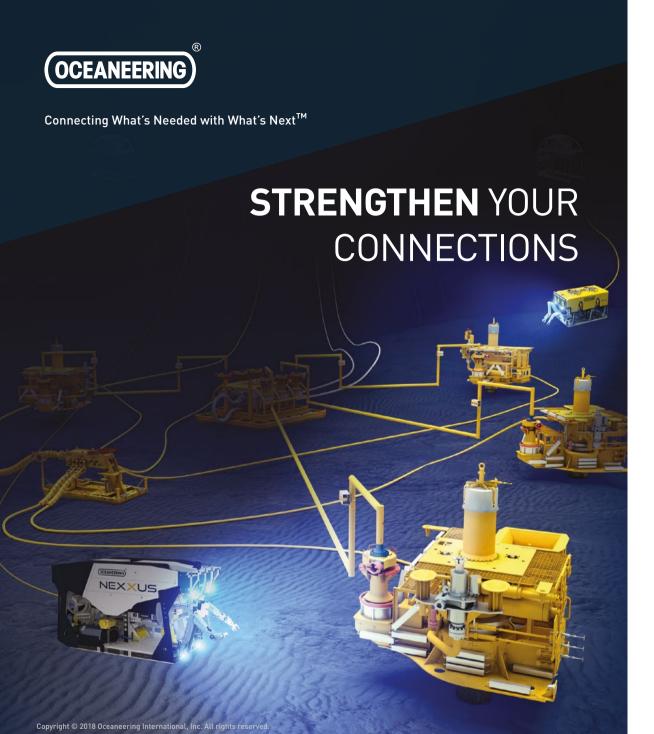




THE ROV//AUV

EQUIPMENT & PARTS DIRECTORY



To safely and cost-effectively solve your deepwater challenges in these dynamic market conditions, choose from our portfolio of advanced technologies and innovative subsea tieback solutions. As your trusted field-development partner, our unmatched experience and advanced engineering enable us to adapt and evolve to safely meet the current and future demands of the oil and gas industry.

By working together, we will safely and reliably re-shape the future of the oil and gas industry.

Connect with what's next at **Oceaneering.com**

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NEXT » BATTERY PACKS & CELLS

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COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

BATTERY
PACKS & CELLS

KRAKEN ROBOTIC SYSTEMS, INC.



HO 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

www.krakenrobotics.com

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



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

SEAPOWER™ 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)

Advanced Battery Solutions

HO 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 buovs that collect needed data.

www.swe.com



Contact

Leon Adams Email: 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.



SUPERIOR POWER FOR SUBSEA APPLICATIONS

SWE SeaSafe II and SeaSafe Direct Smart Battery Modules





NEXT » BUOYANCY

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COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

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



Contact

Gary Yeoman gary.yeoman@balmoral.co.uk +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/m³			
6500 / 2000	385			
9850 / 3000	401			
13100 / 4000	435			
16500 / 5000	479			
23000 / 7000	519			

FLEXLINK™ ARTICULATED UMBILICAL BUOYANCY

FlexLinkTM 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

de enes.

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

Mechanical testing

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

Submersion test tanks

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

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

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

BMTI (ALSEAMAR)

HO 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



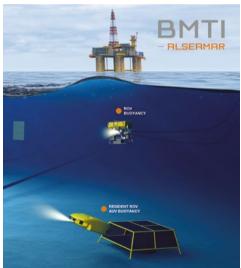
advanced buoyancy solutions

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 1000 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 (kg/m³)	y on a 1 m³ batch (lb/ft³)	Safety Factor (Instantaneous crush / pressure service)
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 (kg/m³)	y on a 1 m³ batch (lb/ft³)	Safety Factor (Instantaneous crush /
	(111344)	(kg/III)	(10/10)	pressure service)
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

	Depth rating	Average Density on a 1m³ batch		Safety Factor
Reference	(msw)	(kg/m³)	(lb/ft³)	(Instantaneous crush / pressure service)
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 PERFORMAN	NCE GRADE (±5, ±10	, ±15)		
Reference	Depth rating (msw)	Average Density (kg/m³)	y on a 1 m³ batch (lb/ft³)	Safety Factor (Instantaneous crush / pressure service)
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 Europe & rest of world regional office: Eagle Way, Off Queensway, Rochdale, Lancashire, OL11 1TO, UK

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.

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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).



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.

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.



Our range of Njord UB (Umbilical Buoyancy) is constructed using a polyethylene outer shell filled with a high performance syntactic foam core. Umbilical buoyancy is used in conjunction with ROVs to keep the required length of umbilical buoyant underwater. They can also be used in a number of general cable or hose buoyancy applications where the diameter of the cable or hose does not exceed 90mm.



- Quick installation Incorporates two quick release, double locking latch mechanisms.
- Changeable grommet interchangeable internal grommet allows use of standard floats on all umbilicals 25-90mm in diameter.

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.

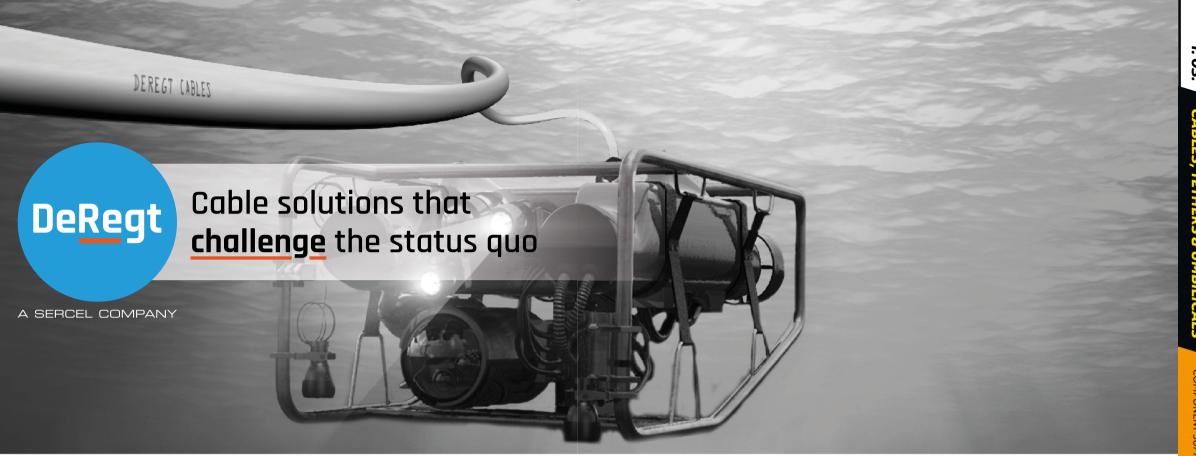


NEXT » CABLES, TETHERS & UMBILICALS

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- **24** Hydro Group Plc.
- **26** Novacavi

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

CABLES, TETHERS
& UMBILICALS





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 u

Zaag 2-4, 2931 LD Krimpen aan de Lek, The Netherlands +31 180 66 88 52 | deregtcables.com

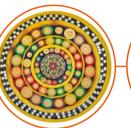
Connect

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.

Fibren

HQ Location: Fibron House, Unit C, RD Park, Stephenson Close, Hoddesdon, Herts, EN11 OBW, 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



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

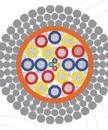
Fibron ROV Main Lift Umbilicals are customdesigned and manufactured to meet your specific requirements. Armour packages utilise in-house field-proven technology, ensuring stable, balanced constructions. Products with load-bearing capabilities based on high tensile galvanised steel, in continuous lengths 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.





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.



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.



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 VectranTM 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

HYDRO GROUP

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

Hydro Group

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



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

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



WITHOUT OUTER SHEATHING



WITH SHEATHING

- 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)

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



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

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



ILLUMINATED ROV TETHER

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



(CS 7237)







25

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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

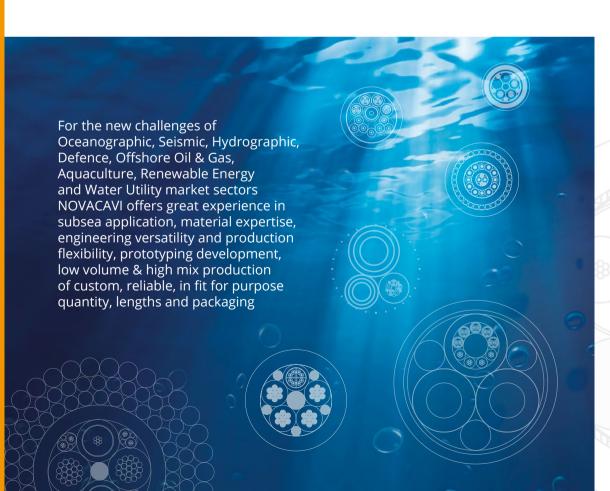
Francesca Faverio ff@novacavi.it +39 02.5538321

WWW.NOVACAVI.IT





ISO 9001 certified design and production process since 1995.



AQUANCABLE®

Cables for Underwater Technologies wnovacavi

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





















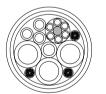




















Subsea detection and instrumentation cables







Contact NOVACAVI for custom requirements: tech@novacavi.it - www.novacavi.it

2G Robotics www.2grobotics.com 360Heros www.360abyss.com Arctic Rays www.arcticrays.com Battelle www.battelle.org BIRNS www hirns com Blue Robotics www.bluerobotics.com Cathx Ocean Systems www.cathxocean.com Ciscrea www.ciscrea.fr C-Tecnics www.c-tecnics.com DeepOcean Vision www.deepoceanvision.com Deepsea Power & Light www.deepsea.com DWTEK www.dwtek.com.tw **ECA Group** www.ecagroup.com GNOM www.anomrov.com Imenco www.imenco.no ISPTEL, Ida www.isptel.com.pt Kongsberg Maritime www.kongsberg.com Lighthouse www.lighthouse-geo.com MacArtney www.macartney.com Marine Imaging Tech www.marineimagingtech.com Novasub www.novasub.com **Ocean Imaging Systems** www.oceanimagingsystems.com Ocean Presence Technologies www.oceanpresence.com Ocean Tools www.nceantonls.co.uk **Outland Technology** www.outlandtech.com Remote Ocean Systems (ROS) www.rosvs.com www.rolloos.com **Rovtech Solutions** www.rovtechsolutions.co.uk Seatronics www.seatronics-group.com **Shark Marine** www.sharkmarine.com **SIDUS Solutions** www.sidus-solutions.com Sonavision www.sonavision.co.uk **SubC Imaging** www.subcimaging.com Subsea Technology & Rentals (STR) www.str-subsea.com **SULIS Subsea** www.sulissubsea.com Teledyne - Bowtech www.teledynemarine.com Tritech www.tritech.co.uk **Unique System** www.uniquegroup.com UVS www.uvs.com.au

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Olean, NY, USA

Toulon, France

Aberdeen, UK

Swansea, UK

Toulon, France

Moscow, Russia

Aksdal, Norway

Aberdeen, UK

Bologna, Italy

Aberdeen, UK

Aberdeen, UK

Aberdeen, UK

Aberdeen, UK

Westhill, UK Sharjah, UAE

Perth, Australia

Slidell, LA, USA



NEXT » CAMERAS & LIGHTS

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COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

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.

Contact

sales@deepsea.com +1 858 576 1261

www.deepsea.com



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

APEX COLLEGE OF THE PROPERTY O

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.

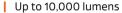


- Ultra small 22 mm diameter
- 55° horizontal FOV
- | Sapphire port
- Up to 6,000 m depth rated titanium housing

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.



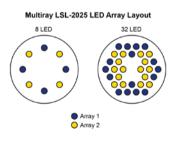
- Spot, flood, or wide beam configurations
- 4,000 m, 6,000 m, and 11,000 depth rated
- Digital and analog dimming interfaces supported
- User configurable power limit
- Customer serviceable



MULTIRAYTM 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



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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

www.forssea-robotics.fr

Gautier Dreyfus sales@forssea-robotics.fr +33 6 09 96 37 82



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 Defintion 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 intertial 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.



NETmc MARINE

HQ Location: Turfhill, New Deer, Turriff, AB53 6TL, Scotland, UK

Company Intro

NETmc Marine has been at the cutting edge of digital video solutions since the beginning of the millennium. With market knowledge drawn on over 40 years accumulative field experience, we are the perfect partner to provide solutions for your digital video acquisition projects.

Since the beginning, our innovative products have been favourites for ROV fleet managers and inspection engineers alike. In recent years our DVCi range of 'over Ethernet/ Copper' cameras have added HD video acquisition capabilities to ROVs without the requirement to upgrade the umbilical or transmission system; thus expanding the capability of the ROV at a modest cost.

Now we are changing the shape of DVRs. By using years of technological innovation we have developed a single adaptive and expandable video recorder. Start with the basic unit and add multi-channel operations, overlay or a number of other options, including integration to integrity software, simply by buying or renting a code.

Tying the cameras and the DVR together is our E-Inspect software, a low cost easy to use integrity reporting package, with full anomalous reporting with media.

With our background in a wide range of offshore projects, including all aspects of diving and ROV video inspections, we will make sure you select right configuration for your application and that the product we sell you is fit for purpose.

Contact

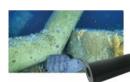
Raymond Ruth sales.uk@netmcmarine.co.uk +44 (0)1771 644001

www.netmcmarine.co.uk



NETMC

FEATURED PRODUCTS: CAMERAS



DVCi-R

With the ability to work over a twisted pair or an Ethernet link and with a 10 times optical zoom ability, the DVCiR is the ideal inspection camera for your IRM or Decommisssioning projects. The camera uses intelligent light compensation so additional lighting is generally not required. The DVCi R also supports IR lighting when used in conjuction with our IR lamp.

The camera video uses H264 compression and encodes the video subsea thus reducing the required bandwidth to transmit the signal over the ROVs own Ethernet or twisted pair. There are three different depth ratings (1000, 3000 and 6000m).

NOW AVAILABLE IN 1080 and 4K versions.

The DVCi R is supported in E-Inspect and Coabis Ver 11 and above.



DVCi-D

The first HD over Ehernet camera for divers for either surface or bell operations. Use your exisiting umbilical and improve your video capability with this small camera system. With it's intelligent light compensation the supervisor will now be able to watch welding operations during the welding rather than after the event. The cameras are made of a plastic that is durable and hard wearing but more importantly light in weight. The system allows the operator to use their existing lamps and comms systems. The DVCi D also supports IR lighting when used in conjuction with our IR lamp.

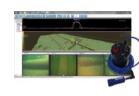
The DVCi D is supported in E-Inspect and Coabis Ver 11 and above.



DVCi-SR

Designed to fit smaller ROVs, the DVCiR uses the vehicles copper conductors to bring HD to many vehicles that do not generally support HD video thus allowing access to more difficult areas. On the VideoRay it connects to the Auxilliary connector. The topside unit is a ruggedised cased version of the new DVR.

The DVCi D is supported in E-Inspect and Coabis Ver 11 and above.



DVCi-P

Set to revolutionise the pipeline inspection market, the DVCi P is the only multichannel camera system, working over Ethernet, designed specifically for the pipeline market. With ease of installation and integration to survey software the DVCi P is a cost effective solution to upgrading your pipeline vide acquisition system whilst giving your clients the clearest image of the pipe.



IR LAMP

Extend your visual inspections in difficult visibility scenarios with our IR lamp. Either ROV or hand held the IR lamp will allow the DVCi range of cameras to see further in difficult conditions. Just switch the DVCi camera to black and white operations and see into the depth beyond.



DIVER CAMERA, LAMP AND CONTROLLERS

A lightweight but high resolution camera with separate LED lamp, these units are low cost but rugged products. The lamp is available as a wide angle flood or a spot light and the camera has 1/3" 650TVL module. The cameas and lamps can be sold separately or as part of a diver spread with rack or portable case controller.

Innovative • Flexible • Adaptable



Introducing the evolutionary

NETmc Marine DVR

A single flexible, modular marine video recording unit, that can be adapted and updated as your business changes or expands.

2021 Latest Option
ONVIF Camera control
over RTSP









INNOVATIVE MARINE RECORDING TECHNOLOGY

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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!



L.Hagstrom@sidus-solutions.com +1 (619) 275 5533 SDVOSB#: 222120

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.



IP and POE convenience HD-SDI fixed focal from 3000m to full ocean depth.



SS465 series, offers HD - **SS474** series, compact length optical corrected lens and compact size. 3000m



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.









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

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

SS250MK2 series: 65 poundforce foot, 88 Newton Metre torque

SS260 absolute encoder high degree of accuracy .001°

COLOUR ZOOM CAMERAS (SS420 / SS449 / SS427)



SS420 Series: 36x optical zoom automatic and manual control of focus and exposure settings 1/4 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 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 mkll 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 mkll 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 com**munication** 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 ad-



dition 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 transmisssion while conserving power*. In situations where a hardware connection is unavailable or undesirable, OceanLink is a perfect deep water alternative to cables.

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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



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

RAYFINTM

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.

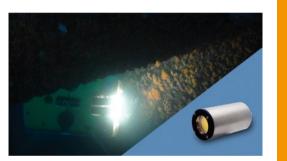
- Live HD via (Ethernet/Coax) or 4K (Fiber)
- 21MP digital stills (JPEG and RAW) with LED strobe synchronization
- 4K and HD video clips stored to 512GB solid-state memory
- Real-time media download and control of all functions (exposure, focus, etc.)
- Sensor-crop Zoom (5x optical equivalent)
- NTP 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 modelling 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 +17097455080 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

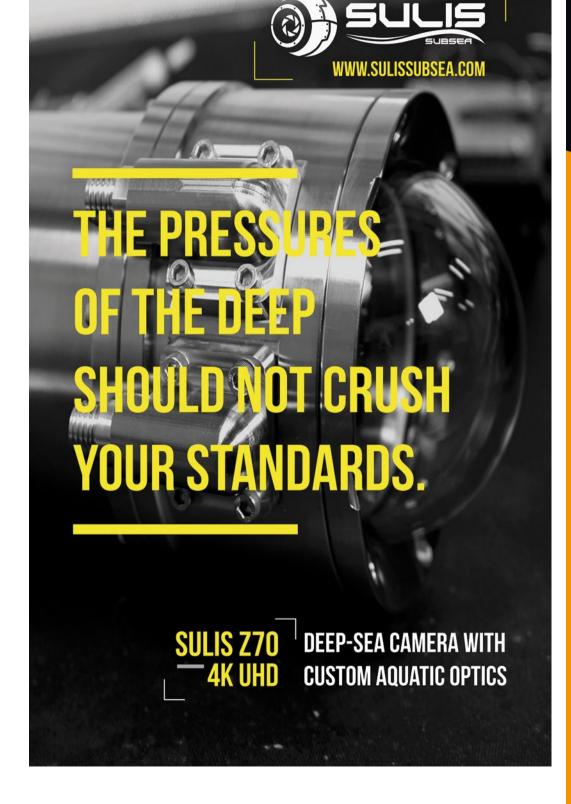
SULIS CB1 CAMERA CONTROL UNIT

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.







40





HQ Location: Peregrine Road, Westhill Business Park, Westhill, Aberdeenshire, AB32 6JL, Scotland, UK **Design & Manufacture:** Oubas Hill, Next Ness Lane, Ulverston, Cumbria, England. LA12 7LB, UK **US Sales & Support:** 1323 Price Plaza Drive, Katv. 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

sales@tritech.co.uk +44 (0)1224 744111 +44 (0) 7801 151 833 (24 hour on call support)

www.tritech.co.uk





SUPER SEASPY - COLOUR CCD UNDERWATER CAMERA

The Tritech Super SeaSpy underwater video camera is a compact, high resolution, full colour camera with integral low voltage lighting. Built to survive the harsh underwater inspection environment, the Super SeaSpy has been designed to be compact and rugged whilst providing high quality colour video.

The Super SeaSpy incorporates a ring of white LEDs which provide uniform illumination over the field of view. The LED Engine utilises Dynamic Light Control (DLC) which automatically adjusts the lighting level to optimise video image quality, regardless of the reflectivity of work surface. This feature also helps enhance picture quality by reducing the amount of backscatter from suspended particles in the water column.

The Super SeaSpy is fitted with a water corrected lens system which optimises the picture quality by reducing radial distortion and reducing chromatic aberration.



TYPHOON - COLOUR UNDERWATER VIDEO CAMERA WITH ZOOM

The Tritech Typhoon is a robust, high resolution colour underwater video camera with an auto-focus zoom lens, which maintains focus throughout x23 Optical and additional x12 Digital Zoom ranges. Both PAL and NTSC Broadcast Standards are supported.

The Typhoon combines the latest CCD with numerous digital enhancements and the camera's wide dynamic range technology compensates for bright backgrounds and low light conditions; providing clear, low noise video with good contrast. The auto white balance maintains natural colours under wide ambient lighting conditions and also the Digital Slow Shutter and IR Cut Filter options deliver higher sensitivity at low levels of illumination.

All optical and digital functions can be controlled via a user-friendly GUI, or integrated within an ROV control system via a RS232 Command Protocol. The GUI provides default system settings or user-specific configurations. Alternatively, focus and zoom can be controlled by analogue signal inputs. Digital Slow Shutter and Back Light Compensation functions can be optionally 'hard-wired'. An 'Ivanoff Corrected' lens system optimises picture quality by reducing radial distortion and chromatic aberration. In benchmark tests, the Typhoon delivered sharper definition and better colour rendering than similar cameras.

Typhoon can be supplied with an integral overvoltage protected Video Line Driver, which with electable gain, this can compensate for video signal attenuation through longer umbilicals.



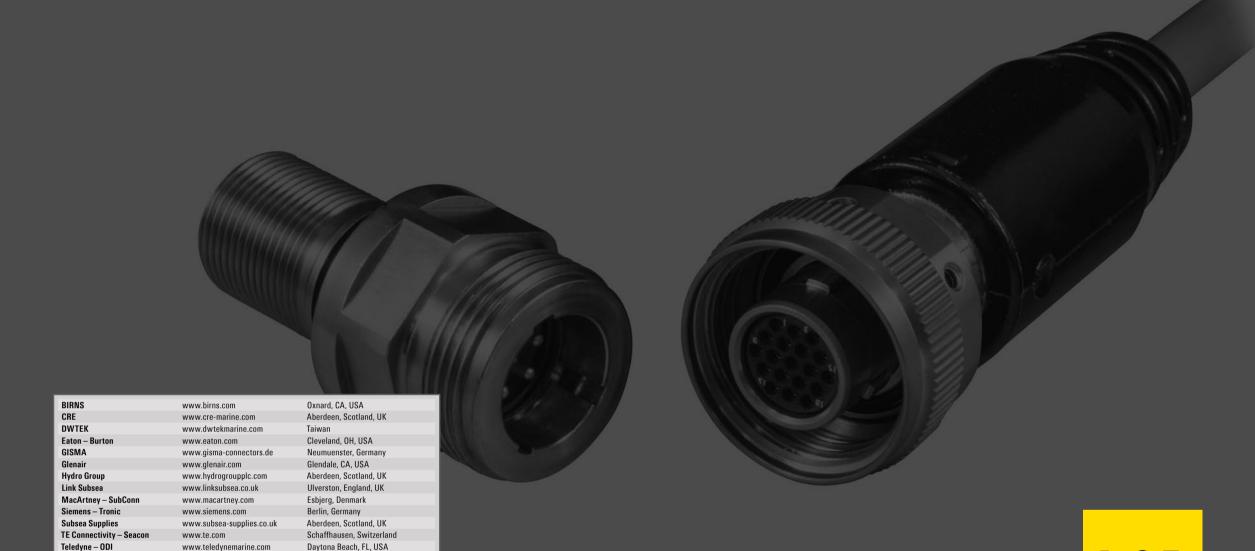
TORNADO - LOW LIGHT UNDERWATER VIDEO CAMERA

The Tritech Tornado underwater video camera is a high quality low light camera system using the very latest CCD technology.

A ½" Interline CCD sensor provides a high-resolution 570 horizontal line monochrome picture. The camera module has a light sensitivity of 3x10-4 lux. The Tornado camera is contained within a new 4000m compact stainless steel housing fitted with a high quality water corrected acrylic view port.

The importance of the view port is often underestimated in underwater cameras. The acrylic view ports used on all Tritech cameras have similar refractive properties to that of water providing the optimum solution for deep water lenses. This ensures a clear and sharp picture during close proximity viewing in all water conditions.

The Tornado underwater video camera is supplied with a switchable high frequency boost amplifier making it suitable for use with short or long umbilicals.



COMPONENT SUPPLIERS AND

EQUIPMENT MANUFACTURERS

NEXT » CONNECTORS & PENETRATORS

46 Glenair

48 Hydro Group Plc.

CONNECTORS & PENETRATORS

1.05.

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



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

SEAKINGTM

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



- Wrench flats and knurl for easy mate and demate
- Metal-to-metal seating
- Polarized metal keyways
- Standard configurations in stock

SEAKINGTM 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 interconnect s 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.

CONNECTORS &

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

HYDRO GROUP

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

Hydro Group

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



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 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

HRS 105

Bulkhead, panel mount or cable mount options available















HDM 105

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



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



NEXT » DIGITAL VIDEO RECORDING

- **52** Abyssal
- **54** Digital Edge Subsea
- **56** NETmc Marine

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

DIGITAL VIDEO RECORDING

ABYSSAL

HQ Location: 1211 Avenida da Liberdade s/n, Pólo do Mar do UPTEC, Sala F4, 4450-718 Leca da Palmeira, Matosinhos, Portugal

Company Intro

Abyssal is a software engineering company with more than 8 years of experience in developing and implementing proprietary software solutions for offshore industries. Based on its technological platform, the company provides several solutions for multiple applications in different phases of an offshore project.

Abyssal's global reach and remote nature allow the company to better serve its customers at any location in the globe with the goal to improve the safety and efficiency of operations by providing real-time, visual, and collaborative tools to assist their clients.

Contact

info@abyssal.eu sales@abyssal.eu +351 220 120 768

www.abyssal.eu



PRODUCTS

ADVANCED, EFFICIENT, AND SAFE

With Abyssal Offshore, crews now have a complete digital toolkit that allows them to safely and efficiently execute offshore operations. The advanced overlay system radically enhances visibility and spatial contextual awareness, eliminating downtime in low visibility conditions while simultaneously improving pilot navigational efficiency by up to 40%.

Offshore's advanced DVR lets users record multiple HD camera feeds simultaneously, allowing all the recorded content to be replayed using the fully-featured in-built video player, letting you easily scrub through all the recorded monitor feeds synchronously. During missions, an inbuilt media manager lets you easily capture, tag, and later search for screenshots.

After the mission, you can digitally access every piece of relevant data such as telemetry, positioning, metadata, screenshots, video, as well as dive log user entries, and export it in portable HTML5 reports, customized to suit the organizational needs of your project.

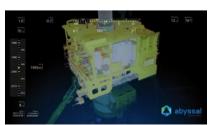
INTEGRATES SEAMLESSLY. EXTENDS YOUR CAPABILITIES

Abyssal Offshore is fully compatible with your favorite software tools, devices and vehicles. When combined with the Abyssal Ecosystem, your projects benefit from an advanced toolkit that includes real-time 3D visualization, augmented reality, and simultaneous operation (SIMOPS) functionalities. The state-of-the-art 3D visualization aids pilots in the most extreme environments imaginable while the patented augmented reality lets you superimpose relevant and accurate information in real-time, letting you increase everyone's spatial awareness of the entire operation.









Advanced SIMOPS functionalities allow you to interact with the operation by defining virtual flight paths, waypoints, geotags, and instructions to reduce risk as well as improve operational efficiency with the ability to have a complete operational view by tracking multiple assets with low-latency data (telemetry, positioning, and video) in large quantities. Combined with the advanced overlay, this all means that you reach your target safely and efficiently while at the same time reducing costs and CO₂.

COMPUTER VISION - FLEXIBLE, ADVANCED, AND TAILOR-MADE

Abvssal Offshore allows you to have Computer Vision modules to support multiple tasks, such as provide a reliable alternative solution for Pipeline Touch Down Monitoring, enabling vou to minimize costs and needs for additional equipment and resources. In this case, the module delivers the real-time position of your pipeline while at the same time contextualizes it with existing survey data into Offshore's 3D GIS viewer, thus giving you the complete view in one self-contained system. Additionally, when coupled with Abyssal's managed cloud platform, Abyssal Cloud, reporting is done in a matter of minutes while inland teams can track and monitor operations onshore with ease and guaranteed uptime.



MINIMIZE COSTS, SAFELY

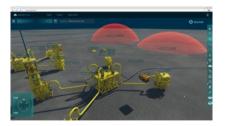
Working side-by-side with Abyssal Cloud, inspection processes, such as marine growth measurement and classification, can be drastically reduced in terms of time and cost. By combining tailored Computer Vision modules and uploading your data into Abyssal Cloud you can have a full contextualized representation of the entire subsea environment, resulting in up to an 80% reduction in inspection and reporting time - without any degradation in quality.

SURVEY-GRADE 3D MODELS AND TOOLS

Based solely on mission videos, Abyssal's software is able to reconstruct any object, creating reliable point clouds that can be contextualized within the 3D visualization, complete with survey-grade GIS and bathymetry. Each reconstructed point contains survey-grade metadata, including size, volume, and area covered by the object. What's more, with Abyssal, you can digitally measure anything in an accurate digital field representation, including, for example, biofouling thickness at any location.

ANYTIME ANYWHERE

Abyssal understands that in the real world you need to have the 360 degree status of your projects 24 hours a day. As such, Abyssal Cloud, a fully-fledged web application, gives you complete access to your project and mission data. no matter where you are or the time of day. Abyssal Cloud is not just a cloud storage service: you can securely create and edit 3D representations of your project fields, precisely and enriched with customized metadata.



REDUCE RISKS AND YOUR FOOTPRINT

Using Abyssal Cloud you can digitally plan any intervention beforehand, identify any potential issues, and define contingencies. Upload reconstructed point clouds coming from different devices or different formats and retrieve accurate inspection, as well as reporting, data. This not only reduces costs, but also your operational risk by bringing you situational awareness and the ability to conduct precise risk assessments.

Abyssal: Fit for purpose technology for digitizing and supporting offshore operations, reducing your cost, risk, and carbon footprint.

DIGITAL EDGE SUBSEA

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



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 to see which dvr would suit you best.

Contact

John Scott **Operations Manager** john.scott@digitaledgesubsea.com 01229-206456

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 | Report Generation
- 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

 - 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 2× solid state hard drive (Raid) for increased speed and reliability.



NETmc MARINE

HQ Location: Turfhill, New Deer, Turriff, AB53 6TL, Scotland, UK

Company Intro

NETmc Marine has been at the cutting edge of digital video solutions since the beginning of the millennium. With market knowledge drawn on over 40 years accumulative field experience, we are the perfect partner to provide solutions for your digital video acquisition projects.

Since the beginning, our innovative products have been favourites for ROV fleet managers and inspection engineers alike. In recent years our DVCi range of 'over Ethernet/ Copper' cameras have added HD video acquisition capabilities to ROVs without the requirement to upgrade the umbilical or transmission system; thus expanding the capability of the ROV at a modest cost.

Now we are changing the shape of DVRs. By using years of technological innovation we have developed a single adaptive and expandable video recorder. Start with the basic unit and add multi-channel operations, overlay or a number of other options, including integration to integrity software, simply by buying or renting a code.

Tying the cameras and the DVR together is our E-Inspect software, a low cost easy to use integrity reporting package, with full anomalous reporting with media.

With our background in a wide range of offshore projects, including all aspects of diving and ROV video inspections, we will make sure you select right configuration for your application and that the product we sell you is fit for purpose.

Contact

Raymond Ruth sales.uk@netmcmarine.co.uk +44 (0) 1771 644001

www.netmcmarine.co.uk



NETMC

MARINE

FEATURED PRODUCTS

DVR

The NETmc Marine DVR is a new concept in video acquisition; a single unit that can be upgraded in the field simply by adding a new code, it replaces all previous DVRs in our product range.

The basic configuration is a single composite channel recorder, but up to three more channels can be added as well as overlay, black box functionality and compatability with third party softwares. Imagine being able to covert a single channel unit to a full pipeline spread as easily as adding a USB device.

Other options include HD recording, compatability with the DVCi range of cameras and recording IR feeds on Coastal and Border Patrol vessels. The system can also be installed in ruggedised cases for portatbility e.g. to work with the DVCi SR.

N.B. future options may require hardware upgrades.



















SYSTEM OPTIONS

Some of the upgrades available:

- Multi channels mix inputs
- Hi-Def HD-SDI, HDMI, 4K
- Video overlav

- Blackbox recording
- Integrity Software Control (Apollo / Coabis NEXUS IC / EIVA)

DIGITAL DIVE LOG

The Digital Dive Log (DDL) is an interactive electronic dive log for use with the NETmc Marine DVR Inspector or X-Ops DVR. The software can run on the DVR itself or on a separate PC and automates the input of data normally recorded during ROV and diving operations.

E-INSPECT

Stand-alone workpack driven inspection / video acquisition package for each workpack a list of Inspection Points or groups of associated Inspection Points can be created, to which Tasks are allocated e.g. take CP.





Chassis options:



1U Rack Mount

- Base model
- Single channel
- composite video or HD

4U Rack Mount

- 4U Rack Mount
- I multi channel
- Hi-Def and composite options
- Supports extra storage



Peli Case version

- Ruggedised construction
- IP rated keyboard and connectors

Innovative • Flexible • Adaptable



Introducing the revolutionary

DVCi Cameras

Complete high definition recording systems featuring cameras, topside and software. Available for use over twisted pair or ethernet.

New for 2021 4K capability over twisted pair and Ethernet



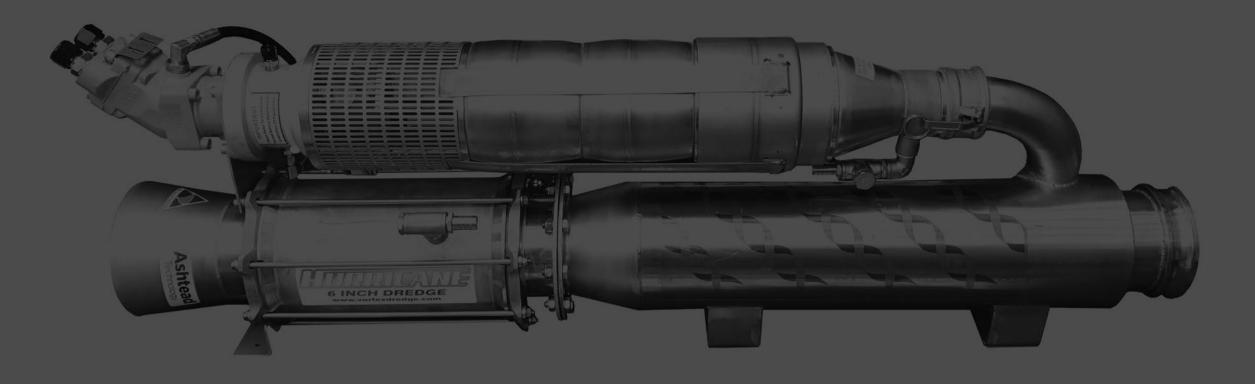








INNOVATIVE MARINE RECORDING TECHNOLOGY



1.07.

NEXT >> DREDGING
60 Vortex

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

DREDGING

Location: 27 Parrs Road RD1, New Plymouth 4371, New Zealand

Company Intro

Vortex dredge solutions offer the highest suction on the market at a proven 100kpa (29.5 in/hg) With vears of experience servicing the oil and gas industry, we have developed robust and efficient ROV dredging and tooling solutions for a range of clients worldwide.

The PATENTED Vortex venturi is designed, manufactured and tested in New Zealand and shipped globally. We can also offer clients a range of custom dredge solutions to suit any dredging requirement even if there is not currently a commercially available system to suit. If you need a powerful but cost-effective solution to your dredging needs, look over our range of dredging equipment or dredging tools. We are global suppliers to Ashtead Technology who can offer everything from our range of dredging solutions worldwide.

Contact

Joe Goodin sales@vortexdredge.com +64 (0) 2768 85372

www.vortexdredge.com



THE VENTURI EFFECT: **POWER TO PERFORM**

It takes countless hours of testing and years of experience to engineer reliable dredging solutions. Joe Goodin, Managing Director of Vortex Subsea Solutions, details some of the technology behind his solutions as well as his longstanding partnership with Underwater Cutting Solutions and Ashtead Technology.

As a result of its unique blend of CFD, R&D and hard-won physical testing. Vortex has successfully pioneered the most powerful and patented venturi dredge ever offered to market – available exclusively through subsea equipment and services provider Ashtead Technology.

The inner workings of this high-performance dredge venturi system are relatively simple, following smooth and natural flow patterns to make the relocation of waste materials easier. However, while no other competitor dredges have any advertised suction figures, only the Vortex 4 inch T-100 TORNADO and 3 inch S-100 STORM deliver a market first and consistent 100kpa (29.5in/hg) of suction at the inlet hose due to its venturi design. Of particular note is that this test is run near sea level where the pumps are prone to cavitation, which disappears as depth increases. To remove any guesswork for the client, the Vortex range of dredge systems comprising the Storm, Tornado, Hurricane and Black Hole all have removal rates based on actual Magnetite iron sand and rocks moved with a weight of 2.3kg/ltr. At 20kg, the Vortex HURRICANE is also the lightest 6 inch dredge venturi on the market.





Joe explains the rationale behind this: "High suction does the work to get sticky mud moving inside the dredge inlet hose, then high rotational water flow keeps the mud moving through the

"Without very high suction, mud flow stops when buried deep until the hose is pulled back into clear water to allow water flow to continue. A strong rate of high suction and high rotational flow are required to get the most out of your dredging equipment."

Based on extensive test tank and field testing. Joe found that the patented Vortex venturi performs at least 20 to 30% better than competitor's dredges using older conventional linear flow venturi technology. Custom-made axial water pump components and shaft seals dedicated to underwater use enable Vortex dredges to withstand sustained operation at the optimum point of the water pump flow charts. For users this means less time to complete projects because of both the better flow rates and the enhanced reliability.

Removal rates are one of the most important standards a customer can use regarding dredge selection, so Vortex suction values and real-world removal rates reinforce its performance claims. Vortex uses volcanic magnetite iron sand and rocks during testing and publishes removal rates based on actual measured material shifted during testing. Vortex patented, proven and superior performance directly results in reduced vessel time and reduced client cost.

Vortex has also devised innovative diving market dredging systems using the same patented venturi technology. With the EASYDREDGE, you can expect diver time to be greatly reduced as the system requires no subsea assembly to utilise the included 4in, 6in and 8in dredge. The system can be easily reconfigured with no need to change hydraulic pumps, and can also be configured to run on electric 4in - 12in dredge systems.

"Hours in the test tanks trying to destroy pumps by simulating what can go wrong in the offshore environment ensures the reliability customers have come to expect from Vortex equipment". says Joe, an ROV operator since 1999.

As an exclusive global supplier to Ashtead Technology, New Zealand-based Vortex has over 20 years of experience in engineering dredging and ROV tooling solutions. As part of Ashtead Technology's wide-ranging equipment offering, customers benefit from a large selection of 'off the shelf' and bespoke tooling available to get the job done.

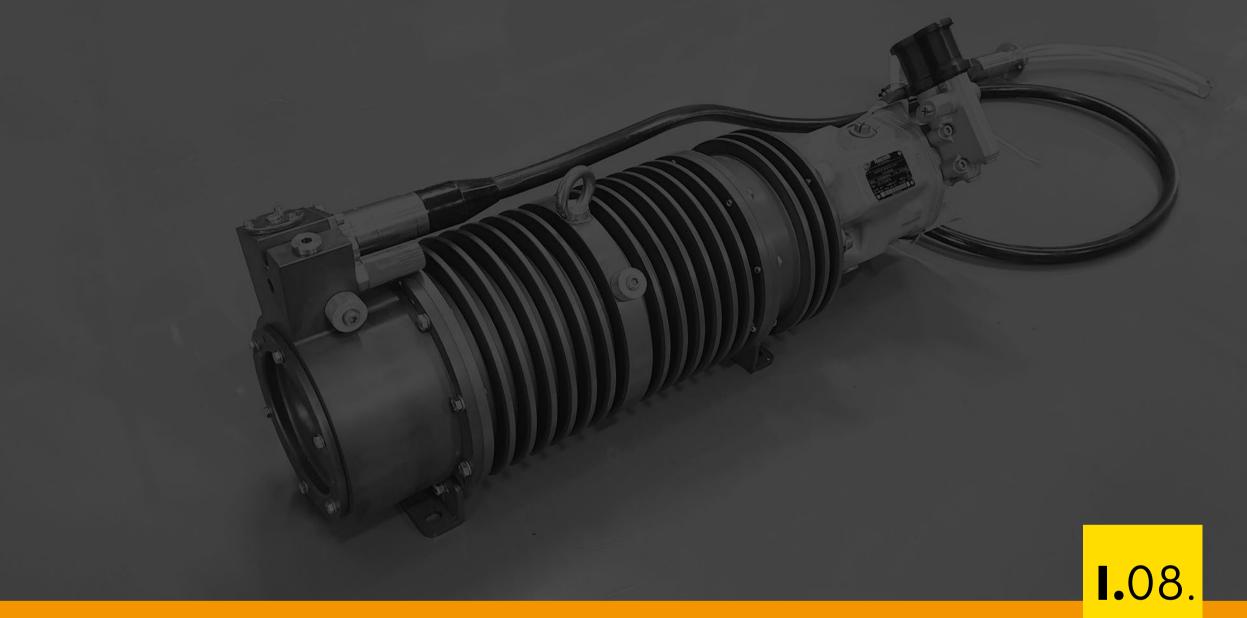
While Vortex offer 3in, 4in, 6in and 8in dredging systems specific to low and high tooling supply WROVs, Ashtead Technology subsidiary Underwater Cutting Solutions (UCS) handle not only smaller sizes but also the larger systems of 8in and 12in which complement the scope of Vortex.

An Ashtead Technology company, UCS provides subsea cutting, coating removal, and seabed dredging services and solutions worldwide. Both Vortex and UCS carry a range of electrically-powered dredge systems engineered and designed entirely in-house, giving the customer high-performance, small and large-nozzle diameter dredging options for the safe removal of larger rocks and sediment.

Both Vortex and UCS offer compact, efficient dredging systems via Ashtead Technology, resulting in a smaller footprint when equipped on a ROV and significantly increased LARS clearance.

Combining the very latest in dredge performance with rigorous testing, customers reap the benefit of Vortex and Underwater Cutting Solutions' global reach via Ashtead Technology. The underwater solutions provider is a one-stop shop for versatile hydraulic and electric dredging equipment to assist your ROV or diver-led project to completion.

To learn more or place an enquiry please contact Joe Goodin (goodinjoe@gmail.com), www.vortexdredge.com or visit www.ashtead-technology.com/contact.



NEXT » ELECTRIC MOTORS

64 iMPAQ Technologies

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

ELECTRIC MOTORS

ELECTRIC MOTO

IMPAQ TECHNOLOGIES

HQ Location: South Fornet Business Centre, Westhill, Aberdeenshire, AB32 7BX, Scotland, United Kingdom



Company Intro

iMPAQ Technologies is a company specialising in the delivery of electrical technology products, predominantly within the underwater industries. In addition to being based in the UK the products are also designed and manufactured in the UK. The core business for many years has been the design and manufacture of electric motors for use underwater. These motors were for varied uses including driving hydraulic pumps to make Hydraulic Power Units (HPU). The motors ranged anywhere from 1kW to 500kW and voltages ranging from 220 to 6000Vac. Depth rating designed to 6000 MSW and beyond. The company has well over 35 years of experience in the industry.

The way forward for the company is to continue motor and control development bringing more efficient electrical power technologies to the various industries which we are involved in.

www.impaq-technologies.com

sales@impaq-technologies.com +44 (0)1330 860045



PRODUCTS

MOTORS & HYDRAULIC POWER UNITS

- 150HP HPU 3000V or 4160V
- 4-pole 1800rpm nominal speed
- Full ocean depth & harsh environment operation
- Anodised aluminium and stainless-steel options

Our mid-range underwater motors and hydraulic power units (HPUs) are the latest versions of a product with a track-record of over 35 years in the underwater industry.

Sharing many common components and a common shaft height outputs range from 75HP to 200HP in normal submerged operation. Ports are provided for circulating the motor oil through an external cooling system for operating outside the normal operating environment and we can assist with designing such systems.



As well as the standard, fully machined (no potentially weak castings are used) and hard anodised aluminium construction we also offer stainless steel versions using our lightweight fabricated stainless-steel housing. A feature of our motor endcaps are the machined pockets to reduce weight and increase surface area for increased cooling without resorting to fins which can become clogged with silt and prevent rather than improve motor cooling. Further options including our water-jacket cooling system are also available, if required please ask.

EXAMPLE OF STANDARD PRODUCTS THAT CAN BE TAILORED TO YOUR NEEDS					
Shaft power (hp)	YOUTAGE LY LI DIMENSIONS (MM)				
150	Main: Kawasaki K3VL140	3000/4160	L: 1010 W: 380 H: 484	333	
150	Main: Kawasaki K3VL140 Aux: Kawasaki K3VL80	3000/4160	L: 1255 W: 380 H: 484	380	
150	Main: Rexroth A10VSO140 Aux: Rexroth A10VSO71	3000/4160	L: 1290 W: 380 H: 484	370	

Pump Mounting

The standard motor endplate design is for closecoupling the Kawasaki K3VL or Bosch-Rexroth equivalent pumps to fit without an additional interface, thereby removing one leakage path. Interface kits can be provided to suit various other makes and types of pump. Alternatively. bespoke endcaps can be provided to special-order.

Voltage & Speed

The standard voltage in use since our motors were first used on underwater ROVs in the 1980s is 3000Vac at a frequency of 60Hz. This should be the voltage at the motor, voltage drop down the umbilical must be factored in to establish surface supply voltage. Alternative voltages from 400Vac to 4160V at 60Hz can be provided. Similarly, alternative frequencies can be provided. This could be 50Hz or any particular frequency designed to match the pump optimum speed; for example, 86Hz to provide a nominal speed of 2580rpm. This can allow a smaller, lighter motor and pump combination to achieve a specific hydraulic flow than would be the case with a 60Hz motor. Instead of running a 60Hz, 2-pole motor at a nominal speed of 3600rpm and fitted with a de-stroked pump (to avoid cavitation) we could design a motor to run at a lower speed without the need to de-stroke the pump.

Testing

All motors and HPUs are tested underwater at fullload and rated supply prior to shipment and provided with calibrated test certificates showing electrical power input and hydraulic power output.

Compensation

The motors must be filled with suitable oil, all air bled, and a positive over-pressurisation applied not to exceed 0.5bar above external ambient pressure. The same type hydraulic oil used in the hydraulics (e.g. Tellus 32 or equivalent) can also be used in the motor. Alternatively, the motor could be filled with transformer oil. Spring-backed compensators can be provided as part of the package.

WATER SENSOR

A simple normally open type water ingress sensor is fitted at a low point in the motor. Additional sensors can be fitted as optional extras.

Temperature Sensor

As standard a PT100 sensor is fitted to measure motor oil temperature. Additional sensors can be fitted as optional extras.

Improved Heat Design

Using latest 5-axis machining techniques our motor endcaps are scalloped to increase the wetted surface area whilst also removing weight without having to resort to deep finning which can become a sediment trap and actually retain rather than remove motor heat. Even after 35 years of manufacturing we can still make improvements to our products so data sheets can become out of date. Always confirm specifications at time of ordering.

LOW & MID-RANGE MOTORS & HYDRAULIC POWER UNITS

- 25-200 HP / 20-150 kW
- Standard supply options of 3000 Vac and 4160 Vac at 60 Hz

Our mid-range submersible hydraulic power units (HPUs) are the latest versions of a product with over 35-years track-record. These HPU utilise our rage of subsea motors which are designed to power various Work class ROVs for both new system as well as part of upgrades to existing ROV systems. The HPU brings together our subsea motor and medium to high pressure Kawasaki pump (other options available). Sharing many common components and a common shaft height, outputs range from 25 HP to 200 HP in normal submerged operation. Options available such as temperature sensors. water ingress sensors and cooling systems.

- 2-Pole 3600rpm Motor
- Harsh environment operation
- Anodised aluminium and stainless-steel options





NEXT » INSURANCE SERVICES

68 Hayes Parsons Insurance Brokers

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

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 insurance contact is Darren Harris. Darren has over 10 years' experience within the industry and can source insurance solutions for all manner of ROV and AUV operators, regardless of size.

www.hayesparsons.co.uk/marine-and-yachts Darren Harris. Account Executive marine@havesparsons.co.uk 0117 930 1687 | 07785 426 360



SERVICES

SUBSEA EQUIPMENT

Hayes Parsons can offer worldwide insurance cover for specialist subsea marine equipment, including Remotely Operated Vehicles (ROV), Autonomous Underwater Vehicles (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 for worldwide insurance cover by all conveyances. They are also able to provide cargo insurance polices 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.

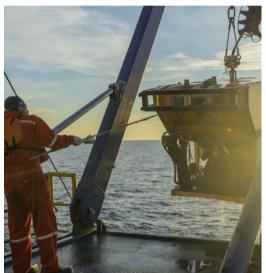
IN-HOUSE CLAIMS SERVICE

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











NEXT » LAUNCH & RECOVERY SYSTEMS (LARS)

72 Hydramec Offshore Hydraulic Systems

74 MacArtney Group

76 Soil Machine Dynamics Ltd (SMD)

LAUNCH & RECOVERY SYSTEMS (LARS)

HYDRAMEC OFFSHORE HYDRAULIC SYSTEMS



Location: Hanover House, Boundary Road, Great Yarmouth, Norfolk, NR31 OLY

Fabrication and Coating Department: James Court, Faraday Road, Gapton Hall Industrial Estate, Great Yarmouth, Norfolk, NR31 ONF

Company Intro

Hydramec Offshore began in 1990 as a small family business in Great Yarmouth. In our 30 years of business, we have become of the market leaders for Launch and Recovery Systems (LARS) across the globe, with 150 currently in operation. We design and builds 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



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.

- 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.







MACARTNEY GROUP

MacArtney

Location: MacArtney A/S, Gl. Guldagervej 48, DK-6710 Esbjerg V, Denmark

MacArtney is a privately owned company established in 1978. The MacArtney Group is a global supplier of underwater technology products and systems specialising in design, manufacture, sales, and service of a wide range of solutions to oil & gas offshore operators, ROV, diving, and survey contractors, the renewable energy sector, ocean science institutes, and navies around the world.

The MacArtney Group supplies and services a wide variety of advanced and reliable products and system solutions spanning from subsea cables and connectors to state-of-the-art integrated packages, including fibre optic telemetry, underwater cameras and lights, oceanographic instruments, marine winch systems, and remotely operated, towed vehicles.

Regional offices

Aberdeen and London (UK), Stavanger (NO), Mölnlycke (SE), Aix-en-Provence (FR), Bologna (IT), Rotterdam (NL), Kiel and Bremen (DE), Houston, Boston and San Diego (US), Victoria and Darthmouth (CA), Santiago de Chile (CL), Rio de Janeiro (BR), Perth (AU), Singapore (SG), and Ningbo (CN). We are accessible around the world and around the clock. With 20 office locations and 24 distributors spread across the globe and 24/7 phone service, we offer global access to local support.

sales@macartney.com

www.macartney.com







- Technology solution for tomorrow
- Intelligent control system
- **Eco-friendly**
- Low cost of ownership
- | High degree of integrity

HIGHLIGHTED MACARTNEY BRANDS

All products supplied are designed and tested to provide high quality, efficiency and reliable performance in the challenging underwater environment.



OptoLink



WET-MATE CONNECTORS

FIBRE OPTIC CONNECTIVITY

SUBSEA CONNECTIVITY



API COMPLIANT CONNECTIVITY



INTELLIGENT **WINCH SYSTEMS**



STAINLESS STEEL **WINCHES**



ALL-ELECTRIC LARS SOLUTIONS



UNDERWATER TELEMETRY



UNDERWATER TELEMETRY

F⊞CUS 3



ROTV BASED SURVEY SOLUTIONS



OCEANOGRAPHIC ROTV SYSTEMS



CAMERAS AND LIGHTS

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

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

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

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 pack- ages, 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 • Bunded skid bases • Suitable for a wide range of 3rd party ROV's, umbilicals & sliprings • 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 Hvdraulic Drive • Active Heave Compensation Operations • Adjustable fleeting box to allow dif-

ferent configurations of fleeting entry angles • Conventional (Transverse) or Axial Fleeting • Optional bolt-on grooved drum shells • Integrated crash frame with lift points • Failsafe 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 required.
- Automated launch features with safety interlocks | Designed to Lloyds or DNV to prevent user error.
- Cursor launch systems with lift winches for heavier vehicles.
- options to reduce deck space if | Slack arm winch option to prevent umbilical snatch loads.
- 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 Stabilising Frames to suit a fibre and power cable systems.
- Wide angle plough launch systems for launching / towing on the same wire.
- 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 over boarding sheaves.





NEXT » LIFTING & RIGGING

80 RUD – RUD Ketten Rieger & Dietz GmbH

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

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





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 es-

tablished 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

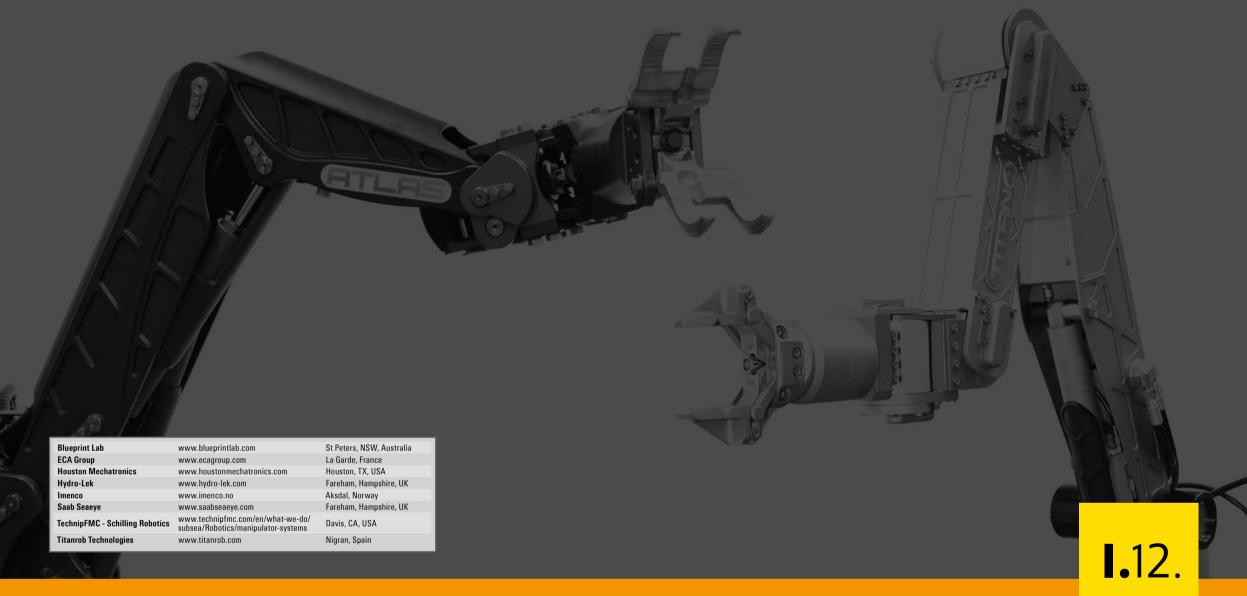
- Superior & safer than the common clevis sling hook
- Supplied complete with a forged and tempered safety latch
- Safety latch locks into hook tip to protect against lateral bending
- Safety latch supported by a triple coiled double leg
- Wear edges in both sides of hook protect against abrasion of 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







NEXT » MANIPULATORS

84 Blueprint Lab

86 TechnipFMC – Schilling Robotics

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

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



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

Reach: 0.25-0.45m

Outer Diameter: 40mm

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.



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

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



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 5501b 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

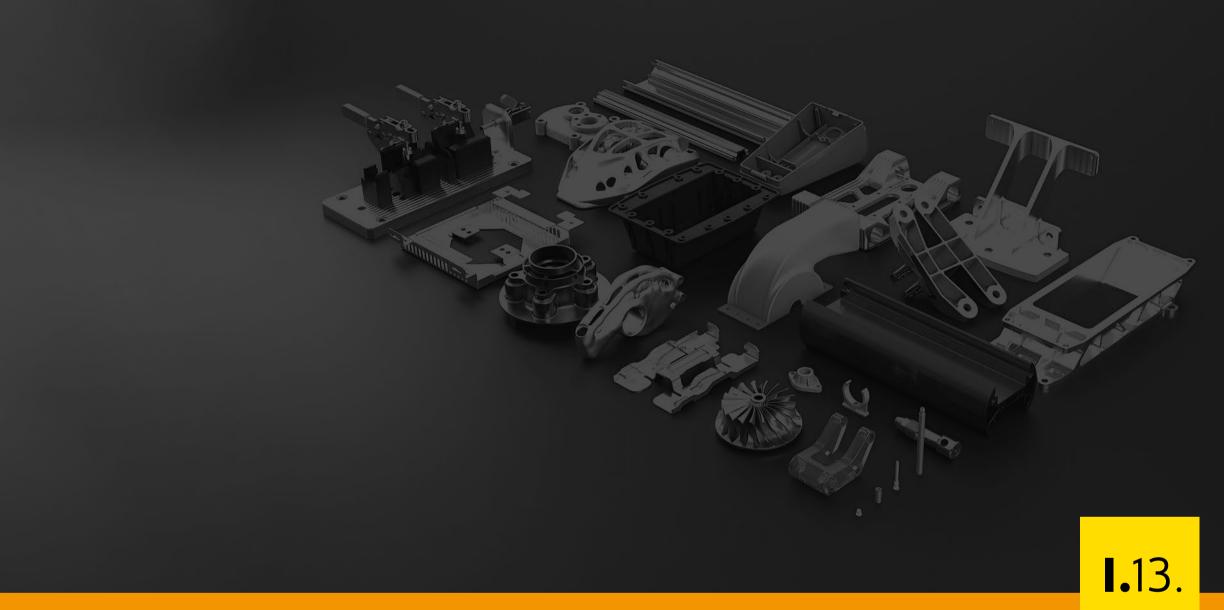
The ORION's compact size, light weight, and excellent payload capacity make it the system of choice for light and medium work-class ROVs. The arm's structural segments are fabricated from hard-anodized extruded aluminium for strength and corrosion resistance. Deepwater tasks are no problem for these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

90 Get it Made

92 Nylacast Group

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

MANUFACTURING SERVICES

GET IT MADE

get it made

HQ Location: 58-72 Dalmain Road, London, SE23 1AT, United Kingdom

Company Intro

Get It Made is a one-stop solution for prototype and volume production. From CNC Machining to Plastic Injection Moulding we are here to help.

We exist to make manufacturing simple. By combining our agile, highly trusted manufacturing partners with a refined level of personalised service, we make sure your project is delivered on-time and with great quality. We're proud to support innovative companies in the subsea industry. Join us and discover how we're making manufacturing simple.

Contact

www.get-it-made.co.uk

Luke Smoothy team@get-it-made.co.uk +44 20 3286 6002









OUR SERVICES



CNC Machining

From one off prototypes through to high volume manufacturing, Get It Made produces bespoke, high-quality CNC Machined parts from metals or plastics.



5 Axis CNC Machining

For complex surfaces and demanding geometry, 5 Axis CNC Machining can produce high precision, mission-critical parts for the subsea industry.



CNC Turning

Get It Made offers fast, efficient CNC turned parts at an affordable cost. We also provide Turn & Mill capabilities for more complex turned parts.



Injection Moulding

We have excellent Injection Moulding expertise which is suited for businesses looking to mould plastic parts for low and high volume production.



Aluminium Extrusion

Get It Made offers low volume aluminium extrusions with no minimum order requirements. This allows custom extrusions for prototypes or small runs.

WHY CHOOSE GET IT MADE?



Highly Competitive Pricing

We partner with the best factories across the globe to provide you with excellent pricing, increasing your competitiveness and margins.



ISO 9001 Certified

Our ISO 9001 accreditation demonstrates our commitment to continually improving quality and our high level of service.



Dedicated Project Support

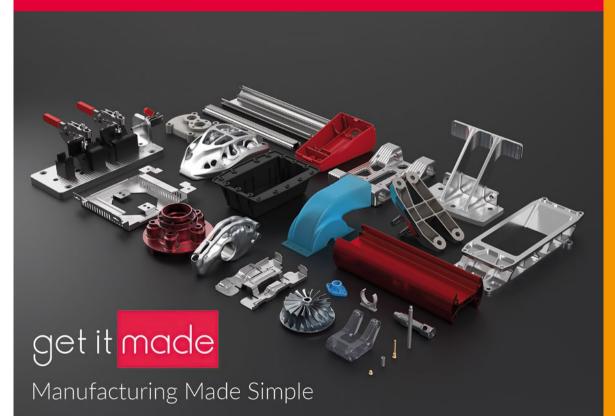
Our team of knowledgeable engineers will offer you a personalised service resulting in complex projects delivered in record time.



Streamline Your Supply Chain

With a vast range of processes on offer we are the path of least resistance. We proactively update you throughout the project so you can focus on what matters, your innovation.

Contact team@get-it-made.co.uk for £500 off your first Get It Made order.



NYLACAST GROUP



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

Supergrip UK Ltd, Riverside Works, Bridge Street, Colne, Lancs, BB8 ODR, UK

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

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

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

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



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 propellor or propulsion units on multiple class ROVs, and channel the thrust generated accordingly in the direction or required travel. They also offer excellent protec-





www.nylacast.com



tion 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 renown 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. Ny lacast Sheaves are also available in ATEX grade material for critical applications.







Blueprint Subsea www.blueprintsubsea.com Coda Octopus www.codaoctopus.com Echologger www.echologger.com **EvoLogics** www.evologics.de Imagenex www.imagenex.com Impact Subsea www.impactsubsea.co.uk www.ixblue.com Kongsberg Maritime www.km.kongsberg.com Kraken Robotics www.krakenrobotics.com Norbit Nortek www.nortekgroup.com Silicon Sensing www.siliconsensing.com Sonardyne www.sonardyne.com Sonavision www sonavision com Teledyne Marine www.teledvnemarine.com Tritech International www.tritech.co.uk Valeport www.valeport.co.uk Water Linked www.waterlinked.com WFS www.wfs-tech.com

Ulverston, England, UK Edinburgh, Scotland, UK Goyang-Si, South Korea Berlin, Germany Port Coquitlam, BC, Canada Ellon, Scotland, UK Cedex, France Kongsberg, Norway St John's, NL, Canada Trondheim, Norway Rud, Norway Plymouth, England, UK Yateley, England, UK Aberdeen, Scotland, UK Thousand Oaks, CA, USA Aberdeen, Scotland, UK Devon, England, UK Trondheim, Norway Livingston, Scotland, UK





COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

NAVIGATION, POSITIONING SURVEY

NEXT » NAVIGATION, POSITIONING & SURVEY

96 Blueprint Subsea

98 Elwave

100 Impact Subsea Ltd.

102 iXblue

104 iXblue

106 Kongsberg

108 Kraken Robotic Systems, Inc.

110 Sonavision

112 Teledyne RD Instruments

114 Tritech International

114 UWIS 0v

BLUEPRINT SUBSEA

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

Regional Offices: #603-A, Daedeok Biz Center, 17, Techno 4-ro,

Yuseong-gu, Daejeon, Republic of Korea, 34013.

Company Intro

Driven by innovation, Blueprint Subsea has been designing and manufacturing a leading range of compact, robust, intuitive, and affordable underwater acoustic products meeting the rigorous demands of the global subsea, offshore and defence markets since 2006. Specialising in two-dimensional imaging sonars, acoustic positioning beacons and diver navigation systems, we use advanced manufacturing techniques to develop outstanding systems, without compromise.

Contact

Technical Sales – James Colebourn Sales Coordinator – Cindy Mercier enquiries@blueprintsubsea.com +44 (0) 1539531536 (UK) +82 70 7767 7766 (Korea)

www.blueprintsubsea.com



OCULUS MULTIBEAM IMAGING SONAR SYSTEMS

Our Oculus range redefines multibeam imaging sonars. Inspection or navigation, the Oculus provides outstanding image quality across a variety of frequencies. 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 and everything in between.

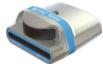


OCULUS M370S / MT370S / MD370S SYSTEMS

With a 200m range capability, these single frequency sonars are a cost-effective alternative to traditional mechanically scanning sonars, typically being used for long range navigation and situational awareness.

| Frequency: 375kHz | Apertures: 130°H, 20°V | Range: 0.2m to 200m | Beams: 256, 0.5° separation | Range Resolution: 8mm | Angular Resolution: 2°





OCULUS M750D / MT750D / MD750D SYSTEMS

General-purpose dual frequency 750kHz/1.2MHz sonars offering up to 120 metre range capability for navigation and high resolution imagery for near field target identification.

| Frequencies: 750kHz / 1.2MHz | Apertures: 130° / 130° H, 20° / 20° V | Range: 0.1m to 120m / 40m | Beams: 512, 0.25° / 0.25° separation | Range Resolution: 4mm / 2.5mm | Angular Resolution: 1° / 0.6°

Update Rate: 40Hz



OCULUS M1200D / MT1200D / MD1200D SYSTEMS

Offering high resolution imaging, these dual frequency 1.2MHz/2.1MHz sonars are recommended for specialised inspection tasks where image quality is critical.

 Frequencies: 1.2MHz / 2.1MHz
 Apertures: 130° / 60° H, 20° / 12° V

 Range: 0.1m to 40m / 10m
 Beams: 512, 0.25° / 0.16° separation

 Range Resolution: 2.5mm / 2.5mm
 Angular Resolution: 0.6° / 0.4°

Update Rate: 40Hz

OCULUS M3000D / MT3000D / MD3000D SYSTEMS

Dual frequency 1.2MHz/3.0MHz ultra-high resolution imaging sonars. These systems offer exceptional image definition for the most detailed inspection tasks.

| Frequencies: 1.2MHz / 3.0MHz | Apertures: 130° / 40° H, 20° / 20° V | Range: 0.1m to 30m / 4m | Beams: 512, 0.25° / 0.1° separation | Range Resolution: 2.5mm / 2mm | Angular Resolution: 0.6° / 0.25°

Update Rate: 40Hz

SEATRAC USBL ACOUSTIC TRACKING SYSTEMS

Always know the location of your in-water assets with a SeaTrac system. SeaTrac is a range of high accuracy USBL acoustic positioning systems 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.



SEATRAC STANDARD (X150/X110) SYSTEM

Seatrac Standard (X150/X110) System includes everything required to track the position of ROVs and AUVs in real-time down to a depth of 2000m. The high accuracy X150 USBL beacon is equipped with an attitude heading reference system (AHRS) and active doppler compensation, both helping ensure the reliability of location data. The X110 beacon benefits from a stainless steel housing and an integral AHRS making it ideally suited to installation on larger inspection/work-class ROVs.

SEATRAC LIGHTWEIGHT (X150/X010) SYSTEM

Seatrac Lightweight (X150/X010) System includes everything required to track the position of ROVs, AUVs and divers in real-time down to a depth of 300m. Using the same high accuracy X150 USBL beacon as the Standard system, the Lightweight system utilises the smaller X010 beacon giving an extremely compact solution for installation on small/micro inspection-class ROVs.



enquiries@blueprintsubsea.com sound by design



NAVIGATION,

COMPONENT SUPPLIERS AND EQUIPMENT

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

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

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 www.elwave.fr

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



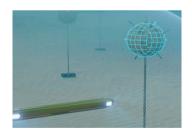
APPLICATIONS

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.



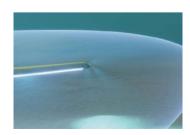
360° SAFETY SHIELD

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



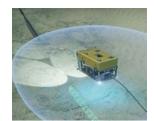
EFFECTIVE DETECTION

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.



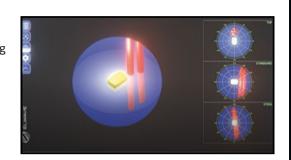
SURVEYING & CHARACTERISATION OF BURIED OBJECTS

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)

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IMPACT SUBSEA LTD.



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 temper ature sensors. In addition, we also provide ultrasonic flooded member detection systems and a bespoke subsea pressure housing design service. We design, manufacture and sup port 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

www.impactsubsea.co.uk

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



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 Acetal or Titanium and with optional integrated Heading, Pitch & Roll, the ISS360 is ideal for a large number of underwater imaging applications.

- World's Smallest Imaging Sonar
- 90 Meter Range
- No Slip Rings
- Optional Heading, Pitch & Roll
- Software to View, Log & Configure
- Depth Rated to 4,000 Meters
- | CHIRP Acoustics
- 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

Emulate Any Device Digital Interfaces

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
- 0.01°C Temperature Accuracy

- Software to View, Log & Configure | AHRS
- Optional Heading, Pitch & Roll Survey Grade
- Robust & Compact Housing



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.



Robust & Compact Housing

±0.07° Pitch & Roll Accuracy

Emulate Any Device

Software to View, Log & Configure Digital Interfaces

Depth Rated to 6,000 Meters

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

Powerful & Intuitive Software

Visualise Acoustic Returns

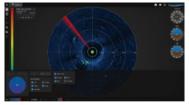
ROV or Diver Operated

| Automatic Report Generation

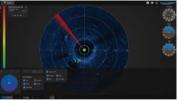
Probe Orientation Sensor

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



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 leader in the design and manufacturing of innovative solutions devoted to navigation, positioning and underwater imaging, as well as shipbuilding. Using its unique inhouse technology, the company offers turnkey solutions to its Civil and Defense customers to carry out their sea, land and space operations with optimum efficiency and reliability. Employing a workforce of 600 people worldwide, iXblue conducts its business with over 35 countries.

www.iXblue.com



Contact

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

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.

SUBSEA ATTITUDE HEADING REFERENCE SYSTEMS (AHRS)



Octans Nano OEM
Compact OEM
navigation-grade AHRS



Octans Nano Navigation-grade AHRS



Octans SubseaSurvey-grade AHRS

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

SUBSEA INERTIAL NAVIGATION SYSTEMS (INS)



Rovins NanoCompact navigationgrade 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	4 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 0.02% of the traveled distance traveled distance		0.01% of the traveled distance	0.04% to 0.01% of the traveled distance
Optional aiding sensor	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 ${\bf \hat{g}}$ 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



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 leader in the design and manufacturing of innovative solutions devoted to navigation, positioning and underwater imaging, as well as shipbuilding. Using its unique inhouse technology, the company offers turnkey solutions to its Civil and Defense customers to carry out their sea, land and space operations with optimum efficiency and reliability. Employing a workforce of 600 people worldwide, iXblue conducts its business with over 35 countries.

www.iXblue.com



Contact

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

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.



North.

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	
Depth rating	6 000m	4 000m	
Positioning system	Posidonia	Gaps Series, Ramses	
Operating frequency	8-16 kHz	20-32 kHz	
Batteries life	250 000 tonal or 55 000 wideband pings @ 20°C (Alkaline)	1600 000 wideband pings @ 20°C (Alkaline)	
Batteries life	560 000 tonal or 120 000 wideband pings @ 20°C (Lithium)	2 800 000 wideband pings @ 20°C (Lithium)	
Telecommand unit	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
Baseline type	USBL	USBL	USBL	LBL
Range (typical)	995m	4 000m	10 000m	4 000m
Position accuracy	0.5% of slant range	0.06% of slant range	0.1%	< 0.10m
Antenna aperture	200 deg	200 deg	70 deg	N.A.
Operating frequency	20-30 kHz (MF)	20-30 kHz (MF)	8-18 kHz	18-36 kHz
Integrated INS	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

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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 elQ 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.



HO 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

www.krakenrobotics.com

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

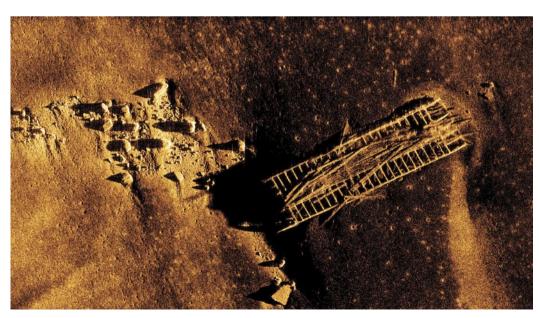


PRODUCTS

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:

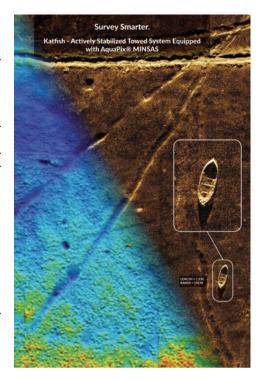
- MINSAS which uses a subset of the InSAS array elements re-packaged to make a product that is smaller and lighter.
- Kraken's Man-Portable Light Weight payload (MINSAS 60 LW) is designed to retrofit and integrate seamlessly with existing Man-Portable UUVs with diameters from 7.5 to 9 inches.



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 km2/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 NA-TO'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.

Spe	ed	MINSAS 60			MINSAS 120		
Knots	m/s	Range me- ters (per side)	ACR w/o Gap Filler km²/hr	ACR w/ Gap Filler km²/hr	Range me- ters (per side)	ACR w/o Gap Filler km²/hr	ACR w/ Gap Filler km²/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



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SONAVISION

HQ Location: Unit 13, Robert Leonard Centre, Howe Moss Drive, Kirkhill Industrial Estate, Dyce, AB21 OGG, Aberdeen, UK

Company Intro

Sonavision Limited are world leaders in the fields of seabed mapping, imaging sonar and acoustic communications and specialise in design, development and production of acoustic sonar and video technologies for underwater data acquisition. We are industry leaders with many years of experience in underwater technology and pride ourselves on customer service which is why our clients, who range from small companies to local authorities and plcs, highly recommend us.

www.sonavision.co.uk



Contact

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SV1010 SONAR

The SV1010 is a frequency agile, high performance, compact mechanical scanning sonar. It introduces a faster scan rate and improved resolution building on the solid foundation set by the successful Mercury Scanning Sonar. At the heart of the sonar is a class leading 1:3 composite transducer providing an operating frequency range of 600kHz to 1.2MHz. This continues to provide excellent long range performance at the lower frequencies whilst giving extremely high resolution at 1.2MHz. Improvements to the hardware and internal firmware have provided a scan rate





improvement of a factor of typically 2 over the existing Mercury unit. Coupled with the enhanced resolution, this truly sets the SV1010 as the essential sonar to use when quality, reliability and price are all at a premium.

- Compact and robust design
- Evolved from the successful Mercury Sonar
- 1:3 Piezo Composite transducer
- Frequency agile, tuneable 600kHz to 1.2MHz
- True Acoustic Zoom
- | Class leading resolution

- Improved, faster scan rate
- Various display modes
- PPI, A & B Scan and Sidescan
- Compatible with laptop or SCU
- Available in 300m and 3000m depth ratings

SV2020 SONAR

The SV2020 is a frequency agile, high performance, mechanically scanning sonar. The SV2020 benefits from the use of similar upgraded hardware and firmware as the new SV1010, giving much improved scanning speeds and the capability of higher data transfer rates. At the heart of the sonar is a class leading 1:3 composite wideband transducer operating over the frequency band of 325kHz to 675kHz. This provides outstanding long range performance and resolution for a sonar of its size. The unit is manufactured from Titanium with its high corrosion resistance and light



weight. The transducer is oil filled and compensated and there are no shaft seals to wear out or leak. The unit is capable of 3000m operation.

- Compact and robust design
- Optional head guard
- 1:3 Piezo Composite wideband transducer
- Frequency range 325kHz to 675kHz (1kHz steps)
- True acoustic zoom
- Class leading resolution

- Improved, faster scan rate
- Various display modes -PPI, A & B Scan, and Sidescan
- Control from laptop or SCU
- 3000m depth rating

SV4040 SONAR

The SV4040 ia a frequency agile, high performance mechanically scanning sonar. The SV4040 benefits from the use of similar upgraded hardware and firmware as used in the new SV1010, giving much improved scanning speeds and the capability of higher data transfer rates. At the heart of the sonar is a class leading 1:3 composite wideband transducer operating over a frequency band of 250kHz to 500kHz. This provides outstanding long range performance and resolution for its size. The unit is manufactured from Titanium with its high corrosion resistance and light weight. The motor assembly is oil filled and compensated and the shaft seal is fully pressure balanced and protected against damage from silt / sand ingress. The unit is provided for 3000m operation as standard.



- Compact and robust design
- 1:3 Piezo Composite wideband transducer
- Transducer in direct water contact for improved performance
- Frequency range 250kHz to 500kHz (1kHz steps)
- True acoustic zoom
- Class leading resolution

- Improved, faster scan rate
- Various display modes -PPI. A & B Scan and Sidescan
- Control from laptop or SCU
- 3000m depth rating
- Easily replaceable transducer















TELEDYNE RD INSTRUMENTS



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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 well over 30,000 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.

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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 system 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 DVL Teledyne has ever designed, making it ideally suited for today's micro vehicles. 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

The Pathfinder DVL provides an array of advanced internal algorithms and features you'd typically expect to find only in higher-end solutions. With up to 150 m of bottom tracking in up to 300 m of water, the Pathfinder 600 delivers a solid, value-priced solution for vehicles ranging from small inspection class ROVs to large diameter AUVs.

KEY SPECS	
Frequency (kHz)	600 khz
Bottom Track Range (m)	0.15 – 89m (optional 140)
Operational Depth Rating (m)	Self-Contained 300, 500m; OEM: 300, 1,000, 6,000m
Weight in Water (kg)	0.7 kg

TASMAN DVL

With bottom tracking ranges from 0.15 m to 420 m in up to 6,000M water depths, the Tasman is a cutting-edge 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.



KEY SPECS		
Frequency (kHz)	600 kHz	300 kHz
Bottom Track Range (m)	0.15 to 100m (optional 160m)	0.3 to 275m (optional 420m)
Operational Depth Rating (m)	4,000 / 6,000m	4,000 / 6,000m
Weight in Water (kg)	7.58 kg	7.58 kg

PIONEER DVL

Teledyne RD Instruments' 150 kHz and 38 kHz Phased Array Doppler Velocity Logs (DVLs) represent the industry's first DVL designed to provide precision velocity data at ranges of 500 m to greater than 2,500 m above the seafloor. This extended range makes the Pioneer 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.



KEY SPECS		
Frequency (kHz)	150 kHz	38 kHz
Bottom Track Range (m)	3-500m (optional 800m)	12 – 2500m
Operational Depth Rating (m)	1,000 / 6,000m	1000m
Weight in Water (kg)	32 kg	282 kg

TRITECH INTERNATIONAL

Headquarters, Sales & Support HQ Location: Peregrine Road, Westhill Business Park, Westhill, Aberdeenshire, AB32 6JL, Scotland, UK

Design & Manufacture & Service: Oubas Hill, Next Ness Lane, Ulverston,

Cumbria, England. LA12 7LB, UK

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

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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www.tritech.co.uk



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 Tritech sensors.



MULTIBEAM SONARS:

GEMINI 720IS

Tritech'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

Tritech'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 Tritech'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 op-



erations. 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

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PRODUCTS





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, ±2,5m in absolute and ±0.2m 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 » ROV CONTROL SYSTEMS

120 Aleron Limited

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

ROV CONTROL SYSTEMS

ALERON LIMITED



HQ Location: Aleron House, Unit B, Kintore Business Park, AB51 0YO. Scotland. UK

Company Intro

Aleron Limited specialise in supplying complete ROV solutions globally for an array of applications. Aleron design and manufacture ROV systems including the industry recognised AUXROV, TRACKROV and MultiROV. With an extensive range of in-house components and their developed Gladiator control system, Aleron offer flexible innovative designs which have evolved with industry demands.

Aleron also provide clients responsive, efficient and fit for purpose subsea tooling solutions with flexibility at the forefront of all projects. In addition to their range of proven and reliable ROV tooling packages, they have in-house capabilities to design and build custom ROV Tooling solutions, based on individual project requirements.

The Aleron Group previously consisting of individual entities, Aleron Subsea and ROVQUIP, are now formally recognised as the single entity of Aleron Limited to strengthen their packaged solutions offered to clients.

Contact

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GLADIATOR CONTROL SYSTEM II

Aleron Limited looked to design a solution to extend the life of subsea ROVs by replacing aging electronics with a cost effective, easy to use and highly capable ROV control system. Enter the Gladiator II Control System. Developed in house, Aleron have a range of subsea and surface PCB boards which can be used to upgrade and operate any ROV system. The control system has been used extensively on their AUXROV vehicles as well as the newly launched MultiROV.

The new Gladiator II Control System builds upon the basic components of the original design. However, it is now a network-based system with the emphasis on a flexible and scalable solution using high speed fibre optics and messaging protocols.

On the ROV there is a single Electronics Pod which connects to oil filled Signal Junction Boxes which are located close to the sensors they serve, allowing a distributed architecture to be achieved keeping cabling, whips and wiring on the vehicle to a minimum.

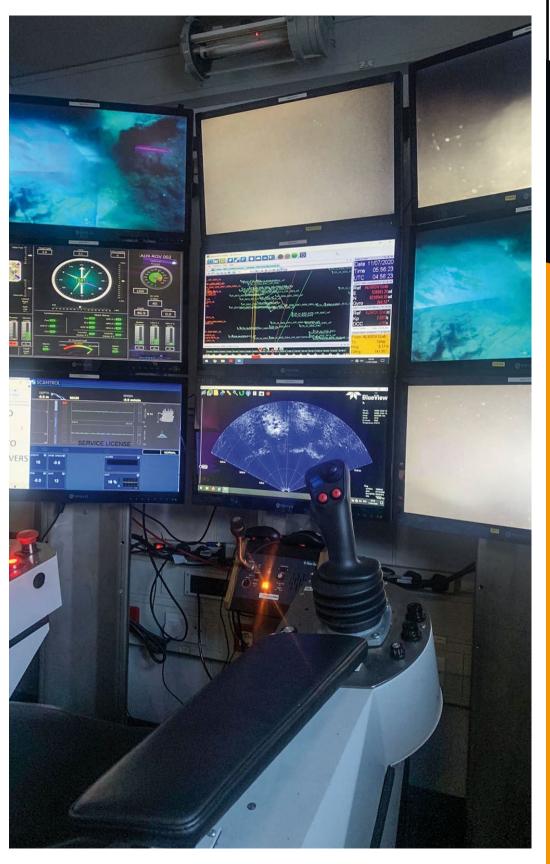
In the Control Cabin the efficient and uncluttered working environment meets the latest HSSE standards and features a pilot console, 24" touchscreen interface as well as a video wall for clear presentation of video and data.

The Gladiator II control system is designed to be user friendly with minimal complexity and minimal components while offering state of the art electronics high speed net working and fibre optics.

Data Highwav:

- 7×10/100/1000 base ethernet channels
- 2× independent 10/100/1000 base ethernet channels (for high speed Sonar/Multi-Beam)
- 32× RS232 serial data channels (20 off are software switchable between RS232 and RS485)
- 12× RS485 serial data channels
- 2× 4K UHD HD-SDI Camera Channels
- 8× SD Composite Camera Channels







NEXT » ROV PILOT TRAINING

124 QSTAR

126 Skilltrade

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

ROV PILOT TRAINING

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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

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.



rovtraining@qstar.es +34 619 686 473

+34 616 604 778

www.rovtrainingcentre.com



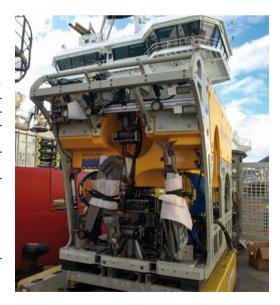
+34 936 338 627

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 división 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 CO05) document RO04. 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 faciliies, quay and on-boad 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 onboard 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 Proffesional ROV simulator with different models and scenarios.



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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 71 561 13 65

www.skilltrade.nl



TRAINING

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

Underwater acoustics

Physics

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.

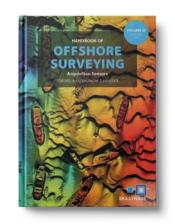
HANDBOOK OF OFFSHORE SURVEYING

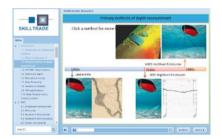
Skilltrade also publishes the Handbook of Offshore Surveying, a 3 volume encompassing series, unmissable for the modern-day hydrographer.

For more info, visit our online bookstore: www.skilltrade.nl/bookstore









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NEXT » **ROV TOOLING**

130 Aleron Limited

132 Seanic Ocean System

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

ROVTOOLING

ALERON LIMITED



HQ Location: Aleron House, Unit B, Kintore Business Park, AB51 0YO, Scotland, UK

Company Intro

Aleron Limited specialise in supplying complete ROV solutions globally for an array of applications. Aleron design and manufacture ROV systems including the industry recognised AUXROV, TRACKROV and MultiROV. With an extensive range of in-house components and their developed Gladiator control system, Aleron offer flexible innovative designs which have evolved with industry demands.

Aleron also provide clients responsive, efficient and fit for purpose subsea tooling solutions with flexibility at the forefront of all projects. In addition to their range of proven and reliable ROV tooling packages, they have in-house capabilities to design and build custom ROV Tooling solutions, based on individual project requirements.

The Aleron Group previously consisting of individual entities, Aleron Subsea and ROVOUIP. are now formally recognised as the single entity of Aleron Limited to strengthen their packaged solutions offered to clients.

Contact

Gary McConnell gary@aleron-group.com +44 (0) 1467 424060

www.aleron-group.com



MULTI-SKID

The flexible Multi-Skid can be configured for connection to almost all Work-Class ROV's, suitable for a wide range of applications. The Skid is constructed from a lightweight aluminium frame and has been designed to maximize available space, whilst still providing positive buoyancy. With no welded parts the Multi-Skid is a modular, user friendly Multi-purpose skid, offering the client an adaptable and robust solution that can be easily maintained.



Various tooling solutions can be situated in the skid, including but not limited to; 250L+ Fluid reservoirs, BOP Intervention Systems, Fluid/Methanol Injection Systems, Retractable Tooling Drawers, Intervention Tooling and Survey & Inspection tools.

HYDRATE REMEDIATION SKID

The Aleron Limited Hydrate Remediation Skid (HRS) was developed to offer a 4-stage solution to Hydrate Remediation Operations. The diverse solution has the ability to skilfully switch between:

- Methanol Injection up to 10,000 psi
- High pressure heat jetting 3,000 psi
- Heat Injection 50 60 degrees above ambient De-Pressurisation operations

Successfully proven in-field on various offshore operations, the flexible HRS skid is compatible with Forum XLX and Schilling HD systems as standard, although, easily adapted to any work class interface.

T4 & ATLAS 7 FUNCTION RATE MANIPULATORS

Aleron Limited now operates an extensive rental fleet of T4s and Atlas 7 function rate manipulators. Aleron Limited has the capability to service, repair and configure each system in-house to bespoke customer requirements, with a large stock of parts to allow for quick turnaround times between rentals. Dedicated to improving how Manipulators are controlled, Aleron Limited have established partnership agreements with OLIS and ICSystems alongside internal software and engineering capabilities. Aleron Limited strives to drive down high maintenance and damage costs by the addition of new technology, making it easier for the operator to use the systems.



CABLE RECOVERY TOOL & WEBTOOL HCV270

The Webtool Cable Recovery Tool was developed in consultation with international certification body and classification society, DNVGL, allowing the safe and controlled recovery of damaged cable and umbilical, up to 8" (203 mm) diameter.

Current methods of recovering umbilical's for repair or replacement are laborious, time consuming and expensive. They involve trenching the seabed around the cable or umbilical to allow a double choke sling to be attached using a ROV.





As a combined packaged solution, Aleron Limited supply a range of complimentary tools and technical support, including the Webtool HCV270 to be used on cutting operations for high tensile Steel wires.

10K IHPU

Aleron Limited stock an extensive range of IHPU's and Dirty work packs to service a range of subsea tasks. The industry recognised 10,000psi IHPU, is a versatile tool used for numerous subsea applications including: Operating BOP Tooling, Transferring Media, and Pressure Testing.

The input pressure is directly proportional to the output pressure, offering full proportional pressure control from the robust HPU design.

The pump can be connected to any subsea reservoir by the suction port (12 JIC). Aleron Limited supply various sizes of soft reservoir and piston reservoir with an electronic readout depending on individual project requirements.



0-120 LPM DWP

The 0-120 LPM Dirty Work Pack is designed to protect the main hydraulic circuit of the ROV system from contamination during fluid transfer operations by providing an isolated circuit. The reliable tool is commonly used with higher flow tooling such as dredge pumps and cutters.



DYNASET 520 CAVITATION NOZZLE

Working in partnership with Cavi-blast UK and Cavidyne USA, Aleron Limited have developed a specialised nozzle for the HP Jetting system Dynaset 520 used by most work class ROVs. The nozzle provides a cost-effective alternative solution for ROV operators avoiding the expense of purchasing a complete pumping system. The Cavitation nozzle has the added benefit of allowing cavitation to greater depths compared to standard cavitation nozzles currently on offer, operating with a lower flow but higher pressure.



122E60-CE CAVITATION SYSTEM

The 122E60-CE Cavitation System supports the small ROV market, with a specially designed retro nozzle that allows a certain percentage of power to be used for cleaning. Operators have the ability to utilise small low powered ROVs to perform cleaning tasks whilst remaining to hold station. The topside driven unit can be plugged directly into harbour or vessel power and receives its water supply from seawater, mains supply or tank fed. The nozzle is attached directly to the ROV and a hose combination allows hose lengths from 30-90 mtr to be used.

SEANIC OCEAN SYSTEMS



HQ Location: 25310 Clay Rd., Katy, 77493, USA

UK Offices: 5A International Avenue, ABZ Business Park, Aberdeen, AB21 OBH, UK

From initial concept development to the final factory acceptance test, Seanic Ocean Systems engineers and delivers quality subsea products that last.

Seanic Ocean Systems, a Centurion company, specialises in the supply of marine and subsea support equipment to the diving, ROV and decommissioning sectors within the offshore oil & gas and renewables industries. We can provide customers worldwide with a fully integrated service from our UK or US locations and international distribution centres, designed to support the needs of the major oil operators and service companies in complex subsea operations.

US Office Contact Person

info@seanicusa.com

Andy Guinn

+1 713 934 3100

UK Office Contact Person

Omar Irvine oirvine@seanic.co.uk +44 (0)1224 222695

www.seanicusa.com



SEANIC PRODUCTS

Seanic's high-calibre engineering and development of custom intervention products will power the success of your ROV or diving operations as they face project challenges. Our real-world experience can help you merge cost effectiveness and efficiency into tooling packages that best suits your project needs. We also offer standard product lines that are immediately available for rent or purchase.



TOROUE TOOLS

Seanic's array of various Torque Tools have been designed in our tradition of providing customers a Simple Rugged and Reliable product. Due to the high cost of downtime in the field, we recognised the industries need for a dependable tool and have built convenience and reliability into our torque tools ranging from Class 1-4, Class 5 and Class 6/7.





PUMPS

This unique pump has the ability to pump a multitude of fluids and can be used for methanol service with no risk of cross contaminating the ROV's supply oil. These pumps can be delivered with a variety of different reservoirs and directional control valves rated for 10k and 15k service. The pump is rated for use in 10.000 FSW and is made of corrosion-resistant materials, making it robust and reliable for subsea use. The pump is ideally suited for hydrate remediation work, as it can draw a powerful 22 in HG vacuum.







through ROV intervention. Custom lockout positions are available. In addition to the LVOT, three different size lockouts are supplied to lock the linearly actuated valve at the 2-inch, 5-inch and 7-inch positions. Seanic has also designed and manufactured an API 17H LVOT Type B for use in all standard API 17H Type B linear interfaces. This Tool is capable of 250,000 lbf for linear override, exceeding API 17H standard override force of 167.500 lbf.





STABS, MANIFOLDS & PANELS

Seanic can custom design and manufacture ROV Intervention Panels per customer requirements. All panels and components will be designed and built under API Guidance to ensure ROV friendliness. Our staff has years of experience designing and building this equipment, providing you the confidence it will be done right the first time. every time. Seanic can provide all components such as Hot Stabs/Receptacles, ROV Torque Receptacles, Ball Valve Actuators and Gauges.





CUTTING & DRILLING

Seanic's hydraulic Core Drill is designed to make holes in jacket legs and other structures for lifting jig installation, flooding or inspection access. The drill is hydraulically actuated and attaches to the structure via sticky



feet suction cups. Capable of being operated by any work class ROV of opportunity. Seanic can offer a variety of designs that includes a Mag Drill that allows an ROV to attach the drill to any metallic subsea surface to cut holes of varying diameters.

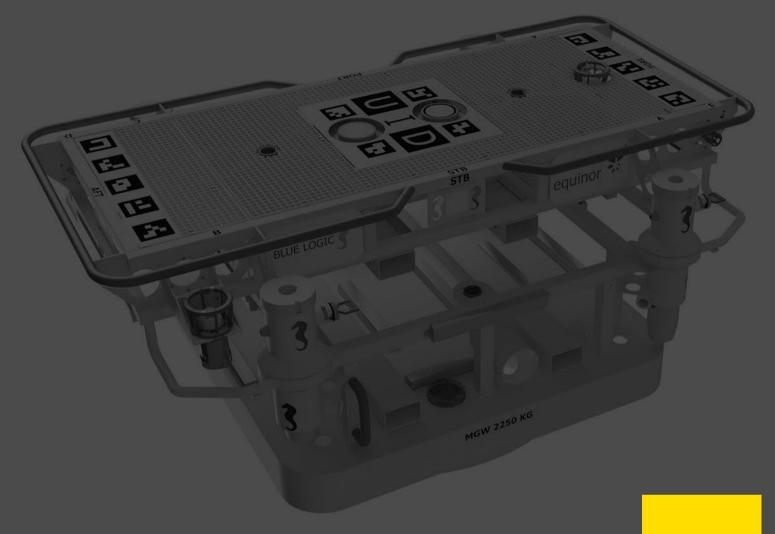




DECOMMISSIONING TOOLS

Seanic is known for providing robust products for decommissioning projects that includes hydraulic shear cutters, hydraulic grab tools, saws, ROV shackles of various types and sizes. When your planning you next project put Seanic on your list.





1.18.

NEXT » SUBSEA & UNDERWATER DRONE INTERFACES

136 Blue Logics

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

SUBSEA & UNDER-WATER DRONE INTERFACES

BLUE LOGIC

Location: Luramyrveien 29, N-4313 Sandnes, Norway

Company Intro

Blue Logic is a complete supplier of cost-effective, high-quality standard mechanical, hydraulic and electrical interfaces to the global subsea market.

Our "One Subsea World" vision aims to simplify your operations

through standardisation of interfaces, harmonisation of requirements and modular based systems. Using our project and engineering capacity in combination with our standard products and interfaces, we are supporting the next generation subsea resident drones to reduce CO2 footprint and to provide multi-task on-demand subsea and

Get in touch if you would like help to enhance your

subsea operations. You can find product drawings and bespoke examples on our web shop: e-sea.bluelogic.no

sales@bluelogic.no +47 91 00 69 50

inspection services.

e-sea.bluelogic.no



BLUE LOGIC

HYDRAULIC INTERFACES

HOT STABS AND VALVE STABS™

We have established a complete and comprehensive range of subsea hydraulic interfaces and coupling systems ranging from Ø35 to Ø200 (¼" to 10") and from 3,000 psi to 20,000 psi.

Our Hot Stab Program, covers dimensions from 028 to Ø200 mm in compliance with API 17H type 1 to type 4. Our Hot Stabs are fully pressure balanced, equipped with our unique and highly robust seal system and can be delivered with 1-6 individual hydraulic ports with different bore sizes and pressure ratings.

Blue Logic have also developed a unique and patented Valve Stab™ system which best can be described as a combination of a pressure-balanced Hot Stab with inte-

grated Ball Valves in each port on both the receptacle and stab side. The Valve Stab™ system offers a 100% leak-free and unrestricted flow path with superior flow performance. Connection and disconnection can easily be performed with full system pressure on each side.

Based on our Valve Stab[™] technology, we have also developed a range of pull-in heads where the Valve Stab[™] receptacle is an integrated part of the structural pull head body. Both pull-in and flushing are performed in an ultra compact weld free and single tubing design. The Valve Stab™ technology are also used in our world leading auto-release (emergency quick disconnect) subsea connector systems. Blue Logic Auto Release systems provides a leak-free resettable connection and safety system.



INDUCTIVE POWER AND COMMUNICATION CONNECTOR SYSTEM

Our Subsea USB underwater connectors are based on inductive technology for the transfer of electrical power and communication. The "Subsea USB" family currently covers a power range from 50W to 2kW, Ethernet communication speeds up to 80 Mbps and RS232 or RS485 serial communication speed up to 230 kbps.

Our Subsea USB Connectors offers an infinite number of wet connection/disconnections for numerous applications.



	Power	Ethernet – Capacity	Serial data comms
Subsea USB A.01	Max 50W	85 Mbps	230kbps RS232/RS485
Subsea USB B.01	Max 250W	85 Mbps	230kbps RS232/RS485
Subsea USB C.01	Max 2000W	85 Mbps	230kbps RS232/RS485
Subsea USB D.01	Max 2500W	85 Mbps	230kbps RS232/RS485

MECHANICAL INTERFACES

ELECTRICAL TORQUE TOOLS, ACTUATORS AND VALVE OPERATION

Our wide range of mechanical interfaces covers all your subsea operations for intervention and permanent applications, static and dynamic movements.

We provide linear and rotational interfaces to operate valves, locks, tooling and lifting for ROV or tool applications, in fact any type of subsea motion can be provided.

In addition to different interfaces, we also provide intervention/ permanent tooling to operate and execute all types of interfaces and movement. This includes also electrical torque tools, torque multipliers, handles etc. We believe our electrical torque tool is the world's lightest subsea torque tool ever built, perfectly suited for ROVs and even small AUVs with limited lifting capacity. All torque tools from Blue Logic has interchangeable outputs keys. automatic Class 2/4 detection for high or low torque mode and absolute output key position sensing.





We also stock a wide range of ROV handles, corrosion free and offshore interchangeable flex joints, and our ultra-compact lightweight Standard API/ ISO Class 6 & 7 Torque Multiplier, with 10, 15 and 50 kNm output torque configurations.

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COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS



NEXT » TETHER MANAGEMENT SYSTEMS

140 Soil Machine Dynamics Ltd (SMD)

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

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

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 graeme.jaques@smd.co.uk|rovs@smd.co.uk Tel: +44 (0) 1912348619 | Mob: +44 7813606336 +44 (0) 191 234 2222 (UK) | +86 21 2078 2027 (China)

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 × H)	1775 × 2265 mm	69.9 × 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 × H)	2175 × 2475 mm	85.7 × 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)



NEXT » THRUSTERS & PROPULSION

144 Blue Robotics

146 maxon motor

148 Soil Machine Dynamics Ltd (SMD) – Curvetech

150 Tecnadyne

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

THRUSTERS & PROPULSION

BLUE ROBOTICS



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

Company Intro

Contact

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/

product-category/thrusters/



THRUSTERS

T200 THRUSTER

sales@bluerobotics.com

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



MAXON MOTOR

Location: Untere Ziel 1, 79350 Sexau, Germany

driven by precision

maxon motor

Company Intro

motors are pressure compensated, compact and energy 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.

Maxon drives are used wherever reliability and precision Maxon motor, the worldwide leading provider of high are essential. Our underwater drives with brushless DC precision drive technology, draws on more than 50 years of experience and innovation to design underwaefficient. They are perfectly suited to ROVs and AUVs. ter propulsion systems. Our motor-gear combinations Having new components at our disposal that are lighter are developed using DC brushless motors and planetary

Contact

Marketing aquaticsolutions@maxonmotor.com +49 7641 / 9114 - 0 | +49 7641 / 9114 - 0) 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			
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	мсвн8м Ті	МСВН8М Ті	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



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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

With over 20 years' knowledge and experience of providing integrated solutions for subsea and marine applications, Curvetech® 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 Curvetech® components to deliver world-leading products that enable customers to maximise on remote subsea operations.

As well as direct selling of Curvetech 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/curvetech-components/



FOR ALL YOUR SUBSEA COMPONENT NEEDS

Curvetech® 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 Curvetech® Components so that customers can ensure suitability to their product. Covering a range of applications, the Curvetech® 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. Curvetech® 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 Curvetech® 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 Curvetech® compensators offer a wide range of field proven reliable configurations. All Curvetech® 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 Curvetech® 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 Curvetech PACS system is an integrated package of Curvetech 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. Curvetech PACS systems can also include top-side tether winches and bespoke control systems utilising our well proven DVECSII control platform. Curvetech 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

worldwide subsea robotics industry, manufacturing underwater brushless DC propulsion systems, rotary & linear hicles, manned submersibles and other subsea platforms. Ocean Engineering, ECA Robotics, Outland Technology, ties and research institutions.

For over 30 years Tecnadyne has been a leader in the 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 actuators, pan & tilt positioners, hydraulic power units, position sensors, and pressure compensators for use on Re- the most dependable and longest lasting products in the motely Operated Vehicles, Autonomous Underwater Ve- industry. Tecnadyne products are presently being used on thousands of vehicles throughout the world, operated Many leading subsea vehicle manufacturers (Deep by many leading offshore oil service companies, universi-

sales@tecnadyne.com +18585869660

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

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





NEXT » UNDERWATER 3D IMAGING

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156 Dimensional Eye

COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

UNDERWATER 3D IMAGING

COMEX INNOVATION



HQ Location: 36, bd de l'Océan, CS 80143, 13275 Marseille, Cedex 9, FRANCE

Company Intro

Comex Innovation is a World pioneer in the development of technologies for manned intervention and robotics in extreme environments. With Comex's long lasting experience in underwater imaging, marinisation and integration of equipment for implementation in extreme environments, Comex Innovation department develop and realize solutions for complex underwater imaging. From integrated systems such as ORUS 3D® (very high resolution three-dimensional modeling system for remote-controlled machines) to specific systems made on demand, the Innovation department meets the requirements of underwater imaging systems for Science, Defence and Industry needs.





Contact

info@comex.fr Phone Number: +33 4 91 29 75 11

www.comex.fr

ORUS 3D®: OPTIMAL RECONSTRUCTION OF UNDERWATER SITES

The photogrammetry solution that revolutionizes subsea inspection and metrology





The ORUS3D® is recognized as the most advanced underwater photogrammetry solution on the market. (COMEX ORUS 3D® first subsea photogrammetric system certified by BUREAU VERITAS Marine & Offshore Division)

The ORUS3D® non-contact underwater photogrammetry system allows three-dimensional, high-precision modelling of all subsea structures and seascapes.

Each ORUS 3D® system consists of two subsea parts: a neutral buoyancy tiltable support carrying a trifocal optical sensor whose shots are synchronized with 4 high power built-in LED lights, coupled with an acquisition unit, featuring quality control and real-time data processing. The system acquires multiple images of very high resolutions which are then processed automatically in order to deliver the most accurate possible 3D reconstruction of the visually inspected object. The unmatched to date and certified precision of the measurements, allow to realize underwater metrology in all fields of activity, meeting the requirements of the Industry, of Defense and of marine sciences. One of the main features of this standalone system is that it does not require any external underwater navigation sensors (namely USBL, LBL, inertial navigation + DVL, positioning systems) nor specific markers as no scale reference with the objects is necessary.

As a result, this system is completely contactless and non-intrusive. Mounted onto any type of ROV, it can be operated regardless of any constraints on the methodology of acquisition. The system only requires a power, video and data link to the surface from the ROV.

The real-time processing of the data carried out by the embedded acquisition unit enables a visual odometry producing a scaled sparse point cloud, thorough coverage monitoring of the inspected area as well as efficient quality control on each pictures confirming sufficient sharpness, illumination and overlap by a colour code indicator. This real time representation of the area surveyed provides useful indications to the ROV pilot, guiding him in his inspection task and guaranteeing full coverage of the scene. This process also provides all the information needed to validate the data before further post-processing, thus resulting in a 3D model with sub-millimetric precision. These results are usually presented in the form of scattered then dense clouds of dots, which can then be meshed and textured in order to obtain a visual rendering at the closest to reality. They are then accessible to as many people as possible via dedicated tools, web platforms or virtual reality systems.











3000m sensor beam

6000m sensor beam

300m Diver version back view

300m Diver version front view

300m ROV mountable version

	Spe	ecifications	3000 and 6000m systems	300m system
	Res	solution	0,1 mm	0,1 mm
RMANCE	Acc	cuaracy	Sub-Millimetric / no navigation accuracy dependant	Sub-Millimetric / no navigation accuracy dependant
	Opt	tical	Very high-resolution trifocal sensor (Ultra HD stills capabilities) – Pre-cali- brated sensor (scaled data acquisition)	Very high-resolution trifocal sensor (Ultra HD stills capabilities) – Pre-cali- brated sensor (scaled data acquisition)
PERFORM	Poi	nt Cloud	Adaptative model density – Serval millions point on 1000 square meter or on 1 square meter	Adaptative model density – Serval millions point on 1000 square meter or on 1 square meter
	Sca	ın Method	Free flying data acquisition supported by real time visual odometry, data analysis and QC	Free flying data acquisition supported by real time visual odometry, data analysis and QC
AL	Pov	wer Require- nts	300 Watts	250 Watts
T E	Ope	erating Voltage	110V to 310V AC or DC	48V DC or 230V AC
ELECTRICAL	Dat	ta Interface	Optical fiber link, Ethernet link (Giga- bit or 10/100) or single copper pair (Gigabit Ethernet Link Advisable)	Optical fiber link, Ethernet link (Gigabit or 10/100) or single copper pair (Gigabit Ethernet Link Advisable)
	Dep	oth Rating	3000m standard (6000m optional)	300m
			10kg in sea water (3000Msw rated Buoyancy) 100 kg in air	1kg in sea water / 25 kg in air
AL	Housings Material Titanium		Titanium	Aluminium
MECHANIC	Car	mera Housing	Titanium camera housings with optically corrected glassdomes	Aluminium camera housings with optically corrected glassdomes
MEG	Sizo	e	Sensor beam (630×420×550mm); Embedded unit (470×220mm) – Integration from Observation to Work class ROV	Sensor beam (450×225×238mm); strobes powering unit (360×120mm) – Integration from Observation to Work class ROV or Diver handheld
	Cor	nnectors	CRE-MARINE 6000Msw (or customer specified on demand)	CRE-MARINE 6000Msw (or customer specified on demand)
	edded Unit	Data Acquisition	Real time acquisition with big data flow management / 2 To data storage standard (more optional)	Real time acquisition with big data flow management / 2 To data storage standard (more optional)
ARE	Embedo	Data Processing	Real time analysis (Visual odometry, coverage with sparse point cloud, data quality control)	Real time analysis (Visual odometry, coverage with sparse point cloud, data quality control)
SOFTWARE	Unit	Data Analysis and Processing	Fast 3d reconstruction handling very big data collection – Models viewer, metrology tools	Fast 3d reconstruction handling very big data collection – Models viewer, metrology tools
	Surface Unit	Export Data Formats	.obj, .ply, .xyz, .neu, .sti, 3ds, .wrl, .dae, .jas, .e57, .cl3, .pts, .dxf, .u3d, .pdf, .fbx, .kmz, .csv, .asc, .bin, .shp, IGES,	.obj, .ply, .xyz, .neu, .sti, 3ds, .wrl, .dae, .jas, .e57, .cl3, .pts, .dxf, .u3d, .pdf, .fbx, .kmz, .csv, .asc, .bin, .shp, IGES,

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.Parasolids ...

DIMENSIONAL EYE



HQ Location: 5115 Douglas Fir Road | Unit B, Calabasas, CA 91302, USA

a high-tech small business with more than twenty vears of experience in the development and implementation of software, hardware and methodologies in Close Range Photogrammetry and Laser Technologies (ISO 9001 certified).

or complex 3D Metrology project. The company has developed and patented innovative solutions such as VLSTM (Video Laser ScanTM), providing the most

Dimensional Eye – also known as DimEye Corp. – is accurate and certified results with the most time and cost-effective methods for each application. Dimensional Eye focuses on inaccessible and/or hazardous environments such as Offshore and Subsea Oil & Gas. Nuclear Power Plants. Wind Tunnels, Confined Spaces and Large Telescopes. Dimensional Eye provides solutions to every basic Dimensional Eye is headquartered in Los Angeles California, operating worldwide (North, Central and South America, Africa, Europe, Asia, Oceania).

Contact

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www.dimeye.com



VLS™ (VIDEO LASER SCAN)

Dimensional Eye offers revolutionary optical 3D measurement with VLS™ (Video Laser Scan). VLS™ is the result of a joint development between Dimensional Eye and BP America. VLS™ was developed to overcome specific measurement challenges in the subsea environment, and has proven to be an extremely versatile and highly accurate 3D metrology tool in multiple industries.

VLSTM is a unique combination of photogrammetry and laser technique which provides the advantages of both technologies without the disadvantages. VLSTM provides high-definition visual inspection, asbuilt 3D CAD modeling. 3D high density point cloud and mapping of deformations and anomalies (for example: cracks, dents, bulges).

VLSTM is a high accuracy metrology tool linked to NIST (National Institute of Standards and Technology) that provides high-redundancy through the volume of data collected (1000's of still images can be captured from HD video in seconds rather than individual photos taken manually at each location). VLSTM provides reliable accuracy estimates (thanks to advanced processing and self-calibration algorithms developed by Dimensional Eye after years of industry experience in multiple measurement environments and scenarios).

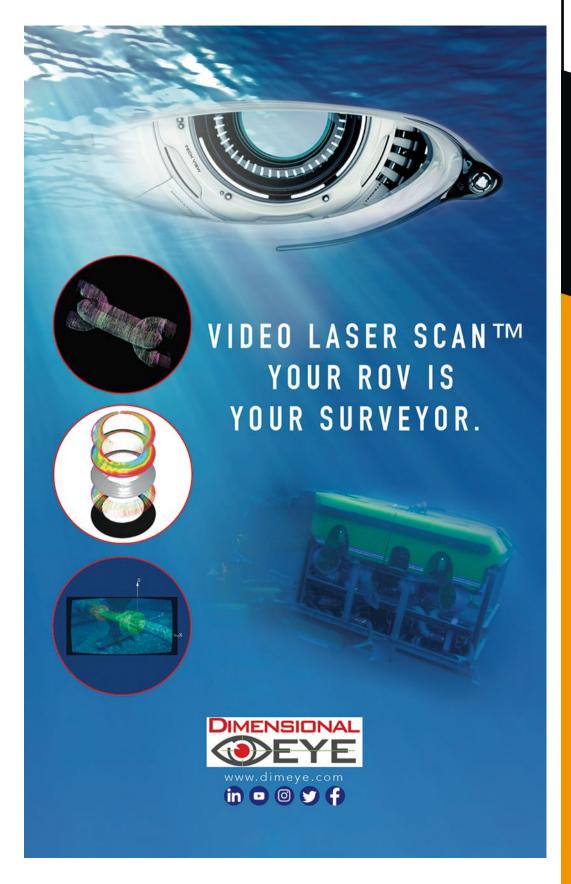
VLS™ is deployed by ROV or divers for subsea applications and by drone for applications in air.

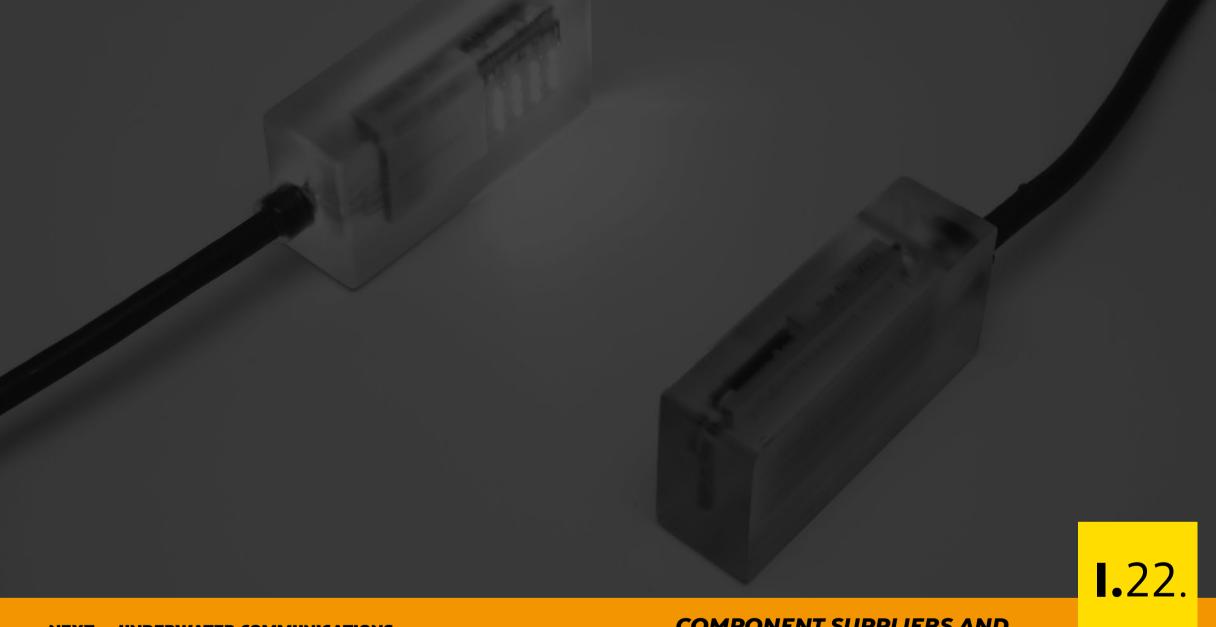
VLS OFFSHORE APPLICATIONS

VLS™ (Video Laser Scan™) is deployed by ROV or by divers to gather the data used to create high accuracy 3D measurements and models. If you can fly it, we can model it. The ROV simply flies by the structure in order to gather the data required for modeling. The VLS is designed to work with most ROV systems, contact us for more information on how we can put VLSTM to work on your 3D Measurement and As-Built CAD Modeling challenges.

- | Flex Joint 3D Inspections
- Mooring Chain 3D Measurements
- Damage 3D Mapping
- Wellhead 3D Inspections
- Manifold 3D As-built CAD Modeling
- | Jumper Hub Alignment

- Spool metrology
- Hull/Propeller Inspections in Water
- 3D As-Built CAD Modeling of any Industrial Installation





NEXT » UNDERWATER COMMUNICATIONS

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COMPONENT SUPPLIERS AND EQUIPMENT MANUFACTURERS

UNDERWATER COMMUNICATIONS

HYDROMEA SA



HQ Location: Avenue Longemalle 11, 1020 Renens, Switzerland

Company Intro

With over 15 years of expertise in building portable, rugged and affordable components for ROVs, Hydromea designs and produces wireless optical modems under a LUMATM brand that can all be deployed to diving depths of 6'000m. Optical communication offers superior data rates, low latency and lower power requirements compared to acoustic modems. This makes it the perfect choice for applications such as fast data download from submerged sensor platforms (landers), real-time HD video feed, wireless control as well as wireless interfacing between ROVs/AUVs and deep sea infrastructure. They are characterized by small size, low weight and wide-angle communication range (120-degrees beam cone). All feature advanced FEC and auto-wakeup. The modems do not require any protocol layer and will work right from the box just like if you'd plug a cable. They have been in various subsea deployments since 2018, performing equally well in murky waters of the North Sea during subsea construction projects and at 4'200m depth in a research mission in the South Pacific Ocean.

Contact

ROV@hydromea.com +41 787 468 639

Dimensions:

100 x 50 x 30 mm

www.hydromea.com



LUMA 100 PERFECT AFFORDABLE REPLACEMENT FOR WET-MATE DATA CONNECTORS

Replacing your wet-mate data connectors with LUMA TM 100 modems will save time and effort required to physically plug connectors. Simply come within 1-2 meters distance for the effortless data exchange wirelessly. With wide-angle beam cone of 120 degrees, no need to face the modems eye-to-eye.





LUMA 250LP ULTRA-LOW POWER MODEM FOR AMBIENT LIGHT ENVIRONMENTS

The LUMATM 250LP is extremely energy efficient, which makes it ideal for battery-powered applications. It can be configured to enter a sleep mode after a specified time of inactivity, and optically woken up from sleep by another modem when the link is re-established. It is also best suited for ambient light environments.

Dimensions: Weight in air: 250 g Data rate: 250 Kbit/sec 100 x 50 x 30 mm Weight in water: 50 g Range: up to 7 m



LUMA 500ER HIGH DATA RATES IN THE MOST COMPACT FORM FACTOR

The software-configurable serial cable interface can be set to RS232 or RS485, which makes the LUMATM 500ER the ideal drop-in replacement for cabled connections in many existing systems. With the longest range and high data rate, this modem provides enough flexibility for even most demanding jobs.

Dimensions: Weight in air: 250 g Data rate: 500 Kbit/sec 100 x 50 x 30 mm Weight in water: 50 g Range: up to 50 m



LUMA X THE FASTEST MODEM CLOCKING UP TO 10MBPS SPEEDS

LUMATMX is our patent-pending ultimate subsea warrior making real-time wireless HD video stream a reality. The modem sends data within the 120-degree beam cone as far as 50m away (in clear water). It offers both ethernet and serial cable interface, self adjusts to the light pollution and has a titanium housing. It is highly customizable for complex networking.



Dimensions: 100 x 60 mm

Weight in air: 650 g Data rate: 10 Mbit/sec Weight in water: 300 g Range: up to 50 m

it/sec



WATCH OUT FOR THE EXCITING NEW EXPANDED PORTFOLIO OF ROV PLANET SERVICES!



Never lose track of your AUV.

NEW GAPS M5 USBL SYSTEM

Gaps M5 offers an export-free, pre-calibrated positioning and communication solution for the tracking of subsea vehicles and towfish. Its telemetry feature allows for AUV control & command, INS recalibration. as well as efficient data retrieval.



