



Smarter System-Level Solutions That Save Space, Reduce Weight, and Boost Performance

TE'S SYSTEM SOLUTIONS ... LIGHTEN THE LOAD ... SAVE SPACE ... BOOST PERFORMANCE

Sense It . . . Connect It . . . Make It Happen

Work with TE Connectivity (TE) to solve tough connectivity and packaging issues. Talk to us early to leverage the full power of our expertise. Early on, we can take your preliminary requirements and recommend the best way to satisfy them technically and economically.

We become an extension of your engineering team—lending our expertise and allowing you to concentrate your resources in areas of your expertise. We can help you achieve:

Size and Weight Reduction

- Lightweight materials, including composites
- Miniaturization
- Higher integration

Complexity Reduction

• Integrated subassemblies

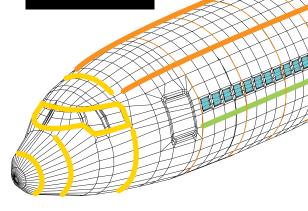
Signal Integrity

- Increased bandwidth
- EMI protection

Reliability

- Lightning protection
- Clean, reliable power
- Mechanical and environmental robustness

Avionics



TE Components ... TE Technology ... TE Know-how ...

AMP | Agastat | CII | Hartman | Kilovac | Microdot | Nanonics | Polamco | Raychem | Rochester | DEUTSCH SEACON Phoenix | L.L. Rowe | Phoenix Optix | AFP | SEACON

Get your product to market faster with a smarter, better solution.

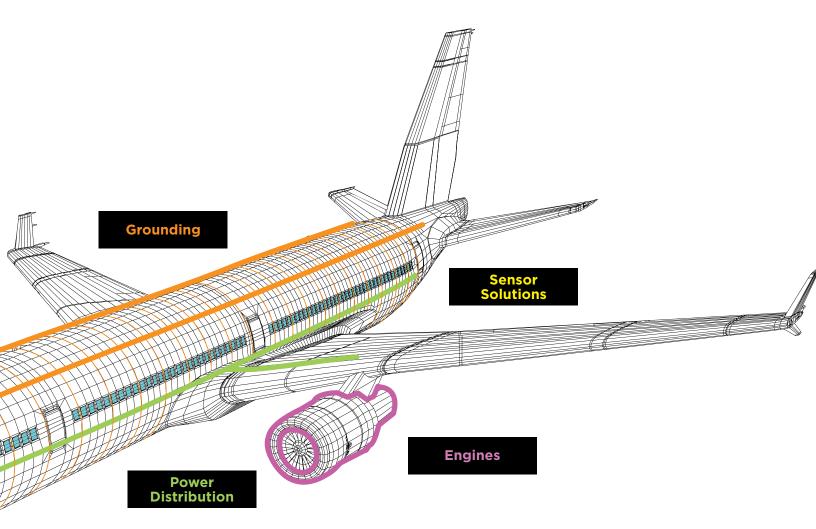
DISTRIBUTED AVIONICS

We are working with industry leaders to improve distributed avionics with concepts like the MiniMRP—with 40% smaller packages, lightweight composite enclosures, and high-speed connectivity



GROUNDING SYSTEM FOR COMPOSITE AIRFRAMES We help solve the challenges of grounding composite aircraft bodies with system-level approaches to reliable bonding and grounding





IFE and Cabin Systems

POWER DISTRIBUTION

Already used on major commercial aerospace platforms, our custom PDUs consolidate multiple contactors, circuit breakers, sensing and protective devices, and related components into modular packages



IN-FLIGHT ENTERTAINMENT

End-to-end connectivity solutions from enclosures and connectors to cable and harnessing—enable space and weight savings with easy-to-install high performance



SENSOR ASSEMBLIES

As a leader in sensor technologies, we are able to provide integrated solutions that combine the needs of high accuracy and reliability with low weight and compact, convenient packaging from sensor to I/O connector



FASTER, SMARTER CONNECTIVITY FOR MORE INTELLIGENT AIRCRAFT

Higher Bandwidth for Advanced Avionics

In today's electronically sophisticated, networked aircraft, higher bandwidth enables the full capabilities of such sophistication to be realized. We support the high-speed needs of avionics to ensure optimal monitoring and control of all flight systems with advanced optics, Quadrax connectors and QUADLITE cable, and the next-generation of industrystandard connectors. Our high-speed backplane connectors support the needs of high-density, high-bandwidth electronics with flexible packaging options, high signal integrity, and a small footprint.



VITA 66/67 OPTICAL AND RF MODULES

Get more flexibility in VPX backplane applications with optical and RF connectivity to allow LRUs and LRMs to be disconnected at the backplane. Our optical modules for VITA 66 support MT, ARINC 801, and expanded beam contacts, while VITA 67 RF modules support four or eight blindmate SMPM contacts



RUGGED OPTICAL

Optical technology saves weight and space and offers inherent EMI immunity. We offer you more choice in single- and multichannel connectivity using precision 1.25 and 2.50 mm ceramic ferrules, expanded beam, and MT multifiber termini for both rectangular and circular connectors



HIGH-SPEED NETWORKING

Our high-speed copper solutions increase aerospace networking performance. TE's Quadrax contacts support 100-ohm Gigabit Ethernet and 150-ohm Fibre Channel. The system includes contacts, QUADLITE cable, and inserts for industry-standard circular and rectangular connectors





Solutions for Avionics

Connectors

- High-Speed Backplane Connectors
- Rack-and-Panel Connectors
- I/O Connectors
- Fiber Optic Products
- Microminiature and
 Nanominiature Connectors

Relays and Circuit Protection

- Signal-Level and Solid-State Relays
- Circuit Breakers

Wire and Cable

- Coaxial, Triaxial, Quadraxial Cable
 and Connectors
- High-Frequency
 Filtering-Effect Wire

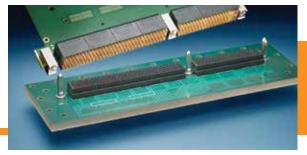
CEELOK FAS-T CONNECTORS

The smallest, field-repairable, 10G Ethernet connector for aerospace applications. CeeLok FAS-T connectors are ruggedized for excellent shock, vibration, temperature, and sealing performance, and feature an integral backshell for low cost, lowweight strain relief, and EMI protection



MULTIGIG RT 2-R CONNECTORS

Ultra-rugged VITA 46-compatible connectors with quad redundant contacts for exceptional performance in high-vibration environments and supporting speeds to 10 Gb/s to extend the potential of VPX systems

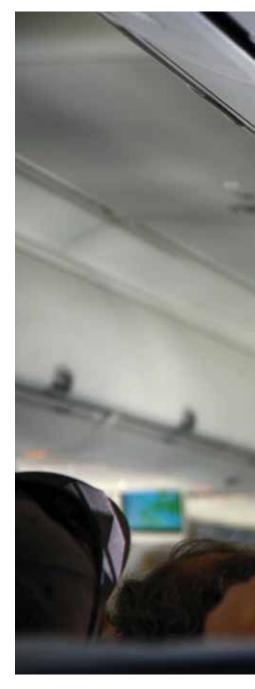


ADD PERFORMANCE FROM SEAT TO GALLEY

Copper or Fiber at Gigabit Speeds

Boost the performance of any cabin with flexible in-flight entertainment, web access, automated galley systems, and high-speed networking. We can provide interconnection solutions based on standards such as ARINC 664, 809, 810, and 832 and GAIN and 4GCN to achieve the right combination of performance and flexibility, allowing cabins to be modularly configured for passenger convenience and comfort and for greater crew efficiency.

Save space, reduce weight and handle tight radii easily with our cable and connectors—designed to install faster, perform better, and increase in-cabin capabilities through plug-and-play of equipment.



RECTANGULAR CONNECTORS

Our comprehensive range of high-density rectangular connectors gives you the flexibility to meet virtually any interconnection need. Inserts support singleended and differential signals, optical, power, and RF needs in a wide variety of combinations



Designed for IFE applications and cabin systems, these light weight single module connectors feature lightweight composite housings and push-pull mating. They are available with a wide assortment of inserts for signal, power, optical, and high-speed connectivity. They have become the standard for 3GCN and 4GCN interconnections



DEUTSCH 369 SERIES CONNECTORS For applications such as lighting requiring fewer contacts per connector, the new 369 Series connectors feature aerospace-grade materials to meet stringent

smoke, toxicity, flammability and





Solutions for Cabin Interiors and IFE

Connectors

- High-Speed I/O Connectors
- EN4165 and ARINC 809 Connectors
- Circular Connectors
- Fiber-Optic Connectors
- Galley Insert (GAIN) Connectors

Wire and Cable

- High-Speed Copper Cables
- Custom Multicore Cables
- Coaxial, Triaxial, Quadraxial Cable and Connectors

Networking

CANbus Networking

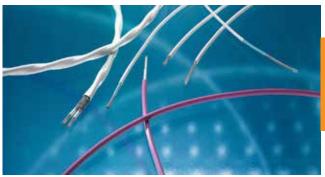
DEUTSCH CEELOK FAS-X CONNECTORS

CeeLok FAS-X connectors handle speeds of 10 Gb/s and more, making them the ideal choice for 10G Ethernet, IEEE 1394, USB 3.0 and other highspeed protocols. The termination and assembly is fast and straightforward, including the ability to field terminate and repair in as little as 5 minutes



HOOK-UP WIRE

Our flight-ready hook-up wire sets new levels for reduced size and weight in single- and dual-wall constructions. With temperature ratings from -65°C to 200°C, low smoke and corrosive gas generation, and resistance to electrical arc tracking in both dry and wet conditions, our hook-up wire also offers excellent abrasion and cut-through resistance and flexibility



MANAGE DEMANDING ENVIRONMENTAL CONDITIONS

Performance for the Extremes

The demanding environments of engines, landing gear, and wings present challenges in temperature extremes, vibration, mechanical abuse, and potential exposure to hydraulic oils and other fluids. From sealed relays and sensors to rugged wire and cable, you will find products that perform better, install easier, and stand up to the stresses of flight. As traditional hydraulic and mechanical systems are replaced with sophisticated electronics, you need robust solutions that can withstand the severe conditions of flight while maintaining mechanical and electrical integrity. From initial design stages to aftermarket maintenance and upgrades, we will work with you to increase performance and lower costs.



RUGGED SEALED CABLE ASSEMBLIES

Integrated harnesses provide ready-to-install solutions that mean reliability in the toughest application environments. Every assembly meets your requirements for sealing, moisture and chemical resistance, shielding, strain relief, flexibility, and ease of use



FILTER CONNECTORS

By incorporating electronic components to provide EMI filtering or transient protection, superior performance can be obtained, with the additional benefits of saving space, weight and system cost



SENSORS

A full range of sensors, from components to custom-made assemblies, like the steering feedback sensor pictured below, make use of titanium and carbon fiber to reduce weight and contactless design to withstand the temperature, shock, and vibration of flight





DEUTSCH 983 SERIES CONNECTORS -ESC10 - BACC63

High-vibration connector with anti-decoupling device for high temperature areas and harsh environments. The connectors are available with or without an integral backshell



RAYCHEM SHF-260 CABLE With a rating of 260°C, SHF-260 highly flexible cable can be bent and routed in extremely tight areas where conventional wire often wrinkles or cracks, and can be used for primary and secondary power distribution where high currents are needed



RUGGED AND CAPABLE FOR MAXIMUM RELIABILITY

Reduced Weight Increases Fuel Efficiency

With a large commercial aircraft containing upwards of 350 km of wiring, significant weight savings are possible with our thin-wall cables, rectangular and circular composite connectors, and optical interconnects. We put our expertise in materials science to work in creating cables and connectors that are smaller and lighter. Not only do they save space for easier routing, they open new possibilities for advanced capabilities such as fly by wire. All while giving you the robust mechanical and environmental performance needed.

Innovation for the Next Generation of Aerospace

We lead the industry in innovation by bringing together expertise in materials, processes, physics, and manufacturing. We use sophisticated computer modeling of the magnetic, thermal, mechanical, and electrical parameters of a design to ensure optimum performance. Then we engineer the product for easier use, longer reliability, and lower applied cost.



HIGH-TEMPERATURE DEVICES TE's shield termination devices provide environmentally protected shield termination on cables that are designed for applications requiring a maximum temperature rating of 200°C in the aerospace applications industry



POWER CONTACTORS AND RELAYS

Our lightweight contactors and relays handle high-power DC and AC needs. They are available hermetically or environmentally sealed, with a variety of electrical configurations, power ratings, voltage ratings, and mounting styles to make your electrical system more reliable and capable



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Solutions for Electrical Interconnection Harnesses

Connectors

- Power Connectors
- Vibration-Resistant Connectors
- Terminal Blocks
- Terminals and Splices

Harnessing

- Harsh-Environment Harnesses
- Bulkhead Feedthroughs
- Shield Terminations
- Identification Labels
- Heat-Shrink Tubing and Molded Parts

Wire and Cable

- High-Temperature and High-Performance Wire and Cables
- Controlled Electrical Cables

DEUTSCH D-EASY FEEDTHROUGHS

For bundle and wire applications, D-EASY pressure-seal feedthroughs offer easy mounting and fast installation. The removable seal fitting allows rework of the seal in situ without wire removal. D-EASY feedthroughs are available with or without shielding protection and accessory interfaces. The overall housing is a lightweight composite, available unplated or nickel plated, with fluorosilicone gaskets and seals



DEUTSCH WILDCAT 38999 AND MICRO CONNECTORS

Wildcat connectors provide the highest contact density in 38999 style connectors. The range is also complemented with a series of micro connectors for use where space is at a premium



POLAMCO CONNECTORS AND BACKSHELLS

Our newest line offers a complete range of high-performance backshells for unshielded, shielded, and rugged conduit systems. Supporting one of the widest variety of Mil-Spec and COTS connectors, we have a solution for virtually every rugged, lightweight, and specialized need



LET'S CONNECT

We make it easy to connect with our experts and are ready to provide all the support you need. Just call your local support number or visit www.te.com/industrial to chat with a Product Information Specialist.

Technical Support

te.com/support-center

| North America | +1 800 522 6752 |
|----------------------|-----------------|
| North America (Toll) | +1 717 986 7777 |
| EMEA/South Africa | +800 0440 5100 |
| EMEA (Toll) | +31 73 624 6999 |
| India (Toll-Free) | +800 440 5100 |

Asia Pacific Japan Australia New Zealand +86 400 820 6015 044 844 8180 +61 2 9554 2695 +64 (0) 9 634 4580

SMARTER SYSTEM-LEVEL SOLUTIONS THAT SAVE SPACE, REDUCE WEIGHT, AND BOOST PERFORMANCE



te.com/CommAero

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Consult TE for the latest dimensions and design specifications.

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Help Your Design Take Off With Solutions That Save Space . . . Reduce Weight . . . Survive Harsh Environments

SMARTER CONNECTIVITY FOR INTELLIGENT FLIGHT

Solving Tough Technical Issues

Success in today's rugged avionics environment takes more than a thorough understanding of your own products. Success demands an equally sophisticated understanding of the application and how well your product interacts as part of an overall integrated system. At TE Connectivity (TE), we understand complex system protocols, key electrical parameter requirements, and overall mechanical performance requirements of the military aerospace market. As you look toward a holistic approach to system interconnection known as electrical wiring interconnection systems (EWIS) and the significant role avionics plays in EWIS systems, count on TE for solutions that combine avionics, high performance, long-term reliability, and innovation to meet the next-generation of needs.

Typical Applications

- Radio Communications
- Processors
- High-Speed Computers
- Navigation

TE Components . . . TE Technology . . . TE Know-how . . .

AMP | Agastat | CII | Hartman | Kilovac | Microdot | Nanonics | Polamco | Raychem | Rochester | DEUTSCH SEACON Phoenix | L.L. Rowe | Phoenix Optix | AFP | SEACON

Get your product to market faster with a smarter, better solution.

FORTIS Zd CONNECTORS

This modular high-density backplane connector system handles signal, power, and high-speed differential pairs up to 12+ Gb/s in a rugged highshock and high-vibration environment



RAYCHEM HIGH-SPEED CABLE A true Gigabit Ethernet family of high-speed cables that are small in size, light weight, rugged, and capable of handling a wide temperature range from -55° C to $+200^{\circ}$ C





MULTIGIG RT 2-R CONNECTORS The standard connector for VITA 46 applications, the MULTIGIG RT 2 connector has been redesigned to be even more rugged. Passing the extreme testing requirements of VITA 72, the new MULTIGIG RT 2-R connectors offer quad redundant contacts for reliable connections and is drop-in backwards compatible with the original design





CEELOK FAS-X CONNECTORS

Using a 38999-style shell, CeeLok FAS-X connectors handle speeds of 10 Gb/s and higher, making them an ideal choice for 10G Ethernet, IEEE 1394, USB 2.0 and other high-speed protocols. The termination and assembly is fast and straightforward, including the ability to field terminate and repair in as little as 5 minutes



Solutions for Avionics

Embedded Computing Connectors

- High-Speed Board-Level
 Connectors
- Mezalok Mezzanine Connectors
- VITA 66/67 Optical and RF Modules

High-Speed I/O

- Gigabit and 10G I/O Connectors
- High-Speed Cable and Cable Assemblies

I/O Connectors

- Subminiature-D Connectors
- Micro-D Connectors
- Nanominiature Connectors

Relays

- Switching Relays
- Solid-State Relays
- Board-Level Relays

Rugged Fiber Optics

- High Density Optics
- Active Optic/Passive
 Optic Solutions
- Physical Contact
- Expanded Beam
- ARINC 845 / SAE AS6251
 EB16 Termini

MEZALOK CONNECTORS

Using well-established Mini-Box contact and BGA technologies, Mezalok connectors for VITA 61 are a high-reliability choice for XMC serial switched fabric applications, supporting data rates of 5 Gb/s and providing exceptional thermal stability and resistance to shock and vibration. The connectors are available in stacking heights of 10, 12, 15, and 18 mm and sizes of 60, 114, and 320 positions



HARNESS RELIABILITY FROM TIP TO TAIL

Rugged Reliability for Higher Performance, End to End

The backbone of every military aerospace platform, wiring harnessing interconnects every subtier system, including critical radar and avionics systems. Our robust and reliable harnessing components help you meet today's stringent 20-year mean time between failure (MTBF) life expectancy—and can help you reduce weight and size, operate at higher data rates, and perform over extended temperature ranges.

Typical Applications

- Avionics Bays
- Environmental Systems
- Engine Bays
- Flight Controls
- Power Switching
- Landing Gear

DEUTSCH CTJ SERIES TERMINAL JUNCTION MODULES

Compact, environmentally sealed, CTJ Series modules accommodate common bussing of 6 to 20 contacts in a small area. Internal busbars are configured to allow connections of various combinations of wires from 22 through 12 AWG, while providing fluid resistance, vibration dampening, and a temperature range of -65°C to +200°C



RAYCHEM MIL-STD-1553B DATA BUS

TE offers a complete line of couplers, connectors, terminators, and cables to help meet the most stringent airframe requirements. We also provide fully tested assemblies with temperature ranges from -55°C to +150°C





RAYCHEM SPEC 55 WIRE AND CABLE

TE's military-qualified, highperformance primary wires and cable, offered in both single- and dual-wall construction, provide small size, light weight, and outstanding chemical resistance. This wire provides excellent abrasion and cut-through resistance and flexibility, with an extended temperature range from -65°C to +200°C





RAYCHEM 200°C SOLDERSLEEVE DEVICES

SolderSleeve terminations are one-step heat-shrinkable wire and cable interconnection devices that insulate, strain relieve, and help protect terminations from environmental damage



DEUTSCH DTS 38999 CONNECTORS

Our range of MIL-DTL-38999 and 38999-style connectors gives you more choice in shell sizes, materials, and inserts for power, signal, and optical needs, filtering and EMI protection, hermetics and other special environmental sealing. If you need 38999, talk to TE



MEET YOUR VISION WITH TE INNOVATION

Reduce SWaP, Increase High-Frequency Capability

The changing RF world is now demanding higher bandwidths and faster speeds to meet the increasingly sophisticated needs of radar and communications. The drive toward smaller packages, higher electronic densities, and ease of use requires innovative next-generation "families of products." TE understands these needs. We will work with you from early design involvement to a final product solution.

Typical Applications

- Radio Communications
 C4ISR
 - Seeker and Guidance
- Data Links

Radar Control

- Seeker and GuidAESA Radar
- ALC

RAYCHEM CHEMINAX

COAXIAL CABLE Cheminax cables bring tightly controlled electrical characteristics to miniature coaxial cable—offering electrical performance exceeding standard RG cables in a smaller, lighter design while providing lower attenuation and capacitance



COMPOSITE CONNECTORS

Achieve significant weight savings with help from our composite-shell connectors, which combine weight savings with corrosion resistance, temperature ranges as wide as -65°C to +200°C, and compatibility with standard inserts for signal, power and optical connectivity. Many of our connector families are available with composite options





DEUTSCH HIGH-FREQUENCY MICROWAVE HARNESSES

MICROWAVE HARNESSES Custom-designed and applicationspecific, with flexible and semirigid cables capable of handling up to 60 GHz. We offer complete in-house design, testing, and certification of our RF cable assemblies



Solutions for Radar

Board-Level Connectors

- High-Speed Backplane Connectors
- Mezalok Mezzanine Connectors

I/O Connectors

- Nanominiature Connectors
- Microminiature Connectors
- Fiber Optic Connectors
- Subminiature-D Connectors

RF Connectors

- OSP, OSSP RF Connectors
- SMA, BNC, TNC RF Connectors
- SMP/SMPM RF Connectors

RF Cable and Assemblies

- Cheminax Coaxial Cables
- RF Cable Assemblies

Relays

• Board-Level Relays

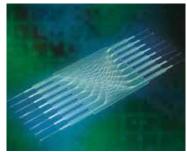
SMP/SMPM RF CONNECTORS

Supporting applications up to 40 GHz, TE's military-qualified SMP/SMPM connectors are available in board- and cable-mount versions, including VITA 67



OPTICAL FLEX CIRCUITS

Our custom optical flex circuits feature a tight bend radii and very low insertion loss over a broad temperature range. With both symmetrical and asymmetrical configurations, they can accommodate up to 6 layers and 6 levels of fiber crossings in a single layer



DEUTSCH EMI FILTER CONNECTORS

By incorporating electronic components to provide EMI filtering or transient protection, superior performance can be obtained, with the additional benefits of helping to save space, weight, and system cost. Filter options range from a few kilohertz to several gigahertz. Custom filtered boxes are also an option



TARGET RUGGED RELIABILITY

Powerful Solutions for Extreme Conditions

The complexity and advanced capabilities of today's smart munitions require a high level of interconnection. Multifunctional levels of capability drive the need for more complex processing in a smaller, lighter weapons package. Rapid-fire weapon systems demand solutions to withstand the high shock and vibration they exhibit.

We are creating the next generation of interconnect products to help meet the most stringent electrical and physical demands.

Typical Applications

- Missile Launchers
- Bomb Racks
- Gun Mounts
- Pods

RAYCHEM SEALED HARNESSES

Design engineered from the beginning, our harnesses are small, lightweight, rugged, and environmentally sealed. Each design is customer specific and tailored to help meet your strictest requirements. Our comprehensive solutions include TE cables, connectors, backshells, tubing, molded parts, and adhesives including next-generation lightweight shielding and boots



DEUTSCH DMC-M EN4165 CONNECTORS

With aluminum alloy or composite shells, DMC-M connectors are lightweight multimodule connectors that give you modularity to deploy signal, power, optical, and highspeed connectivity. Designed to EN4165 requirements, the series' range of inserts, options, and accessories provides maximum flexibility in configuration





DEUTSCH STORES INTERFACE CONNECTOR

TE's ML-STD-1760 connector systems enable a high-reliability interface with mission stores equipment. The drop launch 1760 Type 1 is available in both aluminium and composite versions. The 1760 Type 2 is for rail launch applications and incorporates a replaceable buffer system for protection from missile efflux. The 1760 interface is also available in standard MIL-DTL-38999 Series III shells





Solutions for Weapon Systems

Connectors

- MIL-STD-1760 and Lanyard Connectors
- Ruggedized Circular Connectors
- High-Temperature Connectors
- Hermetic Connectors

Networking

• MIL-STD-1553 Data Bus

Wire and Cable

- Specialty Wiring
- High-Speed Cables and Assemblies
- Sealed Harnesses
- Lightweight Shielding

Rugged Fiber Optics

- AFP MCUBE Transceiver
- MC801 Connectors
- ARINC 845 / SAE AS6251
 EB16 Termini

MICRO-D CONNECTORS TE's Micro-D connectors are qualified to M83513. These high-density, lowprofile connectors are available in circular and rectangular formats. Our new offerings include high-speed signal and power, and can be put into a single housing to help support maximum space and weight savings



AFP MCUBE TRANSCEIVER

With performance to 3 Gb/s in a spacesaving miniature cube that mounts horizontally or vertically, MCUBE transceivers are available with Fabry-Perot lasers for a discrete single channel per fiber or with distributed feedback CWDM lasers for multiplexing up to 18 channels per fiber



MC801 CONNECTORS

The MC801 connector combines the high performance of ARINC 801 optical termini with the convenience of a familiar D38999 Series III connector style to provide a high-density solution with up to 32 fibers in a size 25 shell. Removable alignment inserts enable easy inspection and cleaning



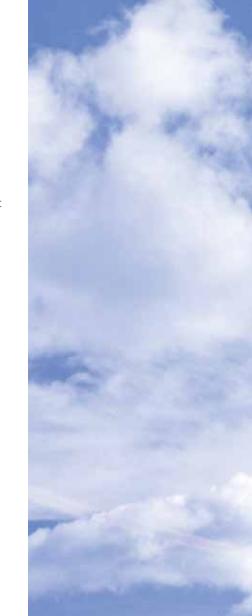
TAP OUR POWERFUL SOLUTIONS

Performance and Reliability Take Flight

Today's modern aircraft, with their advanced avionics, AESA radar, and complex control systems, demand generators to produce electrical power at record levels. This drives requirements for increased isolation and switching performance, better sensing capability, and improved thermal management. With all the capabilities we build into our products, you can still rely on us for compact, lightweight components. Plus we can integrate electronics and custom tailor efficient power distribution panels.

Typical Applications

- Main Bus Isolators
- Weapons Fire and Control
- Radar/Jammer Hydraulic Pumps
- Fly by Wire • Battery Isolators
- Directed Energy Auxiliary Power Unit Start



DEUTSCH 983 SERIES

FIREWALL CONNECTORS High-temperature 983 Series firewall connectors are designed to take the heat-up to 200°C. The finely threaded connectors feature self-locking plugs, shell-to-shell metal bottoming, and special insert materials to make them well suited to firewall feedthrough applications



AC AND DC RELAYS AND CONTACTORS

With one of the largest QPL offerings in the industry, we offer a broad range of relays and contactors, switching power from signal level to hundreds of kilowatts. Our components maintain superior reliability in some of the smallest, lightest weight packages in the industry





POWER DISTRIBUTION UNITS

We have decades of experience designing custom panel assemblies that help accommodate whatever bill of material and point-to-point layout the application requires, optimizing space and providing weight savings over discrete installations



DEUTSCH DTS-HC SERIES POWER CONNECTORS

Ideally suited for high-power interconnections in harsh environments, the connector's power contacts are rated to 300 A and are suitable for terminating conductors up to 70 mm². Based on military-standard 38999 housings, the connectors help provide the reliability and performance required for many of the most demanding aerospace applications



Solutions for Power Systems

Connectors

• Circular Power Connectors

Wire and Cable

• Flexible Power Wire and Cable

Relay and Contactors

- Solid-State Relays
- 270 VDC Contactors
- Board-Level Switching

Protection and Control

- Overcurrent Protection
- Ground Fault Interrupters
- Timers and Sensors
- Solenoids

Value-Added Subassemblies

- Primary Power Distribution
- Secondary Power Distribution
- Custom Power Panels

SMART CONNECTIVITY

We are bringing advanced intelligence to contactors, with current and voltage sensing using current transformers or Hall-effect switches, protection from differential currents, overcurrent tripping, hard faults, and remote reset capabilities. The result is better power management, lower power consumption, and smaller, more capable packages



SETTING NEW DIRECTIONS IN FLIGHT CONTROL

Fly with a Higher Level of Confidence

Modern flight controls combine mechanical, hydraulic, and, increasingly, fly-by-wire systems to manage flight control surfaces, landing gear, and other mechanisms.

As the sophistication of these controls increases, so do the requirements for faster processing speeds and smaller, lighter, and more reliable solenoids, sensors, and actuators.

Typical Applications

- Altitude Control
- Angle of Attack
- Yaw, Roll, and Pitch
- Throttle Controls
- Control Yoke
- Elevator Trim
- Wing Flaps
- Landing Gear

HERMETIC CONNECTORS

The variety of TE connector families available in hermetic versions means you do not have to compromise in your choice of connectivity. Get hermetic sealing for increased environmental performance that helps to meet the harsh demands throughout the aircraft



POLAMCO CONNECTORS AND BACKSHELLS

Our newest line offers a complete range of high-performance backshells for unshielded, shielded, and rugged conduit systems. Supporting one of the widest variety of Mil-Spec and COTS connectors, we have a solution for virtually every rugged, lightweight, and specialized need





RAYCHEM RUGGED CONDUIT HARNESSES

CONDUIT HARNESSES Our rugged conduit harnesses provide reliable connectivity in severe environments with hightemperature insulation and jackets, lightweight shielding, flexibility, and repairable components to meet EWIS requirements





Connectors

- High-Temperature, Vibration-Resistant Connectors
- Hermetic Connectors

Harnessing

- High-Temperature Wire and Cable
- Rugged Conduit Harnesses
- High-Performance Backshells
- Tubing and Molded Parts

Control

- Custom Tubular Solenoids
- Sensors

CUSTOM SOLENOIDS

We custom design linear-motion solenoids to perform in extreme temperatures, high altitudes, and demanding shock, acceleration, and vibration environments. Available with push, pull, or combination actuation, our solenoids service a variety of applications such as fuel tanks, bomb racks, and hydraulic systems



SENSORS

Our sensors help give you high-accuracy and high-reliability sensing combined with low weight, compact size, and low power requirements. Packaged to withstand harsh environments, our sensors can include wired or wireless high-speed telemetry and integration into value-added assemblies



KEEP UAVs ON ACTIVE DUTY

Fly Higher, Fly Longer

Unmanned aerial vehicles (UAVs), ranging from 60-foot wing spans on high altitude platforms to the size of a small hummingbird, require innovative solutions to meet the mission requirements of long flight times, advanced intelligence-gathering capabilities, and weapons delivery. The UAV market demands small, lightweight, low-cost solutions in an ever-evolving market that must adapt quickly to changes and threats in a global environment.

Typical Applications

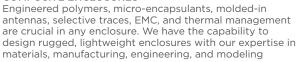
- Electro-Optical
- Communications
- Weapons Systems
- InfraredRadar
- Weapons SystemFlight Controls
- Flight Cont

COMPOSITE ENCLOSURES

DEUTSCH DBAS SERIES CONNECTORS

The rugged DBAS series offers easy and secure locking with a push/pull coupling ring for 100% mating. They are rated from -55°C to +200°C, and available in environmentally or hermetically sealed, rack-mountable, and lanyard release versions





SO57





Solutions for Unmanned Systems

Embedded Computing Connectors

- High-Speed Backplane Connectors
- Mezalok Mezzanine Connectors
- VITA 66/67 Optical and RF Modules

Optical Connectors

- Active Optical Assemblies
- Fiber Optic Connectors
- Expanded Beam and Ceramic Ferrule Optical Termini

I/O Connectors and Cable

- Gigabit and 10G I/O Connectors
- Wildcat Micro Connectors
- High-Speed Cable

Relays and Contactors Packaging

Composite Enclosures

K SERIES RELAYS

Our K Series contactors are among the smallest, lightest available, helping you to meet critical SWaP requirements while providing switching capabilities of up to 1000 A at 28 VDC



DEUTSCH 369 SERIES CONNECTORS

For applications requiring fewer contacts per connector, the new 369 Series connectors feature aerospace-grade materials to help meet stringent smoke, toxicity, flammability, and sealing requirements



INTEGRATED SOLUTIONS

Our expertise in materials, packaging, modeling, and advanced products provides you with custom integrated solutions with plug-and-go convenience. From harnesses and composite enclosures to conformal antennas and PDUs, we help you save weight and space while lowering costs and boosting performance



LET'S CONNECT

We make it easy to connect with our experts and are ready to provide all the support you need. Just call your local support number or visit www.te.com/industrial to chat with a Product Information Specialist.

Technical Support

te.com/support-center

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HELP YOUR DESIGN TAKE OFF WITH SOLUTIONS THAT SAVE SPACE . . . REDUCE WEIGHT . . . SURVIVE HARSH ENVIRONMENTS



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Connectors, Wire and Cable, and Sensor Products and Solutions Designed, Built, and Tested for Proven Performance in Harsh Environments

PERFORMANCE THAT RUNS DEEP

Save Size and Weight, Boost Reliability and Performance

At TE Connectivity (TE), we're focused on improving performance and increasing reliability in offshore applications by providing rugged connectivity solutions to tame the most extreme environments on Earth.

Whether it's long-life performance in a subsea network, corrosive salt spray on a wind-swept oil rig, the severe loading on an umbilical cable on a 4 km dive of a remotely operated vehicle (ROV), or the relentless drive to save space and weight, you'll find your solution in our unparalleled product lineup.

For more than half a century, TE's electronic systems and components have withstood weather, corrosion and extreme temperatures to help keep marine oil and gas exploration and production productive, safe, and dependable.

Our Bottomless Commitment

Our wide and deep experience solving the tough problems in offshore exploration and production, and close working relationship with customers, enable us to deliver the best solution. Working closely with both equipment designers and exploration/production service companies gives us the ability to create connectivity solutions that meet the specific demands of an application in topside, subsea, and downhole environments.

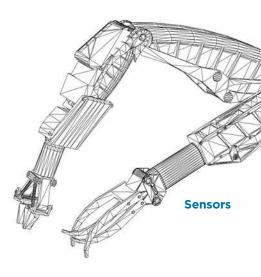
New Depths in Performance and Reliability

Offshore equipment must operate safely and reliably 24/7/365 under harsh conditions. Downtime is expensive, failures can be dangerous, and repairs can be difficult. At TE, we are addressing the key issues in making offshore facilities more productive, reliable and safe.

- Safety
- Mechanical Reliability
- Com
- Signal Integrity
- Space and Weight Savings
- Explosion Proof
- Complex Data Transmission
- 25+ Year Life
- Environmental Toughness

Dry-Mate Connectors

Lighting and Camera Connectivity

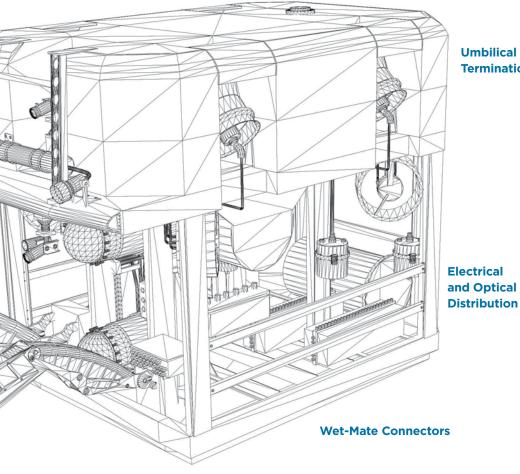


TE Components ... TE Technology ... TE Know-how ...

AMP | Agastat | CII | Hartman | Kilovac | Microdot | Nanonics | Polamco | Raychem | Rochester | DEUTSCH SEACON Phoenix | L.L. Rowe | Phoenix Optix | AFP | SEACON

Get your product to market faster with a smarter, better solution.

Power Management



The Brands You Trust for Rugged Reliability

SEACON • DEUTSCH • Rochester

For the widest range of connectivity and sensor solutions designed for topside and subsea applications, TE's SEACON portfolio includes over 2500 underwater electrical and fiber optic connectors, and complete connectivity systems to give you a wide range of advanced connectivity options. The portfolio includes not only SEACON products, but DEUTSCH connectors, Rochester engineered cables, and TE sensors—giving you one-stop access to rugged, reliable solutions.

Umbilical Cables and Termination Assemblies

An Expansive Line of Solutions

Connectors

- Signal Connectors
- Power Connectors
- Fiber Optic Connectors
- Wet-Mateable Subsea Connectors

Cables

- Umbilical, Tether, MUX, and Other Subsea Cables
- Penetrators
- Topside Marine Wire and Cable
- Flying Leads

Integrated Solutions

- Electrical and Optical Distribution
- SUTAs (Subsea Umblical Termination Assembly)
- Cable Management and Harnessing
- Cable Assemblies

Power Management

- Relays and Contactors
- Telecommunication Services

Sensors

- Pressure Sensors
- Position Sensors
- Temperature Sensors
- Force Sensors

MAKING TOPSIDES SAFER AND MORE PRODUCTIVE

Count on TE connectors to make topside operations safer. TE DEUTSCH and SEACON connectors specifically designed for such applications as FPSO are available for power, optics, and signals. Explosion-proof connectors maintain circuits in severe environments, while allowing dry, splash, or wet mating.

Lightweight, Space-Saving Cables. Explosion-Proof Connectors

We are an industry leader in the application of thin-wall insulation and jacketing to cables. Gain significant savings in space and weight without sacrificing mechanical reliability and strength or thermal stability. Plus, smaller cables have tighter bend radii for more flexible routing and efficient use of cable trays. We help increase safety of personnel and protection of equipment with low-fire-hazard, low-smoke, zero-halogen cables that minimize toxic and corrosive gases. We also help enable safety through our broad range of exlosion-proof connectors for offshore use.

Topside Applications

- Platforms
- Drilling Rigs
- Floating Production, Storage and Offloading
- Compressors
- Top Drives

SEACON EX-MATE CONNECTORS

Atex-certified explosion-proof connectors are wet mateable to depths of 50 m, EX-MATE connectors come in four shell sizes to accommodate 2 to 37 contacts. Interchangeable inserts provide flexibility in achieving a variety of pin configurations. They are rated for 600 VDC/440 VAC



• Seismic Streamers

- Skids
- Dry Trees
- Buoys
- Swivel Stacks
- Disconnectable Turret Moorings

SEACON SEA-MATE CONNECTORS

For diver communications, underwater TV, lights, ROVs, and ship-to-shore communication, SEA-MATE wet-mate connectors are an expansive line withstanding up to 7500 psi in both mated and unmated conditions. Options include oil-filled pressure balancing, ROV mateability, and a high-power 50 A version



SENSORS FOR TOPSIDE

Featuring global certifications including CSA, ATEX, IECEx, SIL2, ABS and DNV, TE pressure transducers can be used in various on and offshore applications. Special alloys and a unique one-piece sensing element combine to offer a high-performance, highly repeatable pressure transducer for hazardous areas up to 20,000 psi







RAYCHEM HARNESSING COMPONENTS

Our application-matched tubing, molded parts, adhesives, backshells, and other harnessing components give you everything you need to build cable assemblies as rugged as your application



DEUTSCH 9316 SERIES CONNECTORS

A workhorse family for a wide range of topside and subsea applications, 9316 connectors are available in seven shell sizes for power, signal, coaxial, and optical contacts. The connectors are available with a range of voltage, current, and temperature ratings, with a pressure rating up to 10,800 psi, and in explosion-proof and hermetic versions



RAYCHEM SIGNAL AND POWER CABLES

Save weight and space with Raychem cables. Our advanced materials technology allows thin-wall cables with robust mechanical, electrical, and environmental properties matched to application hazards. You will find a full range of materials, conductor configurations, and shielding for data communications, control, and power applications



DEUTSCH EXPLOSION-PROOF SIGNAL CONNECTORS

Our MOD, MSD, MDP and 9316 Series connectors are explosion-proof connectors suited to topside application in hazardous environments such as FPSO turrets. Offering robust splash-zone-mateable connections, explosion-proof connectors are available with electrical, optical, and hybrid options



CONNECTING EXPLORATION AND DEVELOPMENT PERFORMANCE WITH RELIABILITY

New Depths in Efficiency and Dependability

TE's Rochester and Raychem remotely operated vehicle (ROV) umbilical and tether cables, available in both standard and custom configurations, benefit from our expertise in matching dynamic mechanical needs with electrical power, control, and instrumentation requirements. Our innovations in thin-wall cables, armoring, buoyancy, and other critical parameters mean smaller, lighter cables—by 15% to 30%—that allow longer lengths on your current winching equipment.

SEACON Connector Range

SEACON connectors offer the widest range of reliable signal, power, optical, and micro solutions for underwater use.

Count on TE for wide-ranging interconnection solutions for exploration and development (E&D). We speak your language, have wide and deep experience solving the tough problems in offshore exploration and production, and work closely with you to ensure the best solution.

Cabling Solutions for E&D Applications

Cable

- Side-Scan Sonar Cables
- Electro-Optical Tow Cables
- Single and Multiconductor CTD and Instrumentation Cables
- ROV Umbilical Cables
- ROV Tether Cables

ROCHESTER UMBILICAL AND TETHER CABLES

Heavy-lift umbilical cables and neutrally buoyant or heavy tether cables are available for all lifting applications in offshore and marine environments. The integration of our thin-wall technology offers reduced weight and diameter to allow longer lengths on current handling equipment, or greater power capability in a fixed cable size



Connectors

- Wet-Mate Connectors
- Dry-Mate Connectors
- Electrical Connectors
- Optical Connectors
- Light and Camera Connectors

SEACON ALL-WET CONNECTORS

These inexpensive yet reliable rubber molded connectors allow the users to make and break connections both on the surface and underwater. The connectors are available in a range of configuration with capabilities of up to 42 contacts, 600 VDC, 50 A, and 20,000 psi pressure



AFP MEDIA CONVERSION

TE's AFP Super Chassis platform offers media conversion and signal aggregation solutions for many common signal protocols. Our expertise in customizing media converters to fit typical ROV electronics enclosures provides an end-to-end ROV-to-topside media conversion and connectivity solution





SEACON 55 SERIES DRY-MATE CONNECTORS With five shell sizes and up to 24 contacts, 55 Series connectors are rated to 10,000 psi and 600 VDC. Material options include stainless steel, titanium, aluminum bronze, alloy 625, and nonmetallic, corrosion-proof PEEK for weight savings. All are compatible with industrystandard connectors



ROV TORQUE SENSOR

Our torque sensors help you control torque tools with a high degree of precision over a wide range for force. Sensing is bidirectional and the sensor is easily integrated into the tool



SEACON OPTI-CON CONNECTORS

Typically used for cameras, monitoring equipment, sonars, towed arrays, and applications requiring high data transfer rates, OPTI-CON connectors come in five shell sizes, are rated to 7500 psig and feature 1, 4, 8, 12, or 20 channels in any electrical or optical configuration, single mode or multimode



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SUBSEA WET-MATE CONNECTOR SOLUTIONS

Making Subsea Operations More Productive

With TE, you will find one of the widest arrays of connectors for subsea applications. We support both dry-mate connectors for permanent use in equipment and wet-mate connectors for subsea pluggability. With design lifetimes counted in decades, our connectors withstand the pressures, temperatures, and other hazards of ocean depths.

As the industry moves toward fiber-optic monitoring systems to leverage the bandwidth, transmission distances, and low noise of optical systems, we can help you achieve end-to-end connectivity supporting both large and small fiber counts and single-mode and multimode fibers.

We also offer power connectors, signal connectors, and hybrid electrical/ optical connectors to give maximum flexibility.

Subsea Applications

- X-Mas Trees
- Subsea Control Module (SCM)
- Transformers
- Circuit Breakers
- Electrical Submersible Pumps
- Variable-Speed Drives

- Compressors
- Separators
- Seabed Seismic
- Multiphase Pumps
- Permanent Reservoir Monitors

SEACON HYDRAELECTRIC

WET-MATE CONNECTORS Qualified for depths of 4000 meters, HydraElectric connectors use a modular construction that enables many configurations to be assembled from a minimum number of components. With a dual-barrier oil-filled, pressure-compensated design, the connectors accommodate 4, 7, or 12 electrical contacts and ROV, manual and stab plate configurations with industry-standard panel interfaces



SEACON HYDRALIGHT CONNECTORS

Oil-filled, pressure-balanced optical connectors, HYDRALIGHT connectors offer low insertion loss and back reflections. The 8-channel titanium connectors withstand depths to 7000 m, with a design life of 30 years and 100 mating cycles





SEACON FIBER OPTIC JUMPER AND DISTRIBUTION HARNESSES

Subsea jumper assemblies and distribution harnesses provide pressurebalanced oil-filled cabling solutions. Serving as a conduit for fiber optic lines, an elastomeric tube is filled with a compensating fluid, allowing the sea pressure to freely communicate with the interior oil volume, equalizing the pressure in the assembly





DEUTSCH POWER CONNECTORS Designed for wet-mate applications used on subsea boosting, compression and renewable applications, DEUTSCH medium and high-power connectors are wet-mateable, offer flexible designs for flexible field layout, and are rated up to 18/30 (36) kV and up to 1600 A



DEUTSCH TUBING HANGER FEEDTHROUGH CONNECTORS

Our DEUTSCH tubing hanger feedthrough connectors are offered in both electrical and optical multi channel configurations capable of withstanding high temperatures and high pressures. The connectors are rated up to 15,000 psi, 350°F and PSL 3G, per API 6A



SEACON CM2000 CONNECTORS

With stab, diver and ROV configurations, CM2000 underwater mateable electrical connectors use a modular design that makes them highly adaptable to special designs beyond their industry-standard configurations. With a depth rating of 3500 m, design life of 25 years, and a minimum of 100 mating cycles, the connectors are available for signal and power up to 3.3 kV



SUBSEA PRODUCTION AND CONTROL

Fathom the Possibilities

You have unlimited opportunity with one of the widest ranges of underwater electrical and fiber optic connectors available anywhere in the world. This range of connectors covers not only optical, signal, and power, but hybrid connectors mixing these capabilities in a single unit. Our broad range of cable, connectors, penetrators, sensors, and switches gives you the flexibility to configure the ideal connector system for your most extreme applications.

Subsea Applications

- X-Mas Trees
- Subsea Control Module (SCM)
- Transformers
- Circuit Breakers
- Electrical Submersible Pumps
- Variable-Speed Drives
- Compressors

- Separators
- Seabed Seismic
- Multiphase Pumps
- Pipe Heating and Monitoring
- Blowout Preventers
- Permanent Reservoir Monitors

SEACON MUX CONNECTORS

Used for communication/ monitoring and control of subsea blowout preventer systems, our MUX connectors are based on the successful Metal Shell Series and incorporate time proven sealing technology and termination methods to allow for reliable terminations of electrical, signal, and power, and optical communication in mission-critical applications



ROCHESTER MUX CABLES

Our high-performance armored MUX cables are impervious to the harsh environmental conditions of offshore drilling and oil production. A range of specialized constructions include both optical and electrical capabilities in a variety of diameters and strengths



API CONNECTORS

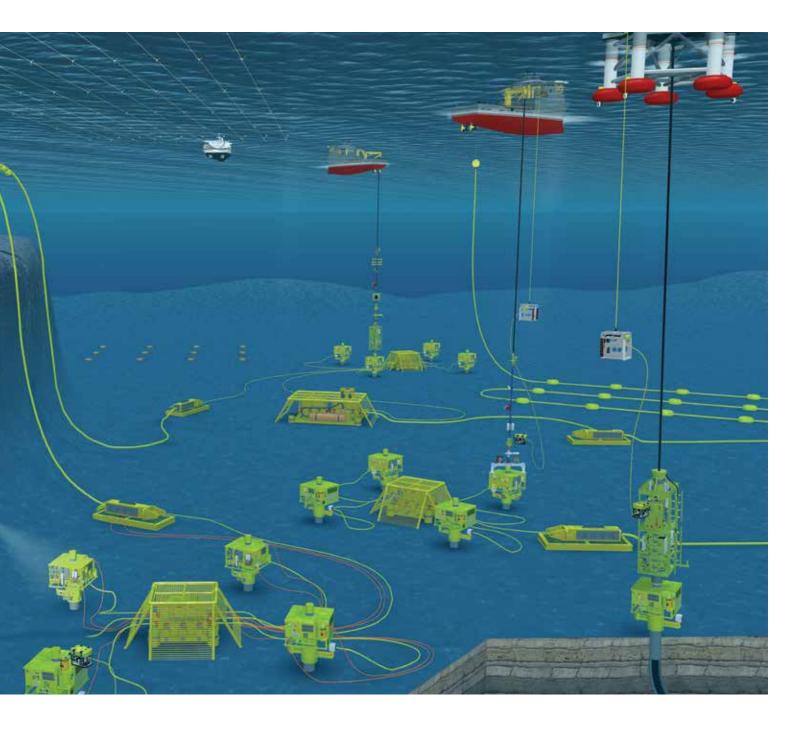
Meeting American Petroleum Institute specifications 16D and 17E, our API connectors feature 316 stainless steel with glass-filled epoxy inserts and gold-plated copper alloy contacts. Ratings include voltages to 600 VDC and pressure to 10,000 psi. Electrical and optical connector options are available in eight shell sizes



PENETRATORS

Supporting power, signal, and optics, our penetrators provide reliable transitions from outside subsea pressures to the inside of equipment. They can be installed in any environment and are capable of withstanding challenging environmental conditions, such as temperatures to 177°C, pressures to 15,000 psi and rapid gas decompression





SUBSEA UMBILICAL TERMINATION ASSEMBLIES

For termination and distribution of optical cables, our SUTAs include an integral pressure balanced compensation system, fiber management system, mechanical armor termination, and fiber k-tube feedthrough penetrations



AFP HTHP FIBER OPTIC PENETRATORS

Capable of withstanding prolonged exposure to aggressive media such as oil, mud, chemicals and salt water, temperatures from -40°C to +177°C and pressures to 20,000 psi, these very compact penetrators support downhole and wellhead applications with up to 24 fibers



CONTROL MODULE CONNECTORS

Connectors such as the SEACON MINI-CON connector give you great flexibility in meeting control applications. Available in 13 shell sizes for up to 203 contacts, standard MINI-CON connectors are rated to 16,000 psi—with higher ratings on request



DOWNHOLE EXPLORATION

Monitoring and Control

Downhole applications represent one of the most challenging environments. Data from downhole not only provides a clear real-time picture of current conditions, but also forms the basis for sophisticated predictive modeling. This permits enhanced operating efficiencies and improved recovery of petroleum reservoirs.

Reliability Below the Seabed

Beyond withstanding pressures to 15,000 psi and operating temperatures as high as 300°F, connectors for downhole applications must be sealed against harsh fluids. Plus, the environment is space constrained so that size matters significantly, and compact connectors are favored.

Downhole

Applications

- Measurement/Logging While Drilling
- Distributed Temperature Sensing

- In-Tool
- Electrical Submersible Pumps

• Pressure/Temperature Gauge

Sensors

- Pressure Sensors
- Position Sensors
- Temperature Sensors
- Force Sensors



DOWNHOLE CABLE

Our rugged downhole cables are designed to provide telemetry, control and power connectivity while withstanding elevated temperatures, high pressures and corrosive environments. Noncorrosive metal cladding and waterblocking agents ensure cables remain isolated from hazardous well gases and fluids



HIGH-TEMPERATURE RELAYS

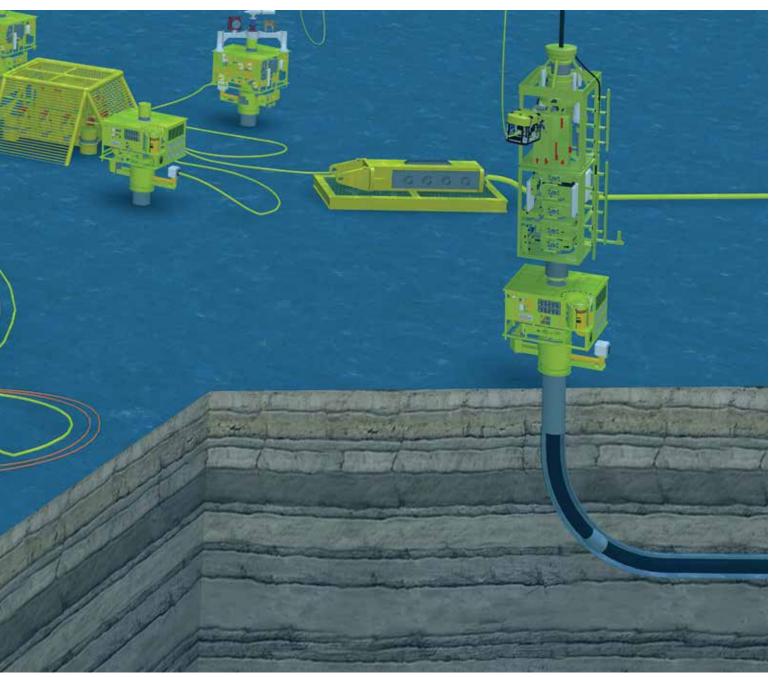
Our hermetically sealed relays give you high reliability in a variety of switching configurations, current and voltage ratings, packaging, and mounting styles



HIGH-TEMPERATURE MICRO-D CONNECTORS

Our high-density Micro-D connectors are extremely compact and light weight, offering from 9 to 100 contacts in eight shell sizes. Versions are available to withstand the high-temperatures and harsh environments of downhole applications





DEUTSCH DOWNHOLE ELECTRICAL AND OPTICAL CONNECTORS

For high-pressure, high-temperature downhole applications, signal and optical wet-mateable connectors offer multiple contacts and are capable of withstanding pressures up to 30,000 psi and temperatures up to 205°C



ROCHESTER WIRELINE CABLE

TE's Rochester wireline cables are used in logging, perforating, and downhole well applications worldwide. The hot, corrosive downhole environment is met through our expertise in hightemperature insulations, special copper alloys and anticorrosive alloys for armoring



SENSORS

Pressure, temperature and position sensors can include SEACON connectors for submersible pressure and position measurement requirements to provide analog or digital output signals



SEACON G3 CONNECTORS

The G3 underwater-mateable connector offers low profile optical connectivity. Available in 6 channels with either single-mode or multimode optical fibers, the G3 connector is rated to 15,000 psig and operating temperature up to 150°C. It can incorporate flat or angle polished contacts for either signal communication systems or optical measurement and sensing systems



RELIABLE SOLUTIONS FROM TOP TO BOTTOM, END TO END

TE specializes in connectivity and sensing solutions for the harshest environments. Building on years of experience and tried and true products, we continue to innovate with new products to meet the evolving needs of offshore oil and gas exploration and production. From explosion-proof connectors and low-smoke, zero-halogen cables to help make the topside platform safer to subsea products designed to operate flawlessly for 25 years or more, you will find more choices and more variety to meet your specific needs.

Work with Us

We participate in standards-setting groups and work closely with industry leaders so that we fully understand today's needs—and tomorrow's. Our collaborative approach allows us to act as part of your engineering team. Tapping our expertise in connectivity and sensing means you can devote your own valuable engineering efforts to your main focus.

Explore Our Full Product Lineup

For additional products for the Marine Oil and Gas market visit www.te.com/MOG



GLOBE-CON SERIES CONNECTORS Designed to handle high vibration and available in 2 shell sizes with up to 12 contacts, Globe-Con connectors are small diameter, dry-mate connectors. Receptacles feature GRE inserts within a metal shell, and utilize gold-plated contacts and fluoroelastomer o-rings. Rated at 300 VDC and 2.5 A, and up to 10,000 psig mated, Globe-Con connectors are ideal for high temperature, high-pressure applications



HUMMER SERIES CONNECTORS

Available in 3 standard shell sizes having up to 28 contacts, this unique ultra-miniature design incorporates the proven characteristics of some of our popular connectors in a smaller, rugged, and reliable package. Contacts are gold plated and range from 28 AWG, 0.10 A to 22 AWG, 1.50 A



DEUTSCH SHOWET SERIES CONNECTORS

These splash-zone hybrid connectors support both copper and fiber in a single shell for signal and control needs. They allow four multimode fiber contacts and four size 12 electrical contacts rated at 20 A





SEACON RUBBER MOLDED CONNECTORS

Rubber Molded connectors typically consist of an in-line female neoprene connector mated to a glass-reinforced epoxy bulkhead connector or to an in-line male connector. With densities up to 12 contacts and a pressure rating to 20,000 psi, these connectors have one of the longest track records in subsea applications



DEUTSCH MEDIUM-POWER EXPLOSION-PROOF CONNECTORS Our robust splash-zone capable, medium-power explosion-proof connectors are rated to 6/10 (12) kV and 300 A, and feature quick-connect/ disconnect couplings for easy installation and reliable operation



PRESSURE TRANSDUCERS

TE manufactures sensors and transducers for hazardous locations certified to the latest international standards including, but not limited to, NEC, IECEx, ATEX, SIL, and CRN



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CONNECTORS, WIRE AND CABLE, AND SENSOR PRODUCTS AND SOLUTIONS DESIGNED, BUILT, AND TESTED FOR PROVEN PERFORMANCE IN HARSH ENVIRONMENTS



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