

NEXT GENERATION DATA CENTER SOLUTIONS



www.senko.com



DATA CENTER SOLUTIONS

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More and more fibers are required in Data Center applications as the data traffic requirements and bandwidths grow so does the need for new innovative interconnect solutions

Distributed Data Center Leaf-Spine Topology in Data Center

Copper vs. Optics

Copper

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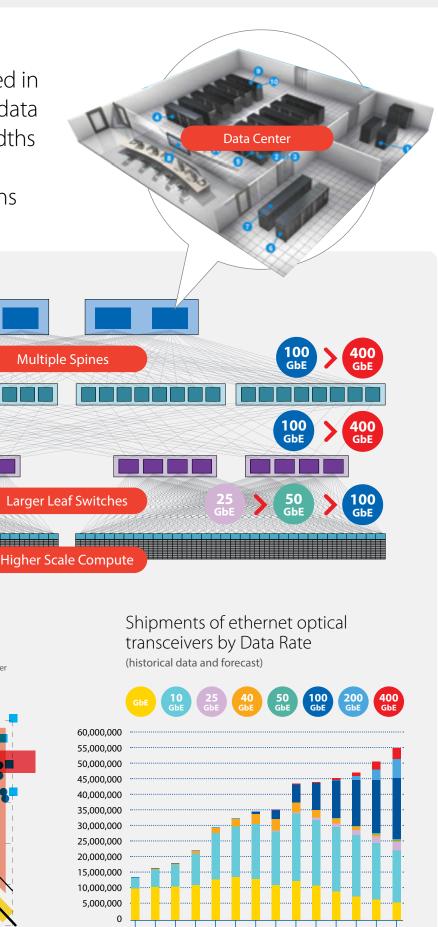
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Backplanes • • • • 10Gb/s. meter

Coax (1970) — 1000Gb/s. meter

10

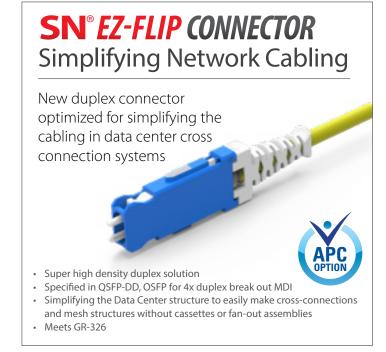
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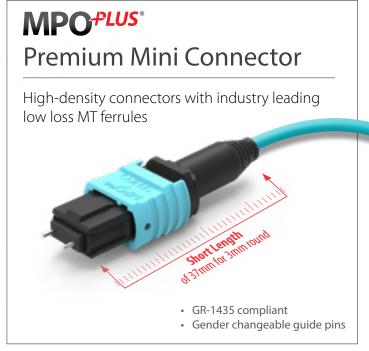


SENKO's solutions for the future data centers:







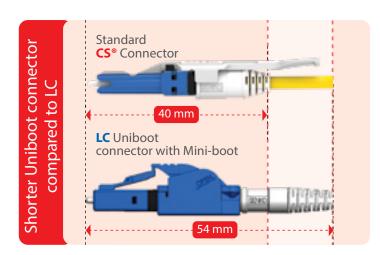


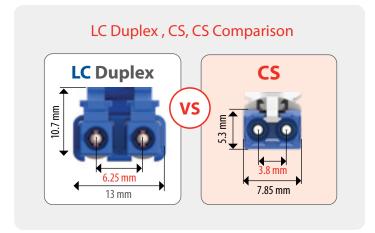
CS[®] Connector

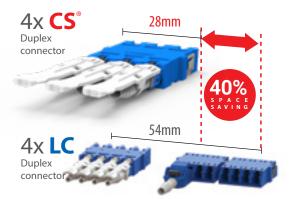
Reach Higher Density/Capacity with CS®

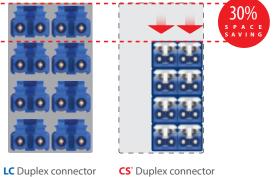










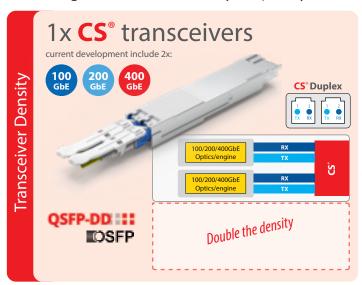


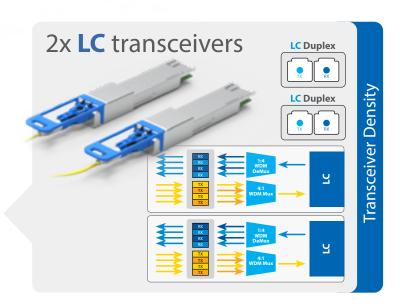
- Higher density vertically and horizontally
- Low profile connector design allows to stack adapter vertically
- 40% reduction in width compared to LC

Go with CS and Double the Density from LC

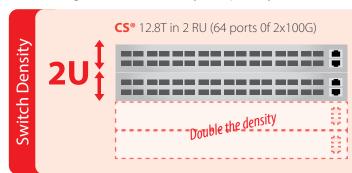
Doubling Density/Capacity in Many Ways

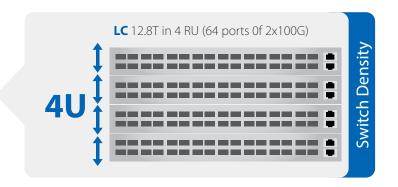
Doubling Transceiver Density/Capacity



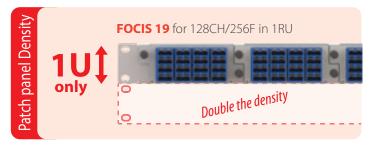


Doubling Switch Density/Capacity





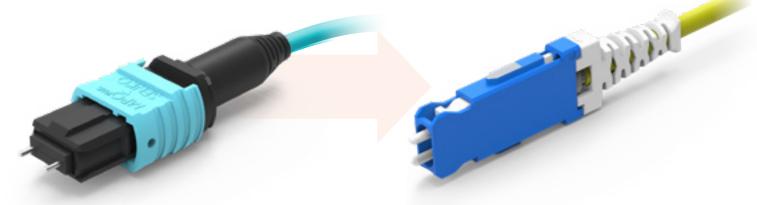
Doubling Patch Panel Density/Capacity



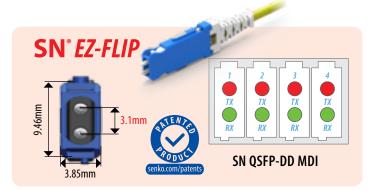


SN[®] Connector

SN Simplified Cabling More Efficient in Performance







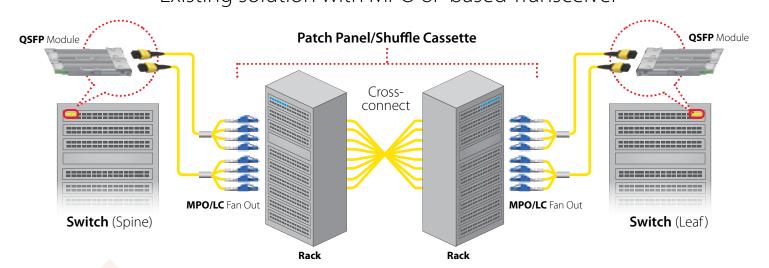
SN with more stable performance and easier maintenance

SN° EZ-FLIP Connector Ferrule end face Ferrule end face 4,6mm SN° EZ-FLIP Connector Ferrule end face

- Multi-fiber ferrules inherently have higher insertion loss when compared to single fiber ferrules
- Multi-fiber ferrules have a large surface area making them challenging to clean
- Utilizes proven 1.25 mm ferrule technology for low insertion loss and high return loss
- Single fiber ferrule is easy to clean and maintain

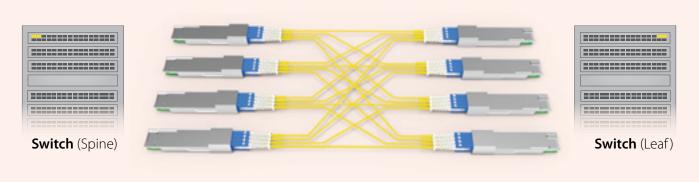
Go with SN and Improve from MPO

Leaf-Spine Cross Connection
Existing solution with MPO 8F based Transceiver



New solution with 4x SN based Transceiver

Less connectivity points required
No fanout or breakout cables are required



Simplified Cabling

- Reduce the number of connection points
- Shuffle or fanout is not required to make cross connection

8 E-1.1 E-1.0

As you would with your car, choose the right connector for your needs:

Density

What is the density you need?

Durability

What is the environment you are working in?

Ease of Use

Who is using it and how often do you need to connect/disconnect?

Ease of Maintenance

What is the skill set & tools available available to the maintenance team?

Connector	LC	CS	SN	МРО
Density	••	•••	••••	••••
Durability	••••	••••	••••	••••
Ease of Use	••••	••••	•••	••••
Ease of Maintenance	••••	••••	••••	•••



Car type	Coupe	SUV	Family	Minivan
Passenger capacity	••	•••	••••	••••
Durability	••••	••••	••••	••••
Ease of Use	••••	••••	•••	••••
Ease of Maintenance	••••	••••	••••	•••

CONNECTOR COMPARISON

Connector		LC
Density	••	Large footprint (largest of the 4 connectors) connector for two fibres
Durability	••••	Complies to GR-326 SFF requirements
Ease of Use	••••	Larger footprint allows space for finger access
Ease of Maintenance	••••	Standard 1.25mm ceramic ferule where cleaning & inspection methodology is convenient

Connector		CS
Density	•••	Medium footprint connector for 2 fibres
Durability	••••	Complies to GR-326 requirements. Highest durability among the 4 connectors (similar to SC)
Ease of Use	••••	Larger footprint allows space for finger access
Ease of Maintenance	••••	Standard 1.25mm ceramic ferule where cleaning & inspection methodology is convenient

Connector		SN
Density	••••	Smallest footprint connector for 2 fibres
Durability	••••	Complies to GR-326 SFF requirements (similar to LC)
Ease of Use	•••	Small footprint with limited space for finger access. Not suitable for glove operation in the field
Ease of Maintenance	•••••	Standard 1.25mm ceramic ferule where cleaning & inspection methodology is convenient

Connector		МРО
Density	••••	Large footprint connector but for 12, 16, 24, 32 fibres
Durability	••••	Complies to GR-1435 requirements (similar to LC)
Ease of Use	••••	Larger footprint allows space for finger access
Ease of Maintenance	•••	Rectangular non-ceramic ferule where cleaning & inspection methodology is challenging

10 E-1.1 E-1.0

At SENKO, we are continuously pushing the limits with our ferrule technology to achieve lower losses. When defining your network budget needs, it is important to know what optical losses are required. While using the Single-mode Premium ferrules will help achieve the lowest loss, it may not always be needed. For Connectors like the CS, SN or LC, the following performance can be expected when choosing the right ferrule for your application.

	Single-mode				
Parameters	UPC		A	ММ	
	SM Premium SM Premium SM Premium S Low Loss Low Loss		SM Premium	Premium	
Typical Insertion Loss (dB) Random Mating	0.05	0.08	0.07	0.12	0.05
Maximum Insertion Loss (dB) Random Mating	0.15	0.20	0.15	0.25	0.15
Typical Return Loss (dB)	≥55	≥65	≥25		
Operating Temperature (°C)	-40°C to +75°C				
Durability	<0.2dB typical change, 500 mating's				
Ferrule Ø	125µm				127μm

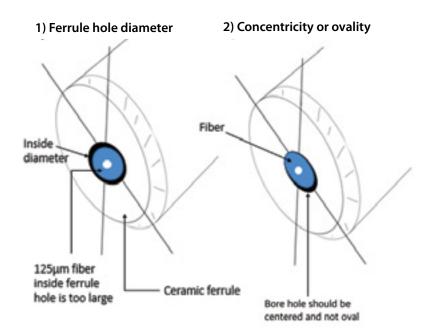
^{*} Per random mating testing IEC 61753-1 For more details about random mating performance, visit: https://www.senko.com/wp-content/uploads/2022/04/Random-Mating-IL-vs-IL-by-Master-Jumer-110221.pdf

The two most critical measurements to meet these losses are:

- Ferrule hole diameter For a minimum Insertion Loss, it is better to use the tightest-tolerance ferrule hole diameter available. As an example, if the typical values for a single-mode fiber glass Outer Diameter (OD) are 124.5um to 124.9um the desirable ferrule Inner Diameter (ID) should be 125.0um to 125.5um. Through multiple studies SENKO ensures
- Ferrule hole concentricity The shape of the bore hole must be round and in the center of the ferrule. An oval shape instead of perfectly round one will not hold an optical fiber in perfect centered alignment. Additionally, the bore hole should be centered relative to the outside of the ferrule to achieve the best alignment and performance. Ferrule hole concentricity is measured inside diameter to outside diameter (ID to OD).

Therefore, it's important to use ferrules considering the above tolerances for optimum performance.

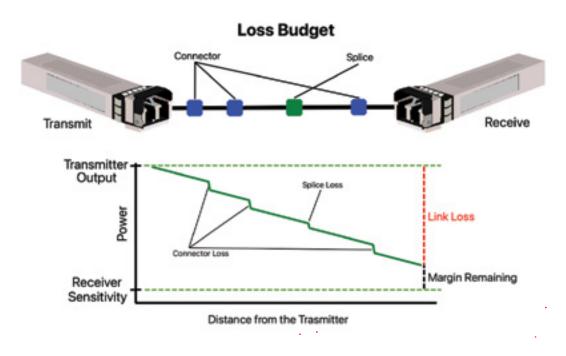
- 1. Ferrule hole diameter
- 2. Ferrule hole concentricity



The manufacturing process of ferrules is focused on making the highest quality ferrule possible with the best possible specifications in terms of ferrule concentricity, and tolerances on the bore hole ID dimensions. However, due to difficulties and complexities of the zirconia ceramic manufacturing process the manufacturers have a secondary operation which is inspection and sorting of produced ferrules. At this stage, 100% of the ferrules are inspected and measured with the state-of-the-art equipment and separated into their respective categories such as SM Premium Low Loss, SM Premium, and Multimode. Typically, the yields for the highest quality ferrules, or Premium Low Loss ferrules are lower when compared to the rest and therefore they command a premium cost.

Is the most expensive Premium Low Loss always better to use over the Premium? The simple answer is, no.

Reasons would include that the Premium Low Loss ferrules typically tighter ID, and if a low-grade fiber is used that has more than typical variation of the cladding OD, it may be difficult to terminate due to potential tolerance overlap and fiber stubbing. In most cases the Premium Low Loss ferrules are used in applications where the optical loss must be the lowest possible. However, the ferrule choice should depend on the end applications optical power loss budget. The optical power loss budget is the allowable amount of loss that a fiber link should have if it is installed properly without external factors such as contamination. The power budget is the determined as the difference between the output power of the transmitter and the minimum input power of the receiver. An average Data Center that utilizes most of the Worlds Interconnect today utilizes transceivers with -18 to -19dBm power output and the receivers with -23 to -24dBm sensitivity. This equates to a dynamic range or data link power budget of about 4 to 6 dB. This means in the typical Data Center deployment the SENKO Premium ferrules would be satisfactory as the average connector loss difference between the SENKO SM Premium Low Loss and SENKO SM Premium is less than 0.1dB which is insignificant for the given power budget.

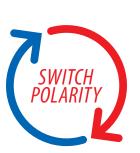


SENKO offers a range of ferrules including Premium Low Loss, Premium, and Standard connectors that offer varying loss specifications. In most cases SENKO Premium grade ferrules achieve the desired results while keeping cost savings in mind. We suggest contacting your SENKO representative if you have any additional questions.

Premium series **CS® EZ-WAY™ CONNECTOR**



Increase the packing density of LC-based infrastructure while optimizing the network for next-generation data rates, including 200G, 400G, and 800G.







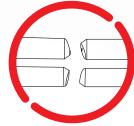


Various

boot

lengths





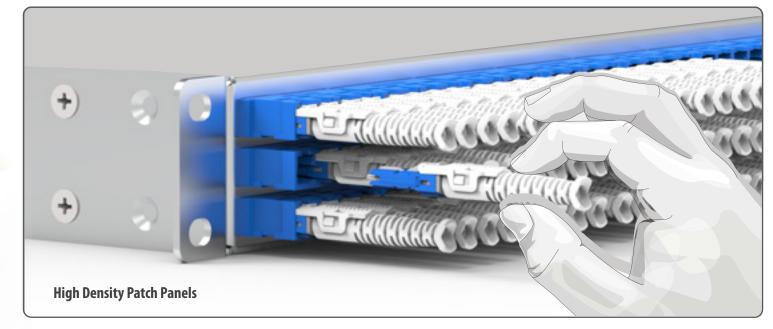
FEATURES

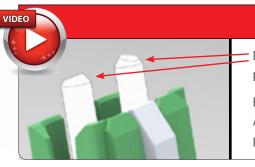
- IEC random mating Grade B
- Very Small Form Factor (VSFF) connector, 2 x cabling density versus duplex LC
- · Allows simple transceiver breakout in spine/ leaf architectures
- Fast and easy polarity reversal of both UPC and APC connectors in the field











CS-EZ-Way APC Connector

New opposing APC angle design makes polarity changing possible.

EZ-ily Flip the CS push-pull tab and connect. Angles mantain the same alignment after polarity change!





TIME SAVING PRE-ASSEMBLED CS EZ-FLIP SWITCHABLE CONNECTOR



Just Insert the two fibers into the ferrules

The CS EZ-Flip connector is available in a preassembled condition. This offers the user the ability to minimize the assembly operations, reduce the risk for damaging the components during assembly and improve assembly yield while reducing assembly labor time.

FEATURES and BENEFITS

- Solutions for: QSFP-DD and 2 CH adapters
- High-density 1RU patch panels
- Side by Side configuration
- 400/800G transceivers with side by side configuration

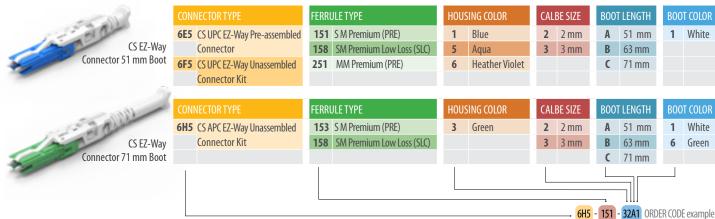


40% HIGHER DENSITY

compared to

LC Connector

CS[®]*EZ*-WAY APC and UPC 2 mm, 3 mm



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Premium series CS° EZ-FLIP CONNECTOR



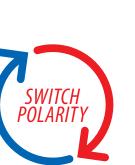




senko.com/patents

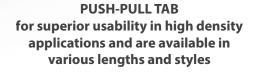
ROHS, Reach SVHC at
UL 94 V-0 compliant.

A new duplex connector designed for dual transceivers which allows the polarity to be switched without connector re-termination









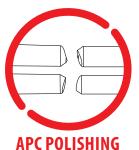


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2X LC STYLE FERRULE

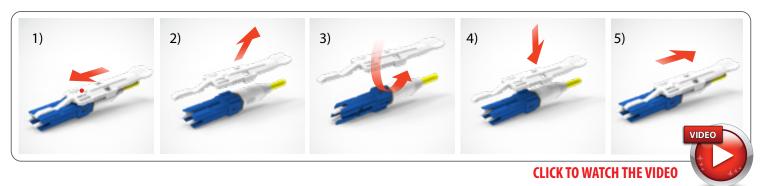
for increased reliability

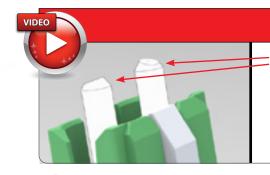




GANG CLIP

CS EZ-Flip Polarity Switching simply by flipping the tab to the opposite side





CS-EZ-Flip APC Connector

New opposing APC angle design makes polarity changing possible.

EZ-ily Flip the CS push-pull tab and connect. Angles mantain the same alignment after polarity change!



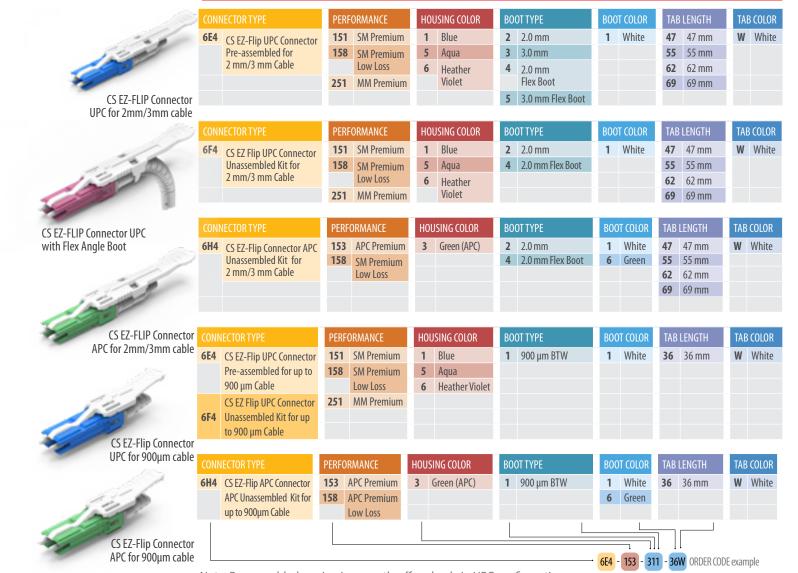




Just Insert the two fibers into the ferrules

The CS EZ-Flip connector is available in a preassembled condition. This offers the user the ability to minimize the assembly operations, reduce the risk for damaging the components during assembly and improve assembly yield while reducing assembly labor time.

CS® EZ-FLIP APC and UPC 900 μm, 2 mm, 3 mm



Note: Preassembled version is currently offered only in UPC configuration.

Reach higher density with the

40% HIGHER DENSITY compared to

LC Connector

using proven

1.25 mm ferrule

technology

CS[®] CONNECTOR





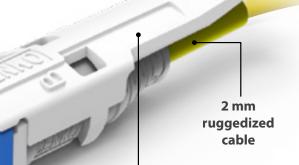
New duplex connector designed for dual transceiver module types







Can achieve 2 x LC STYLE FERRULE **IEC random**



PUSH-PULL TAB for superior usability in high density applications and are available in various lengths and styles

FEATURES

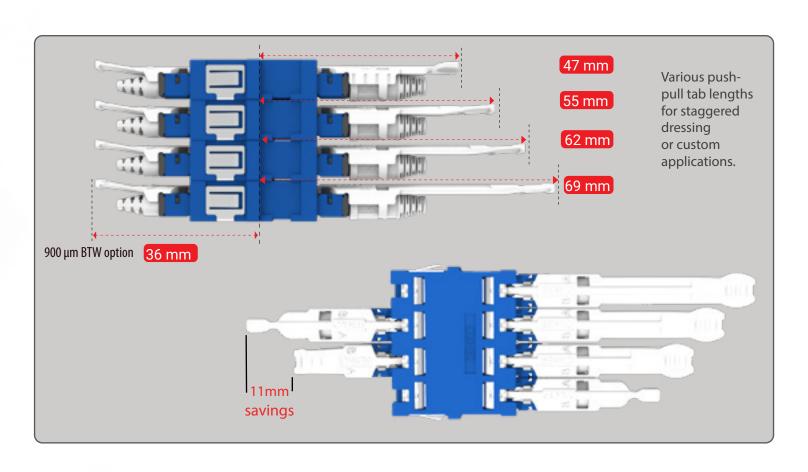
- 40% size reduction compared to LC duplex
- Designed for OSFP/QSFP-DD break out application
- Proven 1.25 mm ferrule technology
- Push-pull tab
- Can achieve IEC random mating Grade B

GANG CLIP READY FEATURES and BENEFITS • Solutions for: QSFP-DD and 2 CH adapters Quick connect/disconnect of ganged connectors • Easy removal of clip to allow extraction of individual connector • Fits within transceiver handle footprint See Accessories page for more details **Gang Clip** P/N 601-CLPP-01-W

mating

Grade B

performance





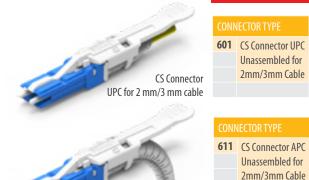
APC and UPC 900 μm, 2 mm, 3 mm

HOUSING COLOR

6 Heather Violet

1 Blue

5 Agua



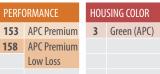


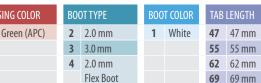


CONN	IECTOR TYPE	
611	CS Connector APC	
	Unassembled for	•
	2mm/3mm Cable	

Unassembled for

2mm/3mm Cable





2 2.0 mm

3 3.0 mm

4 2.0 mm

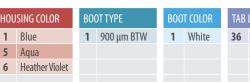
Flex Boot

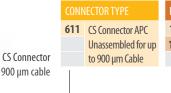
CONNECTOR TYPE				
601	CS Connector UPC			
	Unassembled for			
	up to 900 μm Cable			

	PERFORMANCE			HUU	SING CO
	151	SM Premium		1	Blue
	158	SM Premium		5	Aqua
1		Low Loss		6	Heathe
	251	MM Premium			

151 SM Premium

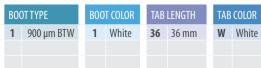
Low Loss





ERF	ORMANCE	HOUSING COI		
53	APC Premium	3	Green (A	
58	APC Premium			
	Low Loss			
		1		







47 47 mm

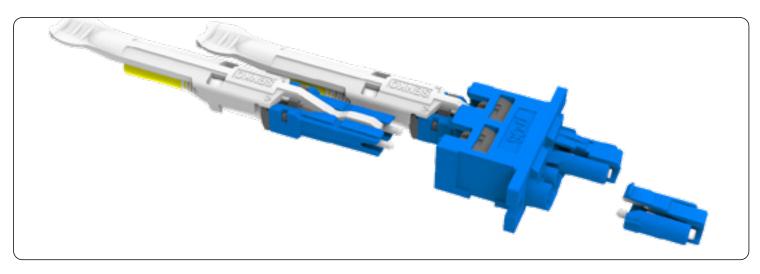
55 55 mm

62 62 mm

69 69 mm

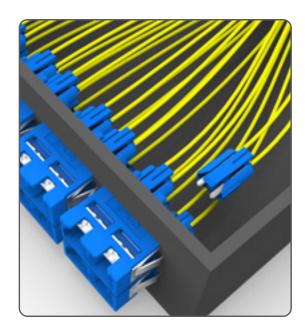
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Micro CS®



Features

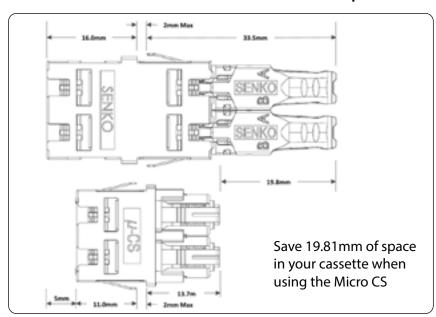
- Significant space saving
- Minimizing behind the wall (btw) side adapter depth
- Cost effective
- IEC Grade B compatible
- Simplifying connector structure
- Available in UPC, MM, and APC configuration

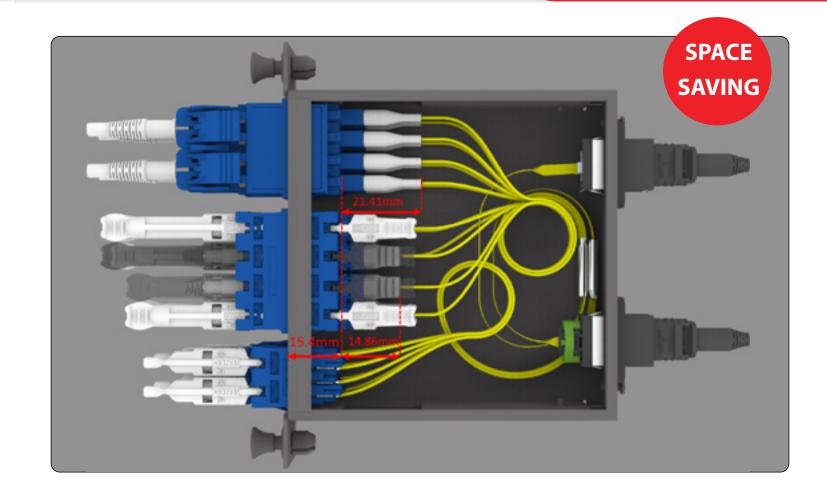


Applications

- Ideal for cassettes, enclosure, on board optics used in plug and play modules
- FTTH, FTTA
- Telecom, Wireless

Standard CS Connector vs Micro CS size comparison



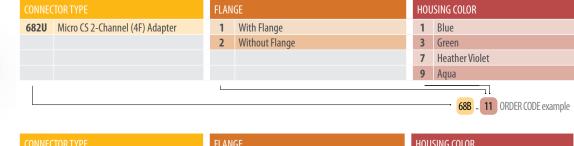




CS® CONNECTOR μCS® Connector and Adapter









E-1.1 E-1.0 20 21

CS[®] & µCS[®] SHUTTER ADAPTERS



μCS® Adapter with Internal Shutters front view



μCS® Adapter with Internal Shutters back view



CS® Adapter with Internal Shutters front view



CS® Adapter with Internal Shutters back view

FEATURES

- Automatic shutter action
- IP5X dust protection
- Unique twin door shutter closes to prevent any ingress of contamination

- Adapter allows for traceability with Visible Light Source
- Available for both CS and μCS footprint

The CS shutter adapter has been developed to meet the evolving requirements of data centers, telecom, and harsh environment solutions by providing automated dust and laser production through a built in internal shutter. The CS shutter adapter maintains the protection from dust while other solutions offer a dust cap that is easily lost. Whether the port is used often, or only used once in a while, the CS shutter adapter provides protection from the number one leading cause of network failure, contamination. As power increases in networks, the eye safety of installers becomes more of a concern. The CS shutter adapter provides protection from potentially unconnected ports in order to give you peace of mind.

CS Adapter Traceability

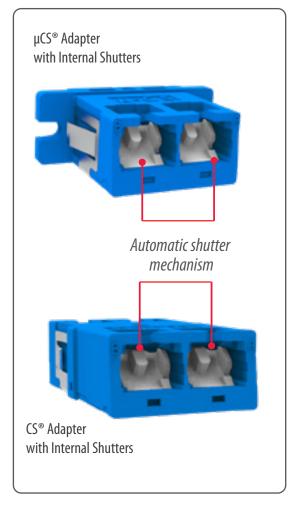


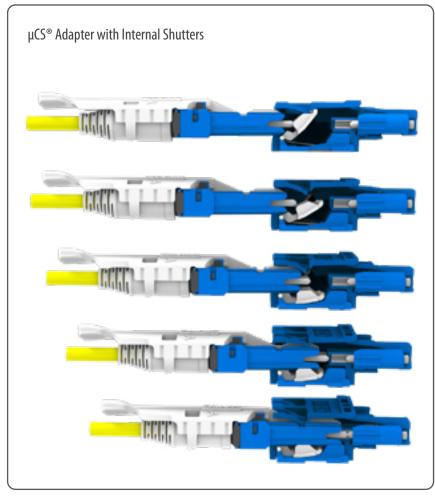
When trying to trace the adapter using a visible light source, you can see the red light glowing through the adapter sleeve.











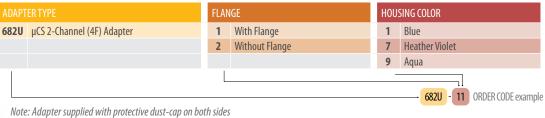




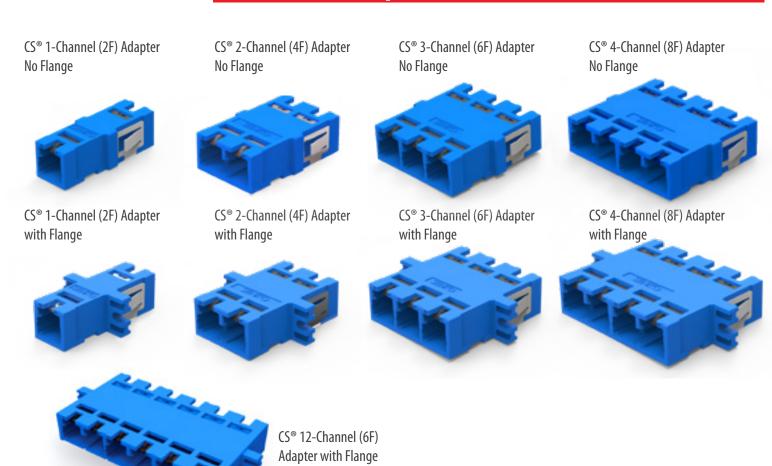








CS[®] **CONNECTOR** Standard Adapters



CS° ADAPTER Part Number

CONNECTOR TYPE		FLANGE			HOUSING COLOR			
681	CS 1-Channel (2F) Adapter	1	With Flange	1	Blue			
682	CS 2-Channel (4F) Adapter	2	Without Flange	3	Green			
683	CS 3-Channel (6F) Adapter			7	Heather Violet			
684	CS 4-Channel (8F) Adapter			9	Aqua			
686-1X	CS 6-Channel (12F) Adapter							
					681 - 21 ORDER CODE example			



CS®-LC Hybrid testing adapter Single LC Channel P/N 680-0



CS® Loopback P/N: LBP-CS-XXX-XX



CS® Adapter with External Shutters P/N 682-XX-E22



Parking Adapter P/N: 681-PRK-01-X

CS® Connectivity Solutions



CS° Consortium aims to promote CS° high density connectivity solutions

The CS° Consortium is a group of leading fiber optic component manufacturers that focuses on educating end users and design consultants about the technical advantages of using CS° based high density connectivity solutions. The CS° Consortium represents technology

leaders committed to providing the most current, reliable, and vendor neutral information about fiber optics and related technologies for advancing new and better communications solutions.

Founding Members

The CS° Consortium is a group of leading fiber optic component manufacturers that focuses on educating end users and design consultants about the technical advantages of using CS° based high density connectivity solutions. The CS° Consortium represents technology leaders committed to providing the most current, reliable, and vendor neutral information about fiber optics and related technologies for advancing new and better communications solutions.













CS° *ECOSYSTEM* **CS**° *ECOSYSTEM*

CS[®] *ECOSYSTEM*

STANDARDIZATION CS





The CS® connector has been adopted to transceiver optic connector option. CS® connector interface is being specifications such QSFP-DD, OSFP and COBO as one of fiber specified by IEC is 61754-36.







































































* Licensee







Capture the QR code to receive



TESTING CS°

















DOMAILLE

POLISHING CS[®]





RACK DISPLAY AT OFC 2022 CS

































E-1.1 E-1.1 26

CS CONNECTOR Patch Panel Examples

128CH/256F

Patch Panel in 1RU

- 16 slots x 4 CS Dual (2 fiber) adapter
- Fully silk screened



128CH/256F

Cassette Module in 1RU

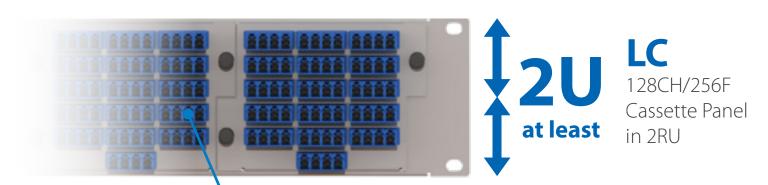
- 4 x 32CH/6F **Cassette Modules**
- · Silk Screen on each side of cassette



Reach higher density with **CS**° *CONNECTOR*

New Duplex connector optimized for 400G new generation Data Center





Adapters too close to reach your finger to LC connector Latch

45RU Rack Comparison

Double your density with **CS**° *CONNECTOR*

Generic LC



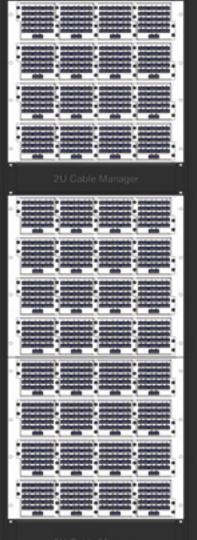


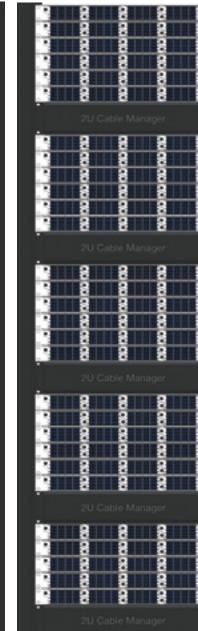
Total **7RU**

Management

Cable

Space





with CS® **Total Capacity** 4352 CH 8704 F

> Total 13RU Cable Management Space

*Note that the 3 RU wire manager is installed on the bottom rack base plate and the remaining 1 RU space at the bottom of the rack.

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SN°CONNECTOR **SN**°CONNECTOR

Premium series **SN**[®] EZ-FLIP CONNECTOR

Simplifying network cabling

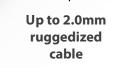
A new duplex connector, optimized for 400G which allows the polarity to be switched without connector re-termination













APC OPTION

AVAILABLE

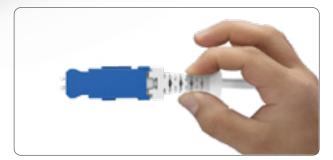
2X LC STYLE FERRULE for increased reliability



COMPATIBLE

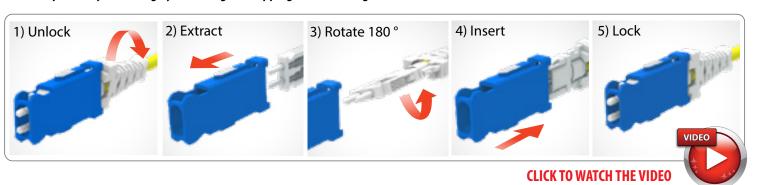


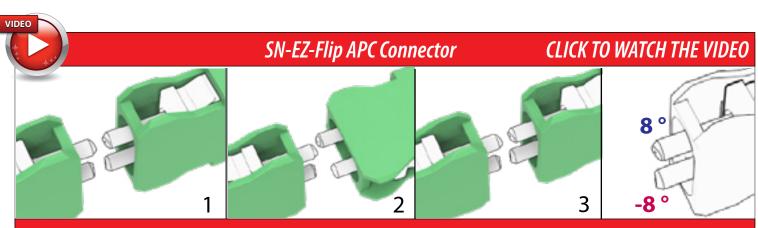
Push-pull on boot design



The Push-pull boot design allows for easy insertion or extraction of the connector from a transceiver or adapter. The boot is flexible to allow for adjacent connectors to be flexed out of the way providing access to the intended connector.

SN EZ-Flip Polarity Switching by unlocking and flipping outer housing





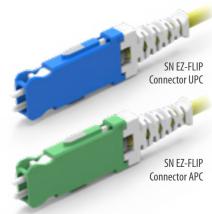
The special design of the ferrule angle allows for perfect allignment of the ferrules after polarity change.

TIME SAVING PREASSEMBLED SN EZ-FLIP SWITCHABLE CONNECTOR



Because the SN® EZ-Flip comes preassembled, there is no need to detach the ferrules from the inner body during termination. This results into an easier termnination process and time saving.

SN[™]*EZ-FLIP* **CONNECTOR**



SN-EZ Premium Connector

	CONN	NECTOR TYPE	PERF	ORMANCE	HOL	JSING COLOR	ВО	OT TYPE	B00	T COLOR
	6A5	SN EZ-Flip Connector UPC Preassembled for 2 mm Cable	151	SM Premium	1	Blue	4	44mm Boot (44T)	1	White
	6A6	SN EZ-Flip Connector UPC Preassembled for 1.6 mm cable	158	SM Premium Low Loss	5	Aqua				
IP	6B5	SN EZ-Flip Connector UPC Unassembled for 2 mm Cable	251	MM Premium	6	Heather Violet				
PC	6B6	SN EZ-Flip Connector UPC Unassembled for 1.6 mm cable								
	CONN	NECTOR TYPE	PERFO	DRMANCE	HOL	JSING COLOR	ВО	OT TYPE	BOC	T COLOR
	CONN 6D5	SN EZ-Flip Connector APC Unassembled for 2 mm Cable		APC Premium	HOU 3	Green	B0 4	OT TYPE 44mm Boot (44T)	B00	T COLOR White
IP PC		SN EZ-Flip Connector APC								
	6D5	SN EZ-Flip Connector APC Unassembled for 2 mm Cable SN EZ-Flip Connector APC	153	APC Premium						
	6D5	SN EZ-Flip Connector APC Unassembled for 2 mm Cable SN EZ-Flip Connector APC	153	APC Premium					1	White

GANG CLIP READY

Features and Benefits

- Solutions for: QSFP-DD and SFP-DD Transceivers
- Quick connect/disconnect of ganged connectors
- Easy removal of clip to allow extraction of individual connector
- Fits within transceiver handle footprint

Metal Duplex

GANG CLIP

P/N 6A5-CLIP-QD-01 (Metal Quad Gang-clip for QSFP-DD and OSFP Transceivers*) P/N 6A5-CLIP-DX-01 (Metal Duplex Gang-clip for SFP-DD Transceivers*)

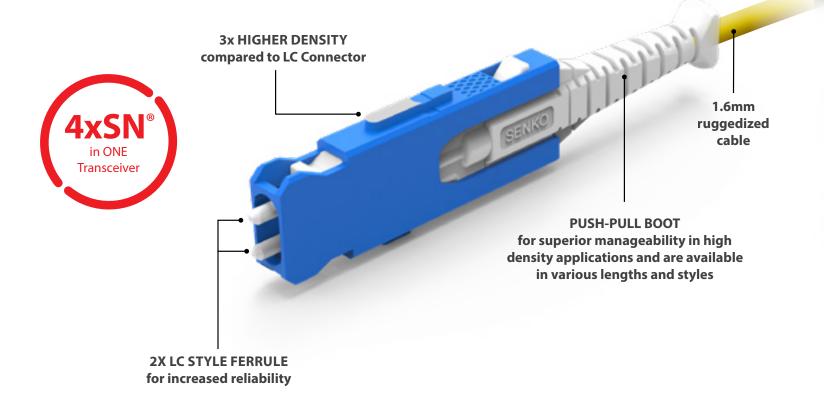
P/N 6A5-CLIP-QD-02 (Plastic Quad Gang-clip for Shuttered Adapters or Adapters with Walls Between Each Port) *Note: SN EZ-Flip Connectors Only See Accessories page for more details

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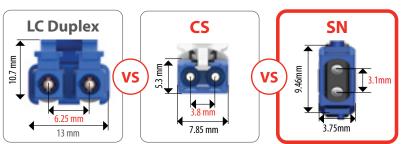
SN[®] CONNECTOR

Next generation connector

New duplex connector optimized for 400G new generation Data Center



LC Duplex, CS, SN Comparison



FEATURES

- LC ferrule base duplex connector
- Ferrule pitch: 3.1mm
- 4x SN® connectors in a QSFP footprint
- 2x SN® connectors in a SFP footprint
- Designed for 4x Duplex break out application
- Push-pull on boot design for better usability

Key Features of SN° connector



Double density compared to **LC Duplex**

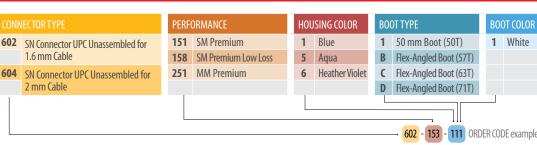
> 4x SN in 1 Adapter



- · Most dense dual ferrule uniboot connector
- Mechanically stronger
- Allows better cable management/routing







Note: Connector supplied with protective dust-cap

SN[®] CONNECTOR





GANG CLIP READY

Features and Benefits

Metal Quad

- Solutions for: QSFP-DD and SFP-DD Transceivers
- Quick connect/disconnect of ganged connectors
- Easy removal of clip to allow extraction of individual connector
- Fits within transceiver handle footprint

Plastic Quad Gang-Clip



P/N 602-CLIP-QD-02 (Metal Quad Gang-clip for QSFP-DD Transceivers) P/N 602-CLIP-DX-01 (Metal Duplex Gang-clip for SFP-DD Transceivers)

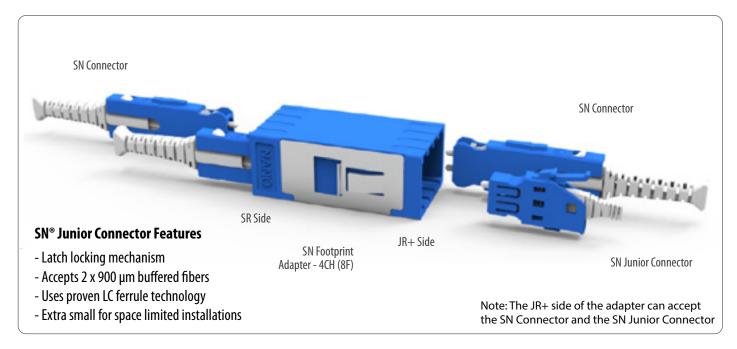
P/N 602-CLIP-DX-02 (Plastic Quad Gang-clip for Shuttered Adapters or Adapters with Walls Between Each Port)

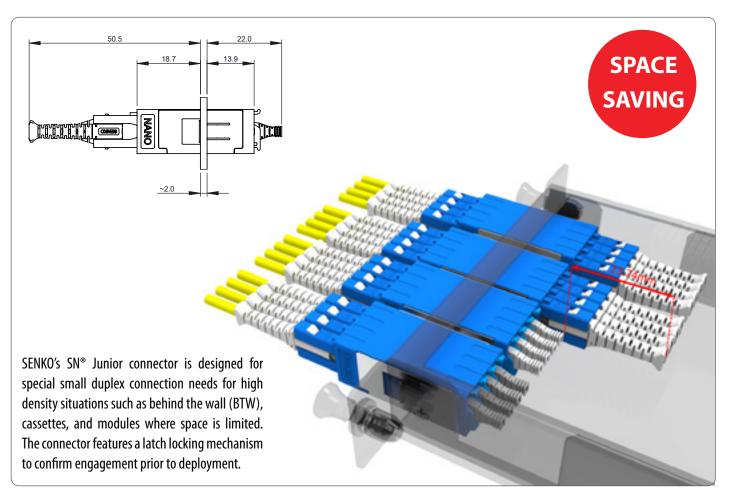
See Accessories page for more details

33

SN°CONNECTOR

SN[®] Adapters





SN[®] JUNIOR



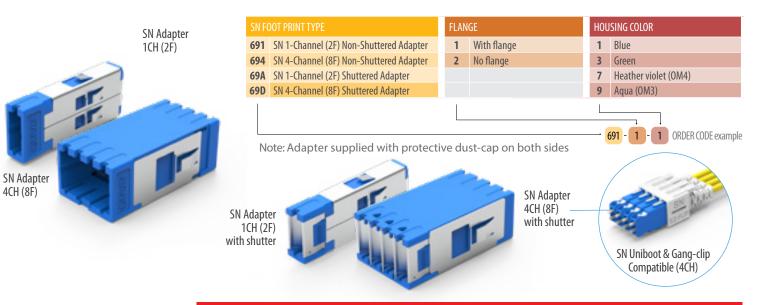
SN Junior Connector

CONNECTOR TYPE	PERF	ORMANCE	HOUS	ING COLOR	В	OOT COLOR	
603 SN Junior Connector UPC	151	SM Premium	1	Blue		1 White	
	158	SM Premium Low Loss	5	Aqua			
	251	MM Premium	6	Heather Violet			
CONNECTOR TYPE	FERR	ULE SIZE	HOU	SING COLOR	В	OOT COLOR	
613 SN Junior Connector APC	153	APC Premium	3	Green		1 White	
	158	APC Premium Low Loss					
						\exists	
					13 - 153	- 31 ORDER CODE exa	mnle

Note: 1. The SN Junior Connector was previously called the BTW1 Connector 2. Connector supplied with protective dust-cap

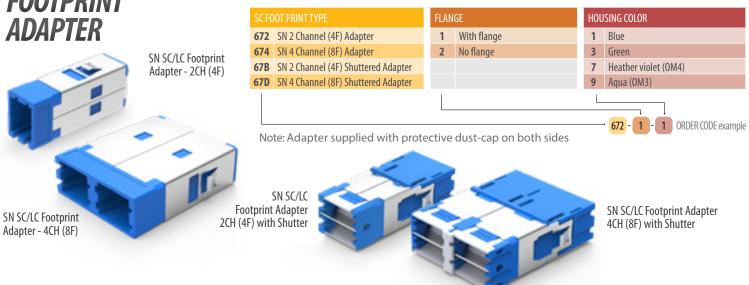
SN[®]*ADAPTER*

SN Adapter



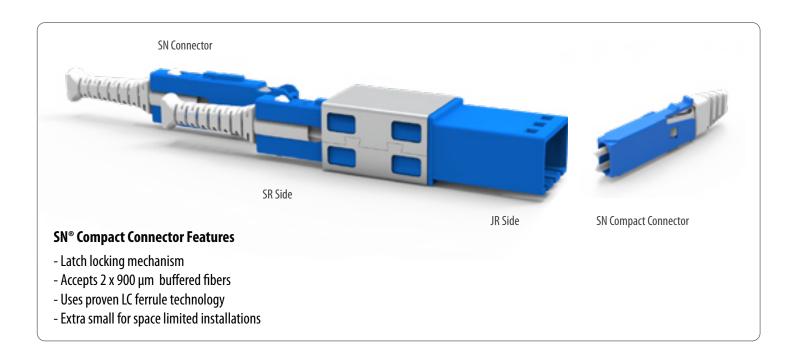


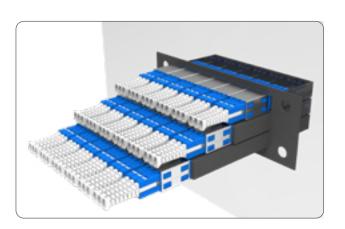
SN Adapter with SC/LC Footprint

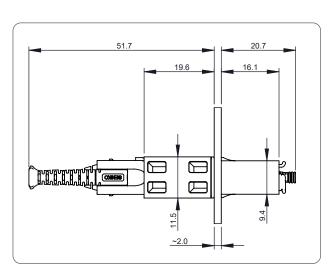


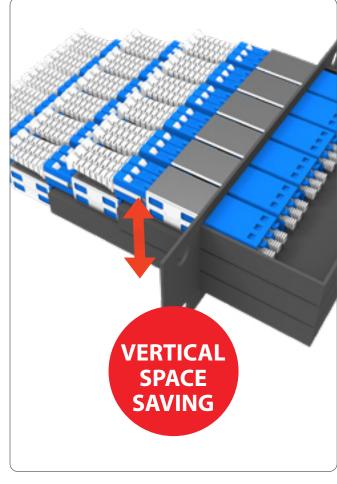
35

SN° *COMPACT* Connector and Adapter









SN[®] COMPACT

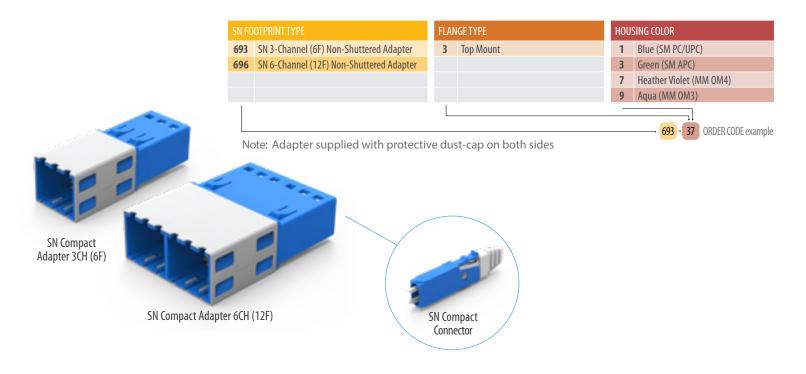
SN Compact Connector





Note: 1. The SN Compact connector was previously called the BTW2 Connector 2. Connector supplied with protective dust-cap

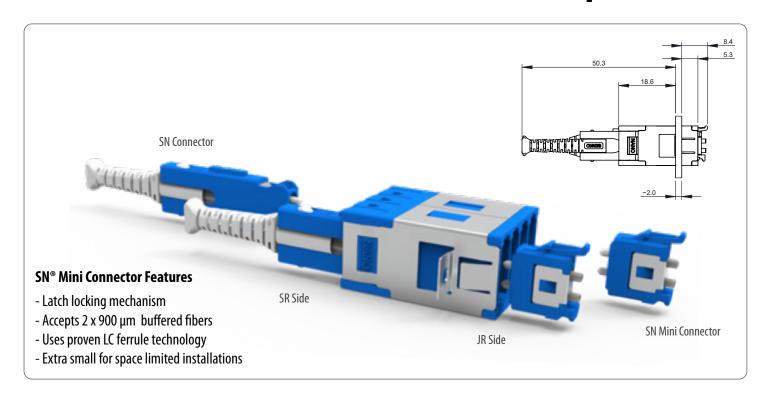
SN°3(Hand6(H Compact Adapter



SN° CONNECTOR

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SN° *MINI* Connector and Shuttered Adapter



SN®MINI



SN Mini Connector

SN MINI Connector

CONNECTOR TYPE	PERFORMANCE	HOUSING COLOR
609 SN Mini Connector	151 SM Premium	1 Blue
	158 SM Premium Low Loss	5 Aqua
	251 MM Premium	6 Heather Violet
CONNECTOR TYPE	PERFORMANCE	HOUSING COLOR
619 SN Mini APC Connector	153 APC Premium	3 Green
	158 APC Premium Low Loss	
Note: 1. SN Mini Connector has n	, la cata	619 - 153 - 3 ORDER CODE example

SN®MINI

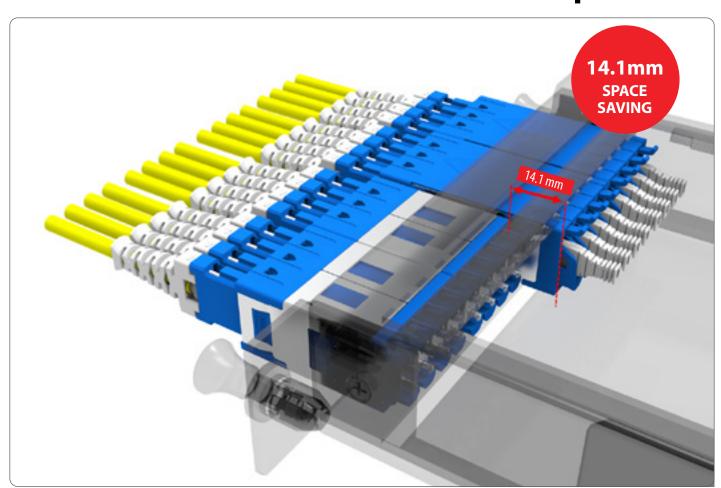


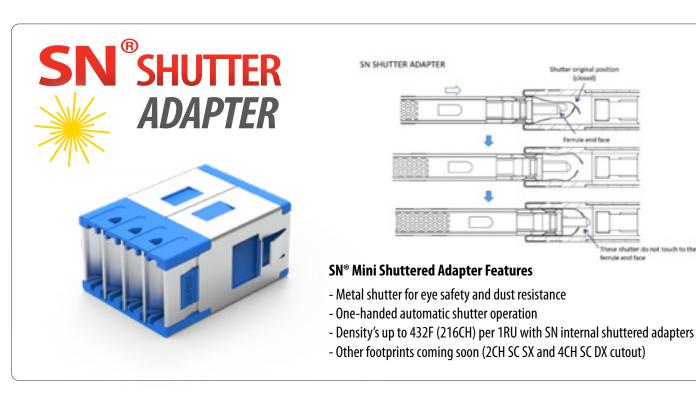
SN MINI Shuttered Adapter

2. Connector supplied with protective dust-cap

SN FC	SN FOOTPRINT TYPE		FLANGE TYPE		HOUSING COLOR		
6MD	SN 4-Channel (8F) Mini Shuttered Adapter	1	With Flange	1	Blue (SM PC/UPC)		
		2	Without Flange	3	Green (SM APC)		
				7	Heather Violet (MM 0M4)		
				9	Aqua (MM 0M3)		
					6MD - 27 ORDER CODE example		

SN° *MINI* Connector and Shuttered Adapter





38 E-1.1 E-1.0

SN[®] ECOSYSTEM

STANDARDIZATION SN°





The SN® connector has been adopted to transceiver optic connector option. SN® connector interface is being specifications such QSFP-DD, OSFP and COBO as one of fiber specified by IEC is 61754-36.



















































RACK DISPLAY AT OFC 2022 SN°

SUMIX NIANI























































G Go Foton

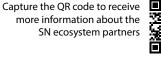






E-1.1 E-1.1

√ viaPhoton























POLISHING SN[®]

DOMAILLE



















SN*-MT CONNECTOR **SN**"-MT CONNECTOR

SN°- MT CONNECTOR

The journey to 1.6TB has already begun

COMPATABILITY

as SN connector

HYPERSCALE

DENSITY 2.7x denser than





SN®-MT Density Comparison with MPO in 1RU Panel

MPO 80-port: total 1280F with MPO-16F, total 2560F with MPO 32F



SN-MT 216-port: total 3456F with SN-MT 16F



Available in 8F and 16F in one row



same connector footprint

Same **Footprint** Connector

 $4 \times$ SN-MT in 1 transceiver

push-pull boot for fast and easy access

ACCESSIBLE

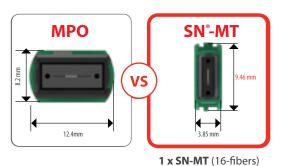
SCALABLE Up to 1.6TB 1.6 TB

SN-MT8/16 Multi-Port





Footprint size comparison with MPO



- Carries a maximum of 16-fibers in a row
- Same connector footprint as SN
- Carries many features from the SN
- The industry's highest density connector solution in a QSFP-DD footprint
- Fiber density per 1RU is improved by
- 2.7 time over MPO-16F
- 1.3 time over MPO-32F
- Insertion loss targeted 0.35dB max for SM

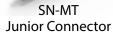
SN®-MT Product Family

Connectors SN-MT Connector







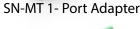




E-1.1

Mini Connector

Adapters





SN-MT 1-Port **Shuttered Adapter**

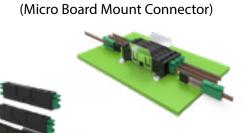


SN-MT 4-Port Adapter

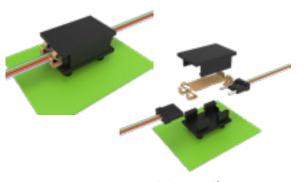


SN-MT 4-Port Shuttered Adapter

Mid-board Interconnect



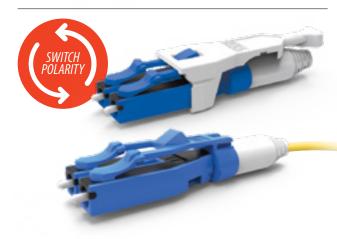
SN-MT Stackable MBMC



MBMC SN-MT Clip

LC Connector Featured Products





LC Dust Shutter Adapter with *Inner Shutter*

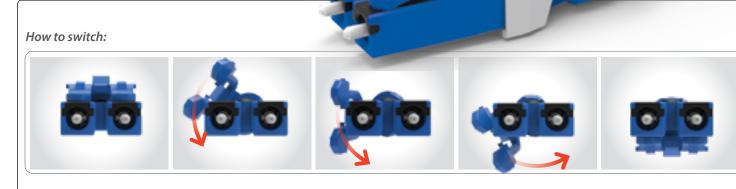
98D SERIES

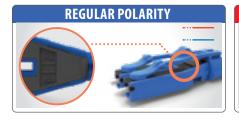


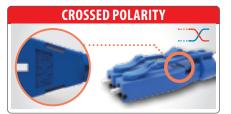
LC EZ-FLIP®

Polarity Reversible Connectors

The Duplex LC connector for round cable, which allows the polarity to be switched without connector re-termination or twisting of the fiber





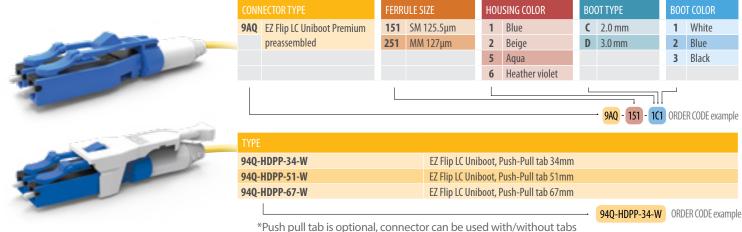


FEATURES

- Push/Pull Tab Ready for High Density applications
- Uniboot Connector aids cable management
- Polarity Reversal without twisting fiber
- Visual indication for Polarity Check
- Short boot design for reduced connector length

LC EZ-FLIP®

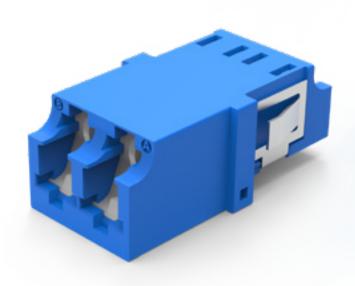
PC 2mm, 3mm

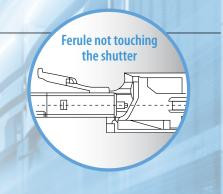


rush puli tab is optional, connector can be used

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LC Adapter with **Dust Shutter**





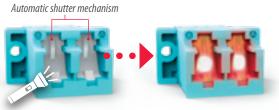
FEATURES

- 100% automatic shutter action
- IP5X dust protection
- SC footprint on non-shuttered side
- Compatible with standard LC connectors
- Adapter traceability with Visible Light Source

LC Adapter Traceability



When trying to trace the adapter using a visible light source, you can see the red light glowing through the adapter sleeve.



Fits in SC Footprint +0.3 16.0 0.0

LC ADAPTER

Dust Shutter







MPO Connector Featured Products

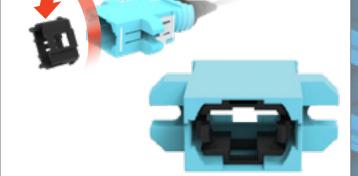
MPO^{PLUS®} Premium Mini Connector

Polarity and Gender change made easy without opening the housing





MPO^{+LUS®} **Polarity Changeable** Adaptér

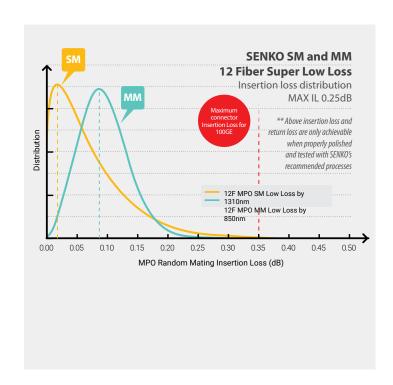


MPO^{PLUS®} **Dust Shutter Adapter DUSTPROOF**

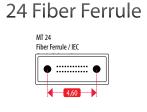




SENKO MT Ferrule performance



MPOPLUS MT Ferrule





SENKO's MPO Plus 24 fiber MT Ferrule consists of 2 rows of 12 high precision fiber holes, yielding a high density connection with industry leading insertion loss values. Versions available in SM, MM and Low Loss MM make it the ideal choice for super high density connections and high speed 100G and 400G parallel optics platforms. SM 24 fiber is recommended to be used with a 10N Spring, and the MM 24 fiber is recommended to be used with a 20N High force spring.

SPECIFICATION	SM	MM LOW LOSS	MM
IL Typical vs Referece connector	0.25dB	0.15dB	0.20dB
IL Max vs Reference connector	1.00dB	0.35dB	0.50dB
IL Typical Random Mating	0.50dB	0.20dB	0.25dB
Return Loss	60dB	25dB	25dB
Recommended PIN Used	SM Pin	SM Pin	MM Pin

st Above number is only achivable when using SENKO Recommended Reference Jumper, Polishing process and testing method

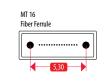
MPO^{PLUS} MT Ferrule 8 and 12 Fiber Ferrule

SENKO's MPO Plus MT 12 fiber ferrule are the most common used MT Ferrule in the market which gives the best combination of easy-to-use and low insertion loss. The SM Low Loss and MM Low Loss now guarantees the industry's lowest insertion loss of 0.25dB, with a typical of greater than 0.1dB, which exceeds the IEC 61755-3-31 Grade B Requirement. Quality, Price, durability and ease of assembly makes the 12 fiber your best choice.

SPECIFICATION	SM LOW LOSS	SM STANDARD	MM LOW LOSS	MM STANDARD
IL Typical vs Referece connector	0.10dB	0.20dB	0.08dB	0.15dB
IL Max vs Reference connector	0.25dB	0.70dB	0.25dB	0.50dB
IL Typical Random Mating	0.12dB	0.20dB	0.10dB	0.15dB
Random Mating IEC Spec: IEC61755-3-31	Grade B (0.25)	Grade C (0.5)	n/a	n/a
Return Loss	60dB	60dB	25dB	25dB
Recommended PIN Used	SM Low loss Pin	SM Pin	SM Pin	MM Pin

MPOPLUS MT Ferrule

16 and 32 Fiber Ferrule







SENKO's MPO Plus MT 16 and 32 fiber ferrules are designed to meet TIA 604-18 standard which addresses 16 fiber hole width MPO requirements and are available in single row 16 fiber and 2x16 row 32 fiber configurations. Industry leading 16F SM Low Loss ferrules meet the most demanding insertion loss and return loss requirements for high speed 100G, 400G and beyond parallel optical networks.

	16 SM LOW LOSS	16F MM	32F MM
IL Typical vs Referece connector	0.15dB	0.25dB	0.25dB
IL Max vs Reference connector	0.35dB	0.60dB	0.60dB
Random Mating Grade IEC 61755-3-31	Grade B 0.25dB	n/a	n/a
Return Loss	60dB	25dB	25dB
Recommended PIN Used	SM Low Loss Pin	MM Pin	MM Pin

^{*}Meets the current IEC Grade B performance requirement for 12F MT ferrule. The grade specification for 16F MT is underdevelopment in IE

E-1.0

^{*} For MM 24 Ferrule High pressure 20N Spring to be used

^{**}Above number is only achievable when using SENKO Recommended Reference Jumper, Polishing process and testing method

MPO^{+LUS} **MT** Ferrule Performance

MPO^{+LUS}®

Premium Mini Connector

Polarity & Gender change made easy

without opening the housing







MPO Mini Connector Aqua

with Bare Ribbon Short Boot



MPO Mini Connector Aqua MPO Mini Connector Aqua with Bare Ribbon Boot with 3.0mm Short Boot

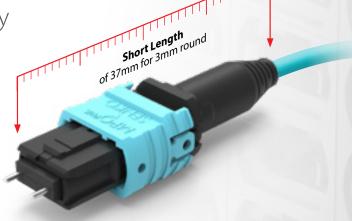


MPO Mini Connector Aqua with 3.6mm Short Boot with 3.0mm Flex Boot

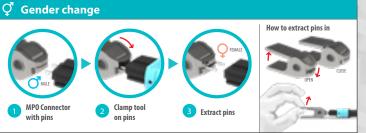
FEATURES

- SENKO Patent pending design
- All the benefit of the MPO Plus and more.
- Industries shortest overall length of 37mm for 3mm round
- Polarity change in the field without any tool
- Simple gender change without taking off the housing
- · Various boot types available
- Complies with MPO IEC and TIA/EIA Requirements













Push Pull Tab

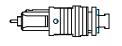


ТҮРЕ					
703-HDPP-34-W	MPO Plus Premium Mini Push Pull Tab 34mm White				
703-HDPP-50-W	MPO Plus Premium Mini Push Pull Tab 50mm White				
703-HDPP-64-W	MPO Plus Premium Mini Push Pull Tab 64mm White				
		703-HDPP-50-W	ORDER CODE example		

Ribbon Boots

00 Bare Ribbon



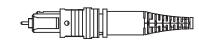




2.0mm Round Boots

21 2.0mm Boot with Crimp

22 2.0mm Boot without Crimp



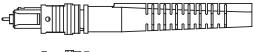


3.0mm Round Boots

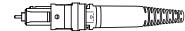
32 3.0mm Flex Angle

33 3.0mm Short

A1 3.0mm Boot



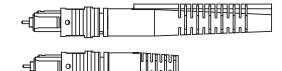




3.6mm Round Boots

42 3.6mm Flex Angle

46 3.6mm Short



4.5/5.0/5.5 Round

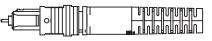
51 4.5mm Boot

52 5.0mm Boot

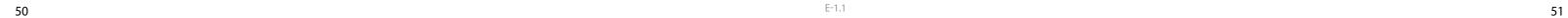
53 5.5mm Boot







Note: When using Flex Angle Boot, always maintain the proper bend radius per the cable manufacturer's specification.



MPO^{+LUS} MPO^{+LUS}

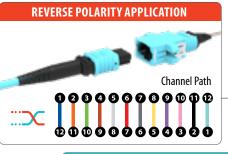
MPOPLUS®

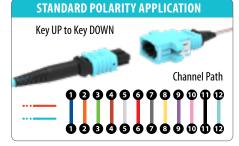
Polarity Changeable Adapter





Polarity change made easy without modifying the connector











- SENKO Patented Design
- · Standard MPO Foot Print
- Available in Black, Aqua, Heather Violet and Gray
- Flanged and Non-Flanged versions avaiable





- Compatible with all MPO connectors

Step by Step

MPOPLUS®



▶ 1 - Connector insertion

When the connector is inserted into the adapter it compress the springs, opening the internal



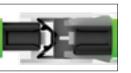
▶ 2 - Shutter opening

The internal shutter opens, and due to the special design of the shutter, it will not touch the ferrule end face.



▶ 3 - Connector mated with adapter

The opening of the shutter allows for the ferrule to be inserted inside the adapter sleeve.



▶ 4 - Connector removal

As the connector is removed from the adapter, the shutter spring automatically returns the internal shutter to the closed position.

Dust Shutter Adapter





Automatic shutter mechanism

- Unique twin door shutter closes to prevent any ingress of contamination can be "installed and forgotten" at sites with poor dust control
- 100% automatic shutter mechanism means one handed connection
- No dust cap required on shutter side reduced waste
- Standard MPO adapter footprint
- Available in Black, Violet, Aqua, Lime, Green, and Gray colours
- Designed to meet GR-1435 requirements
- Can be used in combination with the LC and SC Inner shutter adapter to create a fully dust protected plug and play solution
- Harsh Environment ready
- Fully compliant with IEC dust testing standards
- Compatible with all Senko MPO+ connectors including HD

MPO^{PLUS®}



Polarity Changeable Adapter

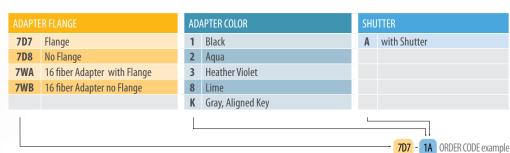
ADAPTI	ER FLANGE	AD	APTER COLOR
773	Flange	1	Black
774	No Flange	2	Aqua
		3	Heather Violet
		K	Gray, Aligned Key
			774 - 1 ORDER CODE example

Note: Polarity changeable feature recommended for non-angled ferrules only

MPO^{PLUS®}



Dust Shutter Adapter



Note: Front shuttered side is compliant with female MPO connectors only

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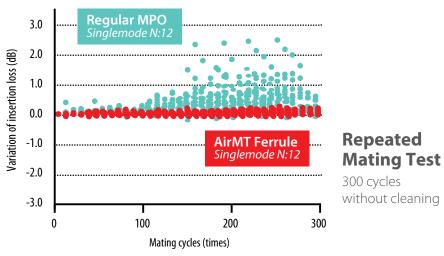
MPO^{PLUS}

AirMT MPOPLUS®

Non-Contact Dust Insensitive Multi-Fiber Solution



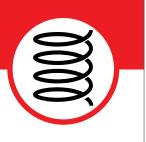
MPO connectors are highly sensitive to all forms of contamination - with such a large end-face and so many fibers, it is very difficult to ensure pristine condition over the entire surface area of the ferrule. Secondly, the standard MPO connector requires high spring force to achieve physical contact for MT to MT ferrules. The non-contact design of the AirMT™ reduces the sensitivity to contamination and allows for a lower spring force for a repeatable Insertion loss over multiple connections.



Key Features of AirMT MPO Plus connector

Lower Spring Force

Consistent optical performance with reduced spring force



High Density

40% higher density by FACT footprint



Stable Performance

Excellent stable optical performance



High Repeatability

Repeatable optical performance



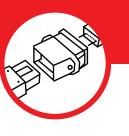
Easy Cleaning

Air blow cleaning capable



Intermateability with MT Ferrule

Retro-fit with conventional MPO Connector



*AirMT™ technology is licensed by Sumitomo Electric Industries, LTD.

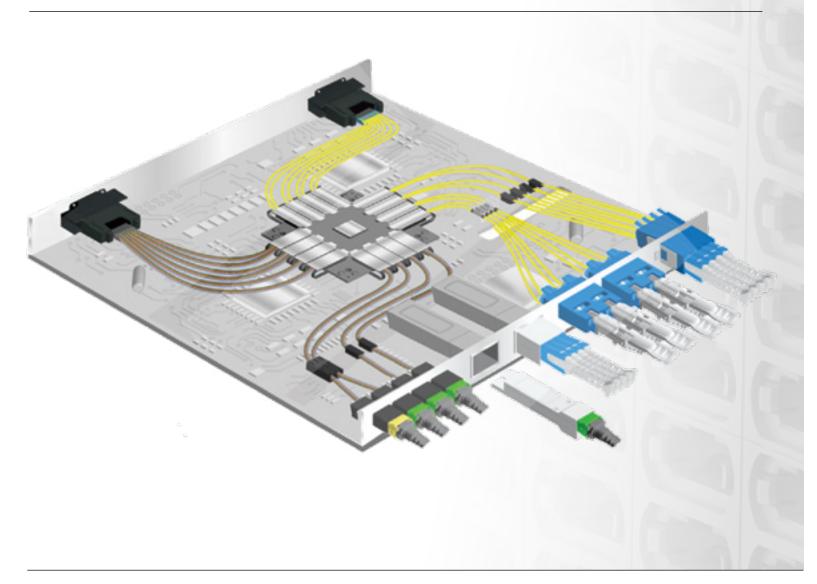
Trademark of AirMT™ is jointly owned by

SENKO ADVANCED COMPONENTS, INC and Sumitomo Electric Industries, LTD

54 Mating cycles (times) 55

MPO^{+LUS} AirMT MPOPLUS®

AirMT MPOPLUS® **Use Case**



APPLICATIONS

Telco/DC front panel

• Midboard/backplane Interconnect

• Reliable splicing MPO connectivity

· Outdoor high density cabling

	Single-mode	Multimode ¹		
Parameters	APC	MM		
	Low Loss	Low Loss		
Typical Insertion Loss (dB)	0.20	0.20		
Maximum Insertion Loss (dB)	0.50	0.25		
Typical Return Loss (dB)	≥55	≥23		
Operating Temperature (°C)	-40°C to	o +75°C		
Durability	500 m	atings		

- 1. Parameters listed for Multimode are target values.
- 2. AirMT technology is licensed by Sumitomo Electric Industries, LTD.
- 3. Trademark of AirMT is jointly owned by Senko Advanced Components, Inc. and Sumitomo Electric Industries, LTD.

Indoor – Front Panel

AirMT MPO-PLUS®

EZ-Flip Connector



- · Polarity reversible in multimode
- 12/24 compatible
- Higher density MPO connectivity

AirMT MPO-PLUS®

Dust Shutter Adapter

- Dust protection IP5x
- 100% automatic shutter action
- · Visual light inspection compatible

AirMT MPOPLUS®



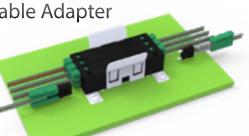
- · Behind the Wall connector
- No boot, no spring needed
- Easy latch operation for extraction
- 12/24 compatible

Onboard Interconnect

AirMT MPOPLUS®

MBMC Stackable Adapter

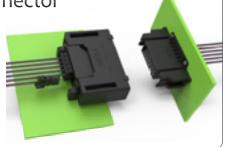
- · Easy stackable design
- Scalable design by stacking
- · Small footprint design 27.3mm
- Mount option (soldering/screw) • 12/24F compatible



AirMT MPO-PLUS®

Backplane Connector

- Blind mating
- High density
- High mechanical durability
- Excellent connection anytime with AirMT™
- · Integrated shutter



Outdoor High Density Cabling

AirMT MPO-PLUS®

IP21

- Factory terminated connector
- High fiber count up to 96F (MT Ferrule x4)
- IP68 rated
- · Higher durability



AirMT MPOPLUS®

IP25

- · Factory terminated connector
- · High fiber count up to 192F (MT Ferrule x8)
- Higher durability
- IP68 rated



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MPO^{PLUS}

MPO^{PLUS®} Removal Tool

Removal tool P/N: RMT-603



Ribbon Stripper P/N: RBN-601

Pin removal tool
P/N: RMT-604



 Removes Outer housing for gender change and ferrule cleaning

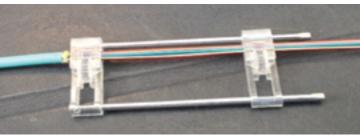


MPOPLUS® Loopback



- Available for 12ch & 24ch
- Standard and QSFP Applications
- Solid Body
- Attenuated and 0dB version





MPOPLUS®Quality Master Jumper



MPOPLUS Mini PIN Remover





MPO^{PLUS®}

Polarity Changebale Adapter Extraction Tool

Polarity Changeable Extraction Tool P/N: RMT-609



Smart Cleaner for Fiber Cleaning

The Smart Cleaner is a dry cloth cleaner specifically designed to clean connections residing in an adapter,



for MPO Connector



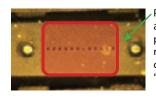
for MPO Port



MPO^{PLUS} Cleaning Pad



Conventional cleaner cleaning area



Particles around the pin area can remain which could cause "air gap."

NEW "Pad" Cleaner Cleaning Zone will clean the full end face



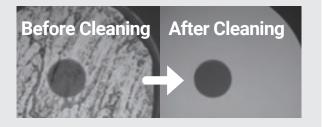
Full surface will be cleaned

Senko's Optical Connector Lineup creates reliability in telecommunications service

The cause of numerous problems in optical communication equipment is contamination of the end face of optical connectors. Senko has developed optical fiber cleaners with fiber specifically for optical connectors to help create a reliable telecommunications service. Senko's optical connector cleaners eliminate even the smallest contaminants that are visible only through magnification.

Why is cleaning optical connectors so important?

Contamination of the optical connector end face can easily occur. The transmission quality will be affected once the contaminants adhere to the 10µm diameter optical fiber core, and there is increased danger that the fiber end face will be damaged by any high powered light. Cleaning the optical connector end face is extremely important before making a connection.



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NETWORK MAINTENANCE

NETWORK MAINTENANCE

Cleaning Tool Options for in Adapter and Unmated

Cleaning 1001 Options for in Adapter and Unma	ateu			
	SN	CS	LC	MPO
NE-CLICK DUPLEX SN Duplex Cleaning SCK-DC-SN	X			
ONE-CLICK DUPLEX CS Duplex Cleaning SCK-DC-CS		X		
SMART CLEANER CS-LC Refillable Dual Purpose Cleaning SCK-SS-CS (Refills SCK-SS-CS-R)		Χ	Χ	
SMART CLEANER MINI 1.25MM Tight Spaces Cleaning SCK-SS-M-C125	X	X	X	
OPTRES HANDY MPO Gel Cleaning SCK-PT-MPO-CTR				Χ
SMART CLEANER MPO 8, 12, 24, 48, 72 F Cleaning SCK-SS-MPO				X
SMART CLEANER MPO 16, 32 F cleaning SCK-SS-MPO-02				Χ



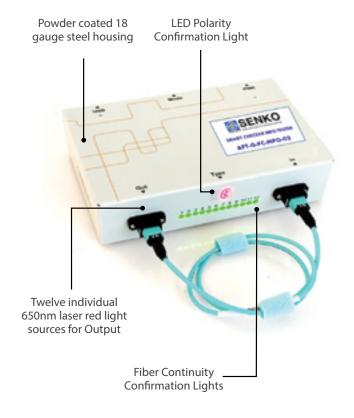
Cleaning Cassettes, Wipes, Sticks and Solvents

	SN	CS	LC	MPO
SMART CLEANER CASSETTE Unpinned MT and Single Fiber SCK-CC-100	Χ	Χ	X	Х
SMART CLEANER CASSETTE Male MT SCK-CC-200				Х
OPTIPOP R Single Slot Unpinned MT and Single Fiber CRE-01 (Refill CRC-RS-01)	X	X	Х	Х
OPTIPOP R Male MT CRE-03 (Refill CRC-RS-01)				Х
OPTIPOP R LC Duplex Dual slots for LC Duplex CRE-02 (Refill CRC-RS-01)			X	
OPTRES GEL PAD CLEANER Gel Cleaning SCK-PT-MPO-01	X	X	X	Х
1.25MM NEOCLEAN Sticks Fabric Cleaning Tip CSK-01	X	X	X	
Non-Flammable Solvent Pen Air Ship Safe AFT-A-WEP	X	X	X	Х
4X4 Optical Wipes 100 wipes/bag AFT-A-NW	X	Х	Х	Х



SMART CHECKER MPO Tester

P/N AFT-G-FC-MPO-02



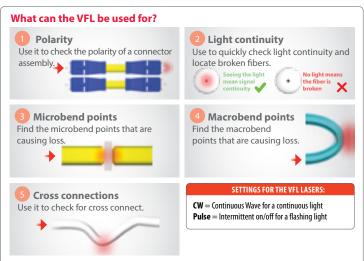
- Ideal for use in field or in production
- Check continuity and Method A, B or C polarity for 12 fiber MPO assemblies
- 5 Hour battery life

SMART CHECKER

Visual Fault Locator (VFL)

P/N AFT-G-FC





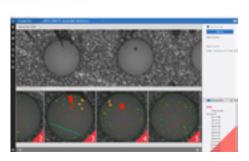
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Benchtop Inspection, Interferometry and Test

SUMIX Manta W+ Benchtop Inspection Scope P/N SMX-MANTA-W+



- Inspects 12 fiber in 2.6 seconds, 24 fiber in 4.5 seconds
- 0.5µm defect detection
- · Inspection tips for MPO, CS, SN, LC available



Inspection Tip Guide

Unmated Inspect Tip	SN/ UPC	SN/ APC	CS/ UPC	CS/ APC	LC/ UPC	LC/ APC	MPO Flat	MPO Angled
SMX-T-1.25/PC-M	Χ		Χ		Χ			
SMX-T-1.25/APC-M		Χ		Χ		Χ		
MNT-W-MPO-PC-M-V2-L	Χ		Χ		Χ			
MNT-W-MPO-APC-M-V2-L								

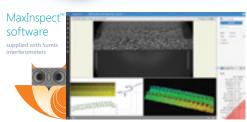
In Adapter Inspect Tip	SN/ UPC	CS/ UPC	LC/ UPC	LC/ APC	MPO Flat	MPO Angled
MNT-SN-PC-F-A	X					
MNT-CS-LC-PC-F-A		X	X			
SMX-T-LC/PC-F-K			Χ			
SMX-T-LC/APC-F-K				Χ		
MNT-W-MPO-PC-F-V2					Χ	
MNT-W-MPO-APC-F-V2						Χ

SUMIX MAX Quantum Interferometer

P/N MAX-QUANTUM



- Inspects 12 fiber in 2.6 seconds, 24 fiber in 4.5 seconds
- 0.5µm defect detection



SMX-Manta-W+ Benchtop Holder

P/N MNT-W-STAND



SMX-Manta-W+ MPO Polarity & Continuity Modul

P/N MPO-VERIFIER



- Works for 8, 12, 24, 48 and 16, 32 fiber MPO
- · Auto test and analysis

NETWORK MAINTENANCE

NETWORK MAINTENANCE

SN® Tools





SN® CRIMP TOOL P/N CRT-201









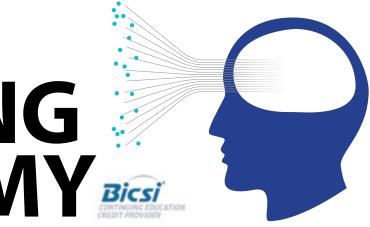
CS® CRIMP TOOL P/N CRT-708

SN EZ-FLIP® Tools



SN *EZ-FLIP*® CRIMP TOOL *P/N CRT-202*

TRAINING ACADEMY



Connect theory with hands-on experience

We can help you set-up and enhance your fiber optic interconnect production line

- Content tailored to your needs
- All experience levels welcome
- New or existing product training
- Witness best practices
- Improve company efficiency
- Learn process improvement
- Discover new troubleshooting techniques
- Expand your portfolio

Available in:

- Americas
- **Europe**
- China
- ☑ United Kingdom



COURSES AVAILABLE NOW

COURSE NAME	CEC CREDITS
Foundation of Fiber Optics	4
Fiber Optic Connectorization and Polishing	5
Fiber Optic Testing	5

Contact your SENKO account representative for more details

More levels coming soon...

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