Amphenol FSI

Harsh Environment Fiber Optic Solutions

Amphenol Fiber Systems International

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Amphenol Fiber Systems International (AFSI) Overview

Company Overview

Amphenol Fiber Systems International (AFSI) is a full service fiber optic company specializing in the fabrication and manufacture of fiber optic connectivity products and systems. Our commitment to technical excellence makes us an industry leader in providing sophisticated products and professional technical assistance.

AFSI provides solutions for communication systems based on fiber optic interconnect technology. Our TFOCA-II®, M83522, TACBeam® (MIL-PRF-83526), and M28876 products are the global standard in the military marketplace and are complemented by a host of products for equally demanding industrial applications. Simply put, we provide data to decision makers when failure is not an option.

AFSI employs over 100 people at its 50,000 square foot facility in the heart of the telecom corridor in Allen, just north of Dallas, Texas.

Since it's inception in 1993, AFSI has and will continue to base its corporate strategy on technical and application support, quality assurance, product performance, and value.

Why Choose Fiber Optics?

Fiber optic interconnect solutions are ideally suited for high speed, high reliability, EMI/RFI immune, digital data transmission in harsh environment applications such as airborne avionics and computers, battlefield communications, oil and gas operations, and weapon systems.

A large amount of data, voice, and video has to be securely transmitted in these applications, sometimes over long distances. Fiber optic links, with a large bandwidth and a small diameter, provide a fast, reliable, lightweight, and simple method to transmit a huge amount of information between various systems. Fiber optic links only carry light pulses making them immune to electromagnetic or RF interferences, which are a threat to the integrity of the transmitted information.

Fiber optic links suit battlefield communication systems exceedingly well where secrecy and data integrity are paramount. Light pulses from fiber optic links can't be detected or hacked, making the link virtually invisible.

5 Advantages to Choosing Fiber Optics:

1. Lower loss:
Optical fiber has lower attenuation than copper conductors, allowing longer cable runs and fewer repeaters.

2. Increased bandwidth:
The high signal bandwidth of optical fiber provides significantly greater information-carrying capacity. Typical bandwidths for multi-mode fibers are between 200 and 600 MHz•km, and > 10 GHz•km for single mode fibers.Typical values for electrical conductors are 10 to 25 MHz•km.

3. Immunity to interference and detection:
Optical fibers are immune to electromagnetic interference and emit no radiation.

4. Electrical isolation:
Fiber optics allow transmission between two points without regard to the electrical potential between them.

5. Decreased cost, size and weight:
Compared to copper conductors of equivalent signal-carrying capacity, fiber optic cables are easier to install, require less duct space, weigh 10 to 15 times less, and cost less than copper.

Certifications

- ISO 9001: Rev D
- MIL-STD-790
- AS9100
- AQAP 2110
- Electronics Technicians Association (ETA) to train and administer the Fiber Optics Installer (FOI) and the Fiber Optics Technician (FOT) certifications.

Fiber Optic Benefits

Harsh Environments:

Amphenol is the world leader in harsh environment fiber optic solutions. From the battlefield to the operating room, our products are specifically designed to provide reliable, durable connectivity in the most demanding applications.

Mobility:

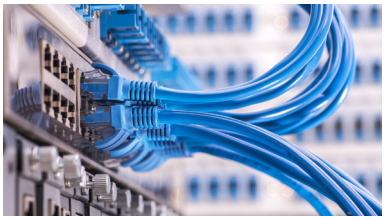
A robust connector design is paramount whenever mobility is required. Amphenol's fiber optic connectors are specifically designed for fiber optic applications (not just repurposed from copper connectors) to ensure the precision alignment required to deliver data reliably.

Weight & Cost Savings:

Fiber optic cable is 10-15 times lighter than equivalent copper solutions (and costs less as well). When weight and cost savings are a priority, fiber optics offer engineers a lighter, more cost-effective alternative for data transmission.

Security:

In the presence of an ever increasing cyber threat, fiber optics afford a greater degree of security over copper. Amphenol's fiber optic solutions are fielded in some of the most sensitive applications, from missile defense systems to homeland security.



High Bandwidth:

In the data-rich world we inhabit, applications like 4K video are continuing to drive demand for increased bandwidth. Fiber optics offer increased bandwidth (significantly greater information carrying capacity) over copper cabling. Typical bandwidths for multi-mode fibers are between 200 and 600 MHz•km, and > 10 GHz•km for single mode fibers. Typical values for electrical conductors are 10 to 25 MHz•km.

EMI:

Because fiber optics are immune to electromagnetic interference (EMI) and emit no radiation, our fiber optic solutions are ideal for sensitive signals in electrically "noisy" environments. Whether it be electromagnetic systems or flight-critical applications, Amphenol has the right fiber optic solution to ensure data integrity is maintained.

Distance:

Because optical fiber has lower attenuation than copper conductors, it is ideal for applications where loss due to long transmission distances would otherwise be prohibitive. This allows for longer cable runs and fewer repeaters. As an example, the distance limitation for 1G over copper is approximately 100m, whereas 1G can be transmitted up to 100km over fiber.

Markets Served

Ground Systems

Harsh environment fiber optic cable assemblies have been used for decades in military ground systems. There are significant security benefits because they emit no EMI signature and are immune to RF interference. They are also ideal for tactical deployment because they are lighter in weight, smaller in diameter and higher in bandwidth.

Naval

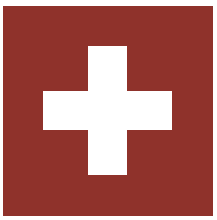
The MIL-PRF-28876 connectors were designed specifically to be tight toleranced fiber optic connectors with the environmental protection and corrosion resistant properties required to withstand the rigors of marine tactical deployment. They have become the universal standard fiber optic connector for all of the US Navy's tactical requirements for shipboard, surface and submarine applications.

Avionics

The use of fiber optics in the avionics and commercial airframe markets is rapidly expanding. The obvious benefit for flight applications is significantly lighter weight, compared to traditional copper cables. There are also considerable security advantages of reduced EMI and RFI interference as well as increased bandwidth and lower power consumption.

Energy

AFSI is the leading provider of Harsh Environment Fiber Optic (HEFO) solutions for Mining and Oil & Gas markets. Our focus is to provide the world's leading OEM suppliers and operators with built-to-order optical interconnect solutions. We have the industry's largest and most technologically advanced portfolio of HEFO and hybrid (fiber and copper) connectors to choose from.



Medical

Our products enable cutting edge medical technology like robotic surgery and 4K video in the operating room. If you need to combine fiber, copper, and illumination (large core fiber) we offer off-the-shelf solutions as well as custom-designed solutions. We can also incorporate Fiber Optic Rotary Joints (FORJ), which allow for data transmission without restricting an equipment's range of motion.

Industrial

AFSI offers a product portfolio of harsh environment fiber optic connectors, termini and cable assemblies that are perfectly suited to a wide range of industrial applications. Their rugged construction can handle the most severe environments and provide dependable performance.

Broadcast

AFSI offers the most complete suite of fiber optic solutions for the broadcast market available anywhere. Our broadcast products have been used in Final Four®, Super Bowl®, World Cup® and Olympic® events. We specialize in harsh environment fiber optic connectors and cable assemblies, so you can count on us to provide the best solution for your broadcast application.

Featured Products

ARES Reels

ARES reels are made with a chemical and impact resistant polymer providing a rust-resistant, lightweight and durable reel for storage solutions and deploying fiber optic cable assemblies. Features on the reel allow them to be stacked together for storage and transit. The ARES reels also have separate payout and storage areas allowing the operator to deploy cable as needed rather than paying out the entire stored length. Compliant to A336463 CECOM stackable requirements.

ProClean™

The ProClean™ harsh environment fiber optic connector is a small but important improvement over the already established TFOCA-II® connector. The ProClean™ features a tool-less removable end cap which, once removed, allows access to the termini for easy field maintenance and cleaning using standard fiber optic tools. Termini ferrule access also enables the field technicians to use hand held end face measurement equipment without connector disassembly.

THDM

AFSI's THDM connector provides high density functionality in a field-proven, rugged connector package. THDM is modular, allowing multiple combinations of fiber types to be used in the same connector. THDM connectors are available in 2, 4 and 8 MT configurations. Each MT supports 12 to 24 fiber channels using industry standard MT ferrules. The connector features M28876 or M38999 strain relief options. THDM connectors also feature a ratcheting coupling nut, as well as insert to insert bottoming to provide superior optical performance in high shock and high vibration applications.

M28876 connectors

AFSI is a leading producer and supplier of M28876 connectors to the US Navy and allied navies around the world. We offer the most complete suite of M28876 connectors, backshells and dust caps as well as QPL MIL-PRF-29504/14 and /15 termini.

Cable Assemblies & System Solutions

Overview

Amphenol Fiber Systems International (AFSI) offers complete fiber optic interconnect solutions, from connectors and termini to cable assemblies and harnesses. We are a high-mix operation and excel at providing custom solutions direct to end customers. Our cable assemblies are used in military, avionics and industrial applications around the world, incorporating popular harsh environment connectors such as TFOCA-II®, M28876, D38999, ARINC 801, expanded beam and others.

For applications demanding reliability, traceability and the highest level of quality, a complete plug-and-play cable assembly directly from the manufacturer offers the highest degree of confidence. For these most demanding applications, AFSI specializes in manufacturing custom cable assemblies with quality components and industry-leading workmanship. AFSI is able to build to a customer print or design and produce custom cable assemblies from a set of requirements. Our highly skilled technicians are trained to a wide variety of industry standard procedures critical to manufacturing harsh environment fiber optic cable assemblies. All AFSI cable assemblies are manufactured by expert technicians in our state-of-the-art, AS9100-certified facility.

Multi-Channel Fiber Optic Cable Assemblies

AFSI builds custom cable assemblies for virtually any application using TACBeam®, TFOCAII®, TFOCA-III®, M28876, and many other connector standards.

System Solutions

Amphenol provides a full complement of fiber optic system solutions, from junction boxes to cable assemblies, to test equipment.

NAVSEA-Approved MQJs

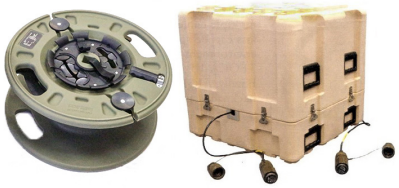
AFSI is fully certified to provide NAVSEA Measurement Quality Jumpers (MQJs), which are designed to interface with all M28876 products.

D38999 Cable Assemblies

AFSI offers a comprehensive line of single mode and multi-mode cable assemblies in a variety of cable configurations using D38999 Series III connectors.

Electrical-Optical-Electrical (E-O-E) Solutions

AFSI offers a comprehensive line of opto-electrical transceivers and converters to meet most harsh environment applications.



Cable Assembly Accessories

AFSI manufactures a full line of cable assembly accessories including reels, transit cases and backpack reels.

Expanded Beam Connectors

Overview

Expanded Beam uses a lens in front of the fiber to collimate the light coming out of the fiber. The lens expands the size of the beam from 9 um to 285 um for SM.

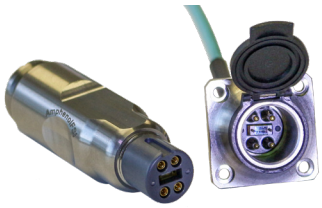
Expanded Beam connectors have distinct advantages and disadvantages compared to Physical Contact connectors. Selecting the right connector requires an expertise in the technology and an understanding of the application. Amphenol Fiber Systems International (AFSI) is the only manufacturer that offers a complete suite of both Expanded Beam and Physical Contact connectors.

TACBeam® - MIL-PRF-83526

AFSI offers a MIL-DTL-83526/20 & /21 qualified expanded beam rugged fiber optic connector for military and industrial applications.

TFOCA-XBT4®

The TFOCA-XBT4® is the next logical step, integrating expanded beam technology into the most popular harsh environment fiber optic connector in the world.

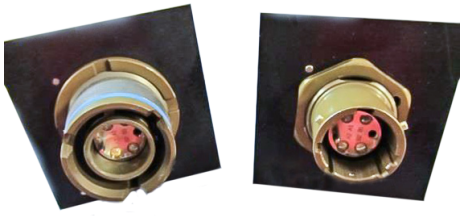


PushMate Hybrid

Hybrid fiber/copper, push-pull style connector designed specifically for medical applications that incorporates an expanded beam MT ferrule.

CTOS

CTOS is an expanded beam fiber optic connector available in singlemode and multimode. CTOS is designed for gloved handling and blind mating in the most extreme conditions.



XBT RNJOP

The RNJOP-XBT brings the benefits of expanded beam to Amphenol's fiber optic rack and panel RNJOP connector series. Ideal for frequent mating cycles and dusty environments.

AXOS

AXOS is a miniature, hermaphroditic and cost-effective alternative to other expanded beam connectors, offering a robust and protected optical connection in a small size (OD 27 mm).

Physical Contact Connectors

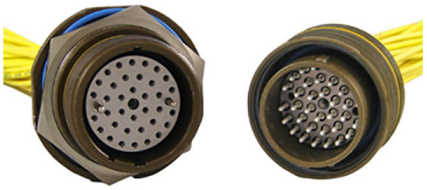
Overview

Physical Contact (PC) connections are characterized by the physical mating of two optical fibers. Precision ceramic ferrules are typically utilized for PC connections. APC connection is accomplished by terminating the optical fiber into a precision ceramic ferrule. Epoxy is used to affix the fiber into the ferrule.

The tip of the ceramic ferrule is polished in a precise manner to ensure that light enters and exits at a known trajectory with little scattering or optical loss. Polishing the terminated ceramic ferrule is a critical process in Physical Contact fiber optic connectors.

Introducing and just released: SINGLE MODE TFOCA-II® APC CONNECTOR (patent pending), the new standard in high performance tactical hermaphroditic connectors.

Circular



NGCON Fiber Optic Connector

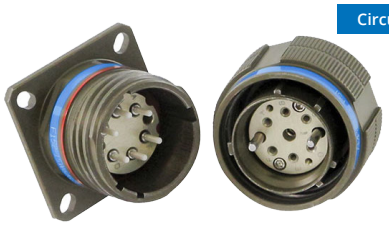
NGCON Fiber Optic Connector features a rear release, genderless termini, and is manufactured IAW MIL-PRF-64266.

Circular

F-143 Pinnacle Series

Building on the legacy of MIL-PRF-28876, these connectors incorporate the latest technologies in fiber optic interconnect design; ideally suited for ground vehicle applications.

Circular



ARINC 801 Connectors

AFSI produces the ARINC 801 cylindrical fiber optic connector for commercial airframe, military radar and more.

Circular

THDM

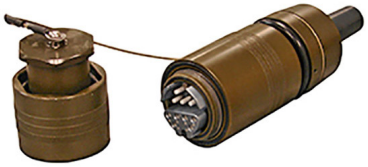
THDM is a MIL-PRF-28876 derived mechanical transfer (MT) rugged fiber optic connector for high-density military and aerospace applications.

Hermaphroditic

TFOCA-II® 4-Channel Fiber Optic Connectors

The TFOCA-II® 4-Channel Fiber Optic Connector is the standard, deployable fiber optics connector. Now available in single mode APC also.

Hermaphroditic



TFOCA-II® 12-Channel Fiber Optic Connectors

Patented by Fiber Systems International, TFOCA-II® 12-Channel can be used in Mining, Industrial, Military Communications, Broadcast, and more.

Physical Contact Connectors

Hermaphroditic

RigLinq

The TFOCA-II® 12-channel RigLinQ's hybrid design lowers overall systems cost and reduces panel mount foot print by combining optical and electrical signals in one quick connect housing.

Circular

M28876 Fiber Optic Connectors

AFSI is a market leader in the manufacture and sale of QPL listed M28876 connectors, primarily used for Naval applications.

Hermaphroditic

mTACh Miniature 2-Channel Fiber Optic Connector

A compact, 2-channel, hermaphroditic connector that offers high-performance for broadcast and military use.

Circular

CF38999

CF38999 is based on D38999 Series III shells and inserts, supports multimode and single mode, and uses field proven MIL-PRF-29504 termini. Eletcrical/Hybrid versions available.

Hermaphroditic

GoldRush® Fiber Optic Connectors

GoldRush® connectors are the next generation "longwall communications" deployable fiber optic connector. They are mining, safety and health certified.

Circular

LC Field

The LC Field Fiber Optic Connector is sealed against fluids and dust, no cabling operation in field and no tools required for installation.

Specialty

LowPro Low Profile Fiber Optic Connectors

The LowPro fiber optic connector is ideal for edge-card connections and other applications that require minimal connector profiles.

Circular

FSHDM Series Hermaphroditic Duplex Miniature

Includes the Hermaphroditic Duplex Miniature (HDM). Eliminates the need for polarising the assemblies and the use of in-line adapters.

Circular

M83522 MIL-ST Connectors

For deployable and fixed systems. Designed for the best optical performance available for severe environmental conditions including Naval shock tests.

Physical Contact Connectors

Circular

MFM

The MFM Fiber Optic Connector is lightweight, with an anti-vibration coupling mechanism, and uses ceramic PC ferrule technology w/ a ceramic alignment sleeve.

Circular

MT38999 Connectors

Used in commercial airframe, avionics, and military radar. Incorporates commercially available fiber optic "MT" 12, 24, and 48 channel ferrules into D38999 Series III connectors.

Specialty

AquaLink® FS140

The AquaLink® FS140 is a cost-effective series of dry-mate submersible fiber optic connectors for underwater applications.

Circular

MTRJ Field TV

With MTRJFTV you can use a standard MTRJ patchcord in a metallic plug which will protect it from shocks, dust and fluids. No hazardous on-field cabling!

Circular

FSBDC Series Bayonet Duplex Connector

Offers the Pattern 105, Size 10, series connector construction, with the tri-mating bayonet locking mechanism for quick mate/de-mate.

Hermaphroditic

109 Series Connectors (SMPTE 358)

The 109 Connector line meets or exceeds the requirements of SMPTE. It is used for broadcast networks, HDTV, ship-to-shore communications.

Hybrid

Optron/ Optron Hybrid

The high-precision, engineered polymer insert provides optical performance superior to that of other hybrid connectors.

Circular

TVOP

Fiber optic connector design with 38999 Series III shell. Optimised insert for butt joint termini dia. 2.5mm. Design for Multimode and Singlemode PC or APC version for high return loss.

Rack & Panel

RNJOP

The RNJOP is a rack and panel style fiber optic connector, ideal for inflight entertainment, LRM and robotic applications

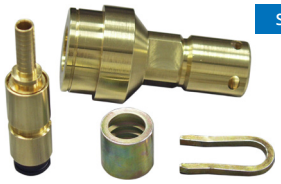
Physical Contact Connectors

Specialty

Space ST

AFSI's Space ST is a derivative offering from the MIL ST connector engineered to meet the most stringent require-ments and life expectancy of space applications.

Specialty



StapleMate®

The StapleMate® is the next-generation "longwall shield communications" deployable fiber optic connector. It uses a staple for quick disconnect.

Hazardous Location Rated

StarLine EX

Star-Line EX® copper/fiber hybrid is qualified for use in Zone 1 hazardous environments and is certified to the latest IECEx, ATEX EN60079 and GOST standards.

Circular

Tactical High-Density Fiber Optic Connector

Tactical High-Density (THD) connectors are designed specifically for high density applications. Available in 48, 64, 72 channel configurations.

Hermaphroditic

TFOCA Multi-Channel Fiber Optic Connectors

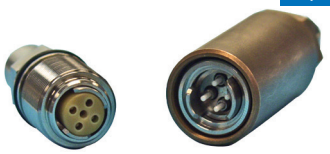
TFOCA (Tactical Fiber Optic Cable Assembly) Connector is a hermaphroditic design used for deployable communications systems.

Hermaphroditic

FS12 Pierside 12-Channel Fiber Optic Connector

FS12 fiber optic connector is for harsh environment, broadcast, and pierside applications. This connector is available in either single mode or multimode.

Specialty



DeepSight®

The DeepSight fiber optic connector is specialized for high pressure, high temperature and corrosive fluids for downhole applications.

Hybrid

110 Series SMPTE 304M Connectors

SMPTE 304M series fiber optic termini (110-TP-125 pin and 110-TS-125 socket) provide superior optical and mechanical performance.

Hermaphroditic

TFOCA-III® Fiber Optic Connectors

The TFOCA-III® utilizes the latest technology in fiber optics. It can be used for broadcast, mining, disaster recovery, oil and gas industries.

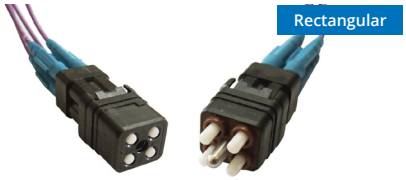
Physical Contact Connectors

TFOCA-II® ProClean

ProClean's sealed, free-floating termini design allows it to survive high humidity and moisture conditions while ensuring optimum alignment for low insertion loss and minimal back reflection.

FTTA (Fiber-to-Antenna)

FTTA is highly configurable to support industrial applications where both fiber and copper connectivity are required in a single connector.

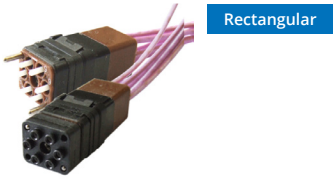


EN4165 / SIM Elio for EN4531-101 Contacts

The module SIM Elio can be used with the whole range of EN4165 / SIM connectors.

EN4165 / SIM for MPO Connectors

MTP/MPO connector directly plugs and locks itself into the module. It can be easily removed for repair.



EN4165 / SIM Luxcis for Arinc 801 Contacts

The module SIM Luxcis can be used with the whole range of EN4165 / SIM connectors.

Media Converters & Electrical-to-Optical Solutions

Overview

Media Converter cable assemblies allow equipment manufacturers to enjoy the advantages of fiber optics (lighter weight, longer distances, higher bandwidth, and EMI immunity) over copper without needing to redesign their external interfaces.

AFSI offers a host of active solutions based on our field-proven connector designs.

ARCH Series TFOCA-II® Converters

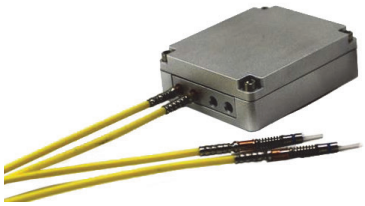
Amphenol's Ruggedized Converter Series provides optical-electrical (O-E) and electrical-optical (E-O) conversion for harsh environments.

Electrical to Optical Conversion Systems

AFSI offers custom, fiber optic interconnect systems featuring integrated electrical media conversion capability.

Mediatac

Mediatac allows manufacturers to enjoy the advantages of fiber optics (lighter weight, longer distances, higher bandwidth, and EMI immunity) without redesigning their external interfaces.



NG-T_{RX} Rugged Transceiver Series

Specifically developed for NAVAIR/NAVSEA harsh environment applications. A high performance ruggedized board mount transceiver capable of supporting up to 5Gbps data rates.

TACBeam® FOM

AFSI offers the TACBeam® Fiber Optic Modem (FOM) to provide optical-electrical (O-E) and electrical-optical.

3G/HD/SD-SDI Stand Alone Converter

This new converter can be used in harsh environment avionics, ground systems, or naval applications that need to transmit and receive SD/HD/3G-SDI signals over fiber optic cables.

Embedded Optical Solutions

AFSI offers embedded opto-electronic interconnect solutions in partnership with Reflex Photonics for harsh environment such as mil aerospace, space industry and others.

Fiber Optic Termini

Overview

Amphenol Fiber Systems International has the most complete suite of fiber optic termini you will find in the industry.

ARINC 801 Fiber Optic Termini

AFSI offers ARINC 801 compliant termini for use in both cylindrical and rectangular connectors for commercial and military applications.

M29504/14 & /15 Fiber Optic Termini

The M29504/14 & 15 fiber optic termini provide superior optical & mechanical performance & are compatible w/ M28876 & comparable military-style connectors.

M29504/4 & /5 Fiber Optic Termini

AFSI's M29504 /04 & /05 style fiber optic termini provide superior optical and mechanical performance. Qualified for use on 5th generation fighter jet applications.

TFOCA-II® MTFP Series Termini

The MTFP fiber optic termini feature an innovative double-floating seal design that allows maximum terminus travel. For use in AFSI TFOCA-II® connectors.

HD20 Series Multimode, Size 20 Termini

The HD 20 is designed for use in size 20 cavities of MIL-DTL-38999 Series II connectors; these termini offer increased termini density.

FSAF Series Termini

The FSAF series fiber optic termini provide superior optical and mechanical performance. Compatible with TFOCA-III®and THD connectors.

Lumiére Fiber Optic Termini

AFSI offers the Lumiére fiber optic terminus for commercial airframe, avionics and aerospace applications.

M29N (NGCON) Series Fiber Optic Termini

M29N (NGCON termini) is a rear release, stainless steel design that utilizes a retaining clip, a ceramic ferrule & a front sealing O-ring.

M28876 APC Termini

AFSI design of the M29A1350 and M29B1350 APC fiber optic termini are based on qualified M29504 /14 and /15 termini.

Fiber Optic Termini

TFOCA Biconic Termini
The biconic terminus was adapted to the military TFOCA connector system in the early 1980s and is designed in accordance with M83626/12-02 & /13-02.

SMPTE 304M Termini
The SMPTE 304M series fiber optic termini (110-TP-125 pin and 110-TS-125 socket) provide superior optical and mechanical performance.

M29F & M29G Series Fiber Optic Termini
Enables reliable and repeatable integration of optical media into industry-standard ARINC400/600 connector.

LuxBeam
Single expanded beam termini compatible with multi-source connectors (38999, EN4165, EN3645). Featuring ball lens technology with an expanded beam superior to 50X in multimode.

Adapters/Other

Quadrax Fiber Optic Adapter
The Quadrax fiber optic cavity reducer allows the user to effortlessly convert electrical quadrax contacts in rack and panel connectors to fiber optics.

Promi
A miniature optical cable adaptor for reduced space. It features a compact removable splice, a split nut for easy installation and a boot for sealed connection.

Termination Kits

Overview

AFSI also offers individual tools and a suite of kits that support not only AFSI's harsh environment connectors but also any commercial-rated connector, including STs, SCs, MTPs, and LCs. These kits include consumables and measured test cables for troubleshooting, cleaning, inspecting, and termination. AFSI can customize kits to meet the requirements of any harsh environment fiber optic application from start to finish. In addition, AFSI is NAVSEA-certified on our tooling and termination kits.

Army / Marines

AFSI offers fiber optic termination kits for terminating most optical connectors on the market today.

Navy

AFSI offers a complete line of kits for terminating shipboard fiber optic connectors used by the Navy.

Industrial / Broadcast

AFSI offers a number of customized harsh environment kits for use with commercial, broadcast, oil & gas and mining applications.

Training

AFSI offers a variety of customized training courses that can be held at either our facility located in Allen, Texas or anywhere in the world. Courses are designed for personnel involved in the installation, testing, troubleshooting, and maintenance of fiber optic systems. They are taught by an Electronics Technicians Association (ETA) certified instructor and can be tailored to cover a host of topics including fiber 101, harsh environment connector solutions, commercial-rated connectors (ST, SC, SC), testing, troubleshooting, and splicing. Each course also offers students an opportunity to take the Fiber Optic Installer (FOI) and the Fiber Optic Technician (FOT) course provided by the ETA.

Field Service

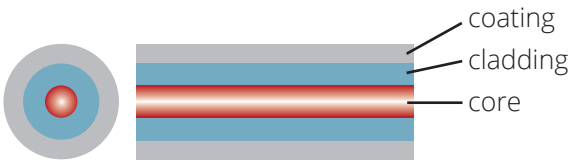
AFSI is a global leader in harsh environment fiber optic solutions. To help support our customer's needs, AFSI has an active field service team that will travel anywhere in the world to provide on-site installation, repair, troubleshooting, guidance, testing, and splicing.

Fiber Optic Cable Assemblies

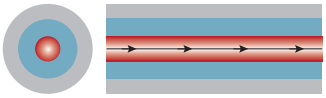
What is an optical fiber?

An optical fiber is made up of 3 concentric layers:

- **Core:** The central section, made of silica, is the light-transmitting region of the fiber.
- **Cladding:** The first layer around the core, also made of silica, that creates an optical waveguide which confines the light in the core by total internal reflection at the core-cladding interface.
- **Coating:** Non-optical layer around the cladding. It typically consists of one or more layers of polymer that protects the silica structure against physical or environmental damage.

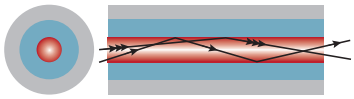


Single Mode Fiber:



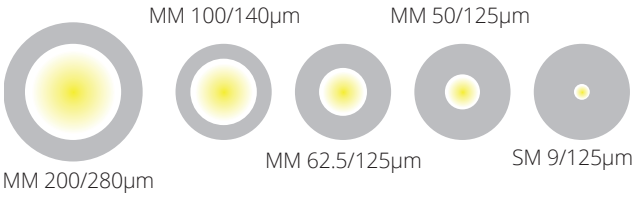
Only one mode is propagated. Light travels "straight" through the fiber. The core diameter is typically 9 microns.

Multi-Mode Fiber:



Light travels through fiber following different paths called "modes".

Fiber Sizes:

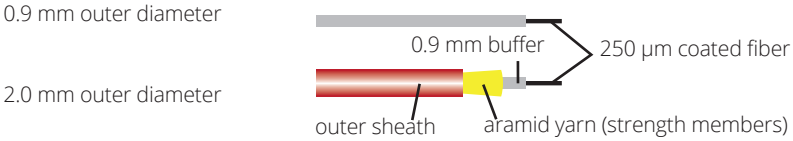


First number is Core diameter in microns.
Second number is Cladding diameter in microns.

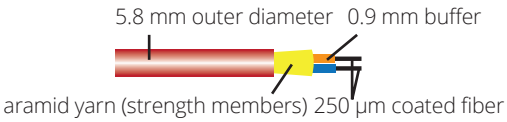
Fiber Optic Cables:

The coated fiber typically has an external diameter of 250 microns and is fragile. It is usually necessary to build cables to reinforce the fibers and make them more durable and easier to handle. There are many different cable constructions.

Single Fiber Cables:



Multi Fiber Cables:

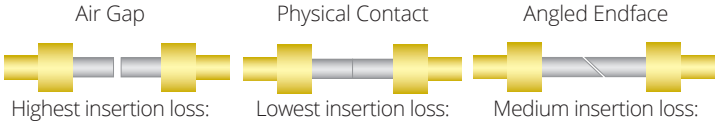


Fiber Optic Connectors:

A connector terminates the optical fiber inside a ceramic ferrule using epoxy to hold the fiber in place. The connectors can be mated and unmated at any time. There are two types of connectors:

Physical Contact:

Direct contact of polished fibers within two ceramic ferrules. The ferrules are aligned using a ceramic alignment sleeve.



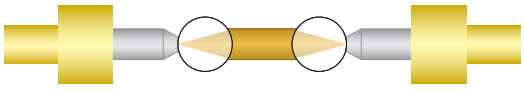
Air Gap	Physical Contact	Angled Endface
Highest insertion loss: > 1.0 db	Lowest insertion loss: < 0.3 db	Medium insertion loss: < 0.3 - 0.7db db
Worst return loss: < 14 db (Fresnel)	Good return loss: > 30 db	Best return loss: > 60 db
Multimode	Multimode	Singlemode

Advantages:
- Most common type of connection: rugged, cost-effective
- Typically low (0.3dB) insertion loss
- Generally less sensitive to liquid contaminates (water, oil)

Limitations:
- Signal loss is a function of alignment accuracy and polish quality

Expanded Beam:

A lens is placed at the exit of each fiber widening and collimating the light, which is then captured and re-focused in the receiving fiber.



Advantages:
- Easy to clean
- Less susceptible to particle contaminants (dust and dirt)

Limitations:
- Performance impacted by liquid/film on lenses
- Mechanical interface between connectors must be precise

The Amphenol Advantage

Amphenol advantage

Amphenol Military & Aerospace Operations is perfectly aligned to provide the latest technologies, cost-effective manufacturing and supply chain management, and local support to solve any military and aerospace interconnect need.

Global footprint, local support:
With 21 divisions in North America, Europe, and Asia, we can provide a local, regional presence to design and build any interconnect solution.

Cost-effective partnerships:
AMAO utilizes a vertically integrated supply chain to flow down the most competitive costs to our customers, even on the most complex solutions.

Manufacturing versatility:
Many AMAO interconnect solutions have dual production locations and off-set options which means our customers benefit from low-cost options without the fear of a single-source position.

Technology proliferation from other Amphenol divisions:
As the second largest interconnect company in the world, we're highly diversified and can provide our proven COTS technology from the antennas, sensors, industrial, and automotive markets to the military and aerospace world.

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