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infrastructure for a connected world

Base 8 Fiber Cable Application Guide

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What is Base-8 Fiber?

Base-8 optical trunks consist of eight fibers per jacket, that are often ribbonized and can terminate with MPO or multiple duplex LC connectors. The adoption of Base-8 fiber is being driven by applications that require eight fiber lanes, with four lanes dedicated for Transmit (Tx) and four lanes for Receive (Rx). An example of a Base-8 application is 100GBASE-SR4 which uses four individual 25G lanes to achieve 100G bandwidth. This 8-fiber lane count aligns with 40GbE, 100GbE, and even 400GbE and 800GbE parallel optics data transmission methods.

Panduit's Base-8 offering will encompass 50 µm OM4, OM4+ (Signature Core), and OM5 for multimode, and 9 µm OS2 for single-mode. Fiber trunk jacket colors will match those of Base-12 fiber applications however, the connector boots of a Base-8 trunk or interconnect will be gray in color to provide a quick visual distinction from 12-Fiber cabling.

How do Base-8 and Base-12 Fiber Applications Differ?

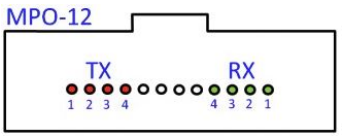
Base-12 structured cable has been the widely deployed standard for fiber backbone installations over the past 30 years, but as applications change, so has the need for additional connectivity methods. With the release of 40GbE standards, it quickly came to light that the breakout to 4x10G was a sweet spot for a Base-8 applications. The need for 8-Fiber breakout applications continued with the advent of 100G x (4) 25G, 400G x (4) 100G, as well as 800G parallel connectivity.

The main physical difference between Base-8 and Base-12 is the count of fibers in the trunk or application. Base-8 consists of 8 fibers, while Base-12 consists of 12 fibers in loose tube or ribbon arrangement. In some of the applications that used 12-Fiber trunks, four of the Base-12 fibers were 'dark', or unused to suit the application, which may have required a conversion harness/cassette to operate in breakout scenarios. While Base-12 fiber can support Base-8 applications, it is considered less than ideal due to four of the fibers (or 33%) are not utilized and remain "dark"**.

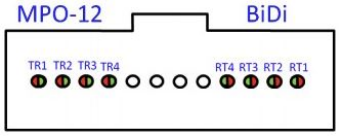
***Note**: With the use of a Panduit PanMPO™ 12-Fiber trunk, Base-8 applications are also achieved utilizing eight of the twelve fibers, then changing the MPO gender from Female to Male, and changing polarity to Method B (Key-Up to Key-Up.)*

Another reason for the shift to Base-8 applications is because it closely matches up with switch providers port counts, i.e., 16, 32, or 48 port switches. While Base-12 provides more fibers per jacketed trunk, it does not break out as cleanly once applications reached 40GB in speed. While both technologies (Base-8/Base-12) are suitable for Base-2 (MPO/LC breakout) scenarios, Base-8 will ultimately match up better with switch technologies to maximize density in port replication applications versus multiple of 12 jacketed fibers. Since Base-12 solutions are not all divisible by 8, Base-8 cabling will provide greater fiber utilization without the need for conversion via harnesses or cassettes, as well as providing reduced attenuation values.
In addition to physical differences in Base-8 vs. Base-12, there is also data transmission differences at the transceiver level. Parallel connections will have Tx/Rx physically separated on

each side of the MPO connector whereas Bidirectional Duplex applications will have Tx/Rx on continuous ports which is represented on the graphic below:



Base-8 Parallel Transceiver Tx/Rx



Base-12 BiDi Transceiver Tx/RX

***Note**: Base-8 assemblies increase the number of MPO connectors (24F and above) by 50% vs the same count in Base-12. See the table below for details.*

Base-8 vs Base-12 Assemblies # of MPO connecters per end		
Fiber Count	**MPO-12**	**MPO-8**
8 or 12	1	1
24	2	3
48	4	6
72	6	9
96	8	12
144	12	18

Table 1: Base-8 vs Base-12 Connector Per Assembly

Example: Base-8 72F Trunk Assembly

What Transceiver Technologies Does Base-8 Encompass?

***Note**: This is not an exhaustive list. These can also be connected with 8F MPO to 4xLC assemblies or 8F x 4 LC trunks or interconnects.*

Most multifiber (greater than two) QSFP or OSFP optical pluggable transceivers are Base-8 compatible. There are a few Base-16 outliers, but generally most applications that are not 2-Fiber Duplex applications are Base-8.

Base-8 Parallel Optics (Either MPO/MPO or MPO/LC Breakout)				
Transceiver Model	**Media Type**	**Transmission Speed**	**Reach**	**Connector Type**
QSFP-40G-SR4	MMF	40G	150m	MPO
QSFP-4x10G-LR	MMF	40G	10km	MPO
QSFP-100G-SR4	MMF	100G	100m	MPO
QSFP-100G-PSM4	SMF	100G	500m	MPO
QSFP-100G-SL4	MMF	100G	30m	MPO
QDD-400G-SR4-BD	MMF	400G	100m	MPO
QDD-400G-DR4	SMF	400G	500m	MPO
QDD-8X100G-FR	SMF	800G	2km	MPO
QDD-400G-SR4.2	MMF	400G	100m	MPO
QDD-4x100G-FR	SMF	400G	2km	MPO
QDD-4X100G-LR	SMF	400G	10km	MPO
OSFP-400G-DR4	SMF	400G	500m	MPO
OSFP-400G-XDR4	SMF	400G	2km	MPO

Table 2: Example Parallel Optics Applications

Why Base-8 Makes Sense, Power Saving via Port Breakout!

In addition to 100% fiber utilization, switch port mapping, breakout via 400/100GbE switch to switch applications, or 400/100GbE, 100/25GbE and 40/10GbE server breakout applications, Base-8 cabling can also greatly reduce overall cost, power, and require less conversion media in the data center.

Let's use the following scenario of 400GbE switch to 100GbE server applications:
Pod of 16 cabinets with 32 servers per cabinet, one 100GbE downlink per server:

Traditional top of rack (ToR) networking will require one 100GbE switch per cabinet for in-cabinet patching. Switching this to a MoR 400GbE switch model with 4:1 (Base-8) fiber breakout will decrease the # of switches needed (CAPEX savings) as well as decrease the amount of power draw (OPEX savings).

These savings only increase as the port count/density grows. Things such as deploying chassis-based or higher radix switches can quickly decrease your total operating cost & power draw per port.

Current Architecture

- One 100G Nexus 9364C-GX ToR Switch (2RU) per cabinet
- One port per server
- Provides connectivity to 32 servers
- 32 downlinks, 16 uplinks 2:1 oversubscription

New Architecture

- Two ToR Nexus 9364D-GX2A Switches (2RU) 8 cabinets
- One port can service 4 servers with 4 to 1 (SR4.2) breakouts
- Provides connectivity to 256 servers
- 32 ports downlinks 16 uplinks 2:1 oversubscription

***Note**: For more information on Base-8 savings, visit Panduit.com.*
Power savings via switch reduction of (16) 100G ToR to (4) 400G ToR switches:

- Typical 2RU 100G switch (ex. Nexus 9364C-GX) 811W x 16 = 13kW
- Typical 2RU 400G switch (ex. Nexus 9364D-GX2A) 1324W x 4 = 5.3kW
- 7.7kW power savings (60% overall) via switch reductions in a 16 cabinet POD

Power savings via using Base-8 switch port breakout (switch downlink review only):

- Total power savings for POD on downlink transceivers
  - Typical 100G transceiver is ~4.3W, a 400G is ~12W
  - Using 100G ToR = 4.3W * (1024) total transceivers in the POD = 4.4kW
  - Using 400G MoR with 100G breakout: (4:1 = 512 * 100G + 128 * 400G)
    - 12W 400G * (128) transceivers = 1.54kW
    - 4.3W 100G * (512) transceivers = 2.2kW
    - Total combined power of 100G & 400G transceivers = 3.74kW
    - Total transceiver power savings of 100G ToR vs 400G 4:1 breakout model: 660W, or an additional 15% power savings for transceivers in this POD

Overall power savings:

- 7.7kW switch savings + 660W transceiver savings = 8.36kW POD power savings

Parallel & Duplex Link Paths

Base-8 fiber is used for parallel links, meaning for applications that use multiple fibers/channels for both Transmit and Receive using a FOCIS-5 MPO (multi-fiber push on) based connector. Base-8 also allows for quick conversion to Base-2 duplex links since it's 8 fibers are divisible for 2-fiber Tx/Rx transmission. With Base-8 fiber, Tx1, or fiber position one, should be received on Rx12. Conversely if traffic enters on Tx12, it should be received on Rx1. This Tx/Rx scenario is achieved by using Type B or 'Method B' polarity link components. Also, to maintain that polarity or light path, the number of components in the channel should remain at an odd number.

Fiber Infrastructure Form Factor Options

Panduit offers Base-8 fiber connectivity components in multiple form factor and density options as well. Base-8 components are available in SFQ QuickNet™, OptiCom®, and HD Flex™ component form factors, as shown below.

Image 5: QuickNet™ Base-8

Image 6: OptiCom® Base-8

Image 7: HD Flex™ Base-8

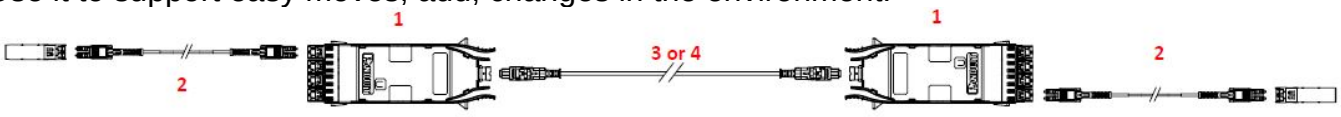
Base-8 fiber assemblies are also available Configure To Order for Trunks, Interconnects (jumpers), and Harnesses. Options such as fiber type, flame rating, connector type, performance, polarity, and length are configurable!

Base 8 Applications

For all applications, please use these channel drawings to help with part selection. For part # specifics, please review the intended application. Application scenarios shown using HD Flex™ components for simplicity but SFQ QuickNet™, OptiCom®, and HD Flex™ component part #'s are available.
*Note: Any OptiCom® applications using cassettes will have two 8-Fiber MPO's and eight LC adapters. There may be additional applications possible using Base-8, but these are the most common deployment options. Jacket Flame Rating shown in Plenum, for LSZH or Euroclass, please visit Here.

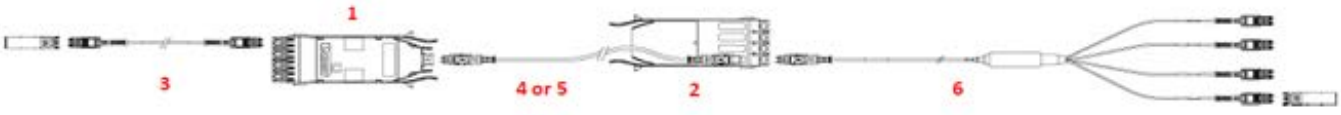
Duplex Applications

1. Duplex Interconnect
   Use it to support easy moves, add, changes in the environment.



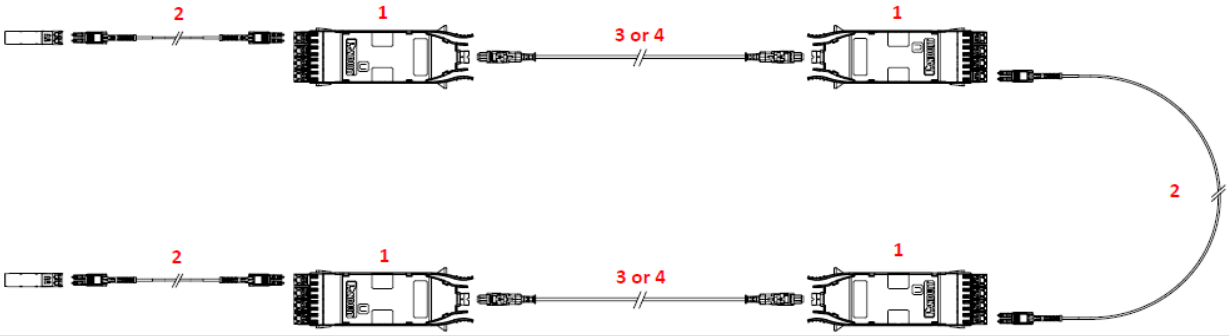
Description		OS2			OM4		
#	Duplex Interconnect	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port, 8-Fiber Cassette - Universal Polarity	FHC39N-08H-10U	FC39N-16-10U	FQ39N-08-10U	FHC3ZO-08H-10U	FC3ZO-16-10U	FQ3ZO-08-10U
2	LC/LC UniBoot Patch Cord - Standard	F92RPU1U1ONM***			FZ2RPU1U1ONM***		
3	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
4	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		

2. Duplex Interconnect With Breakout
   Application supports switches with high port counts. This application also enables the use of less cassettes when the interconnects are well defined. (*Harnesses available in stagger as well)



Description		OS2			OM4		
#	Duplex Interconnect With Breakout	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port, 8-Fiber Cassette - Universal Polarity	FHC39N-08H-10U2	FC39N-16-10U2	FQ39N-08-10U2	FHC3ZO-08H-10U2	FC3ZP-16-10U2	FQ3ZO-08-10U2
2	4-Port MPO FAP	FHMP-4-ABL	FAPH0412BLMPO	FQMAP45BL	FHMP-4-ABL	FAPH0412CGMPO	FQMAP45BL
3	LC/LC UniBoot Patch Cord - Standard	F92RPU1U1ONM***			FZ2RPU1U1ONM***		
4	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
5	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		
6	8F Harness U2*	FH98PWPQ016F***			FHZ8PKPV016F***		

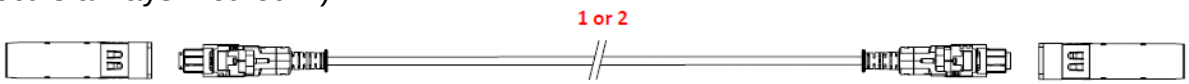
3. Duplex Cross-connect
   Solution allows for flexible patch fields in distribution areas.



Description		OS2			OM4		
#	Duplex Cross Connect	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port, 8-Fiber Cassette - Universal Polarity	FHC39N-08H-10U	FQ39N-16-10U	FQ39N-08-10U	FHC3ZO-08H-10U	FC3Z0-16-10U	FQ3ZO-08-10U
2	LC/LC UniBoot Patch Cord - Standard	F92RPU1U1ONM***			FZ2RPU1U1ONM***		
3	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
4	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		

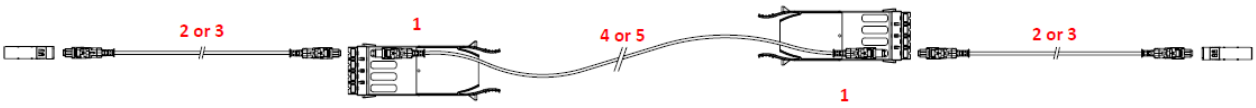
Parallel Applications

4. Direct Connect
   Application for short distance (in-rack/in-row) point to point equipment connections. (Direct Connect is always Method B)



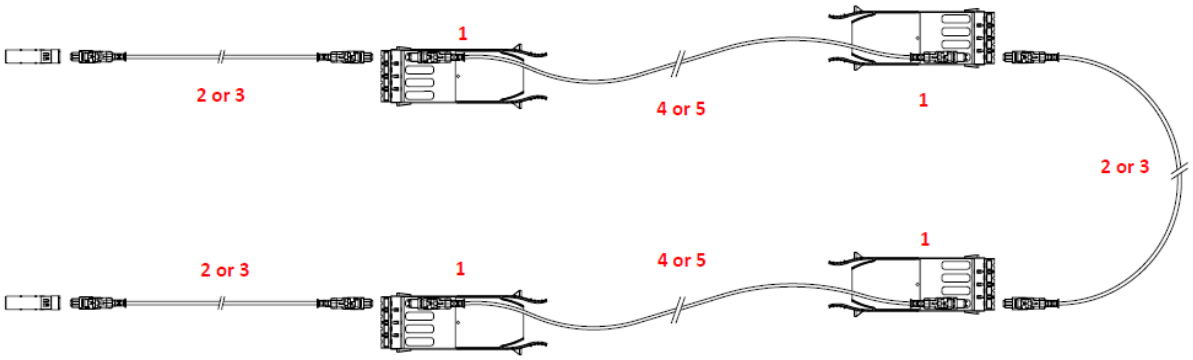
Description		OS2			OM4		
#	Direct Connect	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	8F Interconnect (Female to Female)	FR98PJJB001F***			FRZ8PJJY011F***		
2	8F Trunk (Female to Female)	FY98PJJB005F***			FYZ8PJJY015F***		

5. Parallel Interconnect
   Much like the Duplex Interconnect, this allows for easy moves, add, and changes for high bandwidth applications.



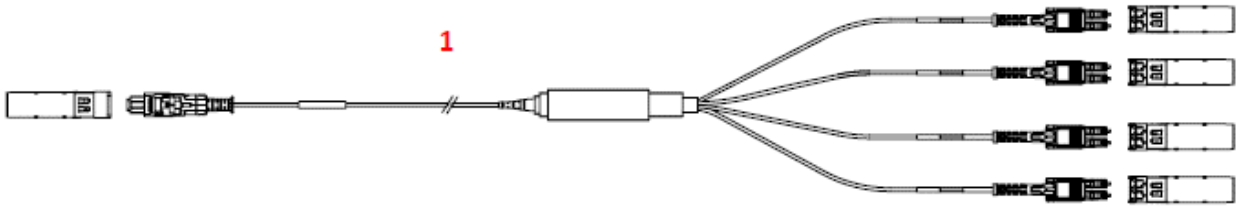
Description		OS2			OM4		
#	Parallel Interconnect	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port MPO FAP	FHMP-4-ABL	FAPH0412BLMPO	FQMAP45BL	FHMP-4-ABL	FAPH0412CGMPO	FQMAP45BL
2	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
3	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		
4	8F Interconnect (Male to Male)	FY98PWWB015F***			FYZ8PKKY015F***		
5	8F Trunk (Male to Male)	FY98PWWB015F***			FYZ8PKKY015F***		

6. Parallel Cross Connect
   Application allows for moves, add, or changes at one end of the patch field and allows for 1:1 port replication at the switch.



Description		OS2			OM4		
#	Parallel Cross Connect	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port MPO FAP	FHMP-4-ABL	FAPH0412BLMPO	FQMAP45BL	FHMP-4-ABL	FAPH0412CGMPO	FQMAP45BL
2	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
3	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		
4	8F Interconnect (Male to Male)	FY98PWWB015F***			FYZ8PKKY015F***		
5	8F Trunk (Male to Male)	FY98PWWB015F***			FYZ8PKKY015F***		

7. Direct Connect With Harness Breakout
   Application for breaking out high bandwidth switch ports to servers in close proximity, such as in-cabinet/in-row switch to server connections. (*Harnesses available in stagger as well)



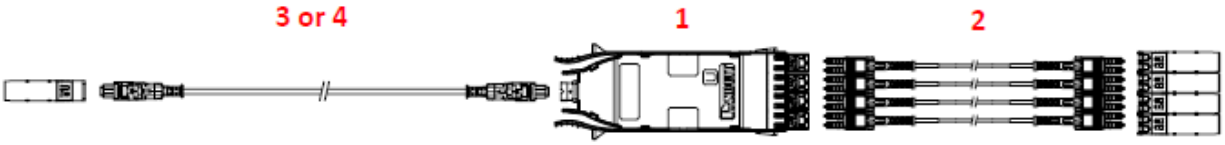
Description		OS2			OM4		
#	Direct Connect With Harness Breakout	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	8F LC Harness U2*	FH98PVPQ016F***			FHZ8PJPV016F***		

10-40G UPGRADE PATH

8. Interconnect to Duplex Breakout
   This application supports breakout of a high bandwidth switch ports to (4) lower bandwidth links using less cassettes.

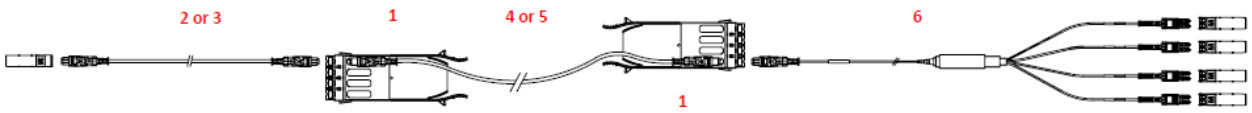
Description		OS2			OM4		
#	Interconnect To Duplex Breakout	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port, 8-Fiber Cassette - Universal Polarity	FHC39N-08H-10U2	FC39N-16-10U2	FQ39N-08-10U2	FHC3ZO-08H-10U2	FC3ZO-16-10U2	FQ3ZO-08-10U2
2	4-Port MPO FAP	FHMP-4-ABL	FAPH0412BLMPO	FQMAP45BL	FHMP-4-ABL	FAPH0412CGMPO	FQMAP45BL
3	LC/LC UniBoot Patch Cord Standard	F92RPU1U1ONM***			FZ2RPU1U1ONM***		
4	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
5	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		
6	8F Interconnect (Female to Male)	FY98PVWB015F***			FYZ8PJKY015F***		
7	8F Trunk(Female to Male)	FY98PVWB015F***			FYZ8PJKY015F***		

9. Interconnect With Port Breakout
   Allows for 1:4 port replication. Solution is best used as an in-cabinet patching application to use shorter length patch cords for clean cable management.



Description		OS2			OM4		
#	Interconnect With Port Breakout	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port, 8-Fiber Cassette - Universal Polarity	FHC39N-08H-10U	FC39N-16-10U	FQ39N-08-10U	FHC3ZO-08-H10U	FC3ZO-16-10U	FQ3ZP-08-10U
2	LC/LC UniBoot Patch Cord _ Standard	F92RPU1U1ONM***			FZ2RPU1U1ONM***		
3	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
4	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		

10. Interconnect With Harness Breakout
    Application allows for ease of Day 2 upgrades from 2-Fiber to 8-Fiber network applications where the harness can be removed/replace with Interconnects without changes to the horizontal infrastructure. (*Harnesses available in stagger as well)



Description		OS2			OM4		
#	Interconnect With Harness Breakout	HD Flex™	Opticom®	SFQ QuickNet™	HD Flex™	Opticom®	SFQ QuickNet™
1	4-Port MPO FAP	FHMP-4-ABL	FAPH0412BLMPO	FQMAP45BL	FHMP-4-ABL	FAPH0412CGMPO	FQMAP45BL
2	8F Interconnect (Female to Female)	FR98PVVB011F***			FRZ8PJJY011F***		
3	8F Trunk (Female to Female)	FY98PVVB015F***			FYZ8PJJY015F***		
4	8F Interconnect (Male to Male)	FY98PWWB015F***			FYZ8PKKY015F***		
5	8F Trunk (Male to Male)	FY98PWWB015F***			FYZ8PKKY015F***		
6	8F LC Harness U2*	FH98PVPQ016F***			FHZ8PJPV016F***		

Note: *For additional Base-8 part #'s, please visit Panduit.com.*

Plenum Base 8 MPO Trunk Cable Assemblies

part number configurator

FYZ8PJJY011F030 = OM4 8-Fiber HD Flex, Indoor Small Diameter Trunk, Plenum, 1× PanMPO-8 Female with 1m breakout to 1× PanMPO-8 Female with 1m breakout, Polarity B, Optimized IL, Pulling Eye End A, 30 feet

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Example	F	Y	Z	8	P	J	J	Y	0	1	1	F	0	3	0

1 – Fiber
F = Fiber

2 – Cable Type
Y = Indoor small diameter trunk cable

3 – Fiber Type
9 = OS2 Singlemode 9/125µm
Z = OM4 50/125µm
S = OM4+ 50/125µm
W = OM5 50/125µm

4 – Fiber Count
8 = 8-Fibers
C = 16-Fibers
U = 24-Fibers
W = 48-Fibers
X = 72-Fibers
Y = 96-Fibers
A = 144-Fibers

5 – Jacket Type
P = Plenum

6 & 7 - Connector Types
G = MPO-8 Female (MM)
H = MPO-8 Male (MM)
J = PanMPO-8 Female (MM)
K = PanMPO-8 Male (MM)
X = MPO-8 Female APC (SM))
Y = MPO-8 Male APC (SM)
V = PanMPO-8 Female APC (SM)
W = PanMPO-8 Male APC (SM)
U = Pigtail (End B only)

8 – Construction/Perfomance
A = Method A, Standard IL (SM)
B = Method B, Standard IL (SM)
X = Method A, Optimized IL
Y = Method B, Optimized IL
K = Method A, Ultra IL (MM) (8 – 48-Fibers)
L = Method B, Ultra IL (MM) (8 – 48-Fibers)

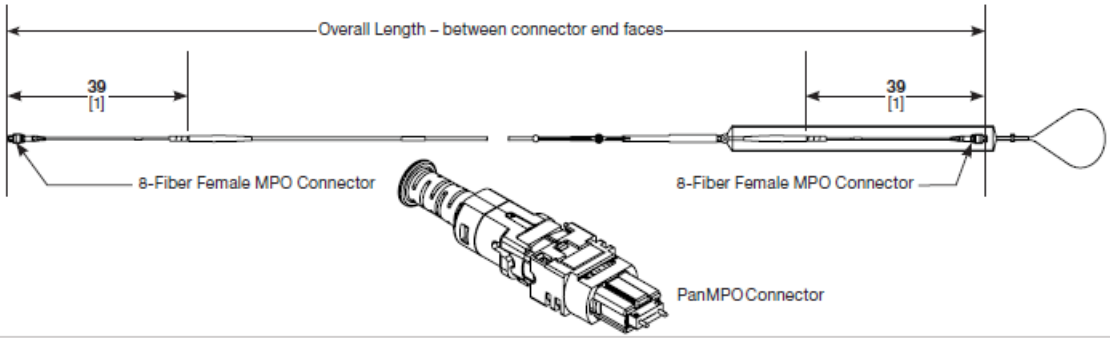
9-11 – Serial

12 – Unit of Measure
F = Feet
M = Meters

13, 14, 15 – Cable Asembly Length
015 – 999 Feet
005 – 999 Meters

Serial	Transition	Pulling Eye
011	HD Flex	Yes
012	HD Flex	No
013	HD Flex to pigtail	Yes
014	HD Flex to pigtail	No
015	Standard	Yes
016	Standard	No
017	Standard to pigtail	Yes
018	Standard to pigtail	No

small diameter trunk cable assembly detail



Base 8 MPO Interconnect Cable Assemblies

part number configurator

Example: FRZ8PJJY011F030 - OM4 8-Fiber Interconnect, Plenum, PanMPO-8 Female to PanMPO-8 Female, Polarity B, Optimized IL, 30 feet.

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Example	F	R	Z	8	P	J	J	Y	0	1	1	F	0	3	0

1 – Fiber

F = Fiber

2 – Cable Type

R = Indoor, round

3 – Fiber Type

9 = OS2 Singlemode 9/125µm
Z = OM4 50/125µm
W = OM5 50/125µm
S = OM4+ 50/125µm

4 – Fiber Count

8 = 8 fibers
C = 16 Fibers
U = 24 fibers

5 – Jacket Type

P = Plenum (OFNP)
L = LSZH
B = LSZH Euroclass B2ca

6 & 7 – Connector Types

G = MPO-8 Female (MM)
H = MPO-8 Male (MM)
J = PanMPO-8 Female (MM)
K = PanMPO-8 Male (MM)
X = MPO-8 Female APC (SM)
Y = MPO-8 Male APC (SM)
V = PanMPO-8 Female APC (SM)
W = PanMPO-8 Male APC (SM)
U = Unterminated (End B only)

8 – Construction/Performance

A = Method A, Standard IL (SM)
B = Method B, Standard IL (SM)
X = Method A, Optimized IL
Y = Method B, Optimized IL
K = Method A, Ultra IL (MM)
L = Method B, Ultra IL (MM)

9 – 11 – Serial

See Table Below

12 – Unit of Measure

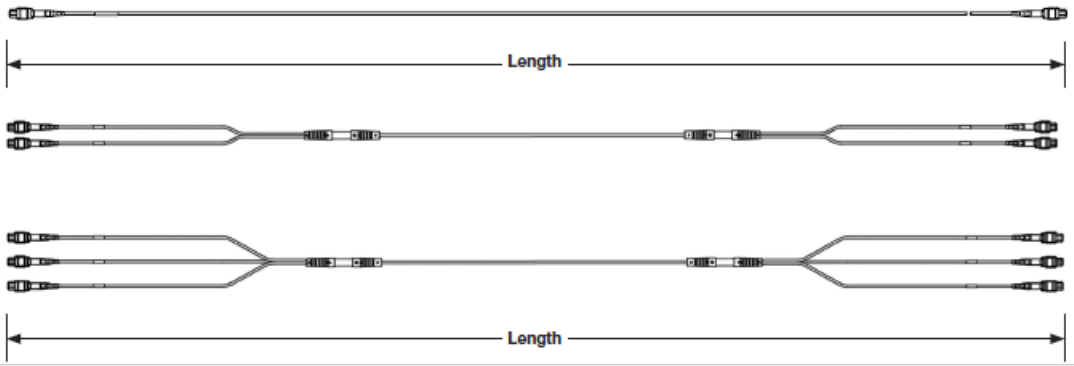
F = Feet
M = Meters

13, 14, 15 – Cable Assembly Length

1 – 300 Feet
0.5 – 100 Meters

Serial	Breakout – End A	Breakout – End B
011	None	None
012	24-inch (60 cm)	24-inch (60 cm)
013	None	24-inch (60 cm)

QuickNet™ MPO Interconnect Round Cable Assembly Detail



Base 8 MPO Breakout Harness Cable Assemblies

part number configurator

Example: FHZ8PJPV016F015 = OM4 Harness, 8-Fiber, round, plenum, Pan-MPO-8 female to LC Uniboot Push Pull with 24in (60cm) equal breakout, 4 to 1 Polarity (U2), Optimized IL - 15 Feet

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Example	F	H	Z	8	P	J	P	V	0	1	6	F	0	1	5

1 – Fiber
F = Fiber

2 – Cable Type
H = Indoor, Round Harness

3 – Fiber Type
9 = OS2 Singlemode 9/125µm
Z = OM4 50/125µm
W = OM5 50/125µm
S = OM4+ 50/125µm

4 – Fiber Count
8 = 8 fibers

5 – Jacket Type
P = Plenum (OFNP)
L = LSZH
B = LSZH Euroclass B2ca

6 – Connector Type (End A)
G = MPO-8 Female (MM)
H = MPO-8 Male (MM)
J = PanMPO-8 Female (MM)
K = PanMPO-8 Male (MM)
X = MPO-8 Female APC (SM)
Y = MPO-8 Male APC (SM)
V = PanMPO-8 Female APC (SM)
W = PanMPO-8 Male APC (SM)

7 – Connector Type (End B)
L = LC Duplex
P = LC Uniboot Push Pull
B = LC/APC Duplex (SM)
9 = LC/APC Uniboot Push Pull (SM)

8 – Construction/Performance
Q = 4 to 1 / U2 - Std. IL (SM)
V = 4 to 1 / U2 - Opt. IL
U = 4 to 1 / U2 - Ultra IL (MM)
1 = 4 to 1 / U - Std. IL (SM)
2 = 4 to 1 / U - Opt. IL
3 = 4 to 1 / U - Ultra IL (MM)

9 – 11 – Serial
See Table Below

12 – Unit of Measure
F = Feet
M = Meters

13, 14, 15 – Cable Assembly Length
1 – 300 Feet
0.5 – 100 Meters

Serial	Breakout Length	Stagger	Serial	Breakout Length	Stagger
011	18" (45cm)	Equal Breakout	01B	30" (76cm)	Equal Breakout
012	18" (45cm)	LC Pair 1 Longest	01C	30" (76cm)	LC Pair 1 Longest
013	18" (45cm)	LC Pair 1 Shortest	01D	30" (76cm)	LC Pair 1 Shortest
014	18" (45cm)	LC Pair 1 and 2 Longest	01E	30" (76cm)	LC Pair 1 and 2 Longest
015	18" (45cm)	Pair 1 and 2 Shortest	01F	30" (76cm)	Pair 1 and 2 Shortest
016	24" (60cm)	Equal Breakout	01M	39" (1m)	Equal Breakout
017	24" (60cm)	LC Pair 1 Longest	01N	39" (1m)	LC Pair 1 Longest
018	24" (60cm)	LC Pair 1 Shortest	01P	39" (1m)	LC Pair 1 Shortest
019	24" (60cm)	LC Pair 1 and 2 Longest	01Q	39" (1m)	LC Pair 1 and 2 Longest
01A	24" (60cm)	Pair 1 and 2 Shortest	01R	39" (1m)	Pair 1 and 2 Shortest