

## Understanding the use of the PanMPO When Testing 40GBASE-SR4 Links

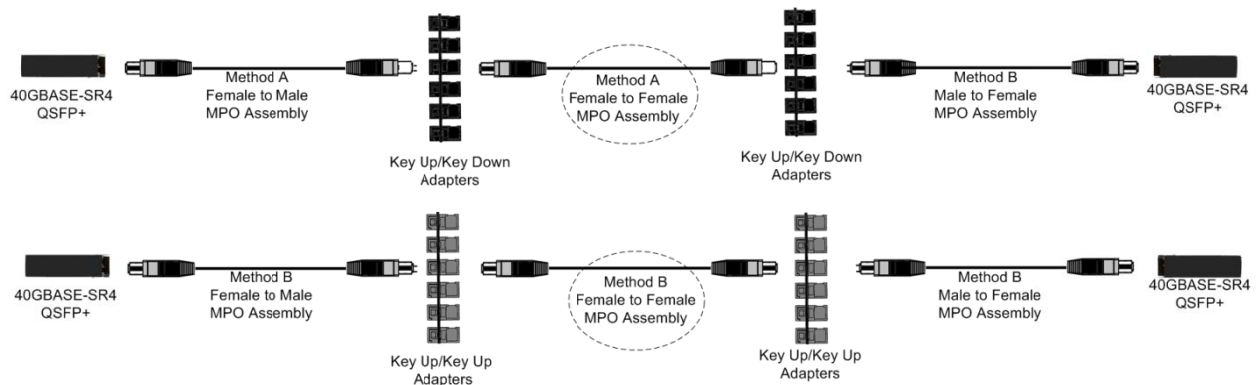
### Purpose

The purpose of this document is to describe the challenges associated with testing the 40GBASE-SR4 channel using ANSI/TIA-568-C.1 - Method B (one jumper) test method and how the PanMPO resolves those challenges to accommodate any MPO polarity or gender infrastructure and any MPO tester interface.

### Background

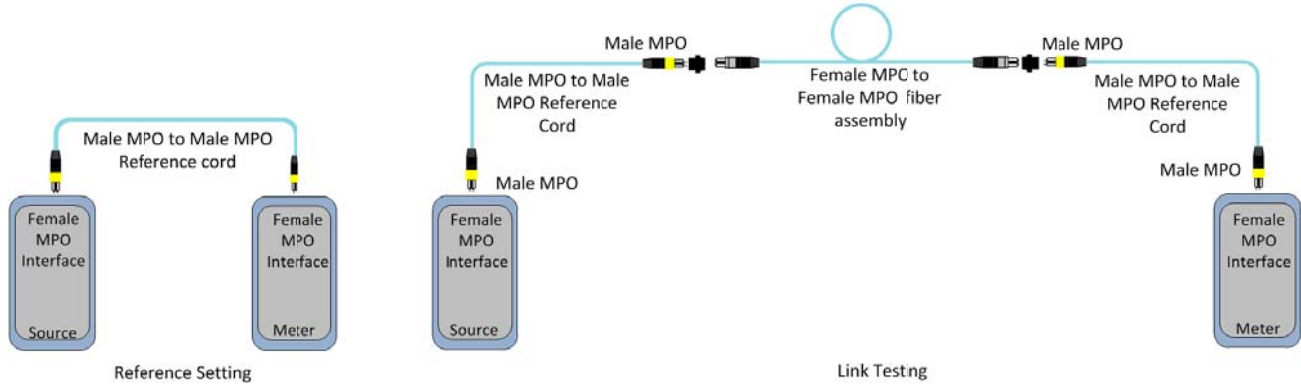
The introduction of the MPO in the end to end horizontal cabling infrastructure has complicated the process in qualifying a link via the one jumper source/power meter testing method as described in ANSI/TIA 568-C.1 – Method B (One Jumper) test method.

As shown in Figure 1, when a 10GBASE-SR standards compliant system is migrated to a 40GBASE-SR4 non-standards compliant system utilizing existing horizontal cabling infrastructure, the MPO cabling installed in the infrastructure is ***female*** and either Method A or Method B polarity.

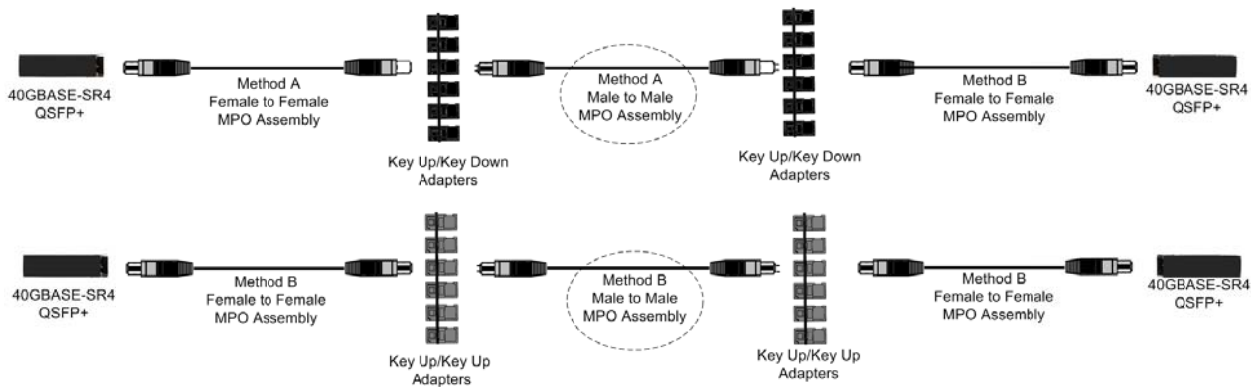


**Figure 1. 40GBASE-SR4 Non-standards Compliant Method A and B channels migrated from 10GBASE-SR**

Testing this infrastructure in accordance with TIA-568-C (TIA-526-14A, TIA-526-7 and IEC 61280-4-1 Ed.2) Method B, one jumper method, requires the test equipment to have female MPO interface as shown in Figure 2.

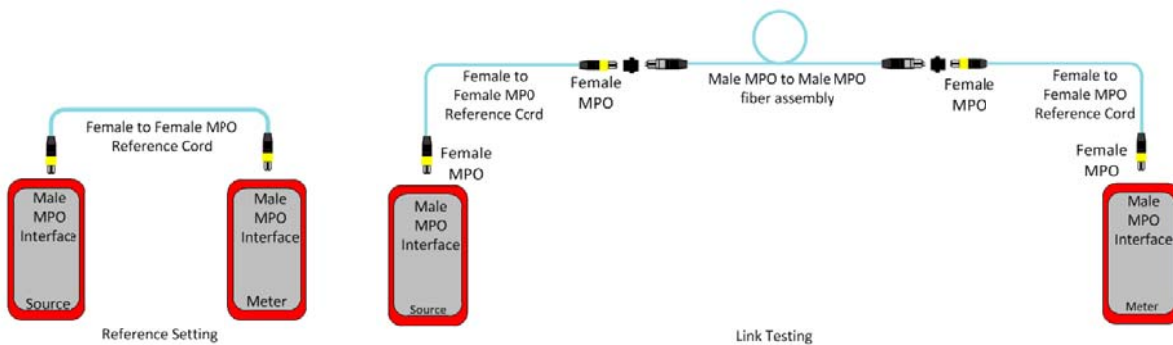


If the 40G horizontal cabling infrastructure is standards compliant, as shown in Figure 3, the MPO cabling infrastructure is male and either method A or method B polarity.



**Figure 3. 40GBASE-SR4 Standards Compliant Method A and B Channels**

Testing this infrastructure in accordance with TIA-568-C (TIA-526-14B, TIA-526-7 and IEC 61280-4-1 Ed.2) Method B, one jumper method, requires the test equipment to have male MPO interface as shown in Figure 4.



As shown in Figure 2 and Figure 4 testing the 40G infrastructure with MPO horizontal solutions creates some challenges. Some testers have a fixed male MPO interface while others have a fixed female MPO interface. In both cases the preferred testing method; Method B, one jumper method, per TIA-568-C (TIA-526-14B, TIA-526-7 and IEC 61280-4-1 Ed.2) cannot be used for both the male horizontal and female horizontal cabling infrastructures. In the case where the MPO interface on the tester does not match the MPO in the horizontal infrastructure, a non-standards based three cable testing configuration would need to be utilized. This non-standard three cable method introduces more variability and possibility for error in the testing and is not recommended to qualify 40G links.

Trying to change the gender of the standard MPO connector in the field to satisfy these different testing requirements is not recommended due to the complex construction of the connector. Trying to change this characteristic in the field is extremely difficult and may lead to damage to the fiber exposed when attempting to replace the connector housing.

**Solution**

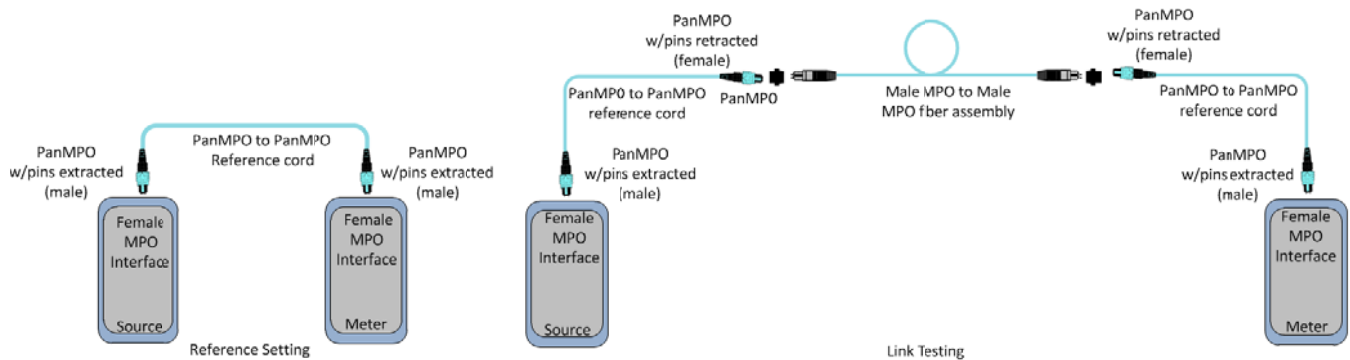
Panduit has introduced the PanMPO, a universal MPO connector that can have the gender and polarity changed in the field with no risk of damage to the internal ribbon fiber or the connectors end face.

The PanMPO is a multiple-fiber push-on/pull-off connector that is IEC-61754-7 and EIA/TIA-604-5 (FOCIS 5) compliant that can be either male or female in gender or key up or key down in housing polarity orientation.

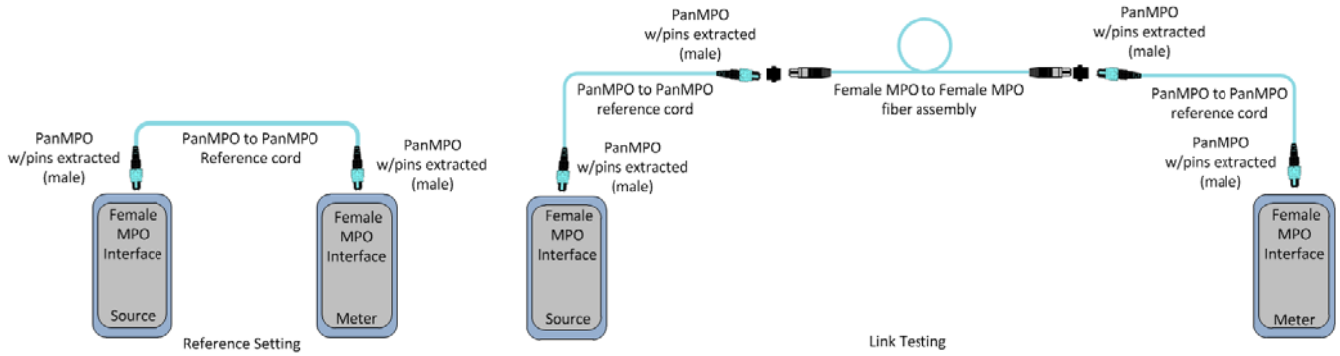


What the PanMPO provides is an all-inclusive connector that will configure to any gender necessary to test your horizontal infrastructure. No matter what your 40G MPO test head configuration or whatever gender exists in your horizontal cabling solution, the PanMPO will allow you to test to the Method B, one jumper method, TIA-568-C (TIA-526-14B, TIA-526-7 and IEC 61280-4-1 Ed.2) standard.

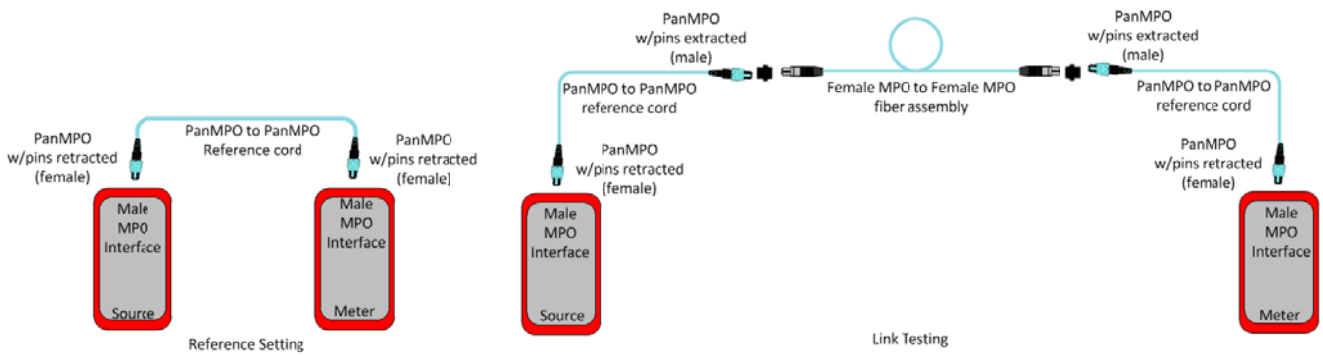
The following figures show the different testing configurations associated with the different genders of the MPO tester interface and different genders of the MPO horizontal infrastructure and how the PanMPO allows the testing of all the configurations utilizing the recommended Method B, one jumper test method.



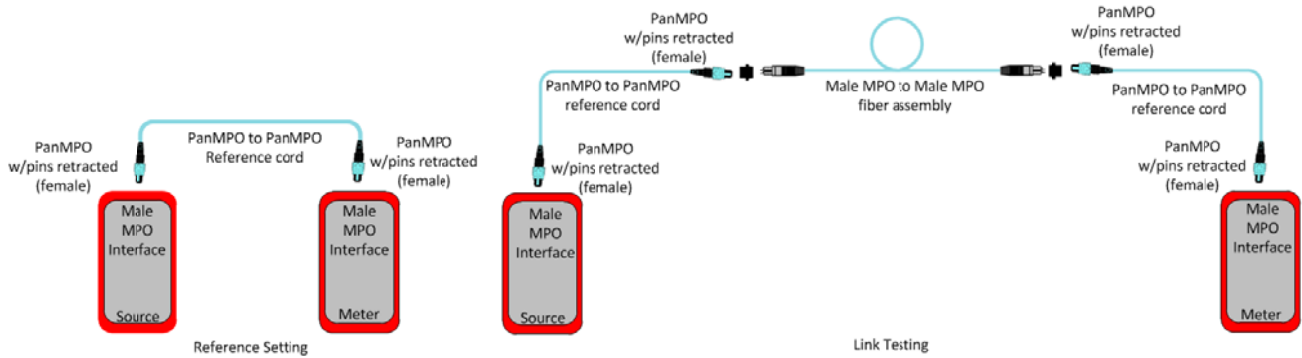
**Figure 5. Female MPO Tester Interface used to Test Male MPO Horizontal Cabling**



**Figure 6. Female MPO Tester Interface used to Test Female MPO Horizontal Cabling Infrastructure**



**Figure 7. Male MPO Tester Interface used to Test Female MPO Horizontal Cabling Infrastructure**



**Figure 8. Male MPO Tester Interface used to Test Male MPO Horizontal Cabling Infrastructure**

As shown in Figures 5 thru 8, the PanMPO can be utilized in any 40G MPO link testing scenario following the Method B, one jumper method, per TIA-568-C (TIA-526-14B, TIA-526-7 and IEC 61280-4-1 Ed.2).

**Summary**

Gender has become an issue when testing an MPO based infrastructure in the 40G environment. When utilizing standard MPO reference cords to test the link, there are several scenarios where Method B, one jumper method cannot be utilized due to the mismatch of the MPO tester interface and the MPO horizontal cabling infrastructure. The two tables in Figure 9 summarize these scenarios and shows how the PanMPO can be used to test all these utilizing Method B, one jumper method, per TIA-568-C (TIA-526-14B, TIA-526-7 and IEC 61280-4-1 Ed.2).

<b>Standard MPO Reference Cords</b>			
<b>Gender Type</b>		<b>Testing Method</b>	<b>Reference Cords Needed to Complete Testing</b>
<b>MPO Tester</b>	<b>Horizontal Cabling</b>		
Female	Male	Non-Standards Compliant – Three cord	3
Female	Female	Method B (One Jumper)	2
Male	Male	Method B (One Jumper)	2
Male	Female	Non-Standards Compliant – Three Cord	3

<b>PanMPO Reference Cords</b>			
<b>Gender Type</b>		<b>Testing Method</b>	<b>Reference Cords Needed to Complete Testing</b>
<b>MPO Tester</b>	<b>Horizontal Cabling</b>		
Female	Male	Method B “One Jumper”	2
Female	Female		
Male	Male		
Male	Female		

Panduit has developed the PanMPO to easily solve the complexity and standards compliancy questions and issues that surround testing the MPO cabling infrastructure by removing the operational risks involved with changing the gender or polarity of the existing MPO connectivity solution in the field while being able to utilize any MPO testing interface manufactured today.