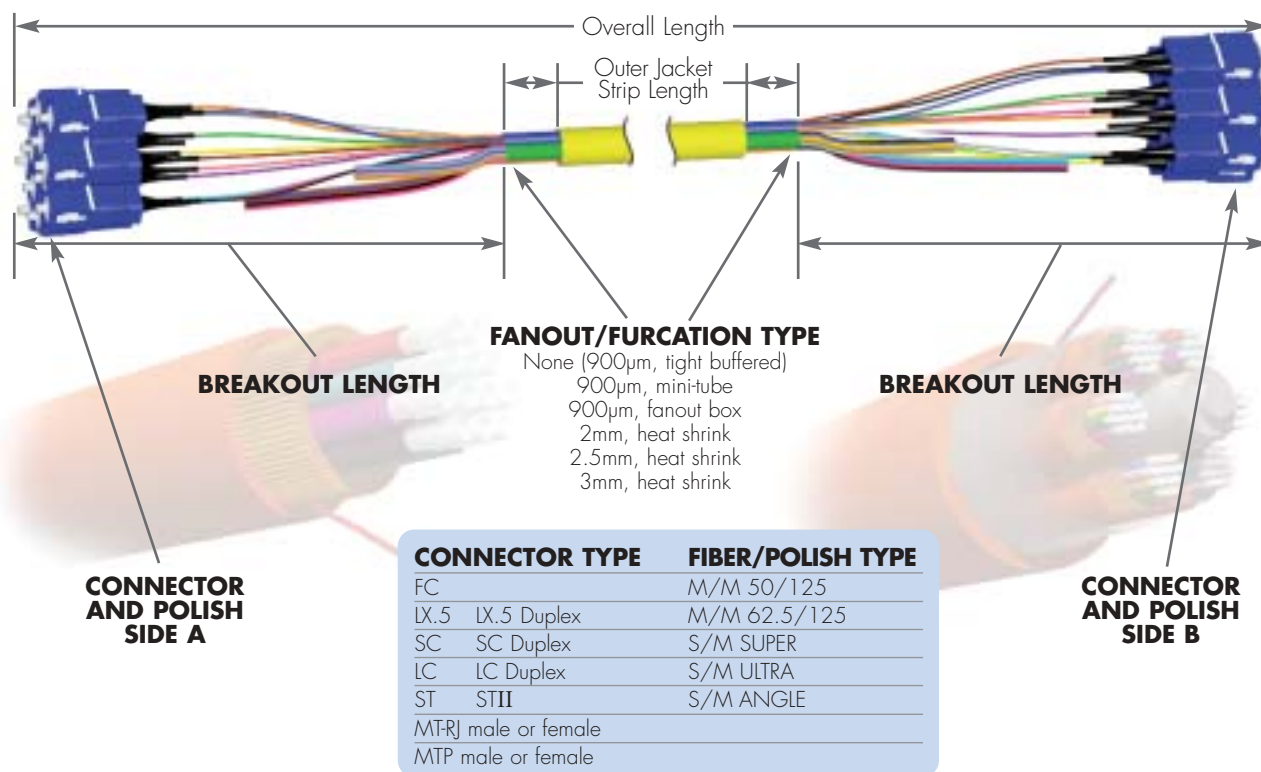
Multi-fiber cable assemblies are enormously valuable in speeding up the installation process, by eliminating the need for unnecessary splicing or terminations in the field.

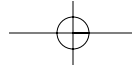
Assemblies are available in various fiber counts, with distribution cable or outside plant cable (OSP). OSP cable assemblies utilize end-blocking kits for water protection and fanout tubing for fiber ruggedizing. Distribution is 900µm tight buffered and typically not ruggedized, depending on the application. While these assemblies are most often pigtailed, jumpers are also available and provide numerous installation advantages. The list below includes some typical multi-fiber cable assembly options. Call Amphenol Customer Service to speak with an application engineer to assist you with configuring the required cable assembly.



Multi-fiber Cable Assembly

ASSEMBLY TYPE	CABLE TYPE
Pigtail Jumper	Indoor Distribution Cable Outside Plant Cable Fiber Count (Typical fiber counts are 2, 4, 6, 8, 10, 12, 24, 48, 72, 96 and 144)

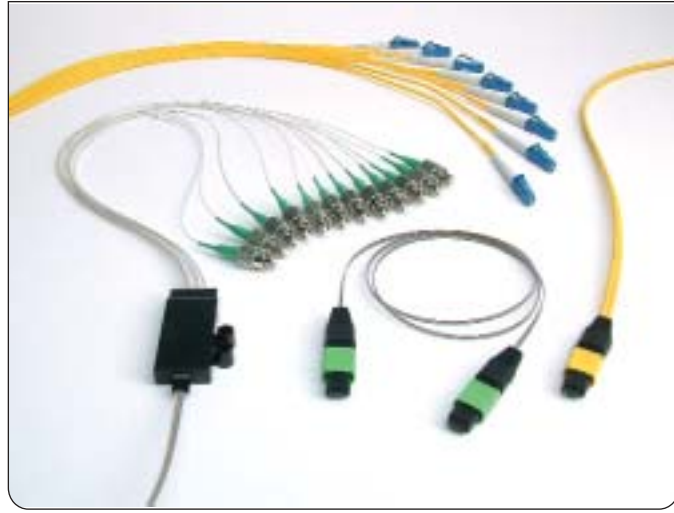




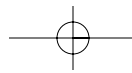
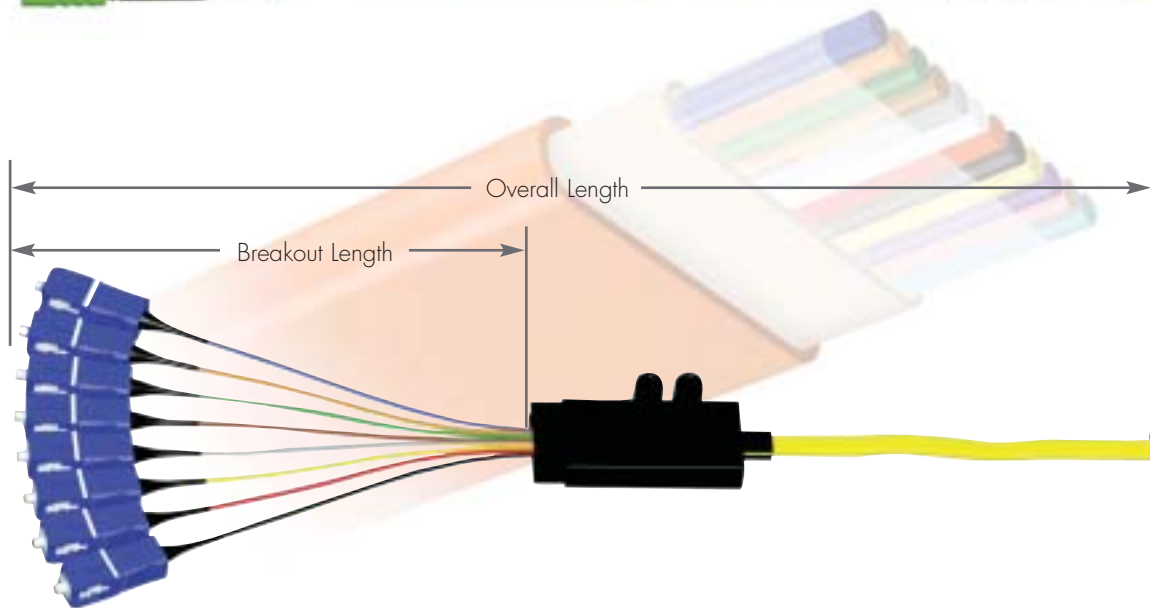
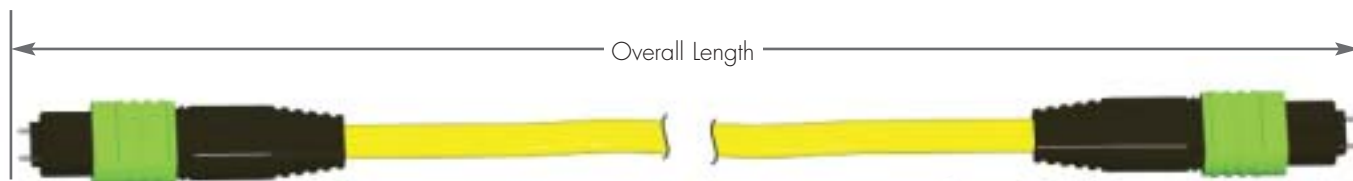
Engineered Ribbon Cable Assemblies

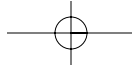
Amphenol offers a wide variety of engineered ribbon cable assemblies in a wide variety of configurations with custom labeling and testing to meet specific customer needs.

Amphenol offers custom breakouts with a wide variety of fan-out cables with staggered leads and connector options. The diagram below will assist you in communicating your requirements for customized assemblies. Optical fabric assemblies are also available.

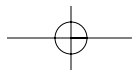
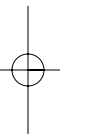
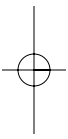
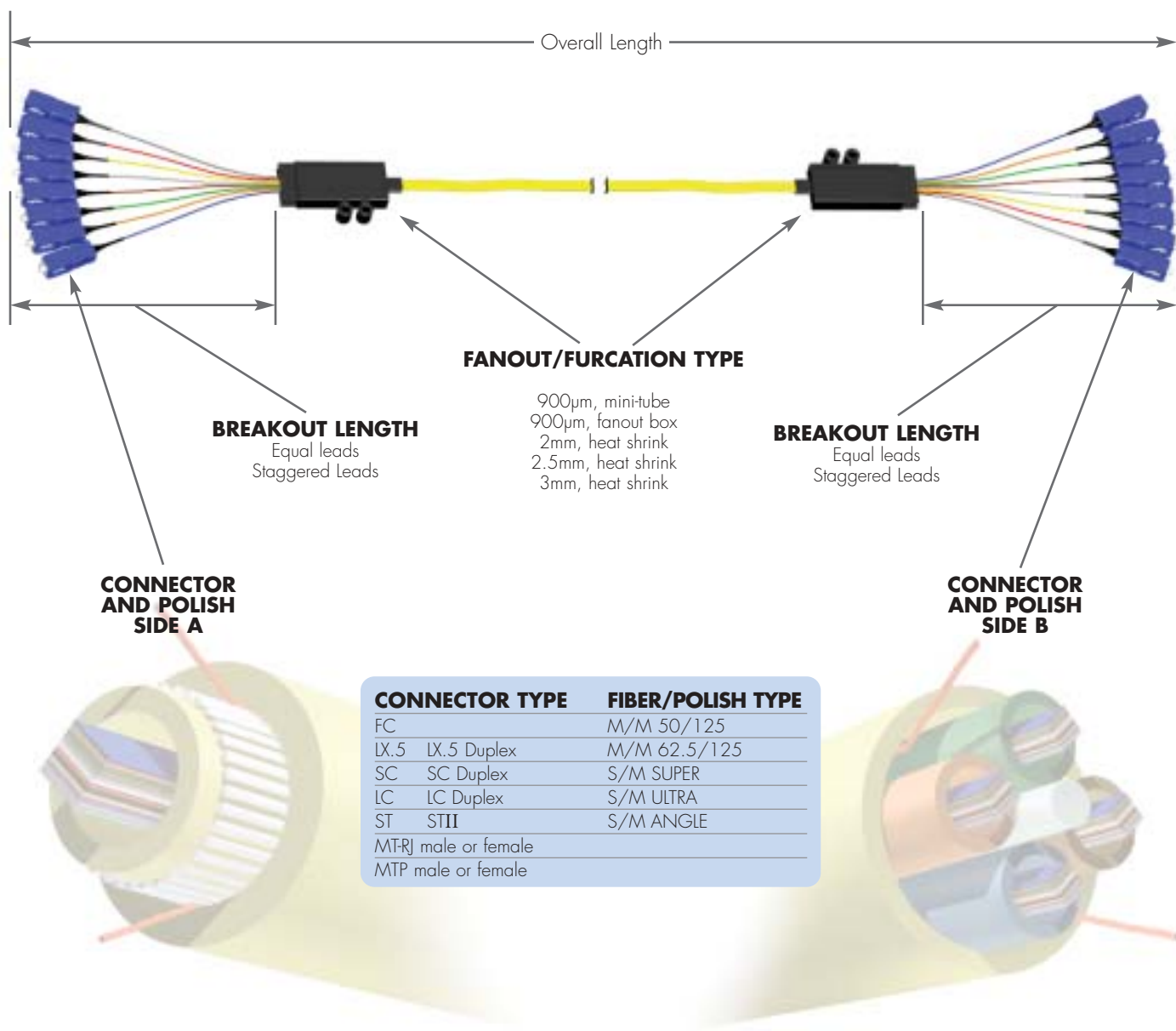


Ribbon Cable Assembly Family





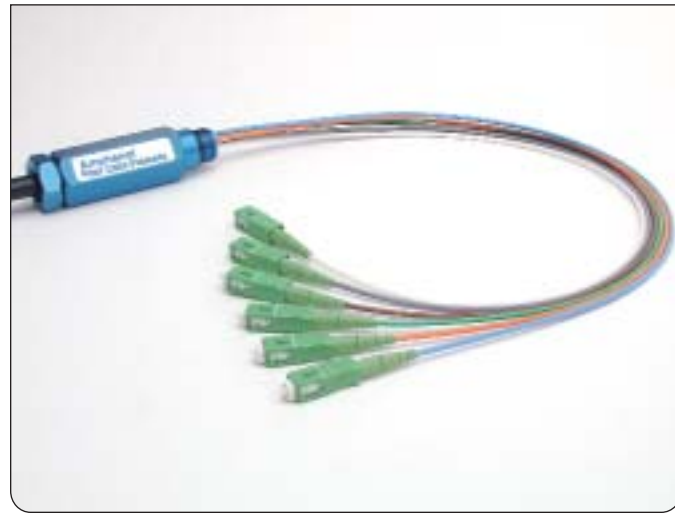
ASSEMBLY TYPE	CABLE TYPE	
Pigtail Jumper	8 fiber, s/m bare ribbon	8 fiber, m/m bare ribbon
	8 fiber, s/m jacketed ribbon	8 fiber, m/m jacketed ribbon
	12 fiber, s/m bare ribbon	12 fiber, m/m bare ribbon
	12 fiber, s/m jacketed ribbon	12 fiber, m/m jacketed ribbon



Service Drop Cable/Node Cable

Amphenol's Service Cable Assemblies are primarily used to link the fiber optic transport cable directly to the fiber optic processing equipment. This connection is critical and requires an environmental seal between the cable and the node housing.

Amphenol's Service Cables utilize a unique feed-through adapter, featuring an anti-twist coupling body. The anti-twist feature, allows the coupling body to be secured to the outdoor housing, without twisting of the cable. Amphenol's Service Cables also use a fully water blocked loose tube cable, with either armored or non-armored versions available. Assemblies can be equipped with a variety of breakout lengths, fan-out types or connector options.



Service Cable Assembly Family

Features

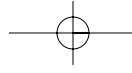
- ▶ 5/8" -24 feed-through adapter spins independently, preventing cable and furcation tubes from twisting during installation
- ▶ Standard non-armored cable meets OFNR/FT-4 and IEEE flammability requirements, yielding full outdoor protection and indoor compliance to the NEC riser cable requirements
- ▶ Breakout leads are color coded for easy identification
- ▶ Excellent thermal stability, less than 0.5dB variation in insertion loss between -40°C to +75°C
- ▶ Anodized aluminum or stainless steel feed-through adapter available
- ▶ Multiple O-ring design provides superior weather protection



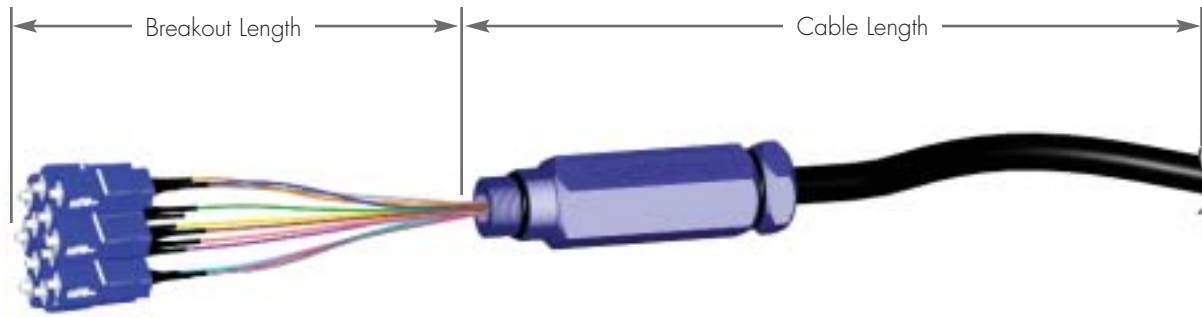
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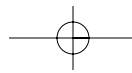
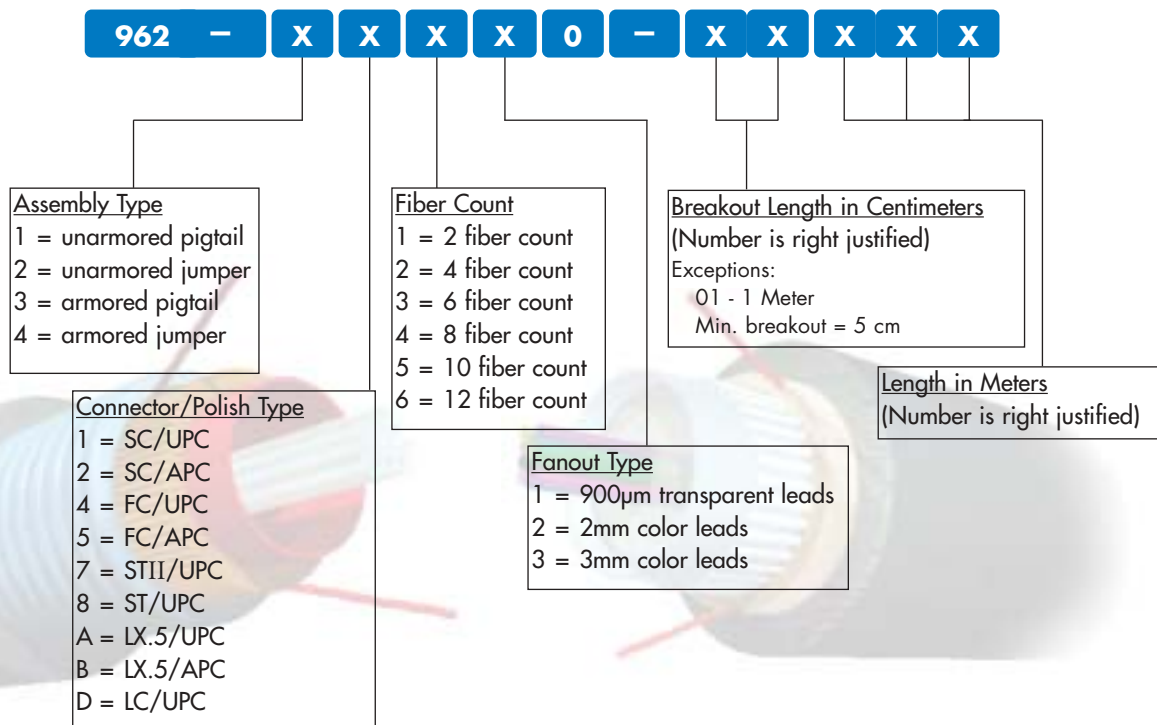
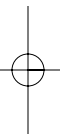
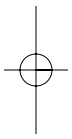
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