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Choosing The Right Fiber Optic Connector

FIS customers rely on Communicator for clear, concise information.

Last month, we provided a comprehensive guide for selecting fiber optic cable. This month, the focus is on connectors!

Simplifying the Selection Process

When installing or upgrading a network, choosing the right connectors can ensure optimal performance. This article, along with the Connector Guide in the centerfold, will help you make the right choice.

To begin the selection process, address the following questions and use the check boxes to record your answers. After that, your FIS Sales Associate can help you make your final connector choice.

Multimode or **Single Mode?**

Are you terminating singlemode cable or multimode cable?

Simplex or **Duplex?**

Are you terminating simplex or duplex cable?

High Port Density? **Yes** **No**

Does your network equipment have "high density" connector ports? Such ports may be spaced too closely together for fingers to easily couple/decouple connectors that have twist-on latching mechanisms. Choosing a "push-pull" connector is one remedy. Also consider high-density "array" connectors such as MTP/MPO connectors, which enable multiple fibers to be contained within a single connector body.

Tight Loss Budget? **Yes** **No**

Focus on those connectors that keep insertion loss and reflection loss to acceptable levels. Insertion loss is the loss of optical power that results when two fibers are connected. Reflection loss (return loss), refers to the loss produced when some portion of the optical power is reflected back to the source.

Skill Level of Installer? **High** **Intermediate** **Novice**

Your choice of termination method should take into account the skill level of your installer as indicated below.

Preferred Termination Method?

SOC **Connectorized Pigtail** **Epoxy / Polish** **Mechanical**

Most fiber optic connectors fall into one of three broad categories: Splice-On, Epoxy / Polish or Mechanical connectors.

The chart in the centerfold lists dB values in terms of "insertion loss" (the loss at the connector endface). To determine total connector loss you must add insertion loss to the additional loss produced by the specific termination method you choose.

The following termination methods are available for a variety of connector styles.

- 1. Splice-On Connector (SOC)** - This pre-polished, low-loss connector can terminate fiber very quickly. (See AMORDillo SOC featured on back page.) SOC's require a fusion splicer, precision cleaver and moderate skill level.
- 2. Splice-On Connectorized Pigtail** - This pre-polished connector has low-loss characteristics similar to an SOC. However, a connectorized pigtail requires external splice protection, such as a splice tray. Requires fusion splicer, precision cleaver and moderate skill level.
- 3. Epoxy / Polish Connector** - With this method, epoxy must be mixed, applied to the field fiber, allowed to cure, and the fiber endface must be hand polished. Low equipment expense but high skill and time are required.
- 4. Mechanical Connector**. Like SOC's, a Mechanical connector has a factory-polished fiber stub within the connector body. However, instead of fusion splicing the fiber stub to the field fiber, Mechanical connectors typically use matching gel to bridge the gap between the two fibers. Although Mechanical connectors are a fast way to terminate fiber, they produce higher optical loss compared to all other termination methods. Minimal equipment expense and low skill level required.

Frequent Decoupling? **Yes** **No**

Will there be many occasions when your connector will be coupled and decoupled? If so, consider using a connector that is known for good "repeatability," which means consistent loss performance between matings. Such connectors are typically keyed to ensure that they maintain the same endface orientation when they are recoupled (see chart).

Disconnect Hazard? **Yes** **No**

Will your cables and connectors be located near human activity? If so, choosing a connector that has a spring-loaded "non-optical disconnect" feature can help prevent network downtime should a cable be pulled or tugged.

Have you narrowed down your connector choices? Great! Now contact your FIS Sales Associate who can help you make your final selection. Call 1-800-5000-FIS (347).

You can also shop online at www.fiberinstrumentsales.com

Inside - Connector Reference Guide from FIS!

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Fiber Optic Connector Ref

	Type	Mode	Available Styles	Insertion Loss (typical dB)	Latching Mechanism	Ferrule Size (mm)	Ferrule Material (typical)	# of Fibers
	SC	SM MM	Simplex Duplex	SM: 0.10-0.30 MM: 0.10 - 0.40	Push-pull, snap-in	2.5	Pre-radiused zirconia ceramic (APC/UPC)	1 2 if dupl
	LC	SM MM	Simplex Duplex	SM: 0.10-0.30 MM: 0.10 - 0.40	Push and click	1.25	Pre-radiused zirconia ceramic (APC/UPC)	1 2 if dupl
	FC	SM MM	Simplex	SM: 0.10-0.30 MM: 0.10 - 0.40	Keyed threaded screw-on coupling	2.5	Available in zirconia ceramic or stainless alloy (APC/UCP)	1
	ST	SM MM	Simplex	SM: 0.10-0.30 MM: 0.10 - 0.40	Keyed bayonet twist-lock	2.5	Most are zirconia ceramic; metal alloy and composite also available	1
 (Shown with alignment pins)	MT-RJ	SM MM	Duplex	SM: 0.25 MM: 0.35	User friendly RJ-45 snap-in type	2.5 x 4.4	Composite, houses two fibers	2
 (Shown with alignment pins)	MTP / MPO	SM MM	Multi-fiber single connector	SM: 0.20-0.70 MM: 0.20 - 0.50	Push-pull, snap-in	2.5 x 6.4	Singlemode ferrules are APC. Multimode ferrules are flat. Polymer material.	4 - 72
Other Connector Styles								
	SMA 905 & 906	MM	Simplex	MM: 0.80 - 2.0 depending on fiber size	Threaded screw-on type	3.0	Ceramic or metal alloy	1
	MU	SM MM	Simplex Duplex	SM: 0.20-0.40 MM: 0.15 - 0.40	Push-pull	1.25	Typically zirconia ceramic	1 2 if dupl
	SMPTE	SM MM	Duplex	SM: 0.75	Push-pull, keyed	2.0	Zirconia ceramic	2, plus copper wires (for power signal)
	TFOCA-II	SM MM	Multi-fiber	SM: 0.40-0.75 MM: 0.30 - 0.75	Keyed threaded outer nut	2.5	Zirconia ceramic	4 - 12



Did You Know? Custom Drilling Available

FIS can custom-drill FC and SC stainless alloy connectors from 250µm to 900µm. ST and SMA stainless alloy connectors can be drilled up to 1550µm. For more information, contact your FIS Sales Associate or see page 101 in the 2017 FIS Product Catalog.

erence Guide



	Termination Methods	Pros and Cons	Common Applications
ex	SOC Spliced Pigtail Epoxy / Polish Mechanical Factory Term.	<p>Pros: Non-optical disconnect design. Minimum back reflection when ultra-polished. Square shape enables connectors to be packed closely together. Push-pull design allows quick patching of cables into rack and wall mounts.</p> <p>Cons: Smaller LC connectors are replacing these connectors in high density applications.</p>	Wide variety of singlemode applications especially Datacom and Telecom including premises installation. Often found in older corporate networks, as well as new network designs. Designed to replace the ST connector.
ex	SOC Spliced Pigtail Epoxy / Polish Mechanical Factory Term.	<p>Pros: The LC is the Small Form Factor (SFF) connector of choice for many single mode applications. Half the size of the ST connector, the LC is ideal for high-density applications. Pull-resistant non-optical disconnect design.</p> <p>Cons: Some people with large fingers may have difficulty installing such a small connector.</p>	System rack mounts and high density applications involving large fiber counts.
	SOC Spliced Pigtail Epoxy / Polish Mechanical Factory Term.	<p>Pros: Non-optical disconnect; low back reflection. Good isolation from vibration due to floating ferrule design and threaded coupling mechanism.</p> <p>Cons: Care must be taken when inserting ferrule into receptacle due to risk of scratching endface. This is of less concern with push-pull type connectors, such as SC and LC, which are replacing the FC. FC retainer nut difficult to grasp where connectors are spaced closely.</p>	Datacom and Telecom. Popular for many years, the FC is being replaced by SCs and LCs.
	SOC Spliced Pigtail Epoxy / Polish Mechanical Factory Term.	<p>Pros: Easy to install, relatively inexpensive. Keyed body keeps mated fibers in alignment when they are coupled and decoupled.</p> <p>Cons: Lacks non-optical disconnect feature. (Exception: "ST 2" has this feature.) APC finish not possible. Retainer nut difficult to grasp where the connectors are spaced closely. The ST is being replaced by compact Small Form Factor connectors.</p>	An older style connector, long the most popular connector for multimode LANs, including campuses. Also popular for industrial applications, security systems, CCTV and naval applications.
	Spliced Pigtail Factory Term.	<p>Pros: Smallest duplex connector available.</p> <p>Cons: Relatively difficult to terminate, being phased out in favor of LC. Need to confirm connector gender. One side of termination requires alignment pins. (Available with or without alignment pins.)</p>	Backbone and horizontal duplex cabling systems, LANs and telecommunication systems. Male and female versions available, with or without alignment pins. Pinned version is used for mating with non-pin connectors on MT-RJ patch cords.
	Spliced Pigtail Factory Term.	<p>Pros: Quick and reliable way to connect multiple fibers within single connector.</p> <p>Cons: Damage to a single connector can potentially result in the loss of up to 72 fiber connections. Polishing and inspection require special equipment and high skill level. Need to confirm connector gender. One side of termination requires alignment pins. (Available with or without alignment pins.)</p>	MTP is ideal for high-density applications given its ability to quickly and reliably connect large numbers of fibers. Four, eight, 24 and 72 fiber MTPs available. Also available for distribution cable.
	Spliced Pigtail Epoxy / Polish Factory Term.	<p>Pros: Commonly used on large-core fibers.</p> <p>Cons: Over-tightening might crush fiber. When installing 906 SMA's into 905 SMA mating sleeves, a 1/2 sleeve must be installed on the 906 ferrule. Sleeve is often provided with connector purchase.</p>	Telecom multimode, industrial lasers, military.
ex	Spliced Pigtail Epoxy / Polish Factory Term.	<p>Pros: Compact size for high density applications.</p> <p>Cons: Popularity limited in the U.S.</p>	High density applications, mostly popular in Japan.
4 res &	Fusion splicing factory preterminated lengths	<p>Pros: Terminates hybrid fiber / copper cable, incorporating 2 fiber and 4 copper contacts. Rugged stainless steel body withstands harsh environments.</p> <p>Cons: Relatively high cost compared to other connector types.</p>	Popular HDTV connection on cameras and equipment panels. Used for sports, mobile news, production studios.
	Fusion splicing factory preterminated lengths	<p>Pros: Withstands harsh environments and repeated handling and mating cycles. Hermaphroditic design.</p> <p>Cons: Relatively high cost compared to other connector types.</p>	Designed for rapid cable deployment and retrieval in a tactical environment. Military and industrial applications.

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PRODUCT SPOTLIGHT

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- Superior Pull Strength - Extended brass crimp sleeve utilizes the Kevlar to provide maximum pull strength*
- High Performance - The factory-polished ARMORdillo meets or exceeds industry standards for loss and back reflection**
- LC, SC, ST styles available: SM, MM, 10 Gig
- 3mm boot protects splice; no splice tray required
- Includes color coded 900µm buffer, 3mm boot, cleave protector and extended dust cap for easy identification
- RoHs compliant and Telcordia GR-326-CORE compliant
- Compatible with many fusion splicers (cordage fiber holders required)

*15Lbs / 5 seconds straight pull; 5Lbs / 5 seconds 90 degree pull

**Return Loss APC >60dB, UPC >55dB and MM 35dB (typical)

To see the ARMORdillo in action, check out our instructional video!

To view the video, please visit the following link: www.youtube.com/watch?v=mSWcYSV54bc

Scan the QR code with your smart phone!



SOC Video

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