SEA CON PRODUCTS
Leaders in Underwater Connector Technology and System Solutions
This brochure contains many of our standard product lines which can be customized for higher pressures, different materials and higher electrical ratings or other parameters. Please contact SEACON for your special order requirements.

**ELECTRICAL DRY-MATE PRODUCTS**

SEACON's electrical dry-mate connectors are mated in air with the mating interfaces being kept dry and sealed from the external environment. Once properly mated, the connector can be submerged to its rated depth.

**RUBBER MOLDED (X5)**
- 4 connector sizes (A, F, G, K)
- Up to 12 contacts
- Up to 20,000 psig (approx. 13,700m)
- Up to 600 VDC (on standard cable)
- Up to 300 amps
- Neoprene rubber, Glass Reinforced Epoxy, Stainless Steel, TFE insulated wire.
- SO cable as standard
- Typical uses; Lights, cameras, swimming pool lighting & ROV's

Please see our RUBBER MOLDED brochure for more details.

**GRE (GLASS REINFORCED EPOXY)**
- 4 connector sizes.
- Up to 36 contacts including coax
- Optic & oil filled available
- Up to 20,000 psig (approx. 13,700m)
- Up to 2,600 VDC
- Up to 200 amps
- Glass reinforced Epoxy, Stainless Steel, TFE insulated wire.
- Typical uses; Lights, cameras and ROV's

Please see our GRE brochure for more details.

**CS-RE**
- 2 shell sizes (J & K)
- Up to 10 contacts
- Up to 1,000 psig (approx. 7,680m) mated or open face
- Insulation resistance >1 Gohms @ 500 VDC
- Dielectric withstand voltage >0.5 mA @ 1,000 VAC
- Up to 13 amps
- Optic & oil filled versions available
- Aluminum, Glass Reinforced Epoxy
- Stainless Steel, Copper Alloy also available
- Typical uses; ROV's, cameras, lights and where size and weight is restricted

Please see our CS-RE brochure for more details.

**55 & 66 SERIES**
- 5 shell sizes (15, 16, 20, 24, 32)
- Up to 24 contacts
- Up to 10,000 psig mated/unordered (approx. 7,000m)
- 600 VDC
- 5 to 18 amps (dependent on contact size and cable)
- Oil filled & ethernet versions available
- Higher current/voltages available
- Stainless Steel, Neoprene
- Non metallic PEEK version available
- Typical uses; UWTV, lights & ROV's

Please see our 55 & 66 SERIES brochure for more details.

**HUMMER**
- 3 shell sizes (G, K, L)
- Up to 28 contacts
- Up to 10,000 psig mated (approx. 7,000m). Open face by special order.
- 500 VDC
- Up to 2.5 amps
- Ethernet versions available
- Copper Alloy, Glass Reinforced Epoxy, Neoprene Rubber, TFE insulated wire.
- Rubber jacketed cable as standard
- Typical uses; Lights, cameras and ROV's

Please see our HUMMER brochure for more details.

**MINI-CON / Micro MINI-CON**
- 17 shell sizes
- Up to 203 contacts including coax (MINI-CON) up to 20 contacts, no coax (Micro MINI-CON)
- Up to 16,000 psig (approx. 10,500m)
- Up to 5,000 VDC (MINI-CON)/ 200 VDC (Micro MINI-CON)
- Up to 23 amps dependent on cable (MINI-CON)/ up to 4 amps (Micro MINI-CON)
- Glass sealed inserts available
- Optics & hybrid available
- Oil filled available
- Ethernet version available
- Stainless Steel, Glass Reinforced Epoxy, Copper Alloy (MINI-CON)
- Titanium, Glass Reinforced Epoxy (Micro MINI-CON)
- Typical uses; Drilling systems, umbilical links & submarines

Please see our MINI-CON / Micro MINI-CON brochure for more details.

**HSG (METAL SHELL SERIES)**
- 8 shell sizes (G, K, L, M, O, P, Q, S)
- Up to 156 contacts including coax
- Glass sealed inserts available
- Optics & hybrid available
- API (American Petroleum Institute) versions available
- Positive keying
- PBOF available
- Up to 20,000 psig (approx. 13,700m)
- Up to 600 VDC standard (higher ratings available)
- Up to 300 amps (dependent on cable)
- Stainless Steel, Glass Reinforced Epoxy, Copper Alloy
- Typical uses; Drilling systems, umbilical links for ROV's & submarines

Please see our HSG brochure for more details.

**GLOBE-CON**
- 2 shell sizes (G, K) & currently 3 different contact configurations up to 12k8 contacts
- Up to 12 contacts
- Up to 10,000 psig mated (approx. 7,000m)
- 300 VDC
- Up to 2.5 amps
- Wet-mate & ethernet versions available
- Materials suitable for caustic environments
- Stainless Steel, Glass Reinforced Epoxy, Neoprene Rubber, Copper Alloy
- Rubber jacketed cable as standard
- Suitable for use in high vibration applications
- Typical uses; Lights, cameras and ROV's or where size is an issue

Please see our GLOBE-CON brochure for more details.

**MIL-SPEC**
- Military specification and design
- Up to 10,000 psig (approx. 7,000m)
- Voltage: contact SEACON for details
- Current: contact SEACON for details
- Stainless Steel, Monel®
- Typical uses; Defense, energy, security, geophysical and telecommunications applications

Please see our SEACON Phoenix brochure for more details.
ELECTRICAL WET-MATE PRODUCTS

Our electrical wet-mate connectors enable the user to make and break connections both on the surface and underwater. Many of these connectors have been used successfully over the years for a variety of applications including underwater cameras, diver communications and ROV systems.

ALL-WET
- Round, split and flat configurations
- Up to 42 contact
- Flat ALL-WET water blocked version available
- Up to 20,000 psig (approx.45,000ft/13,700m) for round configurations
- Up to 10,000 psig (approx.22,500ft/7,000m) for split & flat configurations
- Up to 600 VDC (with standard cable)
- Up to 50 amps
- Copper Alloy, Neoprene Rubber, TFE insulated wire
- SO cable as standard
- Typical uses; Diver communications, UWTV, lights, ROV’s

Please see our ALL-WET brochure for more details.

SEA-MATE
- Second generation U-MATE
- 4 Shell sizes (G, K, L, M)
- Up to 37 contacts
- Oil filled option available
- ROV mateable version available
- Ethernet version available
- Up to 7,500 psig mated & open face (approx.16,000ft/5,000m)
- Up to 600 VDC
- Up to 10 amps/50 amps (for new high power version)
- Stainless Steel, Glass Reinforced Epoxy, Hypalon Rubber, Copper Alloy
- Typical uses; Diver communications, UWTV, lights, ROV’s & ship to shore communications

Please see our SEA-MATE brochure for more details.

WET-CON

Micro WET-CON

Micro WET-CON Split
- Round, low profile and split configurations
- Up to 16 contacts
- Water blocked / single pin / metal shell / high power / ethernet options available
- Up to 20,000 psig (approx.45,000ft/13,700m) for WET-CON
- Up to 10,000 psig (approx.22,500ft/7,000m) for Micro and Split versions
- Up to 600 VDC with standard cable
- Up to 19 amps
- Copper Alloy, Neoprene rubber, TFE insulated wire, SO cable as standard, Rubber jacketed cable as standard for Micro and Split connectors
- Typical uses; Diver communications, UWTV, lights & ROV’s

Please see our WET-CON / MICRO WET-CON / MICRO WET-CON Split brochure for more details.

U-MATE
- Still available but superseded by SEA-MATE
- 3 Shell sizes (G, K, L)
- Up to 12 contacts
- Up to 5,000 psig mated (approx.11,250ft/3,500m)
- Up to 600 VDC
- Up to 10 amps
- Positive keying
- Stainless Steel, NES 633 engaging nut as standard
- Typical uses; Diver communications, UWTV, lights, ROV’s & ship to shore communications

Please see our U-MATE catalogue section via our website www.seaconworldwide.com more details.

OPTICAL HYBRID DRY-MATE PRODUCTS

As fiber optic communication continues to evolve, the SEACon Group are able to offer a comprehensive and extensive range of fiber optic products which are designed and manufactured to meet the specific and varied environmental conditions demanded today.

DRY-MATE FIBER OPTICS
- Single-mode & multi-mode
- Using Standard Connector Ranges:
  - MINI-CON, M66, OPTI-CON
  - Insertion loss < 1.0dB (or < 0.5dB)
  - Up to 20,000 psig (approx.45,000ft/13,700m)
  - Glass sealed options available in some connector styles
  - Typical uses; Sonar & surveillance systems, ROV’s/AUV’s, BOP monitoring equipment, neutrino detection, stress monitoring, subsea camera systems & downhole applications

Please see our FIBER OPTIC brochure for more details.

OPTI-CON
- 5 Shell sizes (F=1 Way, G=4 Way, M=8 Way, Q=12 Way, T=20 Way)
- 1, 4, 8, 12 & 20 channels in any electrical or optical configuration, single or multi-mode
- Single way right angle version available
- Up to 7,500 psig (approx.16,000ft/5,000m) dependent on cable, shell material & configuration
- 600 VDC
- 4 amps
- Oil filled hose as standard with molded unit as a cost option
- Stainless Steel
- Typical uses; Cameras, monitoring equipment, sensors, towed arrays and any applications requiring high data transfer rates

Please see our OPTI-CON brochure for more details.

HP/HT (DOWNHOLE)
- Optical, electrical and hybrid (electro/optic) versions available: 2-channel optical only version
- 2-channel electrical only version
- 4-channel hybrid (2 electro/2 optic)
- Up to 10,000 psig (approx.22,500ft/7,000m)
- Up to 600 VAC
- Up to 2.5 amps
- Less than 1 inch in diameter
- Field installable termination
- Maximum optical attenuation: 0.3dB
- Maximum optical back reflection: -50dB
- Inconel 625
- Typical uses: High pressure and high temperature applications, Downhole & tree tubing hangar systems

Please see our HP/HT Connectors datasheet SAPL-DS-0090 for more details.
ELECTRICAL UNDERWATER MATEABLE PRODUCTS

SEAON’s underwater mateable electrical connectors have features that protect the electrical contacts from the external environment. In addition, pressure compensated fluid-filled chambers allow repeated mates/de-mates underwater without servicing.

**CM2000**
- Simple & unique design features combining superior electrical isolation ensuring high connector reliability
- Slab, diver and ROV configurations
- Individual modular pin & socket contacts
- Oil filled & pressure balanced socket contacts
- No single point failures
- Redundant: O-Rings, Seals, Bladders, Bladder closures
- Standard 4, 7 & 12 contacts
- Other configurations up to 10 contacts
- Up to 10,000 psig (approx. 22,500 W/7,000m)
- Up to 3.3kVAC
- Up to 100amps / 250amps 3.3kVAC versions
- Titanium, 17-4 PH, Nitronic 50, Inconel®. Others available on request.
- Typical uses: Production control, drilling control, ROV, AUV systems, communications & power

Please see our CM2000 datasheet SAPL-DS-0061 for more details
Please see our CM2000 3.3kVAC datasheet SAPL-DS-0062 for more details
Please see our CM2000 3.3kVAC 250 amp datasheet SAPL-DS-0063 for more details
Please see our CM2001 datasheet SAPL-DS-0080 for more details

OPTICAL UNDERWATER MATEABLE PRODUCTS

Our underwater mateable optical connectors manufactured by SEAON Advanced Products, LLC., of Bellville, Texas, USA include the field proven HYDRAIGHT second generation fiber optic connector and the new G3 third generation connector suitable for downhole applications.

**HYDRAIGHT**
- 2nd generation, field proven, underwater mateable connector
- 8-channel optic only & APC versions available
- 8-channel hybrid connector (4 electro / 4 optic) & 48 channel
- Up to 10,000 psig (approx. 22,500 W/7,000m)
- Oil filled & pressure balanced
- Qualified for 7,000m
- Average single-mode insertion loss better than 0.2dB (0.5dB max)
- Average single mode back reflection of -50dB over mated cycle life (min -30dB)
- Titanium
- Design life of 30 years
- Typical uses: High speed communications, long-distance, production control, pumping systems, sensing systems, Risers and PRM systems
- Portable Oil-Filled Station available to remove contaminants from the oil prior to filling

Please see our HYDRAIGHT datasheet SAPL-DS-0001 for more details
Please see our HYDRAIGHTAPC datasheet SAPL-DS-0005 for more details
Please see our 48 CHANNEL HYDRAIGHT datasheet SAPL-DS-0016 for more details
Please see our HYDRAIGHT datasheet SAPL-DS-0018 for more details
Please see our PORTABLE OIL-FILLED STATION datasheet SAPL-DS-0512 for more details

**G3**
- 3rd generation connector utilizing HYDRAIGHT technology
- Very small form factor, with lowloss optical performance
- Matched pairs not required
- Internal pressure compensated
- Suitable for slab, diver and ROV operations
- 6-channel optic (single-mode, multi-mode)
- Up to 15,000 psig (approx. 35,000 W/10,000m)
- Operating temperature 150°C (302°F)
- Few internal moving parts
- Simplicity of operation
- Patented "Joined Chamber" concept
- Stainless Steel, Titanium
- Typical uses: High speed communications & fiber sensing, long-distance, production control, space-restricted applications, free tubing hangar systems, DTS, DPS, DAS systems

Please see our G3 datasheet SAPL-DS-0030 for more details

OPTICAL & ELECTRICAL PENETRATORS

We manufacture a wide range of penetrators for use in applications in which a waterproof seal needs to be made between a cable and a pressure vessel. This is often accomplished using a connector set, but if there is no requirement to separate the cable from the equipment a penetrator can be used. Typical uses: High speed communications, long-distance, production control.

Please see our OPTICAL PIER PENEOTRATORS datasheet SAPL-DS-0100 for more details or see our PENETRATORS catalog section via our website: www.seaconworldwide.com
FIELD INSTALLABLE PRODUCTS

In recent years the search for oil has required operations in progressively deeper waters by mobile offshore drilling units. Drilling at these depths places strong demands on equipment, particularly the cable and connectors that link subsea operations to the surface. SEACON addressed the equipment problem by developing an underwater connector system with high reliability, improved condition assessment capability and better maintainability. SEACON's next-generation multiplex (MUX) cable termination system is the tangible result of the company's ability to apply real-world operator field experience to its product design and produce a step-change improvement in connector performance.

SEACON's range of MUX systems consists of 1 Atmosphere and Positively Pressurized (RUFF-NEK) connector solutions as well as the new underwater cable termination system which consists of the ARMOR TERMINATION ASSEMBLY (ATA), BREAKAWAY UNIT and RUFF-NEK connector.

The RUFF-NEK connector is an electro-optical/mechanical termination that contains an integral system that does not rely on separate external compensator systems to apply a constant overpressure (internal pressure greater than external pressure) to the end of the cable and termination volume. The overpressure is maintained at 15 pounds per square inch (psi) over ambient pressure and helps to prevent water intrusion into the termination chamber that could be caused by flooding of the conductor strands (in the event of cable jacket and conductor insulation breach) or by seal failure. In the cable termination system the ATA is affixed to a clevis mount (padeye) at a convenient location on the BOP (Blow Out Prevention) stack while the RUFF-NEK connector mates to either a transformer module, crossover or directly to the subsea electronics module (pod). The orientation aspect that can be a problem with a conventional connector is eliminated due to the breakaway unit that interfaces the ATA with the BOP, enabling a connection in 90-degree intervals.

There are many benefits to the cable termination system including a lighter, more manageable connector, separate armor termination function from electrical connector function and a controlled breakaway function.

Every seal is redundant (e.g., dual versus single o-ring) for maximum reliability, and everywhere possible, the seals are testable to enable verification of seal integrity off the critical path. The RUFF-NEK connector provides visual verification of correct pressure over ambient. It also includes the ability to electrically check for fluid contamination without opening the connector.

EX-PLOSION PROOF

In recent years there has been an increased requirement for connectors to operate in hazardous environments and many applications now require quick and safe disconnection of connectors to be used in these environments. As a result SEACON has developed a new robust range of EXD connectors.

- Wet mateable in depths of up to 50m*
- Designed around existing SEA-MATE range
- 4 shell sizes (G, K, L, M)
- Up to 37 contact configurations
- Interchangeable inserts
- Rated to IP68
- Incorporate ATEX, IECEx and API certification
- Suitable for applications including Topsides, Drilling Vessels or any potentially explosive environment as covered by the extensive qualification testing

* Subject to further testing.

www.seaconworldwide.com
DOWNHOLE PRODUCTS

Our range of products for downhole applications include the HP/HT connector available in either electrical, optical or hybrid versions and recently developed G3 3rd Generation 6-channel optic which combines the strength of the HYDRAULIGHT design with the latest technology from the telecommunications industry. For further information please see our DOWNHOLE catalog section via our website - www.seaconworldwide.com or see the individual datasheets below:

G3
- 3rd generation connector utilizing HYDRAULIGHT technology
- Very small form factor, with low loss optical performance
- Matched pairs not required
- Internal pressure compensated
- Suitable for stab, diver and ROV operations
- 6-channel optic (single-mode, multi-mode)
- Up to 15,000 psi (approx. 35,000 kPa / 10,000 bar)
- Operating temperature 150°C (302°F)
- Few internal moving parts
- Simplicity of operation
- Patented 'Joined Chamber' concept
- Stainless Steel, Titanium
- Typical uses: High speed communications & fiber sensing, long-distance, production control, space-restricted applications, tree/tubing hanger systems, DT3, DPS, DAS systems

Please see our G3 datasheet SAPL-DS-0030 for more details.

HP/HT (DOWNHOLE)
- Optical, electrical and hybrid (electro/optic) versions available: 2-channel optical only version
- 2-channel electrical only version
- 4-channel hybrid (2 electro/2 optic)
- Up to 10,000 psi (approx. 22,500 kPa / 15,000 bar)
- Up to 600 VAC
- Up to 2.5 amps
- Less than 1 inch in diameter
- Field installable termination
- Maximum optical attenuation: 0.3dB
- Maximum optical back reflection: -50dB
- Inconel 625
- Typical uses: High-pressure and high-temperature applications, Downhole & tree/tubing hanger systems

Please see our HP/HT Connectors datasheet for more details - SAPL-DS-0009.

CM2000
- High integrity, single pin, electrical connector
- Less than 1 inch diameter
- Up to 10,000 psi (approx. 22,500 kPa / 15,000 bar)
- 1,000 VAC
- Up to 10 amps
- Rated to 7,000m
- Oil filled, molded cable, customer specific terminations
- Extensive qualification testing data available
- Titanium, 17-4 PH, Nitronic 50, others available upon request
- Typical uses: Production control systems, communications, space-restricted applications, Downhole & XT’s

Please see our CM2000 datasheet SAPL-DS-0080 for more details.

4 CHANNEL DRY-MATE FIBER OPTIC CONNECTOR
- Small compact connector
- 4-channel optic
- Up to 10,000 psi (approx. 22,500 kPa / 15,000 bar)
- Single-mode or multi-mode fiber accommodated
- Dual "O" seals
- RGBF available
- Field installable (in certain environments)
- Operating temperature: -20° to 150°C (4°F to 302°F)
- Titanium or 17-4 PH. Others available to suit different specification/compatibility requirements
- Typical uses: Downhole applications

Please see our 4 Channel Dry-Mate Fiber Optic Connector datasheet SCE-DS-0001 for more details.

VITON®
- High temperature, small diameter and weight
- 8 electrical contacts
- Up to 20,000 psi (approx. 45,000 kPa / 300 bar)
- 600 VDC
- 2.5 amps
- Harsh environment compatible
- Positive external grip for disconnection
- Field installable tree halves
- Wet mateable
- Operating temperature: -20°C to 250°C (32°F to 482°F)
- Body material: DuPont VITON®
- Typical uses: Downhole applications

Please see our VITON® datasheet SCE-DS-0009 for more details.

ETHERNET PRODUCTS

With ever increasing inquiries for connectors to be used for Ethernet applications and our continuous program of specifying suitable connectors from our standard range for use on these systems, SEA CON has identified a number of standard connector ranges suitable for Ethernet use. These include:
- HUMMER: Dry-mate, up to 1 Gbps, up to 100m cable length, 10,000 psi/690 bar
- Micro WEBCON: Wet-mate, up to 1 Gbps, up to 100m cable length, 10,000 psi/690 bar
- MINI-CON: Dry-mate, up to 1 Gbps, up to 90m cable length, 15,000 psi/1,000 bar
- 55 SERIES: Dry-mate, up to 1 Gbps, up to 80m cable length, tested to 10,000 psi/690 bar
- SEAMATE: Wet-mate, up to 1 Gbps, tested to 10,000 psi/690 bar

The initial examination consisted of mating pairs of each connector range and testing against the requirements for the various Ethernet communications standards with a Validator NT955 high speed certifier. Following these tests, the cable/conector assemblies were subjected to pressure testing and certified under pressure. The above tests are for first product quantity. Additional testing is ongoing on a variety of SEA CON products for Ethernet use. All ETHERNET performances are cable dependent. Please see our ETHERNET news bulletin for more details via our website - www.seaconworldwide.com.
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