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2023

# ***THE ROV/AUV***

## ***EQUIPMENT & PARTS DIRECTORY***



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The Isurus™ ROV enables operations in high current conditions, increasing your working time for offshore renewables projects up to six additional hours.



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**8 YEARS OF OCEAN ROBOTICS PLANET**



**SIGN UP TO STAY  
INFORMED ABOUT THE  
MARINE & UNDERWATER  
ROBOTICS INDUSTRY.**



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Akasol	www.akasol.com	Darmstadt, Germany
AllBatteries UK	www.allbatteries.co.uk	West Midlands, UK
Bellamare LLC	www.bellamare-us.com	San Diego, CA, USA
Cell-Con	www.cell-con.com	Exton, PA, USA
Cell Pack Solutions	www.cellpacksolutions.co.uk	South Shields, UK
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CONTROS Systems & Solutions GmbH	www.contros.eu	Kiel, Germany
Corvus Energy	www.corvus-energy.com	Richmond BC, Canada
Customcells	www.customcells.de	Itzehoe, Germany
DeepSea Power & Light	www.deepsea.com	San Diego, CA, USA
EAS Germany	www.eas-germany.de	Jena, Germany
EIVA A/S	www.eiva.com	Skanderborg, Denmark
ENAG	www.enag.fr	Quimper, France
EnerDel	www.enerdel.com	Indianapolis, IN, USA
Energy Sales	www.energy-sales.com	Sunnyvale, CA, USA
Epsilor	www.epsilor.com	Arava, Israel
Fathom Systems	www.fathomsystems.co.uk	Aberdeen, UK
General Dynamics (Bluefin Robotics)	www.bluefinrobotics.com	Quincy, MA, USA
Global Dynamix, Inc.	www.gdynx.com	Branford, CT, USA
HOBi Labs, Inc.	www.hobilabs.com	Tucson, AZ, USA
Idronaut S.R.I.	www.idronaut.it	Brugherio, Italy
Lian	www.lianinno.com	Shenzen, China
Ocean Server	www.ocean-server.com	Fall River, MA, USA
Ocean Tools	www.oceantools.co.uk	Aberdeen, UK
Oceanworks	www.oceanworks.com	Burnaby, BC, Canada
Oxis Energy	www.oxisenergy.com	Abingdon, UK
Phoenix International	www.phnx-international.com	Largo, MD, USA
RS Aqua	www.rsqua.co.uk	Alton, UK
Saft Batteries	www.saftbatteries.com	Levallois-Perret, France
Skeleton Technologies	www.skeletontech.com	Tartu, Estonia
Southwestern	www.swe.com	Houston, TX, USA
Steatite	www.steatite.co.uk	Redditch, UK
SubC Imaging	www.subcimaging.com	Clarenville, NL, Canada
SubC Tech	www.subctech.eu	Kiel, Germany
Teledyne CDL	www.teledynemarine.com	Cypress, TX, USA
Tritech International	www.tritech.co.uk	Aberdeen, UK

## NEXT » BATTERY PACKS & CELLS

**08** Kraken Robotic Systems, Inc.

**10** Southwest Electronic Energy Corporation (SWE)



**I.01.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# **BATTERY PACKS & CELLS**

# KRAKEN ROBOTIC SYSTEMS, INC.



**HQ Location:** 189 Glencoe Drive, Mount Pearl, NL A1N 6P6, Canada

## Company Intro

Kraken Power GmbH, a wholly owned subsidiary of Kraken Robotics Inc., designs and manufactures unique pressure tolerant thrusters, drives, batteries, and electronics. The aim of Kraken Power is the development of an uncomplicated and economical technology for the construction and application of mechanical, electrical and electronic systems tolerating a hydrostatic pressure of 600 bar (equivalent to diving depths of approx. 6,000 m). Based on this technology, Kraken Power offers various electric drive systems with a power range from 100 W to 3.6 kW and energy supply systems based on lithium-polymer cells with a range of 1.6 kWh up to several MWh.

Kraken Power GmbH is an ISO 9001:2015 certified company and demonstrates Kraken Powers commitment to maintaining the position as a world-class provider of deep-sea pressure tolerant encapsulation technology, products, and services.

## Contact

sales@krakenrobotics.com  
+1-(709)-757-5757 (NL, Canada)

[www.krakenrobotics.com](http://www.krakenrobotics.com)



## PRODUCTS

### SEAPOWER™ BATTERIES

Kraken's SeaPower™ pressure-tolerant batteries have the best energy-to-weight ratio on the market for deep sea batteries and are capable of providing 100+ hours of continuous operation while running a full survey payload. SeaPower's deep-sea proven design operates at depths up to 6,000 m.

Undersea systems are exposed to extremely high-pressure environments. SeaPower silicone encapsulated lithium-polymer cells are protected from the harmful effects of the seawater while still leaving them flexible and stable. This silicone encapsulation eliminates the need for pressure-tolerant housings and components, reducing both weight and costs.

SeaPower's batteries can be used singularly or connected in modular banks, depending on your requirement for capacity and voltage. Each battery block is equipped with an integrated Battery Management System (BMS) allowing you to quickly and easily monitor the status and health of the battery.

Kraken's proprietary vacuum technique for encapsulating the battery cells allow for a depth rating for up to 6,000 m which makes them ideally suited for UUVs, AUVs, ROVs, subsea resident UUVs etc. SeaPower™ batteries are available in three different models – BM50V52, BM100V26 or BM450V45 to meet customer requirements.

### SeaPower™ Features

- | Reliable, rugged design
- | High-energy density
- | Oil compensation not required
- | Modular system
- | Diverse connector options
- | Integrated Battery Management System (BMS)
- | Data interfaces: CAN, RS485, or customer-specific





SeaPower™ BM50V52 / BM100V26 Battery Block



SeaPower™ BM450V52

SEAPOWERTM SPECIFICATIONS			
	BM50V52	BM100V26	BM450V45
Operation depth	6,000m	6,000m	6,000m
Energy Capacity	2.6 kWh; 50Ah	2.6 kWh; 100Ah	20 kWh; 450 Ah
Voltage Range	42 V EOD– 58.8 V EOC	21 V EOD– 29.4 V EOC	36 V EOD – 50.4 V EOC
Nominal Voltage	51.8 V	25.9 V	44.4 V
Life cycle @ 80% DOD	1,000 Cycles	1,000 Cycles	1,000 Cycles
Weight (in air)	31 kg	31 kg	158 kg
Dimensions (L×W×H)	344 mm × 261 mm × 249 mm	344 mm × 261 mm × 249 mm	1426 mm × 249 mm × 261 mm

# SOUTHWEST ELECTRONIC ENERGY CORPORATION (SWE)



**HQ Location:** P.O. Box 31340, Houston, TX 77231, USA  
823 Buffalo Run, Missouri City, TX 77489, USA

## Company Intro

Since 1964, SWE has been a pioneer in innovative energy solutions serving the needs of original equipment manufacturers in diverse fields such as oil and gas, oceanographic, military and remote. SWE has changed the game in subsea and oceanographic applications with SWE SeaSafe, SeaSafe II and SeaSafe-Direct, lithium-ion battery solutions that power subsea vehicles, control systems and oceanographic equipment safer and longer with four times the energy of a sealed lead acid battery. SWE leads downhole battery solutions with superior quality engineered Lithium primary battery packs for high temperature Measurement While Drilling (MWD) and Logging While Drilling (LWD) applications. SWE also provides custom battery solutions for the exploration of the earth's oceans by powering the infrastructure, vehicles and buoys that collect needed data.

[www.swe.com](http://www.swe.com)



## Contact

Leon Adams  
Email: [Info2@SWE.com](mailto:Info2@SWE.com)  
Phone Number: +1.281.240.4000

The future of subsea operations is all-electric and Southwest Electronic Energy (SWE) is committed to providing reliable subsea battery solutions to "untether" data acquisition and monitoring equipment. SWE's American Bureau of Shipping (ABS) and International Electrical Code (IEC) certified lithium Ion polymer battery modules can make that future a reality.

With a goal of providing safe light-weight solutions, SWE designed and introduced the cost-effective SeaSafe-Direct, which can go immediately into the water leaving the pressure vessel and oil case behind. The battery is enclosed in flame-retardant urethane, designed for complete water submersion. It has built-in subsea connectors for power and communications. With the need to generate reliable power subsea, this battery can power AUVs, ROV sleds, and provide power for sensors to determine equipment conditions and send needed data to determine maintenance needs.

Pressure tolerant to 6000m depth, SeaSafe batteries include SWE's patented battery management system (BMS). The BMS has the brainpower to assure safe operation, protect the module's cells from damage, allow reliable distributed battery system architecture, and prolong battery life. Rechargeable with a standard power supply, SeaSafe Smart modules are easy to use battery building blocks. The original SeaSafe and SeaSafe II can be used in oil-filled pressure equalization enclosures, while the SeaSafe Direct can be used directly in the water. Modules can be connected in series or parallel to meet voltage and capacity (Ah) needs. Each smart module is autonomous with its own BMS containing advanced algorithms for automatic and continuous safety protection, charge control and balancing. Additional components to support SWE SeaSafe include the Parallel Integrator Isolator and the SWE SeaSafe Observer Support Software, which allows the user to monitor the health of the battery in real time. The Woods Hole Oceanographic Institution has partnered with SWE in the development of SeaSafe, utilizing it in various Nereid AUV and Hybrid ROVs. The SeaSafe II and SeaSafe-Direct received a Certificate of Design Assessment from ABS in December 2017.



SOUTHWEST ELECTRONIC ENERGY GROUP

*Advanced Battery Solutions*

## SUPERIOR POWER FOR SUBSEA APPLICATIONS

SWE SeaSafe II and SeaSafe Direct Smart Battery Modules



A yellow rectangular battery module with the SWE logo and 'SEA SAFE II' text. It has a black cable with a red and black connector.

**SWE**  
**SEA SAFE II**

PRESSURE BALANCED  
OIL-FILLED 30V 28Ah



A yellow rectangular battery module with the SWE logo and 'SEA SAFE DIRECT' text. It has a black cable with a red connector.

**SWE**  
**SEA SAFE DIRECT**

DIRECT IN WATER 30V 28Ah

- **HIGHER PERFORMANCE & REWARD**

- 4X Longer Mission Run Time
- 6X Longer Battery Life Time
- 100% Condition Based Monitoring

- **LOWER RISK**

- ABS Certified & 2nd Generation Learned
- 6000 M Pressure Tolerant Tested
- Safety Tested and Patented

- **EASE OF USE**

- No Pressure Vessel Required
- Direct in Water Viable
- Simple Battery Sizing & Operation



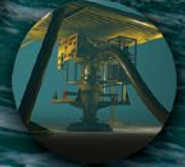
AUV



MUV



ROV



OIL &  
GAS

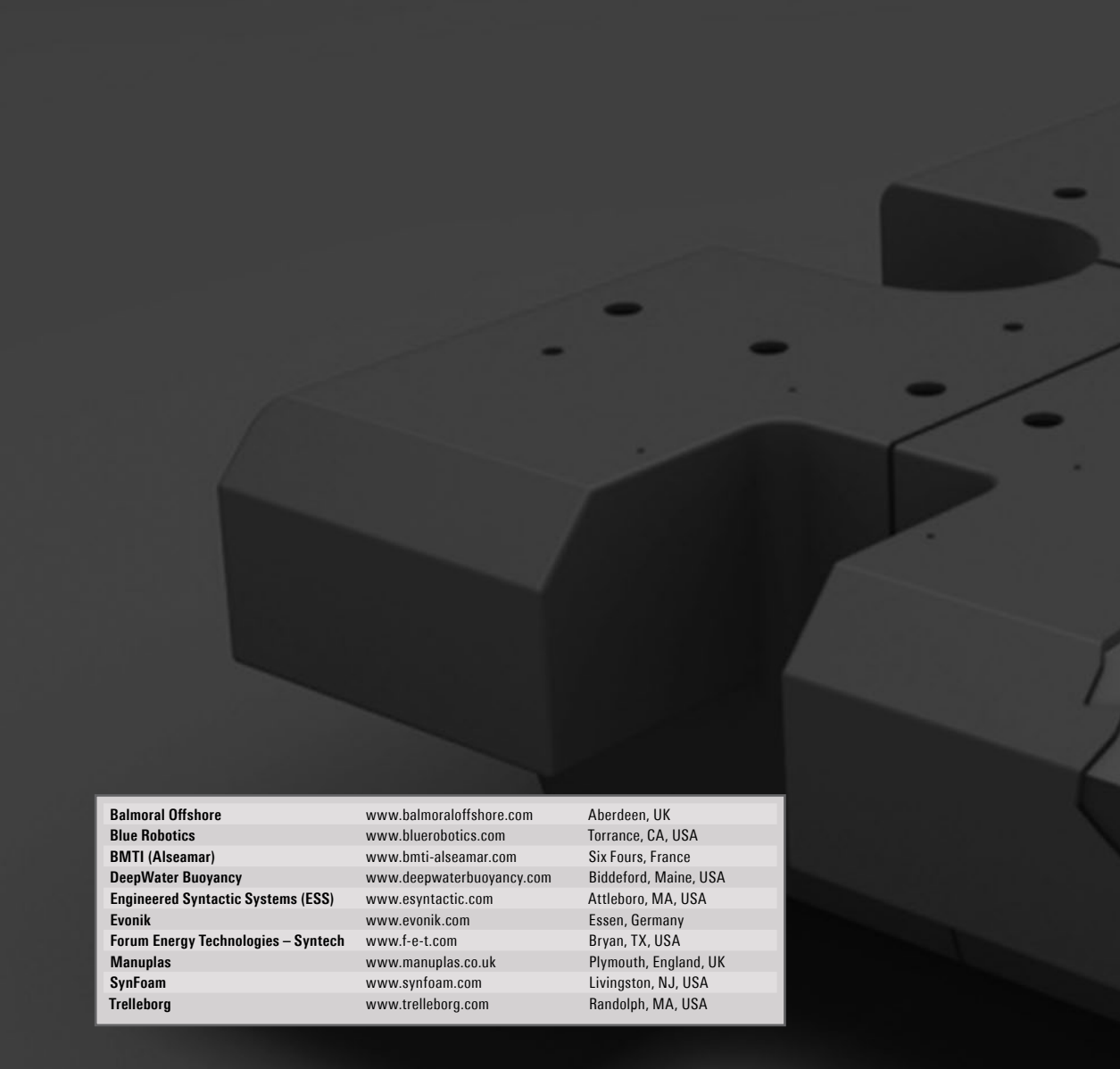
SERVICE

QUALITY

RELIABILITY

281.240.4000 | [seasafetech@swe.com](mailto:seasafetech@swe.com)





Balmoral Offshore	<a href="http://www.balmoraloffshore.com">www.balmoraloffshore.com</a>	Aberdeen, UK
Blue Robotics	<a href="http://www.bluerobotics.com">www.bluerobotics.com</a>	Torrance, CA, USA
BMTI (Alseamar)	<a href="http://www.bmti-alseamar.com">www.bmti-alseamar.com</a>	Six Fours, France
DeepWater Buoyancy	<a href="http://www.deepwaterbuoyancy.com">www.deepwaterbuoyancy.com</a>	Biddeford, Maine, USA
Engineered Syntactic Systems (ESS)	<a href="http://www.esyntactic.com">www.esyntactic.com</a>	Attleboro, MA, USA
Evonik	<a href="http://www.evonik.com">www.evonik.com</a>	Essen, Germany
Forum Energy Technologies – Syntech	<a href="http://www.f-e-t.com">www.f-e-t.com</a>	Bryan, TX, USA
Manuplas	<a href="http://www.manuplas.co.uk">www.manuplas.co.uk</a>	Plymouth, England, UK
SynFoam	<a href="http://www.synfoam.com">www.synfoam.com</a>	Livingston, NJ, USA
Trelleborg	<a href="http://www.trelleborg.com">www.trelleborg.com</a>	Randolph, MA, USA

## NEXT » BUOYANCY

- 14 Balmoral Offshore Engineering
- 16 BMTI (ALSEAMAR)
- 18 Trelleborg Applied Technologies





**I.02.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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***BUOYANCY***



**HQ Location:** Balmoral Park, Loirston, Aberdeen, AB12 3GY, United Kingdom  
**Regional Offices:** Houston, TX, USA | Rio de Janiero, Brazil

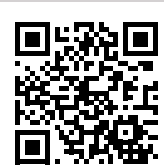
**Company Intro**

Balmoral is a trusted partner to the global offshore energy sector. We offer unrivalled technical expertise, a vast project track record, evidence-based buoyancy, protection and insulation product design, development and delivery. This, combined with an open approach to stakeholder engagement, ensures success.

[www.balmoraloffshore.com](http://www.balmoraloffshore.com)

**Contact**

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 +44 (0) 1224 859000



**ROV/AUV BUOYANCY  
 (TO 7,000MSW DEPTHS)**

**Composite Foam Systems:** A “composite” buoyancy system refers to a syntactic foam comprising glass microspheres and macrospheres held together within an epoxy resin system to create a homogenous matrix. Composite buoyancy systems are cast using dedicated mould tooling providing repeatable consistent production and are therefore ideally suited in applications such as work class ROV’s particularly on a multi-build requirement. Each component within any given Balmoral syntactic foam is individually rated for specific operating depths resulting in a strong, lightweight composite formulation. There is an overlap in the operating depth ranges which is caused by macro efficiency changes in design operating depths. This means that more efficient, lower density composites may generate improved uplift for a given volume as the operating depth increases. Composite buoyancy systems comprise an integrated shell to ensure maximum protection of the core material in the event of accidental impact.



**Pure Foam Systems:** Pure foams offer many advantages over macrosphere composite foam systems including robustness, ease of repair and modification in the event of damage or design changes, and extremely low water ingress rates. It should be noted, however, that this is a premium product and is therefore typically selected for more demanding service conditions such as extreme operating depths and/or service criticality such as manned service. The “ultra-low density range” of pure syntactic foam is normally produced in pre-cast blocks. These blocks may be supplied for client assembly or can be factory assembled into finished buoyancy modules. The buoyancy performance of Balmoral’s ultra-low density material is understood to be unique amongst ROV buoyancy foams in that the buoyancy does not progressively reduce due to hydrostatic compression as the ROV moves into deeper water. This is because the bulk modulus ie, the compressibility under hydrostatic pressure of the foams is marginally less than sea water.

PURE FOAM ULTRA-LOW DENSITY RANGE (LDF)	
Operating depth (ft/msw)	Typical core density kg/m <sup>3</sup>
6500 / 2000	385
9850 / 3000	401
13100 / 4000	435
16500 / 5000	479
23000 / 7000	519

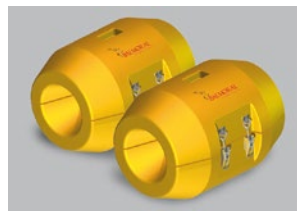
## FLEXLINK™ ARTICULATED UMBILICAL BUOYANCY

FlexLink™ was developed to meet the needs of large, tracked, trenching vehicles that operate on the sea bed. To prevent such vehicles damaging their control lines, FlexLink is installed at the tether point to provide a continuous, articulate buoyant section above the vehicle, thereby ensuring the umbilical remains out of the vehicle work zone at all times. FlexLink is used as a permanent installation which is designed to pass through the sheave wheels of launch and recovery systems (LARS). It is supplied for installation onto umbilicals ranging in size 25-75mm OD while the buoyancy can be specified to suit project requirements. Typical uplift ranges from 6-12kg/m in design operating depths of 0-6000msw.



## UMBILICAL FLOTATION

BOE provides a range of floats to suit most control umbilicals. These floats comprise a pair of symmetrical half shells which are profiled to permit the line to flex within its specified bend radius. Each float is manufactured using a low density composite foam core covered in a high performance impact and abrasion resistant polyethylene shell. BOE's umbilical floats are hinged using two stainless steel latches. The floats are designed to grip the umbilical by means of a natural rubber internal grommet. Balmoral umbilical floats are designed to suit umbilical diameters ranging from 25-50mm OD. Umbilical floats can be supplied to suit larger diameter umbilicals if required.



### UMBILICAL FLOAT VALUES

Operating depth (msw)	Weight in air (kg)	Nominal buoyancy (kg)
1000	14.7	15.2
1500	15.9	14
2000	17.3	12.6
2500	18.1	11.8
3000	19.1	10.8

## BALMORAL SUBSEA TEST CENTRE

### Hydrostatic testing

23 test vessels: internal lengths from 1010-10400mm, testing to 96-700bar

### Submersion test tanks

Three tanks spanning 6600×2300mm-9000mm dia, 2200-4500mm depths

### Mechanical testing

A proprietary testing rig performs load, axial, lateral, static, 3-point, compression, shear, dropped weight, swing arm and bend testing.

### Development and test laboratories

Ultramodern facility offers chemical, thermal, hydrostatic and mechanical testing in a highly controlled scientific environment.



## BUOYANCY REPAIR

It is vital that repair and refurbishment is carried out by fully qualified teams that understand the materials, procedures and environments to which marine buoyancy is exposed. It is vital that repair and refurbishment is carried out by fully qualified teams that understand the materials, procedures and environments to which marine buoyancy is exposed. Balmoral benefits from many years' design, manufacture and materials experience and has dedicated teams of experienced repair personnel travelling the world on a regular basis.

## INDUSTRY REGISTRATIONS

ISO 9001:2015    ISO 45001:2018    FPAL Achilles 10040184

# BMTI (ALSEAMAR)

**HQ Location:** 117 rue d'Ollioules, 83140 Six Fours, France

## Company Intro

BMTI is a leading manufacturer of engineered pure syntactic foam subsea buoyancy products for the Oil & Gas, Oceanography and Defense industries. Using innovative and advanced own-formulation syntactic foam materials technology and manufacturing processes, BMTI® delivers optimal performance in subsea products for deepwater applications.

We offer the smartest buoyancy solutions: own formulations and associated manufacturing processes, testing throughout the production chain, low densities for maximum buoyancy, long-term operational performance, deepwater & very deepwater buoyancy.

## Contact

Alexia Ballatore  
aballatore@alseamar-alcen.com  
+33 (0)4948 70777

[www.bmti-alseamar.com](http://www.bmti-alseamar.com)

**BMTI**  
— **ALSEAMAR**  
advanced buoyancy solutions

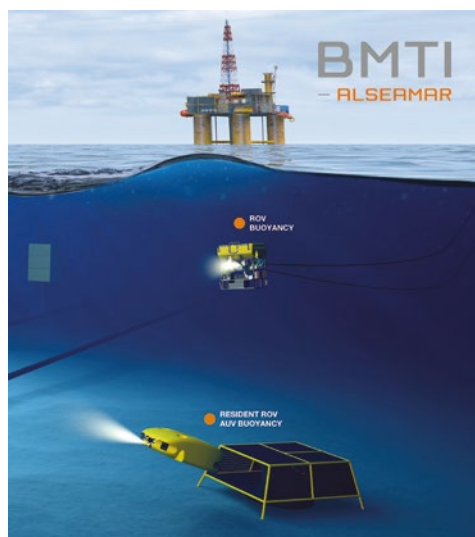


## ROV / AUV / TRENCHER BUOYANCY

BMTI® offers a state-of-the-art ROV buoyancy manufacturing process to ensure the best possible quality. We select the best foam grade for you on the basis of your specifications (depth rating and uplift are generally required). We are different from other buoyancy providers because we have the largest range of off-the-shelf blocks, densities and grades, so we can quickly take care of any application. Buoyancy assemblies are then machined to the exact shape, before being finished with our own-formulation protective PUR and painting, including the positioning of inserts for which we offer premium strengths. We carry out quality controls and testing to a high standard throughout the manufacturing process, so as to guarantee the best product performance.



- | BMTI® combines materials technology and design experience to manufacture highly sophisticated ROV/AUV buoyancy modules
- | BMTI® offers the lowest pure syntactic foam densities on the market for depths from 1 000 to 12 000 m, for maximum vehicle buoyancy.
- | BMTI® also has extensive experience in the positioning and incorporation of metal inserts, and in protective skins and coatings.
- | BMTI® can provide both standard blocks (large size means limited bonding) or finished buoyancy modules.



## HP GRADE FOR RESIDENT ROV/AUV

- | Range of High-performance foam composed of epoxy matrix and glass microspheres, from 1000 to 6000m deep
- | High performance mechanical properties versus density
- | Very low water absorption for long term service
- | A qualified product already tested by several customers



## SYNTACTIC FOAM BLOCKS

Lightweight and strong: BMTI® syntactic foam blocks offer the best performance for all your buoyancy requirements, if you prefer to shape locally.

The blocks are ready to use for assembly or cut-to-fit applications and can also be bonded together to form larger structures. We have an important stock policy, of various densities and depths, as to deliver quickly worldwide.

We offer the lowest variations of density tolerances to ensure maximum uplift.



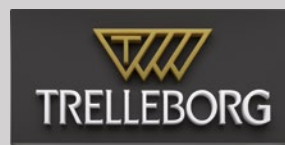
LOW COST GRADE (±15)				
Reference	Depth rating (msw)	Average Density on a 1 m <sup>3</sup> batch		Safety Factor (Instantaneous crush / pressure service)
		(kg/m <sup>3</sup> )	(lb/ft <sup>3</sup> )	
LC2000	2000	445	27.8	1.56
LC3000	3000	510	31.8	1.58
LC4000	4000	510	31.8	1.53
LC6000	6000	590	36.8	1.5

LOW DENSITY GRADE (±15)				
Reference	Depth rating (msw)	Average Density on a 1 m <sup>3</sup> batch		Safety Factor (Instantaneous crush / pressure service)
		(kg/m <sup>3</sup> )	(lb/ft <sup>3</sup> )	
LD2000	2000	420	26.2	1.48
LD3000	3000	435	27.2	1.48
LD4000	4000	460	28.7	1.33
LD5000	5000	505	31.5	1.39
LD6000	6000	565	35.3	1.37

VERY LOW DENSITY GRADE (±10)				
Reference	Depth rating (msw)	Average Density on a 1 m <sup>3</sup> batch		Safety Factor (Instantaneous crush / pressure service)
		(kg/m <sup>3</sup> )	(lb/ft <sup>3</sup> )	
VLD1000	1000	390	24.3	2.17
VLD2000	2000	400	25.0	1.39
VLD3000	3000	425	26.5	1.48
VLD4000	4000	448	28	1.33
VLD5000	5000	495	30.9	1.39
VLD6000-34	6000	545	34.0	1.50
VLD6000-30.9	6000	495	30.9	1.33

HIGH PERFORMANCE GRADE (±5, ±10, ±15)				
Reference	Depth rating (msw)	Average Density on a 1 m <sup>3</sup> batch		Safety Factor (Instantaneous crush / pressure service)
		(kg/m <sup>3</sup> )	(lb/ft <sup>3</sup> )	
HP1000	1000	380	23.7	2.87
HP2000	2000	385	24	1.78
HP3000-26	3000	417	26.0	1.78
HP3000-26.5	3000	425	26.5	1.78
HP4000-28	4000	448	28.0	1.5
HP5000-30	5000	480	30	1.5
HP5000-32.5	5000	515	32.2	1.5
HP6000-33.1	6000	530	33.1	1.5

# TRELLEBORG APPLIED TECHNOLOGIES



**HQ Location:** USA regional office: 24 Teed Drive, Randolph, MA 02368, USA

## Company Intro

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way. Trelleborg Applied Technologies specializes in the development and production of polymers and syntactic foam. Our goal is to perform at every level to deliver innovative and reliable solutions that maximize business performance to meet our customers needs.

Remotely Operated Vehicle (ROV), Autonomous Underwater Vehicle (AUV) and Human Occupied Vehicle (HOV) Buoyancy Systems are being used at increasingly deeper water depths, creating the need for low density materials with high buoyancy and reduced volumes. We develop, design and manufacture these buoyancy systems to be used in oceanographic, marine and offshore applications. Trelleborg Applied Technologies is ISO 9001 certified.

## USA Contact

Craig Chaffee  
craig.chaffee@trelleborg.com  
+1 774 719 1400

[www.trelleborg.com/applied-technologies](http://www.trelleborg.com/applied-technologies)



## ROV/AUV BUOYANCY

### ECCOFLOAT® SYNTACTIC FOAM

Trelleborg Applied Technologies manufactures a range of high performance, low density syntactic foam for deep sea buoyancy applications called Eccofloat®. These composite foams provide ultra-low densities by selecting only the highest specification hollow glass microspheres and combining them within a rigid, high strength resin system. The syntactic foam is typically cast into standard blocks with depth ranges from 1,000MSW (3,280FSW) to 11,500MSW (37,730FSW).

Oceanographers also depend on syntactic foams to suspend instrumentation in deep ocean studies. For these applications, the syntactic foam is used in either block form or custom molded shapes for installation in manned and unmanned submersibles, such as the legendary Alvin and Jason vehicles that were used to discover and explore the Titanic, along with achieving the world record for the deepest dive by a manned submersible by the Triton 36000/2 (DSV Limiting Factor).



Image courtesy of SMD Ltd

**Eccofloat® TG range of syntactic foams** are lightweight for building manned and remote operating vehicles. The foams are also used to manufacture mine neutralization systems because of their zero magnetic and sea-water comparable acoustic signatures. Applications include hydroplanes, rudders, trim adjustment modules for submarines and specialized applications such as acoustic windows due to the material profile and ability to significantly improve sonar functions.

**Eccofloat® EL range of syntactic foams** have been the materials of choice for manufacturing manned and unmanned submersibles for years, with their range of densities and ability to withstand exposure to diesel fuels and hydraulic fluids.

**Eccofloat® DG range of syntactic foams** have been developed for less density critical applications, with excellent mechanical properties for structural applications.

**Eccofloat® DS range of syntactic foams** combine lightweight glass Eccospheres® with multifunctional epoxy resin to produce ultra-high strength-to-weight materials for high-performance, deep sea applications including manned and unmanned submersibles.



XLX-C ROV, Image courtesy of Forum Energy Technologies (UK) Ltd

## RESIDENCY BUOYANCY

Trelleborg Applied Technologies manufactures a range of ultra-high performance, low density syntactic foams, specifically for ROV and AUV residency vehicle buoyancy applications. These composite foams provide very low densities by incorporating the highest specification hollow glass microspheres and combining with a rigid, high strength resin system.

Engineered to withstand long term immersion, our residency buoyancy solutions can withstand the constant hydrostatic conditions created by the challenge of residency applications. The unique polymer syntactic matrix provides superior resistance to compression ensuring consistent performance and stability.

## SUBSEA SPHERICAL AND ELLIPSOIDAL BUOYS

Njord EB (Ellipsoidal Buoyancy) and Njord SB (Spherical Buoyancy) solutions, provide long term, stable buoyancy to arrays of underwater equipment. With a full line of buoyancy solutions ranging from 100 meters to 6,000-meter water depths, these buoys are available in numerous sizes and shapes to ensure successful deployment and recovery during mooring expeditions.

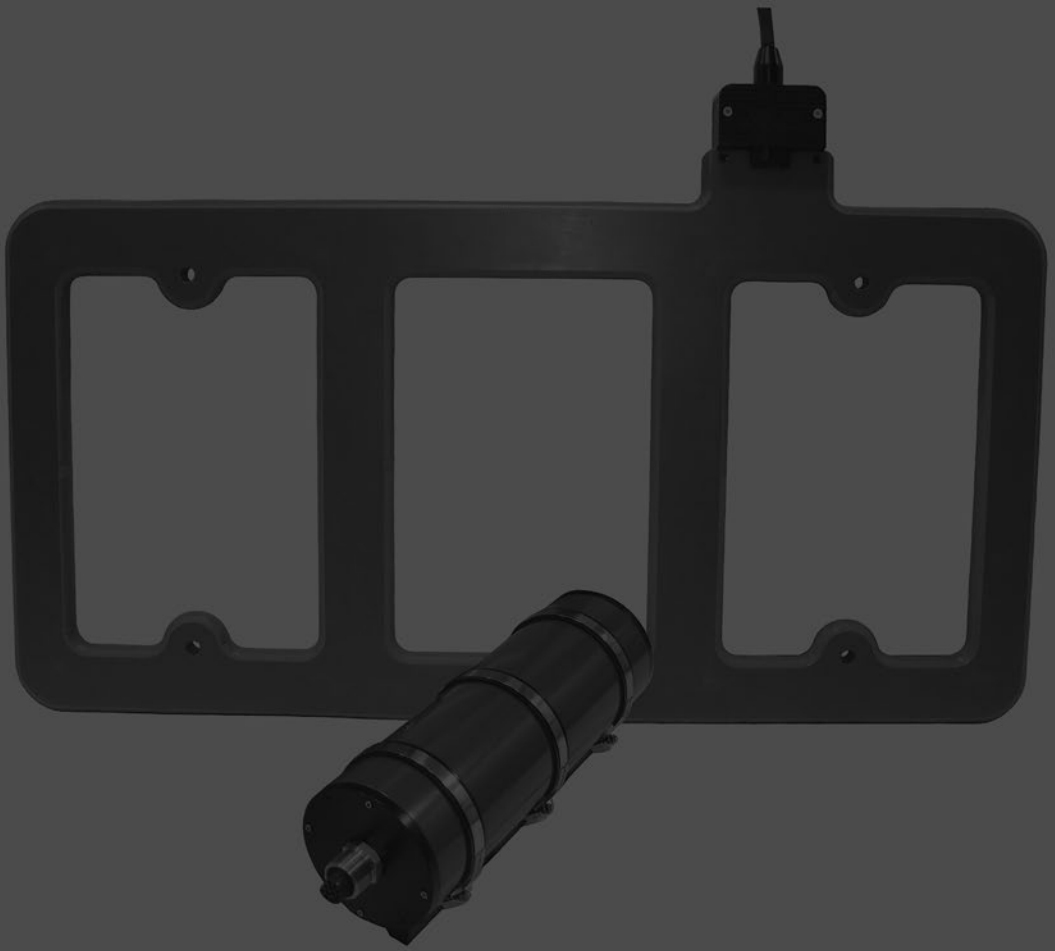
## NANO BUOYS

Trelleborg Applied Technologies range of subsea modular buoys, called Njord NB (Nano Buoys), are suitable for subsea equipment installation, each buoy core varies in density to suit individual project water depth needs (assemblies are available at depth ratings from 1,000 to 6,000 MSW). The unique nesting design of the individual buoyancy elements enables them to quickly assemble into a rigid structure with a specific uplift. Nano buoys are manufactured from a low-density carbon fibre macrosphere and syntactic foam. The core is then encapsulated in a high-density polyethylene shell for impact and abrasion protection.

**NEXT » CABLE AND PIPE TRACKERS**

**22** Teledyne TSS





**I.03.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# ***CABLE AND PIPE TRACKERS***

# TELEDYNE TSS



**TELEDYNE MARINE**  
Everywhere you look™

**HQ Location:** ABZ Business Park, International Avenue,  
Dyce, Aberdeen, AB21 0BH, United Kingdom

## Company Intro

Teledyne Marine is an organization comprised of 23 leading surface and subsea technology brands assembled by Teledyne Technologies Inc. These technologies span oceanographic instruments; subsea and surface vehicles and navigation; imaging sonars, cameras and lights; and interconnect solutions. Collectively, Teledyne Marine is able to offer the widest breadth of technology in the industry.

Teledyne TSS, a brand of Teledyne Marine, is world leading in the design, manufacture, and support of marine products for applications including navigation, motion compensation, platform stabilisation, and subsea pipe and cable survey. Teledyne TSS has specialist sales and support worldwide through a comprehensive network of distributors and service providers.

## Contact

tss@teledyne.com  
Phone: +44 (0)1224 772345

[www.teledynemarine.com/tss/](http://www.teledynemarine.com/tss/)



## PRODUCTS

### HYDROPACT 350 CABLE TRACKING SYSTEM

The ROV Mountable HydroPACT 350 Cable Tracking system uses the industry standard and proven tone injection technology to carry out submarine surveys by detecting and tracking tone-carrying cables to create real-time accurate depth of burial and positioning survey data. The measurement technology used also allows the system to operate out of water with no degradation in performance, range, or accuracy. The HydroPACT 350 is available as either 110VAC or 230VAC systems, rated at either 3000m or 6,000m.



## HYDROPACT 440 PIPE & CABLE TRACKING SYSTEM

The ROV mountable world renowned market leading HydroPACT 440 Pipe & Cable Tracking system uses industry standard and proven pulse induction technology to detect buried pipes, cables and UXO objects and creates real-time accurate depth of burial and positioning survey data. The measurement technology used also allows the system to operate out of water with no degradation in performance, range or accuracy. The HydroPACT 440 is available as either 110VAC or 230VAC systems, rated at either 3000m or 6,000m, or 24VDC system (rated 3000m only).



## HYDROPACT DUALTRACK PIPE AND CABLE TRACKING SYSTEM

The ROV mountable HydroPACT Dualtrack system comprises of the HydroPACT 440 pulse induction system and 350 tone injection system to give the ultimate subsea pipe and cable detection and tracking capability, enabling the user to switch seamlessly between the two technology platforms to create real-time accurate depth of burial and positioning survey data. The HydroPACT Dualtrack is available as either 110VAC or 230VAC systems, rated at either 3000m or 6,000m.



## HYDROPACT 660E PIPE & CABLE TRACKING

With HydroPACT 660E Teledyne Marine brings the world's smallest submarine, pulse induction pipe & cable tracker system to market. Built upon the already established, industry standard and world leading TSS HydroPACT 440 system. The HydroPACT 660E has a 60% smaller coil and single 24 Vdc, small subsea electronic pod, dramatically reducing the installed footprint and payload of the system while maintaining an operating range of greater than 85% of that of the significantly larger HydroPACT 440 system.





<b>Cortland</b>	<a href="http://www.cortlandcompany.com">www.cortlandcompany.com</a>	Cortland, NY, USA
<b>DeRegt Marine Cables</b>	<a href="http://www.deregtcables.com">www.deregtcables.com</a>	Krimpen aan de Lek, The Netherlands
<b>Elmeridge Cables</b>	<a href="http://www.elmeridge.com">www.elmeridge.com</a>	Brighton, England, UK
<b>Falmat Cables</b>	<a href="http://www.falmat.com">www.falmat.com</a>	Falmat, MA, USA
<b>Hydro Group</b>	<a href="http://www.hydrogroupplc.com">www.hydrogroupplc.com</a>	Aberdeen, Scotland, UK
<b>JDR Cables</b>	<a href="http://www.jdr cables.com">www.jdr cables.com</a>	Hartlepool, England, UK
<b>Nexans</b>	<a href="http://www.nexans.com">www.nexans.com</a>	Paris, France
<b>NOVACAVI</b>	<a href="http://www.novacavi.it">www.novacavi.it</a>	Milan, Italy
<b>Oceaneering</b>	<a href="http://www.oceaneering.com">www.oceaneering.com</a>	Rosyth, Scotland, UK
<b>Prysmian Group</b>	<a href="http://www.prysmiangroup.com">www.prysmiangroup.com</a>	Milan, Italy
<b>Seanamic Group – Umbilicals International</b>	<a href="http://www.umbilicals.com">www.umbilicals.com</a>	Stafford, TX, USA
<b>TE Connectivity – Rochester Cables</b>	<a href="http://www.te.com">www.te.com</a>	Schaffhausen, Switzerland

## **NEXT » CABLES, TETHERS & UMBILICALS**

**26** DeRegt

**28** Fibron BX Ltd.

**30** Hydro Group Plc.

**32** Novacavi

A detailed technical diagram of a cable cross-section, showing multiple concentric layers of conductors and insulation. The diagram is rendered in a light gray line-art style against a dark gray background. The central part of the diagram shows a large circular conductor, surrounded by several smaller circular conductors, which are further enclosed by concentric rings of insulation and a final outer jacket. The diagram is positioned in the upper half of the page, with its lower portion overlapping the orange section.

I.04.

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# ***CABLES, TETHERS & UMBILICALS***


**DeRegt**

A SERCEL COMPANY

## Cable solutions that challenge the status quo



### The race to reach greater depths is in full swing

ROV manufacturers are continuously searching for new, innovative ways that will allow existing and new ROV models to dive deeper. As a supplier of ROV cables, we have an unrivalled understanding of the challenges facing ROV manufacturers. Interested in finding out how you, as an ROV manufacturer, can benefit from the latest cable technology?



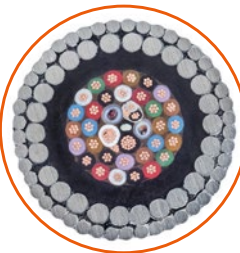
#### Meet us

Zaag 2-4, 2931 LD Krimpen aan de Lek, The Netherlands  
+31 180 66 88 52 | [deregtcables.com](http://deregtcables.com)

#### Connect

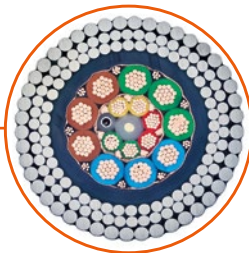
Stay tuned, keep in touch with DeRegt.  
Scan the QR code and be the first to know about our updates.





### Middle weight ROV class cable

- Two layer armour package
- High temperature resistant materials
- Optical fiber communication
- 4km waterdepth



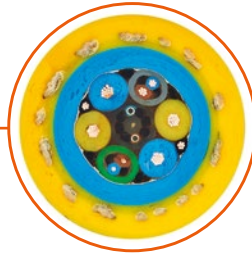
### Fall pipe cable

- Triple layer high tensile steel
- Combination of High power, auxiliary power and communication
- Up to 3.5km waterdepth



### Trenching umbilical

- High tensile steel package to support cable weight
- High power consumption – 1.5mW power
- Combination of main power, auxiliary and communication pairs
- 750 meter length



### Lightweight tether cable

- Light weight design
- Aramid strength member
- Designed for deep water application

# FIBRON BX LTD.

# Fibron

**HQ Location:** Fibron House, Unit C, RD Park, Stephenson Close,  
Hoddesdon, Herts, EN11 0BW, England, UK

## Company Intro

We design and implement umbilical and cable solutions from the surface to the seabed for the Oil & gas, ROV, Diving and Seismic industries. We use a keen knowledge of our environment, combined with innovative thinking, materials testing and analysis to provide products that meet any challenge.

Fibron's goal is to provide the most reliable solutions in today's exploratory subsea industry. Fibron provides an industry-leading range of subsea cables and umbilicals for all diving, ROV and intervention needs. We are all explorers with the spirit of adventure at heart. For some it's about pushing the boundaries of human endeavour, while for others it's about overcoming the everyday challenges. We believe passionately in the power of change. Together, let's go deeper and further, changing attitudes and shaping the future of our industry.

[www.fibron.com](http://www.fibron.com)



## Contact

Matthew White  
Matt.White@fibron.com | houston@fibron.com  
+44 (0) 1992 471 444 | +1 713 292 6486

## PRODUCTS

### CLASS-LEADING ARMOURING PACKAGES

Fibron have many years of field-proven experience and expertise in the design and manufacture of armouring packages, ensuring superior strength and reliability. Fibron's Thin-Wall Insulation technology allows for the design of cables with smaller diameters to suit your specific requirements, saving space and weight. Our ROV umbilicals are designed and manufactured at a purpose-built facility in the UK. Fibron design and production processes are ISO 9001 certified.

### What can we do for you?

Whatever your challenge, Fibron welcomes the opportunity to solve it. We have unique experience to help you lower costs, save time, increase safety and gain better efficiencies. Plus our service doesn't end with product delivery. You can expect Fibron to back you up with industry-leading customer support and technical advice on product use in the field. Our trained service engineers are available to support field installation and maintenance, to give you full peace of mind throughout the life of the product.

## APPLICATIONS

- | ROV Main Lift Umbilicals including Observation Inspection
  - Light / Medium/ Heavy Work Class
- | ROV Tethers
- | Deep Ocean Research Umbilicals
- | Trencher Umbilicals
- | Oceanographic Cables
- | Diamond Mining Umbilicals
- | Subsea Pile Hammer Umbilicals

## ROV MAIN LIFT UMBILICALS

Fibron ROV Main Lift Umbilicals are custom-designed and manufactured to meet your specific requirements. Armour packages utilise in-house field-proven technology, ensuring stable, balanced constructions. Products with load-bearing capabilities based on high tensile galvanised steel, in continuous lengths of 10 km and beyond, allow you to go deeper for more dives. With an enviable track record in Main Lift Umbilical supply to many major system builders and operators, Fibron designs are the result of years of expertise, experience and extensive testing.



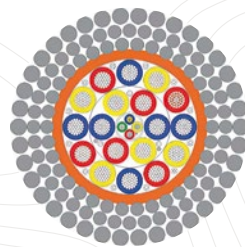
RM0015



RM0053

## TRENCHER UMBILICALS

Combining requirements for high voltage, performance at depth and high load-bearing capability, Fibron have the technology to deliver trencher umbilicals suitable for extreme applications.



RM0005

## DEEP OCEAN RESEARCH UMBILICALS

Working with world-leading organisations, Fibron have a strong history in the supply of umbilicals for Deep Ocean Research based on our superior armouring technology and ability to transmit high voltages in small diameter cables. Having supplied up to 10,000m continuous lengths, successfully tested at independent test houses, you can be sure of the survivability of Fibron products even in the deepest, harshest environments.



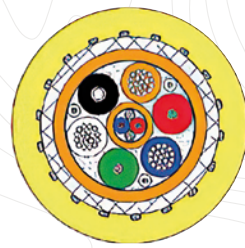
RM0029

## ROV TETHER CABLES

Fibron ROV tethers are individually designed and built to meet your specifications. Whether your application has demanding requirements for voltage, buoyancy, size, length or strength, our ability to process Vectran<sup>TM</sup> fibre and a range of polymeric materials on state-of-the-art machinery means we can work with you to deliver a cable to suit your specific needs.



RM0136



RM0137

# HYDRO GROUP

**HQ Location:** Hydro House, Claymore Avenue, Aberdeen Energy Park, Bridge of Don, AB23 8GW, Scotland, UK

## Company Intro

With over 35 years of international experience, Hydro Group designs, manufactures and installs bespoke subsea electrical and optical connectivity solutions for use in harsh environments in the international oil and gas, defence and renewable energy sectors.

Headquartered in Aberdeen, United Kingdom, Hydro Group's regional subsidiaries Hydro Group Asia Pte and Hydro Group Systems, Inc offer support and aftersales service from Singapore and Florida, USA. A network of Hydro Group business partners are also on hand to support your product from initial quotation to final installation around the globe.

## Contact

The Hydro Group Plc. sales team  
sales@hydrogroup.plc.uk  
+44 (0)1224 825 050



[www.hydrogroupplc.com](http://www.hydrogroupplc.com)



## PRODUCTS

Hydro Group has over three decades of experience in the creation of bespoke and ex-stock cables, tethers and umbilicals and is certified to ISO 9001:2015 and 14001:2015 quality standards. The company is a proud recipient of the 2018 Queen's Award for Enterprise: International Trade, recognising the success of its exports around the world.

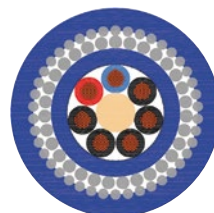
The Group's subsidiaries, Hydro Bond Engineering and Hydro Cable Systems, manufacture a wide range of subsea connectivity solutions including armoured cables, tow cables, fibre optic hybrid cables and ROV tethers. Over 6000 configurations of cable design are available, with a large choice of armour and sheath materials to choose from to suit your specific application.

## ARMoured CABLES

- Subsea armoured cables can withstand higher stresses with superior crush resistance, corrosion resistance and better cold impact bend performance, ideal for harsh underwater environments
- Hydro Group offers multi-core power and data cables with single layer, contra-helical and high tensile armouring
- Our in-house armouring facilities can include armoured wire sizes between 0.5 – 2.5mm diameters for cables up to 80mm in diameter. Minimum order quantities of 100 metres for cable products.
- Protection options include Aramid, Kevlar, Vectran, galvanised or stainless steel (including steel wire rope or steel wire armour)



WITHOUT OUTER SHEATHING  
(CS 7200)



WITH SHEATHING  
(CS 7040)

## FIBRE OPTIC/HYBRID CABLES

- Our fibre optic cables can be supplied in multiple numbers within a gel-filled stainless steel tube, or as individual fibres within a jacket
- 9/125 Single mode, 50/125 and 62.5/125 Multimode Fibre Optics can be supplied as a standalone cable or as part of a bigger bundle

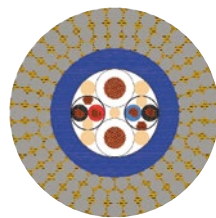


CS 6866



## TOW CABLES

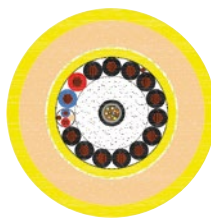
- | Range of applications including in defence industry e.g. anti-submarine warfare and reconnaissance
- | Experienced in creating heavy and light tow cables for several international defence forces
- | Previous example of 600m long steel wire armour heavy tow body sonar cable with hairy fairing on the umbilical to increase coefficients while towed at 20 knots
- | Extensive and gruelling testing process – example operational weight of 5 tons, pull weight 40 tons, destruction at 48 tons



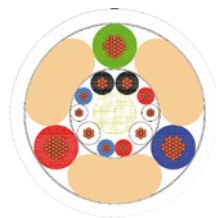
ARMOURED TOW CABLE  
(CS 7160)

## ROV TETHERS

- | A range of custom and ex-stock options available, providing extended operating range between ROV and operating base
- | We can engineer neutral, negative or positive-buoyancy cables with fibre optic, strain-bearing braid and waterblocking capabilities (other options available)
- | Illuminated tether offering with LED elements and Polyurethane (PU) sheath – ideal for inspection ROVs utilised in murky waters to avoid entanglement in limited visibility operations
- | Durable cables provided with tough sheathing options to protect against abrasion and damage in harsh subsea environments



BOUYANT ROV TETHER  
(CS 6707)



ILLUMINATED ROV TETHER  
(CS 7171)

## UMBILICALS

- | Hydraulic umbilicals can include different components including thermoplastic hoses, medium voltage power cores, low voltage electrical power cables, electrical signal cables, fibre optic cables
- | Bundled assemblies protected by layers of steel wire/Vectran armour and inner and outer sheaths of thermoplastic material, either as extrusions or helically-wrapped roving
- | Electrical and Electro-Hydraulic umbilicals also available
- | Neutral buoyancy increases safety for divers and machinery operating in close contact with umbilicals
- | Hydro Group experienced in manufacturing hydraulic umbilical hose bundles for subsea diving, BOP control, topside control umbilicals and Intervention Workover Control Systems (IWOCs) ratings available upon request



UMBILICAL CABLE  
(CS 7237)







# NOVACAVI

*Cables for advanced technology*

## COMPANY INTRO

Italian privately owned company established in 1975. Specialist in custom cables design and manufacturing, NOVACAVI is involved

in providing innovative specialty cables for a broad variety of underwater or water-based environments in high-tech applications.

### HQ LOCATION

1 via Martiri di Cefalonia  
Peschiera Borromeo-Milano  
20068, Italy

### CONTACT

Francesca Faverio  
ff@novacavi.it  
+39 02.5538321

[WWW.NOVACAVI.IT](http://WWW.NOVACAVI.IT)



ISO 9001 certified design and production process since 1995.

For the new challenges of Oceanographic, Seismic, Hydrographic, Defence, Offshore Oil & Gas, Aquaculture, Renewable Energy and Water Utility market sectors NOVACAVI offers great experience in subsea application, material expertise, engineering versatility and production flexibility, prototyping development, low volume & high mix production of custom, reliable, in fit for purpose quantity, lengths and packaging

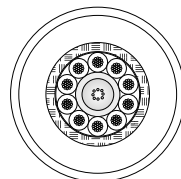
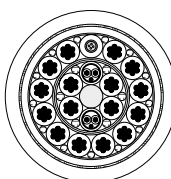


# AQUANCABLE®

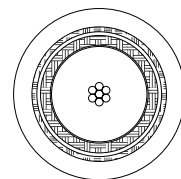
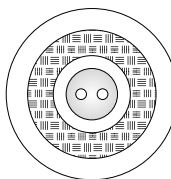
## Cables for Underwater Technologies by **NOVACAVI**

NOVACAVI's custom-engineered cables for underwater technologies feasible on any conceivable configuration.

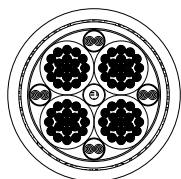
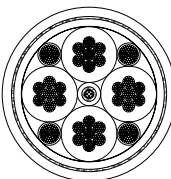
### ROV tether cables



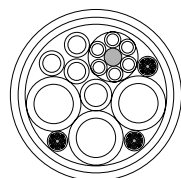
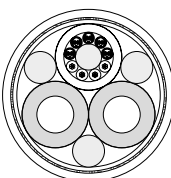
### Underwater drones & robots cables



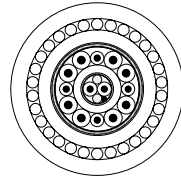
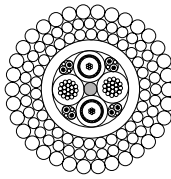
### Fiber Optic subsea hybrid cables



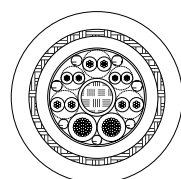
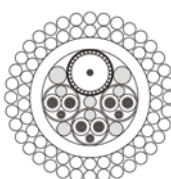
### Umbilicals




### Subsea armoured tow cables



### Subsea detection and instrumentation cables



Contact NOVACAVI for custom requirements: [tech@novacavi.it](mailto:tech@novacavi.it) - [www.novacavi.it](http://www.novacavi.it)



<b>2G Robotics</b>	<a href="http://www.2grobotics.com">www.2grobotics.com</a>	Waterloo, ON, Canada
<b>360Heros</b>	<a href="http://www.360abyss.com">www.360abyss.com</a>	Olean, NY, USA
<b>Arctic Rays</b>	<a href="http://www.arcticrays.com">www.arcticrays.com</a>	Groton, MA, USA
<b>Battelle</b>	<a href="http://www.battelle.org">www.battelle.org</a>	Columbus, OH, USA
<b>BIRNS</b>	<a href="http://www.birns.com">www.birns.com</a>	Oxnard, CA, USA
<b>Blue Robotics</b>	<a href="http://www.bluerobotics.com">www.bluerobotics.com</a>	Torrance, CA, USA
<b>Cathx Ocean Systems</b>	<a href="http://www.cathxocean.com">www.cathxocean.com</a>	Newhall, Ireland
<b>Ciscree</b>	<a href="http://www.ciscree.fr">www.ciscree.fr</a>	Toulon, France
<b>C-Tecnics</b>	<a href="http://www.c-tecnics.com">www.c-tecnics.com</a>	Aberdeen, UK
<b>DeepOcean Vision</b>	<a href="http://www.deepoceanvision.com">www.deepoceanvision.com</a>	Swansea, UK
<b>Deepsea Power &amp; Light</b>	<a href="http://www.deepsea.com">www.deepsea.com</a>	San Diego, CA, USA
<b>DWTEK</b>	<a href="http://www.dwtek.com.tw">www.dwtek.com.tw</a>	Taichung City, Taiwan
<b>ECA Group</b>	<a href="http://www.ecagroup.com">www.ecagroup.com</a>	Toulon, France
<b>GNOM</b>	<a href="http://www.gnomrov.com">www.gnomrov.com</a>	Moscow, Russia
<b>Imenco</b>	<a href="http://www.imenco.no">www.imenco.no</a>	Aksdal, Norway
<b>ISPTEL, Ida</b>	<a href="http://www.isptel.com.pt">www.isptel.com.pt</a>	Perafita, Portugal
<b>Kongsberg Maritime</b>	<a href="http://www.kongsberg.com">www.kongsberg.com</a>	Aberdeen, UK
<b>Lighthouse</b>	<a href="http://www.lighthouse-geo.com">www.lighthouse-geo.com</a>	Bologna, Italy
<b>MacArtney</b>	<a href="http://www.macartney.com">www.macartney.com</a>	Esbjerg, Denmark
<b>Marine Imaging Tech</b>	<a href="http://www.marineimagingtech.com">www.marineimagingtech.com</a>	North Falmouth, MA, USA
<b>Novasub</b>	<a href="http://www.novasub.com">www.novasub.com</a>	Sleeuwijk, Netherlands
<b>Ocean Imaging Systems</b>	<a href="http://www.oceanimagingystems.com">www.oceanimagingystems.com</a>	North Falmouth, MA, USA
<b>Ocean Presence Technologies</b>	<a href="http://www.oceanpresence.com">www.oceanpresence.com</a>	Santa Cruz, CA, USA
<b>Ocean Tools</b>	<a href="http://www.oceantools.co.uk">www.oceantools.co.uk</a>	Aberdeen, UK
<b>Outland Technology</b>	<a href="http://www.outlandtech.com">www.outlandtech.com</a>	Slidell, LA, USA
<b>Remote Ocean Systems (ROS)</b>	<a href="http://www.rosys.com">www.rosys.com</a>	San Diego, CA, USA
<b>Rolloos</b>	<a href="http://www.rolloos.com">www.rolloos.com</a>	Capelle aan den IJssel, Netherlands
<b>Rovtech Solutions</b>	<a href="http://www.rovtechsolutions.co.uk">www.rovtechsolutions.co.uk</a>	Barrow-in-Furness, UK
<b>Seatronics</b>	<a href="http://www.seatronics-group.com">www.seatronics-group.com</a>	Aberdeen, UK
<b>Shark Marine</b>	<a href="http://www.sharkmarine.com">www.sharkmarine.com</a>	St. Catharines, ON, Canada
<b>SIDUS Solutions</b>	<a href="http://www.sidus-solutions.com">www.sidus-solutions.com</a>	San Diego, CA, USA
<b>Sonavision</b>	<a href="http://www.sonavision.co.uk">www.sonavision.co.uk</a>	Aberdeen, UK
<b>SubC Imaging</b>	<a href="http://www.subcimaging.com">www.subcimaging.com</a>	St John's, NL, Canada
<b>Subsea Technology &amp; Rentals (STR)</b>	<a href="http://www.str-subsea.com">www.str-subsea.com</a>	Great Yarmouth, UK
<b>SULIS Subsea</b>	<a href="http://www.sulissubsea.com">www.sulissubsea.com</a>	Mt. Pearl, NL, Canada
<b>Teledyne – Bowtech</b>	<a href="http://www.teledynemarine.com">www.teledynemarine.com</a>	Aberdeen, UK
<b>Unique System</b>	<a href="http://www.uniquegroup.com">www.uniquegroup.com</a>	Sharjah, UAE
<b>UVS</b>	<a href="http://www.uvs.com.au">www.uvs.com.au</a>	Perth, Australia

## NEXT » CAMERAS & LIGHTS

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**I.05.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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**CAMERAS  
& LIGHTS**

# DEEPSEA POWER & LIGHT



**HQ Location:** 4033 Ruffin Road, San Diego, CA 92123, USA

## Company Intro

DeepSea Power & Light is a privately held design and manufacturing company serving the subsea industry. They design and manufacture durable products for subsea applications, including video cameras, lights, lasers, power modules, and pressure relief valves. Uses range from industrial applications and research to cinematography. Their philosophy is to continually advance technology for use in the harshest environments with ease of service, reliability, high performance, and cost effectiveness as important design criteria. DeepSea Power & Light values innovation, collaboration, and the shared success of their employees, customers, suppliers, representatives, and partners.

[www.deepsea.com](http://www.deepsea.com)



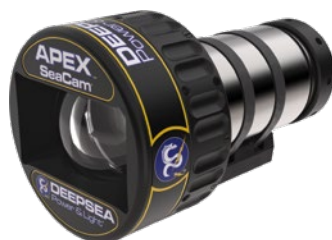
## Contact

sales@deepsea.com  
+1 858 576 1261

## CAMERAS:

### APEX™ SEACAM®

DeepSea Power&Light has elevated its HD camera offerings with the new 4K UHD capable Apex SeaCam. This camera incorporates proprietary corrector optics for superior imaging performance. Rigorously tested with over 10,000 pressure cycles to 10,000 psi during the design and qualification process, the titanium housing and optically polished dome are depth rated to 6,000 m.



- | 4K UHD and multiple HD formats
- | Superior performance with proprietary corrector optics
- | 70° horizontal FOV
- | 12× optical zoom
- | 24× combined lossless digital zoom in HD output formats
- | 4K UHD resolution ver Flexlink™, fiber, and coax options

### SUPER WIDE-I SEACAM®

The Super Wide-i SeaCam features an extreme wide angle field of view in a compact housing, ideal for observation tasks, exploration, and other work environments that benefit from a broad field of view.

- | 150° horizontal FOV
- | Available with aluminum or titanium housing
- | Up to 11,000 m depth rating





## LED MICRO SEACAM®

The small and durable LED Micro SeaCam is ideal for manipulator arms and the inspection of wells, pipes, and other confined applications. The flexible integrated cable between the camera and connector allows the LED Micro SeaCam to maneuver through tight locations, while integrated LED lights provide clear imaging.

- | Ultra small 22 mm diameter
- | 55° horizontal FOV
- | Sapphire port
- | Up to 6,000 m depth rated titanium housing



## LIGHTS:

### LED SEALITE®

Specifically developed to exceed current market demands, the LED SeaLite delivers a high-performance, field serviceable, and affordable subsea light. Versatile configuration options allow the LED SeaLite to meet specific performance requirements.

- | Up to 10,000 lumens
- | Spot, flood, or wide beam configurations
- | 4,000 m, 6,000 m, and 11,000 depth rated
- | Digital and analog dimming interfaces supported
- | User configurable power limit
- | Customer serviceable

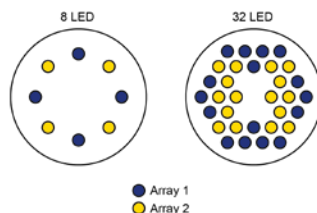


### MULTIRAY™ LED SEALITE®

The Multiray™ LED SeaLite combines the function of two fixtures in a single light. This enables operators to expand vehicle capability while saving space, avoiding downtime for switching luminaires, and lowering costs compared to the multiple luminaires it replaces.

- | Operate two sets of LED sources in a single fixture
- | Choose from whites, colors, ultraviolet, and infrared
- | Choose from a combination of optics that range from a 115° wide flood to a 28° narrow spot

Multiray LSL-2025 LED Array Layout



# FORSSEA ROBOTICS



**HQ and R&D Location:** 130 rue de Lourmel, 75015 Paris, France

**Workshops:** 196 avenue des Eaux Blanches, 34200 Sète, France

## Company Intro

FORSSEA was created in 2016 to cut down operating costs in the offshore energy markets. We believe our industries will evolve toward smaller unmanned vessels. We want to be part of this change bringing new subsea tools to the operators. Our philosophy is to create fully integrated robotics solution that combines cheap plug & play hardware, fit-for-purpose embedded intelligence and real-time supervision.

FORSSEA develops innovative subsea solutions for the offshore industries. Our first vehicle, ATOLL, is a subsea homing vehicle which can transfer power & data to deepsea infrastructures. Our patented technology enables a deployment from light offshore vessels to answer the cost-reduction need faced by our industry.

## Contact

Gautier Dreyfus

sales@forssea-robotics.fr

+33 6 09 96 37 82

[www.forssea-robotics.fr](http://www.forssea-robotics.fr)



## SMART CAM - HD COMPUTER VISION GIGE CAMERA

- | Computer Vision
- | Plug & Play
- | Artificial Intelligence
- | 3D & Stereo Vision

The SMART CAM HD 2000 & 6000 designed by FORSSEA ROBOTICS is a fixed focus High Definition Camera adapted for advanced subsea vision applications. The camera is ideal to equip ROV/AUV for underwater photogrammetry or stereo embedded vision. The focal length is easily adjustable to capture images at very close range. The camera comes fully calibrated with software lens distortion correction.



## OBS CAM - INSPECTION & MONITORING IP CAMERA

- | 30× Optical Zoom
- | HD video
- | TCP/IP Control
- | Advanced Functionalities

The OBS CAM is a 4000m Titanium IP camera that provides HD video streaming over Ethernet at the lowest bandwidth, latency, and power. It is ideally suited for low and black light applications. OBS CAM comes with full HD 30x optical zoom with easy-to-use HTTP based control interface. Additional capabilities also available include integrated auto-focus and visibility enhancer. These features make the OBS CAM a perfect fit for inspection and remote monitoring applications.



## NAV CAM SUBSEA & AIR - REAL-TIME INCLINATION & POSITION TRACKING

- | Real-Time Embedded intelligence
- | Survey Graded Optical Sensor
- | Certified Lab Calibration
- | Plug & Play with inertial navigation systems

NavCam is an all-in-one visual based navigation and control centre. NAV CAM features an embedded GPU integrated pressure sensor and Inertial Navigation System. NAV CAM is coming with V-LOC embedded software. V-LOC calculates your assets real-time coordinates thanks to open-source tags which are affixed to them. Our technology is embedded inside a calibrated camera which exists in both air and subsea versions for highly accurate marine surveys.



## ARGOS - HYBRID LIGHT-INTERVENTION SMART ROV

- | 30kg Payload (Survey Tooling Skid)
- | Hybrid (Tether or Battery Powered)
- | TCP/IP Real-Time Control
- | All Electric ROV

ARGOS ROV embraces the latest advances in ROV technology that the industry has come to demand and expect from modern ROV design. ARGOS is compact in design and is primarily suited to inspection and light intervention tasks. The vehicle is powerful enough to perform maintenance and repair duties with use of the optional electric five function manipulator arm and tooling skid interfaces. The standard system has been designed and built to 500m depth rating, however the unique design of this ROV allows the vehicle to be extended up to 2000m with simple modifications.



## ATOLL - AUTONOMOUS LIFTING ROV

- | Quick-latching system
- | Adapted to light vessels
- | Go-To mode
- | Visual Docking

ATOLL (patented system) is an observation ROV deployable from a light vessel. The system can perform a fully autonomous approach and docking based on embedded control algorithms. Once the link is obtained to the seabed target, ATOLL can either transfer power & data, or mechanically engage the target for recovery back to surface and valve manipulation. ATOLL comes with dedicated LARS system or can be adapted to any LARS or crane system.



# SIDUS SOLUTIONS



**HQ Location:** 7352 Trade Street, San Diego, CA 92121, USA

## Company Intro

SIDUS Solutions LLC, a Service Disabled Veteran Owned Small Business based in San Diego, CA, was founded in 2000. SIDUS is an integrated systems provider of security and video surveillance systems for worldwide businesses in the research, heavy industry, commercial, military, and energy markets. For 19 years we still remain true to our goal of providing the most innovative and robust subsea & hazardous area monitoring products in the industry. Specializing in environmental cameras, robotic-positioning, and lighting systems, SIDUS services and manufactures complete, integrated security and surveillance solutions for any marine, defense and subsea application. SIDUS equipment, is operational in blue water and 6500 meter depths, also is available alone or integrated with existing systems. From concept design to technical support, we have solutions for every need. SIDUS has grown from designing primarily subsea pan and tilts and rotators to providing an extensive product line of underwater positioners, high definition cameras, penetrating bright lights, projection lasers, and inspection systems, as well as an array of engineering services. Our world-class engineering staff provides seamless integration, design, installation, documentation and commissioning for all systems. From sea-floor observation platforms, to surveillance systems for drilling rigs, ships, to sonar deployment systems – SIDUS is a field proven solution. We provide Solutions on Target!



## Contact

L.Hagstrom@sidus-solutions.com

+1 (619) 275 5533

SDVOSB#: 222120

[www.sidus-solutions.com](http://www.sidus-solutions.com)



## FEATURED PRODUCTS: CAMERAS / PAN & TILTS / LIGHTS

### HIGH DEFINITION CAMERAS (SS446 / SS465 / SS474 / SS490)



**SS446** offers stunning full 1080i/720p HD-SDI features a 1/3" CMOS HD sensor, 10X optical zoom with auto focus and is rated to 3000m.



**SS465** series, offers HD – IP and POE convenience from 3000m to full ocean depth.



**SS474** series, compact HD-SDI fixed focal length optical corrected lens and compact size. 3000m



**SS490** series, offers 4K UHD (ultra high definition) with a number of streams and outputs including IP, HDMI, SDI, Fibre Optic. 300m, 3000m, 7000m and full ocean depth upon request.



**SS109 series:** 10 pound-force foot, 13.6 Newton Metre torque



**SS250MK2 series:** 65 pound-force foot, 88 Newton Metre torque



**SS260 absolute** encoder high degree of accuracy .001°



**Pan and Tilt and single axis positioners for cameras lights sonars lydars and more...**

## COLOUR ZOOM CAMERAS (SS420 / SS449 / SS427)



**SS420 Series:** 36x optical zoom automatic and manual control of focus and exposure settings ¼ inch ExView HAD depth of 10,000 feet.



**SS449 Series:** high definition 1080i or 720p HD-SDI (2,000,000 pixels) CMOS Up to 20,000 ft (6000 m) Titanium



**SS481 Series:** high definition IP-POE color zoom, customizable internal red & white LED's and lasers internal in one housing stainless steel 3000m

## LOW LIGHT B&W CAMERAS (SS408 / SS425 / SS426 / SS435)



Sidus Solutions' SS408 B&W cameras are lightweight and robust inspection tools. Designed for high sensitivity in low light, this camera employs a 420 TVL black & white module that has a 1/3" Sony ExView HAD CCD imaging sensor. The video output is provided in EIA or CCIR formats, with a standard 2.97 mm lens that offers 98° FOV in air. The durable acetal housing is corrosion resistant, and will provide years of quality service. The camera is available as part of a complete system or as a low cost replacement for the camera you now use.

## LIGHTS

### SS182MKII LED, LIGHT LINE LASER AND STROBE COMBO

### (SS181 COMPACT) HIGH OUTPUT LED LIGHT WITH DIMMING

**"DARK SABER" – SS182mkII** is distinctively suited for lighting applications on inspection systems and other operations where illumination and the ability to scale and image is required. The SS182 mkII provides outstanding brightness, warm color for subsea videos and its adjustable green laser projector offers the perfect illumination solutions for vast number of applications. It's features safe operations in air with intelligent thermal management and is 35% lighter than previous version. Light functions (including strobing) can be controlled remotely via analog, control through digital inputs, over a serial communication port and while being synced to a digital still camera. The LED life is a 50,000 hour minimum with DC constant current, no flicker and no acoustic noise. The SS182 mkII is field configurable allowing the operator to satisfy exact operational needs.



**Sidus Solutions' SS181** high output LED underwater light offers the perfect illumination solution for a vast number of applications. The compact design and depth rating of 1,000 meters makes the SS181 an ideal light for installation on a diver helmet or other tight spot. With a 6500 K color temperature and Color Reproduction Index (CRI) of 80, the SS181 provides outstanding brightness and luminance for underwater video. The SS181 will far outlast the leading halogen dive lamps with an illumination life of 50,000 hours.

**The SS186 OceanLink** units are the latest generation of **Li-Fi optical communication** using free space optics, utilizing the latest technology in a handheld package. The eye-safe blue light LED used by OceanLink allows communications between units at distances up to 100 meters\*. The units function as a transparent Ethernet link to a remote computing device or to another system via a standard 10/100MHz Ethernet connection. In addition to data communication, OceanLink provides full-duplex voice communication over a separate channel. OceanLink will provide 3 mbps at self selecting brightness as a function of range to optimize transmission while conserving power\*. In situations where a hardware connection is unavailable or undesirable, OceanLink is a perfect deep water alternative to cables.





# SUBC IMAGING

**HQ Location:** Newfoundland, Canada



## Company Intro

SubC Imaging's mission is to continuously create the most technologically advanced and intelligent subsea imaging equipment and software for marine research, offshore oil and gas, aquaculture, and fisheries. With a global client list spanning more than 30 countries, SubC's underwater equipment, which consists of complete camera solutions, cameras, LEDs, and lasers, have been in use for over a decade. Several pieces of equipment deployed for applications like ocean observatories are continuously operating while consistently providing reliable performance.

## Contact

Ian McMillan  
team@subcimaging.com  
1-709-702-0395

[www.subcimaging.com](http://www.subcimaging.com)



## CAMERAS:

### OFFSHORE DVR + OVERLAY

The Offshore DVR + Overlay is an all-in-one video management system. This sophisticated system is backed by powerful software that supports six channels of video for recording, overlay, dive log, LAN, and remote video streaming. The ability to stream video offshore over a ship's local network and view the video feed using any computer on the network can easily be integrated. Video and data recorded with the DVRO can be filtered and reports can be generated. The DVRO software can run on any PC that meets the recommended specifications.



- | Input up to 6 channels of 4K, HD, SD, 3D or IP video
- | Graphics card HDMI and DVI channels can be selected as video output
- | HD-SDI channels can output the IP Ethernet and SD Composite feeds with overlay
- | Record and Black Box all channels
- | Overlay and dive event log
- | Real-time image enhancement
- | Real-Time Video and Audio Streaming

### RAYFIN™

Highly received for its event-tracking capabilities, data acquisition, and superior optics, SubC Imaging's Rayfin smart cameras are employed by a number of renowned marine research organizations and are being used in various applications around the world. The Rayfin product line can record video up to 4K resolution while capturing ultra-high resolution digital stills. It's designed to house lighting and/or lasers that can be powered and controlled through the camera itself. From ROVs, AUVs, drop, tow, and observatory systems, the Rayfin is easily integrated on any platform.



## RAYFIN LIQUIDOPTICS

The Rayfin with LiquidOptics is a subsea digital stills camera with 4K, HD and IP video used by marine researchers for 3D modeling and photogrammetry. The Ivanoff-inspired LiquidOptics greatly reduces any distortion or chromatic aberration and the Sapphire construction is what makes it extremely durable and impact-resistant.

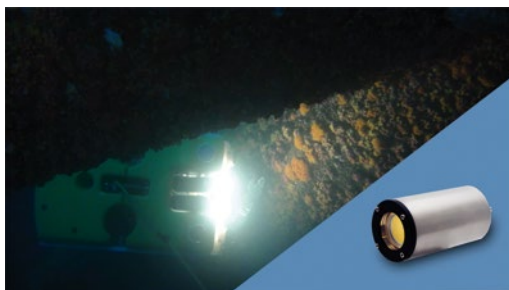
- | Live HD via (Ethernet/Coax) or 4K (Fiber)
- | 21MP digital stills (JPEG and RAW) with LED strobe synchronization
- | 4K and HD video clips stored to 512GB solid-state memory
- | Real-time media download and control of all functions (exposure, focus, etc.)
- | Sensor-crop Zoom (5x optical equivalent)
- | NTP time server synchronization
- | NAS (Network Attached Storage)
- | Autonomous scripting with SubC API

## LIGHTS AND LASERS

SubC's LEDs and lasers are widely used in diverse subsea applications across the globe. Our LEDs and lasers are compatible with subsea ROVs and the software is easily controlled and integrated into our camera systems.

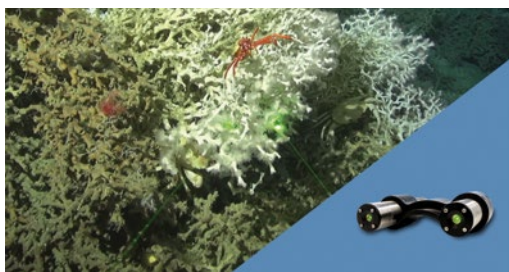
### AQUOREA MK3 LED

The Aquorea LED is SubC's most commonly used LED for diverse marine applications. It's a high-efficiency, TTL synchronized subsea LED module that operates as both a lamp for video and a strobe for digital stills. The lamp and strobe can operate together simultaneously with the LED's activation time tightly synchronizing with the camera sensor exposure time (within 250 nanoseconds) to ensure the video stream is uninterrupted while collecting photos.



### MANTARAY PARALLEL LASER

The MantaRay is a parallel beam laser designed for ROV and subsea systems. This laser projects two parallel beams that appear as green dots in images that are used to get distance and scale of underwater objects. It is light in weight and is easily integrated into a subsea camera using a simple attachment. The MantaRay is accurate to 5m distance and provides a precision scale for size reference when viewed from a subsea camera.



### SKATE MK2 LASER

The Skate Laser is available in a solid line beam or dotted grid pattern and is designed for 3D modeling subsea applications that require a high-quality projected beam. In addition to our standard laser models, there are other beam patterns available.



# SULIS SUBSEA CORPORATION



**HQ Location:** 6-40 O'Leary Avenue, St. John's, NL A1B 2C7, Canada

## Company Intro

SULIS Subsea Corporation is a Canadian company that develops and produces ultra-high-resolution camera technology for a range of aquatic environments, from shallow coastal and freshwater bodies to the deepest depths of the world's oceans. Through partnerships with leading scientists, explorers, and filmmakers, SULIS helps create the awe-inspiring footage found in IMAX films, world-class scientific laboratories, and Remotely Operated Vehicle (ROV) control rooms, often streaming to millions of online viewers. Some of our current partners include James Cameron's DEEPSEA CHALLENGE, Schmidt Ocean Institute, Schmidt Family Foundation, Woods Hole Oceanographic Institution, Black Sea Maritime Archeology Project, and Parks Canada. Our mission is to enable advancements in exploration, discovery and knowledge, across all aquatic environments through the lens of SULIS's ever-advancing imaging products. In addition, SULIS is committed to providing outstanding product quality and global support for your demanding application.

## Contact

info@sulissubsea.com  
+1 709 745 5080

[www.sulissubsea.com](http://www.sulissubsea.com)



## SULIS Z70 4K UHD CAMERA

The SULIS Z70 provides high-end remote underwater imaging for science, exploration, broadcast, and digital cinema.

- | The finest image quality available in a deep-sea camera
- | Live 4K UHD video transmission via fiber or Ethernet, or internally recorded
- | 12x optical zoom with ultra-wide-angle field of view
- | Unparalleled multi-group aquatic optical corrector with corner-to-corner 4K resolution
- | 6,000m depth rating
- | 20-megapixel stills capture
- | Full manual controls



## SULIS CB1 CAMERA CONTROL UNIT

The SULIS CB1 provides the same level of control you would expect from the world's top terrestrial cameras, at its deepest depths.

- | Precision 3-axis joystick for zooming and pan/tilt control.
- | Dials for fine-tuned adjustment of focus, iris, and other settings
- | 7" touchscreen for camera status monitoring and full control of all settings.





**SULIS**  
SUBSEA

[WWW.SULISSUBSEA.COM](http://WWW.SULISSUBSEA.COM)

**THE PRESSURES  
OF THE DEEP  
SHOULD NOT CRUSH  
YOUR STANDARDS.**

**SULIS Z70**  
**— 4K UHD**

**DEEP-SEA CAMERA WITH  
CUSTOM AQUATIC OPTICS**

# TELEDYNE BOWTECH



**TELEDYNE MARINE**  
Everywhere you look™

**HQ Location:** ABZ Business Park, International Avenue, Dyce,  
Aberdeen, AB21 0BH, United Kingdom

## Company Intro

Teledyne Marine is an organization comprised of 23 leading surface and subsea technology brands assembled by Teledyne Technologies Inc. These technologies span oceanographic instruments; subsea and surface vehicles and navigation; imaging sonars, cameras and lights; and interconnect solutions. Collectively, Teledyne Marine is able to offer the widest breadth of technology in the industry.

Teledyne Bowtech specialise in the manufacture and supply of subsea optical products & solutions including underwater cameras, LED Floodlights, emergency Flasher strobes and Laser pointers.

## Contact

bowtech@teledyne.com

Phone: +44 (0)1224 772345

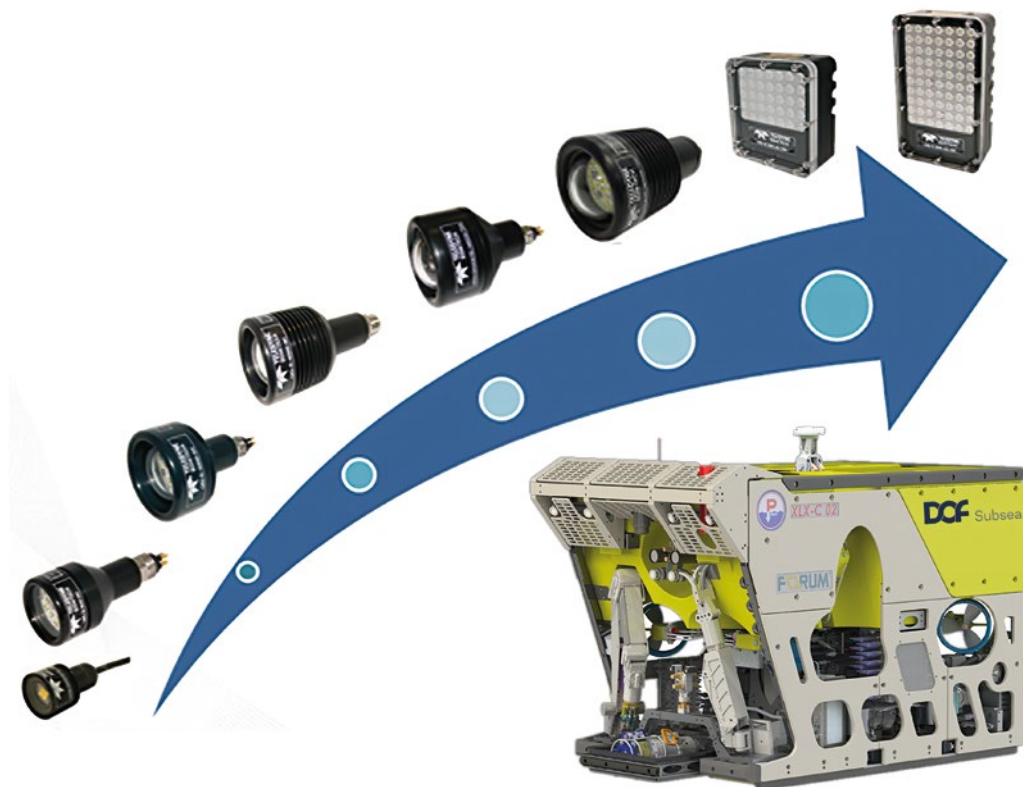
[www.teledynemarine.com/bowtech/](http://www.teledynemarine.com/bowtech/)



## PRODUCTS

### BOWTECH SUBSEA LED FLOODLIGHTS

The Teledyne Bowtech LED floodlight range includes extremely powerful and rugged panel lights suitable for larger deep water work class ROVs, trenchers and tractors, emitting up to 20,000 lumen, down to much smaller 800 lumen traditional round lights suitable for observation class vehicles and divers etc. offered with a range of subsea connectors, controlling methods and power & Depth options. All our lights are housed in hard anodised aluminium offering an extremely robust, reliable, and hardwearing lighting solution for most subsea applications.





## Floodlight Options

### Depth Ratings

| 300m / 3000m / 6000m

### Input Power

| 24Vdc / 120Vac / 230Vac / 140Vdc / 280Vdc

### Control Methods

| ON/OFF / 0-5Vdc / 0-10Vdc Analogue/ RS485

### Lumen Output

| 800 to 20,000 lumens

## PRODUCTS: BOWTECH SUBSEA CAMERAS

The Teledyne Bowtech Subsea camera range includes high resolution zoom cameras ideal for inspection and observations tasks, low light monochrome cameras for navigation purposes and minimum lighting conditions, and smaller fixed focus cameras for up-close tooling work, particularly on manipulator arms, as well as diver helmets & handhelds. Together our cameras are the eyes for pilots of anything from small observation class ROVs to larger work class ROVs, trenchers and tractors. Offered with traditional Standard Definition (SD) or full High Definition (HD), a choice of video outputs, and range of sub-sea connectors. All our cameras are housed in titanium and fitted with Sapphire or Fused Silica glass windows offering an extremely robust, reliable, and ultimate optical transmission and clarity camera solution for most subsea applications.

## Camera Options

### Navigation

| Low light monochrome

### Tooling & Diver

| Standard Definition Colour or Monochrome

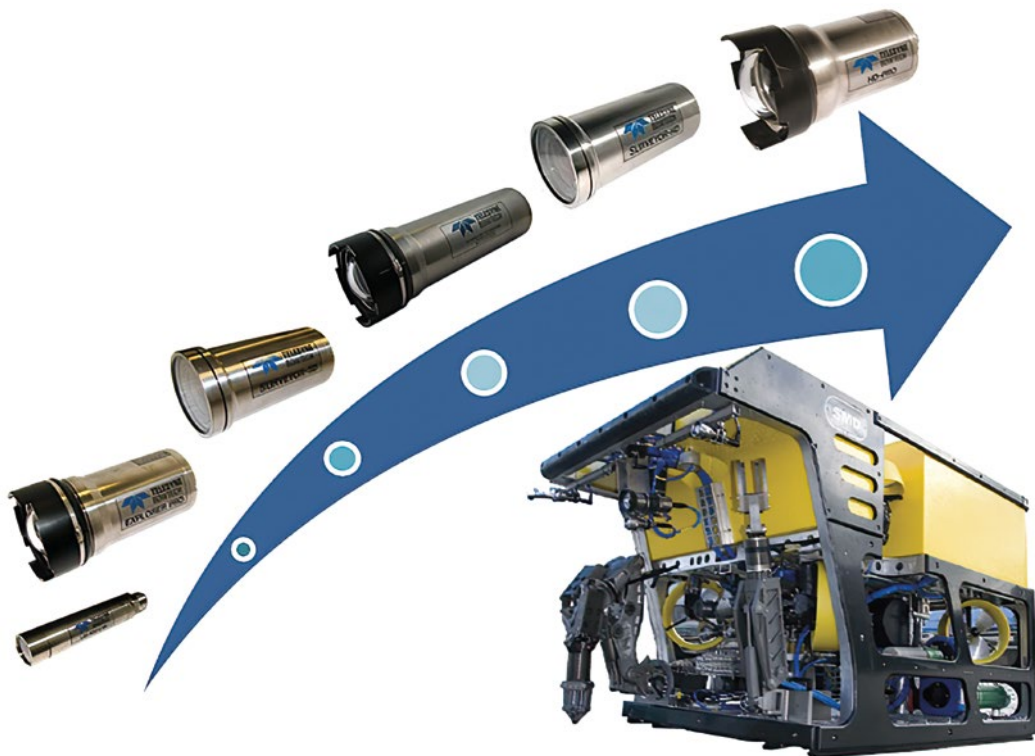
### Inspection

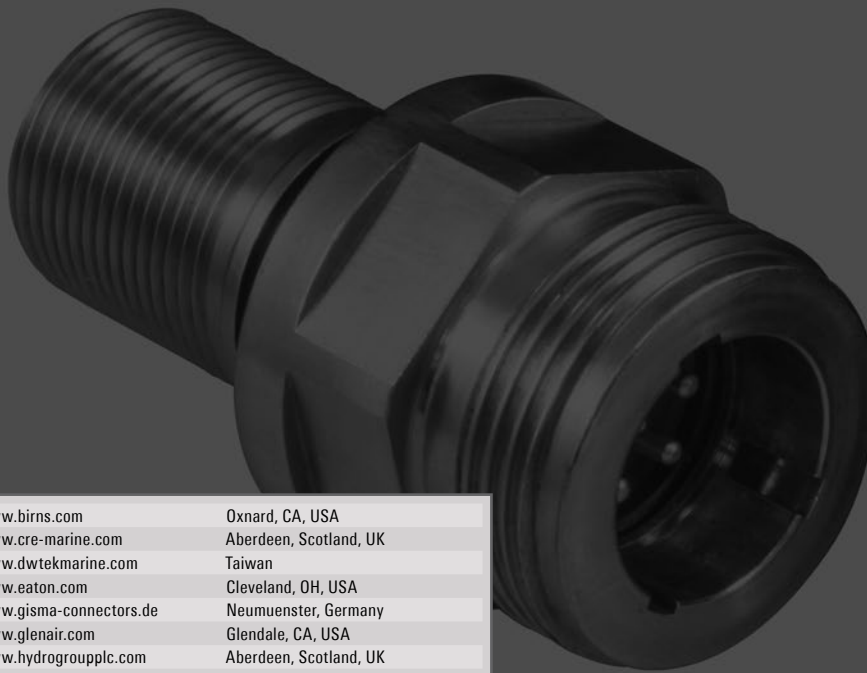
| Standard Definition Colour Zoom

| Analogue High Definition 1080i

| Full High Definition 1080p Zoom

| Full High Definition 1080p





<b>BIRNS</b>	<a href="http://www.birns.com">www.birns.com</a>	Oxnard, CA, USA
<b>CRE</b>	<a href="http://www.cre-marine.com">www.cre-marine.com</a>	Aberdeen, Scotland, UK
<b>DWTEK</b>	<a href="http://www.dwtekmarine.com">www.dwtekmarine.com</a>	Taiwan
<b>Eaton – Burton</b>	<a href="http://www.eaton.com">www.eaton.com</a>	Cleveland, OH, USA
<b>GISMA</b>	<a href="http://www.gisma-connectors.de">www.gisma-connectors.de</a>	Neumuenster, Germany
<b>Glenair</b>	<a href="http://www.glenair.com">www.glenair.com</a>	Glendale, CA, USA
<b>Hydro Group</b>	<a href="http://www.hydrogroupplc.com">www.hydrogroupplc.com</a>	Aberdeen, Scotland, UK
<b>Link Subsea</b>	<a href="http://www.linksubsea.co.uk">www.linksubsea.co.uk</a>	Ulverston, England, UK
<b>MacArtney – SubConn</b>	<a href="http://www.macartney.com">www.macartney.com</a>	Esbjerg, Denmark
<b>Siemens – Tronic</b>	<a href="http://www.siemens.com">www.siemens.com</a>	Berlin, Germany
<b>Subsea Supplies</b>	<a href="http://www.subsea-supplies.co.uk">www.subsea-supplies.co.uk</a>	Aberdeen, Scotland, UK
<b>TE Connectivity – Seacon</b>	<a href="http://www.te.com">www.te.com</a>	Schaffhausen, Switzerland
<b>Teledyne – ODI</b>	<a href="http://www.teledynemarine.com">www.teledynemarine.com</a>	Daytona Beach, FL, USA

## NEXT » CONNECTORS & PENETRATORS

- 50** Glenair
- 52** Hydro Group Plc.
- 54** Teledyne Impulse-PDM



**I.06.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# **CONNECTORS & PENETRATORS**

# GLENAIR



**HQ Location:** 1211 Air Way, Glendale, CA 91201, USA

**Regional Offices:** 40 Lower Oakham Way, Oakham Business Park,  
Mansfield, Notts, NG18 5BY, UK

## Company Intro

If you are like most professionals in the electrical interconnect industry, you know that Glenair has been the leading manufacturer and supplier of commercial and Mil-Spec connector accessories since 1956. Building on that foundation, we now offer a dozen, full-spectrum product lines designed to meet your every interconnect requirement. From hermetic connectors to fiber optics, from conduit systems to Micro-D assemblies, from composite enclosures to assembly tooling – Glenair does it all. And throughout the years, we've made outstanding customer service our approach to earning your trust, and to maintaining our position as the industry's best-value interconnect supplier:

- | By designing quality into every part we ship.
- | By delivering the fastest turnaround on quotes and custom orders.
- | By establishing an unsurpassed sales, support and engineering presence in every major market in the world.
- | By building the largest capacity, broadest capability factory in the interconnect accessory industry.
- | By avoiding cumbersome business practices such as minimum orders and expediting charges, and...
- | By maintaining the world's largest "Same-Day Shipment" inventory.

## Contact

sales@glenair.com

+1 818 247 6000

[www.glenair.com](http://www.glenair.com)



[www.glenair.co.uk](http://www.glenair.co.uk)



## DEEP UNDERWATER SUBSEA, HIGH-PRESSURE 10K PSI / 700 BAR / 7000M CONNECTORS

Next-generation high-speed, signal, and power connectors for mission-critical applications – from submarines and ROVs to seafloor oil and gas

## SEAKING™

The SeaKing is a high density, glass sealed connector that utilizes dual O-rings and redundant sealing as standard. It is a 21st century connector that has been designed based on the best industry practices with much creative and unique advancement which address known limitations of existing designs. The SeaKing was designed with an eye toward modularity and flexibility which eliminates the need for special configurations for different applications. Furthermore, the connector series is designed to optimize electrical and mechanical performance in high-pressure environments – rated to 10,000 psi open face and mated (tested to 15,000 psi). Integrated dual O-ring seals, anti-galling marine bronze coupling, corrosion-resistant stainless steel shells and other material choices maximize durability and reliability. Goldplated copper contacts in both high-density signal and standard-density power contact arrangements provide optimal data and power transmission. SeaKing includes the complete range of connector styles: cable plugs, flange connector receptacles and bulkhead connector receptacles. Pressure Balanced Oil Filled (PBOF) configurations, as well as a purpose-designed family of connector accessories and backshells are available.



- | 10,000 psi working pressure and 15,000 psi test pressure on all designs
- | Glass-to-metal sealed receptacle inserts
- | 500lb pull strength plug to receptacle
- | Dual O-rings on all critical leak paths
- | Solder cup contacts
- | Plug shell is universal for overmolding and PBOF
- | Wrench flats and knurl for easy mate and demate
- | Metal-to-metal seating
- | Polarized metal keyways
- | Standard configurations in stock

## SEAKING™ FIBER OPTIC

The SeaKing Fiber Optic connector offers the 10,000 psi rating in both Open Face and Mated conditions. They are offered in a variety of shell sizes and configurations, and can be terminated with molded cable or PBOF. When used as a PBOF, Glenair uses the same seals to the individual conductors so that the connector will continue to operate in the event of a catastrophic hose flood. As a vertically integrated company, Glenair performs all fiber termination and manufacturing in-house.



## SEAKING™ POWER

The SeaKing Power connector is currently offered in a 4 pin configuration (with other configurations upon request) which is designed for operation at 5kV. This connector too, has incorporated many valuable features in the standard SeaKing. The connector includes API O-ring test ports which allow the user to certify the integrity of the dual O-rings. The interchangeable inserts make it easy to swap genders without having to use different shells, and the aft loaded inserts are secured with a threaded retaining ring to accommodate high pressure in both directions. A detached flange allows the bulkhead to be mounted in a position to reduce stress on the cable and ease of clocking. Additionally, the SeaKing Power connector incorporates an accessory porch very similar to the standard SeaKing which facilitates over-molding, PBOF backshells or other termination accessories.



## SUPER G55 CONNECTOR

The Super G55 family of dry-mate underwater connectors is a revolutionary new design of the popular industry-standard marine interconnection used in countless ROV, underwater camera, diver communications, lights, pan and tilts, and other subsea applications. Available in 3 shell sizes, the Super G55 is manufactured from 316L Stainless Steel with insert molded contact assemblies designed for pressure-sealed applications up to 10,000 psi mated and unmated. Intermateable and intermountable with other "55" series connectors, the Glenair solution introduces a long list of product innovations designed to improve performance and durability. Our PBOF versions, for example, utilize easy-to-assemble threaded fittings which deliver both superior sealing performance while reducing installation time. Other innovations include full-mate inspection windows, improved solder cup contact design, improved potting and sealing, and more. Cable plugs and receptacles are available in attachable (user-terminatable) versions or factory overmolded single-ended whips.



- | 10,000 psi mated/ unmated (approx. 22,500ft/7,000m)
- | Recessed plug socket contacts for safety
- | Intermateable and intermountable with other "55" series connectors
- | 3 shell sizes — 15, 20 and 24, with 3 to 21 contacts
- | PBOF versions available
- | 600 VDC, 5 to 18 Amps (dependent on conductor and cable size and make-up)
- | Retractable, anti-galling coupling nuts prevent mis-mating and improve durability

**NON-STANDARD MATERIALS:** Other material options are available as part of our non-catalog offerings including Anodized aluminium, Titanium, and Aluminium Bronze. Glenair is also able to supply Super G55 interconnects in composite thermoplastic (PEEK) to meet application requirements for reduced cathodic corrosion as well as weight reduction without affecting connector performance.

**HIGH-SPEED ETHERNET:** The Super G55 Ethernet option is available in the 1508, 2013 and 2021 contact configurations and provides both high speed (Up to 1GB) and power (600Volts) in a full subsea environment (10,000 psi). Gigabit speed data transfer up to a distance of 75 meters.



# HYDRO GROUP

**HQ Location:** Hydro House, Claymore Avenue, Aberdeen Energy Park,  
Bridge of Don, AB23 8GW, Scotland, UK



## Company Intro

With over 35 years of international experience, Hydro Group designs, manufactures and installs bespoke subsea electrical and optical connectivity solutions for use in harsh environments in the international oil and gas, defence and renewable energy sectors.

Headquartered in Aberdeen, United Kingdom, Hydro Group's regional subsidiaries Hydro Group Asia Pte and Hydro Group Systems, Inc offer support and aftersales service from Singapore and Florida, USA. A network of Hydro Group business partners are also on hand to support your product from initial quotation to final installation around the globe.

[www.hydrogroupplc.com](http://www.hydrogroupplc.com)

## Contact

The Hydro Group Plc. sales team  
sales@hydrogroup.plc.uk  
+44 (0)1224 825 050



## PRODUCTS

Hydro Group is a reliable provider of high-quality connectors and penetrators and is certified to ISO 9001:2015 and 14001:2015 quality standards. With products tailored to the exact demands of your project regardless of location, the company is a proud recipient of the 2018 Queen's Award for Enterprise: International Trade.

The Group's subsidiaries, Hydro Bond Engineering and Hydro Cable Systems, manufacture a wide range of subsea connectivity solutions including its durable range of HRS, HRM and HDM connectors. Hydro Group also manufactures manned and unmanned penetrators suited for electrical, coaxial, optical or hybrid applications.



HRS 105



HRS 305



## HRS CONNECTORS

- Hydro Rubber Sealing (HRS) ideal for harsh subsea uses
- Underwater mateable; available in moulded or unmoulded configurations with up to 70 pins
- Rated up to 3.3kV, depth-rated to 2440 MSW
- Bulkhead, panel mount or cable mount options available





HDM 105

HDM 306

## HDM CONNECTORS

- Hydro Deck Mate (HDM) are robust and designed for continuous mate/de-mate cycles
- Deck mateable, up to 110 pins density
- Rated to 6900 MSW and up to 3300 Volts RMS
- Ideal for fibre optic connectivity (Multimode 62.5/125 and 50/125, Single mode 9/125)
- Submarine Deck Mate (SDM) connectors available for defence applications upon request

## HRM CONNECTORS

- Hydro Rubber Moulded (HRM) connectors are versatile and reliable
- Surface mateable, durable rubberised connectors with precision-engineered and reliable injection moulding fitment
- Offered with bulkhead, attachable, inline, dummy plug and overmould options
- Connectors available in Standard Circular, Micro Series and Low Profile connectivity
- Rated to 600 VDC (configuration dependent) and between 10 and 60 Amps/pin for SC configurations



HPS-21\_TA

HPS-21-2

## MANNED/UNMANNED PENETRATORS

- Penetrators are suited to applications including diving bell and deck decompression chamber systems
- Lloyd's Register-certified manned submersible electrical penetrators type approved for use at a depth of up to 650 MSW
- Broad operating window of -40°C to 60°C and working voltages of up to 500V
- Fully pressure-blocked with right-angled/in line designs and mono/bi-directional pressure design options
- Rated up to 3,000 Volts RMS, available in stainless steel, titanium, aluminium silicon bronze
- Current ratings up to 140 Amps with higher ratings available upon request

# TELEDYNE IMPULSE-PDM



**TELEDYNE MARINE**  
Everywhere you look™

**HQ Location:** 9855 Carroll Canyon Road, San Diego, CA 92131 USA

## Regional Offices:

**Europe:** 4-6 Alton Business Center, Omega Park, Alton, Hampshire, England GU34 2YU  
Phone: +44 (0) 1420 552200 E-mail: pdmsales@teledyne.com

**China:** Room1006,10th Floor, Century Link Tower One, No.1198 Century Avenue,  
Pudong District, Shanghai 200122, China. Phone: +(86-21) 6876 8038

## Company Intro

Teledyne Marine offers the industry's largest selection of cables and connectors designed for harsh and marine environments. In addition to an extensive standard product offering, Teledyne Marine can design an interconnect system for nearly any application. We have expertise working with rugged materials, molding processes, and extensive qualification testing capabilities that ensure your equipment is operational the first time and every time you need it.

## Contact

impulse@teledyne.com  
+1 800 327 0971

[www.teledynemarine.com/impulse/](http://www.teledynemarine.com/impulse/)



## PRODUCTS

### ELECTRICAL DRY MATE CONNECTORS

Dry-mate connectors must be connected in air, prior to being submerged, and require the face to be clean and dry when doing so. Dry-mate connector designs are generally more compact than comparable wet-mate connector configurations, and a wide variety of options exist. Dry-mate connectors are the widest offering in the Teledyne Marine catalog, and can be ordered as electrical, optical, or hybrid configurations.



1 Net Series 1 Gigabit Ethernet



2 Dry matable connectors



3 IE55 Rubber Molded Metal Shell Connector

## ELECTRICAL SPLASH MATE CONNECTORS

The splash-mate connector designation allows the connectors to be mated even when the faces are wet or otherwise contaminated. This capability is generally achieved by overmolding an elastomeric layer on the face of the connector. Splash-mate functionality is best used in applications where full wet-mate capability is not required, but the connections must be made on the deck of a ship, in the splash-zone, or in other areas where ensuring a clean, dry-mating interface is not practical



4 Splash Mate Series

## ELECTRICAL WET MATE CONNECTORS

Wet-mate connectors are capable of being connected and disconnected while submerged. The most common family of wet-mate connectors in the Teledyne Marine catalog is the Nautilus™ and Rolling Seal Hybrid offering of electrical and optical connectors, which are capable of operating at full ocean depth, thanks to their pressure-balanced, oil-filled design.



5 Wet matable connectors

## OPTICAL/HYBRID DRY MATE CONNECTORS

Dry-mate, optical, and hybrid cost-effective solutions for marine instruments and vehicles. Custom-engineered encapsulation and molding of components for harsh environment subsea applications.



6 Omicron Fiber Optic Connector



7 Omega Fiber Optic Connector



## **NEXT » DIGITAL VIDEO RECORDING**

**58** Digital Edge Subsea





**I.07.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# ***DIGITAL VIDEO RECORDING***

# DIGITAL EDGE SUBSEA

**HQ Location:** Doubletree Court, Cavendish St,  
Ulverston, Cumbria, LA12 7AD, UK

DIGITAL EDGE SUBSEA

## Company Intro

Digital Edge Subsea supplies the Oil & Gas industry with our digital video recording inspection system, the EdgeDVR. Established more than 10 years ago, the Digital Edge Subsea product range has been developed with the end user as the main focus. We pride ourselves on how user friendly our product range is, whilst satisfying the requirements of our global clients. We now have over 500 systems offshore and have a large rental pool of over 80 units.

Digital Edge Subsea is known to have a broad understanding of the subsea industry. So when we combined that with our years of valuable client feedback, it's bound to have created something special. "Version 5" is the next generation of digital recording equipment. The new software and hardware, will keep the original mandate, of being easy, simple to use and most of all, reliable.

You can now choose from 3 levels of software: EdgeLite, Edge and EdgePro. And 3 levels of hardware: Standard Definition, High Definition and our first 4K system. The addition of a 4K(UHD) model is a reflection of the latest technology that is used on some of the most up to date ROV and diving systems worldwide.

In addition, this year also saw the launch of an industry first: the Edge DVR is now available on a laptop. Its storage is fully supported with a total capacity of 3TB on the 17" laptop that has all the capabilities of the original rack mounted system. AND there is a 4 channel HD recording capability. Digital Edge is a trusted brand with a reputation for excellent tech support.

Contact [info@digitaledgesubsea.com](mailto:info@digitaledgesubsea.com) to see which dvr would suit you best.

## Contact

John Scott  
Operations Manager  
[john.scott@digitaledgesubsea.com](mailto:john.scott@digitaledgesubsea.com)  
01229-206456

[www.digitaledgesubsea.com](http://www.digitaledgesubsea.com)



## EDGE LITE - ENTRY LEVEL DVR

- | 4 Channel Recording
- | Online Video Clips and Photos
- | 3 Hardware Models (SD,HD and 4K)
- | 4 Serial Inputs
- | 4 Channel Digital Overlay
- | Multibeam Sonar Recording and control
- | Offline Editor – Offline Video Clips and Photos
- | Built-in Blackbox Recording
- | Network Video Streaming
- | Network Viewer
- | Client Viewer
- | Coabis, Nexen & Apollo Support



## EDGE - STANDARD LEVEL DVR

- | 4 Channel Recording
- | Online Video Clips and Photos
- | 3 Hardware Models (SD,HD and 4K)
- | Automatic Dive, Photo, Video and Anomaly Logs
- | User Configurable Eventing
- | 4 Serial Inputs
- | 4 Channel Digital Overlay
- | Multibeam Sonar Recording and control
- | Offline Editor – Offline Video Clips and Photos
- | Offline Eventing
- | Import/Export Workpack
- | Built-in Blackbox Recording
- | Network Video Streaming
- | Network Viewer
- | Client Viewer
- | Coabis, Nexen & Apollo Support



## EDGE PRO - ADVANCED LEVEL DVR



- | 4 Channel Recording
- | Online Video Clips and Photos
- | 3 Hardware Models (SD, HD and 4K)
- | Automatic Dive, Photo, Video and Anomaly Logs
- | User Configurable Eventing
- | 4 Serial Inputs
- | 4 Channel Digital Overlay
- | Multibeam Sonar Recording and control
- | Offline Editor - Offline Video Clips and Photos
- | Offline Eventing
- | Import/Export Workpack
- | Task Based Inspection Workpack
- | Report Generation
- | Built-in Blackbox Recording
- | Network Video Streaming
- | Network Viewer
- | Client Viewer
- | Coabis, Nexen & Apollo Support



### HARDWARE

The 4U Rackmounted version has a total storage capacity of 12TB. The system has 3 removable hard drives, which store the survey data. The Windows 10 operating system is stored on a solid state hard drive for increased speed and reliability, with a second mirrored SSD for redundancy.

The laptop version has a total storage capacity of 3TB. The system has an external 2 TB SSD drive, which store the survey data. The Windows 10 operating system is stored on a 2x solid state hard drive (Raid) for increased speed and reliability.

# DIGITAL VIDEO RECORDING & INSPECTION SYSTEMS



**SD HD 4K**

Diving ○ Workclass & Inspection ROV

Platform & Pipeline Inspections ○ Construction & Decommissioning

DIGITAL EDGE SUBSEA

[www.digitaledgesubsea.com](http://www.digitaledgesubsea.com)



## **NEXT » INSURANCE SERVICES**

**62** Hayes Parsons Insurance Brokers



**I.08.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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***INSURANCE  
SERVICES***



# HAYES PARSONS INSURANCE BROKERS



**Location:** Beacon Tower, Colston Street, Bristol, BS1 4XE, United Kingdom

## Company Intro

Hayes Parsons Insurance Brokers is an independent, Chartered Insurance Broker based in the South West. As one of the UK's leading marine insurance specialists, their experienced team has established relationships with many of the top marine insurers and are able to provide cover for even the most complex risks.

The Hayes Parsons team can also help advise on risk management. Sensible risk management will help you to comply with legal obligations, such as health and safety legislation, avoid financial losses from those risks that you have chosen (or are not possible) to insure against, and can give you a competitive advantage. Hayes Parsons will help assess your risks to ensure that you receive a completely bespoke approach designed solely for you and the needs of your business. Your designated marine contact is Laura Walton who can source insurance solutions for all manner of ROV and AUV operators, regardless of size.

## Contact

Laura Walton, Account Executive  
marine@hayesparsons.co.uk  
0117 930 1688 | 07471 038 915

[www.hayesparsons.co.uk/marine-and-yachts](http://www.hayesparsons.co.uk/marine-and-yachts)



## SERVICES

### SUBSEA EQUIPMENT

Hayes Parsons can offer worldwide insurance cover for specialist subsea marine equipment, including Remotely Operated Vehicles (ROV), Autonomous Underwater Vehicle (AUV) and other Oceanographic survey equipment.

### MARINE CARGO AND GOODS IN TRANSIT

With cargo coming in all shapes and sizes, some goods require specialist handling. Hayes Parsons can arrange suitable insurance cover for either specialist freight forwarders or logistic companies whilst also being able to cater for one-off shipments by all conveyances. They are also able to provide cargo insurance policies that can include stock throughput and terrorism cover, that also include an ongoing storage risk.

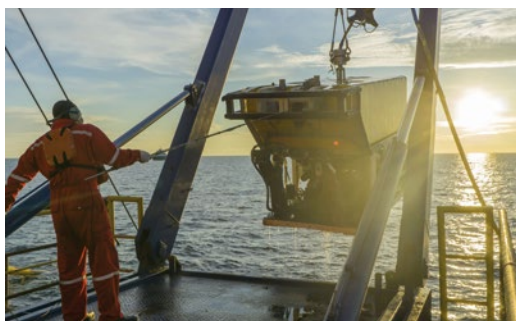
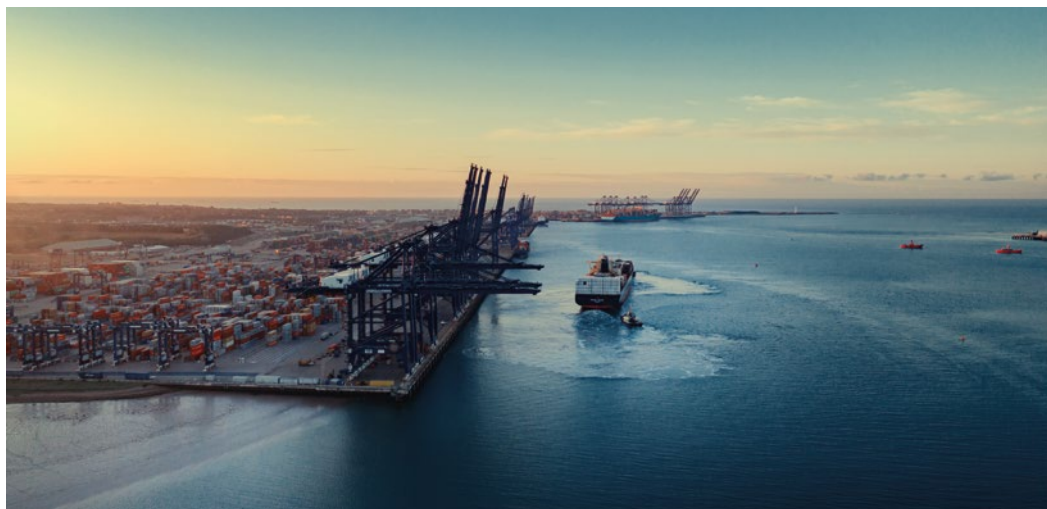
### HULL AND MACHINERY, WAR, PIRACY, KIDNAP AND RANSOM

Hayes Parsons can assist in the placement of anything from single vessels to large fleets including bulk carriers, tugs, and passenger vessel operators. They can also provide Crew Personal Accident and Marine Cyber solutions.

### IN-HOUSE CLAIMS SERVICE

Hayes Parsons' in-house claims department is designed to give you peace of mind should a claim arise and can provide help in what can be a stressful time. The claims service can include:

- | On-site representation for serious incidents
- | Personal visits from the Claims Manager
- | Appointment of a dedicated Loss Adjuster to assist with large claims
- | Access to legal opinion
- | Review of your claims defensibility systems and procedures
- | Claims training
- | Claims reports
- | Proactive management during the life cycle of the claim



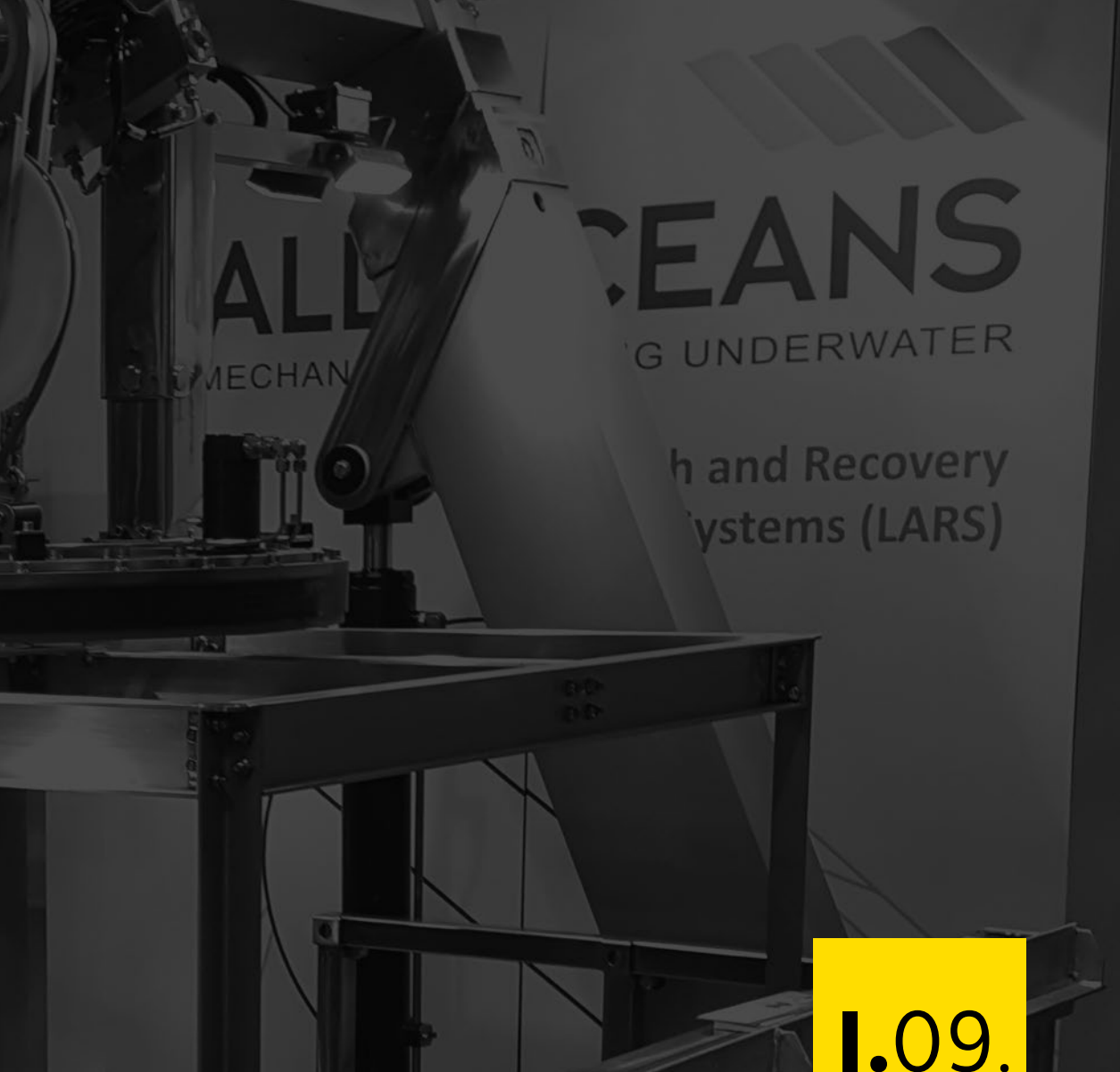
AES	<a href="http://www.engelement.com">www.engelement.com</a>	Washington, DC, USA
Aleron Limited	<a href="http://www.aleronsubsea.com">www.aleronsubsea.com</a>	Aberdeenshire, Scotland, UK
AME Offshore Solutions – AECOR	<a href="http://www.amepl.com.au">www.amepl.com.au</a>	Perth, WA, Australia
ASV Global	<a href="http://www.asvglobal.com">www.asvglobal.com</a>	Portchester, England, UK
ATRAC	<a href="http://www.atrac.net">www.atrac.net</a>	Rio de Janeiro, Brazil
AX Tech	<a href="http://www.axtech.no">www.axtech.no</a>	Molde, Norway
Caley – Seanamic	<a href="http://www.caley.co.uk">www.caley.co.uk</a>	Glasgow, Scotland, UK
Detail Design	<a href="http://www.detaildesigninc.com">www.detaildesigninc.com</a>	Houston, TX, USA
DGI	<a href="http://www.dgi-company.com">www.dgi-company.com</a>	Leidschendam, Netherlands
Dynacon – Forum	<a href="http://www.dynacon.com">www.dynacon.com</a>	Bryan, TX, USA
Ferri	<a href="http://www.ferri-sa.es">www.ferri-sa.es</a>	Pontevedra, Spain
Gen Surv Robotics	<a href="http://www.gensurv.com">www.gensurv.com</a>	Bangkok, Thailand
Hawboldt	<a href="http://www.hawboldtind.com">www.hawboldtind.com</a>	Chester, NS, Canada
Henriksen	<a href="http://www.hhenriksen.com">www.hhenriksen.com</a>	Tønsberg, Norway
Hydramec	<a href="http://www.hydramec.com">www.hydramec.com</a>	Great Yarmouth, England, UK
Hydroid	<a href="http://www.hydroid.com">www.hydroid.com</a>	Pocasset, MA, USA
IHC	<a href="http://www.royalihc.com">www.royalihc.com</a>	Kinderdijk, Netherlands
International Submarine Engineering	<a href="http://www.ise.bc.ca">www.ise.bc.ca</a>	Port Coquitlam, BC, Canada
James Fisher and Sons Plc	<a href="http://www.james-fisher.com">www.james-fisher.com</a>	Barrow-in-Furness, England, UK
Kongsberg	<a href="http://www.kongsberg.com">www.kongsberg.com</a>	Kongsberg, Norway
Lawson Engineers	<a href="http://www.lawson-engineers.com">www.lawson-engineers.com</a>	Carlisle, England, UK
Lidan Marine	<a href="http://www.lidanmarine.com">www.lidanmarine.com</a>	Lidköping, Sweden
MacGregor – Cargotec	<a href="http://www.macgregor.com">www.macgregor.com</a>	Helsinki, Finland
Ocean Scientific International	<a href="http://www.osil.com">www.osil.com</a>	Havant, England, UK
OceanWorks	<a href="http://www.oceanworks.com">www.oceanworks.com</a>	Burnaby, BC, Canada
Okeanus	<a href="http://www.okeanus.com">www.okeanus.com</a>	Houma, LA, USA
Osbit	<a href="http://www.osbit.com">www.osbit.com</a>	Northumberland, England, UK
PAG Offshore	<a href="http://www.pagoffshore.com">www.pagoffshore.com</a>	Dalian, China
Palfinger Marine	<a href="http://www.palfingermarine.com">www.palfingermarine.com</a>	Salzburg, Austria
Parkburn	<a href="http://www.parkburn.com">www.parkburn.com</a>	Hamilton, Scotland, UK
Pommec	<a href="http://www.pommec.com">www.pommec.com</a>	Bergen op Zoom, Netherlands
Radoil – Reelpower	<a href="http://www.reelpowerog.com">www.reelpowerog.com</a>	Houston, TX, USA
Rapp Marine	<a href="http://www.rappmarine.com">www.rappmarine.com</a>	Bodø, Norway
Rolls Royce Naval	<a href="http://www.rolls-royce.com">www.rolls-royce.com</a>	Bristol, England, UK
Ropos	<a href="http://www.ropos.com">www.ropos.com</a>	North Saanich, BC, Canada
RS Aqua	<a href="http://www.rsaqua.co.uk">www.rsaqua.co.uk</a>	Alton, England, UK
Saab Seaeye	<a href="http://www.seaeye.com">www.seaeye.com</a>	Fareham, England, UK
Scantrol	<a href="http://www.scantrol.com">www.scantrol.com</a>	Bergen, Norway
Seaonics	<a href="http://www.seaonics.com">www.seaonics.com</a>	Aalesund, Norway
Seatec	<a href="http://www.n-seatec.com">www.n-seatec.com</a>	Zierikzee, Netherlands
SeaView Systems	<a href="http://www.seaviewsystems.com">www.seaviewsystems.com</a>	Dexter, MI, USA
SH Group	<a href="http://www.shgroup.dk">www.shgroup.dk</a>	Svendborg, Denmark
SMD	<a href="http://www.smd.co.uk">www.smd.co.uk</a>	Newcastle, England, UK
SMP Ltd	<a href="http://www.smp-ltd.com">www.smp-ltd.com</a>	Preston, England, UK
Sperre	<a href="http://www.sperre-as.com">www.sperre-as.com</a>	Notodden, Norway
Subco	<a href="http://www.subcorentals.com">www.subcorentals.com</a>	Great Yarmouth, England, UK
Subsea Innovation	<a href="http://www.subsea.co.uk">www.subsea.co.uk</a>	Darlington, England, UK
Svendborg Yacht Vaerft	<a href="http://www.svvas.dk">www.svvas.dk</a>	Svendborg, Denmark
Tech Safe Systems – Outreach	<a href="http://www.outreachltd.co.uk">www.outreachltd.co.uk</a>	Falkirk, Scotland, UK
Ulmatec	<a href="http://www.ulmatec.no">www.ulmatec.no</a>	Hareid, Norway
West Marine	<a href="http://www.wmt.com.sg">www.wmt.com.sg</a>	Singapore
WT Industries	<a href="http://www.wt-ind.com/">www.wt-ind.com/</a>	Houston, TX, USA

## NEXT » LAUNCH & RECOVERY SYSTEMS (LARS)

**66** Hydramec Offshore Hydraulic Systems

**68** Lawson Engineers

**70** Soil Machine Dynamics Ltd (SMD)



I.09.

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# ***LAUNCH & RECOVERY SYSTEMS (LARS)***



# HYDRAMEC OFFSHORE HYDRAULIC SYSTEMS

**HYDRAMEC**  
OFFSHORE HYDRAULIC SYSTEMS LTD

**Location:** Hanover House, Boundary Road, Great Yarmouth, Norfolk, NR31 0LY

**Fabrication and Coating Department:** James Court, Faraday Road, Gaptown Industrial Estate, Great Yarmouth, Norfolk, NR31 0NF

## Company Intro

Hydramec Offshore began in 1990 as a small family business in Great Yarmouth. In our 30 years of business, we have become one of the market leaders for Launch and Recovery Systems (LARS) across the globe, with 150 currently in operation. We design and build ROV LARS, Winches and Hydraulic Power Units, amongst many other products. Our team of engineers have a wealth of experience in all aspects of design, stress analysis and project management. We also specialize in bespoke marine handling equipment.

## Contact

sales@hydramec.com  
+44 (0) 1493 441000

[www.hydramec.com](http://www.hydramec.com)



## PRODUCTS

### LAUNCH AND RECOVERY SYSTEMS (LARS)

Hydramec have been designing and building LARS for 30 years. We have a breadth of experience in designing, building and installing the systems. We also refurbish any LARS and do any repairs needed to make sure they are running like new. Our systems are built to last, with one of our first still running today, built in 1997.

### A-FRAME

Hydramec systems use a standard range of components developed with our years of experience in the market. All components are stocked to reduce lead-times and are suited for long term ship/rig board operation, working in the most hostile and demanding offshore environments.

#### Features:

- | Built for free swimming or TMS applications, shallow water or up to 6km plus water depth
- | Designed and approved to either Lloyds BS EN 12079 or DNVGL and BV for offshore sea transfer.
- | Designed, approved and certified to LAME 2019 rules for Lloyds or DNVGL-ST-0378





## CRANE LARS

Crane LARS' can be used on fixed installation or vessels of opportunity, they conform to freight container sizes. We have a range of sizes to suit different vehicles. Field serviceable parts and components are used to make maintenance easy for use in the most demanding of offshore environments or remote locations.

### Features:

- | Range from 4tm crane and up to 75tm marine spec cranes,
- | Atex rated Zone 2 electrical systems,
- | Eexd electric motor,
- | hydraulic tank,
- | base and lift frame designed,
- | approved and tested to BS EN 12079 for open seas transfer and weighs up to 16 tonne.
- | Available to suit TMS or free swim systems, safe area or Zone 2 also available
- | Operationally designed, reviewed and approved to Lloyds 'Code for Lifting Appliances in a Marine Environment' 2003 and certified for use in sea state 6 (3G).



## WINCHES

Hydramec offer a full range of existing ROV free swimming tether winches or TMS based lift winches as well as slipring based umbilical winches for side scan sonar, geotechnics, seismic streamers, tugger and heavy lift winches- electric or hydraulic.

### Features:

- | range from 100m cable capacity up to 8000m and lifting from 1t to 50t.
- | can have built in HPU's for single lift convenience with optimised sea-fastenings for rapid mobilisation.
- | fully guarded to be PUWER compliant
- | additional options such as level winds, slip ring fitment, remote controls and sheaves as required to meet modern offshore standards.



## BESPOKE:

Hydramec are well known for building bespoke systems. We are able to offer our design services to create a system with our client that can then be built and installed by our team of engineers.



## HPU

Our standard designs range from 5KW to 300KW and can be either diesel or electrically powered.

We offer power packs as a turnkey solution supplying everything needed to complete, including offshore lifting frames, slings and coatings, electrical installation and commissioning with our offshore engineers.



# LAWSON ENGINEERS, MECHANICAL HANDLING

**LAWSON'S**  
MECHANICAL HANDLING ENGINEERS

**Location:** Dalston, Carlisle, UK

## Company Intro

For over 40-years Lawsons have teamed with forward thinking companies in the ROV, AUV, Tool and Hard Suit Launch and Recovery market. We listen to customers to help deliver innovative solutions which enable them to stand out from the crowd and create new markets for their services. Our machines are widely known among ROV crews for their capability, longevity, robust simplicity and well-thought-out features. Wide ranging attributes cover depth, load, speed, weight, compactness and we provide features like Active Heave Compensation, Hazardous Area rating, automation, but we only sell you what you want. A diverse back-catalogue provides a starting point for something unique, an idea metamorphosed to a working product in the time it takes to buy a 'stock' gearbox.

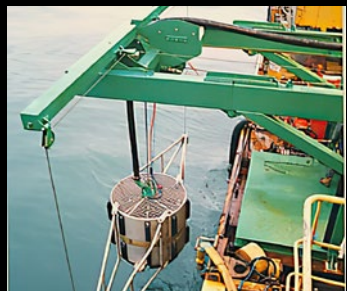
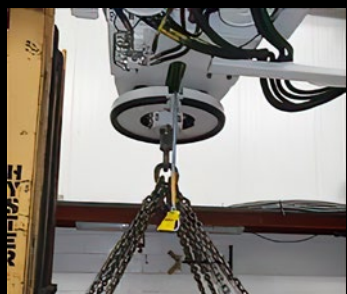
## Contact

enquiries@lawson-engineers.com

[www.lawson-engineers.com](http://www.lawson-engineers.com)



## WE DO DIFFERENT



We can talk about all the things we've done but there are rather a lot ...  
so we'd rather talk about what you want to do next!





Winches, A-frames, pedestal or special cranes and hoists, cursors, tagging towers, gantries, docking heads, HPU, green hydraulic, electric, pneumatic, ATEX-IECex, remote control, Active Heave Compensation, AUV, ROV, TMS, Tool, Grab, free-swim, high speed, high load, auto, modular, containerised, turnkey, and always fully integrated ... LARS



# SOIL MACHINE DYNAMICS LTD (SMD)



**Location:** Turbinia Works, Davy Bank, Wallsend, Newcastle upon Tyne, NE28 6UZ, United Kingdom  
**Other Locations:** No. 321, Feizhou Road, Lingang New Town, Pudong, Shanghai, 201306, China

## Company Intro

SMD is an advanced global designer and manufacturer of subsea remotely operated and autonomous power and control solutions. Operating across several technology areas, SMD specialises in subsea trenching, work class ROVs, submerged mining and vessel deck equipment, as well as providing a range of subsea components through the Curveteck brand. SMD Services offer the capability, resources and expertise to support clients in multiple operations; around the clock and on a global scale. SMD has a passion for excellence, backed by proven engineering expertise and outstanding global service over the last 50 years.

## Contact

Matthew Woodward  
 Business Development Manager  
 matthew.woodward@smd.co.uk  
 +44 (0) 7794 901 896

[www.smd.co.uk](http://www.smd.co.uk)



## A-FRAMES

We supply a large range of fixed and mobile systems from 6Te to more than 300Te SWL. All our systems are tailored to our customers' requirements and are capable of handling vehicles, quadrants, scientific instruments, subsea modules and other tools. Our A-Frame systems can be suited to a variety of vessels such as PSV, survey, dive support, construction and specialised lay vessels. All our A-Frames are certified to Lloyds and DNV rules.

## WINCHES

SMD have a long history in supplying a large range of both lifting umbilical winches and tow winches. We also offer bespoke electric winch solutions. Our lifting umbilical winches are capable of handling loads up to 25Te operating in up to sea-state 7. The umbilical cables are double armoured and operate at voltages from 3300 to 4500 volts. Lifting umbilical winches are primarily used to power Q-Trencher ROVs, such as the QT1400 and the QT600 and lightweight tractor systems.



## DECK HYDRAULIC POWER UNITS

Our standard deck Hydraulic Power Units (HPUs) are manufactured to interface with SMD A-Frames and Umbilical Winches to minimise deck space, forming a complete equipment handling system. SMD standalone HPUs include dual motors for redundancy and a lightweight open frame design suitable for road transportation. All our HPU's are designed for easy integration with other SMD equipment and incorporate designs to enable long service life.

## LAUNCH SOLUTIONS FOR WORK CLASS ROVS

SMD bring years of knowledge and experience to the design and manufacture of Launch and Recovery Systems (LARS) to offer a range of complete turnkey launch systems specifically designed for handling for work class ROVs, trenching and mining systems.

Our standard LARS are manufactured to interface with SMD's range of vehicles, minimising deck space to form a complete vehicle handling system but can be easily interfaced to other OEM vehicles. Designed for maximum reliability, all LARS systems are available with DNV or Lloyds Design Approval as standard and can be load tested at our in-house production facility according to both standards and IMCA if required. We perform full system electrical stack up tests and can carry out umbilical wind on under back tensions of up to 12Te and mechanical termination of the bullet to ensure maximum performance in field.



Optional features such as Electric Drive, AHC, Enhanced instrumentation and automation packages, deck lighting, cameras and umbilical cooling/monitoring systems are available on request.

### GENERAL FEATURES:

Standard 4Te, 6Te, 8Te, 12Te and 15Te SWL LARS available • Light weight designs • Up to sea state 6 • Road Transportable • Bundled skid bases • Suitable for a wide range of 3rd party ROV's, umbilicals & slings • Custom designs can be provided



### A-FRAME FEATURES:

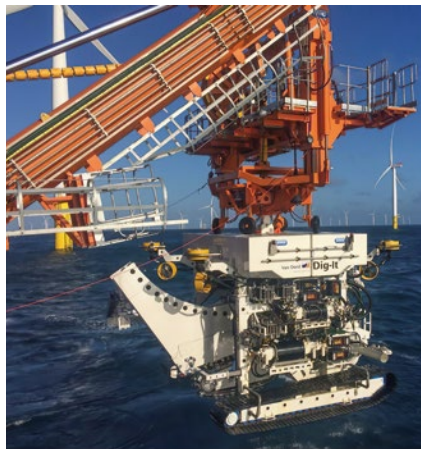
Self-erecting designs • Anti-crush mechanism • Integrated Docking Head • Pivoting sheave wheel • Umbilical length out sensor • Fail-safe docking head latch system • Outboard safety gates • Main gantry cylinders mounted in-line with legs to improve maintenance access

### UMBILICAL WINCH FEATURES:

Dual control for remote or local operation • Closed-loop fleeting control with Manual / Automatic modes • Electric or Hydraulic Drive • Active Heave Compensation Operations • Adjustable fleeting box to allow different configurations of fleeting entry angles • Conventional (Transverse) or Axial Fleeting • Optional bolt-on grooved drum shells • Integrated crash frame with lift points • Fail-safe brake • Quick coupling hydraulic connections

## LAUNCH SOLUTIONS FOR TRENCHING ROVS & TRACTORS

SMD offer the most comprehensive range of LARS solutions on the market for trenching ROVs and subsea tractors. They offer special features for handling heavy in air to light in water vehicles while protecting the umbilical cable always. SMD's Deck Equipment Sales team can advise on optimum deck layout and structural interface of equipment, ensuring that customers are supported every step of the way.



### FEATURES:

- Wide and narrow angle A-Frame designs available.
- Integrated system controls for ease of operation.
- Axial or drum fleeting winch options to reduce deck space if required.
- Automated launch features with safety interlocks to prevent user error.
- Cursor launch systems with lift winches for heavier vehicles.
- Slack arm winch option to prevent umbilical snatch loads.
- Designed to Lloyds or DNV rules up to sea state 6.
- Passive heave compensation packages for landing over products on the seabed.

## LAUNCH SOLUTIONS FOR PLOUGHS

SMD also offer LARS for plough systems for operation on multiple applications including fibre optic, power or pipeline installations. We have the ability in house to advise on deck layout to optimise ease of launch and recovery and ensure efficiency throughout the operation. Our sales team also offer vessel integration support and ship design consultancy to ensure that all LARS are designed to meet individual specifications.

### FEATURES:

- Standard turnkey packages for fibre and power cable systems.
- Wide angle plough launch systems for launching / towing on the same wire.
- Stabilising Frames to suit a range of systems.
- Option to add quadrant handling functionality for power cable operations.
- Heave compensation systems for controlled subsea landing.
- Range of tow winches and overboarding sheaves.





## **NEXT » LIFTING & RIGGING**

**74** RUD – RUD Ketten Rieger & Dietz GmbH



**I.10.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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**LIFTING &  
RIGGING**

# RUD - RUD KETTEN RIEGER & DIETZ GMBH



**HQ Location:** Friedensinsel, 73432 Aalen, Germany

**Regional Offices:** RUD Chains Ltd. Chestfield, Whitstable CT5 3QT, UK

RUD Chain Inc. 840 N. 20th Av., 52233 Hiawatha, Iowa, USA

RUD Chains Pty Ltd. Commerce Place 12, QLD 4110 Larapinta, Australia

RUD Correntes Industriais Ltd. Rua Andreas Florian Rieger 381, 08745-260 Mogi das Cruzes, São Paulo, Brazil

## Company Intro

RUD Ketten, based in Aalen/Germany, is a leading manufacturer of round steel chains, producing top quality chain components and systems for a wide variety of markets and applications, including lifting and lashing means, conveyor systems, hoists and tyre protection. Operating for 140 years you can be confident in the quality and expertise of the RUD product portfolio. RUD is ISO 9001 certified and is renowned for its expertise in heat treatment methods for high tensile steel.

RUD's innovative lifting and lashing solutions "made in Germany" guarantee ultimate safety when lifting, moving and securing heavy loads. Offering over 600 different tested and certified lifting and lashing points, for both bolting and welding, in conjunction with its high quality chains portfolio: VIP (Grade 100) and ICE (Grade 120) RUD provides standard and tailored applications to meet the highest demands in all areas of application of future-oriented lashing and lifting equipment from 80 kg to 200t WLL.

## Contact

slings@rud.com

+49 7361 504 1371

[www.rud.com](http://www.rud.com)



## RUD ROV HOOK

RUD's latest innovation, the ROV HOOK, has been specially designed and engineered for the subsea industry. The new RUD ROV HOOK was developed in cooperation with one of the world-leading subsea construction and remote intervention companies, Subsea 7. The hook features a novel outwards moving safety latch, which closes and locks automatically. By providing the highest level of safety and reliability, combined with speed and ease of use, it ultimately reduces operational costs. A simple, but ingenious solution for lowering and lifting loads in harsh subsea applications.

### The RUD ROV hook

- | No shedding of loads
- | No snagging due to its smooth shape
- | Innovative mechanism saving time & costs
- | Singled-handed operation
- | Designed for harsh operational conditions

## LIFTING AND LASHING PRODUCTS

RUD disposes of an impressive product portfolio for lifting and lashing means and have earned its global reputation as a leading manufacturer of high quality round steel link chains and associated components working across a vast array of industries, including mining, automotive, machinery manufacturing, construction, military, shipbuilding, maritime and offshore, just to name a few.

RUD lifting and lashing products can be used in a wide variety of demanding environments, helping to deliver solutions that are tailored to specific requirements, project aims and working conditions.

In particular, RUD's products have been increasing popular across the offshore industry, due to their heavy lift capabilities of up to 200 tonnes WLL, and their robust resistance to corrosion.

RUD components are equipped with award winning RFID technology, enabling users to easily track, identify, inspect and trace their lifting and lashing equipment.

## LIFTING/LASHING POINTS

Offering over 550 different tested and certified lifting and lashing points, for both bolting and welding, in conjunction with its premium quality chains portfolio; VIP (Grade 100) and ICE (Grade 120) RUD provides standard and tailored applications to meet the highest demands in all areas of application of future-oriented lashing and lifting from 80kg up to 200t WLL.



## VIP CHAINS / SLING SYSTEMS

The VIP range of lifting means (Grade 100 chain) has been established since 1994, and is used in some of the toughest working environments. Although having the same chain diameter as grade 8 chain, the VIP range offers up to 30% increase in the WLL. The chain dimensions range from 4–28 mm (3/16" to 1-1/8"), with a WLL from 0.6t to 31.5t (1386–69300 lbs) in single leg, and up to 56 t (123458 lbs.) in a 4 leg configuration with a balancer.

### VIP lifting means at a glance:

- | Made from CrNiMo special steel, quenched and tempered
- | VIP is less sensitive to notching and hydrogen embrittlement than quality Grade T, 8 or 80.
- | Chains stamped with VIP are manufactured with tighter tolerances in the inner width (size B)
- | VIP chain awarded via the BG German testing authority to stamp the chain with the following
- | H1 stamp indicating manufacturer's number. 1=RUD.
- | 8S means special quality, higher than quality grade 8
- | Offers safe lifting in any direction
- | The bending test acc. to standard specifications of DIN EN 818-2-8, bending min  $F=0.8xd$  is by far exceeded.
- | Comes with multi-functional WLL identification tag enabling simple inspection, can be documented on the tag
- | RUD chains and components are in accordance with DIN EN818 and 1677
- | Type approved acc. To DNVGL ST 0377 (shipboard cranes) and DNVGL ST 0378 platform cranes in the range of 6-22mm nominal chain diameter.

### MASTER LINK CONNECTION

The chain connecting link VRG is attached to the corresponding master link in a permanent but flexible way. The fool-proof clevis connection always ensures that only the correct chain diameter can be fitted. The collection of master links range from the smallest VBK size for the high tensile hoist hooks up to crane hook No. 50 with  $Bi = 250mm$  in 1 to 4 leg assembly versions.



### VIP COBRA HOOK

- | Superior & safer than the common clevis sling hook
- | Supplied complete with a forged and tempered safety latch
- | Safety latch locks into hook tip to protect against lateral bending
- | Safety latch supported by a triple coiled double leg
- | Wear edges in both sides of hook protect against abrasion of the chain
- | Gauge marks on the hook enable easy inspection for elongation of the width of hook opening

### VIP SHORTENING CLAW

- | According to DIN 5692
- | No reduction of WLL
- | Thickened hook tip to avoid misuse
- | Chain support facilitated by calibrated lugs
- | The u-bend insertion slot protects against accidental chain disengagement
- | Can be mounted at every position in chain strand or move





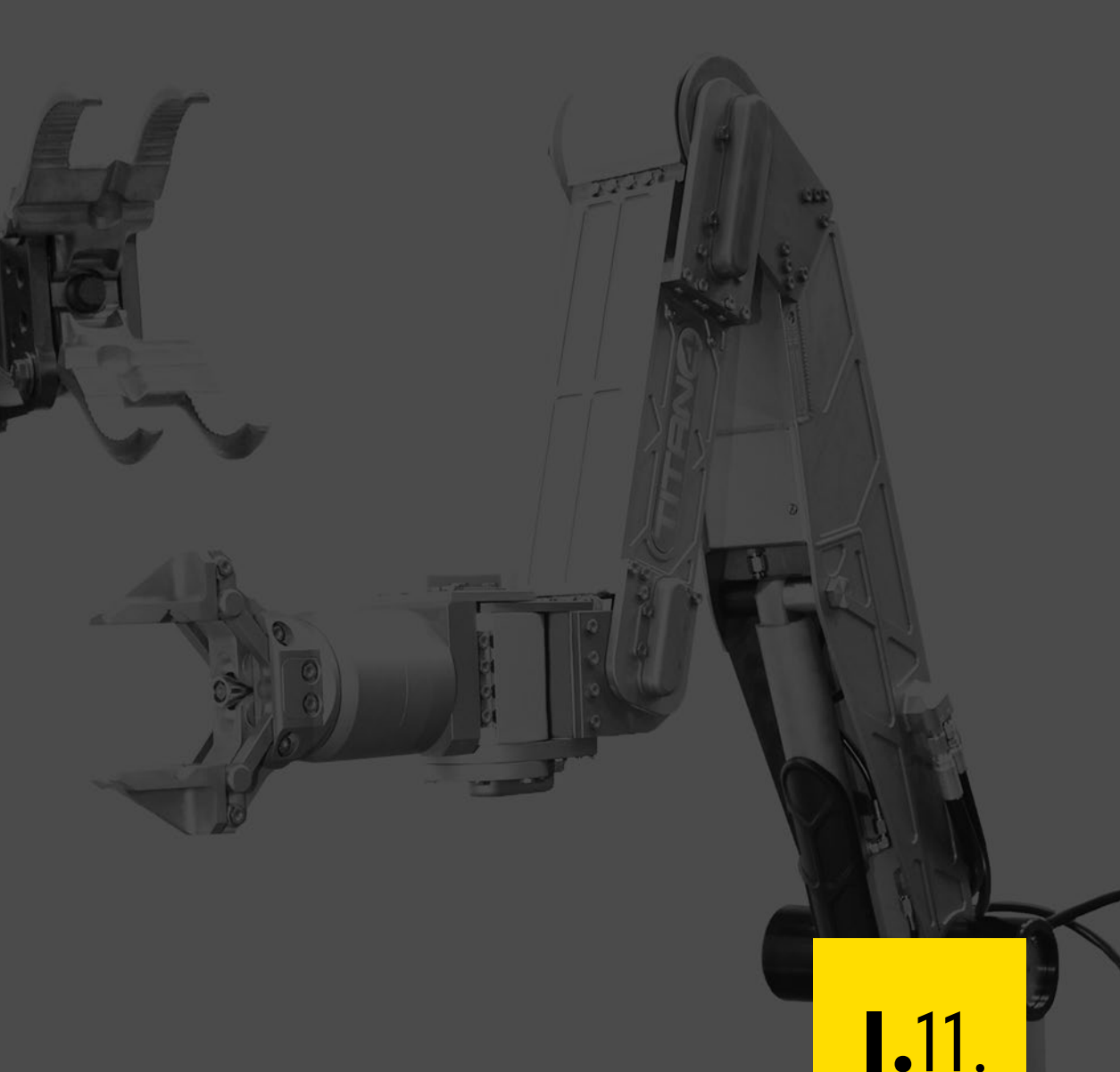
Blueprint Lab	<a href="http://www.blueprintlab.com">www.blueprintlab.com</a>	St Peters, NSW, Australia
ECA Group	<a href="http://www.ecagroup.com">www.ecagroup.com</a>	La Garde, France
Houston Mechatronics	<a href="http://www.houstonmechatronics.com">www.houstonmechatronics.com</a>	Houston, TX, USA
Hydro-Lek	<a href="http://www.hydro-lek.com">www.hydro-lek.com</a>	Fareham, Hampshire, UK
Imenco	<a href="http://www.imenco.no">www.imenco.no</a>	Aksdal, Norway
Saab Seaeye	<a href="http://www.saabseaeye.com">www.saabseaeye.com</a>	Fareham, Hampshire, UK
TechnipFMC - Schilling Robotics	<a href="http://www.technipfmc.com/en/what-we-do/subsea/Robotics/manipulator-systems">www.technipfmc.com/en/what-we-do/subsea/Robotics/manipulator-systems</a>	Davis, CA, USA
Titanrob Technologies	<a href="http://www.titanrob.com">www.titanrob.com</a>	Nigran, Spain

## NEXT » MANIPULATORS

**78** Blueprint Lab

**80** TechnipFMC – Schilling Robotics





**I.11.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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**MANIPULATORS**

# BLUEPRINT LAB

**BLUEPRINTLAB**

**HQ Location:** 3-5 Queen St, Glebe NSW 2037, Australia

## Company Intro

We develop advanced robotic arm solutions for harsh environments. Our high quality, state-of-the-art robotic manipulators help operators push the boundaries of inspection and intervention. Our customers include military organisations, service providers for the oil and gas industry conducting pipe and tank inspections, marine scientists, and the autonomous robotics research community.

## Contact

sales@blueprintlab.com

[www.blueprintlab.com](http://www.blueprintlab.com)



## FEATURED PRODUCTS & SERVICES:

### REACH ALPHA MANIPULATORS



The Reach Alpha is a tough, dexterous, multi-function manipulator for harsh environments. All electric, high accuracy 0.1° positioning, and patented 300m rated actuators make the Reach Alpha the most advanced manipulator for the portable ROV community. The system was designed to enable close NDT inspection and complex intervention at a size not previously possible. Available in several configurations and degrees-of-freedom.

**Max Closing Force:** 400-600N

**Outer Diameter:** 40mm

**Reach:** 0.25-0.45m

**Payload/Lift Capacity:** 2-3kg

**Voltage, Power, Comms:**

18-30V, 35W Max, RS232/485

#### Rotating Grabber

A high grip strength and strong load rating make this subsea grabber ideal for portable ROVs operating at high tempo in tough environments. They are a robust, reliable, and proven solution for operators conducting Special Recovery Operations (SRO), salvage, intervention, and everyday retrieval tasks up to 300m depth. Multiple end tools available. Available as a fixed, non-rotating grabber also.



#### Rotators

Single function and pan-tilt rotators in the Reach Alpha range offer high accuracy (0.1°) payload positioning in a robust and compact package. Designed for small cameras and sonars. Alpha actuators feature active joint compliance which provides self-protection against impact. 300m Depth rating. Available in inline-rotate, 90° rotate, and pan-tilt configurations.



## REACH BRAVO MANIPULATORS



The Reach Bravo is a compact, tough, dexterous manipulator system for inspection class vehicles. The 7-Function variant (Bravo 7) is designed to conduct Inspection, Maintenance, and Repair (IMR) tasks usually reserved for human divers, this class of subsea robotic manipulator is compact, lightweight, and enables unprecedented dexterity at its size. With high accuracy joint positioning and intuitive control options, the Reach Bravo system is a must for operators in the new era of close inspection work and complex intervention. Available in several configurations and degrees-of-freedom.

| **Max Closing Force:** 1000-1200N

| **Reach:** Up to 0.9m

| **Full Reach Lift:** 10kgs at 0.9m

| **Max Lift Capacity:** 20kg

| **Joint Speed:** 60deg/s nominal

| **End-effector Accuracy:** <1cm

| **Voltage, Power, Comms:**

24-48V, 200W Nominal, RS232/385 + Ethernet

| **Wrist Torque:** 20Nm

### Rotating Grabber

The Bravo Rotating Grabber blends two state-of-the-art actuators to give a precise, high strength grip. With the combination of a powerful linear and continuous rotator, the gripper extends the capability portable and inspection class ROVs. Variants exist for high-force cutting including the ability to sever a 1" conduit cable. Multiple tools available.



### Rotator

The Reach Bravo rotator is a 360° continuous rotate actuator, offering high precision programmable set-points and options ethernet, serial, and power pass through. Compact and versatile; perfect for payload pointing or winch activities.



## OPTIONS AND UPGRADES

With one-to-one joint matching and comfortable design, the Master Arm controller reduces ROV operator training time and enables dexterous tasks not possible with traditional control methods. Available in 7 and 5-Function models to suit your manipulator, increase accuracy and precision with this plug-and-play upgrade.



### Mission Tool Sets

These tooling options enable operators to quickly configure their grabber or robotic manipulator for the required task. A rapid swap-out procedure ensures interchangeability on the go.



# SARCOS TECHNOLOGY & ROBOTICS CORP.



**HQ Location:** 650 South 500 West, Suite 150, Salt Lake City, UT 84101, USA

**Regional Offices:** 4925 Harrison Street, Pittsburgh, PA 15201, USA

## Company Intro

Sarcos Technology and Robotics Corporation (NASDAQ: STRC and STRCW) designs, develops, and manufactures a broad range of advanced mobile robotic systems, solutions, and software that redefine human possibilities and are designed to enable the safest most productive workforce in the world. Sarcos robotic systems operate in challenging, unstructured, industrial environments and include teleoperated robotic systems, a powered robotic exoskeleton, and software solutions that enable task autonomy. For more information, please visit [www.sarcos.com](http://www.sarcos.com) and connect with us on LinkedIn at [www.linkedin.com/company/sarcos](http://www.linkedin.com/company/sarcos).

## Contact

[sales@sarcos.com](mailto:sales@sarcos.com)

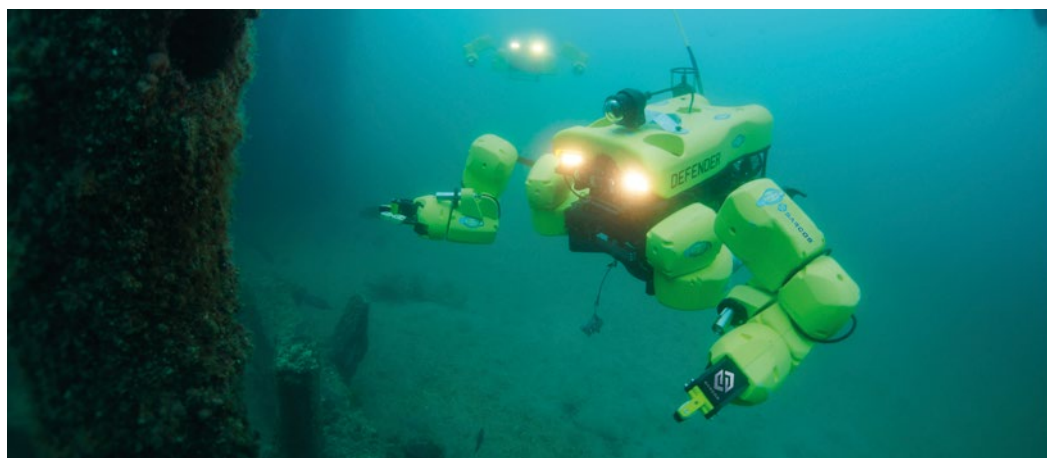
+1-888-927-7296

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[www.sarcos.com](http://www.sarcos.com)



## PRECISION AND SAFETY IN UNDERWATER MANIPULATION



## GUARDIAN® SEA CLASS UNDERWATER ROBOT

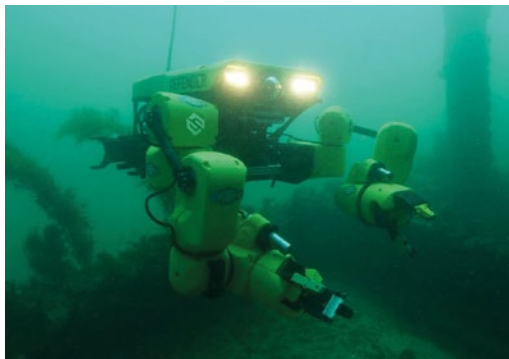
The Sarcos Guardian® Sea Class underwater robot is designed to provide human-like manipulation capabilities in complex and often dangerous underwater environments.

- | Expands utility and scope for inspection-class remotely operated vehicles (ROVs) by enabling light-work capabilities, such as:
  - Rudder, prop, and shaft inspection and obstruction clearing
  - Surface cleaning (biofouling removal)
  - Cutting lines and cables, drilling, and affixing lift balloons during salvage missions
  - Damage inspection with light debris clearing
- | Reduces the need to put divers into the water for inspection and light-work missions
- | Can stay submerged at 300m working depth indefinitely
- | Flexible, dual-armed system with 7-function manipulators enhances station-keeping while operating tools with precision and dexterity

- | Integrated grippers with autonomous tool grasping capabilities enable use of multiple hand tools, manipulation of objects, and interaction with the environment
- | Unique controller design enables easy teleoperation of the manipulators and underwater vehicle with optional autonomous and semi-autonomous control
- | Lightweight, two-person portable design allows for ease of operation and deployment with minimal training requirements
- | Modular design enables integration with existing inspection-class underwater vehicles

## Features

- | 1000m+ working depth capability, 300m standard
- | Electronically driven, energy-saving system
- | Lightweight, two-person portable design
- | Dual-arm configuration featuring 7-function manipulators each (6 degrees of freedom (DoF) gripper per arm)
- | Two-fingered grippers with autonomous, tool-grasping capabilities for quick tool changes
- | HD camera equipped at end of each arm provides topside operator with real-time, first-look assessment capabilities and situational awareness of the workspace
- | Neutral buoyancy improves ROV/manipulator balance and control
- | Sealed, pressure-compensated design protects the electrical system from water ingress and contamination
- | Multi-level corrosion management system



- | Open architecture supports robot operating system (ROS/ROS2) communication protocols
- | Designed to integrate with existing inspection-class ROVs
- | Teleoperated control
- | Autonomous and semi-autonomous capable (optional)
- | Customizable payloads and end effectors

## Industries & Applications

The Guardian Sea Class underwater manipulation robot is uniquely equipped to enhance diver relief and light-work tasks in challenging underwater conditions in a wide variety of industries, including:



- | **Oil & Gas:** Offshore Oil & Gas platform inspection, maintenance & repair (IMR)
- | **Energy:** Traditional, hydro, and offshore renewable power plant IMR
- | **Shipyards & maritime:** Ship maintenance, underwater inspection in lieu of dry dock (UWILD), non-destructive testing (NDT) inspections
- | **Ports, Harbors, Piers:** Port security, underwater contraband detection & inspection
- | **Construction:** Underwater survey, welding, and IMR of bridges and infrastructure
- | **Salvage & Emergency Response:** First-look assessment and prep
- | **Defense:** Underwater discarded military munitions & unexploded ordnance



# TECHNIP FMC - SCHILLING ROBOTICS LLC



**HQ Location:** (Corporate) TechnipFMC, 11740 Katy Freeway, Houston, Texas 77079, USA  
TechnipFMC, Schilling Robotics, LLC, 201 Cousteau Place, Davis, California 95618, USA

## Company Intro

Our Schilling Robotics legacy brand delivered its first manipulator system in 1986. Since then, we have delivered more than 3,000 systems. Our manipulators are deployed on nearly every work-class ROV in the world as well as other submersibles, including electric ROV's, and research and exploration submarines.

As subsea intervention tasks increase in complexity, our manipulator systems will continue to be at the forefront, providing the dexterity, strength and reliability to perform intricate tasks under water. ROV's and Submersibles operate in a global arena and to support our clients Schilling Robotics provides 24/7 helpline, email technical support, field support engineers plus offers comprehensive spares support through its online ordering portal enabling the customer to price, order and track its shipment through the customers own dedicated access portal. Whether help is needed on-site or offshore, our highly trained field support engineers are experienced in assisting customers.

## Contact

Schilling.Sales@technipfmc.com

[www.technipfmc.com/en/what-we-do/subsea/Robotics/manipulator-systems](http://www.technipfmc.com/en/what-we-do/subsea/Robotics/manipulator-systems)



## FEATURED PRODUCTS & SERVICES

### TITAN 4

The TITAN 4 has the dexterity and accuracy necessary to perform the fine movements needed for complex tasks. When this ability is combined with the manipulator's reach (1,922mm), payload capacity (122kg at full extension), depth rating (up to 7,000msw), and large operating envelope, the TITAN 4 offers unparalleled performance in a wide range of subsea applications.



### ATLAS 7R

The ATLAS 7R is a new class of heavy-duty, seven-function grabber that has been designed to lift heavy loads, while being lightweight and easy to control. With six degrees of freedom, a high lift capacity (250kg or 550lb at full extension), and a depth rating of 6,500msw, the ATLAS gives operators the freedom and strength to perform a wider range of heavy-duty jobs in harsh subsea environments.



## CONAN 7P

The CONAN 7P is designed to perform demanding tasks and yet be economical to install, operate, and maintain. Its power, reach, and rugged construction make it the perfect choice for subsea manipulator applications that require a combination of heavy lifting and dexterity.



## RIGMASTER

The RigMaster is a five-function, rate-controlled, heavy-lift grabber arm that can be mounted on a wide range of subsea ROVs. It is engineered for the strength needed to withstand the industry's harsh and repetitive needs day after day. The grabber arm can be used to grasp and lift heavy objects or to anchor the ROV by clamping the gripper around a structural member at the work site.



## ORION 7P, 7R, OR 4R

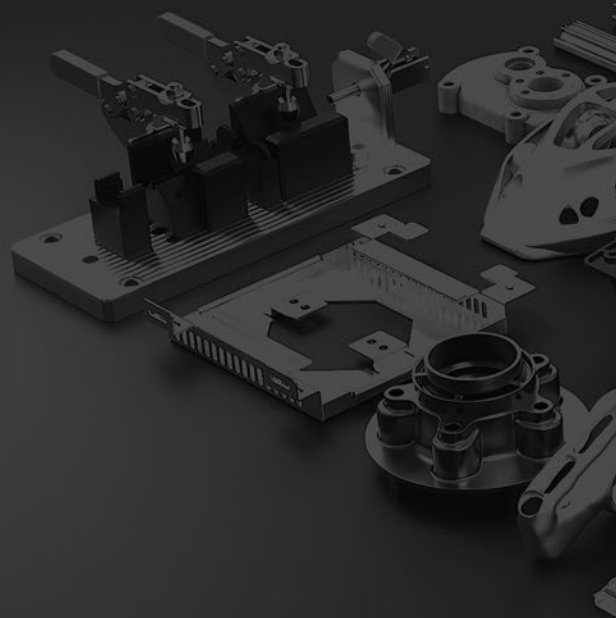
The ORION's compact size, light weight, and excellent payload capacity make it the system of choice for light and medium work-class ROVs. The arm's structural segments are fabricated from hard-anodized extruded aluminium for strength and corrosion resistance. Deepwater tasks are no problem for these arms.



### Options and Accessories

To support client's operational manipulator requirements Schilling Robotics offers:

- | Multiple Gripper Configurations for the Various Manipulators
- | Extended Depth Ratings (Subject to Manipulator)
- | Dual Manipulator Configurations (Subject to Manipulator)
- | Standard and Enhanced Spares Kits
- | Maintenance and Repair Tool Kits



## **NEXT » MANUFACTURING SERVICES**

**84** Nylacast Group



**I.12.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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**MANUFACTURING  
SERVICES**

# NYLACAST GROUP



**HQ Location:** Nylacast, 480 Thurmaston Boulevard, Leicester, LE4 9LN, UK

**Regional Offices:**

Supergrip UK Ltd, Riverside Works, Bridge Street, Colne, Lancs, BB8 0DR, UK

Nylacast LLC, 6951 Allentown Boulevard, Suite K, Harrisburg, Pennsylvania, PA17112, USA.

Nylacast Engineering Plastics (Changshu) Co Ltd, Building M10, Maqiao Industrial Square, Changshu Economic Zone, Jiangsu, ZIP 215513, China.

Nylacast SA (Pty) Ltd, 43 Malcolm Moodie Crescent, Jet Park, Boksburg, Gauteng, South Africa.

**Company Intro**

Nylacast Group is a world-leading innovator in the design, development, and supply of precision manufactured engineering polymer solutions with high-performance, low-weight and low-friction characteristics.

Nylacast's unique Research and Development capability provides full engineering solutions from initial concepts and raw chemistry, through to final products. Nylacast employs passionate teams across nine international sites (UK, USA, South Africa and China), and is committed to meeting the needs of critical applications within key global industries; including Oil, Gas, Energy, Automotive, Transport, Food & Beverage, Marine, Defence, Pharmaceutical and Renewables, including Offshore Wind Farms.

**Contact**

engineer@nylacast.com

+44-(0)116 276 8558

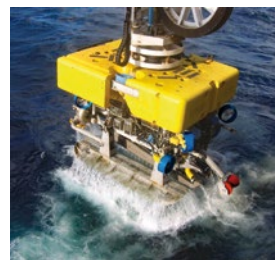
[www.nylacast.com](http://www.nylacast.com)



## PRODUCTS

High performance polymer components for ROVs including Vent Plugs, Thruster Nozzles, Baffle Panels, Manipulator arm parts, Torque Buckets, Handles, Launch & Recovery System Components.

With over 50 years expertise, and a long history with of providing Engineered Solutions for ROV applications Nylacast components can be found across the globe aiding performance and reducing maintenance for ROVs.



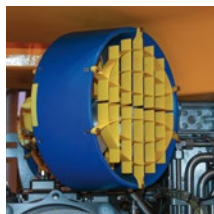
## VENT PLUGS

Nylacast ROV activated / installed vent plugs can be found across all manner of subsea equipment. Manufactured from our high-performance cast nylon material, designed specifically for subsea applications. Nylacast Vent Plugs allow water to flow freely through them, creating a suction (vacuum) effect which in turn secures equipment to the seabed or acts as ballast.

The corrosion resistant and low moisture absorbent material is dimensionally stable to cope with the high pressures found subsea and to create a secure fit, only allowing the equipment or structure to move again once the vent plug has been removed.

## THRUSTER NOZZLES

Nylacast Thruster Nozzles are designed to protect the propeller or propulsion units on multiple class ROVs, and channel the thrust generated accordingly in the direction or required travel. They also offer excellent protection from marine life or debris within the subsea environment. The neutral buoyancy and lightweight properties of the material ensure protection is provided without additional power requirement.





## INTERNAL BAFFLE PANELS

Internal plates provide support or compartmentalization of critical areas. Custom manufactured using our own material grades and CNC machining capabilities allows Nylacast to create engineered solutions for each application to suit equipment and application requirements. These may include external ROV body parts, impact protection components, equipment covers or protective panels.

## ROV TOOL ARMS

As a pioneer in cast nylon material innovation, Nylacast offer two material grades which are ideal for various ROV manipulator / tool arm applications. Nylacast Oilon & Nylacast Nylube grades are world renowned for their self-lubricating and low friction material properties to combat abrasion and wear within pivot points or high wear zones.

The Nylacast range of ROV tool arm (pivot points) include:

- | Bushes for all moving pivot points within the arm and manipulator assembly
- | Inserts for manipulator jaws, especially advantageous for delicate operations
- | Sliding pads for extendable manipulators

## TORQUE BUCKETS

Nylacast Torque Buckets provide docking alignment and socket mating for ROV rotary tools. Commonly found within subsea equipment valve panels, actuation valves and torque verification units.



Proven benefits of our torque buckets include:

- | Lightweight nylon material – Ease of assembly and distribution
- | High corrosion and abrasion resistance for reduced maintenance costs
- | Bespoke manufacturing service for custom designs
- | Available to suit multiple class requirements

## LAUNCH & RECOVERY SYSTEMS

Sheaves and Pulleys formulated from Nylacast custom PA6 or Moly materials are high strength, whilst delivering improved load spread to extend rope life substantially. An additional benefit to using polymer is that it is approximately 1/7th of the weight of steel. Making at height installations, and transport much safer and more efficient.

Nylacast sheaves can also be designed to meet DNV classification requirements. Nylacast Sheaves are also available in ATEX grade material for critical applications.



Blueprint Subsea	<a href="http://www.blueprintsubsea.com">www.blueprintsubsea.com</a>	Ulverston, England, UK
Coda Octopus	<a href="http://www.codaoctopus.com">www.codaoctopus.com</a>	Edinburgh, Scotland, UK
Echologger	<a href="http://www.echologger.com">www.echologger.com</a>	Goyang-Si, South Korea
EvoLogics	<a href="http://www.evologics.de">www.evologics.de</a>	Berlin, Germany
Imagenex	<a href="http://www.imagenex.com">www.imagenex.com</a>	Port Coquitlam, BC, Canada
Impact Subsea	<a href="http://www.impactsubsea.co.uk">www.impactsubsea.co.uk</a>	Ellon, Scotland, UK
iXblue	<a href="http://www.ixblue.com">www.ixblue.com</a>	Cedex, France
Kongsberg Maritime	<a href="http://www.km.kongsberg.com">www.km.kongsberg.com</a>	Kongsberg, Norway
Kraken Robotics	<a href="http://www.krakenrobotics.com">www.krakenrobotics.com</a>	St John's, NL, Canada
Norbit	<a href="http://www.norbit.com">www.norbit.com</a>	Trondheim, Norway
Nortek	<a href="http://www.nortekgroup.com">www.nortekgroup.com</a>	Rud, Norway
Silicon Sensing	<a href="http://www.siliconsensing.com">www.siliconsensing.com</a>	Plymouth, England, UK
Sonardyne	<a href="http://www.sonardyne.com">www.sonardyne.com</a>	Yateley, England, UK
Sonavision	<a href="http://www.sonavision.com">www.sonavision.com</a>	Aberdeen, Scotland, UK
Teledyne Marine	<a href="http://www.teledynemarine.com">www.teledynemarine.com</a>	Thousand Oaks, CA, USA
Tritech International	<a href="http://www.tritech.co.uk">www.tritech.co.uk</a>	Aberdeen, Scotland, UK
Valeport	<a href="http://www.valeport.co.uk">www.valeport.co.uk</a>	Devon, England, UK
Water Linked	<a href="http://www.waterlinked.com">www.waterlinked.com</a>	Trondheim, Norway
WFS	<a href="http://www.wfs-tech.com">www.wfs-tech.com</a>	Livingston, Scotland, UK

## NEXT » NAVIGATION, POSITIONING & SURVEY

- |   |                                    |
|---|------------------------------------|
| <b>88</b> Blueprint Subsea              | <b>102</b> Teledyne BlueView       |
| <b>90</b> Elwave                        | <b>104</b> Teledyne Marine         |
| <b>92</b> Impact Subsea Ltd.            | <b>106</b> Teledyne RD Instruments |
| <b>94</b> iXblue                        | <b>108</b> Teledyne TSS            |
| <b>96</b> iXblue                        | <b>110</b> Tritech International   |
| <b>98</b> Kongsberg                     | <b>112</b> UWIS Oy                 |
| <b>100</b> Kraken Robotic Systems, Inc. |                                    |



**I.13.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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***NAVIGATION,  
POSITIONING  
& SURVEY***

# BLUEPRINT SUBSEA



**HQ Location:** The Clock Tower Business Centre, Low Wood,  
Ulverston, Cumbria, LA12 8LY, UK

## Company Intro

Driven by innovation, Blueprint Subsea's leading range of compact, robust, intuitive and affordable underwater acoustic products have been meeting the rigorous demands of the global subsea, offshore and defence markets since 2006.

We specialise in two-dimensional imaging sonars, acoustic positioning beacons and diver navigation systems. Designed in-house and using advanced manufacturing techniques, we develop outstanding systems, without compromise.

## Contact

Technical Sales – James Colebourn

Technical Sales – Cindy Mercier

enquiries@blueprintsubsea.com

+44 (0) 1539531536 (UK)

[www.blueprintsubsea.com](http://www.blueprintsubsea.com)



## PRODUCTS

### STARFISH SIDESCAN SONARS

The StarFish range offers towed, hull-mounted and OEM systems that give exceptional image quality in a compact and rugged form factor. Specifically designed for shallow water survey work.

- | Frequencies from 450kHz–1MHz, using CHIRP technology
- | Up to a 200m swathe coverage
- | Horizontal beam width as low as 0.3°
- | Towed systems depth rated of 50m and OEM to 2000m
- | Simple, intuitive operator software



StarFish Towed System



StarFish Hull-mounted System



StarFish OEM System

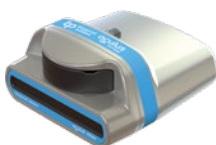
### OCULUS MULTIBEAM IMAGING SONARS

The Oculus provides outstanding image quality across a variety of single and dual frequencies models. Available in 500m, 1000m and 4000m depth ratings, the Oculus is designed for use on small inspection-class ROVs through to large work-class platforms.

- | Single and dual frequencies from 375kHz to 3.0MHz
- | Operating ranges up to 200m
- | Ultra-fast update rates of up to 40Hz
- | Depth ratings of 500m, 1000m and 4000m
- | Simple, intuitive operator software



Oculus M-Series System



Oculus MT-Series System



Oculus MD-Series System

## SEATRAC USBL ACOUSTIC POSITIONING SYSTEMS

SeaTrac is a high accuracy USBL acoustic positioning system for real-time ROV, AUV and diver tracking. Underpinned by a robust signalling protocol, SeaTrac systems give reliable positioning data even in the most challenging of environments.

- | Real-time ROV, AUV and diver location
- | High accuracy positioning
- | Track up to 14 in-water assets
- | Bidirectional data exchange facility
- | 1000m operating range
- | Depth ratings of 300m and 2000m
- | Simple, intuitive operator software



SeaTrac Standard System | SeaTrac Lightweight System

Designed, manufactured, and tested in-house in the UK's Lake District, we deliver high-quality, low-cost, innovative solutions. All products come with extensive technical support and comprehensive customer service.

**Contact us now to discover more – [enquiries@blueprintsubsea.com](mailto:enquiries@blueprintsubsea.com)**

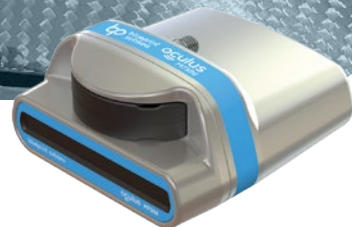
# TRANSFORM YOUR CAPABILITY

**bp** blueprint  
subsea

REAL-TIME IMAGING  
IN ALL CONDITIONS

### Oculus Multibeam Imaging Sonars

High resolution imaging in turbid water for improved situational awareness and target identification. Available in 375kHz to 3.0MHz. Depth rated to 500m, 1000m, or 4000m.



**oculus**



[www.blueprintsubsea.com](http://www.blueprintsubsea.com)  
[enquiries@blueprintsubsea.com](mailto:enquiries@blueprintsubsea.com)



# ELWAVE

**HQ Location:** 2 rue Alfred Kastler, CS40617, 44300 NANTES Cedex 3, FRANCE

## Company Intro

ELWAVE is an innovative French company which develops and markets breakthrough detection, navigation, and surface characterization solution for underwater and industrial environments.

ELWAVE develops solutions based on electrical sensory perception, known as "electric sense", developed since 2007 by the biorobotics research group in Mines-Telecom Atlantique Institute.

Electrical sensory perception is based on the interpretation of disturbances of an electric field emitted by the fish. It generates a 360° electric field around itself which is modified by their environment, other fishes, or predators.

## Contact

Jean-Marie Lapasset  
contact@elwave.fr  
+33 (0)2 51 85 87 71

[www.elwave.fr](http://www.elwave.fr)



ELWAVE

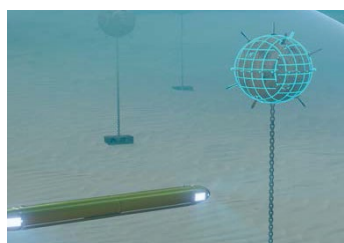
## APPLICATIONS

With its unique ability to detect and characterize (size, shape, electrical nature) any insulating and conductive objects in water into sediments, ELWAVE technology is a breakthrough solution for underwater perception applications.



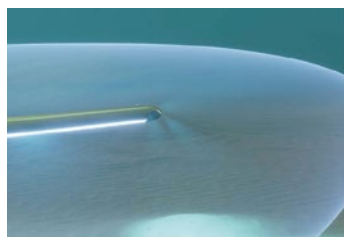
### 360° SAFETY SHIELD

With its real-time 360° detection capability, ELWAVE provides ROVs and AUVs with a unique all-around perception in any environment.



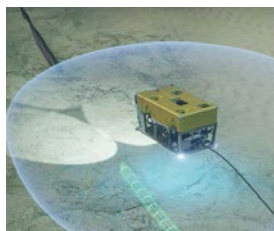
### EFFECTIVE DETECTION

With an EFFECTIVE DETECTION range of up to 5 times the length of the vehicle, ELWAVE real-time 360° technology complements cameras and sonar for navigation in complex environments (turbid water, close approach of infrastructure, shallow water...)



### DETECTION AND TRACKING OF BURIED OBJECTS

The propagation of the electric field into the seabed gives the ELWAVE solution its unique ability to detect and characterize (size, shape, metallic vs non-metallic) all types of object (insulating and conductive) up to 2.0 m depth of burial. ELWAVE systems offer an innovative solution for the detection and the tracking of buried underwater objects.



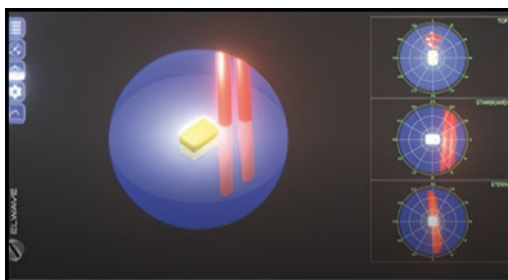
## SURVEYING & CHARACTERISATION OF BURIED OBJECTS

Such as but not limited to pipelines, UXO & mines, cables, wreck & debris, mooring lines & anchorage.

## TECHNOLOGY

Electric sense systems are based on the following principle:

- | Emission of an alternative low frequency, low energy electric field
- | Measurement of its variations
- | Algorithmic process for detection, location, and characterisation of objects



## PLUG & PLAY SENSOR

For easy integration on any ROV and AUV, the sensor is compounded of:

- | A pod integrating high-sensitivity electronics and cutting-edge algorithms
- | Up to 24 electrodes on different location of the vehicle
- | Electromechanical components (cables, connectors...) for implementation on the vehicle
- | Remote software for HMI visualization ("electric image") and sensor management



## SPECIFICATIONS

- | Up to 24 electrodes
- | Low power supply (9-36 volt)
- | Data link RS 232, RS 422/485 & Ethernet
- | Low energy consumption (< 30W)
- | Low size and weight casing (< 40cm- < 5kg)
- | Highly reliable (no mobile mechanical components)



# IMPACT SUBSEA LTD.

ImpactSubsea

**HQ Location:** Unit 10 & 11, Castle Street, Castle Road Industrial Estate,  
Ellon, Aberdeenshire, AB41 9RF, UK

## Company Intro

We are a global provider of underwater sonar, altitude, attitude, depth, heading and temperature sensors. In addition, we also provide ultrasonic flooded member detection systems and a bespoke subsea pressure housing design service. We design, manufacture and support all of our products directly and internationally through a global distributor network. We operate a UKAS certified ISO9001:2015 quality management system to ensure the highest level of quality in our sensor solutions. Want to know how we can help with your underwater sensor or system requirements? Contact us today to discuss further.

## Contact

Ben Grant  
sales@impactsubsea.co.uk  
+44 (0)1224 460850

[www.impactsubsea.co.uk](http://www.impactsubsea.co.uk)



## IMAGING SONAR - ISS360

The ISS360 is the worlds smallest imaging sonar which provides exceptionally clear imagery to a range up to 90 meters. Available in Titanium and with optional integrated Pitch & Roll, the ISS360 is ideal for a large number of underwater imaging applications.

- |                                |                                   |
|--------------------------------|-----------------------------------|
| World's Smallest Imaging Sonar | Software to View, Log & Configure |
| 90 Meter Range                 | Depth Rated to 6,000 Meters       |
| No Slip Rings                  | CHIRP Acoustics                   |
| Optional Pitch & Roll          | 360° field of vision              |



## ALTITUDE & DISTANCE - ISA500

The ISA500 underwater Altimeter & Echo Sounder provides exceptionally long-range measurement capability - in excess of 120 meters. In addition to providing exceptionally long-range capability, the unit has a 1mm accuracy - allowing precision underwater distance measurements to be made.

- |                                   |                               |
|-----------------------------------|-------------------------------|
| 120+ Meter Range                  | Digital & Analogue Interfaces |
| Millimeter Accuracy               | Robust & Compact Housing      |
| Optional Heading, Pitch & Roll    | Emulate Any Device            |
| Software to View, Log & Configure | Multi Echo Output             |



## DEPTH & TEMPERATURE - ISD4000

The ISD4000 is a compact, survey grade Depth & Temperature Sensor. Optionally, the unit can also be provided with an integrated Attitude and Heading Reference System (AHRS). This provides highly stable Heading, Pitch and Roll readings.

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| 0.01% FS Depth Accuracy           | Emulate Any Device                |
| 0.01°C Temperature Accuracy       | Digital Interfaces                |
| Optional Heading, Pitch & Roll    | Survey Grade                      |
| Software to View, Log & Configure | AHRS                              |
| Robust & Compact Housing          | Optional 0.005% FS Depth Accuracy |



## HEADING & MOTION - ISM3D

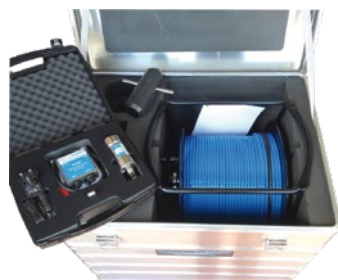
The ISM3D is a highly accurate underwater Attitude & Heading Reference System. The ISM3D utilises high grade MEMS based Accelerometers, Angular Rate Gyroscopes and Magnetometers all of which feed into an advanced fusion engine driven by a dual core micro-processor.



- | ±0.5° Heading Accuracy
- | ±0.07° Pitch & Roll Accuracy
- | Software to View, Log & Configure
- | Depth Rated to 6,000 Meters
- | Robust & Compact Housing
- | Emulate Any Device
- | Digital Interfaces
- | Immune to Magnetic Interference

## FLOODED MEMBER DETECTION

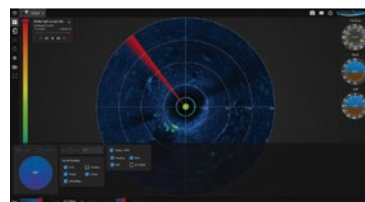
The ISFMD system provides the latest in underwater ultrasonic Flooded Member Detection technology. Suitable for Diver or ROV deployment the ISFMD system provides the most advanced and reliable Flooded Member Detection system available today. Utilising an ultrasonic probe with a broadband composite transducer together with an advanced digital ultrasonic engine ensures the highest level of accuracy and reliability in readings. The ISFMD system does not use gamma ray or any other radioactive sources. The system is based entirely on the use of ultrasonics. This removes the logistical and health and safety difficulties associated with gamma ray based flooded member detection systems.



- | Ultrasonic FMD System
- | Visualise Acoustic Returns
- | Automatic Report Generation
- | Powerful & Intuitive Software
- | ROV or Diver Operated
- | Probe Orientation Sensor

## SEAVIEW SOFTWARE FOR IMPACT SUBSEA SENSORS

seaView is an easy to use software package comprised of multiple applications (Apps) for viewing, logging, calibrating and configuring all Impact Subsea sensors. Additional Apps within seaView allow specific tasks to be undertaken – such as Hydrographic Single Beam Echosounder Surveys or Flooded Member Detection.



- | View Live Data
- | Log Data to CSV File
- | Connect to Multiple Sensors
- | Configure & Calibrate Sensors
- | Conduct Hydrographic Surveys
- | Conduct Flooded Member Detection

**HQ Location:** 34 rue de la Croix de Fer, CS 70121, 78105, Saint-Germain-en-Laye, Cedex, France  
**Regional Offices:** Glover Pavilion, Campus 3 Aberdeen Innovation Park Balgownie Drive,  
 Bridge of Don, Aberdeen, AB22 8GW, United Kingdom  
 11 Erie Drive, 01760 Natick, MA, USA

### Company Intro

iXblue is a global high-tech company specializing in the design and manufacturing of advanced marine, photonics and autonomy technologies. The group in-house expertise includes innovative systems and solutions devoted to inertial navigation, subsea positioning, underwater imaging, as well as shipbuilding and test & simulation. iXblue technologies support Civil and Defense customers in carrying out their sea, land and space operations with maximum safety, efficiency and reliability. Employing a workforce of 750 people worldwide, iXblue conducts its business in over 60 countries.

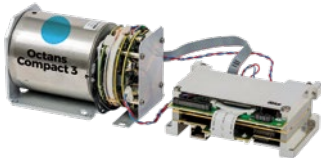
### Contact

contact@iXblue.com  
 +33 1 30 08 88 88  
 +44 1224 355 160  
 +1 888 600 7573

[www.iXblue.com](http://www.iXblue.com)



Based on the Fiber-Optic Gyroscope (FOG) technology, iXblue offers a complete range of Attitude and Heading Reference Systems (AHRS) and Inertial Navigation Systems (INS). This technology ensures unrivaled performance, robustness and maintenance-free systems. Thanks to this advanced expertise, over 80% of the subsea vehicles used in the Energy industry are equipped with iXblue navigation systems.



**Octans Nano OEM**  
 Compact OEM  
 navigation-grade AHRS



**Octans Nano**  
 Navigation-grade AHRS



**Octans Subsea**  
 Survey-grade AHRS

## SUBSEA ATTITUDE HEADING REFERENCE SYSTEMS (AHRS)

	Octans Nano OEM	Octans Nano	Octans Subsea
<b>Measurement</b>	Heading, roll, and pitch	Heading, roll, pitch, and heave	Position, heading, attitude, speed and depth
<b>Depth rating</b>	N/A (embedded)	4 000 m	3 000 m
<b>Heading accuracy</b>	0,5 deg secant latitude	0,5 deg secant latitude	0,1 deg secant latitude
<b>Roll and pitch accuracy</b>	0,1 deg	0,1 deg	0,01 deg



SUBSEA INERTIAL NAVIGATION SYSTEMS (INS)



**Rovins Nano**  
Compact navigation-grade INS



**Rovins**  
Survey-grade INS



**Phins Subsea**  
High performance deep-water survey-grade INS



**Phins Compact Series**  
Compact OEM survey-grade and navigation-grade INS

	Rovins Nano	Rovins	Phins Subsea	Phins Compact Series
Measurement	Position, heading, attitude, speed, depth, and heave	Position, heading, attitude, speed, depth, and heave	Position, heading, attitude, speed, depth, and heave	Position, heading, attitude, speed, depth, and heave
Depth rating	6 000m	3 000m	6 000m	
Heading accuracy	0.1 deg secant latitude	0.04 deg secant latitude	0.01 deg secant latitude	0.15 to 0.01 deg secant latitude
Position with DVL	0.04% of the traveled distance	0.02% of the traveled distance	0.01% of the traveled distance	0.04% to 0.01% of the traveled distance
Optional aiding sensor	USBL, LBL, DVL, GNSS, Sparse Array (with Ramses LBL transceiver)			



iXblue partners with DVL manufacturers Nortek and Teledyne RD Instruments to offer advanced INS/DVL tight-coupling solutions. They combine the best navigation technologies available today and offer scalable plug & play solutions which performance and characteristics can be best suited to the user's needs.

	Rovins Nano	Rovins	Phins Subsea
DVL-aided optimal performance in typical condition	0.04% of the traveled distance	0.02% of the traveled distance	0.01% of the traveled distance
DVL-aided straight-line performance	0.2% of the traveled distance	0.1% of the traveled distance	0.05% of the traveled distance

# iXBLUE

iXblue

**HQ Location:** 34 rue de la Croix de Fer, CS 70121, 78105, Saint-Germain-en-Laye, Cedex, France  
**Regional Offices:** Glover Pavilion, Campus 3 Aberdeen Innovation Park Balgownie Drive,  
 Bridge of Don, Aberdeen, AB22 8GW, United Kingdom  
 11 Erie Drive, 01760 Natick, MA, USA

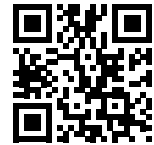
## Company Intro

iXblue is a global high-tech company specializing in the design and manufacturing of advanced marine, photonics and autonomy technologies. The group in-house expertise includes innovative systems and solutions devoted to inertial navigation, subsea positioning, underwater imaging, as well as shipbuilding and test & simulation. iXblue technologies support Civil and Defense customers in carrying out their sea, land and space operations with maximum safety, efficiency and reliability. Employing a workforce of 750 people worldwide, iXblue conducts its business in over 60 countries.

## Contact

contact@iXblue.com  
 +33 130 08 88 88  
 +44 1224 355 160  
 +1 888 600 7573

[www.iXblue.com](http://www.iXblue.com)



## ACOUSTIC TRANSPONDERS

### OCEANO LF

iXblue provides a wide range of low frequency (LF) transponders to operate with Posidonia. Standard product range includes transponder and responder modes, internal batteries, and recoverable (RT) or expendable (ET) configuration. Optional configurations are available for many applications.



### CANOPUS

Canopus is the new intelligent seabed transponder providing the most advanced LBL capabilities to iXblue positioning and navigation solutions. Used either in sparse array mode, with Ramses transceiver and iXblue INS, or in full LBL mode depending on the requirements of the operation area, Canopus provides the highest positioning accuracy with the added advantage of reducing the number of transponders required.

	Oceano LF	Canopus
<b>Depth rating</b>	6 000m	4 000m (6 000m in option)
<b>Positioning system</b>	Posidonia	Gaps Series, Ramses
<b>Operating frequency</b>	8-16 kHz	20-32 kHz
<b>Batteries life</b>	250 000 tonal or 55 000 wideband pings @ 20°C (Alkaline) Standby: 70 months (Alkaline)	1 600 000 wideband pings @ 20°C (Alkaline) Standby: 70 months (Alkaline)
	560 000 tonal or 120 000 wideband pings @ 20°C (Lithium) Standby: 110 months (Lithium)	2 800 000 wideband pings @ 20°C (Lithium) Standby: 110 months (Lithium)
<b>Telecommand unit</b>	Through TT801 Deck Set unit or Posidonia system	Through Ramses or Gaps Series systems

# ACOUSTIC TRANCEIVERS

## GAPS SERIES

Gaps Series is a range of Ultra Short Baseline (USBL) positioning and communication systems which combines a USBL antenna and a fiber-optic gyroscope (FOG) within the same housing. Its unique 3D acoustic array enables tracking and communication from the deep sea to extremely shallow water, even at angles above horizontal.



## POSIDONIA

Posidonia is an Ultra-Short Baseline (USBL) acoustic positioning system dedicated to highly accurate and ultra-long range tracking of subsea vehicles. It offers enhanced performances with an electronic cabinet (USBL-Box) including the most recent iXblue acoustic signal processing capabilities and full compatibility with Ramses Synthetic Baseline Positioning System (ASBL).

## RAMSES

Ramses is an Acoustic Synthetic Baseline positioning system (ASBL) designed to make LBL and sparse-LBL subsea navigation simple. Tightly coupled with iXblue Inertial Navigation System (INS), it delivers extreme precision and robustness using a greatly reduced number of transponders compared to usual LBL systems. Available in a medium frequency version compatible with Gaps, Ramses is a key part of iXblue inertial-acoustic solutions for subsea positioning.



	Gaps M5	Gaps M7	Posidonia	Ramses
<b>Baseline type</b>	USBL	USBL	USBL	LBL
<b>Range (typical)</b>	995m	4 000m	10 000m	4 000m
<b>Position accuracy</b>	0.5% of slant range	0.06% of slant range	0.1%	< 0.10m
<b>Antenna aperture</b>	200 deg	200 deg	70 deg	N.A.
<b>Operating frequency</b>	20-30 kHz (MF)	20-30 kHz (MF)	8-18 kHz	18-36 kHz
<b>Integrated INS</b>	Yes	Yes	No	No

# KONGSBERG

**HQ Location:** Kirkegårdsveien 45, NO-3616 Kongsberg, Norway

## Company Intro

Kongsberg Maritime is a global marine technology company providing innovative and reliable technology solutions for all marine industry sectors including merchant, offshore, subsea and naval. Headquartered in Kongsberg, Norway, the company has manufacturing, sales and service facilities in 20 countries.

Kongsberg Maritime systems for vessels cover all aspects of marine automation, safety, maneuvering, navigation, and dynamic positioning. Subsea solutions include single and multibeam echo sounders, sonars, AUV and USV, underwater navigation and communication systems.

## Contact

km.sales.vancouver@kongsberg.com  
+1 888 464 1598

[www.km.kongsberg.com](http://www.km.kongsberg.com)



KONGSBERG



## MULTIBEAM SONARS

### M3 SONAR®

The innovative design of the M3 Sonar uses two sets of complementary transducers which allow it to generate both imaging and bathymetric data with the same head. Unique to the M3 Sonar is the patented eIQ mode of operation that generates multibeam images with unprecedented clarity.

- | Up to 500 m and 4000 m water depth
- | Portable, cost effective and light weight sonar
- | Generates imaging and bathymetric datasets from one sonar head
- | Produces single-beam image quality with the speed of multibeam sonar
- | Provides GeoTIFF output and creates real-time mosaic using third-party software
- | Compliant to IHO Special Order & 1A
- | Uses Linear FM, CW and Doppler pulses



## FLEXVIEW SONAR

The Flexview is designed specifically for small observation class ROVs where compact size and light weight are key selection criteria. Delivering superior image quality and coverage, the Flexview sonar reduces the time it takes to search for and locate targets.



- | Frequency range: 950 kHz – 1.4 MHz
- | Ideally suited for small observation class ROVs
- | Distortion-free images at a high update rate
- | 200m coverage over a 140° sector, reducing the time it takes to search for and locate targets
- | Removable transducer for rapid field replacement
- | User-friendly interface
- | Low-profile wet mateable connector
- | Applications: site inspection, underwater construction support, marine engineering, underwater science, search and recovery, and environmental monitoring

## SCANNING SONAR

### CLARISCAN

Clariscan is Kongsberg's latest innovation in domed sonar technology. Clariscan combines the Company's wide-bandwidth composite transducer with a patented acoustic lens to provide unprecedented image clarity from a domed sonar head.



- | Patented acoustic lens technology
- | Improved image resolution and sharpness
- | Up to 4000 m operating depth
- | Applications: obstacle avoidance, pipeline survey, target detection and underwater construction support

## ALTIMETERS

Kongsberg's underwater altimeters are primarily used to measure the altitude (height) of an object above the seafloor and are also suited to various other applications including positioning, berthing and below surface monitoring.

- | Robust design
- | Easily configurable analog/digital outputs
- | Three depth ratings: 3000 m, 6000 m and 11,000 m
- | Applications: ROV/AUV altitude, obstacle avoidance, positioning and below surface monitoring





# KRAKEN ROBOTIC SYSTEMS, INC.



**HQ Location:** 189 Glencoe Drive, Mount Pearl, NL A1N 6P6, Canada

## Company Intro

Kraken Robotics Inc. is a marine technology company engaged in the design, development, and marketing of advanced sonar and acoustic velocity sensors for Unmanned Underwater Vehicles for military and commercial applications. We are recognized as world-leading innovators of Synthetic Aperture Sonar (SAS) – a revolutionary underwater imaging technology providing ultra-high-resolution imagery at superior coverage rates which dramatically improves seabed surveys.

## Contact

info@krakenrobotics.com  
+1-(709)-757-5757 (NL, Canada)

[www.krakenrobotics.com](http://www.krakenrobotics.com)

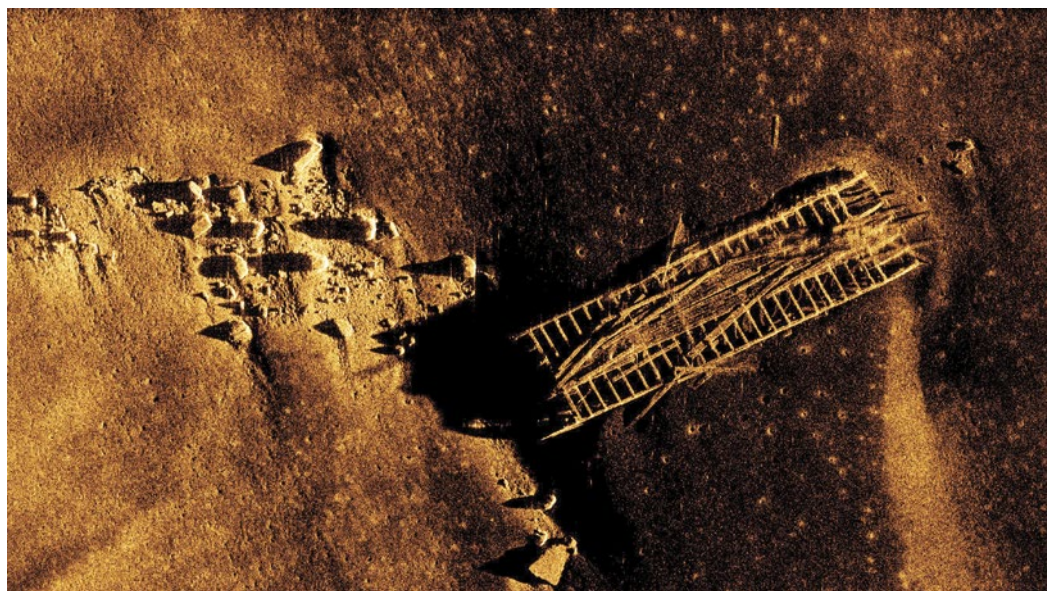


## PRODUCTS

Kraken's AquaPix® is an off the shelf configurable Interferometric Synthetic Aperture Sonar (SAS) which replaces high-end sidescan systems at an affordable price while delivering significantly higher resolution and classification performance to ranges far in excess of those achievable with a sidescan. . AquaPix® is capable of providing detailed seabed images with a constant resolution better than 3cm x 3cm out to a range of 300m from each side of an underwater vehicle (600m swath). It also produces 3D bathymetric data with a resolution better than 25cm x 25cm out to full range while delivering very high depth accuracy, in compliance with IHO S44 special order requirements.

### There are two variants in the AquaPix product family:

- | MINSAS which uses a subset of the InSAS array elements re-packaged to make a product that is smaller and lighter.
- | Kraken's Man-Portable Light Weight payload (MINSAS 60 LW) is designed to retrofit and integrate seamlessly with existing Man-Portable UUVs with diameters from 7.5 to 9 inches.



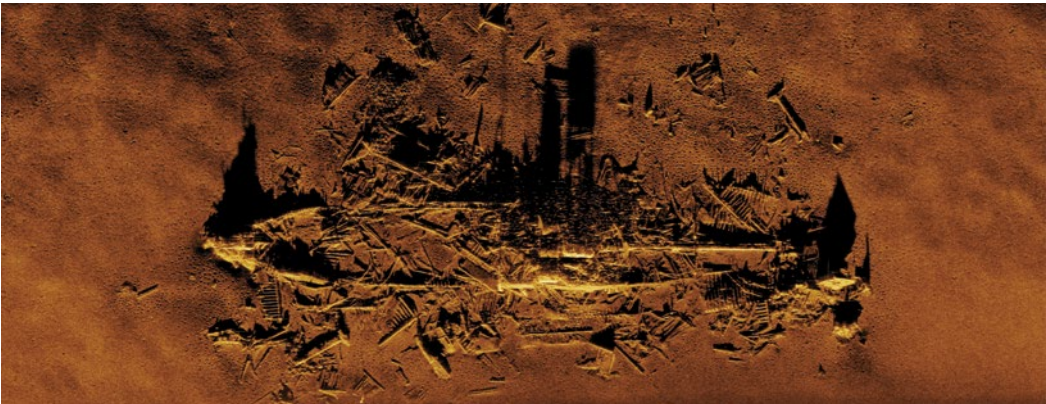
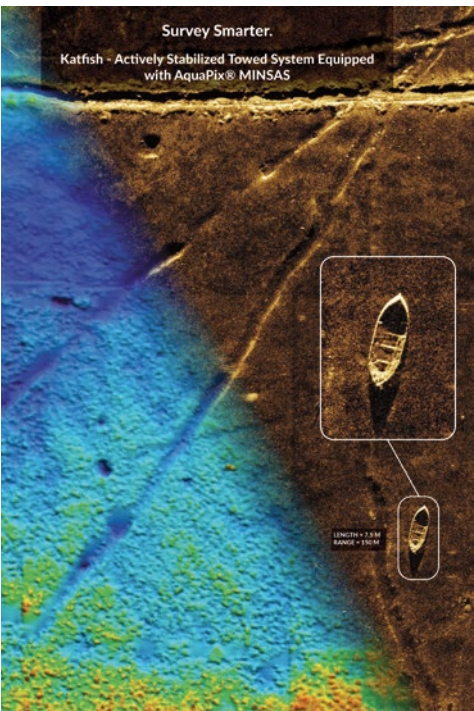
A novel SAS gap filler can be added to the MINSAS to maximize SAS area coverage rate. MINSAS provides a compact and power efficient payload for AUVs or towed platforms from 6" diameter upwards. The table on the right shows the typical speed, range and Area Coverage Rate (ACR) in km<sup>2</sup>/hr achievable with the standard AquaPix® modular arrays.

AquaPix® is delivered with Kraken's SAS image processing software. The processing software – called INSIGHT – has been developed in house and is validated against the processing and AUV data sets from NATO's Undersea Research Center (now known as NATO CMRE). INSIGHT runs on a standard PC GPU card at up to five times real time and outputs geo-referenced SAS image tiles in XTF format. Other formats are also supported. The processing runs either on a desktop machine or embedded in a real time processing pod.

The hardware design addresses the need to be able to operate in highly cathodic environments and over a range of water temperatures and depths and can be configured for the diverse applications that are anticipated. The versatility of the system is possible through the use of 1:3 ceramic array modules which can be used to create the required array length and use of the latest generation low power compact electronics.

The table represents the typical area coverage rate (ACR) of AquaPix® MINSAS at 3 cm resolution based on speed and array length.

Speed		MINSAS 60			MINSAS 120		
Knots	m/s	Range meters (per side)	ACR w/o Gap Filler km <sup>2</sup> /hr	ACR w/ Gap Filler km <sup>2</sup> /hr	Range meters (per side)	ACR w/o Gap Filler km <sup>2</sup> /hr	ACR w/ Gap Filler km <sup>2</sup> /hr
3.00	1.54	118	0.9	1.31	220	1.71	2.44
3.50	1.80	100	0.9	1.30	208	1.88	2.69
4.00	2.06	87	0.91	1.29	181	1.88	2.68
4.50	2.32	77	0.90	1.29	160	1.87	2.66
5.00	2.57	69	0.90	1.28	143	1.86	2.65
8.00	4.12	42	0.87	1.24	87	1.80	2.57



# TELEDYNE BLUEVIEW



**TELEDYNE MARINE**  
Everywhere you look™

## HQ Location:

**Teledyne RESON A/S:** Fabriksvangen 13, 3550 Slangerup, Denmark. Phone: +45 4738 0022

## Regional Offices:

### Europe

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### USA

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### China

**Teledyne Marine:** Room1006, 10th Floor, Century Link Tower One, No.1198 Century Avenue, Pudong District, Shanghai 200122, China. Phone: +86 21 6867 1428

## Company Intro

Teledyne Marine is an organization comprised of 23 leading surface and subsea technology brands assembled by Teledyne Technologies Inc. These technologies span oceanographic instruments; subsea and surface vehicles and navigation; imaging sonars, cameras and lights; and interconnect solutions. Collectively, Teledyne Marine is able to offer the widest breadth of technology in the industry.

Teledyne BlueView is a brand of Teledyne Marine. The Teledyne BlueView sonars are worldwide leading in 2D imaging and 3D scanning sonar technology. The advanced sonar systems are currently deployed on AUVs, ROVs, surface vessels, fixed positions, portable platforms, and have been adopted by leading manufacturers and service providers to support mission-critical operations.

## Contact

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## PRODUCTS

### TELEDYNE BLUEVIEW 2D IMAGING SONAR SYSTEMS

Teledyne BlueView 2D imaging sonar systems deliver real-time, high-resolution video-like imagery, even in very low and zero-visibility conditions. In clear water conditions, situational awareness is significantly increased beyond the optically imaged scene. Fast update rates, high acoustic frequencies, compact size, and industry-leading target tracking make our products the preferred choice in leading-edge multibeam sonar. With the widest range of models available, we offer you the most choices in field-of-view, range, and depth. Teledyne BlueView makes using your 2D Multibeam Imaging Sonar easy with "plug-and-go" operation and multiple deployment options, including: ROV Systems, Diver Hand-Held Systems, Boat-Mounted Systems, AUV Systems, Portable Tripod Systems, Fixed Position Systems.

All Teledyne BlueView 2D multibeam imaging sonar systems include ProViewer® operating software, accessories, and a one-year warranty. We also offer an advanced Software Development Kit (SDK) that enables access to raw data files and sonar controls to make integration into complex monitoring systems easy.



**BLUEVIEW M900 S MK2**

Frequency	Max Range	Highlights
900kHz	100m (328ft)	
Depth Rating	Size	
1000m	L: 192mm (7.56 inch) W: Ø101.6mm (4 inch)	<ul style="list-style-type: none"> <li>Wide 130 degree field of view</li> <li>Low power DC interface</li> <li>Simple to interface</li> </ul>

**BLUEVIEW M900 D MK2**

Frequency	Max Range	Highlights
900kHz	100m (328ft)	
Depth Rating	Size	
6000m	L: 253mm (9.96 inch) W: Ø127mm (5 inch)	<ul style="list-style-type: none"> <li>Capture sonar video with position data</li> </ul>

**BLUEVIEW M450 S MK2**

Frequency	Max Range
450kHz	300m (984ft)
Depth Rating	Size
1000m	L: 203.4mm (8.0 inch) W: 195.6mm (7.7inch)

**BLUEVIEW M450 D6-MK2**

Frequency	Max Range
450kHz	300m (984ft)
Depth Rating	Size
6000m	L: 253.7mm (10 inch) W: 195.6mm (7.7inch)

**BLUEVIEW M900-2250-130 S MK2**

Frequency	Max Range	Highlights
900kHz- 2250kHz	100m (328ft), 10m (33ft)	
Depth Rating	Size	
1000m	L: 206.4mm (8.12 inch) W: 127mm (5 inch)	<ul style="list-style-type: none"> <li>Unique dual frequency combination</li> <li>Wide 130° field of view</li> <li>Leading data quality</li> </ul>

**BLUEVIEW M900-2250-130 D6-MK2**

Frequency	Max Range	Highlights
900kHz- 2250kHz	100m (328ft), 10m (33ft)	
Depth Rating	Size	
6000m	L: 261.3mm (10.29 inch) W: Ø127 (5inch)	<ul style="list-style-type: none"> <li>Compact and low power</li> <li>Capture sonar video and position data</li> </ul>

**BLUEVIEW M900-2250-S 130/45-MK2**

Frequency	Max Range	Highlights
900 kHz- 2250kHz	100m (328ft), 10m (33ft)	
Depth Rating	Size	
1000m	L: 223 mm (8.8 inch) W: Ø127mm (5inch)	<ul style="list-style-type: none"> <li>Dual frequency combination with Wide 130° and 45° field of view</li> </ul>

# TELEDYNE MARINE



**TELEDYNE MARINE**  
Everywhere you look™

**HQ Location:** Teledyne Benthos, 49 Edgerton Drive, N. Falmouth, MA 02556

## Company Intro

Teledyne Benthos designs and manufactures rugged and reliable oceanographic instrumentation and sensor solutions for marine environments. Teledyne Benthos product lines include acoustic communications, acoustic recovery and acoustic positioning technology.

## Contact

benthos@teledyne.com  
+1-508-563-1000

[www.teledynemarine.com/Benthos](http://www.teledynemarine.com/Benthos)



## PRODUCTS

### TELEDYNE BENTHOS ACOUSTIC MODEMS

Teledyne Benthos Underwater Acoustic Modems are used worldwide in subsea applications to transmit data wirelessly through the water. Wireless transmission significantly reduces the cost, complexity, and risk associated with traditional underwater cables and connectors, and allows for endless versatility and extended ranges. Acoustic modems can be used in any number of scenarios to effectively transmit data or commands to/from a subsea asset to the surface or between subsea assets.

#### What sets Teledyne Benthos Acoustic Modems apart?

- | Reliable, robust, proven long distance communications
- | Flexible housing designs to fit virtually any deployment configuration
- | Optional features such as high-capacity data logging, in band acoustic recording, arbitrary waveform play, dual serial port available and GNSS /Nav
- | Transducer options including omnidirectional and directional, both integrated and remote versions
- | Teledyne Benthos proven acoustic modem processing technology can also be found in our acoustic positioning and recovery product lines, greatly expanding the capabilities, value and versatility of these systems.
- | All modems are compatible with the new Janus interoperability standard

### FULL LINE OF A-COMMS SOLUTIONS

From the tiny Ultra Compact Modem (UCM) to the deep-water ATM-960 Series Modems, Teledyne Marine offers a full suite of proven acoustic modems available in a wide array of frequencies, depth ratings and configurations. From the surface to the seafloor, self-contained or OEM, highly reliable a-comms are within your reach.



**UCM-900 Series**  
Smallest Benthos  
modem available



**CM-900 Series**  
Value-priced  
compact modem



**ATM-910 Series**  
Shallow-water acoustic  
modems, battery or  
external power



**ATM-920 Series**  
Mid-water acoustic  
modems, battery or  
external power



**ATM-960 Series**  
Deep-water acoustic  
modems, battery or  
external power



**ATM-903 Series**  
OEM modem board  
set with transducer





# TELEDYNE RD INSTRUMENTS



**TELEDYNE MARINE**  
Everywhere you look™

**HQ Location:** Teledyne Marine, 14020 Stowe Drive, Poway, CA 92064, +1.858.842.2600

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**China:** Teledyne RD Technology, Room1006, 10th Floor, Century Link Tower One,  
No.1198 Century Avenue, Pudong District, Shanghai 200122, China.  
Phone: +86 21 6867 1428

## Company Intro

With nearly 40,000 Doppler products delivered worldwide, Teledyne RD Instruments is the industry's leading manufacturer of Acoustic Doppler Current Profilers (ADCPs) for current profiling and wave measurement applications; and Doppler Velocity Logs (DVLs) for precision underwater navigation applications.

## Contact

rdisales@teledyne.com  
+1.858.842.2600

[www.teledynemarine.com/rdi/](http://www.teledynemarine.com/rdi/)



## PRODUCTS

### DOPPLER VELOCITY LOGS (DLVS)

Teledyne RD Instruments navigation product line provides a wide range of precision Doppler navigation solutions for academic, commercial and defense applications. RDI's Doppler velocity logs (DVLs) are the world-wide standard for commercial, military and academic applications alike. Explore our wide range of DVLs that continue to lead the way as the industry standard.

#### What sets Teledyne RDI's DVLs apart?

- | Unparalleled experience – over 5,000 DVLs delivered worldwide
- | Highly accurate, precise and reliable data
- | Broadband Doppler processing
- | Patented phased array technology
- | Deepest rated and longest range systems available
- | Largest span of bottom tracking ranges
- | Built-in data quality control
- | System health monitoring
- | 24/7 service & support
- | Complimentary Teledyne products for one stop shopping



### WAYFINDER DVL

At just 10 cm × 10 cm × 7 cm, the Wayfinder DVL is by far the smallest and lowest cost DVL Teledyne has ever designed, making it ideally suited for today's micro ROVs. Wayfinder literally puts subsea navigation in the palm of your hand.

#### KEY SPECS

Frequency (kHz)	600 khz
Bottom Track Range (m)	60m
Operational Depth Rating (m)	200 m
Weight in Water (kg)	.51 kg



## PATHFINDER DVL

Teledyne RD Instruments' Pathfinder Doppler Velocity Log (DVL) is small in size and huge on value! Utilizing Teledyne RDI's proven, industry-leading phased-array technology, the Pathfinder DVL provides an array of advanced internal algorithms and features you'd typically expect to find only in high-end solutions. With up to 500 m of bottom tracking, in up to 6000 m of water, the Pathfinder delivers a solid, value-priced solution for vehicles ranging from small inspection class ROVs to large diameter AUVs.

	FREQUENCY	300 KHZ (OEM ONLY)
Max Bottom Tracking Range	89 m (up to 150 m optional)	275 m (up to 500 m optional)
Min Bottom Tracking Range	Min BT Range – 0.15m	Min BT Range – .3 m
Operational Depth Rating	SC – 300 m, 500 m; OEM – 300 m, 1,000 m and 6,000 m	1,000 m
Weight in Water (kg)	Contact Teledyne RDI for weights and dims for your specific configuration.	

## TASMAN DVL

Since its introduction in 2019, the Tasman DVL has replaced the Workhorse Navigator as the gold standard for subsea navigation around the globe.

With bottom tracking ranges from 0.15 m to 420 m, in up to 6,000M water depths, the Tasman is a cutting-edge, value-priced solution for vehicles ranging from small ROVs to large diameter AUVs. Key advancements include, field-swappable phased array transducers, system health monitoring/leak detection, ethernet compatibility, and the ability to upgrade to collect ADCP data.



FREQUENCY (KHZ)	600 KHZ	300 KHZ
Bottom Track Range (m)	up to 160m with XRT option	up to 500m with XRT option
Operational Depth Rating (m)	6,000m	6,000m
Weight in Water (kg)	4.4 kg	4.4 kg

## PIONEER & SAVS DVL

Teledyne RD Instruments' Pioneer and SAVS DVLs are designed to provide precision velocity data at ranges of 500 m to 6000m above the seafloor. This extended range makes RDI DVLs ideally suited for aiding navigation systems onboard small, medium, and large platforms where the ability to transition from the deep waters of the open oceans to the shallow environments of the littoral zone is a critical enabler. The Small Aperture Velocity Sensor (SAVS) is the industry's longest range DVL for truly full ocean range depth detection, yet, as the name implies, the phased array design and proprietary RDI technology enable this range from a relatively small-sized, single transducer.



FREQUENCY (KHZ)	150 KHZ PIONEER	SAVS
Bottom Track Range (m)	up to 800m with XRT option	6000m
Operational Depth Rating (m)	1,000 / 6,000m	2000m
Weight in Water (kg)	Contact Teledyne RDI for weights and dims for your specific configuration	

# TELEDYNE TSS



**TELEDYNE MARINE**  
Everywhere you look™

**HQ Location:** ABZ Business Park, International Avenue,  
Dyce, Aberdeen, AB21 0BH, United Kingdom

## Company Intro

Teledyne Marine is an organization comprised of 23 leading surface and subsea technology brands assembled by Teledyne Technologies Inc. These technologies span oceanographic instruments; subsea and surface vehicles and navigation; imaging sonars, cameras and lights; and interconnect solutions. Collectively, Teledyne Marine is able to offer the widest breadth of technology in the industry.

Teledyne TSS, a brand of Teledyne Marine, is world leading in the design, manufacture, and support of marine products for applications including navigation, motion compensation, platform stabilisation, and subsea pipe and cable survey. Teledyne TSS has specialist sales and support worldwide through a comprehensive network of distributors and service providers.

## Contact

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## PRODUCTS

### SUBSEA NAVIGATION SYSTEMS

The TOGS next generation range of highly accurate and reliable subsea navigation products are built on core TSS fibre optic gyro (FOG) technology with significant improvements in efficiency and functionality, including a fast initial alignment settle time of only 10 minutes giving less downtime and allowing for more operational time.

The range comprises of 3 main models, TOGS (AHRS), TOGSINS (INS) and TOGSNAV (INS & integral DVL) housed in high grade titanium with Impulse connectors, rated for either 4000m or 6000m depths. There are also several models with optional Burton or Seacon connectors.

There are also additional upgrade options available including an external IPS sensor and mounting kit, external DVL adaptor brackets and various cable options, designed to make the installation of the TOGS range flexible and easy for both fitting to new or older models of ROVs.

- | 3 Heading performance options; 0.1--°, 0.3° and 0.5° sec. Lat.
- | Depth rated to either 4000m or 6000m
- | Large range of outputs to suit a wide range of applications
- | External coupling; IPS/DVL/GPS/USBL/LBL
- | Highly accurate Inertial Navigation System (TOGSINS & TOGSNAV)
- | TOGSNAV only – a choice of 600kHz or 300kHz DVL



APPLICATION	TOGS 1/3/5	TOGSINS 1/3/5	TOGSNAV 1/3/5
Offshore Construction	✓	✓	✓
Hydrography		✓	✓
Sonar stabilisation	✓	✓	✓
Military specialist systems		✓	✓
ROV Work Class Navigation	✓	✓	✓
ROV Survey work		✓	✓
ROV Station keeping		✓	✓

#### PRODUCT SPECIFICATIONS

Depth rating	4000m & 6000m	4000m Only
Dynamic Heading (secant latitude RMS)	0.1° / 0.3° / 0.5°	
Static Heading (secant latitude RMS)	0.1° / 0.3° / 0.5°	
Inertial Navigation Performance	✓	✓
Roll and Pitch (RMS)	0.01° / 0.05°	
Heave	5cm or 5% / 5cm or 5% (delayed)	
Alignment / Settle Time	10 minutes	
Power Consumption	16W – 14W	20 – 31W
Dimensions	157mm (Ø) × 280.5mm (h) / 182mm (Ø) × 306mm (h)	182mm (Ø) × 428mm (h) / 182mm (Ø) × 436mm (h)
Weight in Air	10.2kg – 14.5kg	16.9kg – 18.6kg
Weight in Water	5.4kg – 7.2kg	7.7kg – 8.7kg
Operating Temperature	-20°C to +55°C	



# TRITECH INTERNATIONAL



**Headquarters, Sales & Support HQ Location:** Peregrine Road, Westhill Business Park,  
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**Design & Manufacture & Service:** Oubas Hill, Next Ness Lane, Ulverston,  
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**US Sales & Support:** 1323 Price Plaza Drive, Katy, Texas 77449, USA

## Company Intro

Tritech International Limited [Tritech], a Moog Inc. company is a high-technology business dedicated to providing the most reliable imaging and ancillary equipment for use in underwater applications.

Tritech operates in many professional underwater markets, including; Defence, Energy, Engineering, Survey and Underwater Vehicles and remains an industry leader in the provision of sensors and tools for ROVs and AUVs, a reputation achieved from over 25 years of delivering expertise through key products.

## Contact

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## MECHANICAL SCANNING SONARS:

Tritech's range of mechanical imaging sonars comprises the Super SeaKing DST, Super SeaPrince DST, SeaKing Hammerhead and Micron sonar. All products in the SeaKing and SeaPrince family can be run simultaneously on the ARCNET communication link, using the same processor and display; such as Tritech's Surface Control Unit (SCU) or a customer supplied PC or laptop.

### SUPER SEAKING (WORK CLASS ROV)

Tritech's Super SeaKing sonar is the ultimate mechanical scanning sonar. Utilising Digital Sonar Technology (DST) composite transducer and Compressed High Intensity Radar Pulse (CHIRP) technology, the Tritech Super SeaKing offers exceptional clarity and resolution as a dual frequency mechanical scanning sonar. The Super SeaKing Sonar is the industry-standard obstacle avoidance sonar for larger ROVs and is so popular it can be found fitted to work-class ROV fleets around the world. The Super SeaKing Sonar hosts two mechanically scanned imaging sonars in a single subsea pressure housing: a 325 kHz CHIRP sonar with a true operational range of up to 300 metres for long range target recognition and a 650 kHz CHIRP sonar for ultra-high definition images, other frequency options are available on request.



### SUPER SEAPRINCE (WORK CLASS ROV)

The Super SeaPrince has been developed from the industry-standard Super SeaKing sonar. The Super SeaPrince utilises the same Digital Sonar Technology (DST) composite transducer and Compressed High Intensity Radar Pulse (CHIRP) technology, offering exceptional clarity and resolution as a dual frequency mechanical scanning sonar. Built to the highest quality standards, with a hard boot to protect the transducer, the Super SeaPrince is specifically designed for deployment on observation and light work-class ROVs.

### SEAKING HAMMERHEAD (360°)

The SeaKing Hammerhead is at the forefront of sonar technology, offering high resolution, 360° mechanical scanning imaging. Utilising a wide transducer aperture, the SeaKing Hammerhead has a very fine mechanical step size and proven Digital Sonar Technology (DST), for outstanding image quality. The operational range of the SeaKing Hammerhead is increased with two frequencies; a high chirped 935 kHz frequency to enable high-resolution imagery and a second chirped frequency, 675 kHz to allow for long range capability. The unit also has an integrated three axis compass, to allow the sonar image bearing to be continually displayed and updated.



## MICRON

The Micron Sonar is the smallest digital CHIRP sonar in the world and is ideal for use by small ROVs, as a first-rate obstacle avoidance sonar in miniature form. CHIRP technology dramatically improves the range resolution compared with conventional scanning sonars – it is a feature normally associated with much larger, more expensive systems. The sonar has a standard auxiliary port to allow it to interface with other Trittech sensors.



## MULTIBEAM SONARS:

### GEMINI 720IS

Trittech's Gemini 720is multibeam imaging sonar provides users with real-time, crisp imagery for applications including obstacle avoidance, target detection and close-range inspection. With a 120 degree field of view, 20 degree vertical beam width (10 degree downward tilt) and a fast update rate of 30Hz, the Gemini 720is sonar is ideal for poor visibility environments. The Gemini 720is features a 720 kHz operating frequency and an integrated sound velocity sensor to assist in providing the sharpest image possible, with accurate ranging. The Gemini 720is utilises Ethernet or VDSL communication allowing it to be installed on most installations. The sonar's compact size means that it can also be deployed using a pole-mount assembly (customer supplied).



### GEMINI 720IK

Trittech's Gemini 720ik multibeam imaging sonar provides users with real-time, crisp imagery at the same performance level as the Gemini 720is but in a smaller shallower rated configuration. A real-time, high frequency imaging solution, the Gemini 720ik operates at 720kHz and combined with Trittech's advanced processing electronics, it produces images of outstanding clarity, benefitting from 512 beams

which results in a 0.25° effective angular resolution. The Gemini 720ik has been developed specifically for shallow water operations with low power consumption and Compressed High Intensity Radar Pulse (CHIRP) processing for greater definition at long range. The product also has an integrated Velocity of Sound (VoS) sensor to ensure extremely accurate imaging and measurement.

### GEMINI NBI

The Gemini NBI offers a narrow vertical beam and 130° swath. The Gemini NBI produces an acoustic image, cutting through the water with a narrow acoustic beam and at the high refresh rate users can expect from the Gemini range of multibeam sonars. Based on the proven design of the Gemini 720i, the Gemini NBI uses a 1° vertical beam instead of the 20° vertical beam found on the 720i. This reduced beam width allows the user to more precisely identify the position of the acoustic targets than is possible with a wide beam imaging sonar which is commonly used for obstacle avoidance operations. Operating at 620kHz the Gemini NBI is able to produce images with 10mm range resolution while the 0.5° horizontal angular resolution results in an extremely sharp sonar image. Where monitoring your position relative to a known target is the objective and not general obstacle avoidance, then the Gemini NBI can help guide you safely to the desired target. The multibeam transducer design used for the Gemini NBI results in a 130° sector scan width and advanced technology allows update rates as high as 30 scans per second. With wide angle imaging and a high refresh rate the user is able to quickly and effectively manoeuvre to a target in poor visibility conditions. Depth rated to 4000m and manufactured from titanium, the Gemini NBI has been designed to work in the harshest of environments such as those typically found in subsea mining and excavation.



# UWIS OY

**HQ Location:** Kaarinantie 700, 20540 Turku, Finland

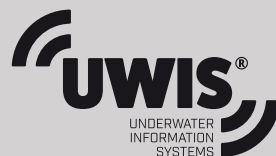
## Company Intro

Company Intro: UWIS Oy, founded in 2014, actively develops new scuba diving equipment and underwater navigation, tracking, and communications systems. UWIS diving gear enables real-time tracking and control of large dive groups and/or a single ROV. The UWIS System is developed and manufactured in Finland.

## Contact

sales@uwis.fi  
Mr. Pertti Arvonen  
+358-40-5140565

[www.uwis.fi](http://www.uwis.fi)



## PRODUCTS

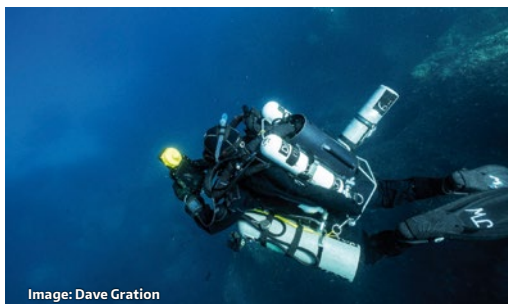


Image: Dave Gratton

## UWIS SYSTEM

The UWIS System is a new and innovative underwater tracking, navigation, and communications system for divers and ROVs.

The divers or ROV carries a so called UWIS diver units which are tracked by three buoys on the surface. Buoys locate themselves with integrated GPS. Surface personnel can follow up to 100 divers at the same time and interact with them by using up to 100 messages.

All locations and messages are delivered also down to divers so they can navigate, like they normally do above the water surface. Divers can see the location of other divers and may communicate with them. This is very useful also when operated with an ROV and divers at the same time.

The UWIS System generates messages by itself according to the given setups. This enables many safety features for the divers.

## UWIS BUOY AND UWIS DIVER UNIT

The UWIS System is a wireless system that is easy to setup. All units have wirelessly charged Lithium batteries with up to 14 hours of operational time. All units collect diving log which is available for post-processing. Other features:

- | Location accuracy depends on the GNSS accuracy of the buoys. Typically,  $\pm 2.5\text{m}$  in absolute and  $\pm 0.2\text{m}$  in relative figures (other units or last positions). It is possible to use fixed and given buoy coordinates for better absolute accuracy.
- | Diving area max 500m from the buoys (radius) with a maximum depth of 150m
- | It is possible to follow divers/ ROVs with buoys with no limits





## UWIS TRACKER SOFTWARE

Windows software for real-time tracking, messaging and for settings. Possibility to upload tracks in different formats. Includes also serial port export (NMEA GGA message for diver id #1 location) possibility to the other computer which has for example ROV control software. Supports max 100 static marker points (POI) and another 100 for dynamic ones (possible to move during the dive).

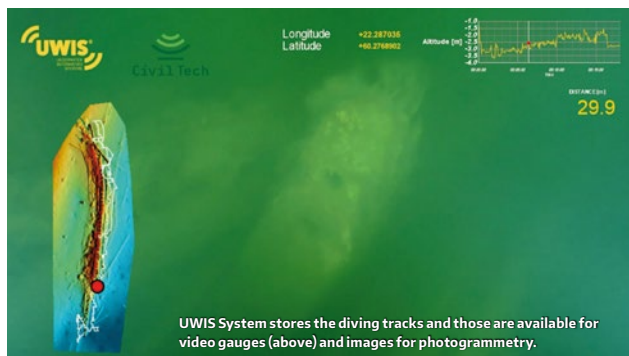
## UWIS PRO CASE

Designed originally for MIL use but works well for everyone. UWIS Pro Case can be equipped with max 6 diver units, always with three buoys and optionally with Panasonic Toughbook and AC/DC charger for it. The case has integrated wireless charging pads under every UWIS unit so only one plug to the wall is required for charging. The full case weights 27kg with dimensions of 139 × 45 × 19 cm.



## ALLTAB PRO 4.0 UNDERWATER TABLET WITH VALTAMER NAVIGATOR FOR UWIS APP, UWIS DIVER UNIT AND UWIS MOUNTING PAD 4.0.

The UWIS System is compatible with the Alltab underwater tablet which is powerful tool for divers. It is an Android tablet inside the waterproof housing rated to 150m depth. The navigation software gives the diver the locations and altitudes of all "participants", and it shows markers and messages with the possibility to add new ones.





## **NEXT » OCEANOGRAPHIC SENSORS**

**116** RBR

**118** Valeport





**I.14.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# **OCEANOGRAPHIC SENSORS**

# RBR

# RBR

**HQ Location:** 359 Terry Fox Drive, Ottawa, ON K2K 2E7, Canada | Tel: 1-613 599 8900

## Regional Offices:

**RBR France:** SAS, 13, route de l'innovation, 29000 QUIMPER, France | Phone: +33 652 259 131

**RBR China:** Rm1503A, Block B, T3 Building, 20 Zhuzhou Rd, Laoshan, China

青岛市崂山区株洲路20号海信创智谷3号楼B座1503A(266101) | Phone: +86 532 80999695

## Company Intro

Since 1973, RBR has been designing and manufacturing oceanographic instruments in Ottawa, Canada. From the ocean abyss to the polar ice cap, our sensors track water parameters: temperature, depth, salinity, dissolved gases, pH, and many others.

## Contact

marketing@rbr-global.com  
1-613 599 8900

[rbr-global.com](http://rbr-global.com)



## PRODUCTS

### RBRCODA

Category: Sensors

When you want great data, you need great sensors. Our designs lead the industry in accuracy, stability, and power consumption. For other parameters, we source sensors from around the industry and integrate them tightly onto our loggers, including deep understanding of ranging behaviour, settling time, and dynamic effects.

- | **External Power:** Requires 6-18V ~3mA
- | **Communication:** RS-232 output
- | **Data:** Polled or autonomous streaming
- | **Baud Rate:** 1200 to 115k
- | **Connector:** MCBH-6MP

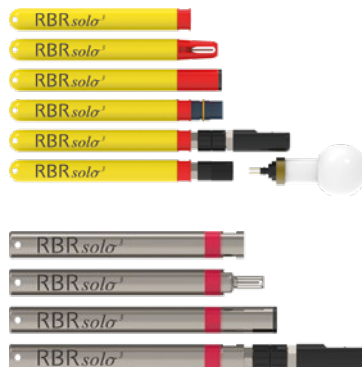


### RBRSOLO & RBRDUET

Category: Compact Loggers

The RBRsolo<sup>3</sup> and RBRduet<sup>3</sup> series are our most compact, lightweight, and versatile loggers. Equipped with big storage capacity and USB-C download, they are optimized for long deployments with high sampling rates.

- | Any AA battery
- | Up to 30M measurements
- | Up to 32Hz sampling (optional)
- | USB-C download
- | Flexible measurement schedules



## RBRBREVIO, RBRCONCERTO & RBRMAESTRO

Category: Standard Loggers

Our standard loggers can measure up to 10 parameters. Numerous configuration options allow for maximum customization for your measurement needs. In addition to our conductivity, temperature and depth sensors, many others, including third-party sensors, can be used with our recorders.

- | Up to 240M readings
- | Up to 32Hz sampling
- | USB-C download
- | Twist activation
- | Wi-Fi ready
- | Supports up to 3 to 10 channel combinations
- | Realtime communication with USB, RS-232, or RS-485 possible



## RBRLEGATO & RBRCENTAURO

Category: Gliders & AUVs

Our RBRlegato<sup>3</sup> and RBRcentauro<sup>3</sup> CTDs offer a new world of measurement opportunities for gliders and AUVs. We've designed the integration to be simple and straightforward on any vehicle. Optimized for flow dynamics, no pump is necessary to obtain fine structure measurements. The power requirement is 90% lower due to modern electronic design and the lack of moving parts. Improving integration efficiency, the RBRlegato<sup>3</sup> and RBRcentauro<sup>3</sup> CTDs can seamlessly integrate and control additional sensors, such as the RBRcoda<sup>3</sup> T.ODO.

- | Rated up to 6000dbar
- | Pump-free design with optimized flow dynamics
- | Ultra-low power consumption
- | Up to 16Hz sampling
- | Accurate conductivity to within 10cm of the air-ocean interface
- | Unaffected by surface contaminants or freezing conditions



## RBRARGO

Category: Floats

To assist with the international Argo program, we developed the RBRargo<sup>3</sup> C.T.D for profiling floats. Salinity to the surface is default behaviour and a full range of additional sensors are available including optical DO, pH, PAR, fluorometers, and others. Our RBRargo<sup>3</sup> C.T.D has been integrated and tested on most commercial profiling floats.

- | Rated to 2000dbar (higher depth ratings available)
- | WOCE accuracy
- | 2000dbar profile consumes only 400J
- | Accurate conductivity to within 10cm of the air-ocean interface
- | Flushing by design – no pump required
- | Up to 8Hz sampling
- | Streamlined design minimizes salinity spiking



# VALEPORT



**HQ Location:** Valeport Limited, St. Peters Quay, Totnes,  
Devon, TQ9 5EW, United Kingdom

## Company Intro

Valeport has more than 50 years' experience designing and manufacturing instrumentation for oceanographic and hydrographic communities. We provide leading-edge marine sensing and monitoring solutions to a worldwide customer base, including the environmental, defence, oil & gas, renewable, construction, dredging, civil engineering, and scientific research sectors.

## Contact

sales@valeport.co.uk  
+44 1803 869292

[www.valeport.co.uk](http://www.valeport.co.uk)



## FEATURED PRODUCTS

### BATHY2

Designed to deliver precision bathymetric data from ROVs/AUVs, this robust new integrated sensor suite generates density corrected depth data up to 6000m. It uses state-of-the-art sensors to generate precision depth and height information.



### MINIIPS2

This smart underwater pressure sensor with accuracy to 0.01% FS, offers a cost-effective solution to vehicle pilots who require highly accurate depth information in real-time.



### UVSVX

Designed for underwater vehicles where space is at a premium, the compact uvSVX features Valeport's 'Time of Flight' technology that delivers SVP with calculated salinity and density data.



## INTERCHANGEABLE PRESSURE SENSORS

The Bathy2, miniIPS2 and uvSVX all feature Valeport's unique interchangeable pressure module that allows users to change pressure transducers for maximising operational specific depth requirements.

The innovative pressure module, with integral calibration, can be easily changed whilst in the field without opening the instrument and is available in 10, 20, 30, 50, 100, 200, 300, 400 and 600 Bar variants.



## MINISVS

miniSVS uses digital 'Time of Flight' technology to provide the lowest noise, highest accuracy, best resolution sound velocity data available. Small size and a choice of sensor lengths down to just 25mm make the sensor suitable for a variety of applications, and the optional pressure or temperature sensor adds versatility.



## MIDAS SVX2

Some users need the superior Sound Velocity data from an SVP with the Salinity and Density data from a CTD. The unique MIDAS SVX2 combines both technologies to give the best of both worlds.



## VA500 ALTIMETER

The VA500 altimeter delivers a new approach to the problem of underwater positioning. State of the art signal processing offers unrivalled range and performance from a 500kHz transducer.

With the option of integrating a high accuracy pressure sensor (0.01%), as used in the miniIPS, this becomes an unbeatable compact and robust package.



## FLUOROMETERS

Offered as standard in a 6000m depth rated, titanium housing the Hyperion Fluorometer has a wide range (9-28V DC) isolated power supply, data output up to 16Hz and RS232, RS485 and Modbus communications. Ideal as a standalone sensor for ROV/AUV integration or as part of a multi-sensor array and data logger.







## **NEXT » ROV PILOT TRAINING**

**122** QSTAR

**124** Skilltrade



**I.15.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# **ROV PILOT TRAINING**

# QSTAR S.L.U

**HQ Location:** Port Forum, Carrer de La Pau 12, 08930, Sant Adria de Besos, Barcelona, Spain

**Regional Offices:** Calle Sao Paulo 17, 35008 Las Palmas de Gran Canaria, Canary Islands, Spain

## Company Intro

QSTAR Internationally leading ROV Training Centre, provides high quality and realistic training, receiving trainees from all over the world. The updated training program is built on (though not limited to) IMCA guidelines. This has meant that our trainers can provide real-world knowledge and skills for students in compliance with the actual requirements of today's ROV industry. This is in addition to expertise in other rising sectors such as Windfarms, Oil & Gas, Search & Rescue, Military and Police, Marine Research, Marine Archaeology, Subsea Operations, and Aquaculture.

Besides being able to provide the highest quality training, we provide real working conditions on board an active work vessel and quay. This allows students to experience and have the opportunity to work as part of a real ROV team. This provides the best training assessment for a newly qualified ROV Pilot technician. QSTAR offers the locations, human technical resources and the experience accumulated over 15 years in services for the maritime industry and training of personnel with the most advanced facilities and environment.

## Contact

rovtraining@qstar.es

+34 619 686 473

+34 936 338 627

+34 616 604 778

[www.rovtrainingcentre.com](http://www.rovtrainingcentre.com)



## CORPORATE ON-SITE ROV TRAINING

**Course duration:** Under request

**Languages:** English or Spanish.

In addition to providing high quality training courses, QSTAR specialises in supplying on site and corporate training. We also offer training for ROV personnel from different companies worldwide by performing specific on-site training, tailored to the company's individual needs and providing the best assessment following the IMCA guidelines. Furthermore, QSTAR Marine and Subsea Solutions division have been undertaking ROV installation and commissioning projects internationally, from both offshore vessels and onshore operating bases.

QSTAR offers the locations, human technical resources and the experience accumulated over 15 years in services for the maritime industry and training of personnel. We have the most advanced facilities and the environment in order to carry out the specific technical training for the subsea industry and others sectors.



## ROV PILOT TECH. GRADE II

**Course duration:** 120 hours in 3 weeks.

**Languages:** English or Spanish.

**Course Content:** Built upon the IMCA guidelines (IMCA C005) document R004. The Commercial ROV Pilot Tech II course delivers training on all the Industry standard competencies and goes further with additional technical training modules. The Course content is in line with guidance documents IMCA R002, R004, R010. Practical training are developed in our facilities, quay and on-board a Multipurpose ROV Vessel, performing real operations found in the industry and in Onshore & Offshore Waters.



## ROV PILOT TECH. PREMIUM

**Course duration:** 280 hours in 7 weeks.

**Languages:** English or Spanish.

**Course Content:** Built upon the IMCA guidelines (IMCA C005) document R004. The Commercial ROV Pilot Tech II Premium course delivers training on all the Industry standard competencies and goes further with additional technical competencies modules. Also includes additional training in Hydraulics / Electrical / Sonar / 7 function hydraulic Manipulator. The Course content is in line with guidance documents IMCA R002, R004, R010 This is our most complete training program including additional modules like Fiber Optic, Electricity, Electronic and Hydraulic, all of these focussed in the ROVs, its maintenance and repair. Practical training are developed in our facilities, quay and on-board our Multipurpose ROV Vessel, performing real operations found in the industry and in Onshore & Offshore Waters.



## WORKCLASS ROV MAINTENANCE & REPAIRS

**Course duration:** 80 hours.

**Languages:** English or Spanish.

**Course Content:** WCROV Maintenance & Repairs: This course consists of a theoretical part about Workclass ROVs, their operation and maintenance as well as a practical part that consists of performing various tasks of maintenance and repairs of Workclass ROVs. A Workclass ROV will be used for the practical module. In addition we will complement the training with 7 functions hydraulic manipulators and with practical piloting with a VMax Professional ROV simulator with different models and scenarios.



# SKILLTRADE B.V.



**HQ Location:** Schoolstraat 174, 2252 CN, Voorschoten, The Netherlands

## Company Intro

Skilltrade specializes in hydrographic training and courses for the hydrographic survey, dredging and offshore construction industry since 2000. Courses and training developed by people who gained their experience in the field and taught by those same individuals. The heart of the company is that the skills its people possess can be traded or exchanged with others, thus improving their hydrographic knowledge and understanding. Skilltrade provides courses and training in three areas by combining theoretical with field experience material:

1. Hydrographic Survey Category B course
2. Short courses, introductory and general courses in hydrography
3. E-learning courses

Skilltrade aims to answer your training needs. The various existing modules provide a starting point for almost all company specific courses, allowing for specific requirements to be included.

Furthermore, Skilltrade also publishes the Handbook of Offshore Surveying, a 3 volume encompassing series, unmissable for the modern day hydrographer.

## Contact

info@skilltrade.nl  
+31 71 56113 65

[www.skilltrade.nl](http://www.skilltrade.nl)



## HYDROGRAPHIC SURVEY CATEGORY B COURSE



**Course duration:** 30 weeks      **Languages:** English.

**Course Content:** A full Hydrographic Survey curriculum encompassing all basic and essential competencies of the Hydrographic Surveyor as defined by the FIG/IMO/ICA International Advisory Board on Standards of Competence for Hydrographic Surveyors for a Category B Course. The course has been officially recognised as such on the 1st July 2008 and received continued recognition (in accordance with the Standards of Competence for Hydrographic Surveyors FIG/IHO/ICA S-5, Edition 11.1.0, December 2014) in 2016. We offer an intense course, a 13 week course in IJmuiden (including 1 week Safety training) preceded by a 13 weeks e-learning programme. The course is fully intertwined with visits, workshops and guest lecturers from companies that support the curriculum. The course is concluded with a 4 week on the job Field Training Project.

**TEMPORARILY ADJUSTED CURRICULUM:** As the development of the COVID-19 pandemic is still unpredictable, we saw no realistic possibility to deliver traditional on-site teaching this year. With approval of the IBSC all lessons that can be delivered on-line will therefore be taught using digital formats for the upcoming 25th class. This means that instead of 13 weeks, the student only has to come to the Netherlands for 4 weeks (for workshops, practical assignments, and exams).



## INTRODUCTION TO HYDROGRAPHY

**Course duration:** 2 days    **Languages:** English or Dutch.

**Location:** any desired location, also via online lessons

**Course Content:** This 2-day course is intended for people who received no formal hydrographic training but who do work or want to work in this field. The course provides inter alia a thorough basic knowledge for functionaries who frequently work with hydrographic recording and processing software and/or functionaries who frequently work together with hydrographers.

The course is not only intended for the operational staff but can also provide the management team with valuable insights into the subject matter. The following subjects are dealt with:

- Geodesy:** Ellipsoid, Geoid, Projections such as RD, Datum transformation, vertical datums and reference planes such as NAP
- Positioning:** Basic knowledge, GPS, DGPS, RTK, Underwater positioning
- Bathymetry:** General, Single beam, Multibeam
- Other systems:** Side Scan Sonar, Sub Bottom Profiler, Sound velocity meter, Land surveyor's equipment.
- Quality assurance:** DGPS Accuracy, Error detection, Statistics
- Tide:** Theory, Observations, Predictions

## E-LEARNING

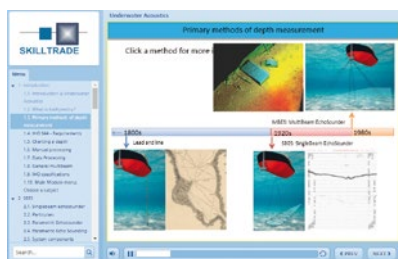
**Course duration:** 30-50 hours per module

**Languages:** English.

**Course Content:** Skilltrade has developed several interactive e-learning courses that can be followed by anybody interested in the subject at hand. These modules are also part of the Hydrographic Survey Category B Course. We offer the following e-learning courses:

- Mathematics**
- Physics**
- Underwater acoustics**
- Bathymetric systems**
- Landsurveying**
- GNSS operations**
- Coordinate Reference Systems**
- Positioning**

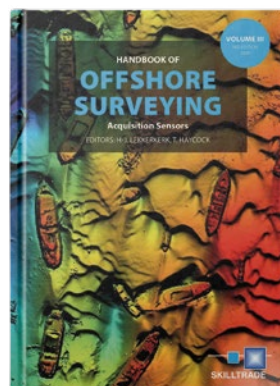
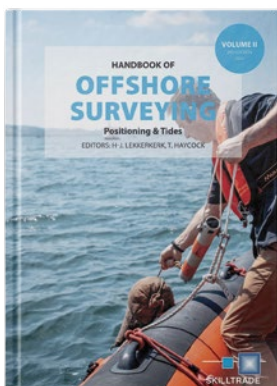
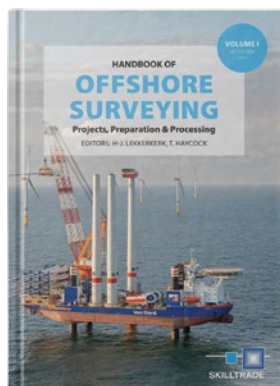
These modules can be accessed on your desktop computer, but also offline through an App on your mobile device. Each module is accompanied by background material; an extract from the Handbook of Offshore surveying. A lecturer is available for questions / tutoring via e-mail. Each e-learning lecture is accompanied by an interactive assessment.



## HANDBOOK OF OFFSHORE SURVEYING

Skilltrade also publishes the Handbook of Offshore Surveying, a 3 volume encompassing series, unmissable for the modern-day hydrographer.

For more info, visit our online bookstore: [www.skilltrade.nl/bookstore](http://www.skilltrade.nl/bookstore)

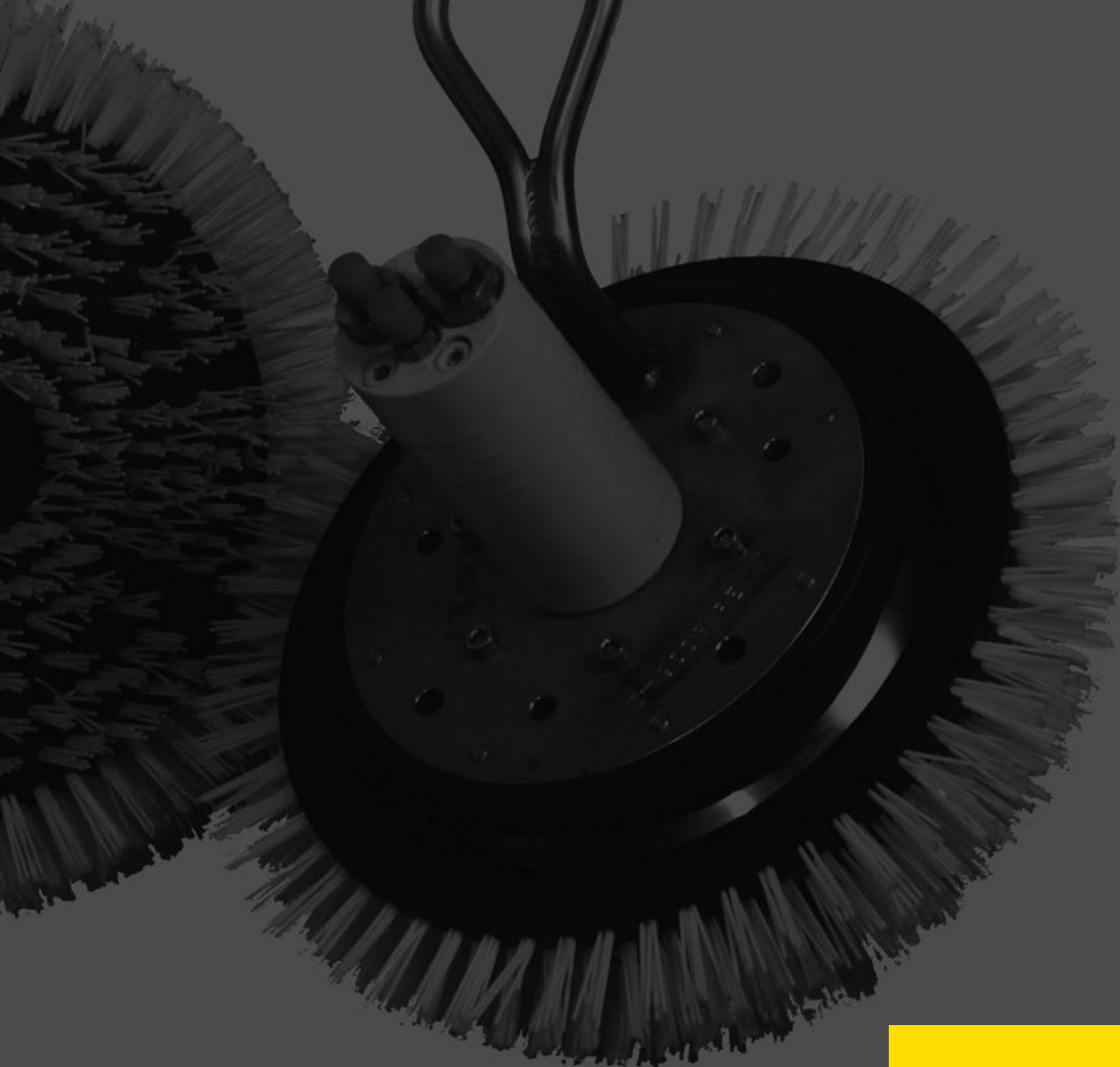




<b>Allspeeds</b>	<a href="http://www.allspeeds.co.uk">www.allspeeds.co.uk</a>	Accrington, England, UK
<b>Frontier Subsea</b>	<a href="http://www.frontiersubsea.com">www.frontiersubsea.com</a>	Paradise, NL, Canada
<b>J2 Subsea</b>	<a href="http://www.j2subsea.com">www.j2subsea.com</a>	Aberdeen, Scotland, UK
<b>Macfarlane Technology</b>	<a href="http://www.macfarlanetechnology.com">www.macfarlanetechnology.com</a>	Aberdeen, Scotland, UK
<b>Miko Marine</b>	<a href="http://www.mikomarine.com">www.mikomarine.com</a>	Lysaker, Norway
<b>Aleron Limited</b>	<a href="http://www.aleron-group.com">www.aleron-group.com</a>	Aberdeenshire, Scotland, UK
<b>Seatools</b>	<a href="http://www.seatools.com">www.seatools.com</a>	Numansdorp, The Netherlands
<b>SengS – Pryme Group</b>	<a href="http://www.sengs.org.uk">www.sengs.org.uk</a>	Aberdeenshire, Scotland, UK
<b>Shark Marine</b>	<a href="http://www.sharkmarine.com">www.sharkmarine.com</a>	St. Catharines, Ontario, Canada
<b>Subsea Americas</b>	<a href="http://www.subseaamericas.com">www.subseaamericas.com</a>	Berwick, LA, USA
<b>Subsea Tooling Services</b>	<a href="http://www.subseatoolingservices.com">www.subseatoolingservices.com</a>	Aberdeenshire, Scotland, UK
<b>The Blueprint Lab</b>	<a href="http://www.theblueprintlabs.com">www.theblueprintlabs.com</a>	Sydney, NSW, Australia
<b>ToolTec</b>	<a href="http://www.tooltecltd.co.uk">www.tooltecltd.co.uk</a>	Aberdeenshire, Scotland, UK
<b>Utility ROV</b>	<a href="http://www.utrov.com">www.utrov.com</a>	Fife, Scotland, UK
<b>Zetechtics</b>	<a href="http://www.zetechtics.com">www.zetechtics.com</a>	Amotherby, England, UK
<b>WeSubsea</b>	<a href="http://www.wesubsea.no">www.wesubsea.no</a>	Kristiansund, Norway

## NEXT » ROV TOOLING

**128** Centurion Subsea Services



**I.16.**

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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**ROV TOOLING**

# CENTURION SUBSEA SERVICES



**HQ Location:** Centurion Subsea Services, Unit B, Kintore Business Park,  
Aberdeenshire, AB51 0YQ, United Kingdom

## Company Intro

Centurion Subsea Services has been borne off two industry-leading providers of specialist subsea equipment and engineering services; Aleron Subsea and Seanic Ocean Systems. Part of the Centurion Group of Companies we continue to deliver high-quality products and services to the energy, renewables, decommissioning and subsea construction industries. Our culture is one of customer centred, solution-driven designs, based on sound engineering principles. We thrive on the continued development of cutting-edge, shallow water, ROV technology and work hard to ensure stock of a range of ready-to-ship surface, diver and ROV tooling packages. This includes the continued development of cutting-edge, shallow water, ROV technology and the stocking of a range of ready-to-ship surface, diver and ROV tooling packages.

At Centurion Subsea Services we provide our clients with a fully integrated service, designed to support their needs with increasingly complex subsea operations. Our bespoke packaged solutions are second-to-none, offering customers everything from reliable deck tooling to tailored ROV solutions, meeting even the toughest subsea challenges. With decades of combined experience behind us, we have the knowledge, personnel, equipment and dedication to support delivery of your subsea projects to the highest of standards, ensuring we add value to your projects effectively, efficiently and sustainably.

## Contact

Gary McConnell  
gmcconnell@centurionsubseaservices.com  
+44 (0) 1467 424060

[centurionsubseaservices.com](http://centurionsubseaservices.com)



## ROV SAWS - CUTTING / GRINDING & DRILLING TOOLING

The CSS 17" Rotary Cutter uses steel jaws to securely clamp on to various structures and cut material from 10 inches and up to 17 inches in diameter, (although larger cuts can be accommodated with some minor modifications).

The jaws are driven by two linear actuators and are adjustable over three different positions depending on the diameter of cut. These adjustments ensure that the cutter clamps onto and centralises the target material accurately, with a bolt on guide to aid the cutting of 10" – 14" materials. The main body of the cutter is made up from lightweight aluminium with the drive motor mounted on a sliding platform to extend and retract the blade position.



## ROV SAWS - CUTTING / GRINDING & DRILLING TOOLING

The CSS Manipulator Mounted ROV Saw, (supporting either 14" or 16" Tungsten Carbide blades), and Manipulator Mounted Diamond Wire Saw are lightweight, efficient, and easily deployed cutting options. Either tool can be mounted onto a Rigmaster manipulator utilising the wrist bolts for quick installation.

During subsea cutting operations, the manipulator jaws are used to secure the ROV, and tool, to the target and once secured the tool cutting motor can be enabled. The pilot will then control a feed actuator, feeding the cutter through the target material.



## CUTTING / GRINDING & DRILLING TOOLING

The CAT S80 Shears can deliver up to 800te of cutting force and boast an impressive jaw opening distance of 620mm. They are suited to cutting a variety of flexible and rigid products and can be configured for topside or subsea operations.

Subject to a maximum working pressure of 350 bar with a flow rate up to 200 lpm the S80 shears can be configured for ROV or diver use and can be delivered with all required topside equipment, such as HPUs, hose reels/spoolers etc. upon request.



## CRANE DEPLOYED, LIFTING & RECOVERY TOOLING

The CSS Mattress Orientation, Lifting and Extraction (M.O.L.E) tool has been designed to safely orientate and/or recover subsea concrete mattresses to deck during decommissioning activities.

Deployed by either the vessel crane and guided and monitored by the ROV, or via the Centurion Subsea Services AuxROV system, this tool ensures as much contact with the mattress area as possible minimising the risk of dropped objects should the mattress not be wholly intact. The tool has 32 contact points over the four rakes used.



## TOPSIDE & BACK DECK EQUIPMENT

Our suite of operator friendly surface equipment comes in a various shapes and sizes, from Hydraulic Power Units (HPU) to Overboarding Chutes and from Powered Reels to Hydraulic Grabs.

HPUs can be provided ranging from 11kW up to 125kW, diesel or electric, with Zoned options also available. We stock powered reels that are designed to accept hose, umbilical, or cable, with drums that can be split/divided to accommodate various bundles simultaneously. Our deployment chutes and sheaves are designed with a wide range of product and load characteristics in mind, with both smooth and roller versions on hand.



## IHPU, DWP & FLUID INJECTION

Our Blow Out Preventer Shutdown System (BOP-SS) has been specifically designed to provide high flow and pressure to shut down a BOP in under 45 seconds, as set out by API standard 53.

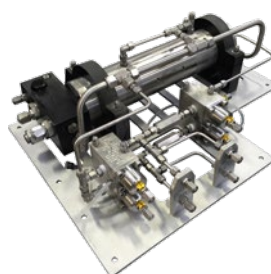
The BOP-SS operates the BOP's Blind Shear Rams with a maximum pressure of 345 Bar at 100 L/min. Pressure is built up in two separate stages, allowing effective, safe sealing of the well bore. The system is designed to be run from a 150Hp vehicle and can run on either water-based glycol, mineral oil or sea water and has been designed to run directly from the ROV main system with absolutely Zero cross contamination, allowing for maximum power input from ROV.



## IHPU, DWP & FLUID INJECTION

The Isolated Hydraulic Power Unit (IHPU) is a versatile tool that can be used for numerous subsea applications including Operating BOP Tooling, Transferring Media and Pressure Testing.

The output pressure is directly proportional to the output pressure. This allows the output to be adjusted from 0 - 10,000 psi (~690 Bar). The pump can be connected to any subsea reservoir by the suction port and is available in 6,000 PSI, 10,000 PSI and 12,000 PSI versions.

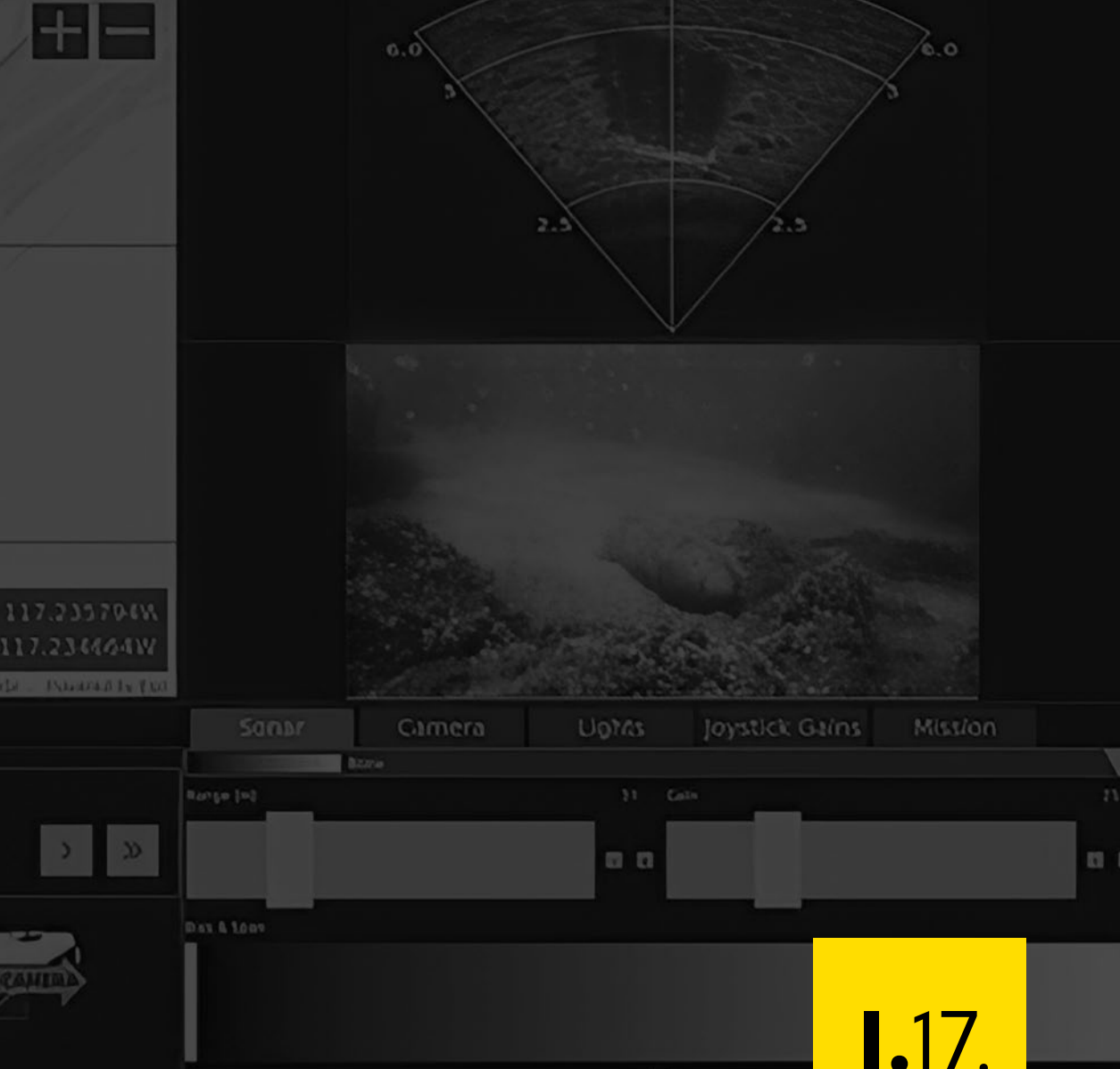






## NEXT » SOFTWARE PLATFORMS

132 Greensea Systems



I.17.

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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**SOFTWARE  
PLATFORMS**

# GREENSEA SYSTEMS



**HQ Location:** 10 East Main Street, Richmond, VT 05477 USA

**Regional Offices:** 10 Cordage Park, Suite 234, Plymouth, MA 02360 USA

Also opening a San Diego, CA office in Q3 2022

## Company Intro

GreenSea is revolutionizing the future of ocean robotics by providing an open architecture platform, OPENSEA®, with access to the OPENSEA API for military and commercial use. OPENSEA delivers intelligent autonomy in any marine vehicle, which will disrupt current marine operations, leading to substantial leaps in new vehicle capabilities. GreenSea directly supports several military programs with products, training, and technology development, including Explosive Ordnance Disposal from deep sea through surf zone and Special Operations Forces combat diving.

Software makes all robotics processes possible. Developers can jump start technologies by building upon a platform that more than 2,500 robotic vehicles trust.

## Contact

sales@greensea.com

+1.802-434-6080

[www.greensea.com](http://www.greensea.com)



## PRODUCTS

### OPENSEA

OPENSEA is a software platform for ocean robotics that provides autonomy, control, navigation, and user interface for surface, subsurface, and surf zone vehicles. This open architecture platform allows manufacturers and developers to reduce development costs and technical risks by building their differentiating technologies and products on top of OPENSEA's core vehicle framework.

#### Attributes of OPENSEA:

- | Function isolated to MISO applications
- | Applications communicate on PUB/SUB model
- | Applications specialize at run-time
- | Derived from common core library
- | Systems are defined by addition of applications
- | Specificity is abstracted to the end-point interface
- | Communication is standardized on generic channels and signals with common data types

#### Benefits of OPENSEA:

- | Easily defined application role
- | Modular, scalable, severable
- | Supports multiple asset (IP) owners
- | Native IP protection
- | Supports collaboration and cooperation
- | Risk isolation and management
- | Provides path to rapid innovation and testing
- | Leads to modular documentation and training

Licensed users have access to OPENSEA API and SDK.

### EOD WORKSPACE AND PROFESSIONAL WORKSPACE

EOD Workspace and Professional Workspace are the user facing interfaces of the OPENSEA platform that is customized for each robotic system. They leverage supervised autonomy to allow explosive ordnance disposal teams and pilots to concentrate more fully upon their critical subsea work. EOD Workspace essentially enables technicians/pilots to hand over as many or as few automated tasks to an ROV itself in any given mission. Multi-mode vehicle control functionalities including click-and-go, drag-and-follow, and point-of-interest orbiting will facilitate any team's ability to identify and neutralize underwater threats, carry out forensic or salvage operations, and survey subsurface structures to secure facilities, under any conditions.

**Key Features:**

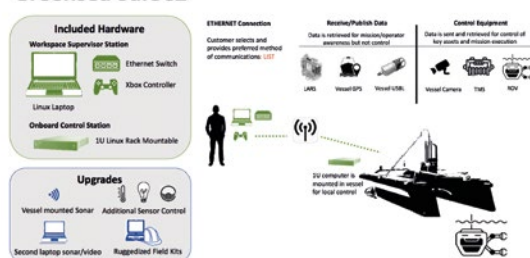
- | Fully open architecture
- | Provides a supervised autonomy and autonomous control framework
- | Also has integrated navigation and control – inside of EOD Workspace platform is a resident INS application – implemented in software and sensor agnostic
- | Completely extendable through open architecture through plug in apps

**SAFEC2**

SafeC2™ is a platform independent, plug-in solution, allowing for the operation of ROVs from safe standoff distances for military or commercial use. It allows an operator to control an off-shore vehicle from remote locations anywhere in the world. Using SafeC2, the operator no longer needs to be on the deployment vessel, reducing risk and freeing up valuable crew space.

The long range control of a ROV, USV, UUV is made practical by SafeC2's handling of the data stream between operator and vehicle. SafeC2 manages the data stream by transmitting the least amount of data necessary and synchronizing data so that even with slight delays, the sonar and video will remain in sync when the operator sees them.

- | Autonomy and supervised autonomy
- | Systems integration
- | Situational awareness
- | Unmanned Surface Vessel (USV) integration
- | Autonomous tether management
- | Target recognition and tracking
- | System and transport agnostic comms link
- | Software-based system
- | Automatic bandwidth sensing and scaling
- | Prioritization of data based on task
- | Low-latency data synchronization
- | Open architecture solution
- | Scalable
- | Vehicle agnostic

**Greensea SafeC2****RNAV2 DIVER NAVIGATION & AUTONOMY**

RNAV2 is an integrated SOF system that supports complex tasks in hostile conditions.

With the RNAV2, combat divers can offload navigation and vehicle operation to the supervised autonomy of STIDD Diver Propulsion Device (DPD), providing a safer and more productive mobility system. Add the OM2 (optionally manned) accessory to allow unmanned transit to or from predetermined locations for INFIL/EXFIL.

Missions can be pre-planned and updated on the fly. Thumb knobs and finger triggers are used to control the vehicle and operate the interface. The diver's hands never have to leave the handgrips to monitor progress to a destination, system status, alarms, or even reroute the vehicle.





<b>All Oceans</b>	<a href="http://www.alloceans.co.uk">www.alloceans.co.uk</a>	Aberdeenshire, Scotland, UK
<b>Argus Remote Systems</b>	<a href="http://www.argus-rs.no">www.argus-rs.no</a>	Laksevåg, Norway
<b>Forum Energy Technologies</b>	<a href="http://www.f-e-t.com">www.f-e-t.com</a>	Houston, TX, USA
<b>Hawboldt Industries</b>	<a href="http://www.hawboldtind.com">www.hawboldtind.com</a>	Chester, Nova Scotia, Canada
<b>Kystdesign</b>	<a href="http://www.kystdesign.no">www.kystdesign.no</a>	Aksdal, Norway
<b>Malm Orstad</b>	<a href="http://www.malmorstad.com">www.malmorstad.com</a>	Voll, Norway
<b>OceanWorks International</b>	<a href="http://www.oceanworks.com">www.oceanworks.com</a>	Burnaby, BC, Canada
<b>Saab Seaeye</b>	<a href="http://www.saabseaeye.com">www.saabseaeye.com</a>	Fareham, England, UK
<b>Soil Machine Dynamics Ltd (SMD)</b>	<a href="http://www.smd.co.uk">www.smd.co.uk</a>	Newcastle, England, UK
<b>Sperre</b>	<a href="http://www.sperre-as.com">www.sperre-as.com</a>	Notodden, Norway
<b>Subsea Innovation</b>	<a href="http://www.subsea.co.uk">www.subsea.co.uk</a>	Darlington, England, UK
<b>Stinger</b>	<a href="http://www.stinger.no">www.stinger.no</a>	Stavanger, Norway
<b>WT Industries</b>	<a href="http://www.wt-ind.com">www.wt-ind.com</a>	Houston, TX, USA

## **NEXT » TETHER MANAGEMENT SYSTEMS**

**136** Soil Machine Dynamics Ltd (SMD)





I.18.

**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# ***TETHER MANAGEMENT SYSTEMS (TMS)***

# SOIL MACHINE DYNAMICS LTD (SMD)



**Location:** Turbinia Works, Davy Bank, Wallsend, Newcastle upon Tyne, NE28 6UZ, United Kingdom

**Other Locations:** No. 321, Feizhou Road, Lingang New Town, Pudong, Shanghai, 201306, China

## Company Intro

SMD is an advanced global designer and manufacturer of subsea remotely operated and autonomous power and control solutions. Operating across several technology areas, SMD specialises in subsea trenching, work class ROVs, submerged mining and vessel deck equipment, as well as providing a range of subsea components through the Curvetech brand. SMD Services offer the capability, resources and expertise to support clients in multiple operations; around the clock and on a global scale. SMD has a passion for excellence, backed by proven engineering expertise and outstanding global service over the last 50 years.

## Contact

Graeme Jaques

Head of ROV Sales

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Tel: +44 (0) 1912348619 | Mob: +44 7813606336

+44 (0) 191 234 2222 (UK) | +86 21 2078 2027 (China)

[www.smd.co.uk](http://www.smd.co.uk)

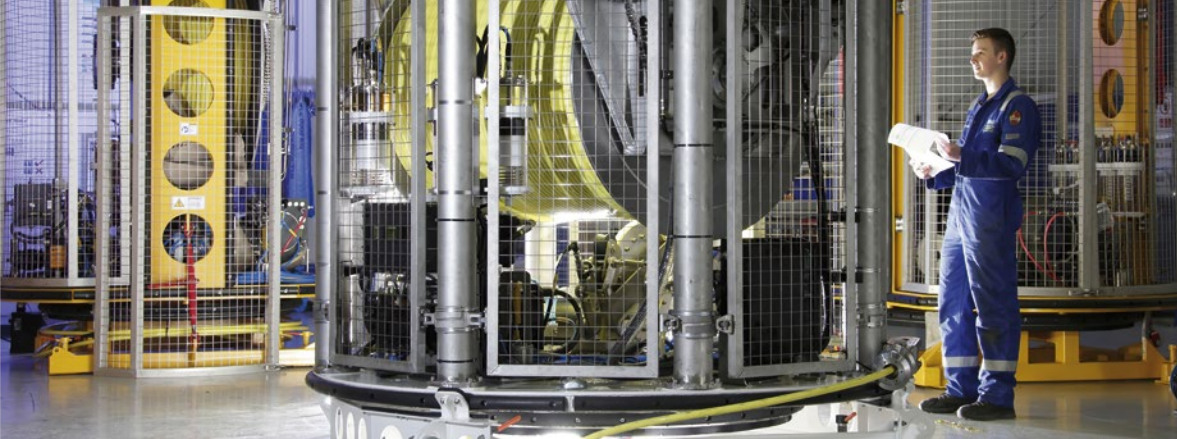


## TETHER MANAGEMENT SYSTEMS (TMS)

Three standard sizes of tophat Tether Management Systems (TMS) are available to suit a wide variety of applications for subsea operations. SMD's standard units utilise a unique fleeting drum arrangement, which offers a simple tether path for extended tether life. A variety of tether sizes can be accommodated with options. The ultra-long excursion (ULX) TMS can also accommodate vectored thrusters for better subsea positioning.

SMD also offer three sizes of garage tether management system (TMS) which are suitable for accommodating a wide variety of work class ROVs. All models include height adjustment and space for installation of tooling, and many parts are interchangeable with SMD's ROV and tophat TMS range. The SMD Garage TMS can also be customised to include thrusters for subsea positioning for prolonged periods of time. This is achieved using a unique winding technique which ensures cooler operation. Built in sensors monitor winding temperature as opposed to oil temperature and all motors incorporate oversized bearings for smooth concentric running.

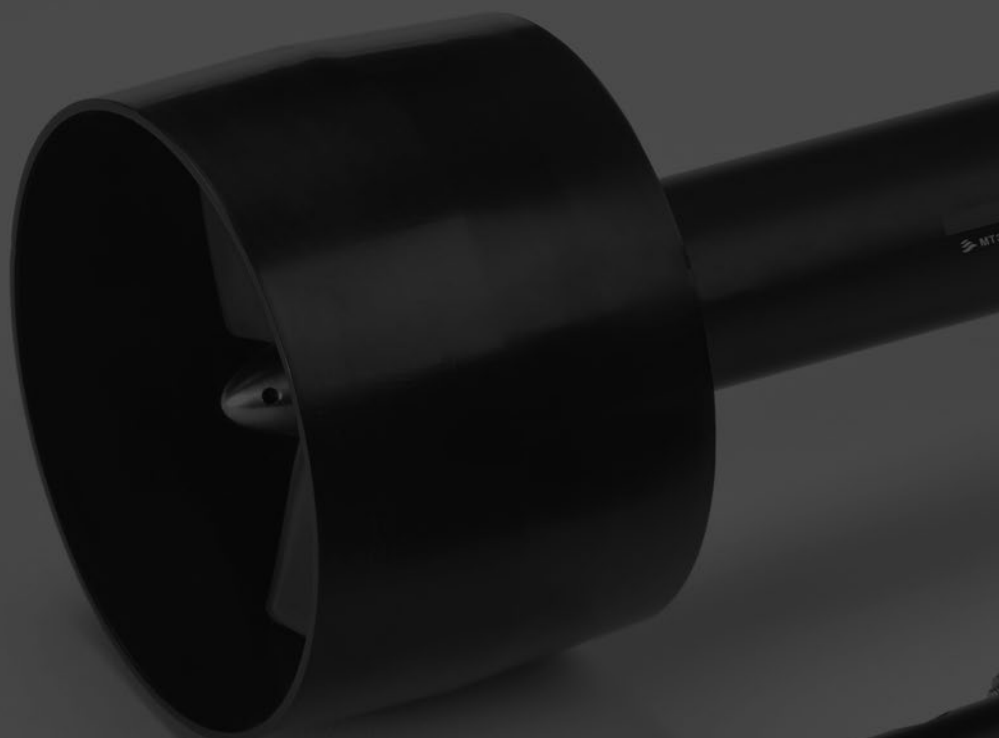




COMPACT TOPHAT TMS		
Suitable for use with ATOM, QUASAR, QUANTUM	Metric	Imperial
Depth rating	4000 msw	13123 ft
Dimensions (Dia x H)	1775 x 2265 mm	69.9 x 90.4 in
Weight in air (base system)	2100 kg	4630 lb
main lift capacity	12000 kg	26456 lb
Latch capacity	9000 kg	19841 lb
Tether capacity	500 m (27 mm tether)	1640 ft
Tether speed	1 m/sec (variable)	3.28 ft/sec (variable)

EXTENDED TOPHAT TMS		
Suitable for use with QUASAR, QUANTUM	Metric	Imperial
Depth rating	4000 msw	13123 ft
Dimensions (Dia x H)	2175 x 2475 mm	85.7 x 97.5 in
Weight in air (base system)	2750 kg	6063 lb
main lift capacity	12000 kg	26456 lb
Latch capacity	9000 kg	19841 lb
Tether capacity	1000 m (27 mm tether)	3280 ft
Tether speed	1 m/sec (variable)	3.28 ft/sec (variable)

ULX TOPHAT TMS		
Suitable for use with QUASAR, QUANTUM	Metric	Imperial
Depth rating	4000 msw	13123 ft
Dimensions (Dia x H)	2435 x 2320 mm	95.9 x 91.4 in
Weight in air (base system)	4500 kg	9921 lb
main lift capacity	15000 kg	33069 lb
Latch capacity	9000 kg	19841 lb
Tether capacity	1500m (27mm tether)	4921 ft
Tether speed	1 m/sec (variable)	3.28 ft/sec (variable)



Blue Robotics	<a href="http://www.bluerobotics.com">www.bluerobotics.com</a>	Torrance, CA, USA
Copenhagen Subsea	<a href="http://www.copenhagensubsea.com">www.copenhagensubsea.com</a>	Copenhagen, Denmark
DWTEK	<a href="http://www.dwtekmarine.com">www.dwtekmarine.com</a>	Taiwan
Forum Energy Technologies – Sub Atlantic	<a href="http://www.f-e-t.com">www.f-e-t.com</a>	Aberdeen, Scotland, UK
Hydromea	<a href="http://www.hydromea.com">www.hydromea.com</a>	Lausanne, Switzerland
Lian Innovative	<a href="http://www.lianinno.com">www.lianinno.com</a>	Shenzhen, China
Marine Propulsion Solutions	<a href="http://www.marinepropulsionsolutions.com">www.marinepropulsionsolutions.com</a>	Batam, Indonesia
maxon motor	<a href="http://www.maxonmotor.com">www.maxonmotor.com</a>	Sexau, Germany
SMD – Curveteck	<a href="http://www.smd.co.uk">www.smd.co.uk</a>	Newcastle, England, UK
Tecnadyne	<a href="http://www.tecnadyne.com">www.tecnadyne.com</a>	San Diego, CA, USA

## NEXT » THRUSTERS & PROPULSION

**140** Blue Robotics

**142** maxon motor

**144** Soil Machine Dynamics Ltd (SMD) – Curveteck

**146** Tecnadyne



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**COMPONENT SUPPLIERS AND  
EQUIPMENT MANUFACTURERS**

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# **THRUSTERS & PROPULSION**



# BLUE ROBOTICS



**HQ Location:** 2740 California St., Torrance, CA 90503, USA.

## Company Intro

Launched in 2014 and based in Torrance, California, their mission is to provide low-cost, high-quality components to enable the future of marine robotics. Their first product, the T100 Thruster, was introduced in 2014 and since then, they have launched over 200 products including their flagship product, the BlueROV2.

[www.bluerobotics.com/](http://www.bluerobotics.com/)

[product-category/thrusters/](http://www.bluerobotics.com/product-category/thrusters/)

## Contact

[sales@bluerobotics.com](mailto:sales@bluerobotics.com)



## THRUSTERS

### T200 THRUSTER

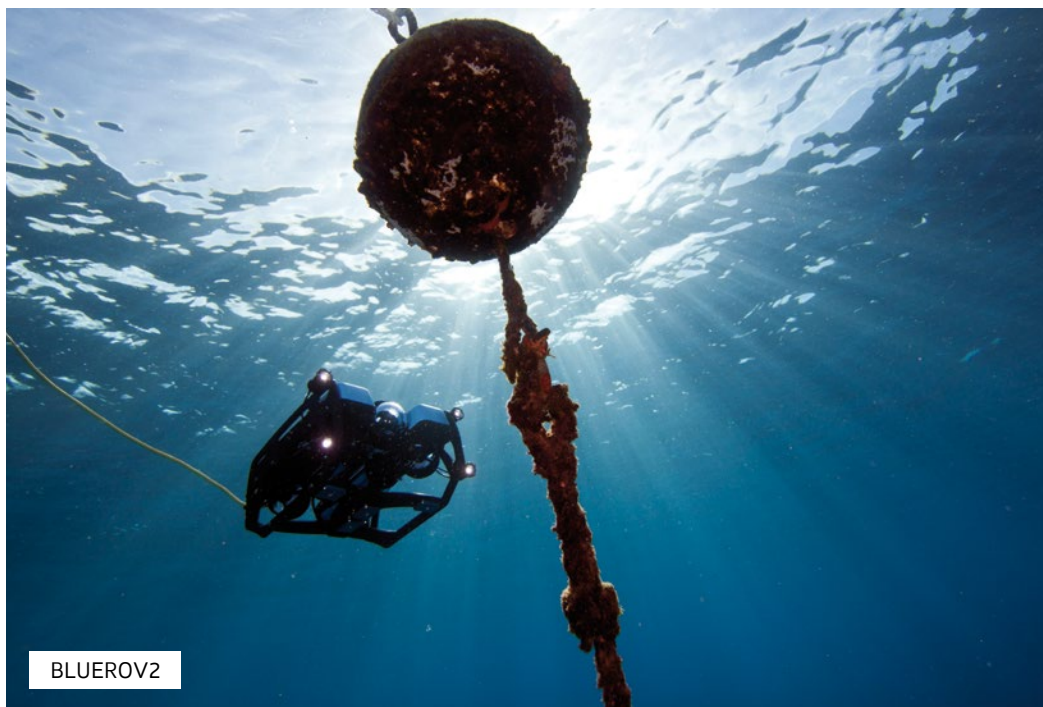
The T200 Thruster is a patented underwater thruster designed specifically for marine robotics. With a unique, flooded motor design, The T200 doesn't have any air- or oil-filled cavities – water flows freely through all parts of the motor while it's running and can handle extreme pressures. An affordable price point, openly available documentation and resources, and a strong community backing have made the T200 one of the most popular thrusters on the market.

### Application

The thrusters are purpose-built for use in the ocean and are designed specifically for use on ROVs, AUVs, and robotic surface vehicles. Users include professionals performing inspections of ships and aqua farms, scientists conducting research in the marine environment, and students participating in robotics competitions around the world.



Thruster Specifications	T200
Maximum Forward Thrust	5.25 kgf / 11.6 lbf (@16V) 6.7 kgf / 14.8 lbf (@20V)
Maximum Reverse Thrust	4.1 kgf / 9.0 lbf (@16V) 5.05 kgf / 11.1 lbf (@20V)
Minimum Thrust	0.02 kg f / 0.05 lb f
Rotational Speed	300–3800 rev/min
Operating Voltage	7-20 volts
Full Throttle Current @ Nominal (16 V)	24 Amps
Full Throttle Current @ Maximum (20 V)	32 Amps
Full Throttle Power @ Nominal (16 V)	390 Watts
Full Throttle Power @ Maximum (20 V)	645 Watts
Length	113 mm / 4.45 in
Diameter	100 mm / 3.9 in
Weight in Air	0.76 lb / 344 g
Weight in Water	0.34 lb / 156 g
Propeller Diameter	76 mm / 3.0 in
Mounting Hole Threads	M3 × 0.5
Mounting Hole Spacing	19 mm / 0.75 in
Cable Length	1.0 m / 39 in
Cable Diameter	6.3 mm / 0.25 in



BLUEROV2

# MAXON MOTOR

**Location:** Untere Ziel 1, 79350 Sexau, Germany

## Company Intro

Maxon drives are used wherever reliability and precision are essential. Our underwater drives with brushless DC motors are pressure compensated, compact and energy efficient. They are perfectly suited to ROVs and AUVs. Having new components at our disposal that are lighter and more powerful is opening up new opportunities. Our specially developed underwater drive, for example, is able to penetrate depths of up to 6000 m and can work in over 95 % of the world's oceans.

## Contact

Marketing

[aquaticsolutions@maxonmotor.com](mailto:aquaticsolutions@maxonmotor.com)

+49 7641 / 9114 - 0 | +49 7641 / 9114 - 0)

**maxon motor**

**driven by precision**

Maxon motor, the worldwide leading provider of high precision drive technology, draws on more than 50 years of experience and innovation to design underwater propulsion systems. Our motor-gear combinations are developed using DC brushless motors and planetary gearheads.

[www.maxonmotor.com/maxon/  
view/content/aquatic-solutions](http://www.maxonmotor.com/maxon/view/content/aquatic-solutions)



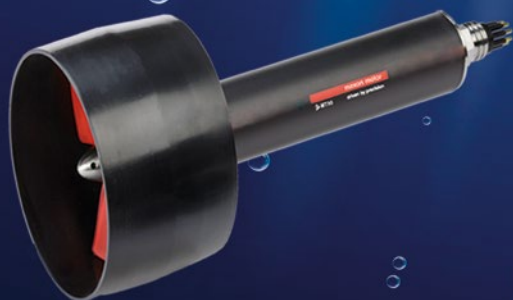
## MAXON THRUSTER SERIES (MT20 / MT30 / MT40 / MT70)

Maxons thrusters are reliable drive solutions for manned and unmanned underwater vehicles such as ROVs (Remote operated Vehicles) and AUVs (Autonomous Unmanned Vehicles). Our underwater propulsions have a maximum depth limit of up to 6,000 meters. Maxon thrusters extend the operation time of underwater vehicles and they achieve longer distances with the same battery capacity. Our engineers focused on an optimal thrust/weight ratio during the development of our maxon thruster. The result is an underwater propulsion which is compact, lightweight and highly efficient. Maxon thrusters are available in sizes ranging from Ø20 mm to Ø70 mm.

Thruster Specifications	MT20	MT30	MT40	MT70
Weight in air (g)	210	450	960	4361
Weight in water (g)	130	262	540	2830
Prop. diameter (mm)	50	80	110	200
Number of blades	3	3	3	3
Depth rating (m)	6000	6000	6000	6000
Oil filling	Panolin HLPSyn15	Panolin HLPSyn15	Panolin HLPSyn15	Panolin HLPSyn15
Pressure compensation	0.1 to 0.7 bar	0.1 to 0.7 bar	0.1 to 0.7 bar	0.1 to 0.7 bar
Max. forward bollard thrust (kg)	2.2	6	10.7	
Cont. forward bollard thrust (kg)	1.2	3.7	7	16.8
Max. reverse bollard thrust (kg)	1.7	4.4	8.6	
Cont. reverse bollard thrust (kg)	1	2.6	5.5	11.2
Max. efficiency (%)	80	80	80	80
Connector	MCBH8M Ti	MCBH8M Ti	MCBH16M Ti	BH16M Ti
Nominal Voltage (V)	36	48	48	48
Max. current (A)	8	16	29	17.6
No load current @5000rpm (A)	0.12	1	1.8	1 (@2500rpm)
Max. stall current @nominal voltage	78.1 (@36V)	140	470	139
Cont. current (A)	4.7	10.3	20	17

## The maxon thruster.

Pressure compensated | Compact | Energy Efficient



[aquaticsolutions.maxonmotor.com](http://aquaticsolutions.maxonmotor.com)

search



Max. depth limit of up to  
6000 meters



High energy efficient of  
minimum 80 percent



Long service life of up to  
1000 operation hours

**maxon motor**

driven by precision

# SOIL MACHINE DYNAMICS LTD (SMD)



**Location:** Turbinia Works, Davy Bank, Wallsend, Newcastle upon Tyne, NE28 6UZ, United Kingdom

**Other Locations:** No. 321, Feizhou Road, Lingang New Town, Pudong, Shanghai, 201306, China

## Company Intro

With over 20 years' knowledge and experience of providing integrated solutions for subsea and marine applications, Curvetechn<sup>®</sup> subsea component products provide cost-effective and reliable solutions for use with marine and subsea operators, system integrators and original equipment manufacturers (OEMs). We have a dedicated team of engineers who specialise in the design and testing of SMD's Curvetechn<sup>®</sup> components to deliver world-leading products that enable customers to maximise on remote subsea operations.

As well as direct selling of Curvetechn components to OEM's, we also have the ability within the Sales team to provide dedicated technical advice to help ensure that the components are all correctly specified for the end users application based on knowledge from our own use of the range on our vehicles.

## Contact

Lee Carden

Head of Sales and Services

lee.carden@smd.co.uk

+44 (0) 7388 949 769

[www.smd.co.uk/product-category/curvetechn-components/](http://www.smd.co.uk/product-category/curvetechn-components/)



## FOR ALL YOUR SUBSEA COMPONENT NEEDS

Curvetechn<sup>®</sup> subsea components provide cost effective, rugged and reliable solutions for use with marine and subsea operators, system integrators and Original Equipment Manufacturers (OEMs). SMD's website offers specifications and 3D CAD models for Curvetechn<sup>®</sup> Components so that customers can ensure suitability to their product. Covering a range of applications, the Curvetechn<sup>®</sup> product range includes:

- | Subsea vehicle propulsion systems
- | Subsea motors and hydraulic power units
- | Hydraulic valve control
- | Compensators
- | Control systems and surface high voltage power units
- | Subsea sensors and electrical control cards
- | Subsea tooling
- | Work Class ROV skid units

## THRUSTERS

SMD's range of hydraulic thrusters are available for subsea vehicle propulsion applications. The range encompasses thrusters from 230mm diameter to 750mm diameter with various motor options. All thrusters within the range are used by SMD on our own vehicles which are famed for their ability to hold station in high current environments. The units are easy to maintain with the benefit of minimal through life costs.



## SUBSEA ELECTRIC MOTORS (3KV+)

SMD's range of oil filled submersible high voltage electric motors are suitable for hydraulic power generation or running a variety of water pumps. The units are designed for work class ROVs, trenchers, ploughs, dredge systems and other customer design applications which demand long term reliability and high performance subsea. Aluminium or stainless-steel versions are available, and customers can choose from a range of electrical connector options. Curvetechn<sup>®</sup> hydraulic motor units are dual-ended and can interface with a range of industry standard pumps. Alternatively, SMD can provide a fully integrated subsea power unit with pump units fitted. SMD takes pride in the reliability of its technology and each unit is tested and certified to run at full power for prolonged periods of time.



## SUBSEA POWER UNITS

The Curvetechn<sup>®</sup> range of oil-filled submersible Hydraulic Power Units (HPUs) are suitable for hydraulic power generation or running a variety of water pumps. The units are ideal for subsea applications which demand long term reliability and high performance. SMD produce HPUs compatible with work class ROVs, trenchers, ploughs, dredge systems and other custom applications. All of our units are designed to minimise weight and overall unit size without compromising on performance.



## COMPENSATORS

SMD's range of Curvetechn<sup>®</sup> compensators offer a wide range of field proven reliable configurations. All Curvetechn<sup>®</sup> compensators are de-signed for long-term reliability, simplicity and ease of use, and are used throughout the SMD vehicle range. Applications vary from vehicle reservoirs to compensation of electrical boxes and other housings. The latest models are available in a range of sizes and options to suit all systems, allowing for ease of use and efficient maintenance. The new generation models (2.75l, 3l & 6l sizes) provide a clear view of oil level and condition. Spot entrained dirt, air and water in your system immediately, ensuring issues are recognised and fixed quickly, preventing further consequential damage. These compensators are compatible with mineral oils and HEES oils as standard – for other oil types please enquire. Optional mounting kits are also available which allow reduced swap-out times. Quick mounting and replacement of compensators is achieved via a single bolt whilst keeping them rigidly mounted to the vehicle for operations.



## HYDRAULIC VALVE PACKS

The Curvetechn<sup>®</sup> range of oil-filled hydraulic valve packs are used extensively on SMD vehicles and are known for their robustness and ease of use. The units can be supplied with a range of solenoid or servo valves fit for a variety of functions, flows and pressures. 2, 4, 6, 10 and 12 function versions are available as standard, and all can be tailored to specific end use requirements.



## CURVETECH POWER AND CONTROL SYSTEM (PACS)

A Curvetechn PACS system is an integrated package of Curvetechn components designed to work together seamlessly to deliver hydraulic and electric power and control to any subsea machine. By supplying these units in a turnkey manner engineering integration is significantly improved, reducing equipment interfaces and improving productivity allowing the end client to concentrate on their machines USP whilst SMD concentrate on providing an efficient power delivery system. Curvetechn PACS systems can also include top-side tether winches and bespoke control systems utilising our well proven DVECSII control platform. Curvetechn PACS can be engineered to suit any customer application including new builds or upgrades and refurbishments to current assets.

**HQ Location:** Suite A, 9770 Carroll Centre Rd, San Diego, CA 92126, USA

**Company Intro**

For over 30 years Tecnadyne has been a leader in the worldwide subsea robotics industry, manufacturing underwater brushless DC propulsion systems, rotary & linear actuators, pan & tilt positioners, hydraulic power units, position sensors, and pressure compensators for use on Remotely Operated Vehicles, Autonomous Underwater Vehicles, manned submersibles and other subsea platforms. Many leading subsea vehicle manufacturers (Deep Ocean Engineering, ECA Robotics, Outland Technology, Shark Marine, Triton, and Uboat Worx to name a few) use Tecnadyne products on their vehicles. These companies value Tecnadyne's commitment to workmanship, quality and absolute reliability and recognize that this results in the most dependable and longest lasting products in the industry. Tecnadyne products are presently being used on thousands of vehicles throughout the world, operated by many leading offshore oil service companies, universities and research institutions.

**Contact**

sales@tecnadyne.com  
+1 858 586 9660

[www.tecnadyne.com](http://www.tecnadyne.com)



**DC BRUSHLESS THRUSTERS**

**Product Features:**

- | Magnetically coupled propellers eliminate shaft seals
- | Self-contained electronics up to 1500m (24 to 330VDC)
- | Full ocean depth available with remote electronics
- | Available with RS485 or analog speed control
- | Thrust range 2.1 kgf – 230 kgf



Model	Thrust	Input Power	Weight	Size
150	2.1kgf Forward 1.1kgf Reverse	125Watts 12,24, or 48VDC	0.7kg in air 0.5kg in water	Ø7.9cm nozzle 22.6cm length
260	5.4kgf Forward 1.8kgf Reverse	325–350Watts 24–330VDC	0.9kg in air 0.7kg in water	Ø9.5cm nozzle 22.6cm length
280	5.4kgf Forward 5.4kgf Reverse	315–350Watts 24–330VDC	1kg in air 0.8kg in water	Ø11.5cm nozzle 22.6cm length
300	8.2kgf Forward 3.6kgf Reverse	450–500Watts 24–330VDC	1kg in air 0.7kg in water	Ø11.1cm nozzle 22.6cm length
521	10.4kgf Forward 5.9kgf Reverse	450–500Watts 24–330VDC	1.8kg in air 1.4kg in water	Ø15.2cm nozzle 25.4cm length
540	10kgf Forward 10kgf Reverse	450–500Watts 24–330VDC	1.7kg in air 1.4kg in water	Ø15.2cm nozzle 23.4cm length
560	17.3kgf Forward 10kgf Reverse	925–975Watts 48–330VDC	1.9kg in air 1.4kg in water	Ø15.8cm nozzle 23.4cm length
580	17.3kgf Forward 10kgf Reverse	925–975Watts 48–330VDC	1.9kg in air 1.4kg in water	Ø15.8cm nozzle 29.7cm length

Model	Thrust	Input Power	Weight	Size
1020	25kgf Forward 14.5kgf Reverse	975-1050Watts 48-330VDC	2.7kg in air 2kg in water	Ø19cm nozzle 34cm length
1040	25kgf Forward 25kgf Reverse	1250Watts 48-330VDC	2.4kg in air 1.9kg in water	Ø20.3cm nozzle 27cm length
1060	48kgf Forward 30kgf Reverse	2.2Kilowatts 120-330VDC	6.1kg in air 4.6kg in water	Ø24cm nozzle 29.6cm length
2020	114kgf Forward 66kgf Reverse	6.2Kilowatts 120-330VDC	11.5kg in air 8.5kg in water	Ø30.5cm nozzle 44.3cm length
2040	86kgf Forward 86kgf Reverse	6.4Kilowatts 120-330VDC	9.5kg in air 7.1kg in water	Ø25.4cm nozzle 44.3cm length
8020	230kgf Forward 132kgf Reverse	14Kilowatts 150-330VDC	25.5kg in air 15.5kg in water	Ø40.9cm nozzle 54.4cm length

## AUV THRUSTERS

Tecnadyne's brushless DC AUV thrusters use the same reliable features but with a focus on high efficiency. Each design has an option for direct drive motors to produce less noise.



### Product Features:

- | Brushless DC motor for maximum performance and longevity
- | Magnetically coupled propeller drive eliminates all rotating shaft seals for optimum reliability
- | Compound planetary gearbox and high rpm motor allows for a compact design
- | Propeller designed for increased efficiency at various speeds
- | Voltage options between 48 and 330vdc
- | Self-contained electronics up to 1500m
- | Full ocean depth available with remote electronics
- | Available with RS485 or analog speed control

Model	Thrust	Input Power	Weight	Size
550	10kgf Forward @10knots 12kgf Forward @3knots	525Watts 48-330VDC	1.8-2.7kg in air 1.4-2.3kg in water	15.2cm propeller 24.6cm length
1050	13kgf Forward @10knots 20kgf Forward @5knots	1.2Kilowatts 48-330VDC	2.7-4.8kg in air 1.8-3.2kg in water	20.3cm propeller
2050	63kgf Forward @10knots 113kgf Forward @5knots	6.4Kilowatts 150-330VDC	10.2-14.5kg in air 7.7-11kg in water	38.1cm propeller
8050	182kgf Forward @10knots 109kgf Forward @6knots	8.7Kilowatts 150-330VDC	40-47.6kg in air 30.8-40.4kg in water	50cm propeller 74cm length



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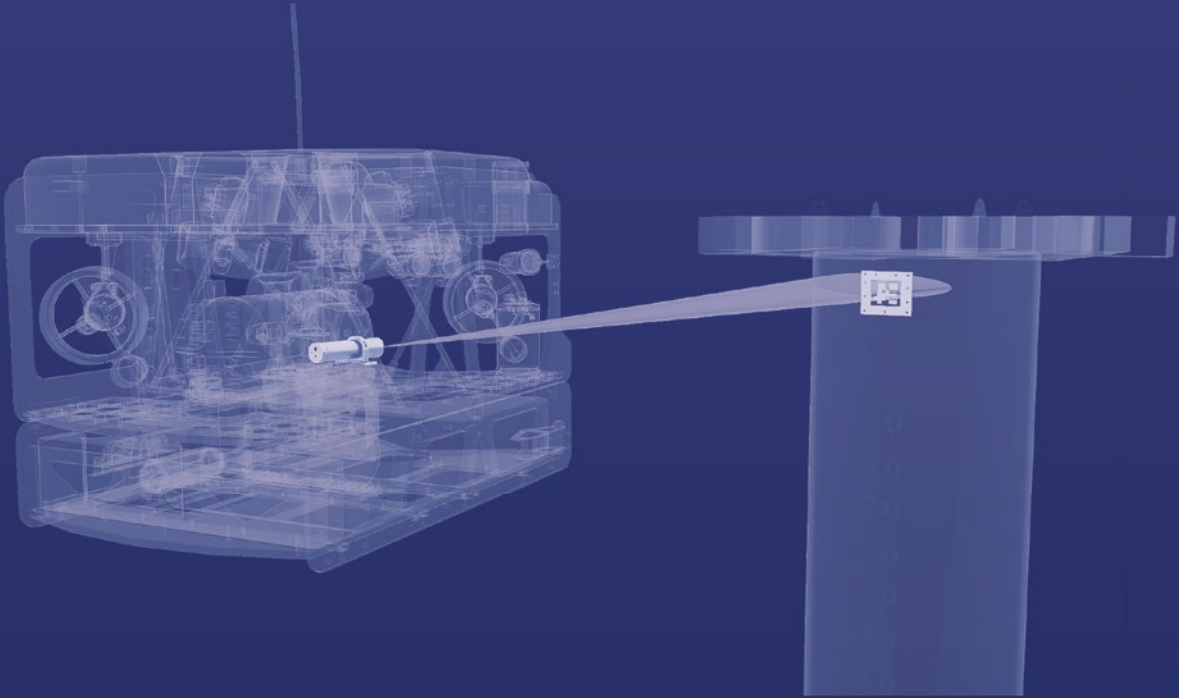
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# UNLOCKING UNRIVALED ACCURACY



## **NEW ROVINS 9-DVL**

**All-in-one INS/DVL**

- › Accurate georeferenced position at high frequency: 0.02% TD
- › Compact design for easy integration on all platforms
- › Pre-calibrated and plug-and-play
- › 6,000 m rated