

PRODUCT OVERVIEW RUGGED FIBER ASSEMBLIES

Reliable Harsh Environment Fiber Connectivity Solutions

- Wide portfolio of industrial and Mil-Spec applications
- Certified partnerships with leading connector manufacturers
- Intercombination of AMPHENOL, HUBER+SUHNER, FIBRECO and more
- Technical design-in support and development of new solutions
- 30 years of high quality proven experience
- Fast deliveries thanks to high component inventory

Are you in need of customized cable solutions for your projects? Look no further!

We are a certified manufacturer specializing in the production of tailor-made interconnecting cables designed to meet your unique requirements. Our expertise ensures that each cable assembly is crafted with precision and attention to detail.

In addition to custom cable assemblies, we offer a wide range of connectors of the highest quality. These connectors are sourced and tested to ensure they meet the most stringent industry standards, providing you with reliable and durable connections for all your applications.

Choose us for your cable and connector needs, and experience the perfect blend of quality, reliability, and customization. Whether for industrial, commercial, or specialized uses, we are here to provide solutions that exceed your expectations.

Contact us today to discuss your requirements and discover how we can support your projects with our exceptional products and services.



AMPHENOL

In the dynamic world of telecommunications and industrial applications, the need for reliable, high-performance connectivity solutions is paramount. Amphenol, a global leader in interconnect systems, stands out with its comprehensive range of fiber optic connectors. These connectors are engineered to meet the stringent demands of various applications, from high-speed data transmission to resilience in harsh environments. This article explores the key features, applications, and benefits of Amphenol fiber optic connectors.

Overview of Amphenol Fiber Optic Connectors

Amphenol's fiber optic connectors are renowned for their high performance, offering superior signal integrity with minimal loss. The company provides a wide range of connectors suitable for diverse applications, from telecommunications to industrial and military uses. Known for their reliability, Amphenol fiber optic connectors are trusted in critical applications worldwide.

Product Portfolio

Amphenol offers a variety of fiber optic connectors tailored to specific needs. Here are some notable examples:

- LC, SC, and ST Connectors
- TFOCA (Tactical Fiber Optic Cable Assembly)
- CF38999 Connectors: Combining the MIL-DTL-38999 design with advanced fiber optic technology
- CTOS (Compact Tactical Optical Solution)
- Hermaphroditic Connectors

Key Features

- Durability
- High Bandwidth
- EMI Immunity: One of the standout features of fiber optic technology is its immunity to electromagnetic interference (EMI). Amphenol's connectors leverage this advantage, providing consistent and reliable performance even in environments with significant electromagnetic noise.

Key applications

- Telecommunications
- Demanding environments
- Military applications
- Aerospace applications
- Petrochemical industry
- Renewable energy sector



TFOCA (Tactical Fiber Optic Cable Assembly)

Features

- Hermaphroditic Design for Versatility
- Removable End Cap - Allows for easy field maintenance and cleaning
- 4, 6, 12, 24 Channel Connector Design
- Improved Cable Retention Strength
- Zn-Ni Plating
- Commercial Ceramic Ferrule Technology
- Solid Core Alignment Sleeves
- Hermaphroditic Dust Cap
- Optional Key Positions - Four key positions (1,2,3, universal) available
- Field Repairable Using Existing Parts
- Also Available in Stainless Steel and Brass

Applications

- US Army, Navy, and Marine Corps military tactical deployments
- Oil, gas and geoscience industries
- Mining
- Industrial
- Broadcast

Product Examples

- TFOCA-II: This ruggedized connector is designed to meet stringent military standards, providing reliable performance in extreme conditions. Its hermaphroditic design ensures ease of use and compatibility with various systems.
- TFOCA Gen3: Known for its modular design, the Gen3 connector allows for easy upgrades and repairs, making it a flexible solution for dynamic field environments.
- TFOCA GenX: This next-generation connector offers enhanced durability and performance, suitable for the most demanding applications. Its advanced design ensures superior optical performance and ease of maintenance.

Description

Amphenol's TFOCA connectors exemplify the company's commitment to providing high-quality, reliable, and durable fiber optic solutions. Designed to withstand the harshest environments, these connectors are ideal for military, industrial, broadcast, and emergency applications. Their rugged design, high performance, and ease of use make them the preferred choice for professionals who require dependable communication links in critical situations.

Choosing Amphenol TFOCA connectors means investing in technology that ensures reliable performance and long-term durability, crucial for maintaining operational efficiency and effectiveness in the field. Whether on the battlefield, in industrial settings, or during emergency deployments, Amphenol's TFOCA connectors deliver the reliability and performance needed to support mission-critical tasks.



CTOS (Compact Tactical Optical Solution)

Features

- Singlemode & multimode, hermaphroditic fiber optic connector, up to 4 channels
- Expanded beam technology for contactless transmission
- Protective window for easy cleaning

Specifications

- Design for gloved handling and blind mating in extreme conditions
- Qualified according to NATO/STANAG4290
- Expanded Beam 680 times the section of the fiber
- Protection Windows for easy cleaning with simple tissue
- Hermaphroditic
- NATO/STANAG 4290
- Drums & Media Converters available

Applications

- Battlefield Communication
- Grounded vehicles
- Military avionics
- Industrial

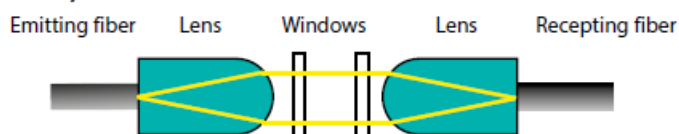
Product Examples

- CTOS: Small Optical Field Connector
- CTOL: Large Optical Field Connector

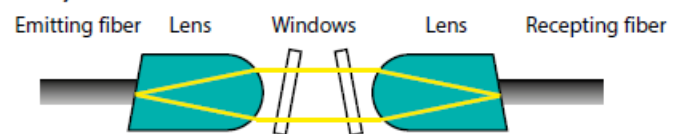
Description

CTOS and CTOL series are robust optical connectors for rapid deployment of high-speed transmission links under harsh environments. The hermaphroditic mating makes it possible to "daisy chain" cable assemblies without using any interconnect adapters. The specific lens design guarantees a large beam diameter and a low loss connection, less sensitive to dirt and dust. A specific front design and ergonomic keys ensure blind mating. The flat protective window mounted On shock absorbers provides an easy to clean surface for improved performances and protection. CTOS and CTOL harnesses are easily and cost effective field maintainable with the FTOS splice kit.

CTOS/CTOS MM



CTOS/CTOS SM

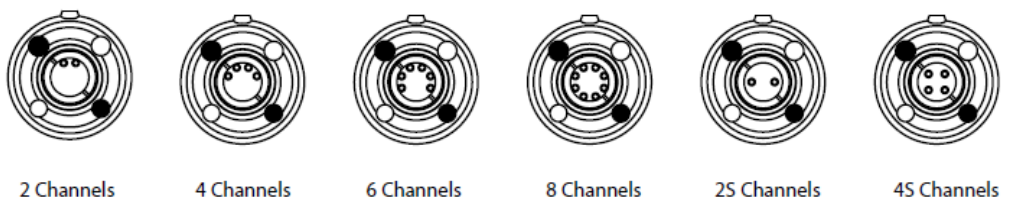


Channel Arrangements

CTOS



CTOL



FIBRECO & STRATOS

Fibreco and Stratos fiber optic connectors and cable assemblies for military, security, outside broadcast, offshore, mining and other industrial harsh environment applications. Fibreco expanded beam connectors and cable assemblies offer high performance, flexible, cost effective solutions to any critical harsh environment communication application.

Description

Fibreco manufactures custom fiber optic cable assemblies for a wide range of military and industrial harsh environment applications.

Our manufacturing facility is geared for volume termination of the Senior, Junior and Mini expanded beam connectors. We keep large stocks of singlemode and multi-mode tactical fiber optic cable and deployable cable reels enabling fast turn-round production of all deployable cable assemblies, harnesses and bulkhead assemblies.

Our facility is fully equipped with the latest automated termination, polishing and testing technology including interferometer ferrule end face characterisation and Optical Time Domain Reflectometer testing.

Key applications

- Demanding environments
- Military applications
- Railway applications
- Petrochemical industry
- Renewable energy sector



Product Examples

Fibreco offers several notable products designed for rugged and high-performance applications:

Hermaphroditic Connectors: These connectors allow for quick and easy field deployment without the need for adaptors, making them ideal for emergency and temporary setups.

Expanded Beam Connectors: Designed for environments where contamination and physical damage are concerns, these connectors ensure consistent performance even under challenging conditions.

- **Fibreco Junior:** A smaller, lighter connector ideal for applications requiring robust performance in a compact form. Suitable for military, broadcast, and industrial uses.
- **Fibreco Senior:** A larger connector designed for higher fiber counts and extreme durability.



Junior

Features

- 1, 2 & 4 channel plugs and bulkheads
- 90° Backshell options for plug and bulkhead
- Low profile
- XLR Description

Specifications

- Singlemode and Multimode Options
- Field terminable using standard termination tools & equipment
- Field repairable: EB insert & shell parts replaceable / re-useable



Description

Junior expanded beam fiber optic connectors have been designed for use in the most demanding harsh environment applications including military tactical communications, outside broadcast, petrochemical plant, mining, and offshore systems. The connectors are terminated using an epoxy-polish ferrule termination process with standard fiber optic termination tools and equipment. The terminated ferrules are simply placed into the expanded beam insert and fixed in place via a spring and cover-plate.

Ferrule alignment to the lenses is achieved automatically by the unique optical arrangement developed and patented by Cinch-Fibreco.

Technical Specification

Insertion Loss	9/125 Fiber at 1310nm / 1550nm: -1.5dB maximum (typical -1.0dB)* 50/125 Fiber at 850nm / 1300nm: -1.0dB maximum (typical -0.7dB)*
Return Loss	> 32dB (typical 40dB) Singlemode / >20dB Multimode*
Durability	3000 matings minimum
High Temperature Storage	+85°C for 16 hours
Low Temperature Storage	-55°C for 16 hours
Thermal Shock	-55°C to +85°C
Water Immersion	15m for 24 hours (plug & bulkhead, mated & open face)
Free Fall Resistance	500 falls from 1.2m height
Vibration	20-500Hz, 3 directions, 0.75mm amplitude @ 10g acceleration
Shock	50g 11ms half size
Crush Resistance	6.7kN
Corrosion Resistance	500 hours salt spray
Cable Retention	1500N (cable dependant)
Weight (approx)	Aluminum: Plug: 120g Bulkhead: 110g / Stainless Steel: Plug: 180g Bulkhead: 200g
Connector Shell Material / Color	Black anodised Aluminum or Stainless Steel Grip & boot: Black or Olive Green

*Measurements against reference—random mate performance in line with MIL-DTL-83526

Senior

Features

- 1 to 8 Optical Channels
- Fiber Optic / Electrical hybrid variants
- Aluminum, Nickel Aluminum, Bronze or Stainless Steel shell options
- RoHS Compliant
- Singlemode and multimode options



Specifications

- Field terminable / repairable
- Hermaphroditic design

Description

Senior expanded beam fiber optic connectors have been designed for use in the most demanding harsh environment applications including military tactical communications, outside broadcast, petrochemical plant, mining, and offshore systems. The Senior connector range includes 1, 2, 4, 6 and 8 optical channel versions and four fiber optic / electrical hybrid variants.

The connectors are terminated using an epoxy-polish ferrule termination process with standard fiber optic termination tools and equipment. The terminated ferrules are simply inserted into the expanded beam housing and fixed in place via a spring and coverplate. Ferrule alignment to the lenses is achieved automatically by the unique optical arrangement developed and patented by Cinch-Fibreco. In hybrid connectors, electrical connections are made via standard gold plated MIL-C-39029 crimp contacts.

Technical Specification

Insertion Loss	9/125 Fiber at 1310nm / 1550nm: 1 to 4 channels: -1.5dB max / 6 & 8 channels: -2.0dB max* 50/125 Fiber at 850nm / 1300nm: 1 to 4 channels: -1.0dB max / 6 & 8 channels: -1.5dB max*		
Return Loss	> 32dB (typical 40dB) singlemode / >20dB multimode*		
Electrical: Power Contacts	Size 20 & size 16 MIL-C-39029. Contact resistance <4mΩ. Operating voltage 1000VAC. Operating current 5A (short term 15A)		
Electrical: Test Voltage	Between contacts and contact / housing: 3000V / 50Hz, 1 minute EN61984		
Durability	3000 matings minimum		
Operating Temperature	-40°C to +85°C		
Storage Temperature	-55°C to +85°C		
Water Immersion	IP68		
Free Fall Resistance	500 falls from 1.2m height		
Vibration	10-500Hz, 3 directions, 0.75mm amplitude @ 10g acceleration 4000		
Bump	bumps @ 40g acceleration		
Crush Resistance	6.7kN		
Corrosion Resistance	500 hours salt spray		
Cable Retention	1500N (cable dependant)		
Weight (approx)	Aluminum	Stainless Steel	Nickel Aluminum Bronze
	Plug: 160g	300g	285g
	Bulkhead: 150g	255g	240g
Connector Shell Material / Color	Black anodised Aluminum, Nickel Aluminum Bronze or Stainless Steel. Grip & boot: Black or Olive Green		

*Measurements against reference—random mate performance in line with MIL-DTL-83526

Q-ODC (Quick-outdoor connector)

The revolution for harsh environment connectivity

QODC connectors from HUBER+SUHNER are innovative, high-performance connectors designed for quick and reliable fiber optic connections. "QODC" stands for Quick Outdoor Connectors, which highlights their primary feature: they enable fast and secure connections even in challenging outdoor environments. These connectors are built to withstand harsh conditions, including extreme temperatures and exposure to water and dust, making them ideal for applications in telecommunications, data centers, and outdoor installations. With their robust design and ease of use, QODC connectors ensure optimal performance and durability, reducing maintenance needs and ensuring long-term reliability.

Features

- Robust pull-push coupling mechanism – fast and easy mating
- Highest installation safety
- 2 channels for singlemode or multimode
- Q-ODC plug connector, build-in socket and extension connector for cable chaining
- Compact design with 2 × 1.25 mm ferrules
- Water-proof IP68, dust proof and corrosion resistant
- Water-proof protection caps
- Nickel plated brass housing
- RoHs compliant
- EMI protected

Product portfolio




- QODC
- ODC-2
- ODC-4
- Q-ODC-2
- Q-ODC Industry
- Q-ODC-2mini
- Q-ODC-12
- Q-ODC-12 Industry
- Q-ODC-24
- Q-ODC-24 Industry
- XCO
- Q-XCO
- Full AXS
- Full AXS mini

Key applications

- FTTA (Fiber-to-the-antenna)
- Automation and industrial cabling
- Surveillance systems
- Naval and ship building
- Broadcast



Harsh environment (Q)ODC connectors overview

	ODC based (outdoor connector) screw-lock		Q-ODC based (quick-lock outdoor connector) push-pull		
	ODC-2	ODC-4	Q-ODC-2*	Q-ODC-2 Industry*	Q-ODC-2 Mini
					
Number of fibers	2	4	2	2	2
Mating cycles	1000	1000	200	500	50
Tensile load	tensile load 800 N plug ≤ 30 N socket	tensile load 800 N plug ≤ 30 N socket	tensile load 450 N plug ≤ 30 N socket	tensile load 450 N plug ≤ 30 N socket	tensile load 150 N plug
Protection class IEC 60529	IP68 (30 days / 3 m)	IP68 (30 days / 3 m)	IP67	IP68 (30 days / 3 m)	IP65
Operating temperature IEC 61300-2-22	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C
Salt mist IEC 61300-2-26	720h	720h	720h	720h	720h

* cross-compatible connectors

Main Applications

BUS SHELTER

Upgrade of transportation and advertisement infrastructure creates ideal locations to deploy small cells but the challenge is the amount of different active equipments. This requires small connectivity solutions that are easy to reconfigure as upgrades are done.

Requirements: small and reliable

Products:

Q-ODC-2 Mini, Q-ODC-2

LAMP POLES

Lamp poles are getting connected to the network. This is challenging, as lamp poles have high visibility and limited space but are deployed in large quantities which requires deployment simplicity and installation speed.







Requirements: small size to fit through reduced size opening, low visual footprint, simple to install, reliable connection

Products:

Q-ODC-2 Mini

Harsh environment (Q)ODC connectors overview

LC Duplex based

	Q-ODC-12 / Q-ODC-24*	Q-ODC-12 Industry / Q-ODC-24 Industry*	XCO	Q-XCO	FullAXS	FullAXS Mini
						
Number of fibers	12/24	12/24	2	2	2/12	2
Mating cycles	100	500	500	100	100	100
Tensile load	tensile load 450 N plug ≤ 30 N socket	tensile load 450 N plug ≤ 30 N socket	tensile load ≤ 500 N plug 30 N socket	tensile load ≤ 450 N plug	tensile load 150 N plug	tensile load 150 N plug
Protection class IEC 60529	IP68 (30 days / 3 m)	IP68 (30 days / 3 m)	IP67	IP67	IP65	IP67
Operating temperature IEC 61300-2-22	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C
Salt mist IEC 61300-2-26	720h	720h	720h	720h	720h	720h

*cross-compatible connectors

Main Applications

Wind power: Data connectivity throughout wind turbine structures

Monitoring and control of wind turbines is conducted by means of fiber optic links. Connectors represent pivotal components that impact deployment and reliability.

Requirements: Designed for fast and easy installation under difficult conditions; high IP class, withstand of mechanical stress, temperature swings and longevity.

Products:

ODC-4, Q-ODC-12, Q-ODC-24, XCO

Underground mining: data networks for CCTV, com and M2M

One of the harshest imaginable operating environments for fiber optics is found in underground mining. Mining firm's needs for robust fiber optic networks evolve in step with their growing breadth and sophistication of automation.

Requirements: Extreme robustness to shock, ingress, and mating durability while maintaining low insertion losses.

Products:

ODC-4, Q-ODC-2, Q-ODC-12, XCO