



Secure/Keyed LC System – Solutions Overview

Designing performance and efficiency into your secure network

Introduction

In recent years, physically discrete fiber connection systems have emerged to respond to a growing demand for security in high-performance fiber networks. While security in the networks can be improved with sophisticated software tools, it is imperative that the right decisions be made in the early stage of the infrastructure design in order to protect the ever increasing amount of sensitive data being exchanged over today's networks.

Networks Take on a Heavy Demand

Secure networks require a special kind of infrastructure design. A high performance network is needed in order to quickly access information generated by sophisticated security applications like biometrics and Digital Video Recording. Today's secure networks typically use a fiber-to-the-desk topology, incorporating multimode fiber and offering 1 Gb/s capacity in the horizontal and 10 Gb/s in the backbone.

The Small Form Factor Decision

All physically discrete connector systems are based on Small Form Factor formats, which offer twice the density of an SC connector. Some SFF connectors have been based on a proprietary connector format, while others have been based on the MT-RJ design. The Belden CDT Networking Division (NORDX) has decided to design its secure fiber connector system based on the LC technology which delivers some obvious performance benefits:

- **Better Insertion Loss and Return Loss characteristics** – The LC connector uses a 125um ceramic ferrule that provides a proven connector-adapter-connector quality mating with excellent durability. The MT-RJ uses a single polymer ferrule and relies on metal pins for the final alignment of the fibers.

Multimode Connectors	LC Duplex	MT-RJ
Insertion Loss (Typ. /Guar.)	0.3 / 0.5 dB	0.4 / 0.75 dB
Return Loss (Typ. /Guar.)	-30 / -20 dB	-20 / -20 dB

- **Easier Cleaning - Protects optical performance over time** – The LC connector can be cleaned using traditional fiber cleaning methods. The MT-RJ is more difficult to clean because of the alignment pins. The pin receptacles on the female connector side can also get plugged with dirt and affect fiber alignment.

- **Simplex/Duplex - Design flexibility, polarity reversal** – The LC Duplex connectors are created by attaching 2 simplex connectors together with a clip. They can be easily un-assembled if the polarity of a patch cord needs to be reversed. The MT-RJ is a Duplex connector that can not be modified for polarity reversal.
- **Fiber spacing/Field installation** – LC connectors can be field-installed on any cable construction using the same proven field-installation method as SC and ST-compatible. Connectors are installed one at a time to obtain very good, stable performance. The MT-RJ connector design requires the 2 fibers to be installed simultaneously, negatively impacting the overall installed performance and installation yield. The fiber spacing in the MT-RJ connector also makes it very difficult to install on certain cable constructions (900 μm buffered fibers).
- **LC is the preferred SFF connector for high bit-rate applications (1Gb/s and up)** – Because of its high performance, reliability and ruggedness, the LC Duplex connector has become the connector of choice for networking equipment running applications at 1 Gb/s and over. Because of the very close proximity between the 2 fibers in the MT-RJ connectors (750 μm), transceiver design becomes very difficult if not impossible at high frequencies.

*LC is the only SFF connector that can be used with XFP
(next generation optical transceiver)*

The Belden offering

The FiberExpress Secure/Keyed LC System is a Small Form Factor (SFF) connection system that allows for physical segregation of network segments in secure fiber cabling infrastructure.

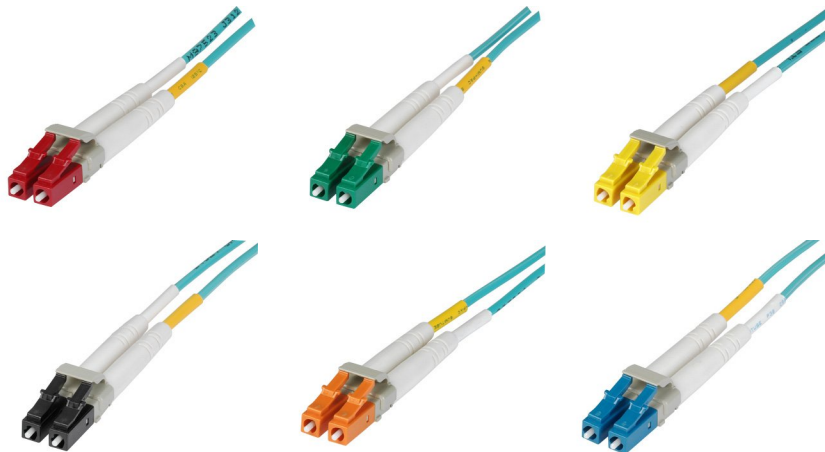
The Secure/Keyed LC components are available with 6 different keying options each carrying a different color to facilitate network administration. The keying detail inside the connectors and adapters is totally tamper-proof and can not be re-produced inside a standard LC connector. All other physical requirements comply with the FOCIS 10 standard and optical performance exceeds all industry standards for SFF connectors.

FEATURES & BENEFITS

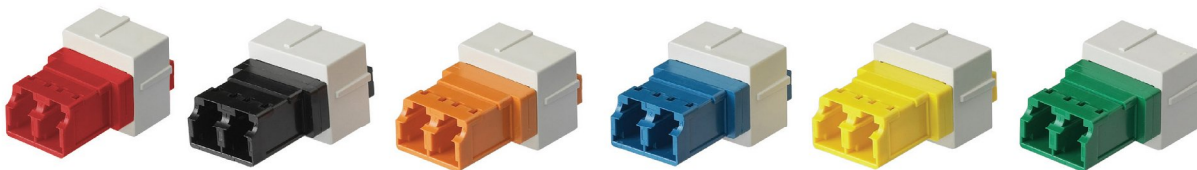
- Six physically discreet, color-coded keying options – provide design flexibility and facilitate network administration
- Tamper-proof key design – prevents intruders' access
- High-quality ceramic ferrule – provides low insertion loss and excellent durability
- High-density Small Form Factor connectors with removable clip – allows for polarity reversal
- Available in multimode 62.5 μm , 50 μm and 50 μm laser-optimized – ready for high-performance networks

- Offered in hybrid configurations KEYx-LC and KEYx-SC – allows interface with network equipment
- Offered in LC simplex 900um pigtailed – allows for fusion splicing

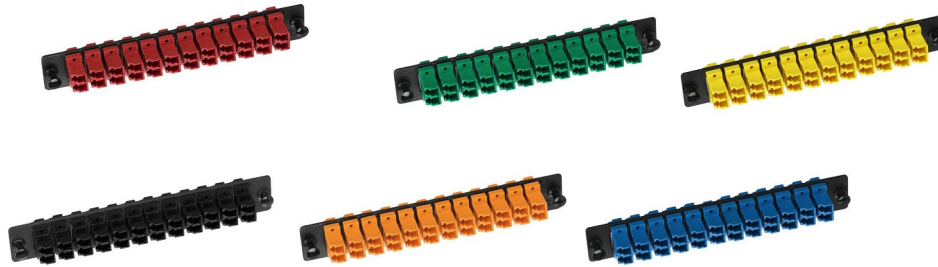
The Secure/Keyed LC Patch Cords are offered in multimode 62.5/125 μm (FX300), 50/125 μm (FX600) and laser-optimized 50/125 μm (FX2000) for the most demanding network performance. Available configurations are KEYx-KEYx as well as KEYx-LC Duplex and KEYx-SC Duplex, they are offered in standard lengths of 2 m (6 ft.), 3 m (10 ft.) and 5 m (16 ft.). Other lengths and configurations may be offered as custom orders.



The Secure/Keyed LC Adapter Modules are keyed on both the front and back to prevent installation errors and avoid a possible security breach. The Secure/Keyed LC Adapter Modules can be used in all NORDX mounting hardware for Workstation Area, Consolidation Point or Telecom Room applications.

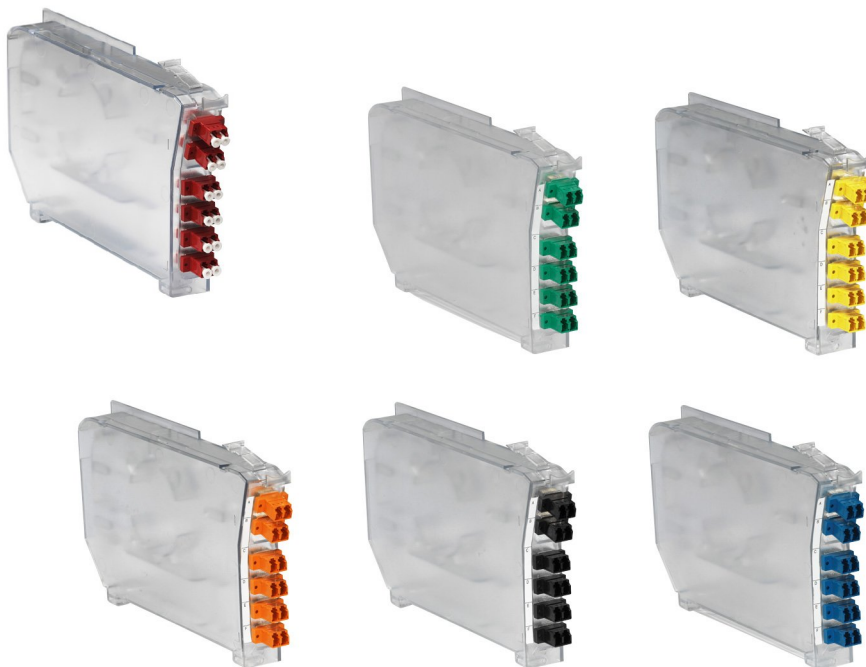


The Secure/Keyed LC FiberExpress Adapter Strips are available in 12 and 24-fiber configurations for a total capacity of 192 fibers in a 4U FiberExpress Patch Panel.



The Secure/Keyed LC FiberExpress Manager Modules are clear which allows the inside to be seen at all times. The module can house up to 12 fiber splices which allows for very high-density configurations, up to 1920 fibers in a 23 in. frame.

The Secure/Keyed LC FiberExpress Manager Modules can be used in 19 and 23 in. FiberExpress Manager Shelves. They can also be used in the new FXM 1U Rack Mount Patch Panel for a capacity of 36 fibers in a 1U rack space. Pre-terminated MPO-Keyed LC modules may be configured as custom orders.



The Secure/Keyed LC Optimax Connectors – Based on the patented Optimax Technology, this field-mount connector with a pre-polished ceramic ferrule offers great performance. It can be installed in less than 1 minute with well over 95% installation success rate. The LC Optimax connector has a spring-loaded ferrule that improves connector performance, increases its durability and makes it a suitable solution for repair of a patch cord or a multi-fiber cable assembly.



Conclusion

The FiberExpress Secure/Keyed LC System is a modular connectivity system that perfectly integrates into Belden's IBDN FiberExpress Solutions portfolio. It was designed to respond to an urgent need for products that perform well for use in secure fiber networks and it is based on the best Small Form Factor connector available in the market. It offers great performance and reliability and can be installed very efficiently in all areas of a fiber cabling infrastructure.