

STATE OF THE ART ANALYSIS

Sub-Activity 3.1.

State of the art analysis

Version: v0.7 (final draft)

Date: 25.01.2016

Status: internal

Document history

Document version	Comments	Authorized by
20.10.2015	first draft, v0.1	Claudiu Dutu
22.10.2015	Draft, v0.2	Teodor Tanasescu
23.10.2015	Draft, v0.3	Claudiu Dutu
24.10.2015	Draft, v0.4	Teodor Tanasescu
23.11.2015	Draft, v0.5	All
30.11.2015	Final draft, v0.6	Teodor Tanasescu, Claudiu Dutu
25.01.2016	Final draft, v0.7 – disclaimer added	Katja Rosner

Authors

Responsible organisation	Principal author
AFDJ Galati	Claudiu Dutu, Teodor Tanasescu
Contributing organisations	Contributing authors
viadonau	Katja Rosner, Andreas Bäck
ARVD	Zuzana Sebastova
OVF	Karoly Gombas, Pal Kotel
APPD	Bozhidar Yankov
ACN	Carmen Manescu

Disclaimer

The sole responsibility of this publication lies with the author. The European Union is not responsible for any use that may be made of the information contained therein.

Price estimations result from an online desk research as well as from individually obtained offers which always suit customers specific needs, are fit to particular national regulations etc. In additions prices change in time and always reflect current market conditions. Therefore the information may be based on data that may no longer be current and/or estimates that may involve highly subjective assessments.

Indicative prices are subject are provided for information purposes only. The implementing bodies of FAIRway do not guarantee their completeness or accuracy of the data provided in this document. During the tender procedures they are responsible for updating the price estimations (if required).

Table of contents

Abbreviations	2
1. Introduction	1
1.1. Activities within the State of the Art Analysis	1
1.2. Expected results/outputs	2
2. Multifunctional marking vessel.....	3
2.1. H2X – VESSEL FOR MARKING WATERWAYS	3
2.2. HERMANN BARTHEL GMBH SHIPYARD – VESSEL FOR WATERWAYS MARKING.....	6
2.3. SHIPYARD ROUSSE JSC – VESSEL FOR WATERWAYS MARKING	7
2.4. MTG DOLPHIN PLG – VESSEL FOR WATERWAYS MARKING.....	11
2.5. DAMEN SHIPYARDS – MULTI CAT® 3713 “YN571673”	12
2.6. DAMEN SHIPYARDS – MULTI CAT® 2712 Green Isle “YN 571674”	13
2.7. DAMEN SHIPYARDS – MULTI CAT® 1908 Shallow Draft “KULAN”	15
2.8. DAMEN SHIPYARDS – MULTI CAT® 1908 Shallow Draft “AGAT”	16
2.9. DAMEN SHIPYARDS – DAMEN MULTI CAT® 3013 “MCS ELLY II”	18
2.10. SET SCHIFFBAU – WORK BOAT	19
2.11. (AFDJ,RO) MULTI-FUNCTIONAL WORK VESSEL – MARKING VESSEL	20
2.12. EA EMDR (BULGARIA) – MARKING VESSEL	22
2.13. Summary and conclusions.....	22
3. Surveying Vessel	23
3.1. ALU MARINE – Hydrographic survey launches	23
3.2. ARMSTRONG MARINE INC. – 26 CAT - SURVEY - Bill Benson – PROPOSAL.....	24
3.3. ARMSTRONG MARINE INC. – 30 CAT AMI Survey.....	26
3.4. CHANTIER ALLAIS SHIPYARD – Hydro	27
3.5. CHANTIER ALLAIS SHIPYARD – VNF.....	29
3.6. CHEETAH MARINE – 7.9m Survey Catamaran ‘Galloper’	30
3.7. CHEETAH MARINE – CREH Tracer 4	32
3.8. CHEETAH MARINE – Hydrographic Survey “CETUS”	33
3.9. DAMEN – SURVEY CATAMARAN 1706 “LIDA”	35
3.10. DAMEN – STAN TENDER® 1504	37
3.11. DAMEN - STAN TENDER® 1505	39
3.12. DAMEN – STAN TENDER® 1504 "H 01"	41
3.13. TRIDENT ALUMINIUM BOATS – TRIDENT 720 CT	43
3.14. MEYER SHIPYARD - MZB 750 Cabin.....	45
3.15. MS Boat – C690 Cabin.....	46
3.16. Summary and conclusions.....	48
4. Single-beam Surveying Equipment.....	49
4.1. OHMEX Ltd – SONARMITE v4.0 MTX	49

4.2.	TELEDYNE ODOM HYDROGRAPHIC – ECHOTRAC CV100.....	50
4.3.	VALEPORT LIMITED – MIDAS Surveyor v2A.....	52
4.4.	ATLAS HYDROGRAPHIC – ATLAS DESO 350 M.....	54
4.5.	NEPTUNE SONAR Ltd. – T141 (Dual Frequency and Dual Beam).....	56
4.6.	NEPTUNE SONAR Ltd. – 340 Series (Dual Frequency).....	58
4.7.	KONGSBERG – EA 440 Echosounder.....	60
4.8.	Summary and conclusions.....	62
5.	Multi-beam Surveying Equipment.....	63
5.1.	KONGSBERG – EM 2040 Multibeam Echosounder.....	63
5.2.	TELEDYNE - SeaBat T20-P.....	65
5.3.	KONGSBERG – GeoSwath Plus Compact.....	67
5.4.	ATLAS HYDROGRAPHIC - ATLAS FANSWEEP 20.....	69
5.5.	IMAGENEX – IMAGENEX DT101 MULTIBEAM.....	71
5.6.	L3 – ELAC Nautik – SeaBeam 1180 / 1185.....	73
5.7.	R2SONIC – SONIC 2020.....	75
5.8.	NORBIT – SEABED PS-120006-5.....	76
5.9.	NORBIT – SEABED PS-140001-3.....	78
5.10.	TELEDYNE ODOM HYDROGRAPHIC – MB1.....	80
5.11.	NORBIT – PS-120005-12.....	82
5.12.	NORBIT – PS-120006-9.....	84
5.13.	TELEDYNE ODOM HYDROGRAPHIC – MB2.....	86
5.14.	L-3 KLEIN – HYDROCHART 3500.....	88
5.15.	EDGETECH – 6205: Combined Bathymetry & Side Scan Sonar.....	90
5.16.	Summary and conclusions.....	92
6.	Acoustic Doppler Current Profiler (ADCP).....	93
6.1.	SONTEK – RiverSurveyor S5 and M9.....	93
6.2.	TELEDYNE – RiverRay ADCP.....	95
6.3.	TELEDYNE RDI – StreamPro ADCP.....	97
6.4.	Summary and conclusions.....	99
7.	Sub Bottom Profiling.....	99
7.1.	EDGETECH – 3200 High Penetration Sub-bottom Profiler.....	99
7.2.	iXBlue – ECHOES 10000.....	101
7.3.	KONGSBERG – GeoPulse Sub Bottom Profiler.....	103
7.4.	Summary and conclusions.....	104
8.	Sediment sampler.....	105
8.1.	BOKU Sediment sampler – design plans by BfG (Koblenz).....	105
8.2.	HYDRO-BIOS – 437 332 Bottom Sampler acc. to Van Veen.....	106
8.3.	Summary and conclusions.....	107

9. Gauging stations	108
9.1. AANDERAA DATA INSTRUMENTS AS – D401 SMARTGUARD.....	108
9.2. SIEMENS AG – SITRANS P MPS TRANSMITTER	110
9.3. CAMPBELL SCIENTIFIC LTD. – CS451 Pressure Transducer.....	111
9.4. OTT HYDROMET – OTT CBS - Compact Bubbler Sensor.....	114
9.5. Summary and conclusions.....	116
10.Drones.....	117
10.1. DJI – PHANTOM 3	117
10.2. DJI – Inspire Pro 1	118
10.3. OneDrone – SuperHero GEO X4/X8 RTF.....	121
10.4. SenseFly – eXom	123
10.5. Trimble Navigation – ZX5	125
10.6. Trimble Navigation – UX5	127
10.7. Summary and conclusions.....	129
11.AtoNs	130
11.1. SRT MARINE TECHNOLOGY LTD. – Tungsten AIS Aid to Navigation	130
11.2. Hydrosphere UK Ltd. – Carbon AIS Aid to Navigation (AtoN).....	131
11.3. SRT Marine - AtoN Express Aid to Navigation.....	133
11.4. TIDELAND SIGNAL CORPORATION – V-Track™ V10 Informer™	135
11.5. Alltek Marine – Mando 301/303	137
11.6. Summary and conclusions.....	139
12.List of pictures.....	140

Abbreviations

ADCP	Acoustic Doppler Current Profiler
AIS	Automated Information System
AL	Activity Leader
ALUM	Aluminum
AtoN	Aids to Navigation
AUV	Autonomous Underwater Vehicle
DGPS	Differential Global Positioning System
DG	Diesel Generator
DP	Dynamic Positioning
ES	Echo Sounder
ECDIS	Electronic Chart Display and Information System
GPS	Global Positioning System

GNSS	Global Navigation Satellite System
HPR	Hydroacoustic Position Reference
IENC	Inland Electronic Navigational Chart
IEC	International Electrotechnical Commission
IALA	International Association of Lighthouse Authorities
LNWL	Low Navigable Water Level
LOA	Length Over All
MB	Multi-beam
MRU	Motion Reference Unit
PP	Project Partner
ROV	Remotely Operated Vehicle
SAL	Sub-Activity Leader
SB	Single-beam
SBP	Sub Bottom Profiler
SSS	Side Scan Sonar
UAV	Unmanned Aerial Vehicle
SVS	Sound Velocity
SVP	Sound Velocity Profiler
USV	Unmanned Surface Vehicles
VHF	Very High Frequency

1. Introduction

In general, market research is conducted to gain better knowledge of both product and supplier availability within the specific area which will be subject of the procurement within the FAIRway Project. Besides, by obtaining more information about the product area in question and knowledge of the products for which the procurement is taking place will lead that tendering documentation has higher quality, which often leads to better procurement results.

Main goal of the State of the art analysis is identification of potential suppliers and information gathering about technology used, product description, specifications, performance, features, operational characteristics, availability, accompanying services and post-sales support.

Research shall be performed in order to demonstrate that the prices for goods or services requested are fair and reasonable as determined by informal assessment of readily available open market pricing information

There are two main pillars for executing of the Market Study:

- Content of the application form that describes the equipment for implementation of the FAIRway project
- Content of the Fairway Rehabilitation Maintenance Master Plan that describes the equipment necessary for proper execution of Fairway Maintenance Cycle

1.1. Activities within the State of the Art Analysis

Preparatory activities

Main activities to be performed within the preparation phase are as follow:

- Elaboration of necessity for performing the procurement (justification)
- Definition of use-case scenarios for the product/equipment
- Definition of general, functional, non-functional and other requirements for the product/equipment (technical specification and other requirements)
- Research activities
- Identification of all main known suppliers for the specific product/equipment that is to be procured
- For obtaining preliminary information about product/equipment, examination of main equipment manufacturers websites for what they reveal and provide about their equipment in terms of technology, product/equipment description, specifications, performance, features, operational characteristics, availability, accompanying services and post-sales support.
- Collecting and reviewing sales material and ads that are available, obtain catalogues and newsletters and analysing them.
- Compare strengths and weaknesses among different competitors, technologies prior to performing direct communication with potential manufacturers
- Checking other sources of information within particular industry, for example people that may have worked with similar equipment, or some of the clients from the reference lists obtained from supplier/manufacturer
- Direct communication activities
- Each partner shall choose suitable means of direct communication with potential supplier(s) identified during preparatory activities. These are, but not limited to:
 - Invitation of known suppliers for individual product presentations
 - Sending questions requests in writing to potential suppliers
 - Organizing the hearing - invite suppliers to a joint meeting to obtain their viewpoints prior to the procurement process, depending on the subject
 - Request for Information (RFI): announcing questions to be answered by potential suppliers by a certain date

Before starting the direct communication it is suggested (but not mandatory) to create a quotation comparison lists. Those lists shall support each administration (FAIRway Partner) in evaluating responses and quotations obtained from different potential suppliers!

Other activities prior to tendering procedure

If possible and if convenient, study visits, test set-ups and demonstrations can be made prior to tendering procedure.

Potential suppliers shall not be paid for time spent or expenses incurred in connection with market survey performed within FAIRway project.

Harmonization activities

Depending on the type of product/equipment, and bearing in mind area and usage scenarios of the equipment, it is advisable to check possibilities of harmonization and aligning the specification for the procurement of the equipment. Partners within the FAIRway Project shall carefully check work of other partners and outputs of the Market Studies performed in other countries, in order to obtain further information that might be useful for improving the tendering documentation for particular procurement(s).

Preparation for procurement activities

On the basis of collected information, in relation to the CEF programme rules and national legislation, partners shall identify proper procedure for each and single purchase. Wherever possible and justified, procedures shall be grouped.

1.2. Expected results/outputs

Main output of the State of the Art Analysis is gained knowledge and information that shall enable proper execution of the procurement procedure in terms of:

- Specification of the equipment
- Prepared tender documentation
- Successful execution of the tender

2. Multifunctional marking vessel

2.1. H2X – VESSEL FOR MARKING WATERWAYS

General description

Marking vessel is designed for the placement of marking objects (which are placed along the river and on the river banks) and their maintenance.

Special features of the vessel on purpose:

- Small draft
- heavily bevelled contour bow
- small height of the fixed point
- big bow manoeuvre deck with a crane for handling the marking objects and their storage on the vessel
- wide bow end for a lean and tightening of the other vessel (pushing another vessel, if necessary)
- two engines for the good manoeuvring
- comfortable accommodation for three crew members (working staff for setting up and maintenance of marking objects)
- space for additional staff in the salon- wheelhouse (8 persons)

Hull form is a displacement type with a bilge-knee and the skew in the middle of stern (protection of the propeller in shallow water). Material of the hull and superstructure is a shipbuilding steel, stiffening system is transversal. Superstructure quarters were released into the deck and the wheelhouse with a salon on the deck is in front of accommodation. The engine room is below the wheelhouse and salon and it is well sound-proofed.

Dimensions

- LOA (m) 17,00 m
- Length on K v l, L k v l (m) 15,75 m
- Width, B (m) 4,46 m
- Height of the hull (m) 1,50 m
- Draft, T (m) 0,85 m
- The highest fixed point (m) 3,80 m
- Displacement D(t) 26,00 TON STELL GRADE A
- Displacement D(t) 20,00 TON COMPOSITE
- Capacity, N(t) 7,08 m
- Engine power, P (kw) 2 x 96 kw
- Speed in calm water, v(km/h) 18,0 ND

Vessel Equipment

STEERING GEAR

Two hanging semi balanced rudders in line behind the propeller. Pivot steering hydraulic cylinder through the tiller and the connecting rod. Hydraulic cylinder torque of 700 Nm. The main drive unit hydraulic pumps in the hydraulic system driven autonomous rotary knob on the desk in the wheelhouse. Auxiliary drive a manual hydraulic pump in the hydraulic system, autonomous, powered by steering wheel in the wheelhouse. Management of the main drive steering device is electrically powered and network with 24 V DC. Remote control of main drive portable handheld device with a cable length of 3 m. Pointing device rudder on the counter in the wheelhouse.

NAVIGATION MEANS

- Mast lights, flipping backwards.
- Downloadable (folding), two masthead lights and poles for signs of limited maneuver.
- Three lights, two fore and one aft, controlled electrically.

- GPS, depth sounder and speedometer.
- River radar range 150 m to 64 km, the transmitting power of 6 kW. The radar antenna will be placed on the pantograph-breaking back, at the aft end of saloon roof, a display above the counter in the wheelhouse.
- Wipers, front wheelhouse.

COMMUNICATION EQUIPMENT AND DEVICES FOR SIGNALING

Lights and signs provided in accordance with the rules and regulations CEVNI:

- Masthead white light of 2250,
- Side lights (green and red) 112.50;
- Yellow stern light of 1350,
- Anchor (peak) white light of 3600,
- Yellow light for a 3600 horn,
- Yellow flashing (rotating) light for public boat in service,
- Two sets of lights for a limited maneuver (upper red 3600, white underside 3600), in combination with appropriate balloons.
- Blue plate bypass (auštek) on the right side of the roof of the wheelhouse, with a white flashing (rotating) light with remote control.
- VHF radio, 2 pcs.
- Siren marine, electro-pneumatic 24 V.
- Radar siren.
- Megaphone - PA 24 V DC, with the signal lights.
- On board the bell on the bow with a windlass.
- Marine alarm 24 V

MOORING, BOAT AND TRACTION (PUSH)

Anchor gear

- One anchor Hall of mass 120 kg, anchor chain 10 mm, 30 m.
- Windlass 380 V AC, power 1.5 kW; on the podium at the bow.
- Store chains on the deck below ground reels.
- Managing anchor winch with anchor and the console from the wheelhouse.

Equipment for mooring

- Double bollards, two pairs, one pair at the stern and one on the bow.
- Bitt: one in the middle on the bow.
- Bollards DN 170 mm.
- One on each side of the beak in the middle, two small pin in the stern, the boat tender.
- Two boat-hooks. III.5 OTHER EQUIPMENT

Equipment for working with marking object:

- Hydraulic winch (capstan) on the right side of the bow, lifting anchors floating mark, with the rails that guide the anchor ropes over the ship's side. Management: the console next to the winch.
- Articulated hydraulic lift at least 300 kg on the arm of 3.0 m, on the right side of the bow. Crane with a hook and reel the rope. Management of the crane with the crane console.
- Searchlight 220 V AC 500 W, under the roof of the wheelhouse, the lighting of the bow workspace.
- Waterproof box with ventilation, on the deck in front of the wheelhouse front wall. Box used to hold tools for working with labels on water and on shore.
- Shelves for storage of spare parts in store bookmarks below deck.
- Davit for tender, on the main deck cabin, with manual winches, load 99 kg.
- Dinghy 3.0m (pneumatic, with solid bottoms) with outboard motors to 5.0 kW.
- Stand for dinghy, on the main deck aft.
- Wooden flooring moving (blinking) on board the cab roof, as well as extra space for storage of various equipment for marking.

Engines

DIESEL ENGINES FOR PROPULSION

Two marine diesel engines: PERKINS – SABRE M130C; 96 Kw at 2500 r/min. The engines have alternators for a minimum 100 A, and its installation at 24 V.

TRANSMISSION

- Two marine gears for transferring 98-100 kW with output speed to 800 r/min, with integrated thrust bearings for the reception of power impulses and the same gear ratio and moment to drive the bow and the stern – for the twin engine drives installation: ZF 45-1, $i=3,03$.
- Two shaft lines with intermediate and propeller shaft in horizontal stern tube. Stern tube extends to strut bearing, which will be based on the structure above the bottom with two holding arms.
- Propeller shaft: steel forging; fixed wings propellers, up to 600 mm diameter.
- Stern tube bearings: both made of bronze, with manual greasing.

DIESEL ELECTRIC GENERATOR

- Diesel electric generator produces voltages of 220 I 380 V AC, with sufficient force to settle all consumers to the balance of electronic power devices, according to the appropriate value for concurrency (such as: CUMMINS ONAN 17.5 MDKBR 17,5 kW/21,9 kVA 220/380 V 50Hz).
- Starting batteries and electric starter 24 V, self-charging; control (start I stop) from the wheelhouse. Emergency stop the engine and the generator from the wheelhouse.
- Diesel engine generator will be cooled with water.

Pictures



Figure 1: Vessel For Marking Waterways (source: AVP offer)

Contact Information

H2X nef A

46, quai François Mitterrand, CS 70056

13703 La Ciotat CEDEX - France

Tél: +33 (0)4 42 98 10 25

Fax: +33 (0)4 42 08 39 20

Public relation : contact@h2x.com

Annexes

E1203 H2X 12.01.23.pdf

E1203 H2X 12.01.24.pdf

H2X - Vessels tech and price.pdf

SCHEDULE VESSELS OPTION 1 COMPOSITE.pdf

SCHEDULE VESSELS STEEL.pdf

2.2. HERMANN BARTHEL GMBH SHIPYARD – VESSEL FOR WATERWAYS MARKING

General description

Marking vessel is designed for the placement of marking objects (which are placed along the river and on the river banks) and their maintenance.

Special features of the vessel on purpose:

- Small draft
- Heavily bevelled contour bow
- Small height of the fixed point
- Big bow manoeuvre deck with a crane for handling the marking objects and their storage on the vessel
- Wide bow end for a lean and tightening of the other vessel (pushing another vessel, if necessary)
- Two engines for the good manoeuvring
- Comfortable accommodation for three crew members (working staff for setting up and maintenance of marking objects)
- Space for additional staff in the salon- wheelhouse (8 persons)

Hull form is a displacement type with a bilge-knee and the skew in the middle of stern (protection of the propeller in shallow water). Material of the hull and superstructure is a shipbuilding steel, stiffening system is transversal. Superstructure quarters were released into the deck and the wheelhouse with a salon on the deck is in front of accommodation. The engine room is below the wheelhouse and salon and it is well sound-proofed.

Dimensions

- Length OA (m) 17.00 m
- Width, B (m) 4.46 m
- Height of the hull (m) 1.50 m
- Draft, T (m) 0.85 m
- The highest fixed point (m) 3.80 m
- Displacement D (t) 26.00 TON STEEL GRADE A
- Displacement D (t) 20.00 TON COMPOSITE
- Engine power, P (kW) 2 x 96 kW
- Speed in calm water, v (km/h) 18.0 ND

Capacities

- Fuel tanks (litre) 2x1200
- Tank of shallow water (litre) 540
- Tank of grey and black water (litre) 320

Vessel Equipment

-

Engines

DIESEL ENGINES FOR PROPULSION

Two marine diesel engines: PERKINS – SABRE M130C; 96 Kw at 2500 r/min.

The engines have alternators for a minimum 100 A, and its installation at 24 V.

Pictures

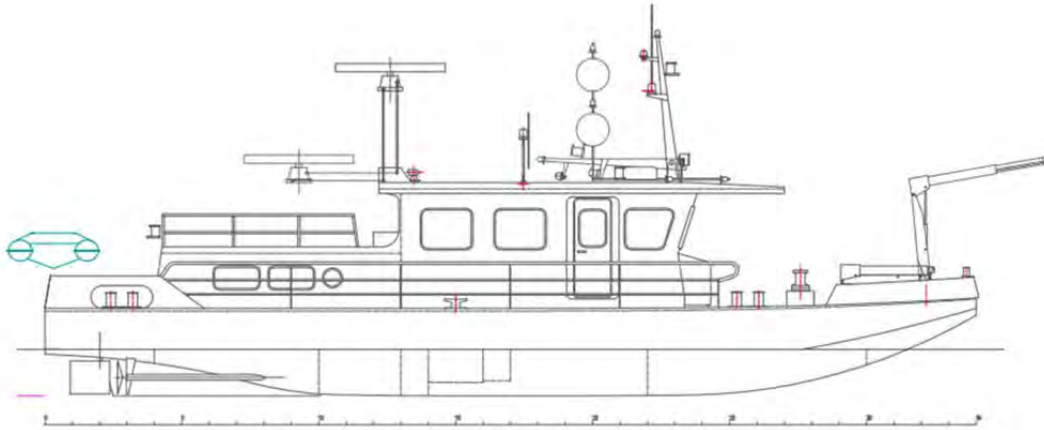


Figure 2: Vessel For Marking Waterways (source: AVP offer)

Contact Information

Schiffswerft Hermann Barthel GmbH

Dipl.-Ing. Corinna Barthel

Hauptstraße 123

D - 39317 Derben

Telefon: 039349-258

Fax: 039343-51895

E-Mail: corinna.barthel@barthel-werft.de

Annexes

Hermann Barthel GmbH Shipyard Offer.pdf

2.3. SHIPYARD ROUSSE JSC – VESSEL FOR WATERWAYS MARKING

General description

Marking vessel is designed for the placement of marking objects (which are placed along the river and on the river banks) and their maintenance.

Special features of the vessel on purpose:

- Small draft
- Heavily bevelled contour bow
- Small height of the fixed point

- Big bow manoeuvre deck with a crane for handling the marking objects and their storage on the vessel
- Wide bow end for a lean and tightening of the other vessel (pushing another vessel, if necessary)
- Two engines for the good manoeuvring
- Comfortable accommodation for three crew members (working staff for setting up and maintenance of marking objects)
- Space for additional staff in the salon- wheelhouse (8 persons)

Hull form is a displacement type with a bilge-knee and the skeg in the middle of stern (protection of the propeller in shallow water). Material of the hull and superstructure is a shipbuilding steel, stiffening system is transversal. Superstructure quarters were released into the deck and the wheelhouse with a salon on the deck is in front of accommodation. The engine room is below the wheelhouse and salon and it is well sound-proofed.

Dimensions

- Length OA (m) 17.00 m
- Length on Kvl, Lkvl (m) 15.75 m
- Width, B (m) 4.46 m
- Height of the hull (m) 1.50 m
- Draft, T (m) 0.85 m
- The highest fixed point (m) 3.80 m
- Displacement D (t) 26.00 TON STEEL GRADE A
- Displacement D (t) 20,00 TON COMPOSITE
- Capacity, N (t) 7,08 m
- Engine power, P (kw) 2 x 96 kw
- Speed in calm water, v (km/h) 18,0 ND

Capacities

- Fuel tanks (litre) 2x1200
- Tank of shallow water (litre) 540
- Water tank of grey and black (litre) 320

Vessel Equipment

HULL EQUIPMENT

Intake and bottom plugs

Intake for all the needs of external water (cooling, the general service pump, air conditioning, etc.) are performed through the two side kingston tanks in the engine room at R16-17.

At the appropriate place (the bow-third the length of the hull) at the bottom plating opens are performed to set the probe depth gauge and speedometer.

STEERING GEAR

Two hanging semi balanced rudders in line behind the propeller.

Pivot steering hydraulic cylinder through the tiller and the connecting rod. Hydraulic cylinder torque of 700 Nm.

The main drive unit hydraulic pump in the hydraulic system driven autonomous rotary knob on the desk in the wheelhouse. Auxiliary drive a manual hydraulic pump in the hydraulic system, autonomous, powered by steering wheel in the wheelhouse.

NAVIGATION AIDS

- Mast lights, flipping backwards.
- Downloadable (folding), two masthead lights and poles for signs of limited manoeuvre.
- Three lights, two fore and one stern, controlled electrically.
- GPS, depth sounder and speedometer.

- River radar range 150 m to 64 km, the transmitting power of 6 kW. The radar antenna is placed on the pantograph-breaking back, at the stern end of saloon roof, a display above the counter in the wheelhouse.
- Wipers for front wheelhouse.

COMMUNICATION EQUIPMENT AND DEVICES FOR SIGNALING

Lights and signs provided in accordance with the rules and regulations CEVNI:

- Masthead white light of 2250,
- Side lights (green and red) 112.50;
- Yellow stern light of 1350,
- Anchor (peak) white light of 3600,
- Yellow light for a 3600 horn,
- Yellow flashing (rotating) light for public boat in service,
- Two sets of lights for a limited manoeuvre (upper red 3600, white underside 3600), in combination with appropriate balloons.
- Blue plate bypass ("auštek") on the right side of the roof of the wheelhouse, with a white flashing (rotating) light with remote control.
- VHF radio, 2 pcs.
- Siren marine, electro-pneumatic 24 V.
- Radar siren.
- Megaphone - PA 24 V DC, with the signal lights.
- On board the bell on the bow with a windlass.
- Marine alarm 24 V

ANCHOR, MOORING AND TOWING (PUSH) EQUIPMENT

Anchor gear

- One anchor Hall of mass 120 kg, anchor chain 10 mm, 30 m.
- Windlass 380 V AC, power 1.5 kW; on the podium at the bow.
- Store chains on the deck below ground reels.
- Managing anchor winch with anchor and the console from the wheelhouse.

Equipment for mooring

- Double bollards, two pairs, one pair at the stern and one on the bow.
- Single bollard: one in the middle on the bow.
- Bollards DN 170 mm.
- On each side in the middle one spout, two small spouts in the stern, for auxiliary boat.
- Two boat-hooks.

OTHER EQUIPMENT

Equipment for work with marking signs:

- Hydraulic winch (capstan) on the right side of the bow, for lifting the anchors of marking objects, with the rails that guide the anchor ropes over the vessel's side. Management: the console next to the winch.
- Articulated hydraulic lift at least 300 kg on the arm of 3.0 m, on the right side of the bow. Crane with a hook and reel the rope. Management of the crane with the crane console.
- Searchlight 220 V AC 500 W, under the roof of the wheelhouse, the lighting of the bow workspace.
- Waterproof box with ventilation, on the deck in front of the wheelhouse front wall. Box used to hold tools for working with labels on water and on shore.
- Shelves for storage of spare parts in store bookmarks below deck.
- Davit for auxiliary boat, on the main deck cabin, with manual winches, load 99 kg.
- Auxiliary boat 3.0m (pneumatic, with solid bottoms) with outboard motors to 5.0 kW.
- Stand for auxiliary boat, on the main deck stern.
- Wooden flooring moving (blinking) on board the cab roof, as well as extra space for storage of various equipment for marking.

CREW EQUIPMENT

SAFETY EQUIPMENT, PROTECTION AND MEDICAL EQUIPMENT

The rescue equipment on vessel for the crew and other people should be:

- Lifebuoy, 2 pieces, one at the bow and one the stern wall of the superstructure;
- Lifejackets, in the parlor at the salon bench, 8 + 1 pcs (orange) and 4 pcs of inflatable (with certificates).

A first aid complete for 12 persons is located in the cabinet in the saloon.

Engines

DIESEL ENGINES FOR PROPULSION

- Two marine diesel engines: PERKINS – SABRE M130C; 96 Kw at 2500 r/min. The engines have alternators for a minimum 100 A, and its installation at 24 V.

TRANSMISSION

- Two marine gears for transferring 98-100 kW with output speed to 800 r/min, with integrated thrust bearings for the reception of power impulses and the same gear ratio and moment to drive the bow and the stern – for the twin engine drives installation: ZF 45-1, $i=3,03$.
- Two shaft lines with intermediate and propeller shaft in horizontal stern tube. Stern tube extends to strut bearing, which is based on the structure above the bottom with two holding arms.
- Propeller shaft: steel forging; fixed wings propellers, up to 600 mm diameter.
- Stern tube bearings: both made of bronze, with manual greasing.

DIESEL ELECTRIC GENERATOR

- Diesel electric generator produces voltages of 220 I 380 V AC, with sufficient force to settle all consumers to the balance of electronic power devices, according to the appropriate value for concurrency (such as: CUMMINS ONAN 17.5 MDKBR 17,5 kW/21,9 kVA 220/380 V 50Hz).
- Starting batteries and electric starter 24 V, self-charging; control (start I stop) from the wheelhouse. Emergency stop the engine and the generator from the wheelhouse.
- Diesel engine generator is cooled with water.

Pictures

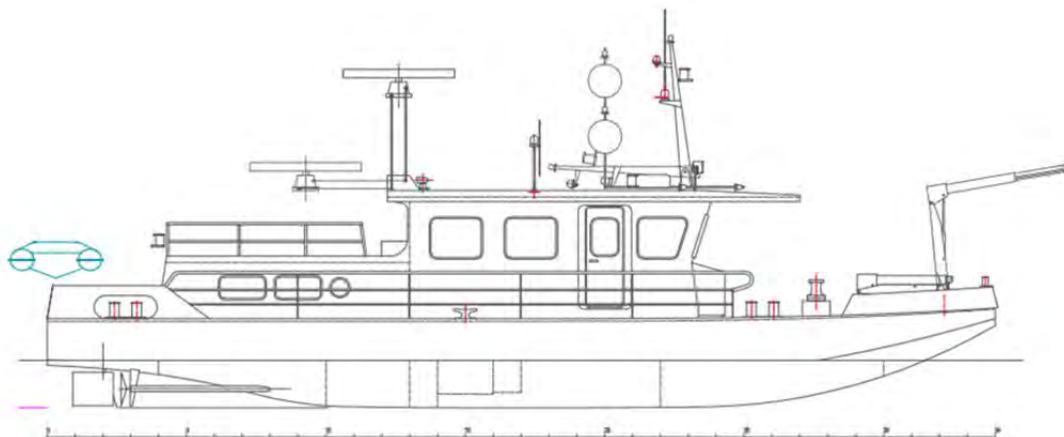


Figure 3: Vessel For Marking Waterways (source: AVP offer)

Contact Information

Irena Krasteva

marketing|offers|contracts|claims

SHIPYARD ROUSSE JSC

5 Matei Stoikov str, 7000 Rousse, BG

ph +359 82 883 705 f +359 82 883 876

Email: contracts.manager@shipyard.rousse.bg

Web: www.shipyardrousse.bg

Annexes

Shipyard Rousse Jsc – Vessel For Waterways Marking Offer.pdf

2.4. MTG DOLPHIN PLG – VESSEL FOR WATERWAYS MARKING

General description

Marking vessel is designed for the placement of marking objects (which are placed along the river and on the river banks) and their maintenance.

Special features of the vessel on purpose:

- Small draft
- Heavily bevelled contour bow
- Small height of the fixed point
- Big bow manoeuvre deck with a crane for handling the marking objects and their storage on the vessel
- Wide bow end for a lean and tightening of the other vessel (pushing another vessel, if necessary)
- Two engines for the good manoeuvring
- Comfortable accommodation for three crew members (working staff for setting up and maintenance of marking objects)
- Space for additional staff in the salon- wheelhouse (8 persons)

Hull form is a displacement type with a bilge-knee and the skew in the middle of stern (protection of the propeller in shallow water). Material of the hull and superstructure is a shipbuilding steel, stiffening system is transversal. Superstructure quarters were released into the deck and the wheelhouse with a salon on the deck is in front of accommodation. The engine room is below the wheelhouse and salon and it is well sound-proofed.

Dimensions

-

Vessel Equipment

-

Engines

-

Pictures

-

Contact Information

MTG-Dolphin plc
 8, Drazki Str
 9000,Varna, Bulgaria
 Tel: +35952602074
 Tel: +35952739721
 Tel: +35952632963
 Fax: +35952739747
 Email: info@dolphin1.bg
 Email: office@dolphin1.bg
 Web: <http://dolphin1.bg/>

Annexes

Mtg Dolphin Plg – Vessel For Waterways Marking Offer.Pdf

2.5. DAMEN SHIPYARDS – MULTI CAT® 3713 “YN571673”

General description

Yard number	571673 (damen shipyards hardinxveld)
Delivery date	Xx
Basic functions	Anchor handling, dredger service, towing, hose handling and survey
Classification	Bureau veritas i tug unrestricted navigation • mach, Aut-ums, dynapos am/at r (dp2)
Nat. Authorities	Dutch shipping inspectorate (il&t) unrestricted service
Flag	Dutch

Dimensions

• Length o.a.	36.66m
• Length mld.	34.50m
• Beam mld.	12.50m
• Depth at sides (1/2 l)	3.74m
• Draught aft max.(approx.)	± 2.60m
• Draught aft min.(approx.)	± 2.25 m
• Gross tonnage (approx.)	499 gt
• Bollard pull	35ton (m)
• Speed	10.0knots

Vessel Equipment

-

Enigines

• Main Engine Center	1x Caterpillar C32 Acert 746 Bkw (Bhp) At 1800 Rpm
• Gearbox Center	1x Reintjes Waf 562 5.947 : 1

- Propulsion Center 1x Promarin Fixed Pitch Propeller In Optima Nozzle, Ø1700 Mm
- Main Generators 2x Caterpillar C32 Acert 1175kva 940ekw 60hz 480vac
- Propulsion outer 2x azimuth thruster veth vz900 – fp
2x 825kw e-motor with ø1600mm prop.
- BOWTHRUSTERS 2X VETH CJ1000 325EKW E-MOTOR 360° ROTATABLE

Pictures

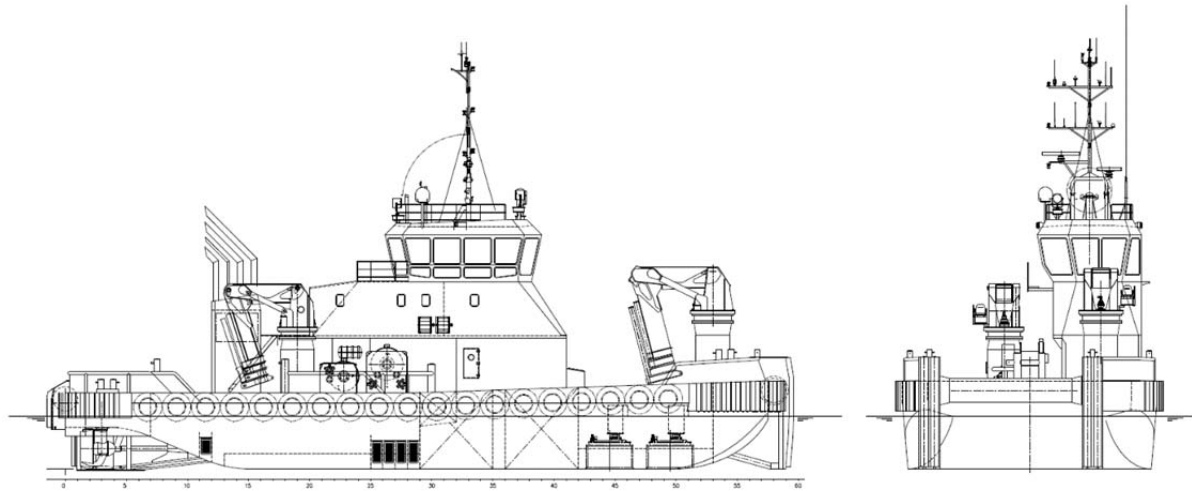


Figure 4: 141104 - Productsheet MuC 3713 571673.pdf (Source: Damen Offer)

Contact Information

Rivierdijk 544

3371 EBHardinxveld-Giessendam

The Netherlands

Phone +31 (0)184 61 30 88

(Current local time: 17:58)

Fax +31 (0)184 61 77 93

Email: sec.dsha@damen.com

Email: info@damen-hardinxveld.nl

www.damenshipyardshardinxveld.nl

Annexes

141104 - Productsheet MuC 3713 571673.pdf

2.6. DAMEN SHIPYARDS – MULTI CAT® 2712 Green Isle “YN 571674”

General description

Yard Number 571674 / A15058 (Damen Shipyards Hardinxveld)

Delivery Date April 2015

Basic Functions	Anchor handling, dredger service, supply, towing, hose handling and survey
Classification	Bureau Veritas I
Hull	MACH Tug Unrestricted navigation, aut-ums
Nat. Authorities	MCA CAT 1 Workboat code
Flag	United Kingdom

Dimensions

- Length o.a. 27.70m
- Beam O.A. 12.45m
- Length load line 23.90m
- Depth at sides 3.90m
- Draught (98%condition) ± 2.85 m
- Displacement light ship 405ton(m)
- Gross tonnage 299GT
- British tonnage 178,8BT

Vessel Equipment

-

Engines

- Main engines 2x cat c32 tta acert
- Total power 1790 bkw at 1800 rpm
- Gearboxes 2x reintjes waf 572l 7,091 : 1
- Propulsion 2x fixed pitch propellers in optima nozzles, 1900 mm
- Bowthruster kalkman beta 250h, 200pk / 184kw hydraulic driven

Pictures



Figure 5:150520 - Productsheet MuC 2712 YN571674 Green Marine.pdf (source: Damen Offer)

Contact Information

Rivierdijk 544

3371 EBHardinxveld-Giessendam

The Netherlands

Phone +31 (0)184 61 30 88

(Current local time: 17:58)

Fax +31 (0)184 61 77 93

Email: info@damen-hardinxveld.nl

www.damenshipyardshardinxveld.nl

Annexes

150520 - Productsheet MuC 2712 YN571674 Green Marine.pdf

2.7. DAMEN SHIPYARDS – MULTI CAT® 1908 Shallow Draft “KULAN”**General description**

Yard Number	571578 (Damen Shipyards Hardinxveld)
Delivery Date	March 2014
Basic Functions	Anchor handling, dredger service, supply, towing, hose handling and survey
Classification	Bureau Veritas I 2 HULL • MACH seagoing launch max. 6 Bft
FLAG	Kazakhstan

Dimensions

- Length o.a. 19.38m
- Beam o.a. 8.50m
- Depth at sides 2.10m
- Draught (approx.) 1.00m
- Displacement (approx.) 145ton(m)
- Bollard pull 8.7ton(m)
- Speed 9.0knots

Vessel Equipment

-

Engines

- Main engines 2x caterpillar c12 ta b
- Total power 574 bkw at 1800 rpm
- Gearboxes 2x reintjes waf 144 3.522 : 1
- Propulsion 2x fixed pitch propellers in nozzles, 1000 mm

Auxiliary equipment

- Generator set 1x caterpillar c-02,2 na, 28.1 kva
- Transfer pumps fuel and fresh water 20 m3/hr
- Hydro/genet 1x c4.4ta, 28,1kva electrical power and 70kw hydraulic power

Pictures



Figure 6: MuC 1908SD YN 571578.pdf (source: Damen Offer)

Contact Information

Rivierdijk 544

3371 EBHardinxveld-Giessendam

The Netherlands

Phone +31 (0)184 61 30 88

(Current local time: 17:58)

Fax +31 (0)184 61 77 93

Email: sec.dsha@damen.com

Email: info@damen-hardinxveld.nl

www.damenshipyardshardinxveld.nl

Annexes

MuC 1908SD YN 571578.pdf

2.8. DAMEN SHIPYARDS – MULTI CAT® 1908 Shallow Draft “AGAT”

General description

Yard Number	571584 (Damen Shipyards Hardinxveld)
Delivery Date	12-06-2014
Basic Functions	Anchor handling, dredger service, supply, towing, hose handling and survey
Classification RMRS	KM R3 AUT 3
Flag	Russian

Owner Rosmorport

Dimensions

- Length o.a. 19.38 m
- Beam mld. 8.50 m
- Depth at sides 2.10 m
- Draught (approx.) 1.05 m
- Displacement (approx.) 150 ton(m)

Vessel Equipment

Engines

- Main Engines 2x Caterpillar C12 TA B
- Total Power 574 bkW at 1800 rpm
- Gearboxes 2x Reintjes WAF 144 3.522 : 1
- Propulsion 2x fixed pitch propellers in nozzles, 1000 mm

Auxiliary Equipment

- Generator Set 1x Caterpillar C-02,2 NA, 28.1 kVA
- Transfer Pumps Fuel and fresh water 20 m³/hr
- Hydro/Genset 1x C4.4TA, 28,1kVA electrical power and 70kW hydraulic power

Pictures



Figure 7: MuC 1908SD YN 571584 Agat (source: Damen Offer)

Contact Information

Rivierdijk 544

3371 EBHardinxveld-Giessendam

The Netherlands

Phone +31 (0)184 61 30 88

(Current local time: 17:58)

Fax +31 (0)184 61 77 93

Email: sec.dsha@damen.com

Email: info@damen-hardinxveld.nl

www.damenshipyardshardinxveld.nl

Annexes

MuC 1908SD YN 571584 Agat.pdf

2.9. DAMEN SHIPYARDS – DAMEN MULTI CAT® 3013 “MCS ELLY II”

General description

YARD NUMBER	571691 (Damen Shipyards Hardinxveld)
BASIC FUNCTIONS	Anchor handling, dredger service, towing, hose handling and survey
CLASSIFICATION	Bureau Veritas I Tug Unrestricted navigation • MACH, AUT-UMS
NAT. AUTHORITIES	Dutch Shipping Inspectorate (IL&T): Unrestricted service

Dimensions

• Length o.a.	30.14m
• Length mld	28.00m
• Beam mld.	12.50m
• Depth at sides (1/2 l)	3.80m
• Draught aft (approx.)	± 2.60m
• Gross tonnage	341gt
• Bollard pull (average)	37.8ton(m)
• Speed	10.6knots

Vessel Equipment

Engines

• Main engines	3x caterpillar c32 tta
• Total power	2124 bkW (2888 bhp) at 1600 rpm
• Gearboxes	3x reijntjes waf 562 5.947 : 1
• Propulsion	3x promarin fixed pitch propellers in optima nozzles, 1700 mm
• Bowthruster	hydraulically driven 184 kW (250 hp), kalkman beta 250h

Auxiliary equipment

• Generator sets	2x caterpillar c 04.4, 107,5 kva each
• Hydraulic power	caterpillar c32 tta, 634 kW @1800 rpm
• Fuel oil separator	alfa laval mib 303

Pictures



Figure 8: Title of the figure 2 (source: www.damenshipyardshardinxveld.nl)

Contact Information

Rivierdijk 544

3371 EBHardinxveld-Giessendam, The Netherlands

Phone +31 (0)184 61 30 88

Fax +31 (0)184 61 77 93

Email: sec.dsha@damen.com

Email: info@damen-hardinxveld.nl

www.damenshipyardshardinxveld.nl

Annexes

www.damenshipyardshardinxveld.nl

2.10. SET SCHIFFBAU – WORK BOAT

General description

The 5 workboats were commissioned by the Federal Waterways in order and should after their delivery in the areas of water and shipping offices Rheine, Meppen, Magdeburg and Braunschweig are used. The ships are to take both work related tasks in the river and canal areas, as well as weather-related Eisaufruch. It is in these ships so as prototypes that can be extremely effective used in the year-round operation.

Dimensions

- Length O.A.: 22.73 m
- Width ü. A: 7.10 m
- Draught empty: 1.25 m
- Speed: min. 13 km / h

- Drive: 1x588 kW fixed propeller
- Class characters: GL + 100 A5 (0.6) Z, ICE, WORK BOAT + MC
Zones 3, 4 and 2 (SINGLE)

Vessel Equipment

-

Engines

-

Pictures



Figure 9: WORK BOAT (source: <http://www.set-schiffbau.de/>)

Contact Information

SET Schiffbau u. Entwicklungs-
gesellschaft Tangermünde mbH
Carlbau 7b, D-39590 Tangermünde
Phone: +49 39322 993 -0
Fax: +49 39322 2442
E-Mail: mail@set-schiffbau.de
Web: <http://www.set-schiffbau.de/>

Annexes

<http://www.set-schiffbau.de/>

2.11. (AFD),RO) MULTI-FUNCTIONAL WORK VESSEL – MARKING VESSEL

General description

Providing a rapid intervention vessel aims to improve substantially the ability to restore signalling intervention which will lead to safer navigation especially in areas critical points.

The supplier pays particular attention to compliance with all requirements for construction of the ship but the facilities provided in the documents, which will provide increased reliability throughout the life of the

vessel, thus reducing time of immobilization for carrying out repair and thus reduce costs the maintenance of the ship.

Dimensions

- Length – 30.5 m;
- Width – 9m;
- Draught – 1.4 m;
- Speed – 16 km/h;
- Autonomy – 120 hours

Vessel Equipment

Manoeuvre installing signalization material, contains:

- a) one piece telescopic crane boom electro- hydraulic type , with 7 m 3 t SWL used to manoeuvre buoys and other weights
- b) two electrically operated winches , with 2 t SWL which are located in the C edges 46, each with ramp hydraulically driven roller that can swing outboard anchors buoys .

Measurements Equipment - GPS System

- Multi beam measurement equipment
- GPS antenna system on standard deck block transceiver, power block, located in the wheelhouse.

The system is powered from 220 V, 50 Hz / 24 VCC of PN and is integrated dynamic positioning system and ultrasonic probe.

Engines

- Two main diesel engine, 350 kW x 2200 rpm each

Pictures

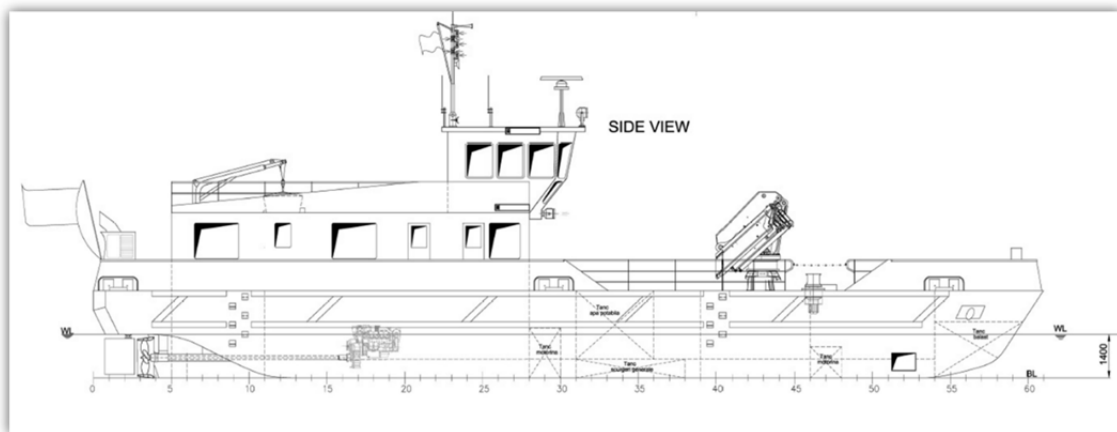


Figure 10: Multi-Functional Work Vessel (source: AFDJ – Feasibility Study)

Contact Information

-

Annexes

AFDJ Feasibility Study

2.12. EA EMDR (BULGARIA) – MARKING VESSEL

General description

-

Dimensions

- Length – 30.5 m;
- Width – 9m;
- Draught – 1.4 m;
- Speed – 16 km/h;
- Autonomy – 120 hours

Vessel Equipment

-

Engines

-

Pictures

-

Contact Information

-

2.13. Summary and conclusions

The purpose of this research for multifunctional marking vessel is to provide all detailed information about the general information and technical specification for marking vessel which are designed for the placement of marking objects along the river. Information provided by partners are based on the findings that comprise feasibility studies, tenders and technical specifications for each vessel. Partners have enough information to apply for the specific vessel characteristics based on their signalling activity and the characteristic of pilot sectors selected that conduct to technical specification for their vessels. More detailed information are provided through “FAIRway - State of the art analysis equipment summary” document.

In conclusion, a marking vessel with a length of about 20 m is required at the Danube in Slovakia and Croatia. Corresponding to the operational requirements on the significantly wider Danube in Bulgaria and Romania a vessel length of about 30 m is required. A decisive parameter is also the vessel draught, which lies in a range between 1 m and 1.4 m in order to enable the waterway administrations to perform proper fairway marking also during low water periods. Vessel speed is also an important factor but less crucial than the vessel draught. In addition the storage capacity for bouys on deck, the size of the work area for handling the bouys as well as handling devices (cranes) are essential to be described in technical specifications of marking vessels. Also the number of persons, who stay on board, the hours of autonomous operation, fuel tanks etc. will be issue to the detailed technical specifications.

Depending on the requirements and the final design prices are expected to range between 1 million Euros for the smaller vessels and 3.5 million Euros for the larger vessels.

3. Surveying Vessel

3.1. ALU MARINE – Hydrographic survey launches

General description

The Alumarine Shipyard has specialized in the construction of aluminium boats since 1986. The shipyard design and build powerful, robust and seaworthy work boats that can be used every day in the most extreme conditions.

Features

These survey boats will make hydrographic surveys in the maritime bief of the Congo River to guide dredging and marking for the development of a transport network in the DRC (Multimodal Transport Project). These hydrographic survey boats are each equipped with an automatic GPS positioning system and the latest equipment dedicated to the entry and processing of bathymetric data (depth measurement of the seabed). The two boats will also probe the secondary channels and the shallow depths creeks.

Applications

The shape of the hull has been optimized to minimize pitching when probing in rough waters, generating more accurate readings. The concentration of weight at the lowest parts of the vessels avoid rolling.

- Robust and custom boats in aluminium
- Stable hull generating minimal disruption around the transducer
- Shallow draft to probe in shallow areas
- Smooth hull without strakes, avoiding air bubbles in the region of probe
- Diamond-shaped bow, extending the dynamic waterline and allowing easy passage in choppy sea.

Technical specifications

• Construction	Alu Marine
• Architect	Francois Lucas
• Material	aluminium
• LOA	7.80 m
• Max beam	2.80 m
• Draft	0.80 m
• Light displacement	4 t
• Engines	2 x 115 hp V drive
• Service speed	8-10 knots
• Range	200 km

Pictures

Figure 11: Hydrographic survey launches (source: <http://www.alumarine-shipyard.com/>)

Contact Information

ALU MARINE

Port Launay 44220 Couëron - FRANCE

Phone. +33 (0)2 40 65 19 31

Fax. +33 (0)2 40 65 16 52

Email. contact@alumarine.fr

GPS. Lat. N 47° 12' 29.393/Long. W 1° 44' 38.827

Web: <http://www.alumarine-shipyard.com/>

Annexes

<http://www.alumarine-shipyard.com/en/industry/230-vedettes-hydrographique-fleuve-congo.html>

3.2. ARMSTRONG MARINE INC. – 26 CAT - SURVEY - Bill Benson – PROPOSAL**General description**

Measuring vessel with multi-beam device will serve for the measurement of the Danube river bed including detailed measurement of the critical sections on the Danube River.

Features

-

Applications

It will enable to obtain better data within the detailed 3D situation of the river bed comparing to the actual condition, because actually SWME, s.e., Branch office Bratislava has had only single beam measuring device and the cross section are measured in density of 50 m. Measuring vessel would have the following parameters and facility devices:

Technical specifications

- Type of the vessel: KATAMARAN,
- Length: 7,9m – 9,5m
- Width: 2,5m – 3,3m,
- Draught max: 1,2m,
- Engine: 2x hanging or built-in engine 220HP
- Fuel: petrol/diesel
- Material: aluminium
- Handling of the engines Hydraulic,

Accessories

- 2x radio station VHF
- AIS transponder device with IENC viewer connection
- signalling devices for the safety of the navigation during the measurement
- sonar (navigational)
- multi-beam type interferometer 200 kHz
- DGPS compass
- motion sensor
- valeport
- miniSVP profiler
- GPS GNSS
- Measuring software for the data collection and their post-processing.

Pictures

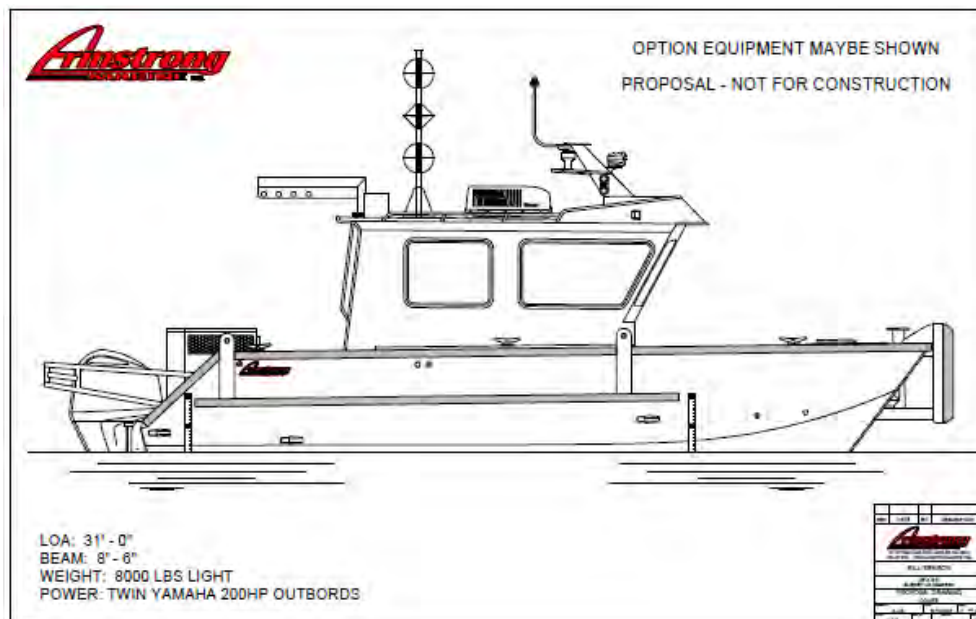


Figure 12: 26 CAT - SURVEY (source: pdf file)

Contact Information

151 Octane Ln, Port Angeles, WA 98362, United States of America

Tel: +1 360-457-5752, Fax: +1 360-457-5753

270 Hogans Rd. Hubert, NC 28539, United States of America

Tel: +1-910-708-1295, Fax: +1-910-708-1318

Web: <http://armstrongmarine.com/>

Annexes

26 CAT - SURVEY - Bill Benson - PROPOSAL - Rev A.pdf

3.3. ARMSTRONG MARINE INC. – 30 CAT AMI Survey**General description**

- LOA 30'
- Beam 11'
- Planing catamaran

Features

-

Applications

It will enable to obtain better data within the detailed 3D situation of the river bed comparing to the actual condition, because actually SWME, s.e., Branch office Bratislava has had only single beam measuring device and the cross section are measured in density of 50 m.

Technical specificationsDeck Accessories

- Hand rails around fore deck
- Forward folding antenna/radar mast
- Roof access ladder
- Hull access hatches
- Aluminum davit mounted on port side
- Hydraulically powered stern gantry c/w PL2 winch

Superstructure

- Forward leaning full width walk through cabin
- Insulated & paneled c/w wood trim
- Gray interior paint

Accommodations

- Two (2) survey stations
- Captains helm
- Head package c/w marine toilet
- Northern Lights diesel generator 9kW

Power & Propulsion

- Twin 225HP Yamaha outboards
- Helm pump steering

Accessories

-

Pictures



Figure 13: 30 CAT AMI Survey (source: 30 CAT AMI Survey Proposal Rev A.PDF)

Contact Information

151 Octane Ln, Port Angeles, WA 98362, United States of America

Tel: +1 360-457-5752, Fax: +1 360-457-5753

270 Hogans Rd. Hubert, NC 28539, United States of America

Tel: +1-910-708-1295, Fax: +1-910-708-1318

Web: <http://armstrongmarine.com/>

Annexes

30 CAT AMI Survey Proposal Rev A.PDF

AMI SURVEY BOAT BROCHURE.PDF

<http://armstrongmarine.com/i-16235981-30-outboard-catamaran-survey-boat.html>

3.4. CHANTIER ALLAIS SHIPYARD – Hydro

General description

Insofar as we design the ships we build, and that we have chosen to keep all aspects of shipbuilding in house, we have decided to develop an organisation model based on ISO 9001 2000 principles. In 2003 we decided to optimise our organisation further by integrating it into a data base management system, that we again preferred to develop in house by creating our own IT department.

Features

-

Applications

- Ship Service and Servitude

Technical specifications

- Hull length 10.30m
- Waterline length 9.20m
- Max width 3.46m
- Maximum width at the waterline 3.30m
- Draught 0.86m

PROPULSION

- Propulsion power 550 hp
- Type of propellant Screw propeller
- Max speed 18 Kn

Accessories

-

Pictures



Figure 14: Boat Hydro (source: <http://www.chantiersallais.fr/>)

Contact Information

MSI Solutions – Chantiers Allais

Atelier Mécanique Nord, BP 80608

50106 Cherbourg Octeville Cedex, France

Tel: +33(0) 2 33 97 33 49

Web: <http://www.chantiersallais.fr/>

Annexes

<http://www.chantiersallais.fr/portfolio-item/hydro-2/?lang=en>

3.5. CHANTIER ALLAIS SHIPYARD – VNF**General description**

-

Features

-

Applications

-

Technical specificationsMEASUREMENTS

- | | |
|------------------------------|-------|
| • Hull length | 7.85m |
| • Waterline length | 7.70m |
| • Max width | 2.94m |
| • Max width at the waterline | 2.76m |
| • Draught | 0.92m |

PROPULSION

- | | |
|--------------------|-----------------|
| • Propulsion power | 130 Cv |
| • Propellant type | Screw propeller |
| • Max speed | 11 kn |

CAPACITY

- | | |
|---------------|--------|
| • Fuel | 2x132L |
| • Fresh water | 150L |
| • Black water | 110L |

Accessories

-

Pictures



Figure 15: VNF Boat (source: <http://www.chantiersallais.fr/>)

Contact Information

MSI Solutions – Chantiers Allais
Atelier Mécanique Nord, BP 80608
50106 Cherbourg Octeville Cedex, France
Tel: +33(0) 2 33 97 33 49
Web: <http://www.chantiersallais.fr/>

Annexes

<http://www.chantiersallais.fr/portfolio-item/vnf-2/?lang=en>

3.6. CHEETAH MARINE – 7.9m Survey Catamaran ‘Gallopier’

General description

‘Gallopier’ is one of the popular 7.9m Cheetah Catamarans, which have earned an outstanding reputation as an extremely versatile workboat, complimented by Cheetah Marine’s ability to customise each boat according to the customer’s specific survey applications.

Features

-

Applications

The main duties of the PLA's hydrographers are to provide accurate charting of the river bed, throughout the 140km tidal stretch of river and estuary that falls under the Authority's jurisdiction. Following the successful mounting of the 8125 and moonpool system on Surveyor 1, commissioned by the Saudi Ports Authority, Cheetah Marine has worked closely with Reson installing into 'Gallop' the new-generation Reson SeaBAT 7125 multibeam echosounder, sound velocity probe and POS MV Motion Sensor by Applanix.

Technical specifications

- | | |
|--------------------------------|------------------|
| • Length overall | 7.9m |
| • Length overall inc bow sprit | 8.2m |
| • Length to inner transom | 7.2m |
| • Beam | 2.7m |
| • Draught | 0.3m (min) |
| • Wheelhouse size | 1.7m |
| • Deck space | 2.1 x 2.58m wide |
| • Propulsion | 2 x Honda 100hp |

Accessories

The instruments are mounted within a hydrodynamic pod which can, for quayside wall surveying, be tilted at a 40 ° angle before being lowered through the moonpool into the water column. With a 400kHz frequency, the 7125 MBES receiver covers a 128° swath with ultra high resolution and a maximum range of 300m. The PLA also has the option of fitting a lower 200kHz frequency bathy transducer, to aid surveying of areas with very dense fluid mud. A second pod incorporates an Acoustic Doppler Current Profiler (ADCP), making the Cheetah launch one of the most versatile small survey boats in operation, anywhere in the world.

Pictures



Figure 16: 7.9m Survey Catamaran 'Gallop' (source: <http://www.cheetahmarine.co.uk/>)

Contact Information

United Kingdom

Sean Strevens MRINA,

sean@cheetahmarine.co.uk

OceanBlue Quay, The Esplanade, Ventnor, Isle of Wight, PO38 1JR

+44 1983 852398

E-mail: mail@cheetahmarine.co.uk

Web: <http://www.cheetahmarine.co.uk/>

Annexes

http://www.cheetahmarine.co.uk/en/deliveries/7.9m_survey_catamaran_galloper_leaps_through_her_sea_acceptance_trials

3.7. CHEETAH MARINE – CREH Tracer 4

General description

The Cheetah 7.9 is the fourth vessel added to the CREH survey capacity and she will make initial contributions in two main science areas. The first is the deployment and sampling of novel microbial tracer systems, developed by CREH Analytical Ltd.

Features

-

Applications

-

Technical specifications

- | | |
|---|-------------|
| • Length overall including engine pods | 7.9m |
| • Length to aft bulkheads excluding engine pods | 7.2m |
| • Moulded Beam overall | 2.65m |
| • Beam overall | 2.7m |
| • Deck size | 2.7 x 2.58m |
| • Wheelhouse size | 2.1 x 2.58m |

Accessories

-

Pictures



Figure 17: CREH Tracer 4 (source: <http://www.cheetahmarine.co.uk/>)

Contact Information

United Kingdom

Sean Strevens MRINA,

sean@cheetahmarine.co.uk

OceanBlue Quay, The Esplanade, Ventnor, Isle of Wight, PO38 1JR

+44 1983 852398

E-mail: mail@cheetahmarine.co.uk

Web: <http://www.cheetahmarine.co.uk/>

Annexes

http://www.cheetahmarine.co.uk/en/deliveries/creh_tracer_4

3.8. CHEETAH MARINE – Hydrographic Survey “CETUS”

General description

The latest hydrographic survey Cheetah Catamaran was delivered to Dutch Company Heuvelman Ibis earlier this month. ‘Cetus’ measures 6.2m LOA and has been fitted with the long survey style wheelhouse. Seatrials in October at Cheetahs base at Ventnor Haven achieved top speeds of 26 knots with twin Honda 50hp outboards. With a lightship weight of 1440kg, Cetus can be easily towed, launched and recovered from various sites where the Company operates across Holland and Germany.

Features

-

Applications

-

Technical specifications

- Length Overall 6.2m
- Length, excluding engine pods 5.5m
- Beam 2.4m
- Draught 0.25 (min)
- Long wheelhouse length 3.1m x 2.2m wide
- Deck area 1.5m x 2.2m wide
- Weight 1460kg (inc Robin generator)
- Engine Installation 2 x Honda 50hp outboards
- Top speed 26 knots
- Cruising speeds 18-19 knots

Accessories

A Kongsberg / geoAcoustics Geoswath Multibeam Echosounder has been bow mounted allowing surveys right up to the nearshore zone. With a shallow draught from 25-30cm 'Cetus' is capable of accessing extremely shallow water giving greater flexibility when working to tidal windows. Heuvelman completed the fit out to include 19" racking housing 2 PCs and UPS, dual 19" monitors, Robin 3200 220/24v Generator, Furuno Navnet radar/chart plotter system with VHF and land based navigation reference antenna.

Pictures



Figure 18: Hydrographic Survey "CETUS" (source: <http://www.cheetahmarine.co.uk/>)

Contact Information

United Kingdom

Sean Strevens MRINA,

sean@cheetahmarine.co.uk

OceanBlue Quay, The Esplanade, Ventnor, Isle of Wight, PO38 1JR

+44 1983 852398

E-mail: mail@cheetahmarine.co.uk

Web: <http://www.cheetahmarine.co.uk/>

Annexes

http://www.cheetahmarine.co.uk/en/deliveries/hydrographic_survey_cheetah_in_northern_holland1

3.9. DAMEN – SURVEY CATAMARAN 1706 “LIDA”

General description

YARD NUMBER 1537 (Damen Shipyards Hardinxveld)

DELIVERY DATE April 2001

NAT. AUTHORITIES Dutch Shipping Inspection, 30 miles

Features

-

Applications

- BASIC FUNCTIONS Supply, survey
- CLASSIFICATION Bureau Veritas I 3/3 (E) Light Ship
Coastal Waters

Technical specifications

Dimensions

- Length o.a. 17.20 m
- Beam o.a. 6.20 m
- Depth 3.05 m
- Draught 1.25 m

Performance

- Speed (Trial) 19.70 knots

Propulsion System

- Main engine(s) 2x caterpillar 3406e di-ta
- Total power 896 kw (1200 bhp) @ 2100 rpm
- Gear boxes 2x zf, type irm350pl2 / 2.077:1
- Propulsion fixed pitch propeller

Auxiliary Equipment

- Generator Set 2x Hatz/Stamford 4L41C

- Capacity 30 kVA, 50Hz, 230/400V

Accessories

Nautical And Communication Equipment

- RADAR Furuno FR-8051
- DGPS -
- AUTOPILOT Robertson AP 45
- ECHO SOUNDER 1x Furuno FE-606
- 1x RHM ES 2000
- VHF 2x Sailor RT 2048
- SSB -
- Navtex -

Pictures



Figure 19: Survey Catamaran 1706 "LIDA" (source: BN1537 Hardinxveld.pdf)

Contact Information

Rivierdijk 544 P.O. Box 60

3371 EB Hardinxveld-Giessendam

The Netherlands

Phone: +31 (0)184 61 30 88

E-mail: info@damen-hardinxveld.nl

Fax: +31 (0)184 61 77 93

Web: www.damenshipyardshardinxveld.nl

Annexes

<http://www.damenshipyardshardinxveld.nl/~media/DamenHardinxveld/Documents/Product%20sheets/Specials/Survey%20Catamaran%201706.ashx>

BN1537 Hardinxveld.pdf

3.10. DAMEN – STAN TENDER® 1504

General description

Hull Material	Steel
Superstructure	Aluminium

Features

-

Applications

Basic Functions	Pilot, survey, crew boat and patrol, duties
Classification	Bureau Veritas, MACH Special Service / Fast Utility Vessel, Sea Area 2

Technical specifications

DIMENSIONS

- Length o.a. 15.20 m
- Beam o.a. 4.50 m
- Depth at sides 2.18 m
- Draught max 1.20 m

CAPACITIES

- Fuel oil 1.6 m³
- Fresh water 0.2 m³
- Waste water 0.1 m³
- Crew 2 persons
- Industrial personnel 4-8 persons

PERFORMANCES

SPEED	13.0 – 18.0 knots
RANGE	175 nm. at speed

PROPULSION SYSTEM

MAIN ENGINES	2x Volvo / Caterpillar
TOTAL POWER	450 – 650 bkW
GEARBOXES	2x ZF /Twin Disc
PROPULSION	2x Fixed pitch propellers

ELECTRICAL EQUIPMENT

NETWORK	24V d.c., 230/400V 50 Hz a.c.
GENERATOR SET	1 x 13.0 kW, 16.5 kVA

Accessories

- Nautical, surveillance and communication equipment
- Searchlight 1x 250w, 24v
- Compass magnetic
- Echo sounder
- Radar
- GPS
- VHF
- Vhf hand held
- Mf/hf
- Navtex

Pictures

Figure 20: Survey Catamaran 1706 "LIDA" (source: prod blad STe 1504.pdf)

Contact Information

Rivierdijk 544 P.O. Box 60

3371 EB Hardinxveld-Giessendam

3370 AB Hardinxveld-Giessendam

The Netherlands

Phone: +31 (0)184 61 30 88

E-mail: info@damen-hardinxveld.nl

Fax: +31 (0)184 61 77 93

Web: www.damenshipyardshardinxveld.nl

Annexes

- <http://products.damen.com/en/ranges/stan-tender/stan-tender-1504/deliveries/ste-1504-lady-zineb>

DATA SHEET DOWNLOAD

- [http://products.damen.com/~media/Products/Images/Clusters%20groups/High%20Speed%20Crafts/Stan%20Tender/Stan%20Tender%201504/Documents/Product Sheet_Damen Stan Tender 1504_29062015.ashx](http://products.damen.com/~media/Products/Images/Clusters%20groups/High%20Speed%20Crafts/Stan%20Tender/Stan%20Tender%201504/Documents/Product%20Sheet%20Damen%20Stan%20Tender%201504%2029062015.ashx)
- prod blad STe 1504.pdf
- bno blad STe 1504 YN 541606.doc

3.11. DAMEN - STAN TENDER® 1505

General description

YARD NUMBER	541606
OWNER	The Royal Moroccan Navy
FLAG	Morocco
DATE OF DELIVERY	March 2011
HULL MATERIAL	Steel
SUPERSTRUCTURE	Aluminium

Features

-

Applications

- BASIC FUNCTIONS Survey duties
- CLASSIFICATIONS Bureau Veritas, I 2 Hull • MACH Light Ship / Pilot Boat Coastal Area

Technical specifications

- Length o.a. 15.20 m
- Beam o.a. 4.80 m
- Depth at sides 2.25 m
- Draught max 1.25 m

Capacities

- Fuel oil 2.5 m3
- Fresh water 0.2 m3
- Dirty oil/ bilge water 0.3 m3
- Waste water 0.3 m3
- Crew 2-3 persons
- Industrial personnel 6-8 persons

Performances

- Speed 18 - 26 kn.
- Range 270 nm. At max speed

Propulsion system

- Main engines 2x mtu / man / caterpillar / volvo
- Total power 500 – 1000 bkW
- Gearboxes 2x twin disc
- Propulsion 2x fixed pitch propellers

Electrical equipment

- Network 24v d.c., 230/400v 50 hz a.c.
- Generator sets 1x 13.5 kW, 16.9 kva

Accessories

- NAUTICAL, SURVEILLANCE AND COMMUNICATION EQUIPMENT
- SEARCHLIGHT 1x 250W, 24V
- COMPASS Magnetic
- ECHO SOUNDER
- RADAR
- GPS
- VHF
- VHF HAND HELD
- MF/HF
- NAVTEX

Pictures



Figure 21: STAN TENDER® 1505 (source: STe 1505.pdf)

Contact Information

Rivierdijk 544 P.O. Box 60
 3371 EB Hardinxveld-Giessendam
 3370 AB Hardinxveld-Giessendam
 The Netherlands
 Phone: +31 (0)184 61 30 88
 E-mail: info@damen-hardinxveld.nl
 Fax: +31 (0)184 61 77 93
 Web: www.damenshipyardshardinxveld.nl

Annexes

<https://www.google.ro/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CB4QFjAAahUKEwjP1f-B7OTIAhVHWBQKHx-RAFI&url=http%3A%2F%2Fproducts.damen.com%2F~%2Fmedia%2FProducts%2FImages%2FClusters%2520groups%2FHigh%2520Speed%2520Crafts%2FStan%2520Tender%2FStan%2520Tender%25201505%2FDocuments%2FDamen%20Stan%20Tender%201505%20Fast%20Twin%20Screw%20Aluminium%20Workboat.ashx&usg=AFQjCNEmM6Z6GM-7LeOE3R11aYzMTuc-3w&sig2=AVCR1477p8nAesPddL5W5A&bvm=bv.106130839.d.d24>

prod blad STe 1505.pdf

3.12. DAMEN – STAN TENDER® 1504 "H 01"

General description

Yard Number	541606
Owner	The Royal Moroccan Navy
Flag	Morocco
Date Of Delivery	March 2011

Features

- Hull Material Steel
- Superstructure Aluminium

Applications

- Basic Functions Survey Duties
- Classifications Bureau Veritas, I 2 Hull • Mach Light Ship / Pilot Boat Coastal Area

Technical specifications

- Length o.a. 15.32 m
- Beam o.a. 4.37 m
- Depth at sides 2.18 m
- Draught (approx.) 1.10 m

Tank capacities

- Fuel 1.50 m3
- Fresh water 0.21 m3

Performance (trials)

- Speed 14.0 kn.

Propulsion system

- Main engines 2 x man d2866 lxe 40
- Total power 442 bkW
- Gearboxes 2 x twin disc
- Propellers 2 x fixed pitch propellers

Electrical equipment

- Battery sets 2 x 24v d.c. / 200ah
- Shore connection 230v / 32a + 25 m cable
- Battery charger 24v / 75a
- Generator set 16.9 kva
- Network 230v a.c. 50hz, single phase

Accommodation

- Crew 2 persons
- Other personnel 2 persons
- Wheelhouse survey area
- Below maindeck galley, mess room/ cabin and sanitary space
- Air conditioning 48000 btu

AccessoriesNautical, surveillance and communication equipment

Searchlight	1 x 250w 24v
Compass	ritchie hb 71
Echo sounder	raytheon st60
Gps	furuno gp-32
Vhf	s.p. Radio, sailor rt2048
Radar	furuno 1832
Survey equipment	qinsy survey system
	kongsberg simrad em3002 multibeam echosounder
	kongsberg simrad e400 single-beam echosounder
	c-max cm2 side scan sonar
	multi-beam add-on
	side scan sonar display add-on
	ixsea phins inertial navigation system
	rtk gps system dc 201
	valeport mini svx
	valeport svp 200

Pictures



Figure 22: STAN TENDER® 1504 "H 01" (source: www.damenshipyardshardinxveld.nl)

Contact Information

Rivierdijk 544 P.O. Box 60

3371 EB Hardinxveld-Giessendam

3370 AB Hardinxveld-Giessendam

The Netherlands

Phone: +31 (0)184 61 30 88

E-mail: info@damen-hardinxveld.nl

Fax: +31 (0)184 61 77 93

Web: www.damenshipyardshardinxveld.nl

Annexes

- <http://products.damen.com/en/ranges/stan-tender/stan-tender-1504/deliveries/ste-1504-h01>
-
- <http://products.damen.com/en/ranges/stan-tender/stan-tender-1504>

3.13. TRIDENT ALUMINIUM BOATS – TRIDENT 720 CT

General description

Model TRIDENT 720 CT has a comfortable, spacious cabin with a reverse slope of windows, it completely eliminates sun glare; rain drops and sprays will not interfere, this design allows to go confident and safe on the boat in all weather conditions. Through cab (doors in fore and aft cockpits) provides a convenient mooring and access to the shore. In the boat, provided fold-out bed - sofa in the cockpit locker. Reliability, functionality, security are all connected together in this aluminum boat.

Features

Design feature of aluminum motorboat TRIDENT 720 CT Evolution is displacement the cabin by half meter forward to the bow, at the expense of the aft cockpit increased up to 2 meters. Such construction is appreciated by both professionals and fishermen, hikers, diving lovers – possibility to place in the spacious aft cockpit any equipment, gear or just stay with a big company. There is plenty of space for work and leisure. Boat is easy to drive, it is stable in the course, quickly goes planning (deadrise 17 °, equipped with a bottom 3 couples of steps) . Great stay and fishing on boat TRIDENT 720 CT Evolution are guaranteed.

Applications

There's nothing to be done - first, the northern latitudes of the Pacific do not tolerate foppish relationship, and secondly, to such projects worth exclusively utilitarian task - hunting , fishing and more time fishing!

Technical specifications

- | | |
|----------------------------|------------|
| • Overall length | 7350 Mm |
| • Overall beam | 2450 Mm |
| • Overall depth | 2300 Mm |
| • Depth of board on middle | 1100 Mm |
| • Deadrise | 17° |
| • Draft | 400 Mm |
| • Passengers | 7 Pers. |
| • Engines, max | 175-200 Hp |
| • Fuel | 200 L |

Accessories

-

Pictures



Figure 23: TRIDENT 720 CT (source: FAIRway market study Trident 720 CT boat-HU.pdf)

Contact Information

Russia, St.-Petersburg, Lomonosov

Transportnij line, 9

Phone: + 7 (812) 423 - 32 - 23

Email: katera@tridentboats.ru

Web: <http://www.tridentboats.ru/>

Annexes

- <http://www.tridentboats.ru/boats/en/b8-720-ct.html>
- FAIRway market study Trident 720 CT boat-HU.pdf

Price

Net 76.000 Euro (equipped with Mercury Verado 175 outboard engine, Lowrance Elit 7x fish finder, air-conditioning and all compulsory equipment, ready to use with all navigation certificates named to VIZIG)

Price is based on Hungarian procurement procedure carried out by OVF in 2015. august (exchange rate is 311 HUF/Euro)

3.14. MEYER SHIPYARD - MZB 750 Cabin

General description

A workboat with mechanical front hatch and spacious cabin "headroom". The MPE 750 is a fast boat application. The new offshore hull offers safe driving behavior in rough water, the Trimaranrumpf grants high stability. The boat has a good thermal insulation and is by default heater designed for year-round operation.

Features

-

Applications

-

Technical specifications

- Length 7:50 m
- Width 2.50m
- own weight 1900 kg
- Payload 850 kg
- Material GFK
- Motorization: gasoline or diesel engine to 300 hp with sterndrive or outboard engine up to 250 hp or jet drive

Accessories

-

Pictures



Figure 24: MZB 750 Cabin (source: Messboote.pdf)

Contact Information

MEYER Bootswerft e.U.

A-3641 Aggsbach Markt, Niederösterreich

Tel.: 0043(0)2712 247

Fax: 0043(0)2712 24740

www.bootserft-meyer.at

E-mail: office@bootswerft-meyer.at

Annexes

- <http://www.bootswerft-meyer.at/media/files/Datenblatt%20MZB%20750%20Cabin.pdf>
- Messboote.pdf
- Mayer_Datenblatt MZB 750 Cabin.pdf
- Mindestanforderung Vermessungsboot.pdf

3.15. MS Boat – C690 Cabin

General description

MS BOAT is a family company manufacturer of the highest quality aluminum boats. Our unsinkable aluminum boats feature high endurance and high dent and corrosion resistance. They have very rigid boat structure with relatively low weight. This makes them a great choice for a year-round use boat, both on seas and inland reservoirs. All our boats are designed and constructed with an idea to support optimum functionality and comfort. Thanks to a well equipped interior they are perfect for family trips or fishing excursions boats.

Our boats can also be used as work-boats. Very strong materials and smart design ensure that the boat will be a great partner whatever your tasks are. What is more, the interior layout and the equipment

which are delivered as standard package can be customized to your needs and wishes. That's because we want to give you the boat exactly the way you want it. A workboat with mechanical front hatch and spacious cabin "headroom". The boat has a good thermal insulation and is by default heater designed for year-round operation.

Features

Ms C690 is a spacious and very stable boat with enclosed Cabin. It cannot stop even with a full load and is equally suitable for transport as for fishing expeditions, or outing with the whole family. Install a heater so you have it nice and warm even in ruske weather. Thanks to the high freeboard, the good stability and carrying capacity, so the boat is very safe to drive even in open and rough seas.

The boat is economical in terms of operating costs, because its basic design of the hull requires relatively small motor. Its practical decor with door on front and back allows you to go through the boat, making it ideal for both fishing trip, transport and disembarkation. The robust ranks and rome affordable deck in the bow facilitate boarding and loading / losing. The boat has a very robust construction throughout 5mm seawater resistant aluminium of the highest quality.

Applications

Work-boat

Technical specifications

- Length 6.90 m
- Width 2.35 m
- Own weight 1600 kg
- Material ALU 5 mm
- Person capacity 7
- Fuel tank capacity 180 l
- Motorization outboard engine up to 200 hp

Accessories

Hydraulic steering / Light for map reading / Fire extinguisher / Roof cargo pipes / Electric bilge pump
Electric panel / Drink holder / Cleats – 4 pcs / Manual bilge pump / Main switch / Couch 2pcs / Rod
holders – 2 pcs / Fuel tank / Wipers – 2 pcs / Tempered glass 5mm / Boat ladder / Fuel gauge / Radio/CD
/ Trunk – 2 pcs / Rubber fenders / Navigation lights LED / Boat horn / Compartments – 2 pcs / Sound-
proofing mats / Halogens LED –2pcs / Socket 12 V - 2pcs / Handles – 4 pcs / Painted bottom / Cabin lights
– 4 pcs / Ventilation / Cargo security handles – 4 pcs / Anodes / Aluminium tread plate floor inside the
cabin

Pictures



Figure 25: MS Boat – C690 Cabin (source: <http://msboat.com/>)

Contact Information

MS Boat

ul. Rzącka 47

30-687 Cracow, Poland

mobile: +48 500 046 464

email: info@msboat.com

web: <http://msboat.com/>

Annexes

- <http://msboat.com/product/c-690-19.html>
- OVF Offer MS Boat – C690 Cabin.pdf

Price

Net 70.000 Euro (equipped with Mercury F150 EXLPT EFI outboard engine, Hummingbird 899 CXI HD SI Combo fish finder, air-conditioning and all compulsory equipment, ready to use with all navigation certificates named to VIZIG)

Price is based on Hungarian procurement procedure carried out by OVF in 2015. august (exchange rate is 311 HUF/Euro)

3.16. Summary and conclusions

According to the survey, partners provide based on the findings and offers received varying types of ships or boats. According to the survey, partners provide offers and technical specification received for many boats. The results of the study consist in different forms of construction hull, materials used, dimensions, equipment used, tasks and purpose that is used. Typically, modern survey vessels will be equipped with one or more of the following equipment: GPS positioning and logging, single beam sonar, multibeam sonar, Side-scan sonar, towed magnetometer, subsurface profiler, grab sampler, bottom coring device or

ADCP. The specification of the vessels varying from 7 m up to 15 m long and the hull of the ship varying from catamaran up to normal one. Many partner opt for small ships that fulfil their needs especially in terms of shallow water measurements. Bathymetric surveys with single-beam and multi-beam equipment will be used for charts can be used for a wide range of applications such as navigation charts, describing sedimentological processes like erosion and sediment accumulation, underwater landslides, fluctuations of sea level, subsidence, and environmental applications.

Indicative price estimations for the surveyinf vessels range between 70,000 and 250,000 Euros.

4. Single-beam Surveying Equipment

4.1. OHMEX Ltd – SONARMITE v4.0 MTX

General description

The SonarMite Portable Echo Sounder has been designed to provide a portable instrument that provides the facilities of a ‘professional’ sounder at the cost and performance of a ‘fish finder’ device. It is important to recognize what the differences are between these two types of echo sounder. The ‘fish finder’ or leisure craft devices are primarily concerned with two functions, finding fish in the water column below the boat by sensing returns from their swim bladders and providing a bottom tracking/smoothing algorithm to detect minimum water depth below the boats hull.

Features

-

Applications

-

Technical specifications

- 1 x 235KHz single beam transducer used in BTX mode
- 1 x 200/30 dual beam transducer used in MTX mode
- 3 x 235KHz transducers spaced at 2 x depth in sweep mode
- 1 x 200KHz centre with 2 x 235 KHz port/starboard transducers
- 1 x 200/30KHz mixed frequency centre with 2 x 235 KHz side transducers

Accessories

- SonarMite MTX main processor unit c/w Bluetooth Antenna
- 'Smart' P66 depth transducer c/w 5m cable and embedded processor
- Serial data lead
- IP68 rugged plastic Transit case
- SonarW7 post process/import/export software
- External battery connector leads

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Acquisition and processing software

Pictures

Figure 26: SONARMITE v4.0 MTX (source: <http://www.ohmex.com/>)

Contact Information

Telephone: +44 (0)1590 681584

Fax: +44 (0)1590 681902

Postal address: Unit 9 Gordleton Ind.Estate, Hannah Way, Sway, Hampshire, SO41 8JD, UK

E-mail: sales@ohmex.com

Web: <http://www.ohmex.com/>

Annexes

SONARMITE v4.0 MTX - Web page

<http://www.ohmex.com/sonarmitev4.html>

4.2. TELEDYNE ODOM HYDROGRAPHIC – ECHOTRAC CV100

General description

The Echotrac CV is a hydrographic echo sounder design incorporating the cutting-edge technology, features and reliability of the Echotrac MKIII, plus the ease and flexibility of operation of a networked Windows® interface. The Echotrac CV transceiver units are supplied in a compact stand-alone package that is ideally suited to many shipboard installations. The Echotrac CV supports Chart-functionality in one optional format, a full size color LCD “electronic chart”. The “electronic chart” is supplied in flexible modular enclosures complete with swivel mounting hardware.

Features

- Multiple time varied gain (TVG) curves (10, 20, 30, and 40 log)

- DSP digitizer with manual filter control
- Manual or auto scale changes (phasing)
- Calibration menu with controls for transducer draft and index plus sound velocity and bar depth controls
- Rugged and waterproof (IP65)
- Help menus
- Flash memory upgradeable
- Auto Gain and Auto Power Modes for minimal operator input
- Suitable for autonomous vessels

Applications

-

Accessories

-

Technical specifications

Single Channel Configuration	High: 100kHz-750kHz (manual tuning in 1-kHz steps) Low: 3.5kHz-50kHz (manual tuning in 1-kHz steps) variable receiver bandwidth
Dual Channel Configuration High:	100 kHz-340kHz
Low:	24 kHz-50kHz
Resolution	0.01m, 0.1 ft.
Accuracy (corrected for sound velocity)	200kHz-0.01 m +/- 0.1% depth 33kHz-0.10 m +/- 0.1% depth
Output Power	Up to 300 watts RMS < 1 watt minimum
Ping Rate	Up to 20Hz in shallow water (10m) range
Depth Range From	<30cm to 600m (depending on frequency and transducer selected)
Input Power Requirement	9-32VDC < 15 watts
Weight	5kg (11lbs)
Dimensions	28cm W (11 in) x 23cm H (9 in) x 11.5cm (4.5 in) D
Mounting	Desktop or bulkhead mount (fixing hardware included)

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Software Control & Logging Software Windows based software included: eChart Display

Pictures

Figure 27: ECHOTRAC CV100 (source: <http://odomhydrographic.com>)

Contact Information

Teledyne Odom Hydrographic
1450 Seaboard Avenue
Baton Rouge, Louisiana 70810-6261
United States of America
Phone: +1 (225) 769-3051
Fax: +1 (225) 766-5122
Web: <http://odomhydrographic.com>

Annexes

http://odomhydrographic.com/wp-content/uploads/2015/04/echotrac_cv100_datasheet_hr.pdf

4.3. VALEPORT LIMITED – MIDAS Surveyor v2A

General description

The MIDAS Surveyor is a revolution in small boat survey work. With an integral GPS receiver and Valeport's unique "fuzzy logic" digital echo sounding technology, the Surveyor is quick to deploy, rugged and reliable, and boasts many features to make your work as easy as possible.

Features

-

Applications

-

Accessories

- Echo Sounder
- Position
- Tide
- Heave
- Sound Speed
- Gyro/Auxiliary
- Event Marker.

Physical

- Surveyor: Rugged IP67 case, 35 x 33 x 16cm, 9kg
- Accessories: IP67 case, 41 x 33 x 18cm, 9kg
- Dual Tdx: Combined 210/33kHz, 30 x 30 x 10cm, 12kg
- Shipping: 62 x 44 x 38cm, 18kg (basic set)

Technical specifications**Echo Sounder**

- Single (210kHz) or dual (210 / 33kHz) channel input, using unique “fuzzy logic” DSP to give accurate readings and reliable performance, even in shallow water. Data may be logged and output either raw (as measured) or corrected for tide and heave.
- Range: 0.3 - 100m (210kHz), 1.8 - 100m (33kHz)
- Accuracy: greater of $\pm 0.01\text{m}$ or $\pm 0.02\%$
- Resolution: 0.01m (210kHz), 0.04m (33kHz)
- Sample Rate: 6Hz

Position

- MIDAS Surveyor logs and displays DGPS position data in WGS84 or Local Grid. User has full control over spheroid and projection constants for Local Grid setup.
- Standard: Integral 12 channel GPS/SBAS receiver with combined antenna:
- $\pm 4\text{m}$ (CEP), with no correction
- $\pm 2\text{m}$ (CEP), with SBAS correction
- Option : Surveyor also accepts user's own differential, GPS or RTK data input.

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Surveyor is supplied with SurveyLog windows based software, allowing data extraction & display. All data is presented in ASCII format, and may easily be exported for use in industry standard hydrographic survey software packages, or simple XYZ format data.

Pictures



Figure 28: MIDAS Surveyor v2A (source: <http://www.valeport.co.uk/>)

Contact Information

Valeport Ltd

St Peter's Quay, Totnes, TQ9 5EW, Devon, United Kingdom

Company Number: 1950444

VAT No.: GB 165 8753 67

Tel: 44 (0) 1803 869292

Fax: 44 (0) 1803 869293

Email: sales@valeport.co.uk

Web: <http://www.valeport.co.uk/>

Annexes

http://www.valeport.co.uk/Portals/0/Docs/Datasheets/Valeport_MidasSurveyor_v2b.pdf

4.4. ATLAS HYDROGRAPHIC – ATLAS DESO 350 M

General description

The ATLAS DESO 350M is a portable dual channel echosounder in a rugged and weatherproof housing. The high frequency channel covers a frequency range from 100 kHz to 350 kHz and is mainly used for survey applications in shallow water and for sidescan operation. The low frequency channel between 24 kHz and 50 kHz has a higher depth range and can also be used for sediment investigation. Due to the wide frequency ranges of the two channels the ATLAS DESO 350M echosounder is not limited to a specific transducer or can easily be adapted to new or existing transducers respectively.

Features

- Portable dual channel echosounder
- All-in-one-box solution

- Versatile frequencies 24 – 50 kHz and 100 – 350 kHz
- Depth range 600 m
- Easy-to-operate
- Sidescan capability
- Remote depth display as option
- Compact box

Applications

- Shallow Water Surveying

Technical specificationsOperating Frequencies

- Low: 24 – 50 kHz
- High: 100 – 350 kHz
- Manual tuning in 1 kHz steps

Depth Range

- 0.5 – 600 m @ 33 kHz
- 0.2 – 200 m @ 210 kHz

Output Power

- Low: 420 WRMS
- High: 350 WRMS

Accuracy

- 0.10 m \pm 0.1% depth @ 33 kHz
- 0.01 m \pm 0.1% depth @ 210 kHz

Resolution

- 0.01 m

Phasing

- Automatic or manual change of measurement range 30%, 20%, 10% overlap

Ping Rate

- Up to 20 Hz

Accessories

- ATLAS DESO 350M
- Laptop (optional)
- Position
- Side-Scan Transducer
- Transducer Low
- Transducer High

System components

- GNSS Tools - RS232
- MRU Tools
- SV System
- Data Logger

Software

- ATLAS DESO CONTROL software supplied for ATLAS DESO 350M operation and echogram storage
- Hydrographic software package on request

Pictures

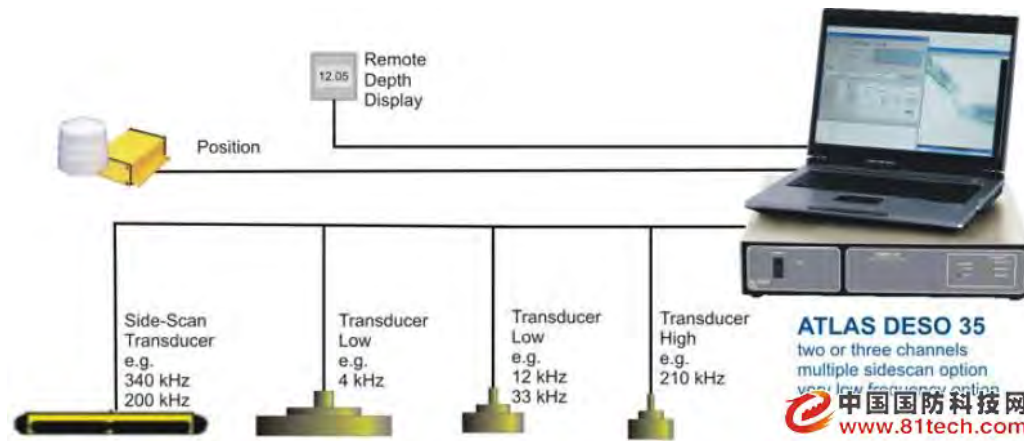


Figure 29: ATLAS DESO 350 M (source: <http://www.atlas-elektronik.com/>)

Contact Information

ATLAS HYDROGRAPHIC GmbH

Kurfürstenallee 130, 28211 Bremen, Germany

Tel +49 421 457-2259

Fax +49 421 457-3449

E-mail: sales-hydro@atlas-elektronik.com

Web: <http://www.atlas-elektronik.com/>

Annexes

https://www.atlas-elektronik.com/fileadmin/user_upload/images/products/001_PDF/ATLAS_DESO_350M.pdf

4.5. NEPTUNE SONAR Ltd. – T141 (Dual Frequency and Dual Beam)

General description

The T141 is both a dual frequency and dual beam transducer, fully compatible with many OEM hydrographic echo-sounder systems, complimenting shallow water surveying operations typically carried out by Port and River Authorities.

The unique 210 kHz 19 element configuration reduces sidelobe levels and forms an excellent beam shape in both wide and narrow modes. The beam is selected by a switch box supplied, which contains the tuning transformers for both frequencies. Electrical connection to the transducer is by a five core screened cable with a tough PU outer jacket.

The NEPTCAST over-moulded polyurethane housing provides a mechanically robust, corrosion free transducer for over-side or hull mounting.

Features

- DUAL FREQUENCY 33 & 210 KHZ
- DUAL BEAM 210 KHZ
- SHALLOW WATER SURVEYING
- OVER-SIDE OR HULL MOUNTING
- NEPCAST® PU MOULDED
- HIGH PERFORMANCE / LOW COST

Applications

Shallow Water Surveying

Technical specifications

Neptune Sonar	Neptune Sonar	T141		Type Number
Frequency	33	210	210	kHz
Beam	Single	Wide	Narrow	Selectable
Beam Angle (-3dB)	22	8	2	Degrees
Transmit Sensitivity	166	173	178	dB uPa/V@1m
Receive Sensitivity	-178	-187	-183	dB re V/uPa
Input Power	800	1600	3000	Watts
Bandwidth	4	7.5	8	kHz
Nominal Impedance	100	100	100	Ohms

Accessories

-

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Pictures



Figure 30: T141 (Dual Frequency and Dual Beam) (source: <http://www.neptune-sonar.co.uk/>)

Contact Information

Neptune Sonar Limited

Kelk Lake, Kelk, East Yorkshire

YO25 8HG, United Kingdom

E-Mail: sales@neptune-sonar.co.uk

Telephone: +44 (0)1262 490234

Facsimile: +44 (0)1262 490485

Web: <http://www.neptune-sonar.co.uk/>

Annexes

<http://www.neptune-sonar.co.uk/wp-content/uploads/2014/06/2014-Complete-Print-Version.pdf#page=84>

<http://www.neptune-sonar.co.uk/products-2/echo-sounder-transducers/t141/>

4.6. NEPTUNE SONAR Ltd. – 340 Series (Dual Frequency)

General description

The 340 SERIES is a high performance all moulded, dual frequency transducer featuring both HIGH and LOW frequency sections combined in a single unit. Compatible with a wide range of echo-sounders the piston elements are configured to achieve optimum echo-sounder performance.

The ability to specify a wide combination of frequencies in the same basic unit, provides the echo sounder manufacturer and operator with the flexibility to configure a system and beam pattern to match the desired survey requirements of resolution, range and silt penetration.

Features

- Dual frequency transducer
- 30 lf / hf combinations
- Hull or over-side mounting

- Neptcast® pu moulded
- Fishing : navigation : survey
- Low cost

Applications

Shallow Water Surveying

Technical specifications

Technical Specification							
Low Frequency Section							
Frequency	24 kHz	28 kHz	30 kHz	33 kHz	38 kHz	50 kHz	kHz
Beam Angle @ -3dB	23 x 34	19 x 30	18 x 27	16.5 x 25	14 x 22	16 x 16	Degrees
Transmit Sensitivity	166	167	167	166	165	166	dB re uPa/V @ 1m
Receive Sensitivity	-164	-166	-167	-168	-169	-178	dB re V/uPa
Input Power	900	900	900	900	900	900	Watts Pulsed
Bandwidth	2.8	3.5	3.0	3.5	3.5	5.0	kHz
Nominal Impedance	75	75	100	100	100	75	Ohms
High Frequency Section							
Frequency	160 kHz	200 kHz	210 kHz	300 kHz	600 kHz	-	kHz
Beam Angle @ -3dB	12	8	7.5	7	5	-	Degrees
Transmit Sensitivity	175	175	174	172	174	-	dB re uPa/V @ 1m
Receive Sensitivity	-187	-186	-187	-174	-204	-	dB re V/uPa
Input Power	300	300	300	300	300	-	Watts Pulsed
Bandwidth	14	20	28	28	57	-	kHz
Nominal Impedance	65	65	75	75	75	-	Ohms

Accessories

-

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

-

Pictures

Figure 31: 340 Series (Dual Frequency) (source: <http://www.neptune-sonar.co.uk/>)

Contact Information

Neptune Sonar Limited

Kelk Lake, Kelk, East Yorkshire

YO25 8HG, United Kingdom

E-Mail: sales@neptune-sonar.co.uk

Telephone: +44 (0)1262 490234

Facsimile: +44 (0)1262 490485

Web: <http://www.neptune-sonar.co.uk/>

Annexes

<http://www.neptune-sonar.co.uk/wp-content/uploads/2014/06/2014-Complete-Print-Version.pdf#page=92>

<http://www.neptune-sonar.co.uk/products-2/echo-sounder-transducers/340-series/>

4.7. KONGSBERG – EA 440 Echosounder

General description

The EA 400SP portable splash proof echo sounder is a compact version of our standard EA 400, making it a perfect choice for surveying in shallow water depths using small and open boats.

Features

- Standard or rugged computer for easy menu operation, interfacing and data storage
- Compensation for sound velocity
- Compensation for heave affecting transducer depth
- Advanced, built-in bottom digitiser

Applications

Inland river survey – shallow waters

Technical specifications

[http://www.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/82B62B00CFC5B34AC1256C38003F7048/\\$file/160847ak_EA400_Datasheet_lr.pdf?OpenElement](http://www.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/82B62B00CFC5B34AC1256C38003F7048/$file/160847ak_EA400_Datasheet_lr.pdf?OpenElement)

Accessories

- transceiver Kongsberg EA440 200 Khz , down scanning
- transducer Kongsberg 200 KHz, 7" circular
- transceiver Kongsberg EA440 , 500 KHz, side scan
- Kongsberg EA 440 software
- transport handbag for equipment(portable computer is not included)
- removable metallic support for sensors
- positioning system Hemisphere L band corrections with the following structure:
 - GNSS receiver
 - DGPS antenna
 - subscription Atlas 10 corrections L-band valid 1 year

System components

- | | |
|--------------|--|
| • GNSS Tools | Hemisphere A325 - Vector V330 wit 2 antennas |
| • MRU Tools | SMC IMU – 008 |
| • SV System | Valeport SWiFT SVP & Valeport TideMaster |
| • Computer | Naval PC with 19" display |

Software

The computer employs Microsoft Windows ® operating systems to perform operator interface and data storage tasks. Communication between the General Purpose Transceiver and the computer is through a network cable (LAN). As standard, the EA 400SP unit operates on DC voltage.

Pictures

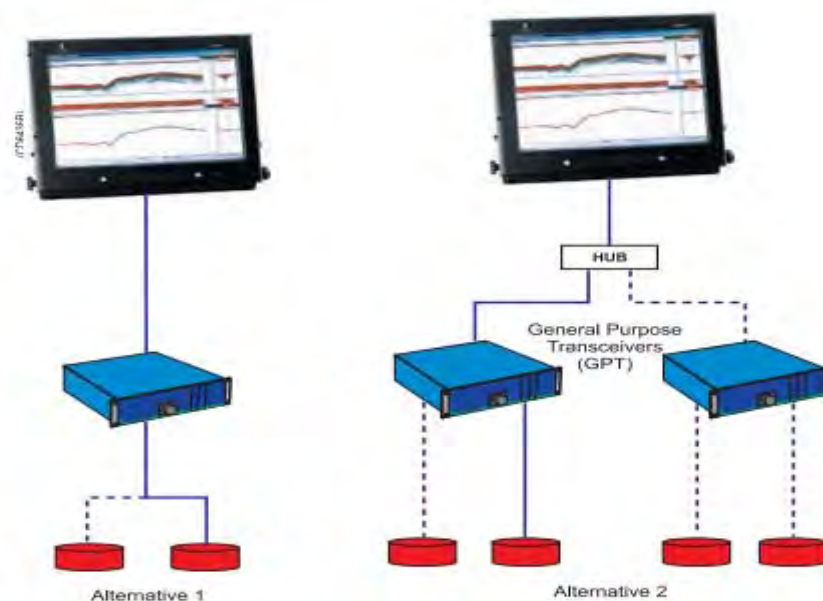


Figure 32: EA 440 Echosounder (source: <http://www.kongsberg.com/>)

Contact Information

Address: Kirkegårdsveien 45, NO-3616 Kongsberg, Norway

Mailing address: P.O.Box 483, NO-3601 Kongsberg, Norway

Phone: +47 32 28 50 00

VAT number: 979 750 730

Web: <http://www.km.kongsberg.com/>

Annexes

EA 400 Web page

<http://www.km.kongsberg.com/ks/web/nokbg0240.nsf/AllWeb/AC4C923ACD68207AC1256B91004412F7?OpenDocument>

Online brochures

[http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/82B62B00CFC5B34AC1256C38003F7048/\\$file/160847ak_EA400_Datasheet_lr.pdf?OpenElement](http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/82B62B00CFC5B34AC1256C38003F7048/$file/160847ak_EA400_Datasheet_lr.pdf?OpenElement)

[http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/5D56CE22B6F500EEC1256DC000250D6A/\\$file/164817ab_EA400_Survey_Product_spec_lr.pdf?OpenElement](http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/5D56CE22B6F500EEC1256DC000250D6A/$file/164817ab_EA400_Survey_Product_spec_lr.pdf?OpenElement)

[http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/476C6A9F1EDCD927C1256FBF0042794F/\\$file/165102aa_ea400sp_product_specification_lr.pdf?OpenElement](http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/476C6A9F1EDCD927C1256FBF0042794F/$file/165102aa_ea400sp_product_specification_lr.pdf?OpenElement)

[http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/5AAB9D95B04617D5C12570EE00502FAB/\\$file/300867aa_Sidelooking_transducer_200_lr.pdf?OpenElement](http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/5AAB9D95B04617D5C12570EE00502FAB/$file/300867aa_Sidelooking_transducer_200_lr.pdf?OpenElement)

[http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/FF36C9E1A6242587C1256EF3002F60D3/\\$file/164999aa_HOS_152_192_product_specific_lr.pdf?OpenElement](http://www.km.kongsberg.com/ks/web/nokbg0397.nsf/AllWeb/FF36C9E1A6242587C1256EF3002F60D3/$file/164999aa_HOS_152_192_product_specific_lr.pdf?OpenElement)

4.8. Summary and conclusions

This research investigates several equipments for surveying shallow water. Depth determination is a fundamental task for a hydrographer, which requires specific knowledge of the medium, of underwater acoustics, of the plethora of devices available for depth measurement, of complementary sensors for attitude. They need to apply proper measurement procedures to achieve and meet the internationally recommended standards for accuracy and coverage as articulated in IHO publication S-44 5th Edition.

Single beam echo sounders have reached a sub-decimetres accuracy in shallow water. The market study in combination with the "FAIRway - State of the art analysis equipment summary" table presents a variety of equipment types. Different frequencies, pulse rates etc. satisfy the specific hydrographers' needs. Digital echo sounders are used in combination with motion sensors, satellite positioning systems (such as GPS) and software for data processing to optimize survey operations.

Single beam equipment may cost up to 70,000 Euros, while multi-beam equipment is more expensive and may cost up to 328,000 Euros.

5. Multi-beam Surveying Equipment

5.1. KONGSBERG – EM 2040 Multibeam Echosounder

General description

The EM 2040 multibeam echo sounder is the first system to bring all the advanced features of deep water multibeam to the near bottom sounding environment. Important deep water system features included with the EM 2040 are:

- Dual swath per ping to allow a doubling of survey speed
- FM chirp to achieve a much longer range capability
- Complete roll, pitch and yaw stabilization
- Nearfield focusing both on transmit and receive

Typical applications for the EM 2040 Multibeam echosounder

- Mapping of harbors, inland waterways and shipping channels with critical keel clearance
- Inspection of underwater infrastructure
- Detection and mapping of debris and other underwater objects
- Detailed surveys related to underwater construction work or dredging
- Environmental seabed and habitat mapping
- Mapping of biomass in the water column

Features

- Frequency range: 200 to 400 kHz
- Dual swath capability, allowing a sufficient sounding density along track at a reasonable survey speed
- FM chirp allowing much longer range capability and increased resolution compared to long CW pulses
- Complete roll, pitch and yaw stabilization
- Nearfield focusing on both transmit and receive
- Operates with very short pulse lengths, down to 25 microseconds
- The depth rating of the subsea parts is 6000 m

Applications

River survey – shallow waters

Accessories

A. Hydrographic Work Station

B. Interfaces:

- Sound speed sensor
- Tide
- Center depth output stabilization

C. Processing Unit (PU)

D. Processing Unit interfaces:

- Positioning systems
- Attitude (roll, pitch and heave)
- Velocity
- Heading

- Clock
- Trigger input/output
- Clock synchronization (1PPS)

Technical specifications

- Frequency range: 200 to 400 kHz
- Max ping rate: 50 Hz
- Swath coverage sector: Up to 140° ($\pm 70^\circ$) (single RX) / 200° ($\pm 100^\circ$) (dual RX)
- Sounding patterns: Equiangular, Equidistant and High Density
- Roll stabilized beams: Yes, $\pm 15^\circ$
- Pitch stabilized beams: Yes, $\pm 10^\circ$
- Yaw stabilized beams: Yes, $\pm 10^\circ$

System components

- GNSS Tools Hemisphere VS330
- GYRO Hemisphere R330 reference station GNSS RTK
- MRU Tools SMC IMU-108
- SV System Valeport SWiFT SVP
- SV Profiler Valeport TideMaster

Software

HYPACK Inc.

Acquisition Software

- SIS (Windows)
- QPS "QINSy"
- HYPACK Inc.
- Triton Imaging Inc.
- Eiva
- Thales Geosolution

Processing Software

- CARIS HIPS/SIPS post processing
- Cfloor integrated with Neptune for digital terrain modelling
- Fledermaus interactive 3D visualisation

Pictures



Figure 33: EM 2040 Multibeam Echosounder (source: <http://www.km.kongsberg.com/>)

Contact Information

Address: Kirkegårdsveien 45, NO-3616 Kongsberg, Norway
Mailing address: P.O.Box 483, NO-3601 Kongsberg, Norway
Phone: +47 32 28 50 00
VAT number: 979 750 730
Web: <http://www.km.kongsberg.com/>

Annexes

EM 2040 Multibeam Echosounder– Brochures

- [Brochure - The Hydrographic product family](#)
 - [Data sheet - EM 2040 Multibeam echosounder - Updated](#)
 - [Data sheet - EM 2040C \(Compact\) Multibeam echoSounder](#)
 - [Product description - Synchronization unit - K-Synk](#)
 - [Application note - Discovering the redefined EM multibeam series](#)
- KONGSBERG – EM 2040 Multibeam Echosounder HU Offer.pdf
KONGSBERG – EM 2040 Multibeam Echosounder RO Offer.docx

5.2. TELEDYNE - SeaBat T20-P

General description

The T20-P family is built on scalable next generation technology with the flexibility to evolve alongside your business. The T20-P is perfectly suited for small survey platforms through to larger vessels, where portability is demanded, covering a wide range of survey applications and tasks. Built-in, configurable features—such as high-density beams with multiple detection capabilities, water column and intelligent automation—deliver highly accurate data that can be easily and quickly analyzed, according to your specific needs.

Features

- 256 beams or 512 beams*
- Water Column Visualisation
- Full Water Column Data Logging
- Frequency Agile (190-420kHz)
- Selectable Beam Density / Constant Seafloor Spacing
- Tracker autopilot
- Teledyne Sonar User Interface
- FlexMode*
- Multi-Detect *
- X-Range / Frequency Modulation*
- 400kHz Full Rate Dual Head*
- Real-Time Pipe Detection and Tracking *
- 3 years warranty

Product features

- Snippets & sidescan backscatter
- Full water column backscatter
- Tracker – powerful tool for automated control
- SeaBat User Interface. Runs on separate laptop or PC (not included)
- Selectable Beam Density – you can define what you need to get the job done

Optional extra features

- X-Range - improve range and reduce external noise

- Multi-Detect - Multiple detections for enhanced detail over complex features and water column targets
- FlexMode – increase data density where you need it most
- Pipe Detection & Tracking – unique to SeaBat, optimize detection of pipes
- Full Rate Dual Head
- Max 512 Beams

Accessories

Receiver EM7219

- Projector TC2181
- Portable Sonar Processor
- 10m Receiver cable
- 10m Projector cable
- Waterproof cable set
- Wet-end bracket

Optional extras

- 25m, 50m, 100m cable
- Fairing
- Dual head bracket
- Motion and positioning sensors
- RESON Sound Velocity Probes
- RESON PDS2000 Survey Package
- RESON Service Level Agreements (SLA)

Technical specifications

- | | |
|-----------------|---|
| • Sensor Type | swat |
| • Depth | 0.5 - 150 m / 0 - 375/575 m |
| • Frequency | 200 - 400 kHz |
| • Beam width | 1° x 1° at 400 kHz; 2°x2° at 200 kHz |
| • Resolution | 6mm |
| • Max. coverage | 165° |
| • Max ping rate | 50 ping/sec |
| • Beam spacing | 10 to 256 standard beams (optional 512) |

System components

- | | |
|------------------|---|
| • POSITION / MRU | POS MV 120 E Version RTK with titan IMU including 25m cables (option)
suitable for river works |
| • SVS | Sound Velocity Probe 70 Titan |
| • SVP | SVP mini Valeport |
| • Computer | have |

Software

HYPACK® and HYSWEEP® Software / Teledyne RESON PDS2000 with CUBE

Pictures



Figure 34: SeaBat T20-P (source: <http://www.tv.reson.com>)

Contact Information

TeledyneRESON Headquarter
Teledyne RESON A/S
Fabriksvangen 13
3550 Slangerup
Denmark
TEL +45 4738 0022
FAX +45 4738 0066
Web: <http://www.tv.reson.com>

Annexes

SeaBat® T20-P Annex – Brochures

- [Download brochure](#)
- [Download Product leaflet](#)
- http://www.tv.reson.com/tag/products%3aseabat_t20-p
- SeaBat T20P package quotation.pdf

5.3. KONGSBERG – GeoSwath Plus Compact

General description

GeoSwath Plus Compact offers very efficient simultaneous swath bathymetry and side scan seabed mapping for small vessels. Accuracies have been shown to exceed the IHO standards for hydrographic surveys.

Features

- Ultra high resolution swath bathymetry
- IHO SP-44, special order
- Co-registered geo-referenced side scan
- Frequency versions: 125, 250, 500 kHz
- Up to 12 times water depth coverage

- 240° view angle
- Compact splash proof deck unit
- 24 V power supply, 40 W
- Operation from laptop PC
- Dual transducer wet end
- Full software solution included: data acquisition, processing, presentation
- Interfaces to all customary peripheral sensors

Applications

-

Accessories

- GeoSwath Compact in waterproof housing with all connections to external sensors & transducers. Includes *ruggedised laptop PC with GeoSwath Plus acquisition & postprocessing software pre-loaded.
- 250kHz integrated "Compact" style transducer head assembly for mounting on standard deployment pole. Includes moulded unit Port/Starboard transducer.
- Octans 3000 in UW Housing: Roll/Pitch (dynamisch): $\pm 0.01^\circ\text{RMS}$, Heave: $\pm 5\text{cm}$, Heading: $0,1^\circ\text{RMS}$
- Valeport MiniSVS (Model # 0652006)

Technical specifications

- Frequency 125, 250, 500 kHz
- Operating temperature 0° to 40°C
- Storage temperature -10° to 50°C
- Humidity 10% to 90% RH non condensing

System components

- | | |
|------------|-------------------------------------|
| • POSITION | Trimble Zephyr™ geodetic technology |
| • MRU | Applanix POS MV SurfMaster |
| • SVS | Valeport SWiFT SVP |
| • SVP | Valeport TideMaster |
| • COMPUTER | Naval PC with 19" TFT monitor |

Pictures



Figure 35: GeoSwath Plus Compact (source: www.km.kongsberg.com)

Contact Information

Address: Kirkegårdsveien 45, NO-3616 Kongsberg, Norway

Mailing address: P.O.Box 483, NO-3601 Kongsberg, Norway

Phone: +47 32 28 50 00

In charge: Geir Håøy, President

Web: www.km.kongsberg.com

Annexes

Attached offer from Kongsberg.

Brochures

- [Brochure - GeoSwath Plus - Wide swath bathymetry and georeferenced side scan](#)
- [Data sheet - GeoRGE, GeoSwath Plus hardware analysis and fault finding tool](#)
- [Data sheet - GeoSwath Plus Compact - Wide swath bathymetry - English](#)
- [Application note - Mapping Hydroelectric Dams](#)

5.4. ATLAS HYDROGRAPHIC - ATLAS FANSWEEP 20

General description

The ATLAS FANSWEEP 20 is a multibeam echosounder that combines the advantages of beamforming and interferometric phase measurement techniques to the benefit of a large coverage together with high accurate depth measurements.

Features

- Coverage up to 12 times the vertical depth
- Corresponding swath width of 180° in sidescan mode

- Up to 1440 measurements per ping
- Up to 4096 amplitude values per ping for side scan measurements
- Accuracy exceeding IHO SP44 Special
- Order requirements for coverage up to 6 times water depth
- Output and display of sidescan data for object detection simultaneous with bathymetry data
- Small size, low weight, transportable

Applications

A wide swath 200 kHz multibeam echosounder designed for survey of ports, waterways and coastal areas to depths of 300 m. The ATLAS FANSWEEP 20/200 has a dual head transducer that provides swath coverage of 6x water depth for bathymetry and up to 12x water depth for side scan imagery.

Accessories

ATLAS FANSWEEP 20

Technical specifications

Atlas fansweep	20-100
Operating frequency	100 khz - 200 kHz
Depth range	0.5 – 1.0 – 600 m
Transmission power per transducer	3 kw
Accuracy	0.10 m ± 0.2% depth for coverage up to 6 times water depth
Coverage	Up to 12 times water depth, operator selectable Typical IHO Special Order compliance up to 6 times water depth
Along track beam resolution	1.3°
Across track beam resolution	1.5° down to <0.2°
PING RATE	Up to 16 Hz

System components

Electronics cabinet	2x Transducer TX/RX
AUX SENSORS	Motion Heading Position SV Keel SVP / CTD / XBT
DATA PROCESSING PC	

Pictures



Figure 36: ATLAS FANSWEEP 20 (source: www.atlashydro.com)

Contact Information

ATLAS HYDROGRAPHIC GmbH

Kurfürstenallee 130

28211 Bremen, Germany

Tel +49 421 457-2259

Fax +49 421 457-3449

Web: www.atlashydro.com

E-mail: sales-hydro@atlas-elektronik.com

Annexes

Online brochure

https://www.atlas-elektronik.com/fileadmin/user_upload/images/products/001_PDF/ATLAS_FANSWEEP_20.pdf

5.5. IMAGENEX – IMAGENEX DT101 MULTIBEAM

General description

The new DT101 Multibeam Profiling Sonar (i.e. Multibeam Echo Sounder) is a single instrument integrating the sonar, motion reference unit (MRU), and sound velocity sensor into one sleek and compact unit. The DT101 requires only one cable for operating all three sensors and is a portable solution for any survey. Compatible with the DT100 SIR (Sensor Interface Relay) power supply/timing box, simply connecting a dual antenna GNSS/GPS receiver is all that is required to perform bathymetric surveys.

Features

-

Applications

-

Accessories

-

Technical specifications

FREQUENCY	240 kHz
SWATH WIDTH	Transmit: 120° x 3°
(nominal beam geometry)	Receive: 120° x 3°
EFFECTIVE BEAM WIDTHS	Narrow: 0.75°
	Medium: 1.5°
	Wide: 3°
NUMBER OF BEAMS Default:	480
	Selectable: 240, 120
RANGE RESOLUTION	0.02% of range
RANGE	75 m (246') water depth
	150 m (492') slant range
MIN. DETECTABLE RANGE	0.5 m (1.6') below transducer
MOTION REFERENCE UNIT	Internally mounted OEM version of CDL MiniSense3
Pitch and Roll Accuracy:	0.04°
Heave:	5 cm or 5% (whichever is greater)
SOUND VELOCITY SENSOR	Internally mounted OEM version of AML Micro•X
	1400 m/s to 1600 m/s +/- 0.025 m/s

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

- DT101_SIR.exe
- Windows™ XP, Vista, 7, 8

Pictures

Figure 37: IMAGENEX DT101 MULTIBEAM (source: <http://www.imagenex.com/>)

Contact Information

IMAGENEX TECHNOLOGY CORP.

209 - 1875 Broadway Street, Port Coquitlam, BC, V3C 4Z1, CANADA

Phone: (604) 944-8248

Fax: (604) 944-8249

e-mail: imagenex@shaw.ca

Web: <http://www.imagenex.com/>

Annexes

IMAGENEX DT101 Online web brochure

http://www.imagenex.com/DT101_Specs_rev2.pdf

5.6. L3 – ELAC Nautik – SeaBeam 1180 / 1185

General description

The SeaBeam 1180/1185 multibeam echo sounders collect bathymetric and sidescan data in very shallow water with beams as narrow as 1.5 x 1.5 degrees and a swath width in excess of 150 degrees.

Features

The systems are ideally suited for surveys demanding performance from shallow water up to 600 m and in areas of extreme sedimentations like for river and port authorities, research institutes and onshore survey operations.

Applications

-

Accessories

- Transducer Arrays LSE 307
- Motion RS232
- Heading RS232

- Position RS232
- Sound velocity profile

Technical specifications

- | | | |
|------------------------------|------------------------------------|-------|
| • Operating frequency | 180 kHz band | |
| • max. depth | SeaBeam 1180 | 600 m |
| | SeaBeam 1185 | 300 m |
| • Along-ship beam width | 1.5° | |
| • Across-ship beam width | 1.5° | |
| • Pulse length | 0,15 ms - 3 ms | |
| • Side lobe suppression | 36 dB (transmission and reception) | |
| • max. swath coverage sector | > 153° | |
| • max. number of soundings | 126 | |
| • Beam spacing | Equiangular | |

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

ELAC HDP 4061, CARIS, COASTAL OCEANOGRAPHCS, EIVA, QPS, ROXAR, PDS 2000, CARAIBES,TEI

Pictures



Figure 38: SeaBeam 1180 / 1185 (source: <http://www.elac-nautik.de/>)

Contact Information

L-3 Communications ELAC Nautik GmbH

Address: Neufeldtstrasse 10 | 24118 Kiel | Germany

Tel. +49 (0)431-883 0

Fax +49 (0)431-883 496

E-mail: elac.marketing@L-3com.com

Web: <http://www.elac-nautik.de/>

Annexes

http://www.elac-nautik.de/uploads/images/pdf/L3_ELAC_Nautik_SeaBeam_1180_1185.pdf

5.7. R2SONIC – SONIC 2020

General description

The Sonic 2020 is the most compact high performance wideband shallow water multibeam echo sounder, suitable for a wide variety of general mapping applications. The Sonic 2020 provides over 20x selectable operating frequencies to choose from within the 200 to 400 kHz band, with unparalleled flexibility to trade off resolution and range and controlling interference from other active acoustic systems.

Features

-

Applications

- Hydrography
- Offshore
- Dredging
- Defense
- Research

Accessories

-

Technical specifications

• Frequency	200kHz-400kHz
• Beamwidth, Across Track	2.0° @ 400kHz / 4.0° @ 200kHz
• Beamwidth, Along Track	2.0° @ 400kHz / 4.0° @ 200kHz
• Number of Beams	256
• Selectable Swath Sector	10° to 130° (user selectable)
• Sounding Depth*	75m+
• Pulse Length	15µs-1000µs
• Pulse Type	Shaped CW
• Depth Rating	500m
• Operating Temperature	-10°C to 50°C
• Storage Temperature	-30°C to 55°C

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

-

Pictures

Figure 39: SONIC 2020 (source: <http://www.r2sonic.com/>)

Contact Information

R2Sonic, LLC

5307 Industrial Oaks Blvd., Suite 120, Austin, TX 78735

Voice: +1-512-891-0000

E-mail: r2sales@r2sonic.com

Web: <http://www.r2sonic.com/>

Annexes**R2SONIC – SONIC 2020 WEB BROCHURE**

[http://www.r2sonic.com/pdfs/R2Sonic Product Brochure.pdf](http://www.r2sonic.com/pdfs/R2Sonic%20Product%20Brochure.pdf)

[http://seatronics-group.com/files/7814/1822/6036/R2 Sonic 2020 - Datasheet.pdf](http://seatronics-group.com/files/7814/1822/6036/R2_Sonic_2020_-_Datasheet.pdf)

pdf files

Sonic 2020_Specsheet_ver1.2_US.pdf

Quotation A1503-0079

5.8. NORBIT – SEABED PS-120006-5**General description**

The 400kHz integrated multibeam solution offers high resolution in conjunction with the preferred inertial navigation system from surveyors around the world. Having the inertial navigation system GNS/INS integrated into the sonar, ensures fast and reliable mobilization.

Features

- Multibeam Sonar integrated with IMU and GPS
- State of the art GNSS-aided
- inertial navigation system

- 80kHz bandwidth
- Ultra-compact Turn-key solution
- Simple Ethernet Interface
- Fast and reliable Mobilization
- Integrated Sound Velocity Probe
- Hydrodynamic Fairing
- Mounting bracket included
- FM & CW Transmissions
- Flexible power

Applications

- Shallow water bathymetry
- Exceeds IHO Special Order
- Exceeds USACE Class 1 & LINZ Special Order
- Pipeline surveys
- Pond surveys
- Harbor surveys
- USV, UUV, AUV & ROV
- MCM & Littoral Combat Zone surveys

Technical specifications

- | | |
|---------------------------|--|
| • Swath coverage | typically 140° (7-179° for spec. Applications) |
| • Range resolution | <10mm (acoustic) |
| • Number of beams | 256 EA/ED |
| • Operating frequency | 360-440kHz, 80kHz bandwidth |
| • Range | 0.2-200m, typical survey range is 120m from sonar head (limited swath) |
| • Ping rate | up to 40hz, range dependent |
| • Resolution | 0.9° across track, 1.9° along track @400kHz |
| • Position accuracy | 0.02-0.1m (rtk) |
| • Heading accuracy | 0.03° (rtk) with 2m baseline |
| • Pitch/roll accuracy | 0.02° independent on baseline |
| • Heave accuracy | 5cm or 5% (2cm rtk) |
| • Weight approx. | 9.5kg (air) <6kg (water) |
| • Interface | 100mb/s ethernet |
| • Standard cable length | 8m |
| • Power consumption | 55wmax (12-28vdc) |
| • Operating/storage temp. | -40° to +40°/-20° to +60° |

Accessories

-

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

qinsy lite software, calibration module, qcloud-3d area based data cleaning tool.

Pictures



Figure 40: SEABED PS-120006-5 (source: <http://web.norbit.no/>)

Contact Information

Norbit subsea, P.O. Box 1858, stiklestadveien 1, n-7441 trondheim, Norway

Phone +47 73 98 25 50

Email: subsea@norbit.com

Web: <http://web.norbit.no/>

Annexes

http://web.norbit.no/media/PS-120006-5_MBES_Integrated_A4.pdf

5.9. NORBIT – SEABED PS-140001-3

General description

The WBMS-series are based on a flexible sonar platform that utilizes the latest in analogue and digital signal processing, and features a conformal array. Combined with broad R&D expertise, NORBIT may adapt the hardware technology to allow for new applications that benefit from the advantages offered by a compact wideband multibeam sonar.

Features

- Multibeam Sonar integrated with IMU and GPS
- State of the art GNSS-aided inertial navigation system
- 80kHz bandwidth
- Ultra-compact Turn-key solution
- Simple Ethernet Interface
- Fast and reliable Mobilization
- Integrated Sound Velocity Probe
- Hydrodynamic Fairing
- Mounting bracket included
- FM & CW Transmissions
- Flexible power

Applications

- Shallow water bathymetry
- Exceeds IHO Special Order
- Exceeds USACE Class 1 & LINZ

Special Order

- Pipeline surveys
- Pond surveys
- Harbor surveys
- USV, UUV, AUV & ROV
- MCM & Littoral Combat Zone surveys

Technical specifications

- | | |
|---------------------------|--|
| • Swath coverage | typically 140o (7-179o for spec. Applications |
| • Range resolution | <10mm (acoustic) |
| • Number of beams | 256 EA/ED |
| • Operating frequency | 360-440khz, 80khz bandwidth |
| • Range | 0.2-200m, typical survey range is 120m from sonar head (limited swath) |
| • Ping rate | up to 40hz, range dependent |
| • Resolution | 0.90 across track, 1.9o along track @400khz |
| • Position accuracy | 0.02-0.1m (rtk) |
| • Heading accuracy | 0.030 (rtk) with 2m baseline |
| • Pitch/roll accuracy | 0.020 independent on baseline |
| • Heave accuracy | 5cm or 5% (2cm rtk) |
| • Weight approx. | 9.5kg (air) <6kg (water) |
| • Interface | 100mb/s ethernet |
| • Standard cable length | 8m |
| • Power consumption | 55wmax (12-28vdc) |
| • Operating/storage temp. | -4o to +40o/-200 to +600Accessories |

Accessories

-

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

-

Pictures



Figure 41: SEABED PS-140001-3 (source: <http://web.norbit.no/>)

Contact Information

Norbit subsea, P.O. Box 1858, stiklestadveien 1, n-7441 trondheim, Norway

Phone +47 73 98 25 50

Email: subsea@norbit.com

Web: <http://web.norbit.no/>

<http://web.norbit.no/subsea/products/>

Annexes

http://web.norbit.no/media/PS-140001-3_iWBES_Compact_A4.pdf

5.10. TELEDYNE ODOM HYDROGRAPHIC – MB1

General description

Designed and manufactured entirely within the Teledyne Marine group to meet the growing needs of hydrographic professionals that are looking for a low-cost shallow-water multibeam echo sounder. Using both amplitude and phase bottom detection, the MB1 is capable of sounding a swath of up to 120° in over 120m water depth. With 24 bit raw data and a dedicated projector, both raw water column and seabed data can be collected within the controller software. The new and improved Real Time Appliance (RTA) improves time synchronization on all of the sensors necessary for surveying down to 0.1ms. New options include a fully integrated GPS heading system built into the RTA and a TSS motion sensor built into the sonar head. Teledyne Impulse Titan® Series connectors are used for quick dependable data and power connection.

Features

- 120° swath width
- User-defined beam distribution and angles
- Sidescan and snippets
- 24-bit resolution water column backscatter data
- Uncertainty estimation

- Raw data logging for post processing, beam forming, bottom detection
- Titanium and acetal construction
- Optional integrated motion sensor and GPS heading system
- Field serviceable/upgradeable

Applications

- Bathymetry

Accessories

- Laptop with 3rd party acquisition software
- Heading
- GPS
- Real Time Sound Velocity
- The Heave, Pitch and Roll, or Motion of vessel
- MB1 Transducer

Technical specifications

- | | |
|----------------------------------|--------------------------------|
| • Frequency (KHz) | User-selectable, 170–220 |
| • Range Resolution | 3.6cm |
| • Pulse Width | User-selectable, tied to range |
| • A/D | 24 bit |
| • Maximum Ping Rate | 60Hz |
| • Number of Beams | User-selectable, 10-512 |
| • Swath Width | User-selectable, 10°-120° |
| • Beam Spacing | User-selectable, 0.23°-12° |
| • Maximum Sounding Depth (Nadir) | 240m |
| • Bottom Detection Method | Amplitude & Phase |

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Teledyne Odom's Windows based software included: IMAGE - Control, Data Display and Export

Pictures



Figure 42: MB1 (source: www.odomhydrographic.com)

Contact Information

Teledyne Odom Hydrographic

1450 Seaboard Avenue, Baton Rouge, Louisiana 70810-6261 USA

Tel. +1-225-769-3051

Fax: +1-225-766-5122

Email: odom@teledyne.com

Web: www.odomhydrographic.com

Annexes

<http://odomhydrographic.com/product/mb1/>

<http://odomhydrographic.com/wp-content/uploads/2014/01/teledyne-Odom-Hydrographic-MB1-Datasheet.pdf>

<http://odomhydrographic.com/wp-content/uploads/2014/01/The%20Real%20Time%20Appliance-Appliance%20Configuration-Configuration%20of%20the%20MB1.pdf>

5.11. NORBIT – PS-120005-12

General description

The WBMS-series are based on a flexible sonar platform that utilizes the latest in analog and digital signal processing, and features a conformal array. Combined with broad R&D expertise, NORBIT may adapt the hardware technology to allow for new applications that benefit from the advantages offered by a compact wideband multibeam sonar.

Features

- Millimeter Range Resolution
- FM & CW Processing
- 80kHz Broadband
- Flexible Power Source (12-30 VDC, 90-250 VAC)
- Simple Ethernet Interface

- Side-scan, Water Column, Backscatter
- Integrated Sound Speed Probe
- Integrated Attitude Sensor & GPS Option
- Exceeds IHO Special Order
- Exceeds USACE New York & LINZ Special Order

Applications

- Shallow Water Bathymetry
- Pipeline Surveys
- River, Estuary, Channel and Pond Surveys
- Harbor and Coastline Surveys
- USV, UUV, AUV & ROV Surveys
- MCM & Littoral Combat Zone

Accessories

- 4000M Depth Rating
- Mounting Bracket
- Motion Sensor
- Data Acquisition Software
- On-Site Senior Hydrographer
- Support
- Turn-Key Survey Platform
- Laptop
- AUV Version
- VDSL Data Link
- Permanent Hull Mount Option
- Pole Mount and Travel Option

Technical specifications

- SWATH COVERAGE 7-179° (140° NOMINAL)
- RANGE RESOLUTION <10MM (ACOUSTIC)
- NUMBER OF BEAMS 256-512 EA & ED
- OPERATING FREQUENCY 400KHZ W/ 80KHZ BANDWIDTH (200-700KHZ POSSIBLE)
- PING RATE UP TO 50HZ, RANGE DEPENDENT
- DEPTH RANGE 0.2-275M (160M TYPICAL)
- RESOLUTION 0.9° ACROSS TRACK, 1.9° ALONG TRACK @400KHZ
- WEIGHT <4.5KG(AIR), 3KG(WATER)
- POWER <28W
- VOLTAGE 10-28VDC OR 100-240VAC (ROV DIRECT: 22-29VDC)
- INTERFACE ETHERNET
- STANDARD CABLE LENGTH 8M, OPTIONS: 20M, PIGTAIL, MAX 600M VDSL
- DEPTH 100M, 6000M OPTIONAL
- STORAGE TEMPERATURE -20°C TO +60°C
- OPERATING TEMPERATURE -4°C TO +40°C (TOPSIDE -25°C TO +40°C)

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

-

Pictures

Figure 43: PS-120005-12 (source: <http://web.norbit.no/>)

Contact Information

Norbit subsea, P.O. Box 1858, stiklestadveien 1, n-7441 trondheim, Norway

Phone +47 73 98 25 50

Email: subsea@norbit.com

Web: <http://web.norbit.no/>

<http://web.norbit.no/subsea/products/>

Annexes

<http://web.norbit.no/media/PS-120005-12 MBES A4.pdf>

5.12. NORBIT – PS-120006-9

General description

This all-in-one tightly integrated broadband multibeam kit offers high resolution bathymetry over a wide swath. Having a globally leading GNSS/Inertial Navigation System embedded onto the sonar ensures fast and reliable mobilization and highest quality sounding for installations in all conditions.

Features

- Multibeam Sonar Tightly Integrated
- With State of The Art
- GNSS-aided Inertial Navigation

Accessories

- 80kHz Bandwidth
- Side-scan, Water Column, Backscatter
- Simple Ethernet Interface

- Integrated Sound Velocity Probe
- Hydrodynamic Fairing
- Mounting Bracket Included
- FM & CW Processing
- Flexible Power
- Exceeds IHO Special Order
- Exceeds USACE Class 1 & LINZ Special Order

Applications

- Shallow Water Bathymetry
- Pipeline Surveys
- Pond, River and Estuary Surveys
- Harbor and Lake Surveys
- USV & UUV
- MCM & Littoral Combat Zone
- River Surveys

Technical specifications

- | | |
|---------------------------|--|
| • SWATH COVERAGE | 70-1790 , (1400 NOMINAL) |
| • RANGE RESOLUTION | <10mm (ACOUSTIC) |
| • NUMBER OF BEAMS | 256 EA/ED |
| • OPERATING FREQUENCY | 360-440kHz, 80kHz BANDWIDTH |
| • RANGE | 0.2-275m, TYPICAL SURVEY RANGE IS 120m (LIMITED SWATH) |
| • PING RATE | UP TO 50Hz |
| • RESOLUTION | 0.90 ACROSS TRACK, 1.90 ALONG TRACK @400kHz |
| • POSITION ACCURACY | 0.02-0.1m (RTK) |
| • HEADING ACCURACY | 0.030 (RTK) WITH 2m BASELINE |
| • PITCH/ROLL ACCURACY | 0.020 INDEPENDENT OF BASELINE |
| • HEAVE ACCURACY | 5cm OR 5% (2cm RTK) |
| • WEIGHT APPROX. | 9.5kg (AIR) <6kg (WATER) |
| • INTERFACE | 100Mb/s ETHERNET |
| • CABLE LENGTH STANDARD | 8m, OPTIONAL 20m |
| • POWER CONSUMPTION | 55W MAX (12-28VDC, 110-220VAC) |
| • OPERATING/STORAGE TEMP. | -40C TO +40C/-20C TO +60C |

Accessories

- Senior Hydrographer Support and Training
- Navigation Post Processing
- Software
- Sound Velocity Profiler
- Acquisition and Processing

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

-

Pictures

Figure 44: PS-120006-9 (source: <http://web.norbit.no/>)

Contact Information

Norbit subsea, P.O. Box 1858, stiklestadveien 1, n-7441 trondheim, Norway

Phone +47 73 98 25 50

Email: subsea@norbit.com

Web: <http://web.norbit.no/>

<http://web.norbit.no/subsea/products/>

Annexes

Online web datasheet

http://www.gserentals.co.uk/gse/pdf/NORBIT_iWBES_A4%202015.pdf

5.13. TELEDYNE ODOM HYDROGRAPHIC – MB2**General description**

The MB2 Multibeam Echosounder is developed for fast mobilization on smaller vessels and is optimized for shallow water survey companies, Port and Harbour Authorities, dredging companies and other users looking for an easy to use, quick to deploy, high resolution system. Using both amplitude and phase bottom detection, the MB2 is capable of sounding a swath of up to 140° in up to 110m water depth. With 24 bit raw data, both water column and seabed information can be collected within the controller software. The Real Time Appliance (RTA) synchronizes all of the sensors with accuracy better than 0.1 ms.

Features

- 1.8° x 1.8° beam width
- Selectable swath width up to 140 degrees
- User selectable frequency range from 200 to 460 kHz

- 24 Bit Resolution, No Analogue TVG
- User selectable number of beams 10 to 256
- Water column backscatter data included as standard features
- A Teledyne Odom Hydrographic Multibeam Echosounder Datasheet
- Sidescan and snippets included as standard features
- Raw data logging for post processing, beam forming, bottom detection
- Titanium and Acetal construction
- Optional built in Applanix POS MV Wavemaster
- Optional integrated real-time SVP sensor

Applications

Bathymetry

Accessories

- Laptop with 3rd party acquisition software
- Heading
- GPS
- Real Time Sound Velocity
- The Heave, Pitch and Roll, or Motion of vessel
- MB1 Transducer

Technical specifications

- | | |
|----------------------------------|---|
| • Frequency (KHz) | User Selectable, 200 - 460 |
| • Swath Width | User Selectable, 10° - 140° |
| • Acoustic Beam Width | Along Track 1.8° x 1.8° Across Track |
| • Range Resolution (cm) | 2 |
| • Pulse Width | User selectable, optionally tied to range |
| • A/D | 24 bit |
| • Maximum Ping Rate | 60 Hz |
| • Number of Beams | User Selectable, 10 - 256 |
| • Maximum sounding depth (Nadir) | 200m |
| • Bottom detection method | Amplitude & Phase |

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Teledyne Odom's Windows based software included: IMAGE - Control, Data Display and Export

Pictures



Figure 45: MB2 (source: www.odomhydrographic.com)

Contact Information

Teledyne Odom Hydrographic

1450 Seaboard Avenue, Baton Rouge, Louisiana 70810-6261 USA

Tel. +1-225-769-3051

Fax: +1-225-766-5122

Email: odom@teledyne.com

Web: www.odomhydrographic.com

Annexes

Online web brochure

<http://odomhydrographic.com/wp-content/uploads/2015/06/Teledyne-Odom-MB2-product-leaflet.pdf>

5.14. L-3 KLEIN – HYDROCHART 3500

General description

The HydroChart 3500 is a professional bathymetry sonar for shallow water operation with exceptional performance and is a portable, turnkey, bundled system which includes a motion reference unit, heading sensor and sound velocity sensor, located in the sonar head, and coupled with a water column reverberation resistant altimeter.

Features

- Wide Swath Bathymetry, up to 12x water depth or altitude
- Co-registered, High-resolution Side Scan Imagery
- Supports IHO sP-44 Special Order accuracies
- Over 200° View Angle, Dual Array Configuration
- No Nadir Gap and Multipath Suppression
- Better Spatial Resolution than MBES
- Portable, Turnkey Solution
- Versatile Mounting Options
- Integrated Calibration File
- Rapid Post-ProcessingSystem Components

GeoSwath Plus Transducer, V-Plate with MRU, MiniSVS sound velocity sensor and altimeter, GeoSwath Plus Deck Unit, GPS Position and Heading and SVP

Applications

- Shallow Water Hydrographic and Geophysical Surveys
- Port & Harbor Security
- Shallow Water IED Mine-hunting (MCM) Detection
- Nautical Charting
- Benthic Habitat Mapping
- Dredging Operations
- Engineering Inspection

Technical Specification

See the Annex 1 Data Sheet Brochure for GeoSwath Plus Compact

Accessories

- Simultaneous dual frequency side scan imagery, with bathymetry
- Interface to various external thirdparty motion sensors
- 10 m, 20 m, or 50 m cable option
- SHU-integrated motion sensor
- SHU-integrated heading sensor
- SHU-integrated sound velocity sensor
- Sound velocity profiler
- Semi-rugged laptop
- Rackmount PC
- HYPACK/HYSWEEP software
- QPS QINSy / Fledermaus software
- Rugged and waterproof reusable shipping container with wheels
- Hemisphere Vector True Heading RTK VS330 GNSS/GPS
- On-site training
- Factory training
- Pre-calibration and patch test (when purchased with SVS, MRU and heading sensors)

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

- SonarPro® Software Package

Pictures



Figure 46: HYDROCHART 3500 (source: <http://www.l-3mps.com/>)

Contact Information

L-3 Klein Associates, Inc.
Address: 11 Klein Drive, Salem, New Hampshire 03079, USA
Telephone: (USA) - 603-893-6131
International: - 603-893-6131
Fax: (USA) - 603-893-8807
Email: Klein.Mail@L-3com.com
WEB: <http://www.l-3mps.com/>

Annexes

HYDROCHART 3500 Annex – Brochures

- [HydroChart 3500 Swath Bathymetry Sonar System](#)
- http://www.l-3mps.com/klein/pdfs/Klein_HydroChart3500.pdf

5.15. EDGETECH – 6205: Combined Bathymetry & Side Scan Sonar

General description

The 6205 uses EdgeTech's unique Multi Phase Echo Sounder (MPES) technology, or hybrid approach, to overcome the limitations of Multi Beam Echo Sounders (MBES) and Interferometric systems in shallow water by combining both beamforming and phase discrimination to determine each sounding along the seafloor. The 6205 also incorporates EdgeTech's Full Spectrum® technology to exceed IHO SP-44, NOAA and USACE specifications for feature detection and bathymetric point data uncertainty.

Features

- Next Generation EdgeTech Bathymetric technology
- Multi Phase Echo Sounder (MPES)
- Wide swath coverage in shallow water, up to 12 times water depth
- Co-registered dual frequency side scan and bathymetry with full nadir coverage
- Improved Depth Performance

- New lightweight Sonar head
- Superior Multipath and surface reflection suppression
- IHO SP-44 Special Order compliance with proven results
- Over 200° view angle with no nadir gap
- Equidistant and Equiangle output options

Applications

-

Technical Specification

See the Annex 1 Data Sheet Brochure for GeoSwath Plus Compact

Accessories

• Pulse Modulation		CW & FM CHIRP
• Ping Rate (Range Dependent)		Up to 60 Hz
• Construction		FRP Composite / Stainless Steel Reinforced
• Dimensions		150 x 211 x 762 mm
• Deck Cable Length		20m (Standard)
• Depth Rating		50 m
• Weight (In Air)	1	9.9 kg (44 lbs)
• Input Voltage		48-60 VDC, 115-230VAC
• Power (Typical /Max)		55W / 70W

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Software Windows based software included EdgeTech's Discover Bathymetric Acquisition and Sonar Control

Pictures



Figure 47: 6205: Combined Bathymetry & Side Scan Sonar (source: <http://www.edgetech.com/>)

Contact Information

USA, Massachusetts Office

4 Little Brook Road
West Wareham, Massachusetts 02576
Tel: 1-508-291-0057
USA, Florida Office
1141 Holland Drive, Bay 1
Boca Raton, Florida 33487
Tel: 1-561-995-7767
Web: <http://www.edgetech.com/>

Annexes

6205: Combined Bathymetry & Side Scan Sonar – Brochures

- [6205 Brochure](#)
- [EdgeTech Sonar Products Brochure: A Complete Overview of all of EdgeTech's Sonar System Offerings](#)
- [EdgeTech Paper on 6205 presented at CHC2014](#)
- [Multiphas Echosounder to Improve Shallow-Water Surveys – A Sea Technology Magazine Article](#)
- [Performance Analysis of the EdgeTech 6205 Swath Bathymetric Sonar](#)
- [6205 Bathymetry and Side Scan Sonar User Hardware Manual](#)
- [Discover Bathymetric Users Software Manual](#)

5.16. Summary and conclusions

Multibeam echosounders are typically used by hydrographic surveyors to determine the depth of water and the nature of the riverbed. Most of the multibeam echosounders presented above are modern systems discovered within the elaboration of the market study. Many of them are designed transducer across the full swath across track with a narrow along track then forming multiple receive beams (beamforming) that are much narrower in the across track (around 1 degree depending on the system). From this narrow beam a two way travel time of the acoustic pulse is then established utilizing a bottom detection algorithm. Multibeam systems presented in this study are for deep and shallow water, selected in "FAIRway - State of the art analysis equipment summary" with specific information about characteristic and technical specification. Partners have the opportunity to choose specific system based on recommendation of the specification according to their needs.

Configuration provide an operational system that can be installed on their ships and also on other boats that will provide a great versatility in use. In addition, sensor integration for correction and a positioning system performance, both geometrically and logically (in software acquisition) are likely to ensure compliance with the highest standards of quality measurements Bathymetric as defined by Standard IHO (International Hydrographic Organization) S44. This standard is requested and used by EU countries in research and other applications. Many EU countries adopted multibeam technology as the methodology of choice for the collection of bathymetric data for new chart production.

Parameters of multibeam equipment for prioritization:

- Scanned riverbed width (swath coverage) or measuring head viewing angle (view angle): the higher the value, the wider the coverage with one route and the less time and cost is needed for measuring a given area;
- Frequency or scanning speed: the higher the value, the more detailed picture of the riverbed will be produced.
- Beam width: shows the focusing of the emitted beam. The smaller the number, the smaller the average value of the area is based for depth measurements, the more accurate the measurements. Value given in degrees.
- Minimum measuring depth: as we work in shallow river (compared to sea application) it is important to get measured data at very low water level.

Multi-beam equipment may cost up to 328,000 Euros.

6. Acoustic Doppler Current Profiler (ADCP)

6.1. SONTEK – RiverSurveyor S5 and M9

General description

The RiverSurveyor®, S5/M9 systems give a new perspective to the notion of measuring open channel hydraulics. Using SonTek's exclusive SmartPulseHD®, multiple acoustic frequencies are fused with precise bandwidth control for the most robust and continuous shallow-to-deep discharge measurements ever.

Features

- Multi-Band - Multiple acoustic frequencies^{1,2}
- Vertical acoustic beam¹
- SmartPulseHD®³
- Internally computed discharge and secure data¹
- Standard 360° compass and two-axis tilt sensor
- Reverberation control with ping rates to 70Hz
- Bottom-tracking
- RTK GPS (optional)

Applications

-

Technical Specification

- | | |
|---|-----------------------------------|
| • Profiling Range — Distance | 0.06 to 40m |
| • Profiling Range ¹ — Velocity | ±20 m/s |
| • Velocity ¹ — Accuracy | ±0.25% of measured velocity |
| | ±0.2cm/s |
| • Velocity — Resolution | 0.001 m/s |
| • Number of Cells | Up to 128 |
| • Cell Size | 0.02 to 4m |
| • Transducer Configuration | Nine (9) Transducers |
| | Dual 4-beam 3.0 MHz/1.0 MHz |
| | Janus 25° Slant Angle |
| | 0.5 MHz Vertical Beam Echosounder |
| • Depth — Range | 0.20 to 80m |
| • Depth — Accuracy | 1% |
| • Depth — Resolution | 0.001 m |

Accessories

Dual Janus configuration with four 3.0 MHz and four 1.0 MHz transducers for velocity measurement and one 500 kHz vertical acoustic beam for depth. Includes power/communications cable. Max profile range: 40m.

- DGPS Telemetry
- RTK GPS

Pictures



Figure 48: RiverSurveyor S5 and M9 (source: www.sontek.com)

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

- CurrentSurveyor (v4.50 or later required)
- FlowTracker (v2.20 or later required)
- HorizonADV (v1.20 or later required)
- RiverSurveyor (v4.60 or later required)
- SonUtils (v4.20 or later required)
- Stationary Measurement (v1.20 or later required).

Contact Information

OCEAN / LAB
Contact SonTek
inquiry@sontek.com
Phone: +1 (858) 546-8327
Web: www.sontek.com

Annexes

RiverSurveyor S5/M9 Annex – Brochures

- [RiverSurveyor S5 and M9 SmartPulseHD Feature](#)
- [SIRWMD Poster: Sliver River Sonar](#)
- [Power & Communications Module \(Second Generation PCM\) Technical Overview](#)
- [Paper: RiverSurveyor Buyers Guide](#)
- [Paper: Compass Calibration Procedure for RiverSurveyor S5/M9](#)
- [App Note: Dam Removal in Washington Yields Flow Measurement Challenges](#)
- [App Note: Jag Ski Creates Versatile Platform for Bay Study](#)
- [App Note: S5-M9 Tackle Tough Questions During Mississippi Flood](#)
- [App Note: RiverSurveyor Deliver Insights - Australia Floods](#)
- [App Note: Lower Colorado River Authority Data Delivers On-the-Spot Forecasts](#)

6.2. TELEDYNE – RiverRay ADCP

General description

Go straight to work collecting highly accurate stream and river discharge data with the RIVERRAY ADCP (Acoustic Doppler Current Profiler). This economical turnkey system comes complete with: the RiverRay ADCP, a custom-designed boat, user-friendly software, and convenient wireless communication—everything you need to begin making precision river discharge measurements.

Features

- Ease of use: Easy to carry, easy to deploy, and easy to operate;
- just power and go.
- Intelligent: Automatic adaptive sampling based on flow
- conditions continuously optimizes your discharge measurement
- from bank to bank, thus ensuring the highest quality
- data without your intervention.
- Flat transducer: The sleek phased array transducer design
- provides reduced size, weight, and flow disturbance.
- Versatile: A single instrument can deliver high quality data in
- environments ranging from a 0.4m stream to a 60m deep river.
- Superior surface measurements: Interwoven independent
- and short range measurements improve the discharge
- computation in your critical surface layer.
- Platform stability: RiverRay's float boasts reduced drag,
- causes less flow disturbance, and provides superior handling—
- even in high water velocities and rough surface.
- No cables required: Data is wirelessly transmitted to your
- shore station via Bluetooth™ technology.
- DGPS compatible: Integrate an external DGPS for difficult
- conditions, such as moving beds.

Applications

-

Technical Specification

See Data Sheet of Riverray ADCP

Accessories

The RiverRay ADCP utilizes a flat surface 4-beam phased-array transducer. A dedicated fifth beam is used to measure depth.

Pictures



Figure 49: RiverRay ADCP (source: <http://www.teledyne-reson.com/>)

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

- WinRiver II
- StreamPro Software for Pocket PC
- WinRiver II (included) for moving-boat measurement
- SxS Pro (optional) for stationary measurement (i.e., under-ice); comes with an uncertainty model for in situ quality evaluation and control

Contact Information

Teledyne RD Instruments Europe
Les nertieres
5 avenue hector pintus
06610 la gaude, france
Phone: +33-492 110 930
Fax: +33-492 110 931
Loic-mobile: +33614128769
Web: <http://www.teledyne-reson.com/>

Annexes

RiverRay ADCP Annex – Brochures

- http://www.rdinstruments.com/datasheets/riverray_ds_lr.pdf
- <http://www.rdinstruments.com/riverray.aspx#samples>
- http://www.rdinstruments.com/adcp_upgrade.aspx

6.3. TELEDYNE RDI – StreamPro ADCP

General description

Teledyne RD Instruments' STREAMPRO ADCP (Acoustic Doppler Current Profiler) represents a revolutionary advancement in streamflow measurement. You can accurately measure discharge in shallow streams in a matter of minutes—a fraction of the time required using traditional hand-held devices. With StreamPro there's no need to move from station to station to obtain single-point velocity data or compute the discharge by hand; streamflow measurements are obtained in real-time.

Features

- Quick: Collect complete streamflow measurements in streams or canals in a matter of minutes.
- Convenient: No need to move from station to station. Simply cross a bridge or use a tagline to collect data.
- Easy to Operate: Data is conveniently acquired using a PocketPC or a laptop equipped with a highly intuitive user interface.
- Reduced Disturbance: Small transducer head, 3.5cm in diameter, for minimal flow disturbance.
- Affordable: Value-priced system designed to suit your budget.
- Bottom Tracking: Reliable bottom-tracking in 0.1m–7m depth.
- Wireless: Bluetooth communications utilized between electronics and PocketPC or laptop.
- Low Power Consumption: Full day of operation on 8 AA batteries.
- Versatile: Minimum cell size 2cm with up to 30 cells. Standard profiling range of up to 2m (6m with upgrade).
- Flexible Data Format: All acquired data is compatible with Teledyne RDI's WinRiver II software for data display and processing.

Applications

- Scientific Research
- Soil & Water Conservation
- Hydrology & Survey
- Water Resources Management
- Channels

Technical specifications

- | | |
|----------------------|--|
| • Velocity range | ±5m/s ³ |
| • Profiling range | 0.1m ¹ to 2m standard or 6m ² with upgrade |
| • Accuracy | ±1% of water velocity relative to ADCP, ±2mm/s |
| • Resolution | 1mm/s |
| • Number of cells | 1–20 standard or 1–30 with upgrade |
| • Cell size | 2cm to 10cm standard or 20cm with upgrade |
| • Surface cell range | |
| • Data output rate | 1Hz |

Accessories

System components

- GNSS Tools
- MRU Tools

- SV System
- Data Logger

Software

- WinRiver II
- StreamPro Software for Pocket PC
- WinRiver II (included) for moving-boat measurement
- SxS Pro (optional) for stationary measurement (i.e., under-ice); comes with an uncertainty model for in situ quality evaluation and control

Pictures

Figure 50: StreamPro ADCP (source: <http://www.teledyne-reson.com/>)

Contact Information

Teledyne RD Instruments Europe

Les nertieres

5 avenue hector pintus

06610 la gaude, france

Phone: +33-492 110 930

Fax: +33-492 110 931

Loic-mobile: +33614128769

Web: <http://www.teledyne-reson.com/>

Annexes

TELEDYNE RDI – StreamPro ADCP - Brochures

http://www.rdinstruments.com/datasheets/streampro_ds_lr.pdf

6.4. Summary and conclusions

Acoustic technology is rapidly becoming the primary methodology for measuring streamflow to predict floods, manage and allocate water resources. Acoustic Doppler current profilers (ADCP) instruments are used to measure water/boat velocities and water depths. Measurements are undertaken by transmitting an acoustic pulse of known frequency into the water and measuring the 'Doppler shift' of returned signals from particles in the water.

The purpose of this analysis is to present the needs and use of equipment by partners. Hydro-acoustic instruments offer great versatility in use. Acoustic Doppler Current Profiler (ADCP) offer accuracy of 2mm/s of measured velocity and 1mm/s Resolution. Provides a 3D water-current velocity for a small volume of the overlying water column by making very high-frequency acoustic (75- to 600-kHz) Doppler shift measurements.

ADCP was estimated to cost up to 40,000 Euros.

7. Sub Bottom Profiling

7.1. EDGETECH – 3200 High Penetration Sub-bottom Profiler

General description

The EdgeTech 3200 Sub-bottom Profiling System is a wideband Frequency Modulated (FM) sub-bottom profiler utilizing EdgeTech's proprietary Full Spectrum CHIRP technology. The 3200 generates high resolution images of the sub-bottom stratigraphy in oceans, lakes, and rivers and provides penetration of up to 200m.

Ideally suited for use in rivers, lakes, ponds and shallow water ocean applications up to 200m max depth. The system was designed for customers that require a portable system that can be used from smaller boats while not wanting to sacrifice image quality.

Features

Underwater Equipment:

EdgeTech SB-512S with

5-12 kHz CHIRP frequencies

Shipboard Equipment: EdgeTech 3200-XS Portable Topside; Processor with computer running; EdgeTech's JStar software for acquisition and display

Applications

- Bridge/Shoreline Scour Surveys
- Buried Object Location
- EEZ Resource Development
- Geohazard Surveys
- Geological/Geophysical Surveys
- Mining/Dredging Surveys
- Sediment Classification

Technical specifications

Towfish	SB-0512i	SB-216S	SB-424
Frequency Range	500 Hz–12 kHz	2-16 kHz	4-24 kHz
Vertical Resolution (Depends on pulse selected)	8–20 cm	6-10 cm	4-8 cm
Penetration (typical)			
In coarse calcareous sand	20 m	6 m	2 m
In clay	200 m	80 m	40 m

Accessories

- Underwater Equipment:

Modified EdgeTech SB-0512i Towfish operating at 1.5 kHz to 100 kHz

Modified EdgeTech 2200 operating at 150 kHz to 600 kHz

- Shipboard Equipment:

EdgeTech processor running software for acquisition and display

System components

- **GNSS Tools**
- **MRU Tools**
- **SV System**
- Data Logger
- **Software**
EdgeTech Discover – Sub-Bottom
- **Acquisition Software**
EdgeTech's JStar software for acquisition and display
- **Processing Software**

Pictures



Figure 51: EDGETECH – 3200 (source: : <http://www.edgetech.com/>)

Contact Information

USA

Massachusetts Office

4 Little Brook Road

West Wareham, Massachusetts 02576

Tel: 1-508-291-0057

Florida Office

1141 Holland Drive, Bay 1

Boca Raton, Florida 33487

Tel: 1-561-995-7767

Web: <http://www.edgetech.com/>

Annexes

Online web brochure and application note

[EdgeTech Sonar Products Brochure: A Complete Overview of all of EdgeTech's Sonar System Offerings](#)

[Application Note: Dredging Precision with the Use of a Sub-bottom Profiler](#)

7.2. iXBlue – ECHOES 10000

General description

ECHOES 10000 is an ultra-high-resolution sub-bottom profiler (SBP) designed for shallow water environments. It incorporates iXBlue flat spectrum Tonpilz ceramic transducers allowing unrivalled data delivery. Together with DELPH seismic acquisition, it is a full-feature survey tool with DELPH interpretation high-productivity software, enabling a mission to be achieved successfully and effortlessly.

Features

- True flat spectrum, high-directivity CHIRP Signal
- Full package: antenna, rugged rack, laptop PC
- Easy pole-mounted solution
- Data basing of all information
- Worldwide iXBlue network

Applications

- Pre-dredging survey
- Environmental, coastal, ports, lakes, waterways survey
- Sedimentology
- Windfarms and renewable energy construction pre-survey
- Shallow water hydrographic survey
- Pipe, buried object detection
- Archaeology
- Bridge, shoreline scour surveys

Technical specifications

- | | |
|--|---|
| • Operational depth | Shallow water |
| • Frequency range | 5 – 15 kHz |
| • Equivalent acoustic level (ref 1μPa@1 m) | > 230dB within the useful bandwidth @ 2kVA |
| • Resolution | <10 cm |
| • Frequency response | Flat spectrum |
| • Digital data format | 24 bit raw data / Segy 32 bits floating point |
| • Available pulses | User-designed and pre-defined chirp library |

- | | |
|--|------------------------------|
| • Directivity | 20°, frequency dependent |
| • Typical mount Pole-mounted / over the side | Pole-mounted / over the side |
| • Transmission power 2 kVA (4 kVA option) | 2 kVA (4 kVA option) |

Accessories

-

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger
- Software
 - Delph seismic acquisition
- Acquisition Software
- Processing Software

Pictures



Figure 52: ECHOES 10000 (source: <https://www.ixblue.com>)

Contact Information

iXBlue SAS

34 rue de la Croix de Fer, 78100, Saint-Germain en Laye, France

Phone: +33 1 30 08 88 88

Web: <https://www.ixblue.com>

Annexes

- <https://www.ixblue.com/products/echoes-10000>
- [iXBlue ECHOES 10000 shallow water sub-bottom profiler](#)

7.3. KONGSBERG – GeoPulse Sub Bottom Profiler

General description

Sub-Seabed structures are delineated using reflexions from a selectable single frequency multi-cycle high power signal, which is transmitted from an over-the-side, towed or hull mounted platform. The signal is processed in the compact deck unit.

Features

- Selectable transmit frequency 2 to 12 kHz
- Over-the-side, towed or hull mounted deployment
- Reliable, proven, easy to use
- Good penetration and resolution

Applications

-

Technical Specification

See the Annex 1 – Data sheet - GeoPulse - Profiler

Accessories

The system comprises the deck unit (Transmitter Model 5430A and Receiver Model 5210A) and a four transducer array (Models T135) in a two-fish (Model 136), over the side-mount assembly (Model 132) or a bespoke hull mount arrangement, which can be configured to hold up to 16 transducers.

GeoRGE is a GeoSwath Plus hardware analysis and fault finding tool.

System components

- GNSS Tools
- MRU Tools
- SV System
- Data Logger

Software

Operating on Windows the GS+ software package provides a complete project based solution, including control, acquisition, storing and editing of sonar and ancillary data, grid-based patch test calibration, data processing with audit trail, advanced bathymetry data gridding and side scan mosaicing, data visualisation including 3D fly-through capability. Depending on the survey situation full online data processing can be performed or the operation can be limited to basic acquisition start and stop commands.

Pictures



Figure 53: GeoPulse Sub Bottom Profiler (source: www.km.kongsberg.com)

Contact Information

Address: Kirkegårdsveien 45, NO-3616 Kongsberg, Norway

Mailing address: P.O.Box 483, NO-3601 Kongsberg, Norway

Phone: +47 32 28 50 00

In charge: Geir Håøy, President

Web: www.km.kongsberg.com

Annexes

Online web brochures

[Data sheet - GeoPulse - Profiler](#)

[Data sheet - Pipeline Detection Sub-Bottom Profiler](#)

7.4. Summary and conclusions

Sub Bottom Profiler (SBP) are used to identify and characterize layers of sediment or rock under the river floor. Sub-bottom profiling systems utilize the principle of seismic reflection. Seismic reflection uses a stronger sound signal than echolocation and lower sound frequencies. Systems allow to obtain a clear picture of what lies below the seabed and this compact, low power unit, ideal for ROV and AUV use.

Chirp is the newest technology in the field and improves the signal / noise ratio obtained with a lower transmission power and increased resolution using the total frequency band. In addition, provide new signal processing algorithms.

Market study for these systems comprise a complete description that includes elements as control unit computer system, towfish, cable, software acquisition and allow all partner to access to newest technology on the market. Table FAIRway - State of the art analysis equipment summary contain technical specification of each Sub Bottom profiler.

8. Sediment sampler

8.1. BOKU Sediment sampler – design plans by BfG (Koblenz)

General description

The purpose of the equipment is to sink down to the bottom of the riverbed and collect transported sediment material in a planned and controlled way. It has a filtering sack which traps sediment particles over a certain grain size. The inlet can be turned up and down to start or stop the sampling.

Features

By a defined opening interval the tool is capable to measure bottom sediment flux and carry up the drifted material. After that the collected sediment can be analysed (grain distribution and weight). Complementary sensors can be attached as digital camera, turbidity meter, pressure (depth) or water quality parameter measuring units etc. During the let down or pull-up phase it can measure the vertical distribution of the parameters as well.

Applications

With a suspensor steel rope it can be utilized from bridges, ships or directly from the bank of the river. The sensors could be connected to field measuring units with cables or URH transmission. For easy transport and handling it is assembled from parts and it has a transport frame.

Technical specifications

- Material: welded and screw connected stainless steel
- Dimensions: app. 900x2500x650 mm
- Weight with full setup: app. 200 kg

Accessories

- additional ballasts, hoist with steel ropes
- changeable filter units
- transport frame
- digital camera and other sensors with pressure-proof boxes

Pictures



Figure 54: BOKU Sediment sampler (source: BfG Koblenz)

Contact Information

- Bundesanstalt für Gewässerkunde (Federal Institute of Hydrology) in Koblenz, Germany
- http://www.bafg.de/EN/Home/homepage_en_node.html
- Dr. Ing. Stefan Vollmer - Referatsleitung

Price

- Realisation costs: app. 10.000 € + sensors

Annexes

- conceptual plans

8.2. HYDRO-BIOS – 437 332 Bottom Sampler acc. to Van Veen

General description

The Bottom Sampler acc. to Van Veen is a qualitative sampler to achieve low-disturbed sediment samples in soft or medium hard grounds from any desired depth. It consists of two clamshell jaws connected by a hinge. During descent both levers are locked wide apart and the jaws are open. Upon touching the water bed the locking mechanism is released and when the rope is pulled taut to raise the sampler the jaws close. During retrieval the jaws are holding the sample and prevent sample wash-out. Additionally flaps on top of the heavy version 437 333 allows to inspect the sample before emptying.

Features

-

Applications

Sediment sample from the bottom of a body of water.

Technical specifications

- Bottom Sampler acc. to Van Veen, large model
- Material: Stainless steel
- Grasping area: 1000 cm²
- Overall dimensions:
- Approx. 35 x 42 x 90 (cm)
- Weight: approx. 25 kg

Accessories

-

System components

-

Pictures

Figure 55: HYDRO-BIOS – 437 332 Bottom Sampler (source: <http://www.hydrobios.de>)

Contact Information

Hydrobios GmbH

Am Jägersberg 5-7

24161 Altenholz – Germany

Telefon: +49-431-36960-0

Fax: +49-431-36960-21

Web: <http://www.hydrobios.de>

Annexes

<http://www.hydrobios.de/product/bottom-sampler-acc-to-van-veen/>

<http://www.hydrobios.de/wp-content/uploads/2014/10/Hydrobios2014.pdf>

8.3. Summary and conclusions

The sediment sampler described use both technologies (bed-load sampler and spring-loaded jaws) specialised for collecting sludge's, muds and sediments. Equipment are described in detail in "FAIRway - State of the art analysis equipment summary" table.

9. Gauging stations

9.1. AANDERAA DATA INSTRUMENTS AS – D401 SMARTGUARD

General description

SMARTGUARD is the next generation sensor and instrument HUB for ocean, lake, reservoir, estuary and river hydrometric stations. Monitoring water and weather conditions is essential in many operations and the SmartGuard node is well suited for stand-alone stations powered by battery and solar power utilizing wireless real-time data communication.

Features

- Smart Sensor technology Plug and Play
- Sensor Calibration coefficients are stored in the sensor
- Minimal and simple maintenance needs
- Low current drain
- Power: 5 to 14VDC, 50mA max
- Output formats: AiCaP CANbus, RS-232/RS-422
- Short update interval: 1 seconds to 255 minutes
- 2Hz and 4Hz sampling frequency
- New updated wave parameters every 1 second
- 256, 512, 1024 & 2048 samples
- Outputs: Pressure, Temperature, Tide pressure, Tide Level, Significant wave height, Maximum wave height, Mean Periode, Mean Zerocrossing Periode, Energy Periode, Steepness, Irregularity of sea state, Cut-off frequency, Pressure time series, Last pressure sample index, Wave spectrum
- Real-time XML output

Applications

Designed for ease of integration of new and existing sensor technologies into a single Aanderaa observatory node with modern self-describing XML data output formats. SmartGuard interfaces with all Aanderaa atmospheric and in water sensors, along with most 3rd party sensors.

Technical specifications

Accessories

- Atmospheric Sensors
- Aanderaa Smart Sensors
- Pressure sensor
- Wave and Tide Sensor

System components

- Atmospheric sensors
- Data logger
- Radio modem
- Compensating Unit
- Tide sensor
- Software

Software

- Aanderaa Real-Time Collector display and remote control software via two-way communication
- Aanderaa Geoview

Pictures

Figure 56: D401 SMARTGUARD (source: <http://www.aanderaa.com/>)

Contact InformationPostal address

Aanderaa Data Instruments AS
P.O.Box 103 Midtun, N-5843 Bergen, Norway

Street address

Aanderaa Data Instruments AS
Sanddalsringen 5b, N-5225 Nesttun, Norway

Tel: +47 55 60 48 00

Fax: +47 55 60 48 01

email: aanderaa.info@xylem-inc.com

web: <http://www.aanderaa.com/>

Annexes

Online web page / Brocures

<http://www.aanderaa.com/productsdetail.php?SmartGuard-36>

<http://www.aanderaa.com/media/pdfs/SmartGuard.pdf>

<http://www.aanderaa.com/media/pdfs/B189-Smartguard-Brochure-A3.pdf>

9.2. SIEMENS AG – SITRANS P MPS TRANSMITTER

General description

SITRANS P (submersible sensor) pressure transmitters, MPS series, are submersible sensors for hydrostatic level measurements. The pressure transmitters of the MPS series are available for various measuring ranges and with explosion protection as an option. A junction box and a cable hanger are available as accessories for simple installation.

Features

SITRANS P pressure transmitters, MPS series, are for measuring the liquid levels in wells, tanks, channels and dams.

Accuracy	≤ 0.3%
Long-Term stability	≤ 0.20 % / 12 months
Measuring range	0 - 2 m H ₂ O (0 - 6.6 ft H ₂ O) to 0 - 20 m H ₂ O (0 - 66 ft H ₂ O)

Applications

SITRANS P pressure transmitters, MPS series, are used in the following branches for example:

- Oil and gas industries
- Shipbuilding
- Water supply

Technical specifications

<u>Measuring range</u>	<u>Maximum working</u>
• 0 ... 2 mH ₂ O (0 ... 6 ftH ₂ O)	1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 4 mH ₂ O (0 ... 12 ftH ₂ O)	1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 5 mH ₂ O (0 ... 15 ftH ₂ O)	1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 6 mH ₂ O (0 ... 18 ftH ₂ O)	3.0 bar (43.5 psi) (corresponds to 30 mH ₂ O (90 ftH ₂ O))
• 0 ... 10 mH ₂ O (0 ... 30 ftH ₂ O)	3.0 bar (43.5 psi) (corresponds to 30 mH ₂ O (90 ftH ₂ O))
• 0 ... 20 mH ₂ O (0 ... 60 ftH ₂ O)	6.0 bar (87.0 psi) (corresponds to 60 mH ₂ O (180 ftH ₂ O))
• Output signal	4 ... 20 mA
• Accuracy	To EN 60770-1
• Error in measurement (including non-linearity, hysteresis and repeat-°F))	0.3 % of full-scale value (typical) ability, at 25 °C (77 °F))

Accessories

Standard measuring set:

- Transmitter
- Cable hanger
- Junction box

System components

- Atmospheric sensors

- Data logger
- Radio modem
- Compensating Unit
- Tide sensor
- Software

Pictures

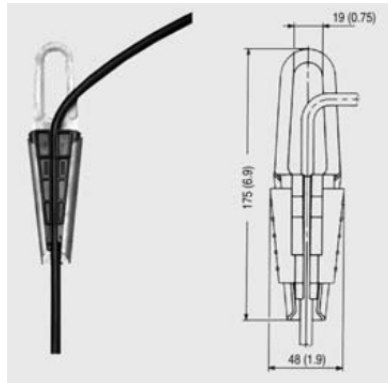


Figure 57: Sitrans P MPS Transmitter (source:<http://www.siemens.com/entry/cc/en/>)

Contact Information

<http://www.siemens.com/entry/cc/en/>

Annexes

Product Web page / Online Brochures / Manual

<http://www.industry.usa.siemens.com/automation/us/en/process-instrumentation-and-analytics/process-instrumentation/pressure-measurement/pressure-transmitter-overview/Pages/SITRANS-P-MPS.aspx>

http://www.industry.usa.siemens.com/automation/us/en/process-instrumentation-and-analytics/process-instrumentation/pressure-measurement/pressure-transmitter-overview/documents/mps_us_pressure.pdf

https://cache.industry.siemens.com/dl/files/174/9716174/att_80331/v1/a5e00136035-04_MPS_denfspitpt.pdf

9.3. CAMPBELL SCIENTIFIC LTD. – CS451 Pressure Transducer

General description

The CS451 is a pressure transducer for water-level measurements in canals, wells, ponds, harbours, lakes, streams and tanks. It has a stainless-steel case that can be submerged in most canals, wells, ponds, lakes, and streams. The CS451 outputs either a digital SDI-12 or RS-232 signal to indicate observed pressure and temperature. This output can be read by many of our data loggers.

Features

- Quality construction ensures product reliability

- Rugged stainless-steel case protects piezo resistive sensor
- Compatible with most Campbell Scientific data loggers
- Fully temperature-compensated
- Low-power sleep state between measurements reduces power consumption
- Optional weighted nose cone facilitates submersion
- NPT fitting allows it to be used in closed-pipe applications
- Quick shipment after receipt of order (ARO)

Applications

Campbell Scientific's CS451 and CS456 submersible pressure transducers provide reliable, accurate pressure and temperature measurements. Their rugged construction makes them suitable for water level measurements in canals, wells, ponds, harbours, lakes, streams and tanks.

Technical specifications

- Measurement Time: < 1.5 s
- Outputs: SDI-12 (version 1.3) 1200 bps; RS-232 9600 bps
- Resolution: 0.0035% FS
- Dry Storage Temperature¹: -10° to 80°C
- Operating Temperature¹: 0° to 60°C
- Temperature Accuracy: $\pm 0.2^{\circ}\text{C}$
- Overpressure: 2 x pressure range
- Power Requirements: 6 to 18 Vdc

Power Consumption

- Quiescent: < 50 μA
- Measurement/Communication: 8 mA (1 s measurement)
- Maximum: 40 mA

Measurement Ranges

Pressure (psig)	Pressure (kPa)	Depth of Fresh Water
≤ 2.9	≤ 20	≤ 2.0 m (6.7 ft)
≤ 7.25	≤ 50	≤ 5.1 m (16.7 ft)
≤ 14.5	≤ 100	≤ 10.2 m (33.4 ft)
≤ 29	≤ 200	≤ 20.4 m (67 ft)
≤ 72.5	≤ 500	≤ 50.9 m (167 ft)
≤ 145	≤ 1000	≤ 102 m (334.5 ft)

Accuracy

- Standard Accuracy Option: $\pm 0.1\%$ full-scale-range TEB²
- High Accuracy Option³: $\pm 0.05\%$ full-scale-range TEB²

Maximum Cable Length

- SDI-12 (1 sensor connected to a single port): ~457 m (1500 ft)
- SDI-12 (10 sensors connected to a single port): 60 m (200 ft)
- RS-232: 60 m (200 ft)

Air Gap

- Standard and weighted nose cone: 0.653 cm (0.257 in)
- NPT fitting: 2.72 cm (1.07 in)

Accessories

- Split Mesh Cable Grip (pn 25431)
- Replacement Desiccant Tube (pn 25366)
- A200 Sensor to PC Interface (for configuring sensor)
- A150-L Single Sensor Terminal Case, Vented with Desiccant
- Heyco Cable Grip (pn 31648) for mating with a 1 in. PVC pipe

System components

- Atmospheric sensors
- Data logger
- Radio modem
- Compensating Unit
- Tide sensor
- Software

Pictures



Figure 58: CS451 Pressure Transducer (source: www.campbellsci.co.uk)

Contact Information

Campbell Scientific Ltd.

Sales and Support : +44 (0) 1509 828888

General : +44 (0) 1509 601141

Fax: +44 (0) 1509 601091

+44 (0)1509 601141 (switchboard)

Email sales@campbellsci.co.uk

Website www.campbellsci.co.uk

Annexes

Online page / product specification / brochures

<https://www.campbellsci.com/cs451>

<https://www.campbellsci.com/cs451-specifications>

https://s.campbellsci.com/documents/us/product-brochures/b_cs451-cs456.pdf

9.4. OTT HYDROMET – OTT CBS - Compact Bubbler Sensor

General description

The OTT CBS is a compact, accurate, and low power bubbler sensor for surface water level monitoring. The OTT CBS meets or exceeds USGS standards for accuracy, and will not drift over time. It features outputs for SDI-12 and 420 mA.

Features

- Measures the pressure of air in a measuring tube and calculates the difference of pressure in the tube compared to atmospheric pressure to calculate water level
- Indirect pressure measurement with no electrical components installed in water
- Drift-free measurement principle that does not require desiccant
- Uses standard communication protocols like SDI-12

Applications

- Water level measurement in streams, rivers, canals, lakes
- Dams, irrigation plants, water reservoirs
- Garbage depots, industrial and mining waste water
- Channels with long, flat embankments

Technical specifications

Measuring range

- | | |
|---|---|
| • Version "Standard" and "USGS specification" | 0 ... 15 m (0...50 ft) |
| • Version "30 m measuring range" | 0 ... 30 m (0...100 ft) |
| • Resolution | 1 mm (0.01 ft) |
| • Accuracy | Version "Standard" and "30m measuring range" ±5 mm |
| • Version "USGS specification" | 0 ... 15 ft: ±0.01 % |
| | 15 ... 50 ft: ±0.065 % of measurement value or 0.02 ft, whichever is less |

- | | |
|------------------------------|--|
| • Units | m, ft, bar, PSI |
| • Electrical data Interfaces | 4 ... 20 mA, SDI-12, SDI-12 via RS-485 |
| • Power supply | 10 ... 30 V DC, typ. 12/24 V DC |
| • Measuring interval | 1 min typ. 320 mAh/day |
| • Measuring interval | 15min typ. 25 mAh/day |
| • Housing material | ABS |
| • Dimensions L x W x H | 165 mm x 205 mm x 115 mm |
| • Weight | approx. 1,500 g |
| • Protection class | IP43 |

Environmental conditions

- | | |
|-------------------------|----------------------------------|
| • Operating temperature | -20 ... +60 °C |
| • Storage temperature | - 40 ... +85 °C |
| • Relativ air humidity | 10 ... 95 %; not condensing |
| • Measuring tube | inner diameter typ. 2 mm or 4 mm |

Accessories

- OTT CBS water gauge
- OTT measuring tube
- OTT submersible probe for surface water (bubbles output)
- OTT DuoSens data logger with display and analog inputs
- OTT PCU 12 power supply unit
- OTT bracket for solar module
- Solar modul ET-M (55 Wp)
- Battery Fiam 12V 42Ah
- RITTAL cabinets 400x600x200, with fasteners for assembly
- OTT IRDA adapter for PC
- Transport
- Infrastructure works

System components

- Atmospheric sensors
- Data logger
- Radio modem
- Compensating Unit
- Tide sensor
- Software

Pictures



Figure 59: OTT CBS - Compact Bubbler Sensor (source: <http://www.ott.com/>)

Contact Information

5600 Lindbergh Dr.

Loveland, CO 80539

Tel: 800-949-3766 option 1 or (970)-669-3050

E-mail: sales@otthydromet.com

Web: <http://www.ott.com/>

Annexes

<http://www.ott.com/en-us/products/download/brochure-ott-water-level-measurement-1/>

<http://www.ott.com/en-us/products/download/leaflet-compact-bubble-sensor-ott-cbs-8/>

<http://www.ott.com/en-us/products/download/operating-instructions-bubble-sensor-ott-cbs-6/>

9.5. Summary and conclusions

Gauging stations are facilities used by hydrologists to automatically monitor streams, wells, lakes, canals, reservoirs and or other water bodies. Instruments at these stations collect information such as water height, discharge, water chemistry and water temperature. Inside “FAIRway - State of the art analysis equipment summary” table are provided technical information for all three measurement technology (bubbler technology, smart sensors technology and pressure technology).

Prices for gauging stations start from 900 Euros. The final price largely depends on the available infrastructure (power supply, GSM connection, installation on fortified banks etc.)

10. Drones

10.1. DJI – PHANTOM 3

General description

Finally, a flying camera that packs years of experience in aerial imaging into one compact, easy to use system. With the Phantom 3 Professional, you're shooting 4K video at up to 60 frames per second and capturing 12 megapixel photos that look crisper and cleaner than ever. Has an aperture lens with a maximum amount of coverage f.2.8 and an angle of 95 °.

Features

- DJI's Vision Positioning System (VPS) for precise and stable indoor flying
- Lightbridge digital streaming (720p) to phone/tablet with simultaneous full resolution video storage on included 16GB micro SD card
- DJI Pilot App (compatible with iOS and Android) that provides complete camera control and live video streaming
- Lithium ion rechargeable flight battery
- Rechargeable controller (remote)
- Controller (remote) includes a mobile device holder
- 3-axis fully stabilized gimbal
- "Return to home" feature for automatic safe return of drone to starting position if contact between drone and controller is lost (operator can also activate "return to home" at any time).
- Ready-to-fly right out of the box!

Applications

- 4K at 24 fps shooting
- Photos 12Mpx
- 3-axis stabilized gimbal head
- Remote control operation at max 2km
- guiding the GPS-based system
- Monitoring Live HD 720p
- optical sensor "floating"

Technical Specification

See Online web brochures:

http://download.dji-innovations.com/downloads/phantom_3/en/Phantom_3_Professional_User_Manual_v1.6_en.pdf

System components

- Aircraft
- Remote Controller
- Propeller Pairs
- Intelligent Flight Battery

Accessories

- Gimbal Clamp
- Vibration Absorbers
- 16gb Micro-SD Card
- Anti-drop Kit
- Landing Pads

Camera

-

Hardware equipment

-

Software

iOS 8.0 or later / Android 4.1.2 or later

Pictures

Figure 60: DJI – PHANTOM 3 (source: <http://www.dji.com/>)

Contact Information

DJI GmbH – Europe

(please send your requests in English)

Address: Im Birkenfeld 2, 97795 Schondra, Germany

Tel: +49 (0) 9747 93042 00

Dealer inquiries: sales@dji.com

Marketing requests: marketing.europe@dji.com

Web: <http://www.dji.com/>

Annexes

Online web brochures:

<http://www.dji.com/product/phantom-3-standard>

<http://www.dji.com/product/phantom-3-standard/download>

Price: 2.126 Euro (Phantom 3 Professional Everything You Need Kit (Hardshell Backpack - <http://store.dji.com/product/phantom-3-professional-everything-kit-hardshell-backpack>

10.2. DJI – Inspire Pro 1

General description

A Micro Four Thirds CMOS sensor with 4K image capture is introduced to DJI's quadcopter line with the Inspire 1 PRO featuring the Zenmuse X5 camera and gimbal system along with a 15mm f/1.7 lens. Forgoing the fixed landing gear design found on many earlier quadcopters, the Inspire 1 features a retractable arm system whereby the underside of each prop motor has a foot to act as a landing pod when the arms are lowered. In-flight, the arms lift up to provide the camera an unobstructed 360-degree view. A 3-axis gimbal keeps shots steady and the camera pointed the same direction as the quadcopter banks and turns. The camera records internally to microSDHC/SDXC memory cards and can also beam a live 720p

feed to a mobile device running the DJI GO app or a monitor or FPV glasses with an HDMI input. One transmitter (radio controller) is included and a second can be added so that one operator can pilot and another can pan and tilt the camera.

As with many other multi-rotor systems, the Inspire 1 relies on a GPS-based stabilization system that - thanks to spatial awareness - is able to hold a position even when experiencing wind interference, can compensate for overzealous pilot inputs to help avoid stalling, automatically brings the aircraft home in the event of signal loss or at the press of a button, and makes possible a number of semi-automated flight modes that can be enabled through the app. There is also an "indoor" mode which relies on Vision Position technology - combining optical flow with ultrasonic - to provide stability indoors or in other contexts where GPS is unavailable (Note: certain features will be unavailable in indoor mode).

Features

- Ready-to-fly aerial system
- Included professional 4K camera and 3-axis stabilization gimbal (Zenmuse X5) with unobstructed 360° Shooting
- 16MP Stills Capability
- Live, wireless HD video transmission via DJI Lightbridge
- Dedicated remote with flight and camera controls
- Powerful app to adjust camera settings, edit videos, and more
- Vision Positioning system for GPS-free or indoor flight
- Retractable Carbon Fiber Arms
- App-Based Control Software
- Auto-Takeoff and Landing
- Up to 1.2 Mile Radio Range
- GPS-Based Stabilization System

Applications

high-level shoots and professional sets

Technical Specification

Performance

- Hovering Accuracy (GPS Mode) Vertical: 1.6' / 0.5 m
- Horizontal: 8.2' / 2.5 m
- Maximum Speed 72.2 fps / 22 m/s (Attitude mode; no wind)
- Maximum Flight Altitude 14,764' / 4,500 m
- Maximum Wind Speed Resistance 32.8 fps / 10 m/s
- Maximum Flight Time Up to 18 minutes

Gimbal

Details at <http://www.dji.com/product/inspire-1/spec>

System components

- Model Zenmuse X5
- Mount Detachable
- Number of Axes 3-axis
- Control Angle Accuracy $\pm 0.02^\circ$

Accessories

IN THE BOX - <http://store.dji.com/product/inspire-1-pro#/box>

- DJI Inspire 1 PRO Quadcopter with Zenmuse X5 4K Camera and 3-Axis Gimbal
- Transmitter for Inspire 1 Quadcopter
- Zenmuse X5 Camera and 3-Axis Gimbal
- MFT 15mm f/1.7 ASPH Prime Lens
- TB47B Intelligent Flight Battery for Inspire 1 (99.9Wh)
- Flight Battery Charger
- Power Cord
- 4 x Spare Prop CW/CCW Pairs
- Limited 1-Year Warranty on Aircraft (Excluding Gimbal, Camera, and Battery)
- Limited 6-Month / 200 Cycle Warranty on Battery (whichever Comes First)

Camera

- Model Name: Zenmuse X5
- Photo Resolution 16 MP (4608 x 3456)
- Video Resolution DCI 4K (4096 x 2160): 24p, 25p
- UHD 4K (3840 x 2160): 25p, 30p
- FHD (1920 x 1080): 24p, 25p, 30p, 48p, 50p, 60p

Hardware equipment

-

Software

DJI GO App

Pictures



Figure 61: DJI – Inspire Pro 1 (source: <http://www.dji.com/>)

Contact Information

DJI GmbH – Europe

Address: Im Birkenfeld 2, 97795 Schondra, Germany

Tel: +49 (0) 9747 93042 00

Dealer inquiries: sales@dji.com

Marketing requests: marketing.europe@dji.com

Web: <http://www.dji.com/>

Annexes

Online web brochures:

<http://www.dji.com/product/inspire-1>

<http://store.dji.com/product/inspire-1-pro>

Price: 4.999 Euro - http://store.dji.com/product/inspire-1-pro?from=related_products

10.3. OneDrone – SuperHero GEO X4/X8 RTF

General description

OneDrone SuperHero GEO RTF is a result of one year long testing and numerous inputs from geo surveyors, but also fire-fighters, police forces, army and civil protection services. Equipped with powerful gimbal and camera, reliable autopilot system, industry-leading motors & equipment and auto-deploy rescue parachute represents perfect work tool for any geo surveyor. Total flying weight with 16.000 6S battery is 5.5 kg and offers up to 28 minutes of operational flight time. With smaller battery (10.000 6S) flying weight can go below 5 kg (crucial for countries with 5 kg weight limit) and flight time is still up to 20 minutes.

Features

- Perfectly designed and quality frame
- Great flight times (flight times with 16.000 6S battery are up to 28 minutes)
- Reliability
- Integrated Parachute System
- Custom components

Applications

- geo surveyors
- firefighters, police forces,
- army and civil protection services

Technical Specification

-

System components

-

Accessories

IN THE BOX

- Sky Hero Spyder X4-850 GEO Edition
- 3DR Pixhawk flight Controller + uBlox GPS module
- 3DR RadioTelemetry Kit-433Mhz
- Futaba T14SG
- Gens Ace 16.000 mAh 6S 22,2V 25/50C
- iCharger 406Duo 1400W 40A 6S
- E-Fuel Mega Power NEW (30V-50A)
- FPV downlink (TX, diversity monitor, instalation)
- 3-axis gimbal for Sony RX100 camera with HDMI converter
- Parachute system (assembly, instalation)
- Assembly, testing & FC programming

Camera

Sony RX100 camera

Pictures



Figure 62: SuperHero GEO X4/X8 RTF (source: <http://onedrone.com>)

Contact Information

OneDrone.com * One stop drone shop (FPV, UAV, RC) OneDrone d.o.o.

Cesta Andreja Bitenca 36

1000 Ljubljana

Slovenia, EU

VAT ID: SI88522253

e-mail: robert@onedrone.com

web: <http://onedrone.com>

Annexes

Online web brochures: <http://onedrone.com/store/multi-copters/rtf-arf-pnf/onedrone-superhero-geo-x4-x8-rtf.html>

Price: 6,999.90€ (Ex Tax: 5,737.62€)

10.4. SenseFly – eXom

General description

Create high-resolution 2D and 3D maps, or complement fixed-wing drone data by mapping a site's highly inclined and vertical surfaces. Capture high-resolution aerial imagery and transform this into full 3D models of buildings and small/ medium-sized infrastructure. Examine and document surfaces and objects—such as bridges, towers, rooftops and cliff faces—in high-resolution.

Post flight Terra 3D is a professional photogrammetry software program*, which is supplied as standard with every eXom drone. Use it to transform still RGB from any eXom flight into geo-referenced 2D orthomosaics, 3D building models, 3D point clouds, triangle models, digital surface models and more — in just a few easy clicks. Powered by Pix4D technology, Postflight Terra 3D includes a Rapid Check feature, mosaic and rayCloud editors, a full Quality Report, plus a point cloud fly-through video creator and much more.

Features

-

Applications

- Crack detection
- Bridge, pipe & tower inspection
- Plant inspection & documentation
- Stockpile assessment
- Construction monitoring
- Close agricultural & archaeological mapping
- Solar panel hotspot detection
- Conservation & environmental monitoring

Technical Specification

- Type V-shaped quadcopter
- Engines 4 electric brushless motors
- Propellers 4
- Take-off weight 1.8 kg (3.9 lb) incl. battery, payload & shrouding
- Flight time (full system) Up to 22 min
- Max. climb rate 7 m/s (15 mph)
- Max. airspeed Automatic flight: 8 m/s (18 mph) Manual flight: 12 m/s (27 mph)
- Wind resistance Automatic: up to 8 m/s (18 mph) Manual: up to 10 m/s (22 mph)
- Autopilot & control IMU, magnetometer, barometer & GPS
- Materials Composite body, moulded carbon fibre arms and legs, precision-molded magnesium frame, precision-molded injected plastic
- Operating temperature -10 to 40° C (14°-104° F)

System components

- 1 eXom drone
- 1 Interactive ScreenFly controller
- 2.4 GHz remote control (for safety pilots)
- 2.4 GHz/5GHz dual band USB radio modem
- 2 SD memory cards (32 GB)
- 2 batteries
- 2 single battery chargers w/power supplies

Accessories

- 1 wheeled carry case
- 1 User Manual
- 1 USB cable set
- 1 spare leg set
- 1 spare propeller set
- eMotion X & Postflight Terra 3D software (accessible via my.senseFly at no extra cost)

Camera

-

Hardware equipment

-

Software

-

Pictures

Figure 63: eXom (source: <https://www.sensefly.com>)

Contact Information

senseFly SA

Route de Genève 38, (Z.I. Châtelard Sud), 1033 Cheseaux-Lausanne, Switzerland

Telephone: +41 21 552 04 40

Web: <https://www.sensefly.com>

Annexes

Web: <https://www.sensefly.com/drones/exom.html>

Brochures:

https://www.sensefly.com/fileadmin/user_upload/sensefly/documents/brochures/eXom-brochure-en.pdf

https://www.sensefly.com/fileadmin/user_upload/sensefly/documents/senseFly-eXom-Technical-Specifications.pdf

10.5. Trimble Navigation – ZX5

General description

The Trimble ZX5 is another accurate, reliable tool in Trimble's family of UAS solutions. Fast to setup and easy to operate, the Trimble ZX5 allows you to quickly collect data in the field so you can create the dynamic deliverables required for today's jobs. Orthography down to 1 mm ground sample distance (GSD) and 3D models generated as easy as ever before.

Features

-

Applications

Tested, proven and reliable, the Trimble ZX5 Multirotor UAS is built to perform tough, everyday jobs quickly, even in the tightest spaces. It requires no launcher, is easy to assemble and includes everything you need to capture ultra high quality georeferenced photos. The ZX5 also takes a 16 MP Olympus camera along for the ride, which allows you to collect hi-resolution aerial imagery and achieve GSD down to 1 mm for superior image quality.

Technical Specification

HARDWARE

- Type..... Rotary wing
- Number of rotors..... 6
- Maximum takeoff mass..... 5 kg
- Payload capability..... 2.3 kg
- Dimensions..... 85 cm x 49 cm
- Material..... Carbon frame structure
- Propulsion..... Electric pusher propeller; 6 brushless motors
- Battery..... 2 x 6600 mAh 14.8 V
- Camera..... 16 MP with interchangeable 14 mm lens
- Controller..... PC or tablet running Microsoft® Windows® XP operating system or later (Windows 7 or later recommended)
- Display..... Capable of at least XGA (1024x768) and at least one USB port

OPERATION

- Endurance..... 20 minutes
- Flight time without payload..... 25 minutes

- Maximum ceiling. 3,000 m AMSL
- Pre-flight system setup time. 5 minutes
- Launch and recovery. Vertical takeoff and landing
- Weather limit. Stable in winds up to 36 km/h
- Control frequency. 2.4 GHz
- Video frequency. 5.8 GHz
- Communication and control range. Up to 2 km
- Live video stream resolution. 480i
- Recordable video resolution. 1080p30

System components

-

Accessories

-

Camera

-

Hardware equipment

-

Software

Trimble UX5 aerial image data can be processed into powerful deliverables with the Trimble Business Center (TBC) Aerial Photogrammetry module. The TBC Photogrammetry Module is based on state-of-the-art image processing technology. The incorporation of photogrammetric algorithms specialized for small UAS produces very accurate results automatically, with minimal manual interaction. This office software combined with the Trimble UX5 provides a reliable photogrammetric system delivering excellent results without requiring specialized photogrammetry knowledge or experience.

The TBC Aerial Photogrammetry module works seamlessly with the TBC Complete and Advanced software editions, making it possible to process complete survey projects including aerial imagery, Trimble VISION imagery, GNSS data, and total station observations.

Pictures



Figure 64: ZX5 (source: <http://uas.trimble.com/>)

Contact Information

Trimble Navigation, Buchtenstraat 9/1, 9051 Gent - Belgium

E-mail: info@gatewing.com

Tel: +32 9 335 05 15

Fax: +32 9 335 88 03

VAT BE 0899.848.709

RPR Gent

Web: <http://uas.trimble.com/>

Annexes

Online ZX5 web page

<http://uas.trimble.com/zx5>

ZX5 Brochures

http://uas.trimble.com/sites/default/files/downloads/022516-199a_trimblezx5_multirotor_uas_geospatial_ds_a4_0915_lr.pdf

10.6. Trimble Navigation – UX5

General description

The Trimble ZX5 is another accurate, reliable tool in Trimble's family of UAS solutions. Fast to setup and easy to operate, the Trimble ZX5 allows you to quickly collect data in the field so you can create the dynamic deliverables required for today's jobs. Orthography down to 1 mm ground sample distance (GSD) and 3D models generated as easy as ever before.

Features

-

Applications

For mapping and surveying professionals around the world, the Trimble UX5 unmanned aircraft system has raised the bar for UAS performance, delivering unparalleled results and efficiency. Ideal for general survey and agricultural applications, the UX5 comes complete with its own 24 MP camera to deliver enhanced image accuracy. Also costeffective, the UX5 provides tremendous benefits at a very competitive price—offering far greater value for less.

Technical Specification

- | | |
|------------------------|--------------------|
| • Type | fixed wing |
| • Weight | 2,5 kg (5.5 lb) |
| • Wingspan | 100 cm (39.4 in) |
| • Wing area | 34 dm ² |
| • Maximum takeoff mass | - |
| • Payload capability | - |
| • Dimensions | 100 x 65 x 10.5 cm |

- | | |
|--------------|--|
| • Material | EPP foam; carbon frame structure; composite elements |
| • Propulsion | electric pusher propeller; |
| • brushless | 700 W motor |
| • Battery | 14.8 V, 6000 mAh |
| • Camera | 24 MP mirrorless APSC |

System components

-

Accessories

- UX5 body plane
- 24 MP camera
- propeller
- Trimble Tablet Rugged PC

Camera

-

Hardware equipment

-

Software

The Trimble Business Center Aerial Photogrammetry Module was developed for Professional Land Surveyors working with small UAS from Trimble, and Inpho UASMaster was developed for Professional Photogrammetrists working with data from small UAS (of any type).

- High Resolution Orthomosaic
- True Color Point Cloud (DTM & DSM)
- Relative and Adjustment with Ground Control
- Coordinate System Management
- CAD & Drafting Tools
- Support for non-Trimble UAV platforms
- Support for Multi-Rotor Platforms
- Integration with Inpho
- Interactive Editing Workflow
- Manual Measurement of Tie Points
- For Professional Photogrammetrists working with UAS of any type

Pictures

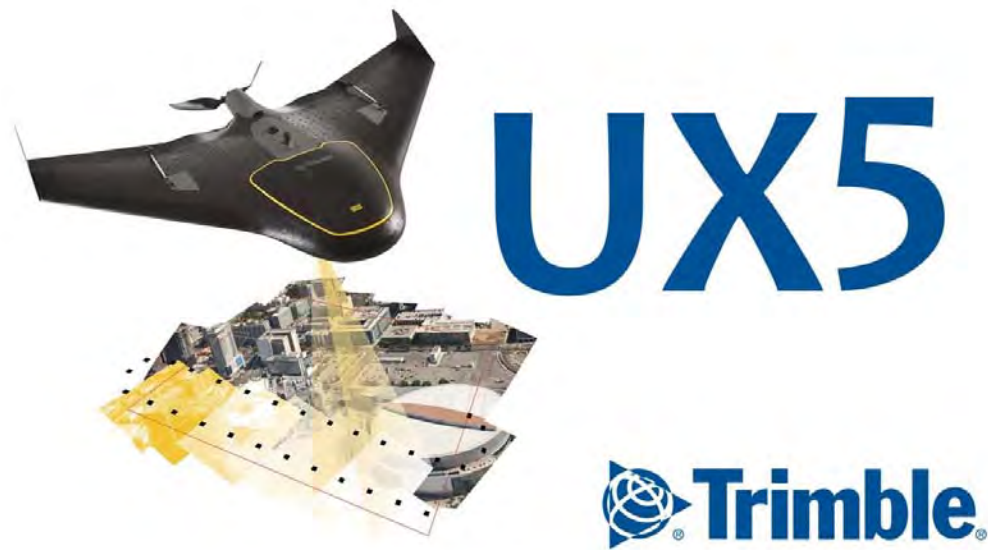


Figure 65: UX5 (source: <http://uas.trimble.com/>)

Contact Information

Trimble Navigation, Buchtenstraat 9/1, 9051 Gent - Belgium

E-mail: info@gatewing.com

Tel: +32 9 335 05 15

Fax: +32 9 335 88 03

VAT BE 0899.848.709

RPR Gent

Web: <http://uas.trimble.com/>

Annexes

Online web page

<http://uas.trimble.com/ux5>

UX5 Online Brochures

http://uas.trimble.com/sites/default/files/downloads/022543-576b_trimbleux5_ds_0615_lr_1.pdf

10.7. Summary and conclusions

One innovative approach of FAIRway project is aerial photo monitoring concept which identify the potential of alternative means for surveying the waterway and the shore-line with its navigational structures. During the past 50 years, surveying and engineering measurement technology has made five quantum leaps: the electronic distance meter, total station, GPS, robotic total station and laser scanner. Unmanned aircraft systems (UASs) or drones (also known as unmanned aerial vehicles or UAVs) will be the sixth quantum leap in technology. The study market aim is to present the two basic types of drones—

fixed-wing units with a brushless electric motor and a rotor type that has between three and eight or more brushless electric motors (commonly referred to as multirotors) and their technical characteristics about performances and efficiency. Further information is presented in FAIRway - State of the art analysis equipment summary table.

The presented drones are estimated to cost up to 10,000 Euros.

11. AtoNs

11.1. SRT MARINE TECHNOLOGY LTD. – Tungsten AIS Aid to Navigation

General description

Developed using SRT Marine Technology's third generation technology, Tungsten offers the ultimate functionality and integration options. Incorporating an internal GPS antenna, multiple connectivity options and optional sensor board, Tungsten is the class leading AIS AtoN module. Tungsten offers the ultimate flexibility of either FATDMA or RATDMA transmit protocols and has been tested and internationally approved to the highest specifications.

Features

- Leading edge technology inside Tungsten sets a new standard for power consumption. Ultra-low power consumption and small form factor allows Tungsten to be installed risk free inside any target enclosure.
- Tungsten offers a flexible, internationally approved, AIS service solution with both Type 1 and Type 3 options available, as well as accurate environment monitoring using the optional sensor board.

Applications

-

Technical Specification

See online datasheet brochure

System components

-

Accessories

- Tungsten AIS AtoN Type 1
- Connectors kit for Tungsten
- GPS Antenna
- VHF Antenna
- IP68 Enclosure
- Rechargeable battery 65Ah

Hardware equipment

-

Software

-

Pictures

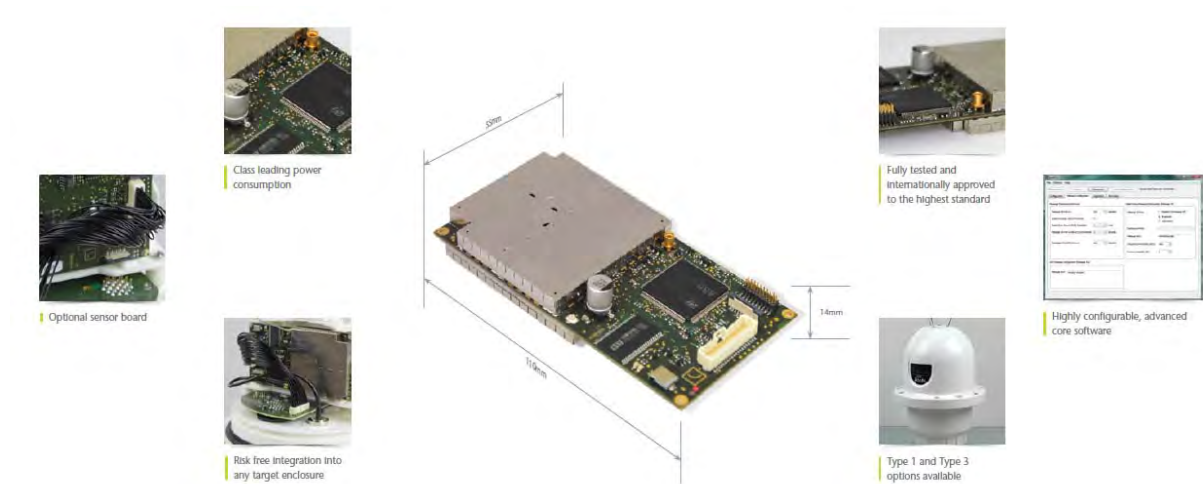


Figure 66: Tungsten AIS Aid to Navigation (source: <http://www.srt-marine.com/>)

Contact Information

SRT Marine Technology Ltd

Wireless House, Westfield Industrial Estate, Midsomer Norton, Bath BA3 4BS, UK

T: +44 (0)1761 409 500

F: +44 (0)1761 410 093

E: enquiries@srt-marine.com

Web: <http://www.srt-marine.com/>

Annexes

Online brochures

<http://www.srt-marine.com/products/modules/tungsten-t1-ais-aton/>

<http://www.srt-marine.com/wp-content/uploads/2014/04/418-0005-Tungsten-AIS-Aid-to-Navigation.pdf>

11.2. Hydrosphere UK Ltd. – Carbon AIS Aid to Navigation (AtoN)

General description

Leading edge technology inside Carbon enables a new standard of power consumption to be set. Ultralow power consumption and reliable core technology allows Carbon to be installed on a buoy and left for years without maintenance.

Carbon offers a flexible AIS service solution with both Type 1 and Type 3 options available. Accurate environment monitoring via optional sensor board. Triple level environment protection allows Carbon to be safely deployed on a buoy, whilst simple installation and configuration ensures risk-free operation.

Features

- Enhanced sensor module for environmental data monitoring
- Military spec connectors allow simple integration into any system
- Simple installation, configuration and operation
- Fully tested and internationally approved to the highest standard
- Enhanced environmental protection ensures reliable operation and optimum field performance
- Supplied with GPS antenna (internal or external) and fixing bracket
- 12 to 24VDC power supply

Applications

-

Technical Specification

See online datasheet brochure

http://www.hydrosphere.co.uk/site/assets/files/1226/hydrosphere_srt_carbon_ais_aton_v_2_02_may_14_web.pdf

System components

-

Accessories

- Carbon TRS AtoN
- Connectors kit
- USB configuration cable
- GPS Antenna and receiver
- VHF Antenna
- ProAtoN configuration software
- Fixed bracket

Hardware equipment

-

Software

-

Pictures



Figure 67: Carbon AIS Aid to Navigation (source: <http://www.hydrosphere.co.uk>)

Contact Information

Hydrosphere UK Ltd

Units C & D, West End Centre, Colthouse Lane, Upper Froyle, Hampshire, GU34 4JR, UK

Tel: +44 (0)1420 520374

Fax: +44 (0)1420 520373

Email: sales@hydrosphere.co.uk

Web: <http://www.hydrosphere.co.uk>

Annexes

Online web brochures

<http://www.hydrosphere.co.uk/products-services/ais-monitoring/carbon-ais-aton/>

http://www.hydrosphere.co.uk/site/assets/files/1226/hydrosphere_srt_carbon_ais_aton_v_2_02_may_14_web.pdf

http://www.hydrosphere.co.uk/site/assets/files/1140/hydrosphere_srt_carbon_ais_aton_aug_v_2_01_web.pdf

11.3. SRT Marine - AtoN Express Aid to Navigation

General description

Fully certified and integrated Type 1 AIS AtoN with internal rechargeable battery. Designed for quick and easy deployment on even the smallest buoys. Able to operate for over 5 days between charges or connect directly to an external power source for permanent installations. Unique secure quick fit bracket system.

Features

- Leading edge technology inside Tungsten sets a new standard for power consumption. Ultra-low power consumption and small form factor allows Tungsten to be installed risk free inside any target enclosure.
- Tungsten offers a flexible, internationally approved, AIS service solution with both Type 1 and Type 3 options available, as well as accurate environment monitoring using the optional sensor board.

Applications

-

Technical Specification

- Certified type 1 AIS AtoN
- Integrated&protected GPS & VHF antennas
- Battery Internal rechargeable battery
- Dimensions: 350mm x 63mm max. (H x D)
- Weight: 250g (AtoN Express unit only)
- Mounting bracket Min / max pole diameter: 25mm to 55mm
- VHF Transceiver Transmitter x 1
- Frequency 156.025 to 162.025MHz in 25 kHz steps
- GPS GPS Receiver & Antenna
- Channels 50
- IEC 61108-1 Compliant
- Internal GPS antenna 4
- AIS standards IEC62320-2 Edition 1 2008-03 IEC standard, AIS AtoN Stations ITU-R M.1371-5 Universal AIS Technical Characteristics
- Environmental standard IEC60945:2002-08
- Product Safety EN60950-1:2006, +A11:2009 +A1:2010 +A12:2011
- GPS performance IEC61108-1:2003-07

System components

- AIS AtoN Type 1
- Connectors kit for Tungsten
- GPS Antenna
- VHF Antenna
- IP68 Enclosure
- Rechargeable battery 65Ah

Hardware equipment

-

Software

-

Pictures



Figure 68: AtoN Express Aid to Navigation (source: <http://www.srt-marine.com/>)

Contact Information

SRT Marine Technology Ltd

Wireless House, Westfield Industrial Estate, Midsomer Norton, Bath BA3 4BS, UK

T: +44 (0)1761 409 500

F: +44 (0)1761 410 093

E: enquiries@srt-marine.com

Web: <http://www.srt-marine.com/>

Annexes

Online brochures

<http://www.srt-marine.com/pdf/ais-aton-express-transceiver/>

<http://www.srt-marinesystems.com/wp-content/uploads/2014/04/418-0012-AtoN-Express-Aid-to-Navigation.pdf>

11.4. TIDELAND SIGNAL CORPORATION – V-Track™ V10 Informer™

General description

V-Track™ V10 Informer™ is an AIS information provider and remote monitoring system for use on marine aids to navigation (AtoN) and other structures. The V10 Informer™ is available in two options: “Type 1” is a transmitter only device, and “Type 3” is a transmitter and receiver device that can also be used as an AIS repeater. For most applications a transmit only device provides the ideal AIS AtoN solution.

Features

PROGRAMMING SOFTWARE

The V10 Informer™ is supplied with a comprehensive software application that enables you to program the unit via an RS232 interface.

REPEATER OPTION

The V10 Informer™ “Type 3” has the capability of repeating the standard supported AIS AtoN messages

for predetermined MMSI numbers. In its "Type 3" option, the V10 informer™ can also be controlled over the VHF data link (VDL). This is all possible through the configuration software.

Applications

Inland waterways - River buoys

Technical Specification

• IP Rating	IPx6 and IPx7
• Designation	Automatic Identification System (AIS) for AtoN
• Power Supply	12VDC nominal
• Type 1 Power Consumption	FATDMA < 0.288Ah/day*
• Type 3 Power Consumption	FATDMA < 0.432Ah/day*
	At 12.5W, reporting interval 3 minutes
• Temperature Range	-20o C to +55o C
• Message 21 Content	MMSI Number, Name of AtoN, Position, Position Accuracy, RAIM Indicator
	Type of Position Fixing Device, Time Stamp, Dimension of AtoN, Type of AtoN
	Virtual AtoN Target Flag, 8 bits reserved for regional application

System components

- AIS AtoN Type 1
- Connectors kit
- GPS Antenna
- VHF Antenna
- IP68 Enclosure
- Rechargeable battery

Software

-

Pictures



Figure 69: V-Track™ V10 Informer™ (source: <http://www.tidelandsignal.com/>)

Contact Information

UNITED KINGDOM

Burgess Hill Office

Kendall House, Victoria Way

Burgess Hill Sussex RH15 9NF

Phone: +44 (0) 1444 872240

Fax: +44 (0) 1444 872241

Gt Yarmouth Office

Signal House, Morton Peto Road

Gt. Yarmouth, Norfolk NR31 0LT

Phone: +44 (0) 1493 441711

Fax: 44 (0) 1493 440322

Web: <http://www.tidelandsignal.com/>**Annexes**<http://www.tidelandsignal.com/2014/data/racon-ais/v10-informer-rev01.pdf>**11.5. Alltek Marine – Mando 301/303****General description**

AMEC MANDO-301/-303 is an AIS AtoN (Aids to Navigation) equipment that provides accurate and real time information to nearby vessels and shore stations. MANDO-301 is a type 1, and MANDO-303 is a type 3 model.

The MANDO series prevents collisions by transmitting position of a fix or a floating AtoN. It has the ability to transmit meteorological and hydrological data with proper additional sensors installed.

MANDO is designed with state-of-the-art technologies to offer users many possibilities with ease of integration. As a first in the class, MANDO-303 supports chaining functions which has been successfully approved by BSH. To extend transmission range, the feature has the ability to chain several units to cover a wider area and it definitely brings flexibilities in implementations.

Features

-

Applications

-

Technical SpecificationAPPLICABLE STANDARDS

- | | |
|---------------|----------------|
| • IALA A-126 | IEC 61162-1 |
| • IEC 60945 | IEC 62320-2 |
| • IEC 61108-1 | ITU-R M.1371-3 |

GPS RECEIVER

- Receiving Channels 50 channels
- Tracking & Navigation Sensitivity ≥ -159 dBm
- Reacquisition Sensitivity ≥ -159 dBm
- Horizontal Position < 2.5 m Autonomous
 < 2.0 m SBAS
- Receiver Type SBAS: WAAS, EGNOS
MSAS, GAGAN

TRANSMITTER PERFORMANCE

- TX Frequency Range 156.025 MHz ~ 162.025 MHz
- Frequency Accuracy ± 500 Hz
- Channel Space 25 KHz
- Channel Protection 1 Sec max on air
- Modulation GMSK/FM
- Data Rate 9,600 bps
- TX Power Control 2/5/12.5 Watt (programmable)
- Carrier Power Error ± 1.5 dB (normal)
- Nominal Impedance 50Ω

RECEIVER PERFORMANCE (MANDO-303 only)

- Numbers of Receivers 2
- RX Frequency Range 156.025MHz ~ 162.025 MHz
- Sensitivity PER 20% at -107 dBm
- Data Rate 9,600 bps
- PER 20% at -107 dBm
- Co-Channel Rejection 10 dB at 1 KHz offset
- Adjacent Channel Rejection 70 dB at 25 KHz
- Nominal Impedance 50Ω

System components

- AIS Type 1
- AIS Type 3
- Connectors kit
- VHF Antenna
- GPS Antenna
- IP68 Enclosure
- Rechargeable battery

Software

-

Pictures



Figure 70: Mando 301/303 (source: <http://www.alltekmarine.com/>)

Contact Information

Alltek Marine Electronics Corporation
14F-2, No. 237, Sec. 1, Datong Road, Xizhi District,
New Taipei City, 22161, Taiwan
Tel: +886 2 8691 8568 Fax: +886 2 8691 9569
Web: <http://www.alltekmarine.com/>

Annexes

<http://www.alltekmarine.com/upload/d1fs211510110837129263.pdf>

11.6. Summary and conclusions

The AtoN's chapter will analyse new innovative technologies, which will contribute strongly to waterway maintenance daily work and to high quality services. Chapter contain general description of types and functionalities, technical specification and performances of AtoNs, also in "FAIRway - State of the art analysis equipment summary" table are described all sensors and components of a system.

12. List of pictures

Figure 1: Vessel For Marking Waterways (source: AVP offer)	5
Figure 2: Vessel For Marking Waterways (source: AVP offer)	7
Figure 3: Vessel For Marking Waterways (source: AVP offer)	10
Figure 4: 141104 - Productsheet MuC 3713 571673.pdf (Source: Damen Offer)	13
Figure 5: 150520 - Productsheet MuC 2712 YN571674 Green Marine.pdf (source: Damen Offer)	14
Figure 6: MuC 1908SD YN 571578.pdf (source: Damen Offer)	16
Figure 7: MuC 1908SD YN 571584 Agat (source: Damen Offer)	17
Figure 8: Title of the figure 2 (source: www.damenshipyardshardinxveld.nl)	19
Figure 9: WORK BOAT (source: http://www.set-schiffbau.de/)	20
Figure 10: Multi-Functional Work Vessel (source: AFDJ – Feasability Study)	21
Figure 11: Hydrographic survey launches (source: http://www.alumarine-shipyard.com/)	24
Figure 12: 26 CAT - SURVEY (source: pdf file)	25
Figure 13: 30 CAT AMI Survey (source: 30 CAT AMI Survey Proposal Rev A.PDF)	27
Figure 14: Boat Hydro (source: http://www.chantiersallais.fr/)	28
Figure 15: VNF Boat (source: http://www.chantiersallais.fr/)	30
Figure 16: 7.9m Survey Catamaran ‘Gallopier’ (source: http://www.cheetahmarine.co.uk/)	31
Figure 17: CREH Tracer 4 (source: http://www.cheetahmarine.co.uk/)	33
Figure 18: Hydrographic Survey “CETUS” (source: http://www.cheetahmarine.co.uk/)	34
Figure 19: Survey Catamaran 1706 “LIDA” (source: BN1537 Hardinxveld.pdf)	36
Figure 20: Survey Catamaran 1706 “LIDA” (source: prod blad STe 1504.pdf)	38
Figure 21: STAN TENDER® 1505 (source: STe 1505.pdf)	40
Figure 22: STAN TENDER® 1504 “H 01” (source: www.damenshipyardshardinxveld.nl)	43
Figure 23: TRIDENT 720 CT (source: FAIRway market study Trident 720 CT boat-HU.pdf)	44
Figure 24: MZB 750 Cabin (source: Messboote.pdf)	46
Figure 25: MS Boat – C690 Cabin (source: http://msboat.com/)	48
Figure 26: SONARMITE v4.0 MTX (source: http://www.ohmex.com/)	50
Figure 27: ECHOTRAC CV100 (source: odomhydrographic.com)	52
Figure 28: MIDAS Surveyor v2A (source: http://www.valeport.co.uk/)	54
Figure 29: ATLAS DESO 350 M (source: http://www.atlas-elektronik.com/)	56
Figure 30: T141 (Dual Frequency and Dual Beam) (source: http://www.neptune-sonar.co.uk/)	58
Figure 31: 340 Series (Dual Frequency) (source: http://www.neptune-sonar.co.uk/)	60
Figure 32: EA 440 Echosounder (source: http://www.km.kongsberg.com/)	61
Figure 33: EM 2040 Multibeam Echosounder (source: http://www.km.kongsberg.com/)	64
Figure 34: SeaBat T20-P (source: http://www.tv.reson.com)	67
Figure 35: GeoSwath Plus Compact (source: www.km.kongsberg.com)	69
Figure 36: ATLAS FANSWEEP 20 (source: www.atlashydro.com)	71
Figure 37: IMAGENEX DT101 MULTIBEAM (source: http://www.imagenex.com/)	73
Figure 38: SeaBeam 1180 / 1185 (source: http://www.elac-nautik.de/)	74
Figure 39: SONIC 2020 (source: http://www.r2sonic.com/)	76
Figure 40: SEABED PS-120006-5 (source: http://web.norbit.no/)	78
Figure 41: SEABED PS-140001-3 (source: http://web.norbit.no/)	80
Figure 42: MB1 (source: odomhydrographic.com)	82
Figure 43: PS-120005-12 (source: http://web.norbit.no/)	84
Figure 44: PS-120006-9 (source: http://web.norbit.no/)	86
Figure 45: MB2 (source: odomhydrographic.com)	88
Figure 46: HYDROCHART 3500 (source: http://www.l-3mps.com/)	90
Figure 47: 6205: Combined Bathymetry & Side Scan Sonar (source: http://www.edgetech.com/)	91
Figure 48: RiverSurveyor S5 and M9 (source: www.sontek.com)	94
Figure 49: RiverRay ADCP (source: http://www.teledyne-reson.com/)	96
Figure 50: StreamPro ADCP (source: http://www.teledyne-reson.com/)	98
Figure 51: EDGETECH – 3200 (source: : http://www.edgetech.com/)	100
Figure 52: ECHOES 10000 (source: https://www.ixblue.com)	102
Figure 53: GeoPulse Sub Bottom Profiler (source: www.km.kongsberg.com)	104
Figure 54: BOKU Sediment sampler (source: BfG Koblenz)	105
Figure 55: HYDRO-BIOS – 437 332 Bottom Sampler (source: http://www.hydrobios.de)	107
Figure 56: D401 SMARTGUARD (source: http://www.aanderaa.com/)	109

Figure 57: Sitrans P MPS Transmitter (source: http://www.siemens.com/entry/cc/en/)	111
Figure 58: CS451 Pressure Transducer (source: www.campbellsci.co.uk).....	113
Figure 59: OTT CBS - Compact Bubbler Sensor (source: http://www.ott.com/)	116
Figure 60: DJI – PHANTOM 3 (source: http://www.dji.com/)	118
Figure 61: DJI – Inspire Pro 1 (source: http://www.dji.com/)	120
Figure 62: SuperHero GEO X4/X8 RTF (source: http://onedrone.com)	122
Figure 63: eXom (source: https://www.sensefly.com)	124
Figure 64: ZX5 (source: http://uas.trimble.com/)	126
Figure 65: UX5 (source: http://uas.trimble.com/).....	129
Figure 66: Tungsten AIS Aid to Navigation (source: http://www.srt-marine.com/)	131
Figure 67: Carbon AIS Aid to Navigation (source: http://www.hydrosphere.co.uk)	133
Figure 68: AtoN Express Aid to Navigation (source: http://www.srt-marine.com/).....	135
Figure 69: V-Track™ V10 Informer™ (source: http://www.tidelandsignal.com/)	136
Figure 70: Mando 301/303 (source: http://www.alltekmarine.com/).....	139