

# Solutions for Marine Oil and Gas

ADVANCED INTERCONNECT PRODUCTS,  
TECHNOLOGY AND SYSTEM SOLUTIONS

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

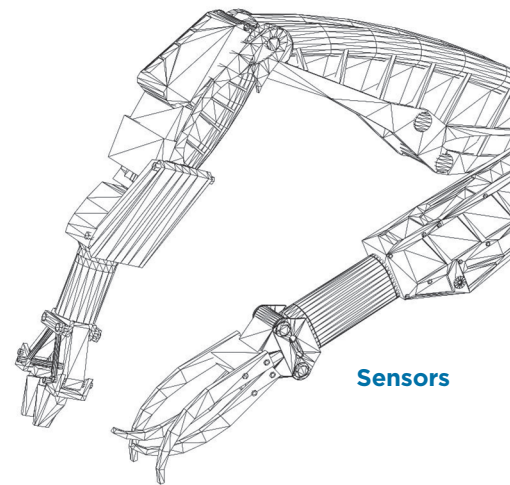
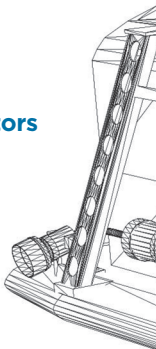
## TE Components . . . TE Technology . . . TE Know-how . . .

AMP | AGASTAT | CII | HARTMAN | KILOVAC | MICRODOT | NANONICS | POLAMCO | Raychem  
SEACON | Rochester | DEUTSCH

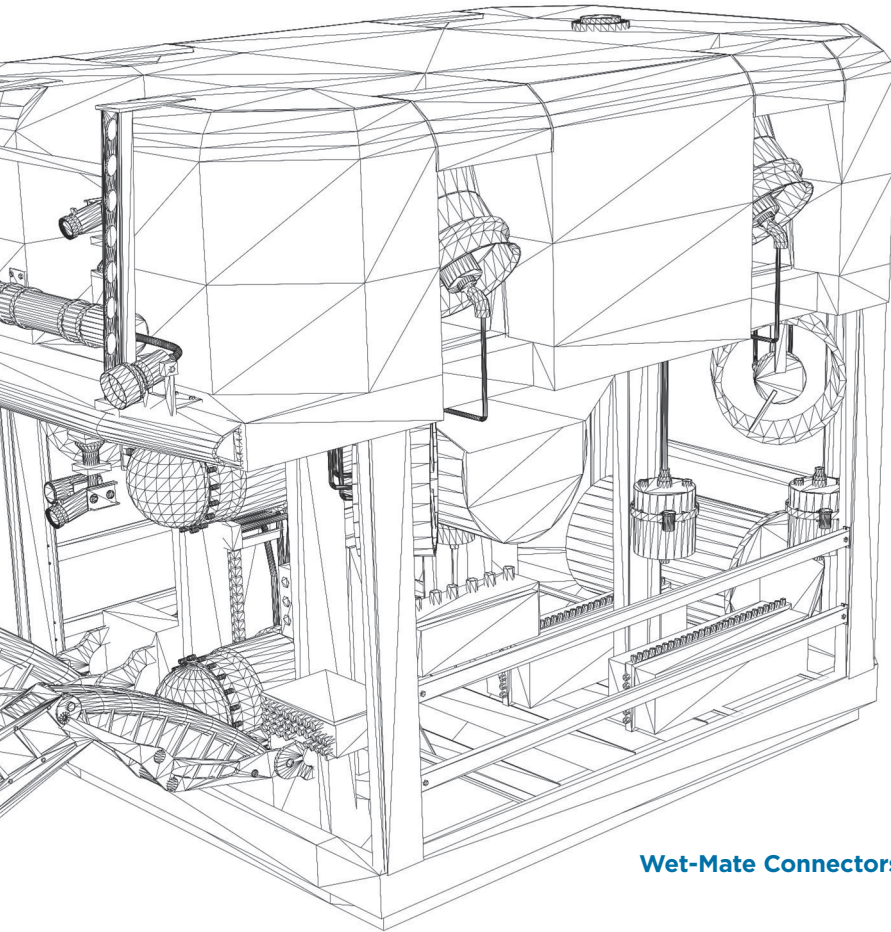
Empower Engineers to Solve Problems, Moving the World Forward.

Dry-Mate Connectors

Lighting and Camera Connectivity



## Power Management



## Umbilical Cables and Termination Assemblies

## Electrical and Optical Distribution

## Wet-Mate Connectors

## 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 Umbilical Termination Assembly)
- Cable Management and Harnessing
- Cable Assemblies

### Power Management

- Relays and Contactors
- Telecommunication Services

### Sensors

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

## 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.

# 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 explosion-proof connectors for offshore use.

## Topside Applications

- Platforms
- Drilling Rigs
- Floating Production, Storage and Offloading
- Compressors
- Top Drives
- Seismic Streamers
- Skids
- Dry Trees
- Buoys
- Swivel Stacks
- Disconnectable Turret Moorings

### 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



### 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

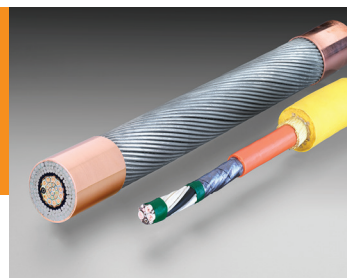
- Side-Scan Sonar Cables
- Electro-Optical Tow Cables
- Single and Multiconductor CTD and Instrumentation Cables
- ROV Umbilical Cables
- ROV Tether Cables

### Connectors

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

### 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



### SEACON ALL-WET CONNECTORS

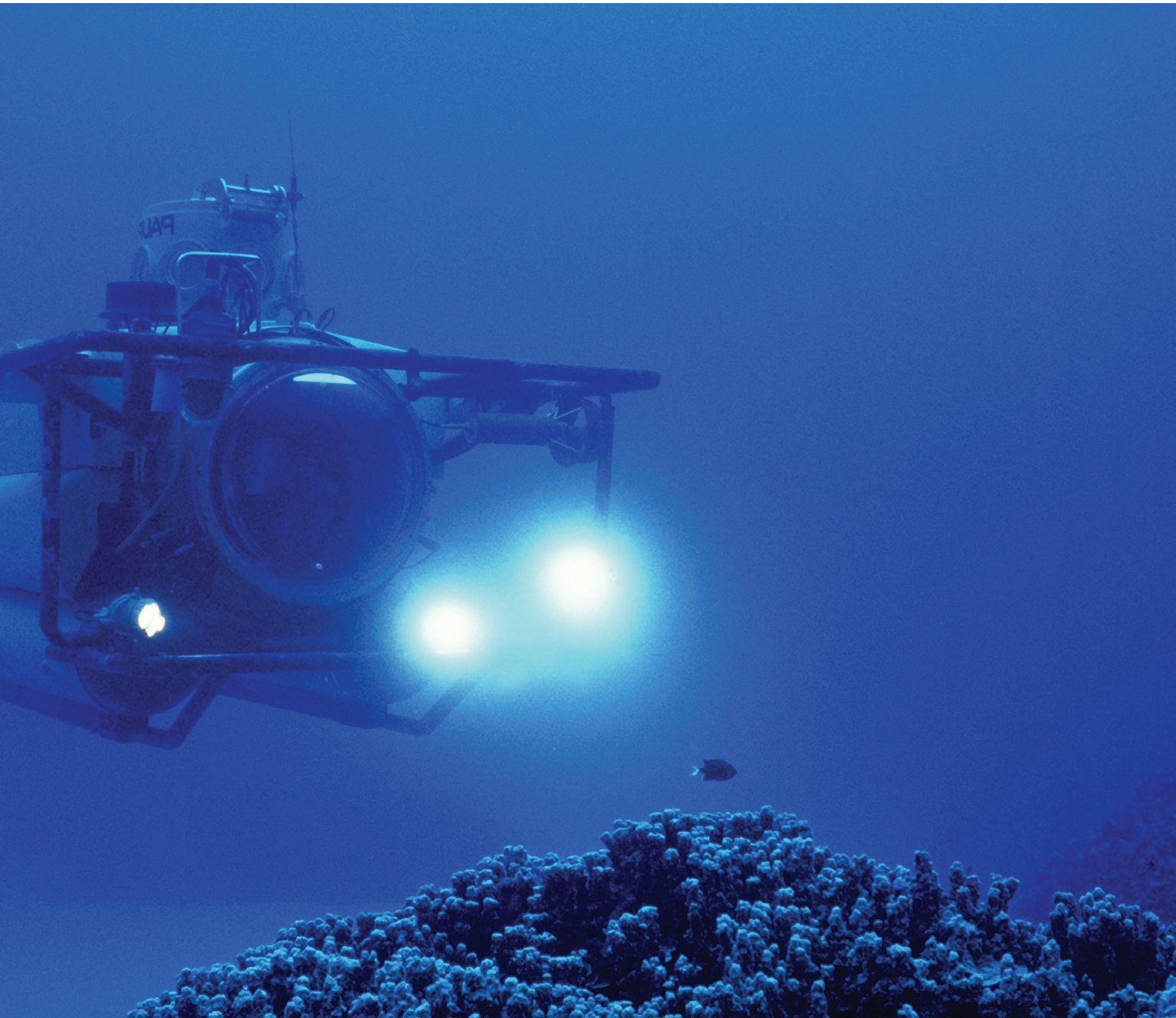
These inexpensive yet reliable rubber molded connectors allow the users to make and break connections both on the surface and underwater. The connectors are available in a range of configuration—with capabilities of up to 42 contacts, 600 VDC, 50 A, and 20,000 psi pressure



### MEDIA CONVERSION

TE's 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





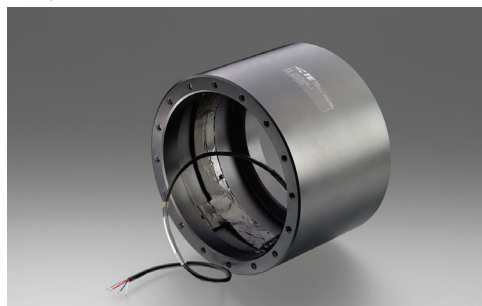
**SEACON 55 SERIES  
DRY-MATE CONNECTORS**

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 industry-standard 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



# 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

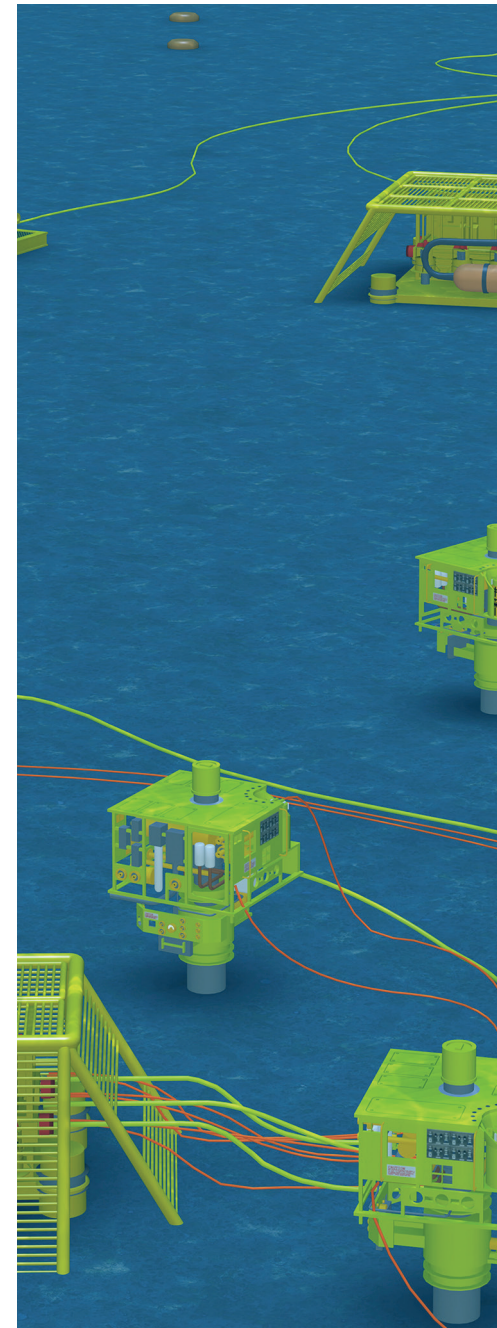
### SEACON HYDRAELECTRIC WET-MATE CONNECTORS

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



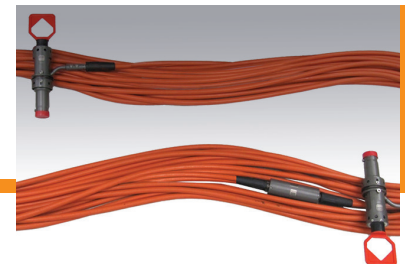
### SEACON HYDRALIGHT CONNECTORS

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 HARNESSSES

Subsea jumper assemblies and distribution harnesses provide pressure-balanced 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

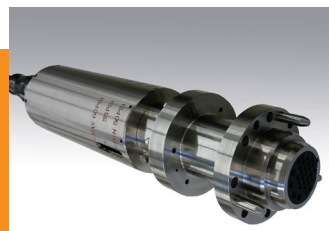
You have unlimited opportunity with one of the widest ranges of underwater electrical and fiber optic connectors available anywhere in the world. This range of connectors covers not only optical, signal, and power, but hybrid connectors mixing these capabilities in a single unit. Our broad range of cable, 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



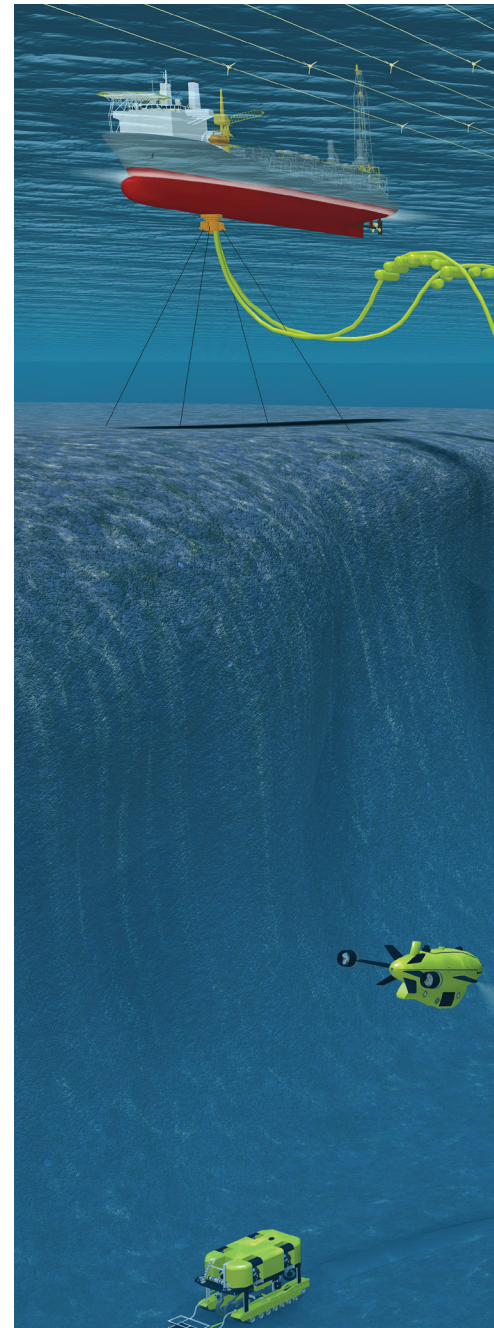
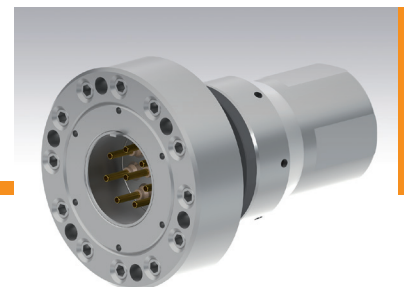
### API CONNECTORS

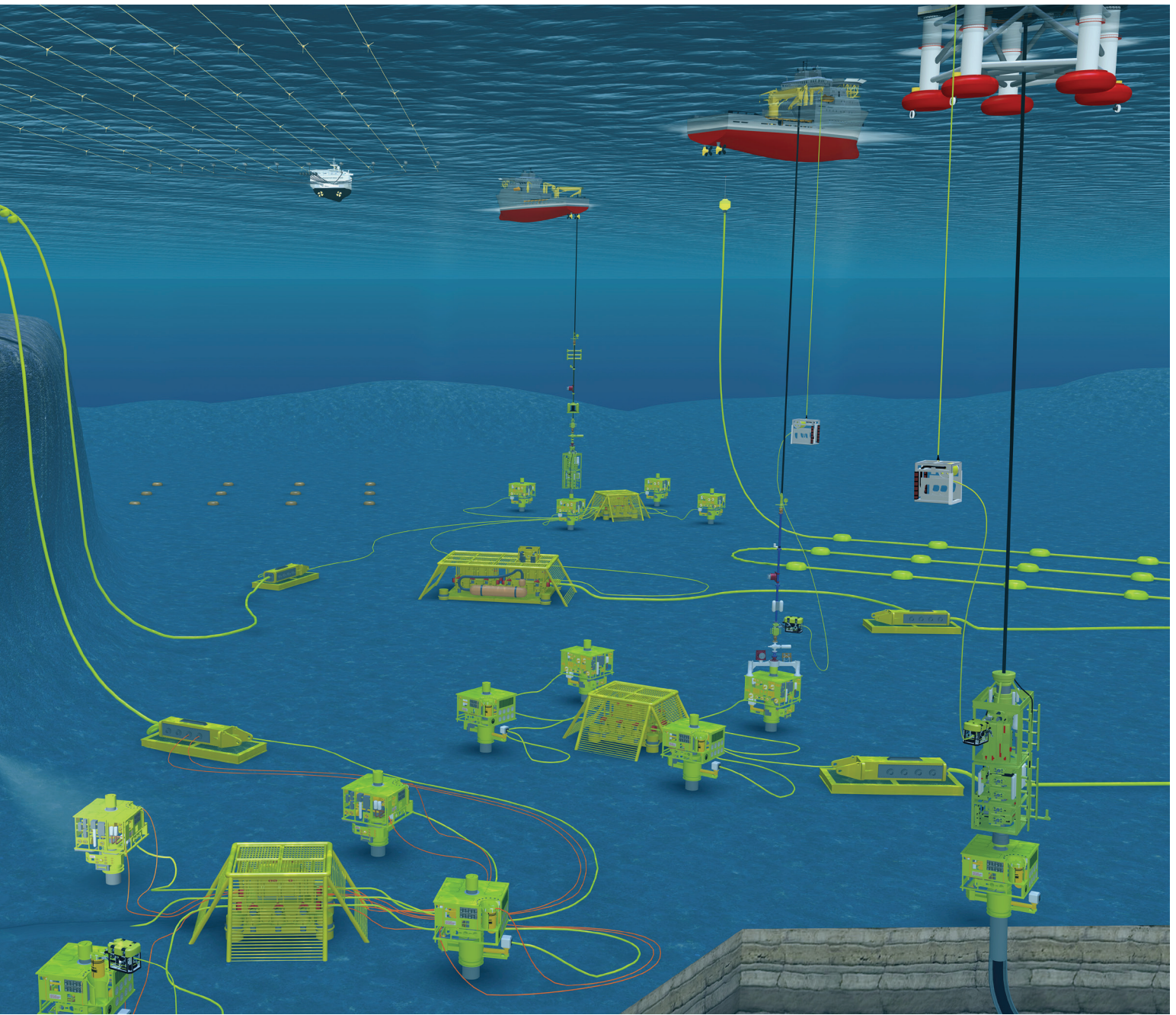
Meeting American Petroleum Institute specifications 16D and 17E, our API connectors feature 316 stainless steel with glass-filled epoxy inserts and gold-plated copper alloy contacts. Ratings include voltages to 600 VDC and pressure to 10,000 psi. Electrical and optical connector options are available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



### PENETRATORS

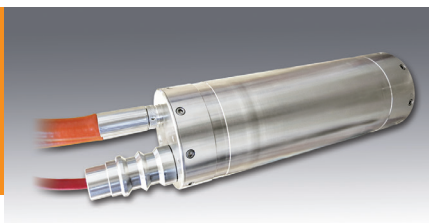
Supporting power, signal, and optics, our penetrators provide reliable transitions from outside subsea pressures to the inside of equipment. They can be installed in any environment and are capable of withstanding challenging environmental conditions, such as temperatures to 177°C, pressures to 15,000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





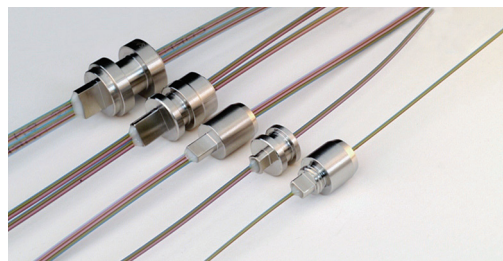
**SUBSEA UMBILICAL  
TERMINATION ASSEMBLIES**

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



**HIGH TEMPERATURE, HIGH PRESSURE  
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.

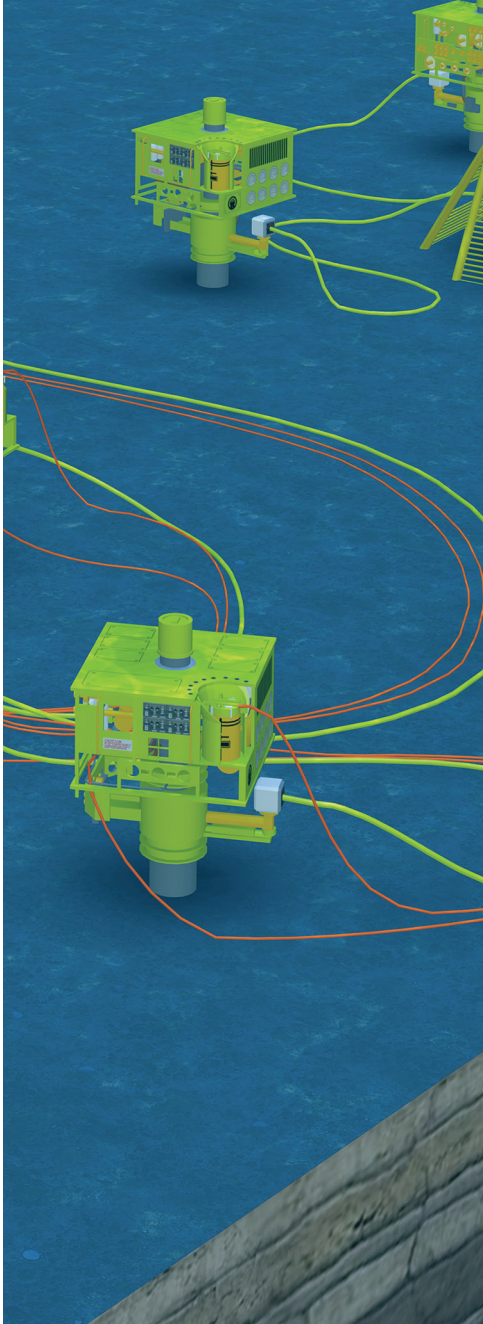
## Downhole

### Applications

- Measurement/Logging While Drilling
- Distributed Temperature Sensing
- Pressure/Temperature Gauge
- In-Tool
- Electrical Submersible Pumps

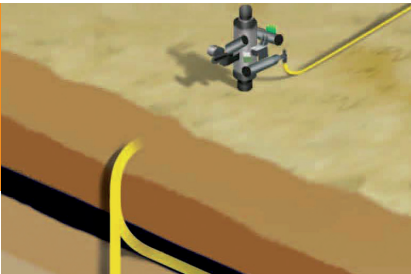
### Sensors

- 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



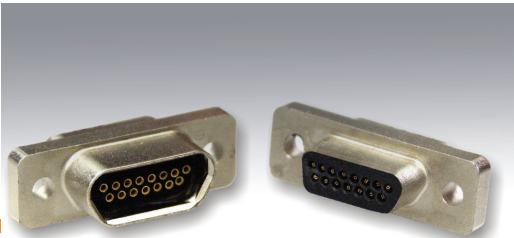
### HIGH-TEMPERATURE RELAYS

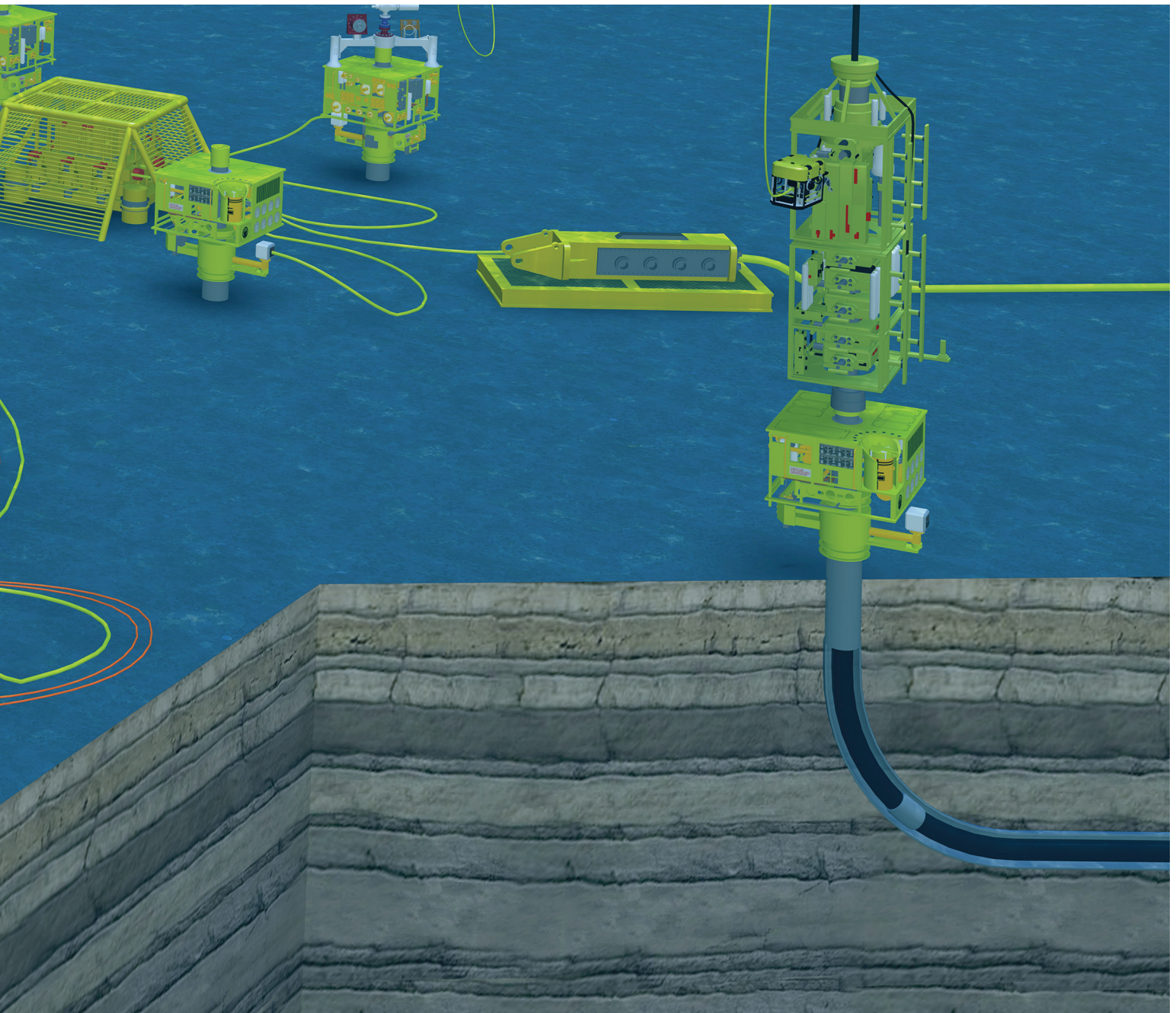
Our hermetically sealed relays give you high reliability in a variety of switching configurations, current and voltage ratings, packaging, and mounting styles



### 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





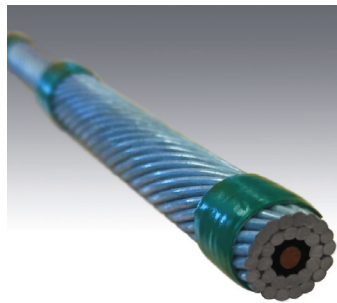
**DEUTSCH DOWNHOLE ELECTRICAL AND OPTICAL CONNECTORS**

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 high-temperature 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

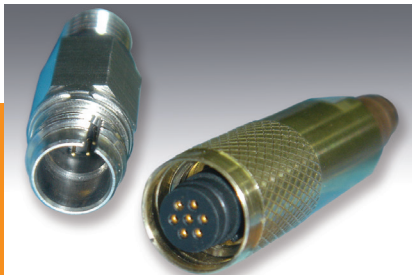
We participate in standards-setting groups and work closely with industry leaders so that we fully understand today's needs—and tomorrow's. Our collaborative approach allows us to act as part of your engineering team. Tapping our expertise in connectivity and sensing means you can devote your own valuable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





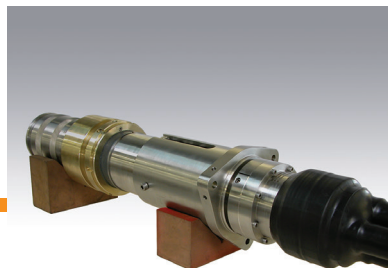
**SEACON RUBBER MOLDED CONNECTORS**

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



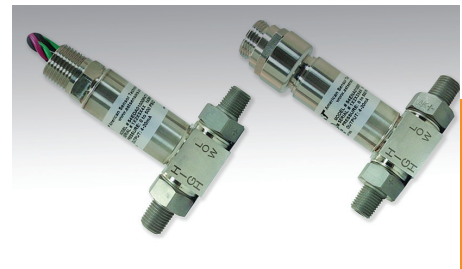
**DEUTSCH MEDIUM-POWER EXPLOSION-PROOF CONNECTORS**

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



## Technical Support

### SEACON

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Consult TE for the latest dimensions and design specifications.

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