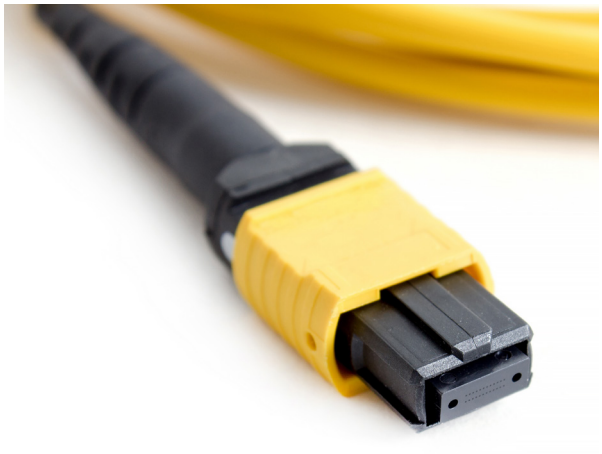
A Guide to MPO



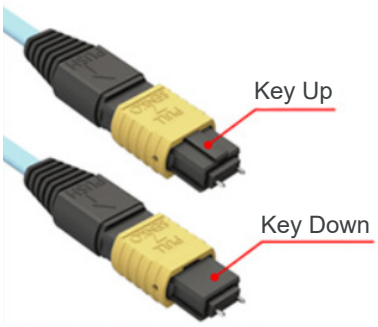
Background: The MPO connector concept was originally designed by NTT Group and a number of manufacturing licenses were subsequently issued. There are several variants of MPO compliant connectors in the market including the MTP® connector which is a registered trade mark of US Conec. MPO stands for "Multi-Fibre Push On" and MTP is "Multi-Fibre Termination Push-on", both connectors are compatible with one another. MPO's popularity stems from its ability to connect multiple fibres within a single connector body significantly reducing space requirements and its ability to migrate from 10G to 100G applications making it ideal for data centre applications.

Understanding MPO Polarity/Methods: Unlike traditional 10GbE transmission which utilises a 2-fiber configuration, 40GbE and 100GbE are implemented over multi fibre MPO connectors. The TIA 568.3-D standard provides the methods for configuring MPO systems to ensure proper connections are made and a transmit signal from active equipment is directed to a receive port on a second active device and vice versa. Understanding these three methods where the connector body is either "key up" or "key down" (methods A, B and C) is critical to the correct implementation of a network using MPO connectors.

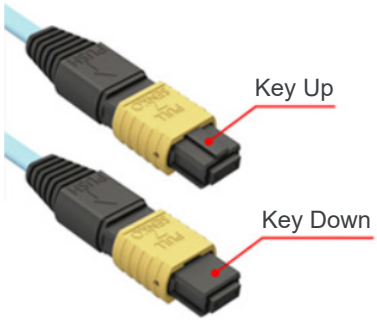
Each MPO connector has a key on one side of the connector body. The "Key Up" position refers to the orientation where the key is located at the top of the connector. When looking at the end face of the connector, position 1 (Indicated by a white dot on the connector) is on the far left while position 12 is on the far right. For a 24 fibre MPO connector, the same orientation applies with the top row being positions 1 to 12 and the bottom row positions 13 to 24. Depending on orientation the MPO connector/patch lead is either "Key Up to Key Down" or "Key Up to Key Up".

MPO Gender: In addition, MPO connectors are male and female. A male MPO connector has two alignment pins while a female MPO connector has two alignment holes where the pins are inserted for connection to be made. An MPO connection can only be performed between a male and female connector to ensure proper alignment which is required to maintain a low loss connection.

The MPO interfaces on active equipment is usually male (with pins) so when connecting a Transceiver, the MPO Trunk cable should be female which is without pins. Always check your equipment to confirm before ordering.



MPO Male Connector
With Pins



MPO Female Connector
Without Pins

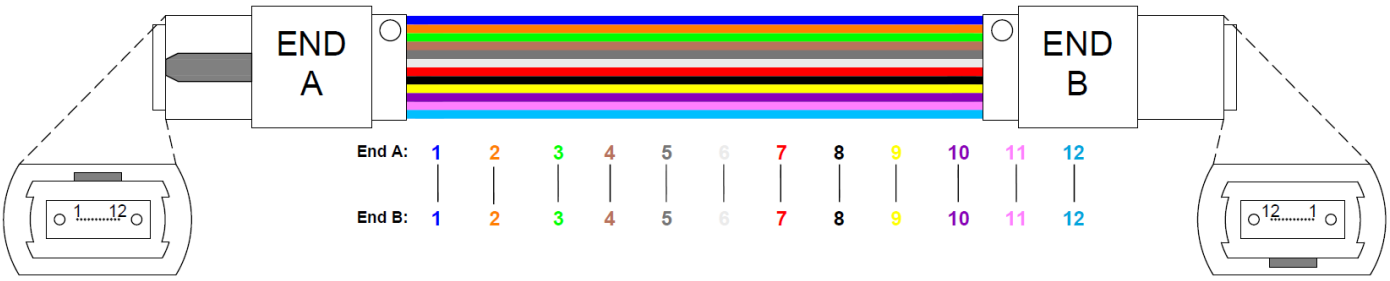
Clarifying the Wiring Confusion: There has been much confusion in the market for many years surrounding the correct wiring for 24 position MPO Trunk Assemblies because there was no industry standard. The previous TIA-568-C3 standard only gave the wiring for 12 position MPO's so when 24 position versions appeared suppliers came up with their own specifications for what they thought the additional wiring should be and gave them non industry standard designations such as straight or cross etc. This resulted in 24 way assemblies from different sources not being compatible and causing a great deal of confusion.

The new TIA 568.3-D standard has now clarified the wiring for MPO/MTP assemblies ensuring that assemblies manufactured to this specification are compatible. xSiCute manufactures to this standard, the diagrams for which are shown below in 12 and 24 position versions.

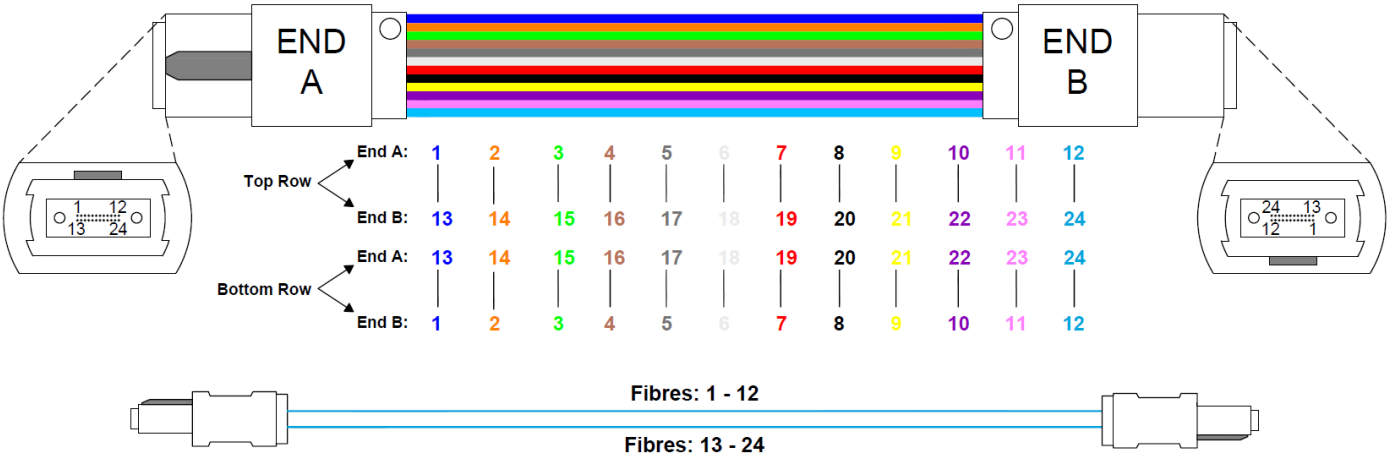
Method A - Key UP to Key DOWN

Method A: With "Key Up" at one end and "Key Down" at the other end. xSiCute manufactured to the TIA 568.3-D industry standard. The images below show the polarity and wiring for 12 and 24 position Method A assemblies.

12 Fibre:



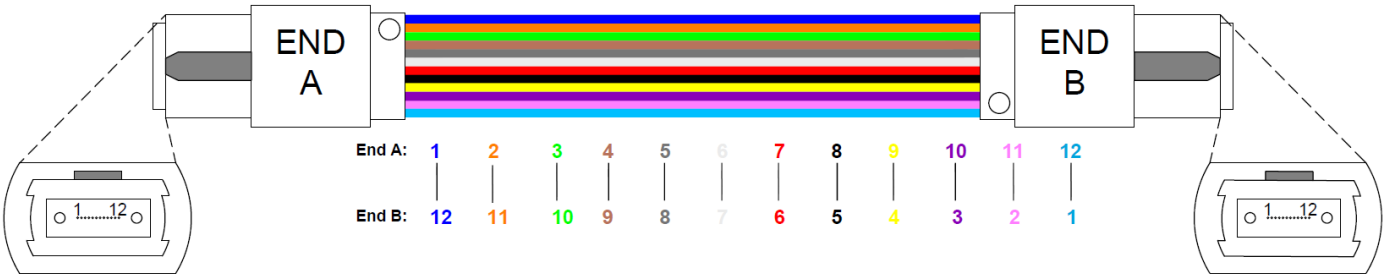
24 Fibre:



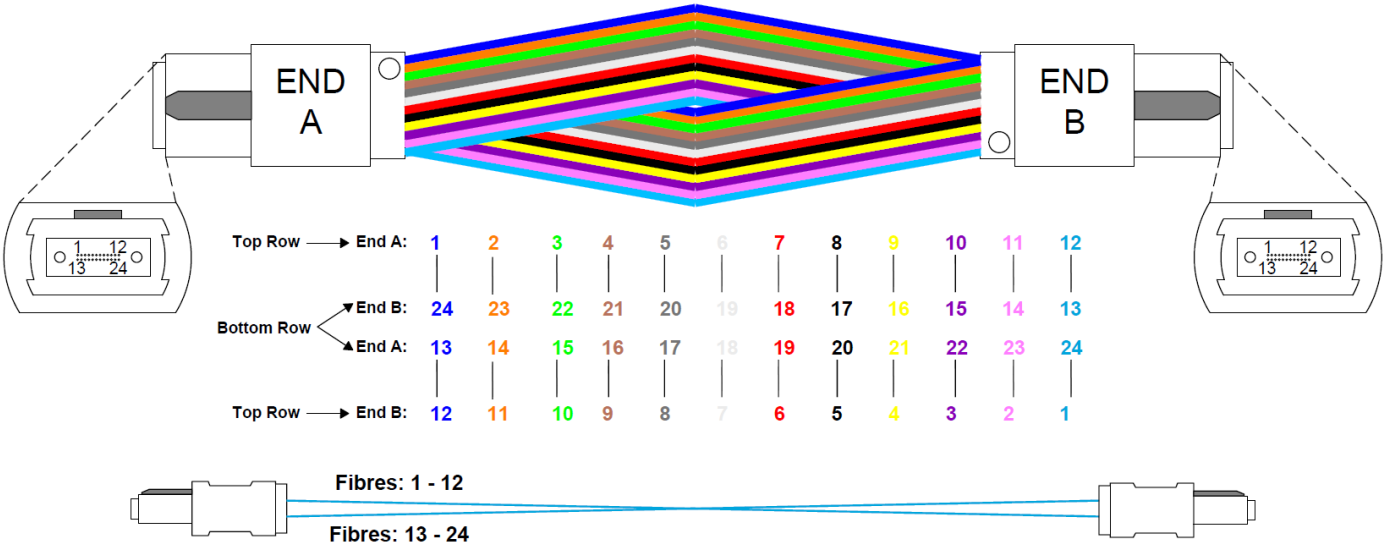
Method B - Key UP to Key UP

Method B: With "Key Up" at both ends of the assembly. xSiCute manufactured to the TIA 568.3-D industry standard. The images below show the polarity and wiring for 12 and 24 position Method B assemblies.

12 Fibre:



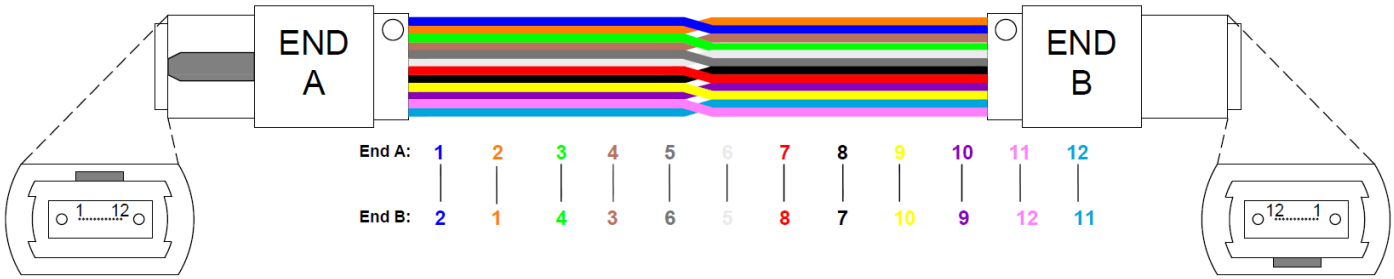
24 Fibre:



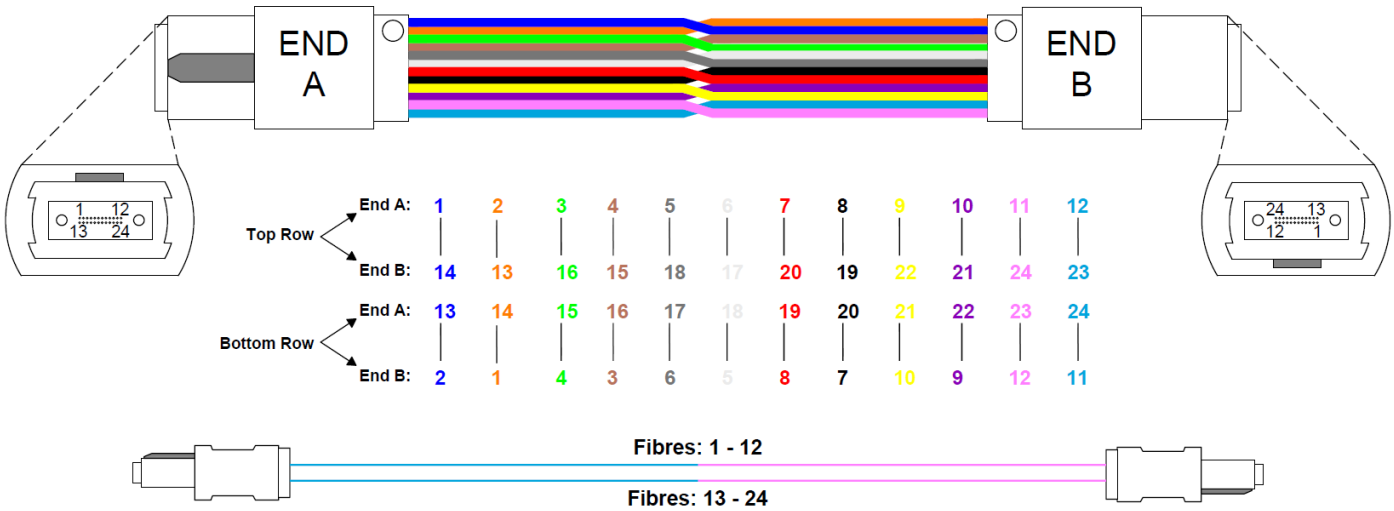
Method C - Key UP to Key DOWN

Method C: With “Key Up” at one end and “Key Down” at the other end so at first site appears the same as Method A assemblies, however, the wiring is different. xSiCute manufactured to the TIA 568.3-D industry standard. The images below show the polarity and wiring for 12 and 24 position Method C assemblies.

12 Fibre:



24 Fibre:



Trunk Cable Types: Having decided on polarity and male/female gender MPO - MPO patch cables commonly referred to as Trunk cables can be divided into two further types:

Single jacket MPO Trunk cables with 3mm diameter (12 core) and 4.5mm (24 core) which are typically used for patching within a cabinet and are sometimes referred to as round cables because of the cable sheath shape. These small diameter cables optimise the available space within a rack.

Dual jacket MPO Trunk cables with a more robust dual jacket sheath providing greater crush resistance. These are typically designed for longer cable lengths in cabinet to cabinet applications, or for connecting different areas of a building and will have a pulling eye option to aid installation. For particularly harsh environments IP rated assemblies are also available.