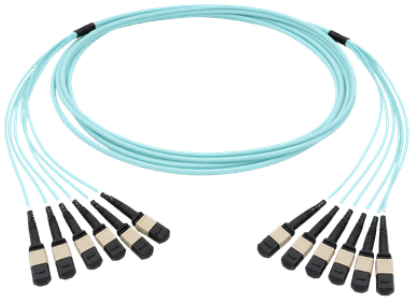
MPO Cable Assemblies

Overview

MPO connectors deliver high-performance fiber-optic connectivity by housing multiple fibers into a single compact connector. They typically come in standard counts of 8, 12, 16, and 24 fibers, making them ideal for meeting today's escalating bandwidth demands. Designed for rapid deployment, these factory-terminated assemblies support high-speed parallel optics with plug-and-play convenience.



Our MPO cable assemblies are available in patch cables, trunk cables, and fanout (breakout) assemblies. Every assembly is fully customizable, configured to your required fiber count, polarity, connector type, jacket rating, and length, so you get a solution built for your exact network architecture. Commonly used in patch panels, cassettes, and cross-connect setups, our MPO assemblies facilitate efficient connectivity between switches, servers, and storage units.

Features

- Available in 8, 12, 16, and 24 fiber configurations
- Multimode fiber types: OM1, OM3, OM4, OM5; Singlemode: OS2
- UPC and APC polish options
- Method A, Method B, and Method C polarity, custom pinout configurations
- Standard and Low Loss connector grades
- Available in a variety of jacket types, including OFNP, OFNR, Indoor/Outdoor, and OSP
- Fully customizable lengths, gender pins fanout configurations
- Tested to EIA-455-171, FOTP-171, NECA-FOA-301, and IEC 61280-4-5 standards

Applications

- High-density data center cross-connects between switches, servers, and storage
- Structured cabling backbones and trunk runs between racks or rooms
- Patch panel and cassette connections
- Breakout/fanout from MPO trunks to MMC, MDC, LC, SC, ST, or FC connectors
- High-density backplane and PCB-level connectivity
- Mission-critical and specialized installations requiring rigorous testing standards

Available Configurations

- **Patch Cables** — MPO-to-MPO assemblies for direct connections between patch panels, cassettes, and equipment.
- **Trunk Cables** — MPO assemblies for backbone runs between racks or rooms, available in standard 24, 48, 72, and 144-fiber counts. Fully custom fiber counts are available upon request.
- **Fanout (Breakout) Cables** — MPO on one end breaking out to individual MMC, MDC, LC, SC, ST, or FC connectors on the other, connecting trunk cables to end equipment.

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Optical Performance (MPO Connector)

MPO connectors are available in UPC (Ultra Physical Contact) and APC (Angled Physical Contact) polish types. UPC connectors use a flat polished end-face and are typically used with multimode fiber. APC connectors feature an 8° angle polish, which significantly improves return loss performance and is standard for single-mode applications where back-reflection must be minimized

Ferrule Type	Typical Insertion Loss	Maximum Insertion Loss	Return Loss
Singlemode APC Standard	< 0.25 dB	< 0.75 dB	> 60 dB
Singlemode APC Elite®/Low-Loss	< 0.10 dB	< 0.35 dB	> 60 dB
Multimode UPC Standard	< 0.20 dB	< 0.60 dB	> 20 dB
Multimode UPC Elite®/Low-Loss	< 0.10 dB	< 0.35 dB	> 20 dB

Singlemode and Multimode Fiber Options

MPO cable assemblies (including patch, trunk, and fanout configurations) are available in multimode (OM1, OM3, OM4, OM5) and singlemode (OS2) fiber types to support a range of data rates, distances, and network architectures. Fiber type selection should be based on application requirements, transceiver compatibility, and link distance.

Fiber Type	Core/Cladding (µm)	Wavelength (nm)	Max Attenuation (dB/km)	Typical Application
OS2 (Singlemode)	9/125	1310 / 1550	0.5 / 0.4	Long-distance links, campus and data center interconnects
OM1 (Multimode)	62.5/125	850 / 1300	3.5 / 1.5	Legacy installations; not recommended for new deployments
OM3 (Multimode)	50/125	850 / 1300	3.0 / 1.5	General data center and enterprise network connectivity
OM4 (Multimode)	50/125	850 / 1300	3.0 / 1.5	High-density, high-speed data center connectivity
OM5 (Multimode)	50/125	850–953 (SWDM)	3.0 / 1.5	SWDM-based deployments, future-ready high-speed networks

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MPO Gender Interface

MPO connector gender is determined by the presence of guide pins.

- Male connectors have two guide pins on the ferrule.
- Female connectors have two pin holes to receive those pins.

These guide pins ensure precise fiber alignment, which is critical for low insertion loss. MPO connectors mate through a "barrel sleeve" adapter that holds a male and female MPO plug together at the connection interface.

Transceivers and cassettes typically have the sleeve adapter built in, with a male connection on the inside, meaning a female-to-female cable is the most common configuration for direct connections to equipment. Male-to-male and male-to-female assemblies are also available for extending runs, connecting two cables together, or interfacing with specific equipment and adapter configurations.

Common Assembly Genders	
Cassettes	Male Port
Transcievers	Male Port
Patch Cables	Female to Female
Extender Cables	Male to Female

Keys and Dots

MPO connectors feature a key on one flat side and a white dot on the connector body that permanently marks the P1 (Position 1) side. When the connector is oriented key-up (key on top) and you are looking at the end face, fiber positions are numbered sequentially from left to right, with Position 1 on the far left, aligned with the white dot side. Flipping the connector to key-down reverses this fiber position mapping, which directly affects the cable's polarity. Ensuring correct key alignment is essential for maintaining signal integrity and correct polarity in MPO-based systems.

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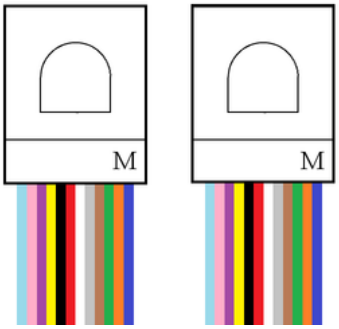
Polarity Explained

Method A - Straight Cable

Method A (also known as a straight-through cable) was the first standardized polarity method and remains widely used in the industry. It features a one-to-one fiber position mapping (Pin 1 to Pin 1), achieved through opposite key orientations (key-up to key-down) on each end of the cable. This straight-through design makes Method A cables well suited for trunk cable runs and patch extensions.
Because the transmit/receive polarity flip occurs in the duplex patch cords rather than the trunk cable itself, Method A deployments require a crossover (A-to-A) duplex patch cord at one end of the link to complete proper polarity.

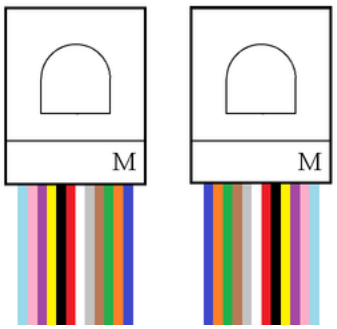
BEWARE of Tx to Tx clash! Method A maintains Pin 1 to Pin 1 polarity. When connecting to duplex (LC/SC) equipment via patch cords or cassettes, a crossover duplex patch cord is required at one end to avoid a Tx-to-Tx signal clash.



Method B - Crossover Cable

Method B (often referred to as crossover cable or 40G MPO cable) is the second standardized polarity method. The cable has a "flipped" polarity, with Pin 1 on one end mapping to Pin 12 on the other, using key-up to key-up connectors on both ends.
This configuration is ideal for direct connections between parallel optics transceivers (QSFP+, QSFP28) used in 40G and 100G applications such as 40GBASE-SR4 and 100GBASE-SR4, where the transceiver's internal fiber mapping requires the flipped Pin 1-to-Pin 12 alignment that Method B provides.

Don't Get Flip-Flopped! Method B cables flip the fiber polarity (Pin 1 to Pin 12). Use Method B for your 40G/100G parallel optics applications, and Method A for trunk and patching extensions.



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Polarity Explained

Method C - Pairwise Flip Cable

Method C (also known as pairs-flipped) functions structurally similar to Method A (one key-up, one key-down connector), but with a pairwise fiber flip: Pin 1 connects to Pin 2, Pin 3 to Pin 4, and so on. This design preserves correct transmit/receive alignment for duplex applications using standard A-to-B patch cords, without requiring crossover patch cables.

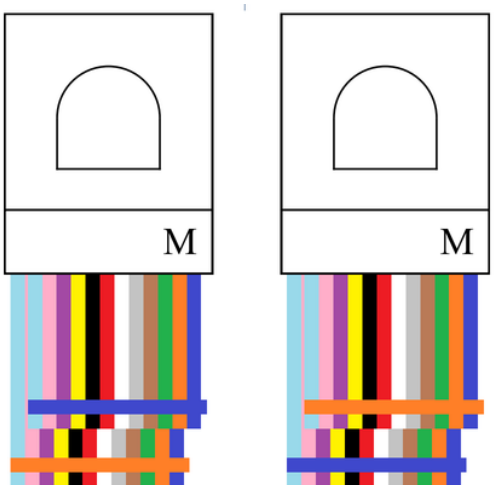
Because of this pairwise mapping, Method C is intended for duplex applications only and is not compatible with parallel optics transceivers (e.g., 40G/100G QSFP applications), making it less common in modern data center deployments.

Row Flip - Pin 1 to Pin 13 (24-Fiber)

A row flip is an option used with MPO connectors that have two rows of fibers. This occurs in a 24-fiber MPO cable where one end has fibers 1–12 on the top row and 13–24 on the bottom row, while the other end swaps the rows, placing fibers 13–24 on the top and 1–12 on the bottom. This results in a Pin 1 to Pin 13 pinout.

The diagram below illustrates this concept, with the blue and orange horizontal lines representing the two matrixed groups of 12-fiber that make up the 24-fiber cable. In one connector, the blue group is positioned in the row above the orange group, while in the other connector, the positions are reversed, placing the orange group above the blue.

24-fiber MPO assemblies are also available with fully custom pinout configurations upon request. Contact sales@fibertronics.com for more information.



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Jacket Options

All standard Fibertronics MPO cable assemblies are plenum-rated (OFNP), meeting the highest fire resistance requirements per NEC 770. Riser (OFNR), LSZH, Indoor/Outdoor, and OSP jacket options are available as custom options.

Jacket Type	Rating	Standard	Best For
Plenum (OFNP)	Highest fire resistance; low smoke	NEC 770 / UL 910	Air-handling plenum spaces, dropped ceilings, raised floors with circulated air
Riser (OFNR)	Flame retardant; vertical run rated	NEC 770 / UL 1666	Vertical backbone runs between floors in non-plenum shafts and conduits
LSZH	Low smoke, zero halogen; no toxic gas emission	IEC 60332	International deployments, enclosed spaces, transit/rail, and EU data centers
Indoor/Outdoor	Water-blocked, UV-resistant jacket suitable for both environments	ICEA-696	Building entrance points, transitions between outdoor and indoor runs
OSP (Outside Plant)	Direct burial/aerial-rated, weather and UV resistant	ICEA-640	Outdoor trunk runs, campus and building-to-building links

MPO and MTP® Connectors

All standard Fibertronics MPO cable assemblies are terminated with generic MPO connectors, governed by international standards (IEC 61754-7 and TIA-604-5). MTP® (a registered trademark of US Conec) is a high-performance version of the MPO connector featuring mechanical refinements such as improved guide pins and tighter endface tolerances. MTP® termination is available as a custom upgrade option across our patch, trunk, and fanout cable assemblies.

Customization Options

Beyond the standard configurations, Fibertronics Inc. works with customers to build MPO assemblies to exact specifications across our full line of patch, trunk, and fanout cables. Our team can help you specify the right combination of fiber type, polarity, gender, jacket, and connector options for your application, including BABA-compliant manufacturing for federally funded infrastructure projects.
To request a custom solution, contact our sales team at: sales@fibertronics.com

Post-Manufacture Modifications

Fibertronics also offers services to modify completed MPO cables, including changing gender or flipping polarity between Method A and Method B configurations. This process involves carefully disassembling the MPO connector, which carries a risk of damaging the delicate internal fibers, even when performed by experienced technicians, and may incur an additional charge.
Note: Polarity flipping is not possible with APC (8-degree angled) ferrules and aligned-key (key-up to key-up) adapters cannot properly mate APC ferrules.

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