

**SpecTRON™**  
Medium and High Power  
Electrical Connector Systems



# SpecTRON - Setting the standards for all subsea power requirements



## Medium & High Power Electrical Connector Systems

Expro introduces its Tronic SpecTRON™ (Subsea Power Electrical Connector) range of Medium & High Power Electrical Connector Systems

### Product History

Since 1979 Tronic has been involved in subsea applications for the Oil & Gas industry. Initially, most electrical equipment placed on the sea bed was relatively low power, i.e. control systems and instrumentation. The company's involvement in high power connectors started with a development programme initiated in 1988 (SPEED). This led to the design, manufacture and test of a subsea mateable connector pair rated to 11kV 400Amps. Development of these connector ranges continued and became our standard SpecTRON 10 connector which is generally used on all Multi Phase Pumping (MPP) projects.

1994 saw a significant turning point in oil production history, when Petrobras, in partnership with Tronic, installed the world's first subsea Electrical Submersible Pump (ESP) system complete with wet mate connectors to power the downhole pump. Since that time, ESPs for subsea wells have become an accepted solution, and the SpecTRON 5 system is seen as the industry standard.

As the market for subsea 'medium to high power connectors' increases Tronic, now Expro Connectors & Measurements, will continue to develop the enabling technologies needed to satisfy the requirements of the subsea oil & gas industry.

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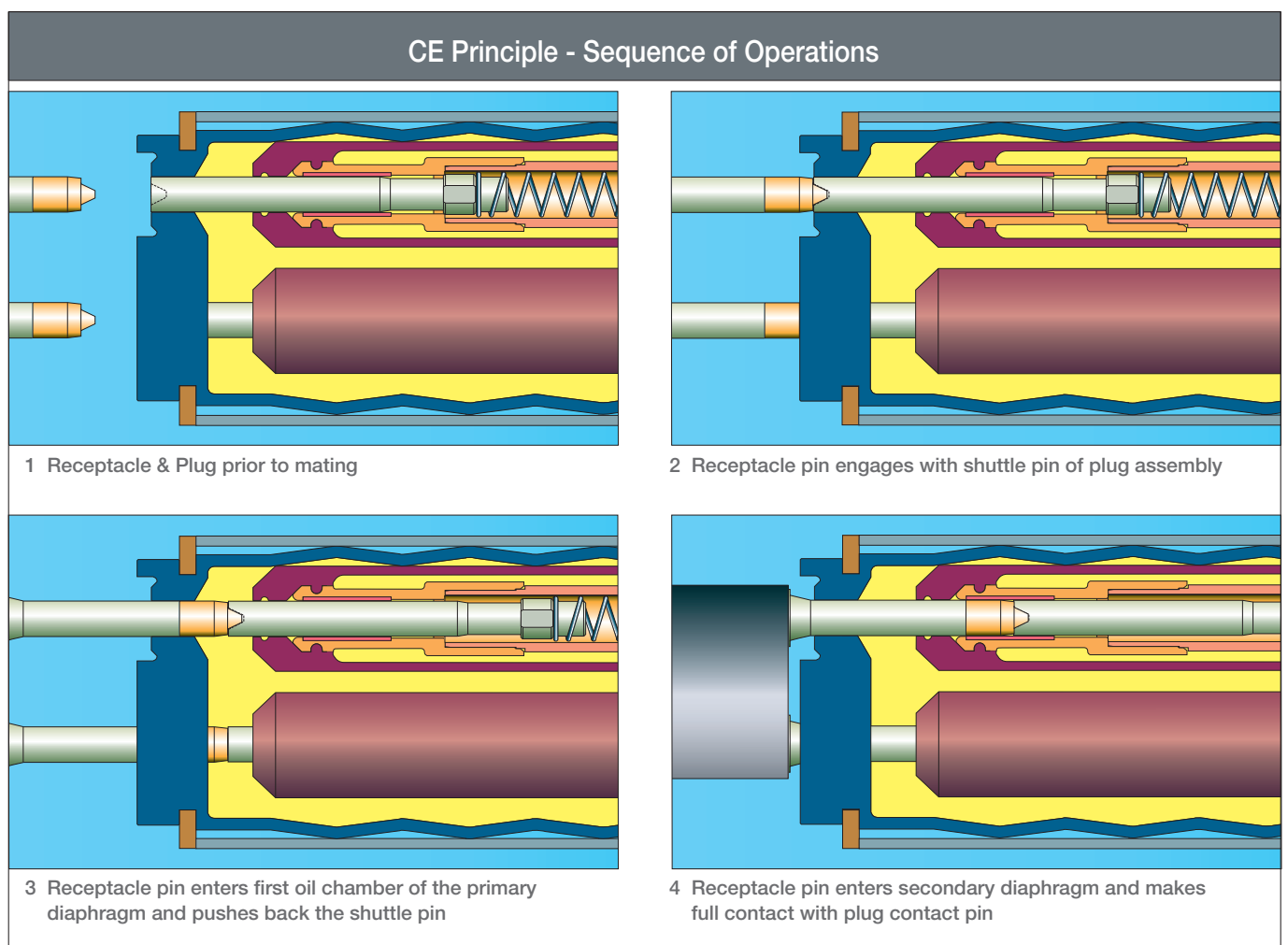
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# SpecTRON

## Connector Range Design Features

- The connector design is based on the proven Controlled Environment (CE) principle used in all Tronic connectors (see diagram below)
- Incorporates true dual redundancy sealing allowing continuous operation with the primary seal breached (flooded front end and/or flooded cable termination gland)
- Incorporates compensated elements to eliminate differential pressure across seals
- Designed to be Partial Discharge (PD) free at the operating voltage
- Qualified for HV breakdown greater than 6U<sub>o</sub>
- Designed for reliability with high MTBF based on Tronic's currently deployed power connectors
- Compatibility and product design life verified for 25 years maintenance free by accelerated testing to ISO and NORSOK standards
- Qualified for mate/demate cycles at pressure in a simulated sand and silt environment



# SpecTRON 2

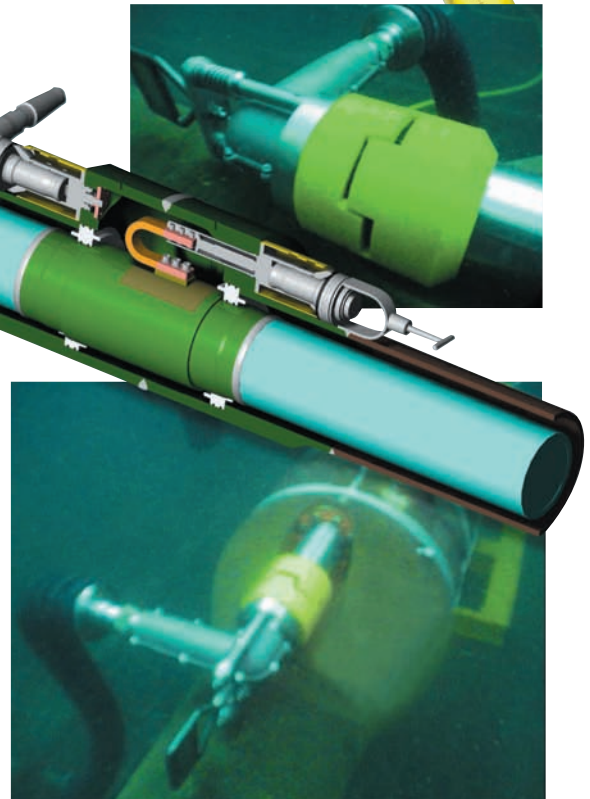
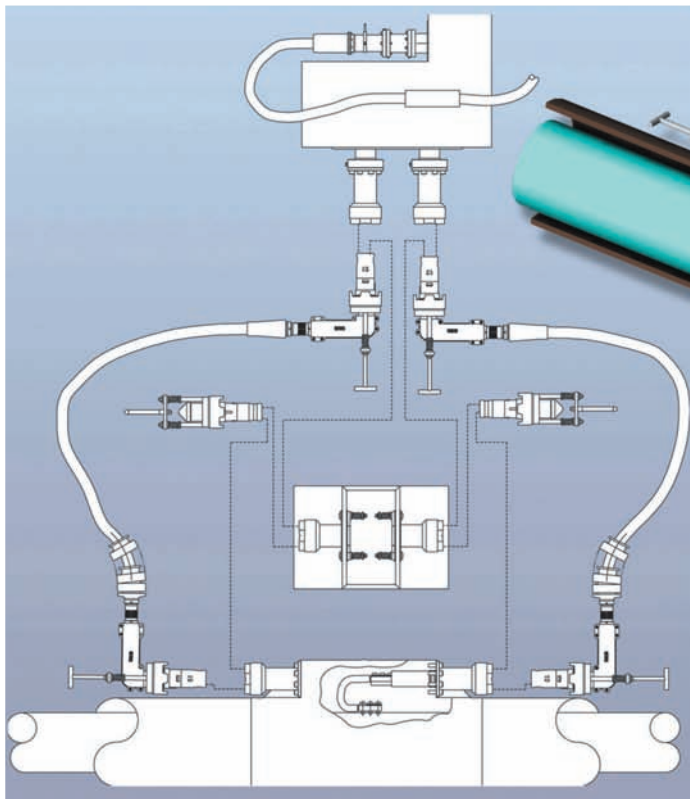
## 2kV (U) 1000A Connector Systems

### Pipeline Heating Connector Systems

Pipeline heating systems can be used to prevent or remedy hydrate formations which would otherwise require the use of expensive and environmentally undesirable chemicals or, in extreme cases, result in the scrapping of a pipeline.

In 2002 Tronic developed a single phase, 2kV (U), 2MW connector system for a pipe-in-pipe heating system which is now deployed in approximately 2000mwd in the Mississippi Canyon, Gulf of Mexico. The connectors are qualified to 1.9kV (U), 1100A and a water depth pressure of 240bar. The pipeline receptacles are qualified to withstand both internal and external differential pressures.

A typical system architecture is as follows: The electrical power is supplied from a platform or barge via an umbilical cable to a transformer on the seabed. A SpecTRON 15 dry mate connector connects the umbilical to the primary windings of the transformer. SpecTRON 2 wet mateable connectors link the secondary windings of the transformer to the pipeline using a 'flying' jumper which can be made up by ROV.



**Other Applications:** Low voltage / high current supply to mudline processes

### SpecTRON 2 Wet Mate Connectors Basic Electrical Specification

Number of Contacts	1	Voltage Frequency (Contact Expro C&M for D.C. Applications)	0-100Hz
Voltage Uo/U (Um)	1.2/2 (2.4) kV	Maximum Current (Dependant on Ambient Temperature & Supply Frequency)	1000A

# SpecTRON 5

## 5kV (U) 200A Connector Systems

Electrical Submersible Pumps (ESPs) have been used since the early 1990s to enhance oil recovery from deepwater and marginal wells. Tronic, now part of the Expro Group, has been heavily involved in providing ESP connection systems since those pioneering days, and Expro's 5kV 200A (SpecTRON 5) connectors are now seen as the industry standard with deployments worldwide.

The connection system is a 3-phase, 2.9/5(5.8)kV system qualified to a water depth of 1330m (200 bar test). Wet mate connectors can be configured as ROV, Diver or Stab Plate mated. The penetrator and tubing hanger receptacle are designed to API standards and differential pressure rated to 260 bar (520 bar test). The most recent addition to this range is a penetrator with an API flange rated to 380 bar (570 bar test).

An ESP power feedthrough system typically comprises an Umbilical Termination Unit to splice the umbilical power cores to flexible leads which then terminate into a Wet Mate Receptacle. A 'flying' jumper links the Umbilical to the Xmas tree. A penetrator in the tree cap provides a pressure retaining feedthrough to a wet mateable tree cap plug, which mates with a wet mateable receptacle in the tubing hanger. The tubing hanger receptacle is pressure retaining and engineered to withstand the hostile environment of aggressive chemicals at high temperature.

The tubing hanger receptacle is terminated to downhole motor cable which ultimately connects to the Pump.



### Other Applications:

Low voltage / high current supply to mudline processes.



### SpecTRON 5 Wet Mate Connectors Basic Electrical Specification

Number of Contacts	3	Voltage Frequency (Contact Expro C&M for D.C. Applications)	0-100Hz
Voltage Uo/U (Um)	2.9/5 (5.8) kV	Maximum Current (Dependant on Ambient Temperature & Supply Frequency)	200A

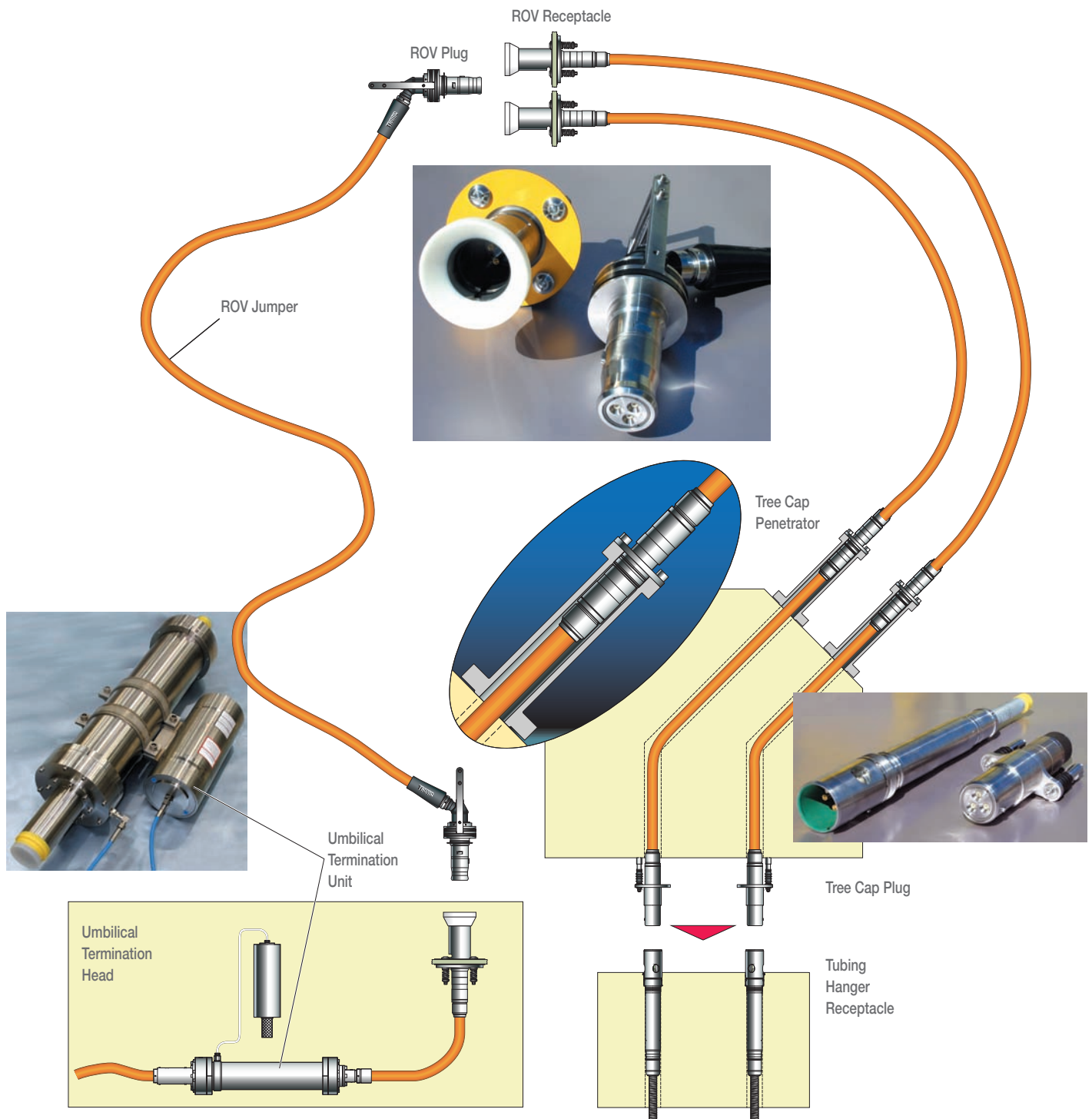
# SpecTRON 5 5kV (U) 200A Connector Systems

## ESP Power Feedthrough Systems

Electrical Submersible Pumps (ESPs) are used to boost well pressure and enhance oil recovery. Power to the ESP is provided through a series of electrical jumpers and subsea inter-connections.

The inter-connections are made up of wet mateable electrical

connectors and penetrators. These allow power to pass from the umbilical through the subsea tree to the ESP. They provide both a pressure retaining capability at the tree cap and tubing hanger, and a wet mate / demate function at the umbilical and tubing hanger.



# SpecTRON 8

## 8kV (U) 220A Connector Systems

SpecTRON 8 is the latest addition to Expro's range of medium & high power connector systems.

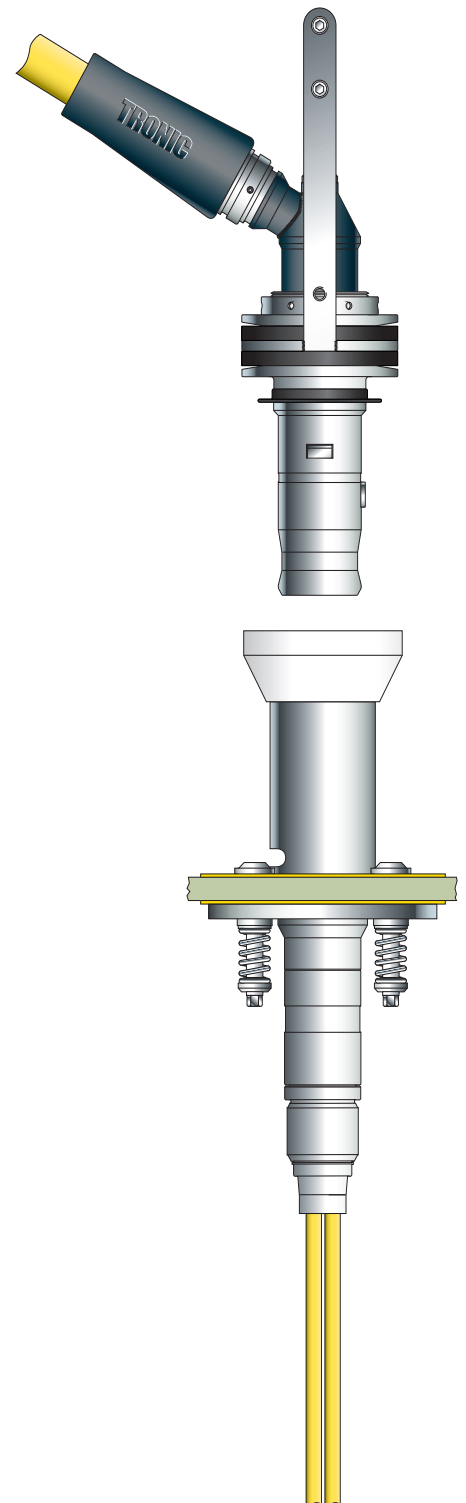
The design & development of this range of connectors is based on the knowledge and experience that we have gained from the extensive deployment of SpecTRON connectors throughout the oil & gas industry. At the same time we have taken the opportunity to incorporate the latest developments in technology.

This new product range provides the industry with increased power capacity, particularly for ESP systems, whilst maintaining the high degree of reliability inherent in the SpecTRON product range.

The SpecTRON 8 satisfies a similar need to the SpecTRON 5, but has been developed to meet the increasing power demand for ESPs to extract the heavy oils in deep & ultra-deep water (particularly offshore Brazil).

The SpecTRON 8 provides a complete connection system from the umbilical through to the pump/tubing hanger; comprising Umbilical Termination Unit, ROV wet mate-able connectors, penetrator, plug and tubing hanger receptacle.

They provide both a pressure retaining capability at the tree cap and tubing hanger, and a wet mate/de-mate function at the umbilical and tubing hanger.



### SpecTRON 8 Wet Mate Connectors Basic Electrical Specification

Number of Contacts	3	Voltage Frequency (Contact Expro C&M for D.C. Applications)	0-100Hz
Voltage Uo/U (Um)	5/8.7 (10) kV	Maximum Current (Dependant on Ambient Temperature & Supply Frequency)	220A

# SpecTRON 10 10kV (U) 450A Connector Systems

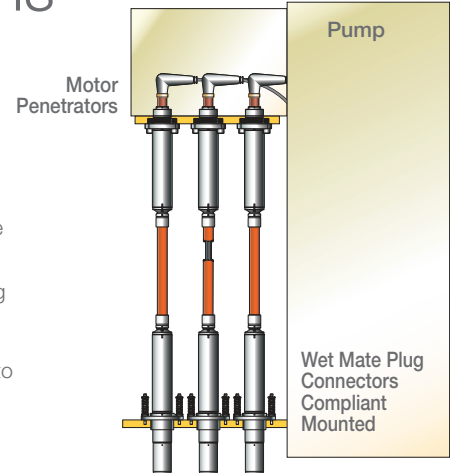
## Multi-Phase Pumping

SpecTRON 10 connectors are typically used for MPP (Multi-Phase Pumping) applications, also called Booster pumps and Mud-line pumps. The MPP sits on the sea bed and is joined to the pipeline, boosting flow from the well back to top-side. The pumps increase oil recovery and can be specified for new field developments, or to existing fields to extend their life.

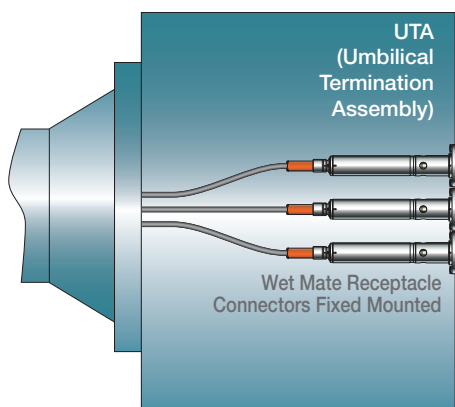
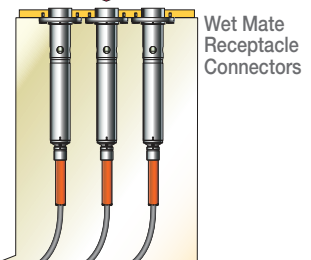
SpecTRON 10 connectors have a nominal voltage rating of 6/10(12)kV, in accordance with the IEC voltage class system. This makes them suitable for 3-phase system voltages up to 12kV (Um).

Maximum current throughput is up to 450A, depending on system parameters, particularly the temperature and pressure inside the pump motor. This means the connectors can provide power to pump motors rated to 9MW (12,000 hp), or to 5MW (6,700 hp) for systems requiring Category C operation.

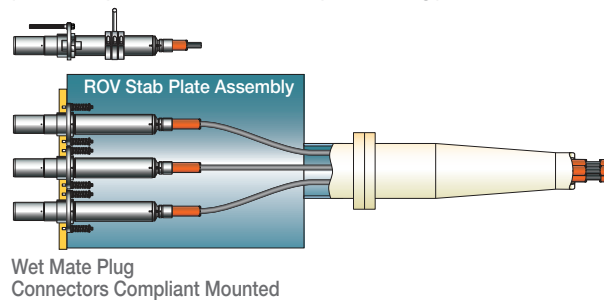
The SpecTRON 10 system has been qualified to 200 bar test (2000m) for use in deepwater to 1730m, which is currently the world's deepest MPP project.



SpecTRON 10 'Right Angle' (Elbow) Connector. This can be offered as an alternative to 'In-Line' (co-axial) cable entry.



Diver Mate Option - Wet Mate Plug Connector (see above photo of Diver Mate Receptacle & Plug)



## SpecTRON 10 Wet Mate Connectors Basic Electrical Specification

Number of Contacts	1	Voltage Frequency (Contact Expro C&M for D.C. Applications)	0-100Hz
Voltage Uo/U (Um)	6 / 10 (12) kV	Maximum Current (Dependant on Ambient Temperature & Supply Frequency)	450A

# SpecTRON 15

## 15kV (U) 200A Dry Mate Connectors

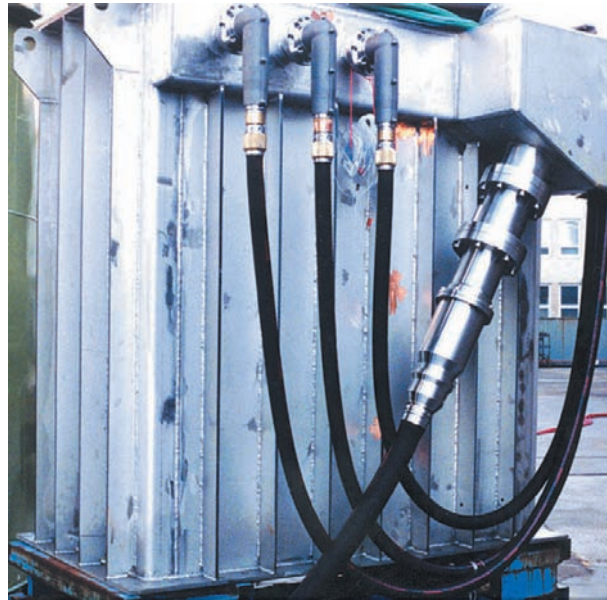
### Subsea Electrical Power Distribution

The SpecTRON 15 Dry Mate connector can be utilised as part of a sub-sea electrical power distribution system, providing the connection between the subsea umbilical power cores and the subsea step-down transformer. The step down transformer is used where long step-out distances require high voltage transmission.

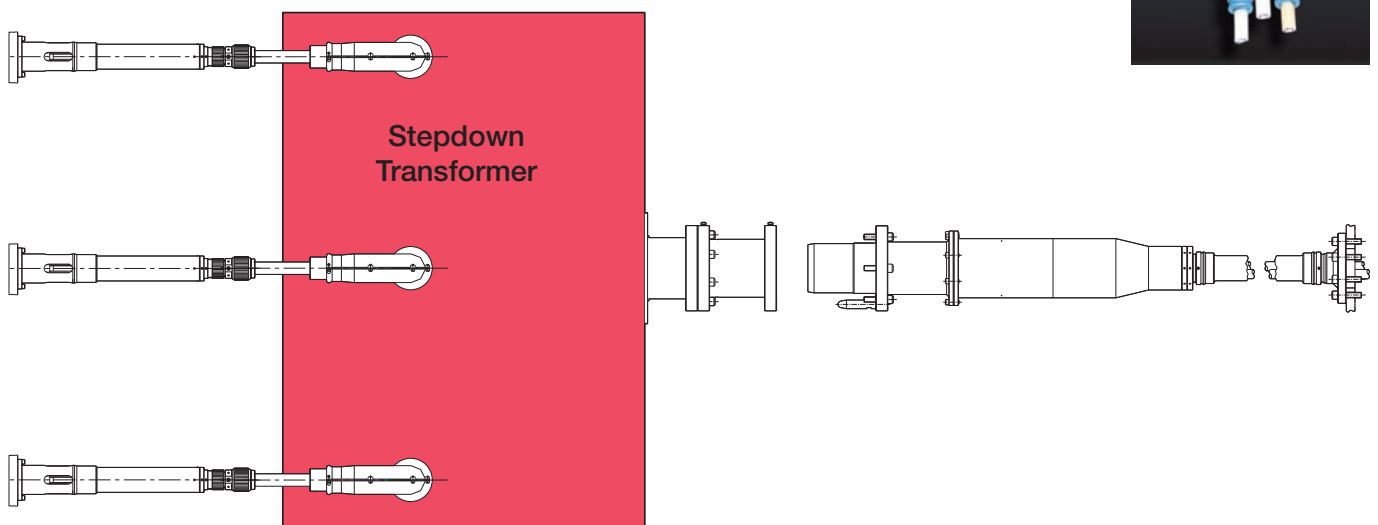
Power is then taken from the secondary side of the transformer and delivered to the load via a Tronic electrical connector system; typically SpecTRON 2 or SpecTRON 10. Utilising a SpecTRON 15 allows the umbilical and transformer to be transported seperately and connected together prior to deployment.

SpecTRON 15 Dry Mate connectors have a nominal rating of 8/14(15)kV\*. With a current capacity of 200A, the system power throughput can be up to 4.8MW (6400 hp).

*\* Currently rated at 14kV (U), Tronic would be happy to undertake a re-qualification programme to re-rate the connector to 15kV (U), in order to fit with the IEC voltage class of 8.7/15(17.5)kV.*



Subsea stepdown transformer with SpecTRON 15 Connector assembly and SpecTRON 2 jumper assemblies.



### SpecTRON 15 Dry Mate Connectors Basic Electrical Specification

Number of Contacts	3	Voltage Frequency (Contact Expro C&M for D.C. Applications)	0-100Hz
Voltage Uo/U (Um)	8/14 (15) kV	Maximum Current (Dependant on Ambient Temperature & Supply Frequency)	200A

At Expro Connectors & Measurements we are continuously reviewing our market's requirements and improving our product range to meet new and evolving demands. Our team of 25 highly qualified and experienced engineers, with a large test department at their disposal, are always available to respond to your product-development needs.

The development of the 8kV (U), 220A ESP system is an example of our response to market requirements; recognising the developing need for higher power ESP connector systems.

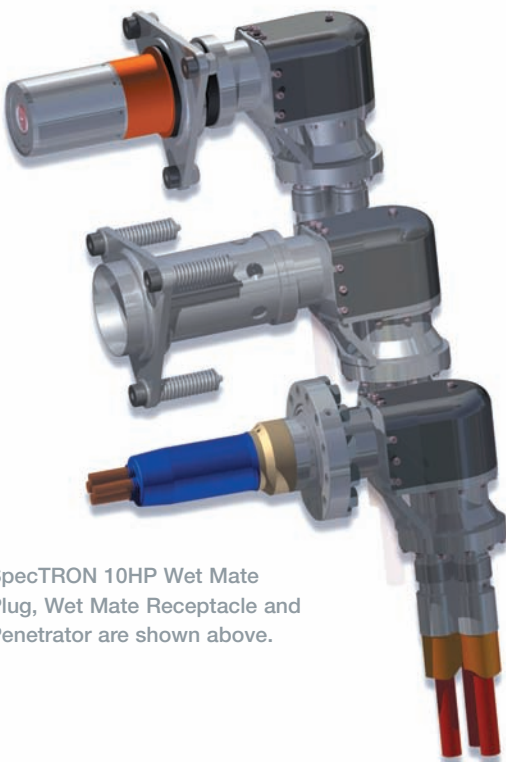
Further examples of products that we are preparing for the market are shown below.

## SpecTRON 10HP 10kV (U) 1800A Connector Systems

In preparation for the future demand for increased subsea electrical power, Expro Connectors are currently developing a high power version of their standard SpecTRON 10 range of connectors.

The SpecTRON 10 HP is being developed specifically to meet the requirements of subsea gas compression and high power subsea electrical distribution. As well as featuring all the reliable elements from the standard SpecTRON 10 range, the new connectors will also benefit from Expro Connectors latest materials research and innovative designs. The connectors will be rated at 10kV (U), 1800A, and will be capable of providing up to 31MW of electrical power in water depths to 2000m.

This product is currently at the design stage.

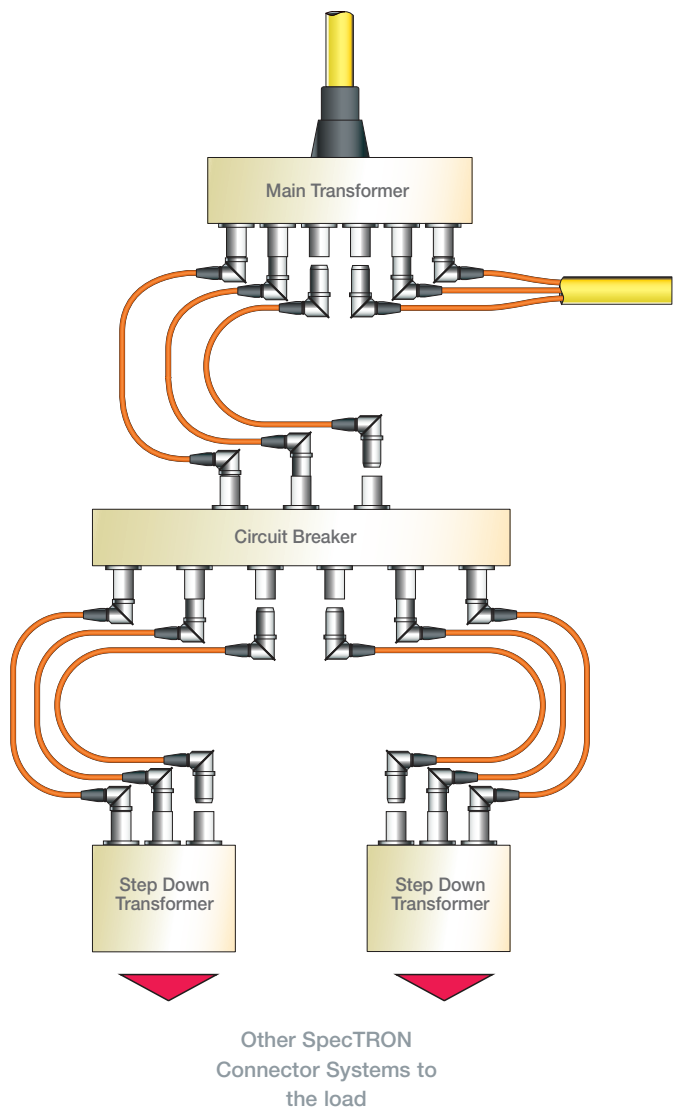


SpecTRON 10HP Wet Mate Plug, Wet Mate Receptacle and Penetrator are shown above.

## SpecTRON 30 30kV (U) 1350A Connector Systems

For some years now the oil industry has been exploring the possibility of operating electrical powered production systems such as transformers, High Frequency Variable Speed Drives (VSDs), pumps and compressors on the seabed. A number of high profile oil & gas companies are now actively researching and developing subsea power distribution architecture for the application of long step-out subsea gas compression (SGC). Expro Connectors have supported subsea power projects since 1997 with a number of innovative and industry award winning High Voltage power connector developments. The SpecTRON 30 is specifically designed to meet SGC requirements.

This product is complete subject to the qualification of cable interface and gland. A typical SpecTRON 30 system is illustrated below.



# SpecTRON Generic Data Sheet

## Wet Mate Connectors

### Wet Mate Connectors

Electrical Specification	SpecTRON 2 2kV (U) 1000A	SpecTRON 5 5kV (U) 200A	SpecTRON 8 8kV (U) 220A*	SpecTRON 10 10kV (U) 450A**	SpecTRON 10 HP 10kV (U) 1800A*	SpecTRON 30 30kV (U) 1350A
Number of Contacts	1	3	3	1	1	1
Voltage Uo/U (Um)	1.2/2 (2.4) kV	2.9/5 (5.8) kV	5/8.7 (10) kV	6 /10 (12) kV	6 /10 (12) kV	18/30 (36) kV
Voltage Frequency (Contact Expro C&M for D.C. Applications)	0-100Hz	0-100Hz	0-100Hz	0-100Hz	0-200Hz	0-200Hz
Maximum Current (Dependant on Ambient Temperature & Supply Frequency)	1000A	200A	220A	450A**	1800A	1350A
Short Circuit Condition	7kA for 1 second, 15kA peak	TBA	TBA	2.5kA for 0.5 second, 875A for 10 seconds	8kA for 5 seconds, 22.6kA peak	25kA for 1 second, 62.5kA peak
Maximum Test Voltage	5kV rms	10.1kV rms	20kV rms	27.6kV rms	24kV rms	67kV rms
Minimum Breakdown Voltage	>28kV rms	>36kV rms	>30kV rms	>41kV rms	>36kV rms	>120kV rms
Insulation Resistance	>10 giga Ohm (@1000V at 20°C)	>10 giga Ohm (@5000V at 20°C)	>10 giga Ohm (@5000V at 20°C)	>10 giga Ohm (@5000V at 20°C)	>10 giga Ohm (@5000V at 20°C)	>10 giga Ohm (@5000V at 20°C)
Maximum Contact Resistance (@20°C)	<0.05 milli Ohm	<0.3 milli Ohm	<0.3 milli Ohm	<0.1 milli Ohm	<0.1 milli Ohm	<0.05 milli Ohm
Maximum Conductor Cross Sectional Area	240mm <sup>2</sup>	16mm <sup>2</sup>	35mm <sup>2</sup>	240mm <sup>2</sup>	>720mm <sup>2</sup>	>400mm <sup>2</sup>

### Wet Mate Connectors

Mechanical Specification	SpecTRON 2 2kV (U) 1000A	SpecTRON 5 5kV (U) 200A	SpecTRON 8 8kV (U) 220A*	SpecTRON 10 10kV (U) 450A**	SpecTRON 10 HP 10kV (U) 1800A*	SpecTRON 30 30kV (U) 1350A
Water Depth Rating (metres)***	2200	1330	3000	1330	2000	2000
Number of Matings	100	100	100	100	100	50
Submerged Design Life	25 years	25 years	25 years (10 years: Tubing Hanger Receptacle)	25 years	25 years	25 years
Connection Method	Stab	ROV, Tubing Hanger, Diver & Tree Cap	ROV, Tubing Hanger & Tree Cap	Stab / ROV & Diver	Stab	Stab / ROT
Mate / Demate Forces	<640 Newtons	<640 Newtons	<750 Newtons	2kN per phase	3.5kN per phase	TBA
Differential Pressure Rating (Outboard Pressure High)	Receptacle only: 190 bar (240 bar test)	Receptacle only: 260 bar (520 bar test)	Receptacle only: 300 bar (450 bar test)	Receptacle only: 130 bar (200 bar test)	Receptacle only: 130 bar (200 bar test)	TBA
Differential Pressure Rating (Inboard Pressure High)	Receptacle only: 156 bar (195 bar test)	Tubing Hanger Receptacle 260 bar (520 bar test)	Tubing Hanger Receptacle 360 bar (450 bar test)	N / A	N / A	N / A
Weight (in air) approx.	Receptacle: 11kg Plug: 13kg	ROV Recept: 13kg ROV Plug: 15kg TH Conns: 10kg	Tree Cap Plug: 15kg Tubing Hanger Receptacle: 16kg	Receptacle: 25kg Plug: 32kg	Receptacle: 110kg Plug: 149kg	Receptacle: 240kg Plug: 170kg
Weight (in water) approx.	Receptacle: 8kg Plug: 10kg	ROV Recept: 10kg ROV Plug: 12kg TH Conns: 7kg	Tree Cap Plug: 11kg Tubing Hanger Receptacle: 12kg	Receptacle: 20kg Plug: 24kg	Receptacle: 90kg Plug: 122kg	Receptacle: 105kg Plug: 120kg
Connector Body Material	Super Duplex & Inconel Alloy 625	316L Stainless Steel or Super Duplex	316L Stainless Steel or Super Duplex & Inconel Alloy 625	316L Stainless Steel or Super Duplex	316L Stainless Steel	316L Stainless Steel
Angle of cable termination to connector axis	Plug: 90° or In-line Receptacle: In-line	Plug: In-line ROV Plug: 120° Receptacle: In-line	ROV Plug: 120° Receptacle: In-line	In-line or 90°	90°	90°

### Wet Mate Connectors

Environmental Specification	SpecTRON 2 2kV (U) 1000A	SpecTRON 5 5kV (U) 200A	SpecTRON 8 8kV (U) 220A*	SpecTRON 10 10kV (U) 450A**	SpecTRON 10 HP 10kV (U) 1800A*	SpecTRON 30 30kV (U) 1350A
Working Temperature Range	-4° to 20°C	-4° to 110°C - TH Conns: 200A at ambient of 80°C	-4° to 110°C	-3° to 20°C	-3° to 20°C	-4° to 20°C
Storage Temperature Range	-20° to 80°C	-40° to 70°C	-40° to 70°C	-40° to 70°C	-25° to 50°C	-20° to 70°C
Cathodic Protection Required	No	Yes (for 316L SS Conns.) NO (for Super Duplex Conns.)	Yes (for 316L SS Conns.) NO (for Super Duplex Conns.)	Yes (for 316L SS Conns.) NO (for Super Duplex Conns.)	Yes	Yes

Please Note: Many of the specifications are based on project specific requirements and are not necessarily a limitation of the connector.

Where a requirement is beyond the stated specification, contact Expro Connectors & Measurements for analysis. Expro's Tronic power connectors are engineered to operate continuously without damage under normal earth fault conditions. If operation with an earth fault is required, please contact us so that the most appropriate connector can be selected to suit the expected fault condition.

\* These connectors: SpecTRON 8 (8kV (U) 220A) & SpecTRON 10 HP (10kV (U) 1800A) are currently under development.

\*\* The current rating of a harness which includes a penetrator is limited to the penetrator rating of 400A.

\*\*\* Hyperbaric pressure tested to 1.5 x water depth rating pressure.

# SpecTRON Generic Data Sheet

## Dry Mate Connectors & Penetrators



### Dry Mate Connectors

### Penetrators

Electrical Specification	Dry Mate Connectors		Penetrators				
	SpecTRON 5 5 kV (U) 200A	SpecTRON 15 15 kV (U) 200A*	SpecTRON 2 2 kV (U) 1000A	SpecTRON 5 5 kV (U) 200A (API Flange)	SpecTRON 5 5 kV (U) 200A (Spool Mount)	SpecTRON 10 10 kV (U) 450A**	SpecTRON 10 HP 10 kV (U) 1800A***
Number of Contacts	3	3	1	3	3	1	1
Voltage (Uo/U)	2.9/5 (5.8) kV	8/14 (15) kV*	1.2/2 (2.4)kV	2.9/5 (5.8) kV	2.9/5 (5.8) kV	6/10 (12) kV	6/10 (12) kV
Voltage Frequency (Contact Tronic for D.C. Applications)	0-100Hz	0-100Hz	0-100Hz	0-100Hz	0-100Hz	0-100Hz	0-200Hz
Maximum Current (Dependant on Ambient Temperature & Supply Frequency)	200A	200A	1000A	200A	200A	400A	1800A
Short Circuit Condition	TBA	5kA for 1 second, 10kA peak	7kA for 1 second, 15kA peak	TBA	TBA	2.5kA for 0.5 second 875A for 10 seconds	8kA for 5 seconds 22.6kA peak
Maximum Test Voltage	9.2kV rms	28kV rms	5kV rms	9.2kV rms	9.2kV rms	21kV rms	24kV rms
Minimum Breakdown Voltage	>25 kV rms	>60kV rms	>7.2kV rms	>25kV rms	>25kV rms	>60kV rms	>36kV rms
Insulation Resistance	>10 Giga ohm (@5000V at 20°C)	>10 Giga ohm (@5000V at 20°C)	>10 Giga ohm (@1000V at 20°C)	>10 Giga ohm (@5000V at 20°C)	>10 Giga ohm (@5000V at 20°C)	>10 Giga ohm (@5000V at 20°C)	>10 Giga ohm (@5000V at 20°C)
Maximum Contact Resistance (@20°C)	-	<0.3 milli ohm	-	<0.3 milli ohm	<0.3 milli ohm	<0.1 milli ohm	<0.05 milli ohm
Maximum Conductor Cross Sectional Area	35mm <sup>2</sup>	240 mm <sup>2</sup>	240mm <sup>2</sup>	16mm <sup>2</sup>	16mm <sup>2</sup>	240mm <sup>2</sup>	>720mm <sup>2</sup>

### Dry Mate Connectors

### Penetrators

Mechanical Specification	Dry Mate Connectors		Penetrators				
	SpecTRON 5 5 kV (U) 200A	SpecTRON 15 15 kV (U) 200A*	SpecTRON 2 2 kV (U) 1000A	SpecTRON 5 5 kV (U) 200A (API Flange)	SpecTRON 5 5 kV (U) 200A (Spool Mount)	SpecTRON 10 10 kV (U) 450A**	SpecTRON 10 HP 10 kV (U) 1800A***
Water Depth Rating (metres)****	1000	1600	2500	3500	2600	1730	2200
Number of Matings	30	30	N / A	N / A	N / A	N / A	N / A
Submerged Design Life	25 years	25 years	25 years	25 years	25 years	25 years	25 years
Connection Method	Topside	Topside	N / A	N / A	N / A	N / A	N / A
Differential Pressure Rating (Outboard Pressure High)	N / A	N / A	250 bar (375 bar test)	345 bar (518 bar test)	260 bar (520 bar test)	170 bar (260 bar test)	90 bar (112 bar test)
Differential Pressure Rating (Inboard Pressure High)	Receptacle: 345 bar (517 bar test)	Receptacle: 10 bar	355 bar (533 bar test)	345 bar (518 bar test)	260 bar (520 bar test)	380 bar (570 bar test)	200 bar (300 bar test)
Weight (in air) approx.	Plug: 15kg Receptacle: 13kg	Plug: 88kg Receptacle: 40kg	20kg	26kg	10kg	40kg	149kg
Weight (in water) approx.	Plug: 12kg Receptacle: 10kg	Plug: 63kg Receptacle: 33kg	16kg	22kg	7kg	38kg	128kg
Connector Body Material	Plug: 316L Stainless Steel or Super Duplex Recept: Super Duplex	Super Duplex	Super Duplex & Inconel Alloy 625	Super Duplex	Super Duplex	316L Stainless Steel or Super Duplex	316L Stainless Steel
Angle of cable termination to connector axis	In-line	In-line	90°	In-line	In-line	In-line or 90°	90°

### Dry Mate Connectors

### Penetrators

Environmental Specification	Dry Mate Connectors		Penetrators				
	SpecTRON 5 5 kV (U) 200A	SpecTRON 15 15 kV (U) 200A*	SpecTRON 2 2 kV (U) 1000A	SpecTRON 5 5 kV (U) 200A (API Flange)	SpecTRON 5 5 kV (U) 200A (Spool Mount)	SpecTRON 10 10 kV (U) 450A**	SpecTRON 10 HP 10 kV (U) 1800A***
Working Temperature Range	-4° to 110°C	-4° to 20°C	Inboard: Oil @40°C max. Outboard: Water@ -4°C to 20°C	-4° to 110°C	-4° to 110°C	Inboard: Oil @ 60°C max. Outboard: Water@ -4°C to 20°C	Inboard: 60°C Gas (Wet) Outboard: Water@ -4°C to 20°C
Storage Temperature Range	-20° to 70°C	-20° to 80°C	-20° to 80°C	-40° to 70°C	-40° to 70°C	-40° to 70°C	-40° to 70°C
Cathodic Protection Required	Plug: Yes Receptacle: No	Yes for 316L No for super Duplex	No	No	No	Yes for 316L No for super Duplex	Yes

\* Currently rated at 14kV, EXPRO C&M would be happy to undertake a re-qualification programme to re-rate the connector to 15kV, in order to fit with the IEC voltage class of 8.7/15 (17.5) kV.

\*\* The current rating of a harness which includes a penetrator is limited to the penetrator rating of 400A.

\*\*\* This connector: SpecTRON 10HP (10kV (U) 1800A) is currently under development.

\*\*\*\* Hyperbaric pressure tested to 1.5 x water depth rating pressure.

# Aftermarket Services

Expro connectors are recognised throughout the global subsea oil and gas industry as leading in the design, manufacture and installation of reliable subsea electrical and optical connection systems.

Even with the best reputation, we strive for continuous improvements to meet the latest challenges of the industry. Expansion of our customer support organisation is another example of our strength, commitment and determination to remain the market leader.

Our Aftermarket Services Group now provides a range of post-sales support to the industry including a dedicated Site Team of 21 qualified and fully-trained installation engineers whose expertise is utilised around the world, supporting our customers at both onshore and offshore locations.

## Our Aftermarket Services

- Connector Installation
- Offshore Deployment Support
- Investigation Support
- Umbilical Test
- Test Connector Hire
- Customer Training

## Global Capabilities

Our UK-based Site Team has extensive experience of installing the full range of connector systems at onshore and offshore locations around the world. Additionally, we provide growing and dedicated in-country support using locally based personnel. This not only provides focused in-country resource, but also offers indigenous workforces where 'local content' is required. In-country support is available in the UK, Europe, USA, Brazil, West Africa and Malaysia.

## Site Team Profile

Over 20 years experience in the provision of onshore and offshore support on a global basis. Today, our installation engineers boast a combined experience of over 50 man-years and we continue to grow in order to meet market demand.

## Capabilities

- Termination, installation & test of the complete Tronic connector range
- On-site system interrogation & applications advice
- Standard response mobilisation within 14 days
- Rapid response mobilisation within 24 / 48 hours
- 24 hour 7 days a week telephone emergency response service
- Paperless Documentation system available to compliment hard copy records



Expro's business is well flow technologies and specialised services, and our mission is to:

- **measure**
- **improve**
- **control** and
- **process**

flow from high-value oil & gas wells.

Our expertise is marketed through five segments:  
**Well Testing & Commissioning, Production Systems,  
Wireline Intervention, Connectors & Measurements  
and Deepwater Intervention.**



# EXPRO

CONNECTORS & MEASUREMENTS

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