



FUGRO

M.V. FUGRO PIONEER

M.V. Fugro Pioneer has been built to the highest standards demanded of a modern internationally operating multi-purpose survey vessel.

The diesel electric propulsion, specially designed hull, resilient engine mounts and rudder propellers maximize station keeping and navigational control while ensuring acoustically quiet running at survey speeds.

Designed with consideration for safety and environment, Fugro Pioneer is a compact flexible platform supporting a wide range of offshore services with a typical operational profile of geophysical, geotechnical survey operations up to 1000m WD.

It's limited 3m draft adds to its capabilities to operate in shallow water nearshore. The vessel can easily be configured to support light ROV and environmental operations. The 53 metre-long vessel is prepared for dynamic positioning and equipped with state-of-the-art survey equipment.



State of the Art Kongsberg Dual Head Dual Ping Multibeam in retractable moonpool system.



Limited draft makes it specifically suitable for survey nearshore.





M.V. FUGRO PIONEER

Technical specifications

General info

Name	Fugro Pioneer
Classification society	DNVGL
Flag state / Port	Bahamas Maritime Authority / Nassau
Build(er)	September 2014 – Damen Shipyards Galati
IMO / Cal sign	9701645 / C6BH3
Official Number	7000674

Dimensions

LOA.	53.7m
Beam	12.5m
Draught (summer) max.	3.1m + 0.26m blister
Tonnage	1322T
Deck area aft	250m ²
Deck strength	5T / m ²
Deck load	81,6T

Accommodation

Cabins	30+4 Bunks / 10x Single cabins, 10x Double cabins
Crew (Typical)	11x Marine Crew, 20x Survey Crew
Recreational	1x Dayroom, 1x Gym
Work Offices	2x Survey, 1x Meeting room

Machinery

Propulsion	2x Azimuth thrusters (electric)
Bow thrusters	1x Tunnel thrusters (electric)
Cruising speed	10 kn
Survey speed	Variable as required
Maximum speed	11.2 kn

Electrical power

Diesel generator sets	4x 372kW
UPS supply survey	1x 30VA, 220vac

Capacities

Fuel capacity	305 m ³
Fuel consumption (FOC t/day)	Survey 3t / Stationary (DP) 4.2t / Transit 6t
Potable water capacity	115 m ³
Water making	6 m ³ /d

Control and navigation

DP System	Imtech DP-0
Radar	Hagenuk Bridgemaster FT CAT1/2 S-band and X-band
Electronic chart	Imtech ECDIS (Single)
DGPS	1x Kodan KGPGZO / 2x Fugro Starpack
Magnetic compass	Sperry Jupiter

Deck Machinery

Deck crane aft	Palfinger PK65002 MD
Storage crane forward	Palfinger PK15000 MC
Hydraulics Ring Main system	300bar / 200ltr.
A-frame aft (geophysical)	2x 3/6T SWL
A-frame side (geotechnical)	1x 9T SWL
CTD winch/davit	1x 300 kg / 1000m (environmental sampling)
Tugger winch aft deck	4x 3T SWL
Moonpool	Rectangular 1630x883mm (free space)

Communications

GMDSS	Motorola - 3x VHF Handheld
Vsat	2x Seatel 5009 Ku-band
Iridium	Iridium Openport (Fall back)
UHF / VHF Radios (Operational coms)	Motorola - 2x VHF Handheld / 3x UHF Mobile / 9x UHF Portable
CCTV Camera system	Orlaco
TVRO	Intellian t40W

Safety

MOB boat	RIB
Life rafts	6 x 20 persons
Survival suits & Life jackets	44 pcs
Lifeline Pulley System	Yes
Personal Locator Beacons (PLB)	SeaMarshall

Survey equipment

DGPS Positioning	Fugro Starfix Starpacks
Navigation package	Fugro Starfix Suite
Acoustic positioning	Kongsberg HiPap 501 incl Cymbal
Motion Reference Unit	Hydrins + Octans
Echosounder	Simrad EA400
Draft monitoring	2x Rosemount Pressure Sensors
Multibeam Echosounder	Kongsberg Maritime EM 2040 (Dual head/ Dual ping)
Side Scan Sonar	Edgetech 4200 (100/600)
Sub Bottom Profiler	Hullmount Array/ Fugro Glog, Boomer, Sparker
Magnetometer	Geometrics G-882
Geophysical tow winch	2x EMCE (3.5Te/ 4000m/ Rochester)
Geotechnical hoisting winch	1x EMCE (9Te/ 1500m/ 19mm)
Seismic Compressor	Wärtsilä Water Systems Ltd Hamworthy 185E MK2
2D-Seismic gear	as required
Geotechnical sampling	as required
Environmental sampling	as required

Fugro N.V.

Veurse Achterweg 10
 2264 SG, Leidschendam
 The Netherlands
 Telephone: +31 (0) 70 311 1422
 Email: offshoresurvey@fugro.com
 www.fugro.com



BMS Towing BV

Telephone: +31 (0) 6-53125323

PO box 55, 4300 AB Zierikzee

Website: www.bms-towing.nl E-mail: info@bms-towing.nl

Multi Purpose Anchorhandling Tug Workboat André-B



Dimensions:

Loa: 31.10 mtr.
Beam: 9.50 mtr.
Draught - max: 3.60 - 4.00 mtr.

Build completed: April 2008
Shipyard: Gebr. Kooiman Zwijndrecht/Dordrecht
Build number: 178
Crew: 4 persons / 24 hrs
Accommodation: 8 persons fully air-conditioned

Classification: L.O.R.S. deepsea no restrictions 100 A1 TUG

Main Engines: Mitsubishi 2 x 1250 kW (1700 hp) each
Auxiliary: 2 x 71 kVa Mitsubishi
1 x 410 kW Mitsubishi for Hydraulic

Bowthruster: 330 kW (450 hp)

Propulsion: Twin screw + Kort Nozzles - Van Voorden diameter 2.10 mtr.

Rudders: 4 fishtail rudders - 2 rudders behind each propeller
With a separate steering possibility

Bollard pull: 50 tons



BMS Towing BV

Telephone: +31 (0) 6-53125323

PO box 55, 4300 AB Zierikzee

Website: www.bms-towing.nl E-mail: info@bms-towing.nl

Tank Capacity:

Fuel (Diesel):	120,0 m ³
Freshwater:	28,0 m ³
Sewage:	7,5 m ³ (sewage can also be taken from other vessels)
Dirty oil:	4,5 m ³
Lub oil:	3,5 m ³

Fuel transfer pump:	50 m ³ /hrs
Freshwater transfer pump:	25 m ³ /hrs
Fuel separator:	2 x Alfa-Laval 5000 ltr. / 24 hrs each
Fresh water maker:	3500 ltr. / 24 hrs

Towing equipment:

Hydraulic towing winch with a pulling force of approx 40 ton, holding force 60 ton
2 Drums one with 700 mtr of 38mm steel wire - one with 400 mtr 38 mm steel wire

Stern roller, with on each side 2 Hydraulic Towing Pins SWL 30 Tons
Karmoy Fork and Towing Pins in the centre.
Push Bow with Rubber Fender of 90 cm in Diameter

Deck equipment:

Heila crane type HLRM 200 mt - 4 SL max 9 tons @ 16,31 mtr. remote controlled
Mampeay Towing Hook
Hydraulic driven Cap stand
Free deckspace: 120 m² with 10", 20" and 40" feet container fittings, reeferplugs available





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Navigation equipment:

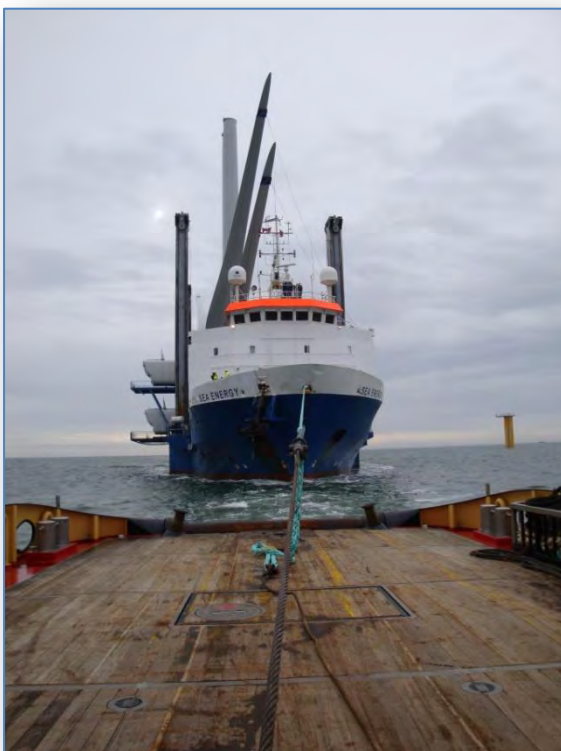
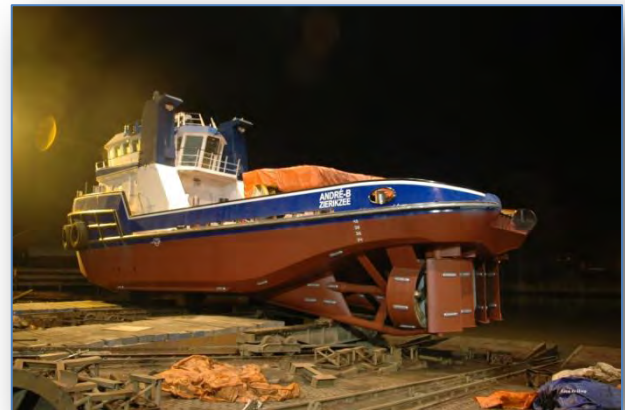
- 2 x JRC radars one with ARPA function
- 1 x Gyrocompass Alphascon type Minicourse
- 2 x Automatic pilot, Alphascon Alphaseapilot MFA
- 2 x Rate of turn indicator Alphascon Alphaseapilot MFA
- 1 x Magnetic compass Cassens & Plath
- 2 x Echo Sounder JRC Color LCD Fish Finder FF60
- 1 x DGPS JRC J-Nav 500 GPS Navigator
- 1 x DGPS MX Marine MX420 Navigation System
- 1 x Intercom Alphascon type Alphacall with 6 call points
- 3 x VHF/DSC 25 watt sets in wheelhouse type Sailor RT 5022,
With 5 extra call points, 3 in the aft console, 1 in the messroom and 1 in the **captain's** cabin
- 1 x MF/HF type Sailor CU5100 150 watt PEP
- 1 x Satellite telephone
- 2 x INMARSAT-C stations type Sailor TT 3606E with e-mail connection
- 1 x NAVTEX receiver JRC type NCR-333
- 1 x GSM telephone cellular
- 2 x ECDIS, Certified Electronic Chart System Alphascon type Alphachart (Tresco)
- 1 x AIS Identification system
- 1 x Satellite Compas JRC type JLR-10T
- 4 x Submersible handheld VHF radio's
- 4 x CCTV with 6 infrared **camera's**

Wheelhouse:

Fully air-conditioned

Large Survey desk with big cable pipes through wheel house ceiling and floor.

Callsign: PHON
MMSI: 245188000
IMO no.: 9451252
Phone no.: +31 (0) 610029953
Fax no.: +31 (0) 610029954
Email: Andre-B@BMS-Towing.nl



Teledyne RESON

SeaBat[®] T50-R

Ultrahigh resolution Multibeam Echosounder with fully integrated Inertial Navigation System



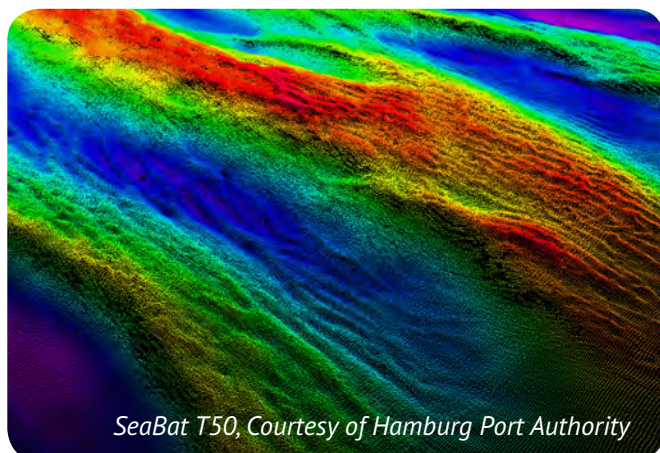
Extremely compact and flexible rack-mounted sonar system with built-in INS

The SeaBat T50-R is the newest addition to the leading SeaBat T-series product range, engineered from the ground up to evolve with your business. Combined with a very compact Rack-mounted Sonar Processor (RSP), the SeaBat T50-R produces unprecedented clean data, providing faster operational surveys and reduced processing time.

The SeaBat T50-R is fully frequency agile from 190 to 420kHz, allowing for improved swath performance and reduced survey time under challenging acoustic conditions.

The Rack-mounted Sonar Processor comes with an optional industry leading fully integrated Inertial Navigation System for accurate sensor time tagging and motion stabilization.

The SeaBat T50-R is designed for very fast mobilization on any type of survey vessels, securing minimal interfacing and low space requirements.



SeaBat T50-R standard configuration

Rack-mounted Sonar Processor (RSP)

- Single point for all cable connections – for fast mobilization
- Accurate sensor time tagging and motion stabilization from the optional integrated INS
- 25m cable configuration
- 2U form factor in standard 19" rack

SeaBat T50 sonar head assembly

- 190-420kHz wide-band sonar arrays
- Lightweight sonar bracket
- Robust titanium housing
- Less than 8kg in water

Extended range option

- Replace the standard projector with the TC2187 Extended range projector to achieve 900m range performance maintaining an impressive 1.5° high resolution beam width.
- In shallow water the TC2187 projector increases shallow water resolution to an unprecedented 0.5°*0.5°.

PRODUCT BENEFITS

- All-in-one, fully flexible and fully integrated survey system
- The compact system allows for fast mobilization, minimal interfacing and extremely low space requirements
- Unprecedented clean and ultrahigh data quality for faster operational surveys and reduced processing time
- Fully frequency agile from 190 to 420kHz, allowing for improved swath performance and reduced survey time under challenging conditions
- The new compressed water column data significantly reduces data volume while maintaining the required information
- Normalized backscatter designed for accurate, reliable and repeatable seabed classification
- Three-year standard warranty

SEABAT T50-R SYSTEM SPECIFICATIONS

Input voltage	100-230VAC 50/60Hz
Transducer cable length	25m (standard) Optional: 10m, 50m or 100m
Temperature (operational / storage)	Rack-mounted Sonar Processor: -5°C to +45°C / -30°C to +70°C Sonar wet-end: -2°C to +36°C / -30°C to +70°C

	height [mm]	width [mm]	depth [mm]	weight [kg/air]	weight [kg/water]
T50 Rx (EM7218)	102.0	460.0	90.7	8.2	3.9
T50 Tx (TC2181)	86.6	93.1	280	5.4	3.4
T50 Tx (TC2187)	86.6	93.1	500	9.8	6.8
Rack-mounted Sonar Processor <small>Standard 19" rack-mount</small>	88 (2U)	478*	462	12.3-13.8	N/A
Teledyne Type 20/30 IMU	123	118	95.6	3.0	1.6

	Extended Range Projector (TC2187)*		Standard projector (TC2181)	
	400 kHz	200kHz	400kHz	200kHz
T50 Acoustic performance				
Across-track receiver beam width¹	0.5°	1°	0.5°	1°
Along-track transmit beam width¹	0.5°	1°	1°	2°
Number of beams	10 - 512			
Swath coverage (up to)	10°-150° Equi distance, 10°- 165° Equi Angle			
Typical depth (CW²)	300 meters	600 meters	0.5-150 meters	0.5-375 meters
Max depth (CW³)	350 meters	750 meters	250 meters	550 meters
Typical depth (FM⁴)	350 meters	650 meters	0.5-180 meters	0.5-450 meters
Max depth (FM⁵)	425 meters	900 meters	300 meters	575 meters ⁵
Ping rate (range dependent)	Up to 50 pings/s			
Pulse length (CW)	15 - 300µs			
Pulse length (FM)	300µs - 10ms			
Depth resolution	6mm			
Depth rating (sonar head)	50 meters			

Teledyne INS Type -20	Roll/Pitch 0.02°	Heading ⁴ 0.015°	Heave ⁴ 5cm/5%	TrueHeave 2cm/2%	Optional postprocessing with POSPac MMS. Optional Fugro MarineStar®.
Teledyne INS Type -30	Roll/Pitch 0.01°	Heading ⁴ 0.010°	Heave ⁴ 5cm/5%	TrueHeave 2cm/2%	

For relevant tolerances for dimensions above and detailed outlined drawings see Product Description

*Optional

1 Nominal values

2 This is a depth range within which the system is normally operated, from the minimum depth to a depth value corresponding to the max. swath -50%.

3 This is the single value corresponding to the depth at which the swath is reduced to 10% of its max. value. For actual swath performance refer to Product Description.

4 With 4m GPS base line. Heave 5cm/5% whichever is greater for periods +/- 20sec

5 An extinction coverage of +/-20° is observed at about 530 meter water.

T50-R scope of supply

- Receiver EM7218
- Projector TC2181
- Rack-mounted Sonar Processor
- 25m receiver cable
- 25m projector cable
- Wet-end bracket
- Nuts and bolt for ease of installation
- Three-year warranty

Optional extra features

- Integrated INS Type 20 or Type 30
- 10m, 50m or 100m cable
- Hydrodynamic fairing
- Dual-head bracket
- Teledyne RESON Sound Velocity Probes
- Teledyne PDS Survey Package
- Teledyne RESON Service Level Agreements
- Normalized backscatter license
- Motion and positioning sensors
- X-Range - improves range and reduces external noise
- Multi-Detect - multiple detections for enhanced detail over complex features and water column targets
- FlexMode - increases data density where you need it most
- Extended range projector
- Full rate dual head across the entire frequency range

SYSTEM 3000 SIDE SCAN SONAR

DUAL-FREQUENCY SINGLE BEAM SONAR

Digital Side Scan Sonar:

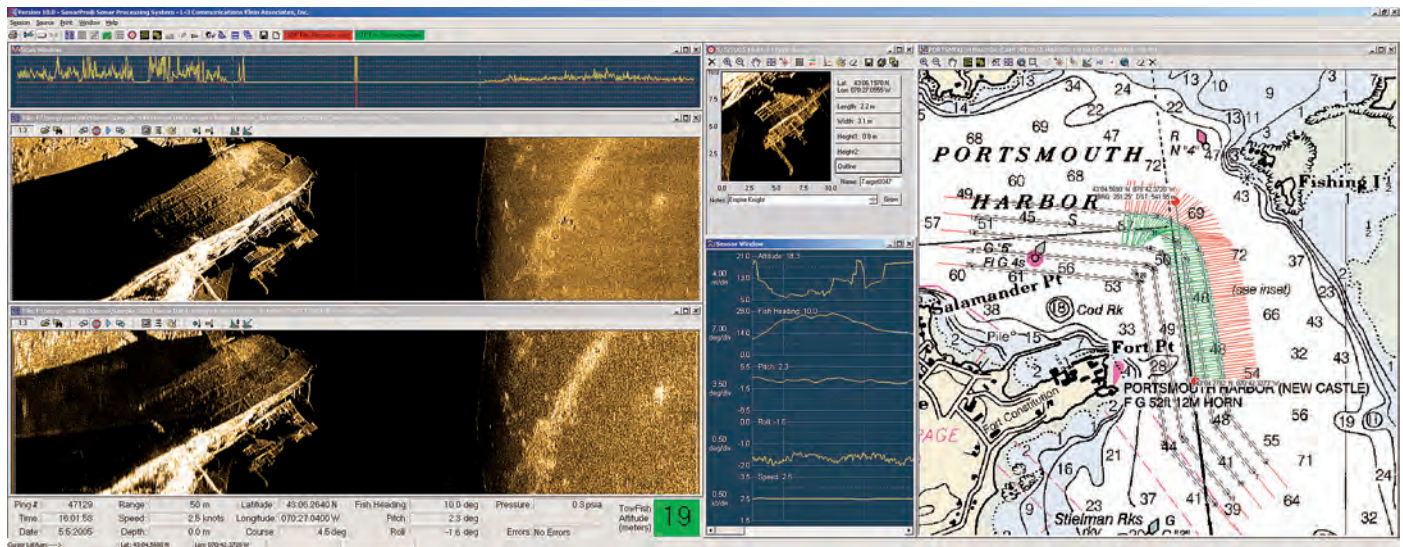
The Klein System 3000 presents the latest technology in digital side scan sonar imaging. The simultaneous dual-frequency operation is based on new transducer designs, as well as the high-resolution circuitry recently developed for the Klein multi-beam focused sonar. The System 3000 performance and price is directed to the commercial, institutional and governmental markets.

Key Features:

- Advanced signal processing and transducers produce superior imagery
- Cost-effective, affordable
- PC-based operation with SonarPro® software, dedicated to Klein sonars
- Small, lightweight and simple designs - easy to run and maintain
- Easily adapted to ROV's and custom towfish
- Meets IHO & NOAA Survey specifications



The Difference Is In The Image



SYSTEM 3000 SIDE SCAN SONAR



DUAL-FREQUENCY SINGLE BEAM SONAR

Specifications:

System 3000 Towfish	
Frequencies	100 kHz (132 kHz, ± 1% actual) 500 kHz (445 kHz, ± 1% actual)
Transmission Pulse	Tone burst, operator-selectable from 25 to 400 µsecs; Independent pulse controls for each frequency
Beams	Horizontal: 0.7° @ 100 kHz 0.21° @ 500 kHz Vertical: 40°
Beam Tilt	5°, 10°, 15°, 20°, 25° down, adjustable
Range Scales	15 settings - 25 to 1,000 meters
Maximum Range	600 m @ 100 kHz 150 m @ 500 kHz
Depth Rating	1,500 m standard; other options available
Construction	Stainless Steel
Body Length	122 cm (48 in)
Body Diameter	8.9 cm (3.5 in)
Weight	29 kg (63.9 lbs) in air
Standard Sensors	Roll, Pitch, Heading
Options	Magnetometer, pressure sensor, acoustic positioning, sub-bottom profiler
Transceiver Processor Unit (TPU)	
Operating System	VxWorks® with custom application
Basic Hardware	Splash-Proof 2 (SP2) TPU
Outputs	100 Base-Tx, Ethernet LAN
Navigation Input	NMEA 0183
Power	120 watts @ 120/240 VAC, 50/60 Hz (includes towfish)
Interfacing	Interfaces to all major sonar data processors
Options	19-in rack mount TPU
Tow Cable	
Klein offers a selection of coaxial, Kevlar® reinforced, lightweight cables, and interfaces to fiber optic cables. All cables come fully terminated at the towfish end.	

Klein Sonar Workstation	
Operating System	Windows
Sonar Software	SonarPro®
Data Format	SDF or XTF or both, selectable
Data Storage	Internal Hard Drive, CD/DVD-RW
Hardware	Industrial PC
Options	Optional Waterproof Laptops
SonarPro® Software	
Custom-developed software by users and for users of Klein Side Scan Sonar Systems operating on Windows 7. Field-proven for many years. SonarPro® is a modular package combining ease of use with advanced sonar features.	
Basic Modules	Main program, data display, information, target management, navigation, data recording & playing, and sensor display.
Multiple Display Windows	Permits multiple windows to view different features as well as targets in real-time or in playback modes. Multi-windows for sonar channels, navigation, sensors, status monitors, targets, etc.
Survey Design	Quick and easy survey set up with ability to change parameters, set tolerances, monitor actual coverage and store settings.
Target Management	Independent windows permitting mensuration, logging, comparisons, filing, classification, positioning, time & survey target layers, and feature enhancements. Locates target in navigation window.
Sensor Window	Displays all sensors in several formats (includes some alarms) and responder set up to suit many frequencies and ping rates.
Networking	Permits multiple, real time processing workstations via a LAN including "master and slave" configurations.
"Wizards"	To help operator set up various manual and default parameters.
Data Comparisons Real Time	Target and route comparisons to historical data.

This technical data and software is considered as Technology Software Publicly Available (TSPA) as defined in Export Administration Regulations (EAR) Part 734 7-11. Specifications subject to change without notice. SonarPro® is a registered trademark of Klein Marine Systems, Inc. Cleared for public release. Data, including specifications, contained within this document are summary in nature and subject to change at any time without notice at Klein Marine Systems' discretion. Call for latest revision. All brand names and product names referenced are trademarks, registered trademarks, or trade names of their respective holders. Rev 07/18

G-882

Cesium Marine Magnetometer



Geometrics' G-882 Marine Magnetometer is the leading marine system in the industry with over 1,000 systems sold! The G-882 is the only system that meets the standards for UXO clearance in the North Sea.

This very high-resolution Cesium vapor marine magnetometer is low in cost, small in size, and offers flexibility for professional surveys in shallow or deep water. Use your personal computer with our MagLog™ software to log, display and print GPS position and magnetic field data.

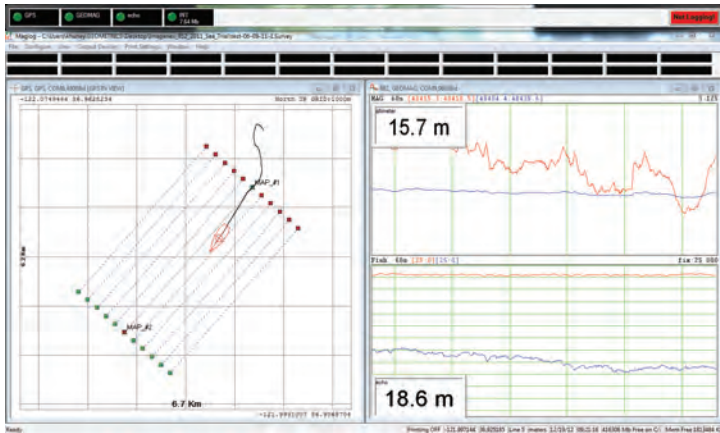
The system directly interfaces to all major side-scan manufacturers for tandem tow configurations. Being small and lightweight, it is easily deployed and operated by one person. But add several streamlined weight collars and the system can quickly weigh more than 100 lbs for deep-tow applications.

This marine magnetometer system is particularly well-suited for the detection and mapping of all sizes of ferrous objects. This includes anchors, chains, cables, pipelines, ballast stones and other scattered shipwreck debris, munitions of all sizes (UXO), aircraft, engines and any other object with a magnetic expression. The G-882 is also perfect for geological studies. Its high sensitivity and high sample rates are maintained for all applications.

Objects as small as a 5-inch screwdriver are readily detected provided that the sensor is close to the seafloor and within practical detection range (refer to table on back).

FEATURES & BENEFITS

- **Cesium Vapor High Performance** – Highest detection range and high probability of detecting all sized ferrous targets.
- **Streamlined Design for Tow Safety** – Low probability of fouling in fishing lines or rocks. Rugged fiber-wound fiberglass housing.
- **Sample at up to 20Hz** – Unparalleled data density while also covering larger areas per day.
- **Sensor can be Rotated for Optimal Signal** – Can be used worldwide.
- **Easy Portability and Handling** – No winch required. Built-in easy-carry handle. Operable by a single man; only 44 lb with 200 ft cable.
- **Combine Multiple Systems for Increased Coverage** – Internal CM-221 Mini-counter provides multi-sensor sync and data concatenation, allowing side-by-side coverage which maximizes detection of small targets and reduces noise.
- **Export Version Available** – Use anywhere in the world without need for an export license (except embargoed countries). See specifications.



MagLogLite™ Data Logging software is included with each magnetometer and allows recording and display of data and position with automatic anomaly detection. Additional software options include: MagLog Pro™, advanced logging software; MagMap™, a plotting and contouring package; and MagPick™ post-acquisition processing software.

MAGNETOMETER / ELECTRONICS

Operating Principle: Self-oscillating split-beam Cesium vapor (non-radioactive).

Operating Range: 20,000 to 100,000 nT.

Operating Zones: The earth's field vector should be at an angle greater than 10° from the sensor's equator and greater than 6° away from the sensor's long axis. Automatic hemisphere switching.

Noise: $<0.004 \text{ nT}/\sqrt{\text{Hz}}_{\text{rms}}$. (SX (export) version: $<0.02 \text{ nT}/\sqrt{\text{Hz}}_{\text{rms}}$).

Max Sample Rate: 20 Hz.

Heading Error: $< 1 \text{ nT}$ (over entire 360° spin).

Output: RS-232 at 1,200 to 19,200 Baud.

Power: 24 to 32 VDC, 0.75 A at power-on and 0.5 A thereafter.

MECHANICAL

Sensor Fish

DIA: 7 cm; L: 137 cm (2.75x54 in) (with fin assembly).
Weight: 18 kg (40 lb).

Includes sensor and electronics and 1 main weight. Additional collar weights are 6.4 kg (14 lb) each; total of 5 capable.

Tow Cable

DIA: 12 mm; L: 800 m (0.47 in x 2,625 ft).
Weight: 7.7 kg (17 lb) with terminations.
Break strength: 1,630 kg (3,600 lb)
Bend diameter: 30 cm (12 in).

Typical Detection Range for Common Objects

- | | |
|-------------------------|----------------------------------|
| 1. Ship: 1000 tons | 0.5 to 1 nT at 800 ft (244 m) |
| 2. Anchor: 20 tons | 0.8 to 1.25 nT at 400 ft (120 m) |
| 3. Automobile | 1 to 2 nT at 100 ft (30 m) |
| 4. Light Aircraft | 0.5 to 2 nT at 40 ft (12 m) |
| 5. Pipeline (12 inch) | 1 to 2 nT at 200 ft (60 m) |
| 6. Pipeline (6 inch) | 1 to 2 nT at 100 ft (30 m) |
| 7. Iron: 100 kg | 1 to 2 nT at 50 ft (15 m) |
| 8. Iron: 100 lb | 0.5 to 1 nT at 30 ft (9 m) |
| 9. Iron: 10 lb | 0.5 to 1 nT at 20 ft (6 m) |
| 10. Iron: 1 lb | 0.5 to 1 nT at 10 ft (3 m) |
| 11. Screwdriver: 5-inch | 0.5 to 2 nT at 12 ft (4 m) |
| 12. Bomb: 1000 lb | 1 to 5 nT at 100 ft (30 m) |
| 13. Bomb: 500 lb | 0.5 to 5 nT at 50 ft (16 m) |
| 14. Grenade | 0.5 to 2 nT at 10 ft (3 m) |
| 15. Shell: 20 mm | 0.5 to 2 nT at 5 ft (1.8 m) |

ENVIRONMENTAL

Operating Temperature: -35°C to +50°C (-30°F to +122°F).

Storage Temperature: -45°C to +70°C (-48°F to +158°F).

Altitude: 9,000 m (30,000 ft).

Depth: 4,000 psi (2,730 m; 8956 ft).

Water Tight: O-Ring sealed for up to 4,000 psi depth operation.

ACCESSORIES

Standard: Operation manual, shipping/storage container, ship kit with tools and hardware, power supply, MagLogLite™, MagMap™ and MagPick™ processing software, depth transducer, altimeter.

Optional: Steel tow cable to 6,000 m (19,600 ft) with telemetry, longitudinal or transverse gradiometer, plastic Pelican® case, MagLogPro™, collar weights.

Specifications subject to change without notice. G-882_v1 (0118)

K KNUDSEN

PINGER

PORTABLE SHALLOW WATER
CHIRP SUB-BOTTOM PROFILER



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PINGER SBP

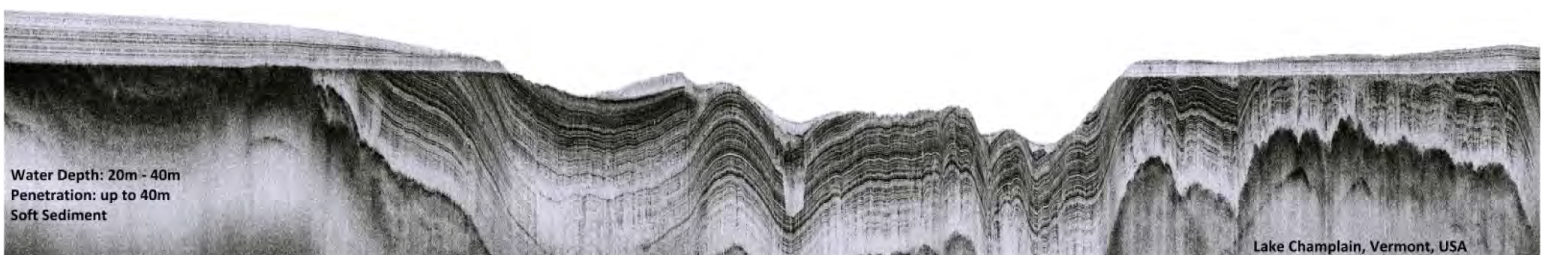
Technical Specifications (subject to change without notice)	Low Frequency Channel		High Frequency Channel
	3.5kHz	15kHz	200kHz
<i>Dry End - Echosounder</i>			
Bandwidth	User configurable (up to 20kHz)		
Output Power	up to 2kW	up to 2kW	up to 1kW
Pulse Length (min / max)	62.5µs / 64 ms		62.5µs / 4 ms
Ping Repetition Rate (max)	20 Hz		
Gain	Manual, automatic (AGC), and time varied (TVG)		
Analog Gain	96dB programmable analog gain		
Time Varied Gain (TVG)	20logR, 40logR		
Zoom Display	Dynamic Window Positioning and Sizing		
Units	Meters, Feet, or Fathoms		
User Interface	Control using standard Windows PC		
Digital Data Formats	SEG-Y, XTF, KEB (Knudsen proprietary), ASCII		
Power Supply	24 Vdc		
Operating Temperature	0 - 50 degC		
Enclosure	Portable splashproof case		
Dimensions (length x width x height)	488mm(19.2") x 386mm(15.2") x 185mm(7.3")		
Weight	10.5kg (23lb)		
<i>Wet End - Transducer</i>			
Projector	KELA5701-3.5kHz	KEL291-15kHz	KEL491-200kHz
Impedance	100 Ohms	60 Ohms	60 Ohms
Peak Transmit Voltage Response	149dB	157.5dB	176dB
Receiver	KEL-Hydrophone		KEL491-200kHz
Beamwidth	30 deg @6kHz	12 deg @15kHz	9 deg @200kHz
Peak Receive Voltage Response	-197.2 dB re 1V/uPa		-191 dB re 1V/uPa
Dimensions (length x width x height)	864mm(34") x 514mm(20.25") x 381mm(15")		
Weight	21kg (46lb) - 15kHz Option		
	29kg (64lb) - 3.5kHz Option		
Cable Length	10m(33ft)		
Installation	Pole mount -over the side		



Fiberglass Fairing Assembly



Pinger Wet End shown as shipped





S-Boom System



The **S-Boom System** is a high power, high resolution repeatable sound source that can be operated at fast repetition rates.

The transmitted energy is focused by the array geometry to improve the directivity and beam pattern, giving an improvement over traditional sound sources.

Key Features

- Deep penetration seismic surveys with ultra high resolution data quality, better than 0.25m
- Three AA252 boomer plates provide a single, focused beam pattern
- Deployed with fast-charging CSP-Nv for optimum results
- Maximum energy output of 1000J per pulse, firing at 3 pulses per second
- Can be used with single and multi-channel streamer hydrophone arrays
- Perfect UHR package for research, mapping and construction geological surveys.

Technical Specification

S-BOOM SYSTEM COMPONENTS

Catamaran	CAT303
Boomer plates x3	AA252
HV Cable	HVC3000
HV Junction box	HVJ3000

Powered from a CSP-Nv seismic energy source

PHYSICAL SPECIFICATION

CAT303 Catamaran

Dimensions	1700mm (L) x 490mm (H) x 660mm (W) frame/876mm (W) including floats
Weight	60kg

AA252 Boomer plate (each)

Length	380mm
Width	380mm

S-Boom System Technical Specification

Weight 18kg (air), 10kg (water)
Connector type RMK 1/0 complete with locking collar

HVC3000 Cable

Breaking strain 2000kg
Standard length 75m

ELECTRICAL INPUT

Recommended energy 700 – 1000J per shot
Maximum energy 1000J per shot
Average energy 3000J/second
Operating Voltage 3600 to 4000Vdc

Thermal interlock protection interfaced to energy source

SOUND OUTPUT

Source level Typically 222dB re 1 μ Pa at 1 metre with 1000J
Pulse length 300 to 500 μ s depending on energy applied
Reverberation <10% of initial pulse

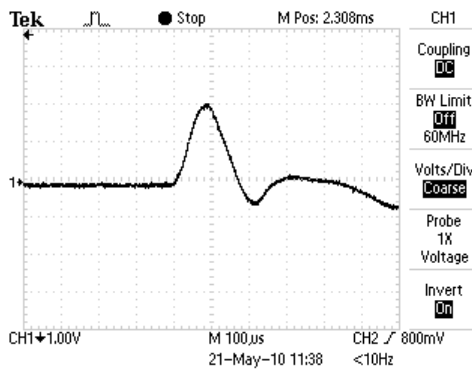
COMPATIBLE ENERGY SOURCE

S-Boom System CSP-Nv (Primary source)
CSP-Dv, CSP-S1250, CSP-S

COMPATIBLE HV CABLE

S-Boom System HVC 3000
Standard 75m
RMK 1/0 connectors complete with locking collars

TYPICAL PULSE SIGNATURE AT 1000J



APPLIED ACOUSTICS
Underwater Technology
An AAE Technologies Group Company

Due to continual product improvement, specification information may be subject to change without notice.
S-Boom System / April 2015
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Applied Acoustic Engineering Ltd
Marine House, Marine Park
Gapton Hall Road
Great Yarmouth NR31 0NB
United Kingdom

T +44(0)1493 440355
F +44(0)1493 440720
E general@appliedacoustics.com
W www.appliedacoustics.com

UK8 TRACKED RIG



Our 'bogskipper' tracked rig's low bearing pressures, large footprint, and high ground clearance make it ideal for working sites with boggy or soft ground conditions.

Unique to the UK, this rig is suitable for intertidal projects, peat bogs and weight-sensitive sites. The rubber tracks minimize the potential for any damage to delicate infrastructure, such as a sea wall.

Performance Rates

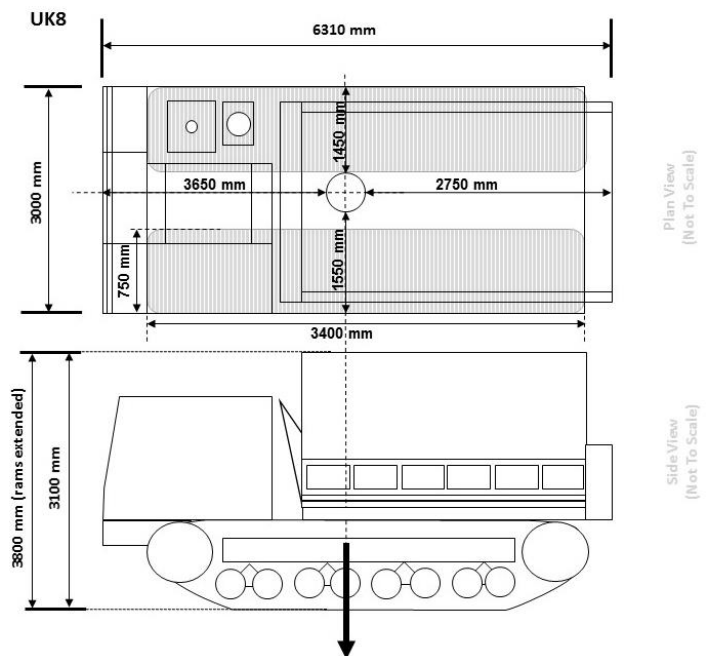
An expected 100m+ of standard CPTu testing can be executed in a day (dependent on site conditions and access).

Applications

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> • Specialist testing • Seismic • Pressuremeter • Magnetometer • Video cone • Wing cone • Push-in Vane | <ul style="list-style-type: none"> • Installations • VWP • Piezometer • Inclinator | <ul style="list-style-type: none"> • Sampling • MOSTAP • Shelby |
|---|--|--|

TECHNICAL DETAILS

Rig Weight	18.5 T
Maximum Operating Ram Capacity	15 T
Maximum Travelling Speed	15 km/h
Track Material	Rubber
Track Length	3.40 m
Track Width	0.75 m
Maximum Ground Clearance on Jacks	0.21 m
Maximum Ground Bearing Pressure	Tracking / Pushing – 35 kPa Pulling – 63 kPa
Maximum Testing Gradient	Flat – No Self-Levelling
Maximum Traversing Gradient	35 degrees (operator assessed)
Noise Output at 2 m	Testing – 74 dBA Driving – 95 dBA
Clamp Arrangement	36/55 Push Pull Clamp
Ram Stroke	0.70 m
Maximum Casing Size	55 mm



www.lankelma.com

Tel: +44 (0)1797 280050

Fax: +44 (0)1797 280195

Email: info@lankelma.com

Lankelma Limited, Cold Harbour Barn, Cold Harbour Lane, Iden, East Sussex. TN31 7UT



Van Veen grabs

Manual



Meet the difference

Description

The stainless steel Van Veen grabs are used for taking disturbed samples from the bottom of lakes, rivers, etc. Various versions are available. The smaller versions are manually operated.

Soil type

The Van Veen grab can be used for sampling the top layer of consolidated sediment consisting of silt and/or sand. The Van Veen grab is not suitable for the sampling of hard or extremely soft top layers. In the former case there is a high probability of no sample being taken and in the latter there is a chance that the grab will dig too deep, in which case a sample will be taken but not of the top layer. In the case of sediments with a very soft and watery top layer there is a reasonable chance of the fine fraction being rinsed out of the grab.

Accuracy of the sample

A sample taken using the Van Veen grab will always be disturbed. This makes it impossible to provide a correct description of the local structure of the sediment. Inaccuracies can arise in the sampling because:

- The fine fraction may be rinsed away during sampling;
- The penetration depth is unknown and depends upon soil composition;
- The grab can drop through a thin layer of silt so that the depth in the sediment at which the sample was taken is unknown;
- Relatively more top material is taken than material from the layer below due to the semi-circular shape of the grab.



For a more accurate description of the sediment structure, the use of a transparent sampling device with piston is recommended. The following were specially developed for sediments: Multisampler (penetration by manual force only; not closed at the bottom against loss of sample) or the Beeker sediment core sampler (can be knocked in, closure by inflatable bellows in sampling head).

Specifications

Item no.:	Description
04.30.01	Van Veen grab (stainless steel), capacity 0.5 litres, sampled surface approx. 126 cm ²
04.30.02	Van Veen grab (stainless steel), capacity 2 litres, sampled surface approx. 260 cm ²
04.30.03	Van Veen grab (stainless steel), capacity 6 litres, sampled surface approx. 480 cm ²
04.30.05	Van Veen grab (stainless steel), capacity 12 litres, sampled surface approx. 880 cm ²

Max. sampling depth:	> 30 m
Sampling volume (max.):	0.5 - 12.0 l
Disturbed/undisturbed:	disturbed
Type of sample:	loose material
Sediment type:	soft/medium
Profile description:	no
Suitable for use in flowing water:	flow rate of max. 0.2 m/sec
Usable in situations in which the pores are not filled with water (such as powders):	yes
Operation:	manually or with davit
Weight of the set:	2 - 41 kg



OSIL

Environmental Instruments
and Systems

High Power Vibrocorer

AN EASY TO TRANSPORT, EASY TO USE CORING SYSTEM

OSIL's new High Power Vibrocorer has been designed as an easy to use, easy to transport modular system capable of collecting up to 12m cores in 600m water depth (max).

- For use in dense/compact sediments in up to 600m water depth.
- Easy to assemble modular system offering cores of 3m, 6m, 9m or 12m system.
- Assemble dockside or on vessel, over stern deployment.
- High power vibrator motors engaged once unit is on the sea floor to drive the core barrel into the bed.
- Cutting shoe and core catcher specifically designed to minimise sample disturbance.
- Unit designed for easy horizontal recovery to the vessel, and easy recovery of the core on deck.
- System can be quickly and easily deployed, delivering a well defined core.
- Epoxy coated steel construction.
- PVC Core barrel liner.
- 96mm diameter sample.



FOR FURTHER INFORMATION PLEASE CONTACT:

OSIL, Culkin House, C7/8 Endeavour Business Park, Penner Road, Havant, Hampshire PO9 1QN

T: +44 (0) 2392 488240 F: +44 (0) 2392 488241 E: osil@osil.com W: www.osil.com



OSIL

Environmental Instruments
and Systems

High Power Vibrocorer

AN EASY TO TRANSPORT, EASY TO USE CORING SYSTEM

Operational Dimensions:

Height	3m unit	3.75m
	6m unit	6.75m
	9m unit	9.75m
	12m unit	12.75m

Width Tower 1.2m

Width Base Supports 5.0m

Weight	High Power VC10000	
	3m	2350Kg
	6m	2925Kg
	9m	3500Kg
	12m	4075Kg

Standard Power VC4000

3m	1450Kg
6m	1800Kg
9m	2150Kg
12m	2500Kg

Power Supply:

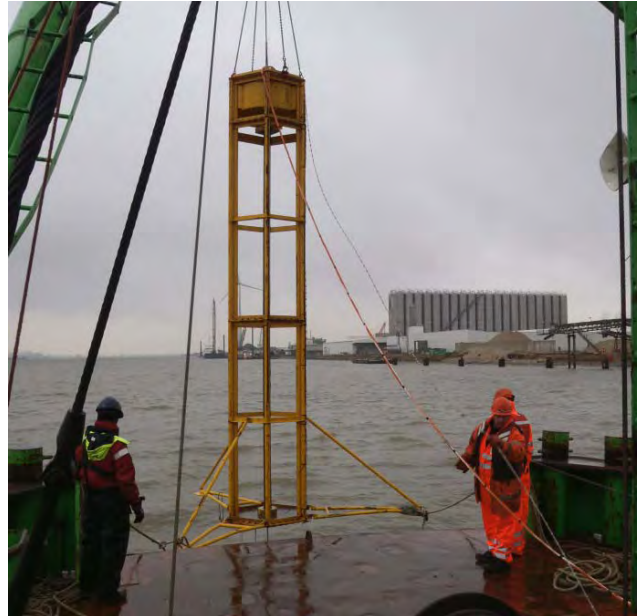
415V 3 phase supply 1 off 9.6kW motors
or 415V 3 phase supply 1 off 4.0kW motors
83/ 43A Start up current
16/ 8A Operational current.

Vibration Force:

High Power VC10000	89kN
Standard Power VC4000	44kN

Optional Sensors:

Heat Flow
Inclinometer
Penetration Rate
Penetration Distance
Additional sensors available on request



Features:

Frame

- Base Plate
- Support Legs
- Vibrocorer Frame (3m sections)
- Vibrocorer Head fitted with high power vibrator motors

Coring

- Corer Barrel 114mm OD
- Core Cutter
- Core Catcher
- Liner

Surface

- Armoured Deck supply cable (415V)
- Direct On Line Starter Box
- Armoured High Power Vibrocorer cable (non load bearing)

FOR FURTHER INFORMATION PLEASE CONTACT:

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T: +44 (0) 2392 488240 F: +44 (0) 2392 488241 E: osil@osil.com W: www.osil.com



DWR4 with ACM

Datawell - Oceanographic Instruments

The in-home developed, Directional Waverider that integrates wave and current measurements has been launched



DWR Wave measurements: same sensor, new data processing

The wave sensor of the Directional Waverider equipped with the Acoustic Current Meter option (DWR4/ACM for short) is identical to the sensor in the well-known Directional Waverider MkI, II and III. Processing of the measured data is now performed at the doubled sample frequency of 2.56 Hz. The high frequency limit of the heave and direction signals is shifted from 0.58 to 1.0 Hz. With this choice, the high frequency limit of the wave buoy is determined by the hydrodynamic response of the hull, not by the onboard instrumentation.

In addition, the DWR4 transmission protocol allows for a superior heave and horizontal displacement resolution. Easy comparison of the new DWR4 output to the familiar DWR-MkIII results is facilitated in the accompanying waves4 software suite.

Operational improvements

Extra features of the DWR4 compared to the DWR-MkIII to facilitate operation are:

- For identification, the buoy is tagged with an electronic ID-number (or actually two ID's for hull and hatch cover separately) which is transmitted along the measured data.
- As a kind of health parameters, the temperature of the Hippy-40 sensor as well as that of the hatch cover electronics are measured.
- For better energy management, the energy used from the batteries and the energy supplied by the optional solar panel are measured.

An operational difference between the DWR-MkIII and the DWR4 is the criterion for the flashlight. This has changed from light detection to a sunset/sunrise algorithm based on the GPS position and time.

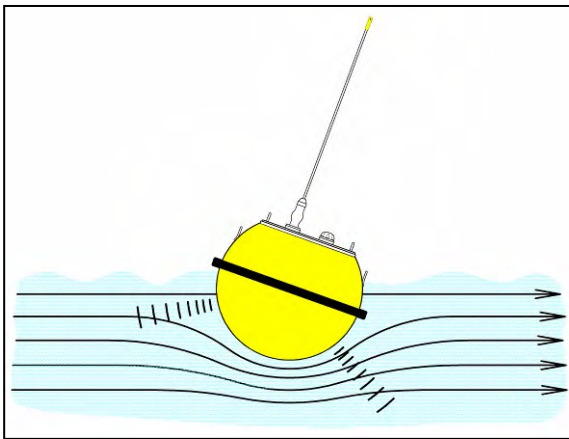


DWR4 with ACM

Datawell - Oceanographic Instruments

The Acoustic Current Meter

The DWR4 is extended with a surface current meter. This Acoustic Current Meter, or ACM for short, combines a robust measuring principle, Doppler shift, with a mechanical design that avoids vulnerability. This results in a coherent oceanographic instrument that meets the challenges at sea.



By integrating three acoustic transducers in the hull of the well-known Directional Waverider, the surface water velocity can be measured. The current is determined at roughly one metre below sea level, by measuring the Doppler shift of reflected 2 MHz pings. This robust and reliable method accords well with the Hippy 40 wave sensor, the standard in wave direction measurements.

Every 10 minutes, the magnitude and direction of the surface current are measured by three acoustic transducers. The transducers all face 30° down and are 120° laterally apart. Each transducer measures the projection of the current velocity along its axis. By time-gating the sensitive distance for the water velocity measurement is between 0.5 and 1.75 m from the hull. The current flow is affected by the presence of the Directional Waverider; close to the hull, the radial component of the velocity will be small, as opposed to the tangential components. Potential

theory predicts thus an underestimation of a few percent. No compensation for this effect is applied.

The velocities as measured by the transducers are converted into a North-West-Vertical water velocity by means of the pitch-roll sensor and the compass of the DWR.

During one minute each transducer fires 150 acoustic pings. The velocity measurements are quality-controlled and averaged.

Impact of waves on the current measurement

Due to the orbital nature of the wave motion, the horizontal velocity is not a constant over time and place. Different ranges of wave periods have a different impact on the water velocity measurement. Short waves, up to 1 second (1.5 m wavelength) average out in the volume over which the velocity is measured. Due to the size of the DWR, the wavelength is too small to make the buoy follow the waves and introduce artificial water velocity.

Waves which have a period smaller than 30 seconds (wavelength smaller than 1.5 km), can affect the velocity measured by the individual pings. Being moored flexibly, the Waverider buoy is able to follow the wave motion, which reduces the impact by the horizontal wave velocity significantly.

Wave periods beyond 30 seconds (wavelength longer than 1.5 km) will affect the individual water velocity measurement in the case of a moored buoy.

Impact of tidal motion on the current measurement

At the change of tide, the direction of the current typically changes by some 180° and the buoy traverses from one stationary position to the other. During the crossing, the actual water velocity is the vector-sum of the current as measured by the buoy plus the velocity of the buoy itself. The velocity of the



DWR4 with ACM

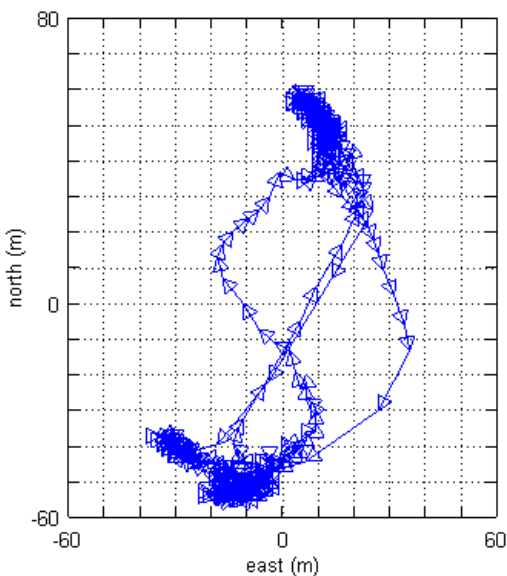
Datawell - Oceanographic Instruments

buoy when moving from one location to the other is typically small, up to a couple of centimetres per second, depending on the location and the mooring line length. At some locations however, the buoy velocity can be one or more decimetres per second at every change of tide.

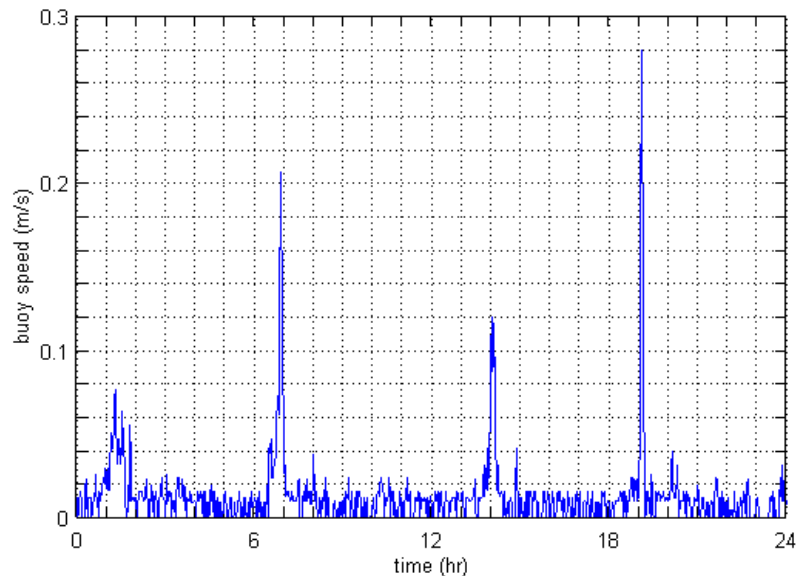
By measuring the position of the buoy by means of GPS every 2 minutes the buoy velocity is obtained. Each GPS-location is validated and results in a calculated buoy velocity that is transmitted alongside the velocity by the acoustic transducers.

Operational performance

During the development of the ACM option, several field tests have been performed off the coast near IJmuiden, The Netherlands, where a pole mounted ADCP provided reference data. Significant wave height during the test period rose to 4.5 m. Water velocity oscillated with the tides between 1 m/s to the south and 1 m/s to the north. Agreement with the ADCP is typically within 2 % and 0.02 m/s.



GPS buoy positions during a field test in 14 m deep water off the Dutch coast, near IJmuiden. Two clusters of points can be discerned, corresponding with flood tide (North) and ebb tide (South).

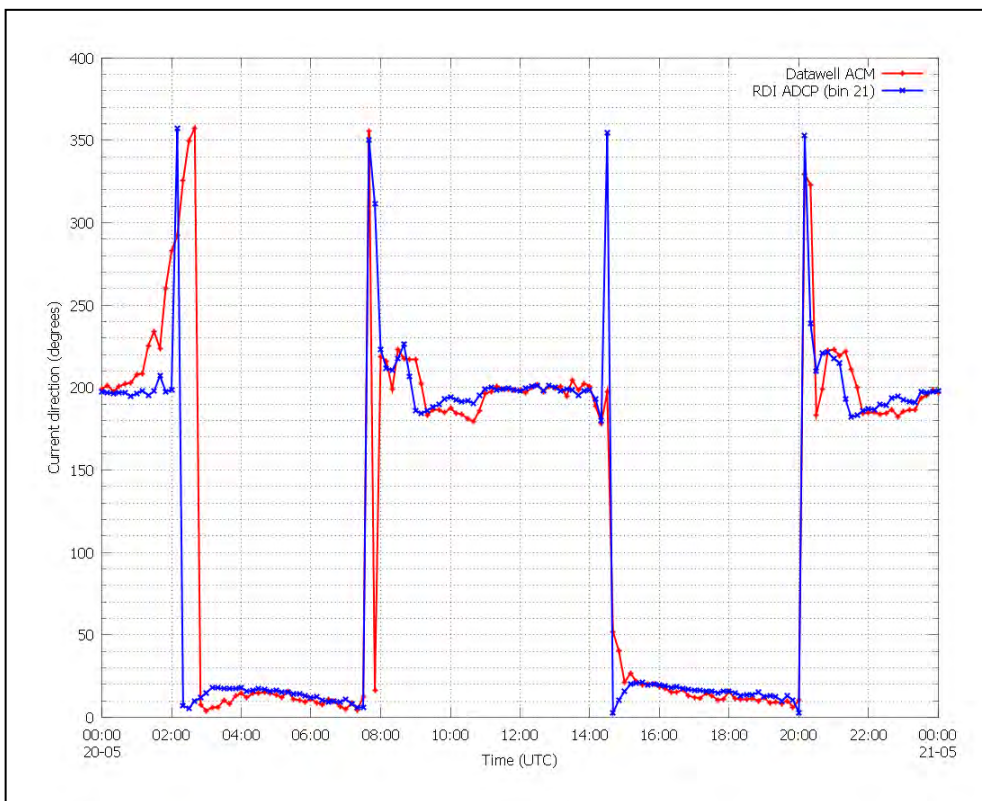
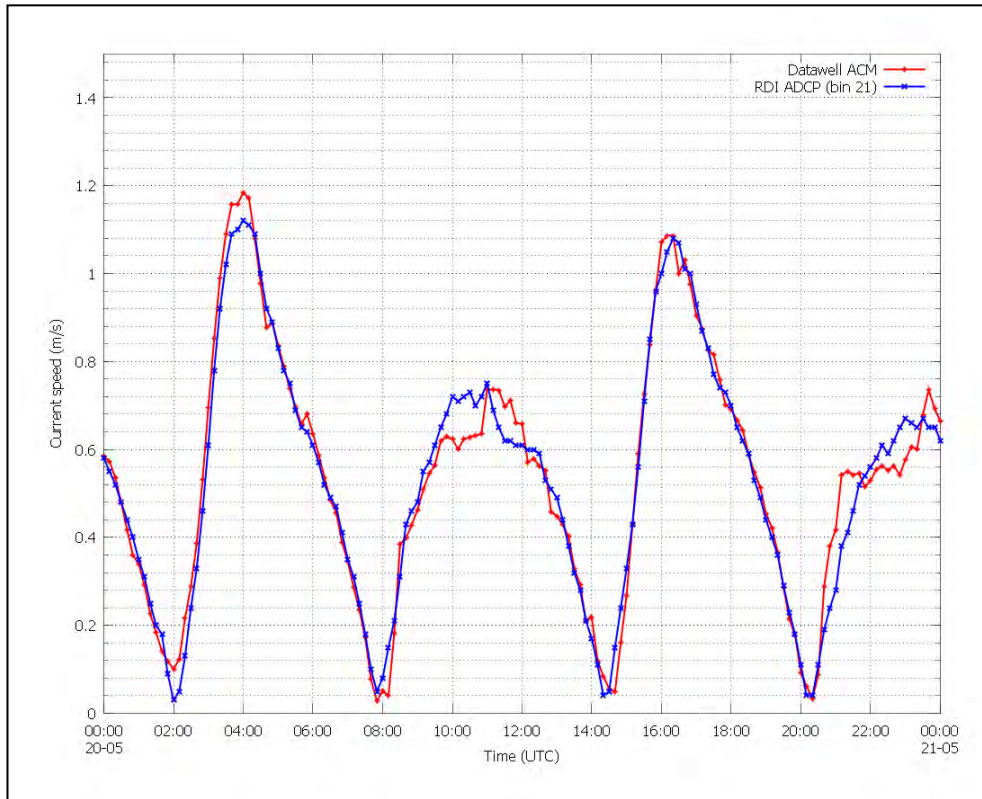


Buoy speed during field test



DWR4 with ACM

Datawell - Oceanographic Instruments





DWR4 with ACM

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Fouling

The main reason for low signal to noise ratio of the received acoustic signal is fouling. In order to monitor the performance of the ACM, the RSSI of each transducer is determined and transmitted ashore.



Fouling after fourteen weeks at sea.

To reduce fouling on the hull, the user can apply an antifouling coating. This does not affect the quality of the current measurement. Care should be taken that the used antifouling does not interfere with the active surface which is made of epoxy.



Transducer hardly visible, still measuring.

Alternatively we offer a Cunifer10 hull to prevent fouling.

Transducer damage

The basis of the ACM are the well proven acoustic sensors made by Reson. Their intrinsic robustness is ruggedized by placing them in recess in a stainless steel housing. Should the surface of the transducer yet get damaged, this does not inevitably lead to failure of the current measurements. Even severe damage of the surface turns out to be acceptable.



Recessed transducer in the hull.

In the hostile environment of the sea, vessel interference cannot always be avoided. Collisions with ships or boats may leave a bump or a dent in the hull, which in turn may destroy the initial transducer alignment. A mechanical realignment of the transducers may be no easy job, or even impossible. In order to meet this situation, the azimuth and elevation directions of the transducers can be recalibrated. The new alignment matrix is stored in the ACM memory.



Severely damaged surface still measuring well. The scratch is 0.3 mm wide and 0.2 mm deep.



DWR4 with ACM

Datawell - Oceanographic Instruments

Specifications

Current Meter	General	Method: Doppler Cell size: 0.4 m - 1.1 m from surface Update rate: every 10 minutes Sensors: three 2 MHz acoustic transducers
	Speed	Range: 0 - 3 m/s, resolution: 1 mm/s Accuracy: 1% of measured value +/- 2 cm/s Std. (1 σ): 1 - 3 cm/s (depending on wave height)
	Direction	Range: 0° - 360°, resolution 0.1° Accuracy: 0.4° - 2° (depending on latitude) typical 0.5° Reference: magnetic north
Wave sensor	Type and processing	Type: Datawell stabilized platform sensor Sampling: 8-channel, 14bit @ 5.12 Hz Data output rate: 2.56 Hz Processing: 32bits microprocessor system
	Heave	Range: -20 m - +20 m, resolution: variable, 1 mm smallest step Accuracy: < 0.5% of measured value after calibration < 1.0% of measured value after 3 year Period: 1.0 s - 30 s
	Direction	Range: 0° - 360°, resolution: 0.1° Heading error: 0.4° - 2° (depending on latitude) typical 0.5° Period: 1.0 s - 30 s (free floating) 1.0 s - 20 s (moored) Reference: magnetic north
Other	Water temperature	Range: -10 °C - +50 °C, resolution: 0.01 °C Sensor accuracy: 0.1 °C Measurement accuracy: 0.2 °C
	Integrated data logger	Compact flash module 1024Mb - 2048Mb
	LED Flashlight	Antenna with integrated LED flasher, colour yellow (590 nm), pattern 5 flashes every 20 s.
	GPS position	50 channel, update every 10 min, precision < 5 m
	Datawell HF link	Frequency range 25.5 - 35.5 MHz (35.5 - 45.0 MHz on request) Transmission range 50 Km over sea, user replaceable. For use with HVA compatible Datawell RX-C4 receiver.
General	Power consumption	522mW
	Batteries	0.7m diam. Operational life 10.5 months 0.9 m diam. operational life 21 months Type RC24B (240 Wh black)
	Material	Stainless steel AISI316 or Cunifer10
	Weight	Approx. 109 Kg 0.7m AISI316, 113 Kg 0.7m Cunifer10 Approx. 192 Kg 0.9m AISI316, 201 Kg 0.9m Cunifer10
	Power switch	Data files are closed and secured
Options	Solar power system	Solar panel combined with Boostcaps capacitors (0.9m version only) Peak power: 5 W Capacity: 2WH
	Transmission	Iridium-SBD, Iridium-internet, GSM-internet and Argos
	Hull diameter	0.7m (excluding fender) 0.9m (excluding fender)
	Hull painting	Brantho Korruux "3 in 1" paint system (no anti-fouling)

SEAWATCH Wind LiDAR Buoy



The Wind LiDAR buoy is a cost-effective and reliable solution for measuring wind profiles, waves and current profiles.

Wind Profile, Wave and Current Measurements

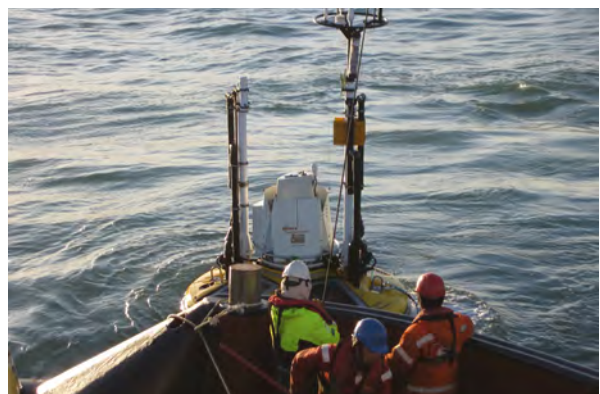
The SEAWATCH Wind LiDAR Buoy represents the next generation of multi-purpose buoys tailored for the renewable energy industry. The buoy accurately measures the speed and direction of wind across the diameter of wind turbine rotors, whilst sensors provide oceanographic parameters such as ocean waves and current profiles.

Features

- Collects data for wind resource assessments and/or for engineering design criteria
- Buoy mast wind profile measurements at 2.5 m, 4 m and 5 m
- Configurable LiDAR wind profile measurements at 10 levels from 12.5 m up to 300 m
- Configurable ocean wave measurements and sea current profiles
- Full on-board processing of all measured data
- Two-way communication link for data transfer and control
- Real-time data transfer and presentation
- Flexible configuration of sensors and data collection
- Modular hull for easy transport and local assembly
- Safe and easy handling and deployment
- Robust and reliable in all weather and temperature extremes
- Position tracker for increased safety
- The Wavescan buoy platform has a successful track record worldwide since 1985



Accurate measurement of wind profile using SEAWATCH Wind LiDAR Buoy



Deployment of the SEAWATCH Wind LiDAR buoy



SEAWATCH Wind LiDAR Buoy

A Unique Cost-Efficient Solution

The SEAWATCH Wind LiDAR Buoy is a cost-efficient way to measure wind data at heights of conventional offshore wind turbines for wind resource assessments and engineering design criteria.

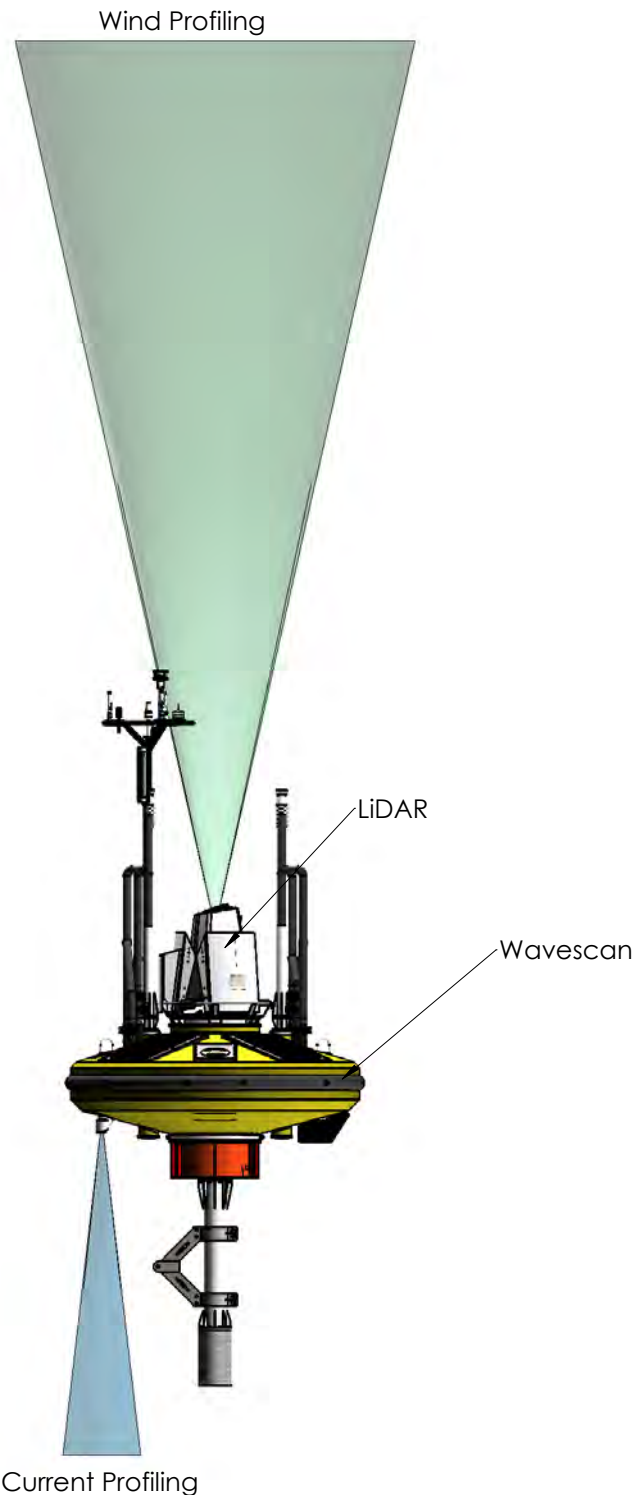
It is the first single compact buoy capable of measuring:

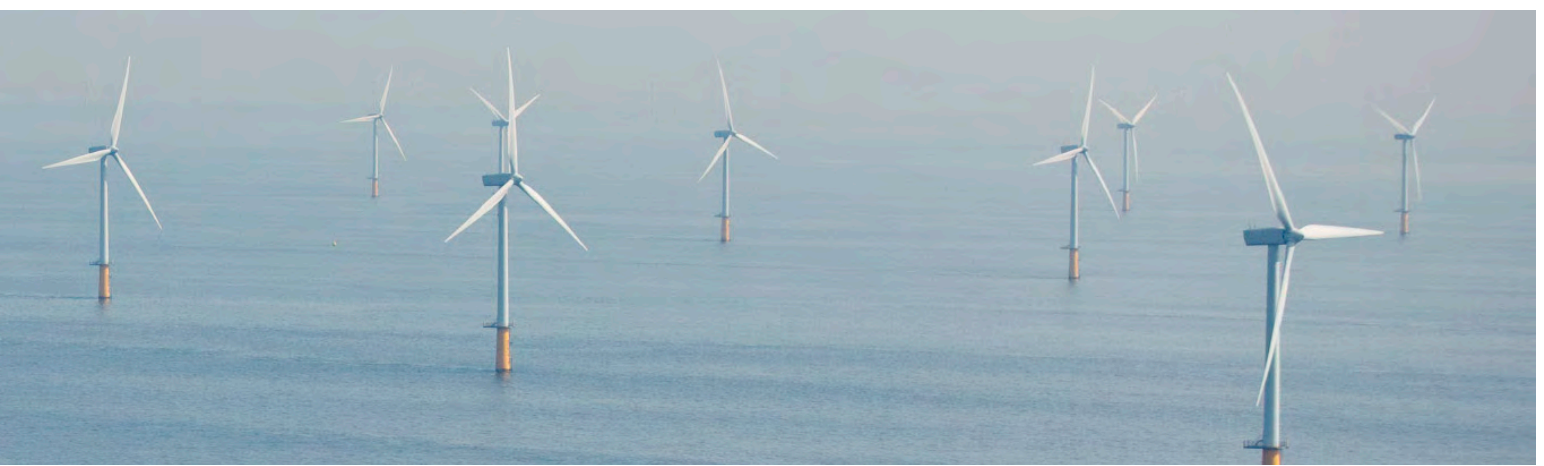
- Wind profiles across the blade span of the largest offshore wind turbines
- Ocean wave height and direction
- Ocean current profiles from the surface to the seabed
- Meteorological parameters
- Other oceanographic parameters as required

The smaller SEAWATCH Wind LiDAR Buoy is a proven ocean monitoring solution and is easily deployed and relocated (by towing or lifting onboard vessels) enabling data gathering across multiple locations. This is a more cost-effective alternative to existing wind profiling solutions such as fixed met masts or larger floating buoys.



- 300m
- 200m
- 125m
- 100m
- 75m
- 50m
- 40m
- 30m
- 20m
- 12m
- 3,5m
- 2,0m





Proven Platform and Technology

The SEAWATCH Wind LiDAR Buoy is built on the SEAWATCH Wavescan platform which has been deployed for a large number of satisfied clients in the most hostile oceanographic environments since 1985.

Its well proven SEAWATCH technology, includes the GENI™ controller, an intelligent power management unit and the ZephIR LiDAR.

ZephIR LiDAR

The ZephIR LiDAR was selected after years of testing and comparison of various concepts. The ZephIR 300 provides highly accurate measurements across the entire rotor diameter and beyond and can be configured to measure up to 10 different heights from 12.5 to 300 metres above the sea surface.

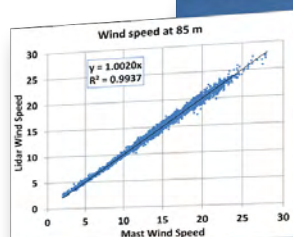
Low power consumption of the ZephIR 300 and intelligent power management are key to efficient operation when using a small low-cost platform.

Successful Collaboration

The SEAWATCH Wind LiDAR Buoy is the result of a successful joint industry R&D project, utilising offshore and wind technology expertise from Norwegian universities, research institutes and the energy company Statoil.

Offshore Testing / Validation

The SEAWATCH Wind LiDAR Buoy has been tested and validated at the Ijmuiden met mast in Dutch waters. The wind profile data measured by the SEAWATCH Wind LiDAR Buoy were compared with data from anemometers at 3 heights mounted on the met mast and a ZephIR LiDAR, measuring the wind profile above 90 m. An inter-comparison showed almost no bias and a squared correlation of more than 0.99. The validation test was performed in close cooperation with DNVGL.





SEAWATCH Wind LiDAR Buoy

Technical Specifications

General

Material	Polyethylene, Aluminium, Stainless Steel
Flash light	LED based, 3-4 nautical miles range IALA recommended characteristic
Positioning	GPS (Inmarsat-C, Iridium, Standalone Receiver)

Buoy Dimensions

Weight (approx) ¹	1700 kg
Overall height	6.1 m
Diameter	2.8 m
Net buoyancy	2500 kg
Mast height (above water)	3.5 m

Power Supply^{2,3}

Solar panels (optional)	180 W
Lead-acid battery bank (optional)	Up to 248 Ah
Lithium battery bank	Up to 9792 Ah
Fuel cells	Up to 25926 Ah

Processing

- 4 GB data storage
- Real-time operating system (Linux)
- Large number of serial and analogue inputs
- Flexible data acquisition software

Data Communication

Short range	GSM / GPRS UHF / VHF radio (two-way)
Long range	Inmarsat-C and Iridium (two-way) ARGOS (one-way)

- 1 - With fuel cells and methanol cartridges
- 2 - All values are nominal ratings
- 3 - The buoy consumes roughly 150 Ah per day. Exact power consumptions will be made for each case

Wind Profiler - ZephIR 300 CW LiDAR

Measurement height (configurable)	10 m – 300 m
Probe length at 10 m	0.07 m
Probe length at 100 m	7.7 m
Number of simultaneous heights measured	Up to 10
Sampling rate	50Hz
Average period (configurable)	1 second upwards
Scanning cone angle	30°
Wind speed accuracy	< 0.5%
Wind speed range	< 1 m/s to 70 m/s
Wind direction accuracy	< 0.5°

Various additional sensors are available on request, including but not limited to:

Oceanographic Sensors

- Wave height and direction
- Surface current velocity and direction
- Water temperature
- Conductivity / Salinity
- Current profile
- CTD profile

Meteorological Sensors

- Wind speed/direction
- Air pressure
- Air temperature
- Humidity
- Precipitation
- Solar radiation

Water Quality Sensors

- Dissolved oxygen
- Light attenuation
- Chlorophyll-a
- Hydrocarbon
- Turbidity

Fugro GEOS Ltd, Wallingford, UK
T: +44 1491 820 500 E: uk@geos.com

Fugro GEOS, Structural Monitoring, Glasgow, UK
T: +44 141 774 8828 E: fsm@geos.com

Fugro OCEANOR AS, Sandnes, Norway
T: +47 5163 4330 E: sandnes@oceanor.com

Fugro OCEANOR AS, Trondheim, Norway
T: +47 7354 5200 E: trondheim@oceanor.com

Fugro GEOS Pte Ltd, Singapore
T: +65 6885 4100 E: singapore@geos.com

Fugro GEOS, Abu Dhabi, UAE
T: +971 2 554 5101 E: gulfmet@geos-uae.com

Fugro GEOS, Perth, Australia
T: +61 8 6477 4400 E: perth@geos.com

Fugro GEOS Sdn Bhd, KL, Malaysia
T: +60 3 2164 6210 E: malaysia@geos.com

Fugro GEOS Inc, Houston, USA
T: +1 713 346 3600 E: geosusa@fugro.com

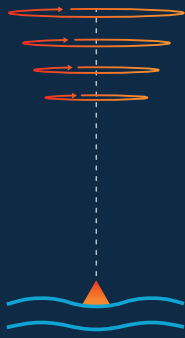
Fugro Mexico, Campeche, Mexico
T: +52 938 381 1970 E: mexico@geos.com

Fugro Brasil, Rio de Janeiro, Brazil
T: +22-33217901 E: brazil@geos.com

Wind speed at light speed

 **ZXLidars**

Product Guide 2018



ZX 300M

Offshore wind measurements from vertical profiling Lidar

Available on all commercial floating buoys and designed for any offshore platform.
Proven in the harshest of offshore floating environments. All with the longest
service and warranty period, as standard, of any Lidar.

ZX 300M at a glance:

- 10 to 200+ metre wind measurements from deck.
- Specifically designed for the offshore environment with enhanced marinisation.
- Extensive 3 year service period ensuring the lowest cost of ownership of any offshore Lidar available.
- Installed and proven for use on all market-ready floating Lidar platforms.
- Validated across multiple pre-commercial floating deployments and as mast replacements on fixed platforms.



The industry standard Lidar offshore for affordable remote wind speed measurements

Significantly reduce the cost of your measurement campaign.

Reduce your measurement uncertainty by measuring higher than a met mast.

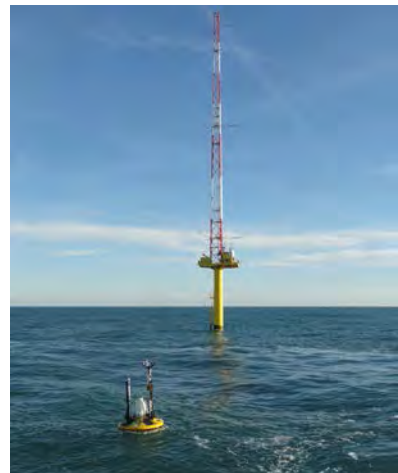
Reduce your measurement uncertainty further by mobilising measurements across a whole site by utilising floating Lidar.

Better manage health & safety requirements on site with no need to work at height.

Be flexible within your planning applications by using a low visual impact, low height device.

ZX 300M features include:

- Our Continuous Wave laser measures the Line of Sight wind speed every 20 milliseconds to 'freeze' any motion encountered.
- Multi-layered, highly insulated, plastic moulded Lidar housing, with additives to provide high UV stability and improved marine growth resistance.
- Highest grade of marine connectors available for all peripheral items, 2000+hrs salt spray tested.
- Custom stainless steel frame to allow for ease of handling and efficient securing to any platform surface.
- Marine met station with improved yaw determination, for floating offshore platforms.
- Stainless steel window wiper system with silicone wiper blade.
- External cooling system / air movement fans upgraded to IP 68.



300M Specification

Measurements

Range	10 - 200 metres (Lidar measurement) 0 - 10 metres (onboard met weather station)
Probe length	± 0.07 metres @ 10 metres ± 7.70 metres @ 100 metres
Heights measured	10 User configurable 1 Additional met weather station measurement
Sampling rate	50Hz (up to 50 measurement points every second)
Averaging rate	True 1-second averaging 10 Minute averaging
Accuracy wind speed	0.1 m/s*
Direction variation	< 0.5°
Range	< 1 m/s to 80 m/s

Product

Service interval	36 months from new
Size	805 x 845 x 966mm
Weight	53.4kg
IP Rating	IP 67
Power consumption	69W
Power input	12V
Temperature range	-40 + 50°C
Warranty	3 years
Maintenance	No annual maintenance or calibration in this period