



Satlab Marine And Water Resources



www.satlab.com.se



info@satlab.com.se



Järnbrotts Prästväg 2 SE-42147 - Västra Frölunda
Gothenburg, Sweden

PREFACE

The boundless ocean has surging power and profound beauty, we revere her, and we explore her. Light can only penetrate a few meters underwater, while sound waves propagate at a speed like 1500m/s in the water to unveil the water covering the earth for people. Over a hundred's years ago, people of wisdom invented sonar to emit sound waves. After a century of development, sonar technology has become more sophisticated and our exploration of water is growing rapidly!

We may not fully understand the ocean yet, but we see the widest range of real needs in marine and water resources. Large numbers of rivers and lakes face improper management, navigation between countries requires more and better ports and routes, and a large number of offshore projects such as windmills and fossil fuel energy system are waiting to be built.

To meet the challenges of water, we have launched the SatLab marine series products to make our contribution to the firm footings towards the water.

SATLAB MARINE SERIES PRODUCTS

CONTENTS

● Njord



» High Precision Position and Heading Receiver 02

● ES-224



» Dual-frequency Echo Sounder 04

● HydroScan



» The Dual-frequency Side Scan Sonar Systems 06

● HydroFlow



» River Discharge Measurement System 08

● HydroBoat-990



» USV Bathymetry Solution of Efficiency and Durability 10

About GNSS Receiver

GNSS Receivers are the core product for satellite positioning. They convert signals from visible satellites into a position on earth. The amount of visible satellites is dependent on the number of constellations the receiver is compatible with, such as GPS, GLONASS, GALILEO, and BDS.

The Njord is a SatLab next-generation multi-GNSS, multi-frequency, position and heading receiver designed specifically for marine and construction applications with the capability of L-Band correction and multiple I/O interfaces for versatile data communication.

How to Implement Heading?

The Njord receiver is connected to two GNSS antennas for positioning and heading. The farther the distance between the two GNSS antennas, the higher the accuracy of the heading. The accuracy will not be improved all the time due to the increase in the distance; the maximum distance can be controlled at 10 meters. The satellite signals received by the primary antenna and the secondary antenna are slightly different. The primary antenna is mainly used for positioning, while the secondary antenna assists the primary antenna to provide heading information together.

Applications

- Marine Engineering Measurement
- Navigation and Positioning
- Displacement Monitoring of Operating Platforms
- Tide Level Monitoring



Features

- 1408-Channel Signal Tracking; GPS L1/L2/L5, GLONASS L1/L2, BDS B1/B2/B3, Galileo E1/E5 and L-Band Capability
- Convenient Front Panel Display and Configuration
- Multiple I/O Ports for Different Signals and Purposes Including NMEA-0183 and PPS
- Radio, Cellular Internet, Cables, and Other Kinds of Communication
- Benchmark PPP Service Provides Centimeter-Level Positioning at Sea.



Specifications

System	CPU & OS	Cortex-A8, AM3358, Linux
	Storage	8 GB Internal Storage, Support External SD Card
	Channel	1408
	Signal Tracking	BDS: B1/B2/B3 GPS: L1/L2/L5 GLONASS: L1/L2 GALILEO: E1/E5 QZSS: L1/L2/L5 Support L-Band
	RTK Accuracy	H:± 8 mm + 1 ppm V:± 15 mm + 1 ppm
	Static Accuracy	H:± 2.5 mm + 0.5 ppm V:± 5 mm + 0.5 ppm
	Autonomous	H:±1.5m (RMS) V: ± 3 m (RMS)
	SBAS	H:±0.5 m (RMS) V: ± 0.85 m (RMS)
	PPP	H:±5 cm (RMS) V: ± 10 cm (RMS)
	Heading Accuracy	0.05° @ 4.0 m Antenna Separation
GNSS Performance	Positioning Rate	20 Hz Max
	Message Type	RTCM2.x, RTCM3.x
	Operation Frequencies	LTE:900/1800/1900/2100/2300/2500/2600 MHz WCDMA:850/900/1900/2100 MHz; GSM:900/1800 MHz
	Protocols	TRIMTALK450S, TRIMMARK III, TRANSEOT, SOUTH
Internal Cellular	Frequency	410-470 MHz, -116 dBm
	Channels Power	116, Editable from 100 to 115 2 W, 1 W, 0.5 W
	Bluetooth	2.4 GHz, 4.0/2.1+EDR
Radio UHF	WIFI	2.4 GHz, 802.11 b/g/n
	Display	1.3 inch LED Display, 128*64
	Buttons	Power and FN (Function)
	Indicators	LED for Satellites, Data, and Power
Interface	Web UI	LAN IP: 192.168.20.1

ES-224

Dual-Frequency SBES

About Echo Sounder

For many small waters and shallow waters, the single beam echo sounder (SBES) survey method is still the best choice. From fish finders to bathymetric instruments, SBES uses the simplest principle - by calculating the sounder velocity and the interval between pings and echoes to get the depth of water, the simplest installation method, the most affordable price, and occupies a place in the hydrographic survey.

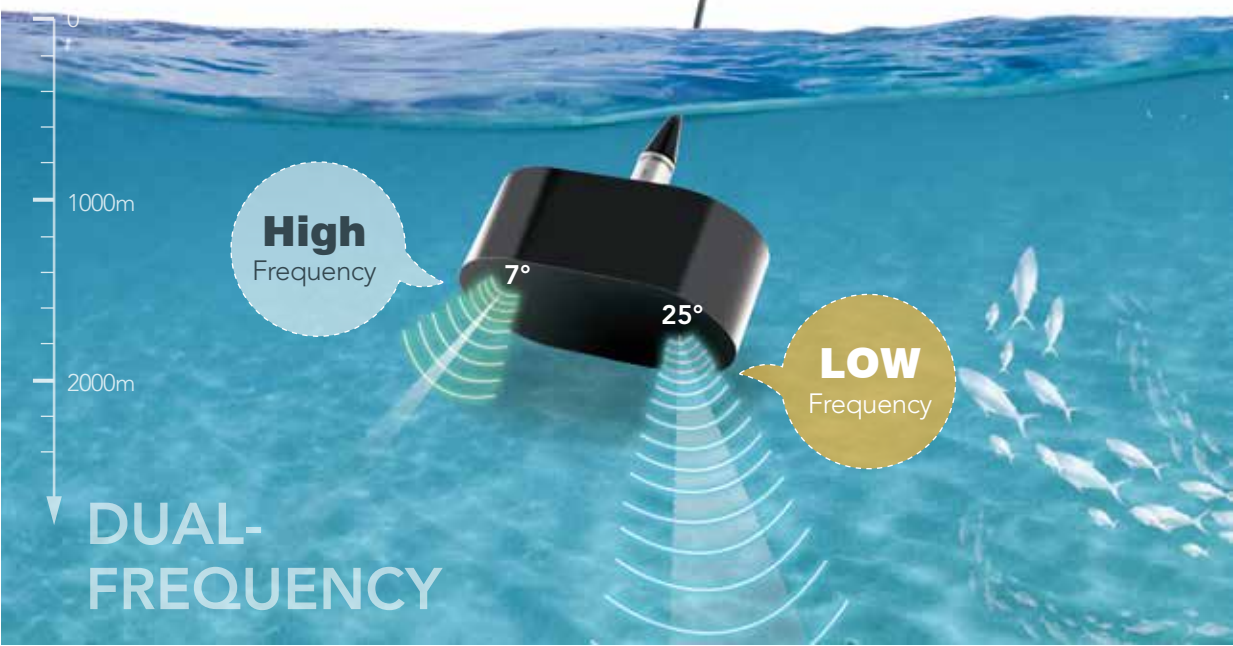
Why Dual-frequency?

SBES has a single frequency and dual frequency. Most echo sounders have a high frequency of about 200kHz with a small beam angle and high accuracy to meet the water area between 100 and 200 meters. The ES-224 is equipped with a larger 24kHz&200kHz dual-frequency transducer. The 20kHz low-frequency signal is more penetrating and can penetrate further through the sediment and detect a harder bottom surface, with a maximum depth of up to 2000 meters.

The ES-224 transmits both high-frequency and low-frequency signals to meet all inland river and lake bathymetry as well as marine measurements up to 2000 meters.

Applications

- Tracking of the Seabed
- Turbid Water with High Sand Content
- Sediment Measurement for Dredging
- Measurement at High Speed



Features

- Dual-frequency
- Rugged Industrial Platform
- Windows OS
- Multiple I/O Interfaces
- 17-inch Large Tempered Glass Screen
- CE and EN 60945 Certification
- The Full-featured SLHydro Sounder Software
- Frequency Span Available for Special Projects
- 128 GB Internal Data Storage



Specifications

Frequency	High: 200kHz	Low: 24kHz
Maximum Transmitting Power	400W@200kHz	1200W@24kHz
Depth Range	0.15~300m/1.0~900 ft.@200kHz 0.8~2000m/2.4~6000 ft.@24kHz	
Depth Range	0.01m/0.10 ft @200kHz 0.10m/0.30 ft @24kHz	
Ping Rate	Maximum 30Hz	
Storage	128GB SSD	
Interfaces	RS-232*3, USB*4, Power Port*1, Transducer Port*1, VGA*1	
Operating Temperature	-20℃ ~70℃	
Weight	9.5 kg(20lbs)	

SatLab Software



SLHydro Sounder

SLHydro Sounder bathymetry software. The software supports access to GNSS receivers, bathymetry and auxiliary equipment for survey work. Main functions of the software: project management, boat design, plan line design, CAD and sea chart import, bathymetry, data sampling and correction, result preview and export.

About Side Scan Sonar

Side scan sonar also referred to as side-looking sonar and side-imaging sonar is a type of sonar system that is usually towed aft of a survey vessel and emits sonar pulses to the water bottom. Side scan sonar is used to effectively create images of large areas under the water. The sound frequencies used in side scan sonar usually range from 100 to 500 kHz; higher frequencies yield better resolution but less range. Side-scan image interpretation is also a necessary skill when using side-scan.

How Is Interpretation Done?

As with all acoustic sonar, the side scan sonar only measures the echoes of objects that reflect sound to the side scan sonar transducer. Therefore, the side scan image is highlighted when the surface of the rock is at right angles to the sonar, and some smaller targets are completely obscured by the rough seafloor texture. Metals, boulders, and gravels are very effective at reflecting acoustic pulses (high backscatter). Finer sediments, such as clay and silt, on the other hand, do not reflect sound very well (low backscatter). Strong reflectors produce strong echoes, while weak reflectors produce weak echoes. Knowing these properties, you can interpret the composition of the seafloor and any objects that may be lying on it based on the intensity of the echoes on the side scan image.

Applications

- Hydrographic Surveys
 - Search & Rescue & Found
 - Geological Surveying and Mapping
 - Cable Route & Pipeline Surveys
- Channel/Clearance Surveys
 - Water Construction Inspections
 - Environmental Habitat Surveys



Features

- Multiple Frequency Available
- Real-time CW & CHIRP
- Multiple Internal Sensors
- Ultra Small Beam Angle
- Strong and Robust Towfish
- Meets IHO & NOAA Survey Standard

Specifications

			
Model	1400	4900	900P
Frequency	100kHz & 400kHz	400kHz & 900kHz	900kHz
Pulse Width	20~1000μs (CW), 1ms~4ms (LFM)	20~1000μs (CW), 1ms~4ms (LFM)	20~500μs(CW) 0.5ms~2ms(LFM)
Signal Types	CW/LFM	CW/LFM	CW/LFM
Horizontal Beam Angle	0.6°@100kHz, 0.2°@400kHz	0.2°@400kHz, 0.2°@900kHz	0.3°
Vertical Beam Angle	45°	45°	45°
Depression Angle	10°, 15°, 20° Optional	10°, 15°, 20° Optional	15°
Along Track Resolution	0.01h@100kHz 0.003h@400kHz	0.003h@400kHz 0.003h@900kHz	0.005h@900kHz
Across Track Resolution	1.25cm	1.25cm	1.25cm
Maximum Range	450m@100kHz, 150m@400kHz	150m@400kHz, 75m@900kHz	45m
Work Speed	2-6kn	2-6kn	2-6kn
Depth Rating	1000m	1000m	300m
Dimension	105mm*1300mm	105mm*1170mm	55mm*285mm
Weight	30kg (316#Stainless Steel)	26kg (316#Stainless Steel)	1kg
Power	MAX 40W	MAX 30W	9-18V DC, 15W
Inner Sensor	Attitude, Heading, Pressure, Depth Sensor	Attitude, Heading, Pressure, Depth Sensor	\
Cable	Kevlar Cable, Standard 50m (250m Optional)	Kevlar Cable, Standard 50m (250m optional)	Kevlar Cable, Standard 2m (Optional)
SLHydroSSS	NMEA-0183 Input; OTSS, XTF, Output; Windows		

SatLab
Software



SLHydroSSS

SLHydroSSS, data acquisition software for side scan sonar with simultaneous display of high and low frequency data. Main functions: Real-time underwater imaging, data correction, boat setting.

HydroFlow

Acoustic Doppler Current Profiler

About ADCP

Water flow can be measured in many different ways, such as rotating-element current-meter, float run method, slope-area method, and now we use acoustic Doppler devices to quickly and accurately measure water flow.

Acoustic Doppler devices use sound waves and the Doppler effect to measure velocity fluctuations underwater. The main Doppler techniques used in ADCP are water tracking - measuring the movement of the water relative to the ADCP, and bottom tracking - measuring the movement of the river bottom or seabed relative to the ADCP.

What Platforms Are Needed?

The ADCP is usually fixed underwater or mounted on a survey vessel or USV. ADCPs that are bottom-mounted need an anchor to keep them on the bottom, batteries, and an internal data logger. Vessel-mounted instruments need a vessel with power, a shipboard computer to receive the data, and a GPS navigation system (so the ship's movements can be subtracted from the current data). ADCPs have no external read-out, so the data must be stored and manipulated on a computer. Software programs designed to work with ADCP data are needed. We supply vessel-mounted HydroFlow ADCP and self-developed SLHydroFlow software to get your job done!

Applications

- River Hydrology
- Fisheries Studies
- Irrigation Monitoring
- Flood Warning
- Environmental Impact Studies
- Circulation Studies



Features

- Multiple Built-in Sensors
- Long Profiling Range Multiple Cells
- High Precision Discharge Measurement
- Easy to Use Software



Specifications

Model	HydroFlow 600	HydroFlow 1200
System Frequency	600kHz	1200kHz
Transducer Type	Piston	
Beam	4 Beams Janus, 20°	5 Beams Janus, 20°
Profiling Range (Distance)	0.4~80m	0.15~35m
Depth Range	0.7~120m	0.15~50m
Velocity Range	±5m/s typical, ±20m/s maximum	
Accuracy	+ 0.25%±0.2cm/s	
Resolution	1 mm/s	
Cell Size	0.25~4m	0.06~2m
Quantity	1~260	
Internal Sensors Temperature: Range/Accuracy/Resolution	-10℃ ~ +60℃ / ±0.1℃ / 0.001℃	
Compass: Range/Accuracy/Resolution	0°~360° / ±0.5° / 0.001°	
Motion Sensor: Range/Accuracy/Resolution	±30° / ±0.2° / 0.001°	
Communication Protocol	RS-232, RS-422, WIFI	
Power Input	9~18VDC (standard 12V)	
Power Consumption	3.5W (average), 0.5W (sleep), 30W (peak)	
Working Temperature	-5℃~+45℃	
Storage Temperature	-20℃~+60℃	
Float Configuration	Three Hulls (trimaran)	
Material	Polyethylene	

SatLab Software



SLHydroFlow

SLHydroFlow, data acquisition and post-processing software for ADCP. Main functions of the software: instrument parameter setting, data acquisition setting, measurement plot display, post-processing and other functions.

About USV

USVs (Unmanned Surface Vehicles) are widely used in hydrographic surveys, environmental monitoring, and water search and rescue. The most used and developed field of USV is hydrographic surveying. Hydrographic surveys face many uncharted waters, often require long navigation times, and have high demands on accuracy. These have higher demands on the quality of surveyors and challenge the safety and health of surveyors.

The hydrographic survey USV combines various complex systems to give the user the simplest mode of operation. With advanced hull design, USV combines the GNSS system, bathymetry system, communication system, autonomous navigation system, HydroBoat-990 ensures both efficient surveys and safe navigation.

USV UNMANNED SURFACE VEHICLES



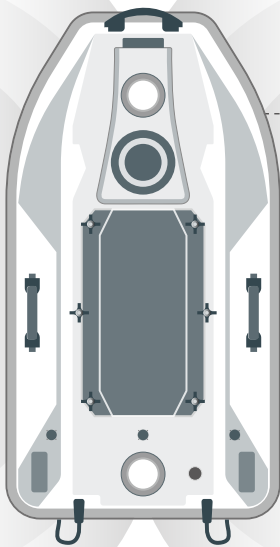
200m

HydroBoat-990 USV

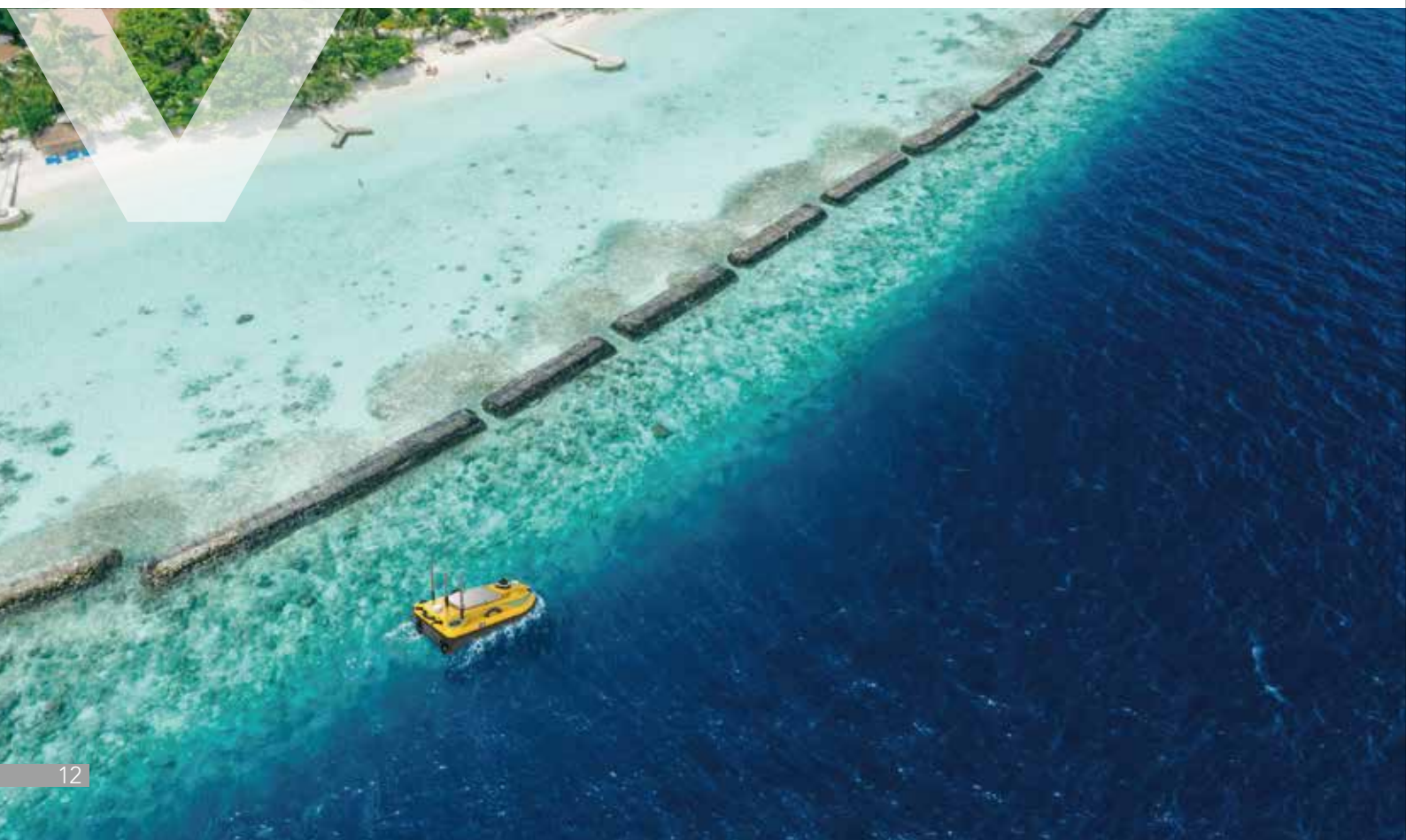
USV Bathymetry Solution of Efficiency and Durability

HydroBoat-990 Solution

Solution of efficiency and durability



- 1 Advanced pilot system for auto and manual mode, safeguarded by radar avoidance and hovering system. Stable hull design for standing waves, IP67 wind-resistant, and rugged body with collision durability.
- 2 One key setup with just a powerful controller, and the auto-connection makes it a direct-to-go system with a 2km operation range.
- 3 Advanced Android app for hydrography and pilot control, making the task easier to be done on the smart controller.



System Safety/Durability

- Double Hull
- Avoid Collision with Obstacles
- Automatic reversing in the shallows
- Anti-collision and wear-resisting
- IP65
- Verified and Certified by CE
- Battery Management System
- Satellite and Communication Light
- Video Patrol



Usability

- Time-saving Turn on and Survey
- Communicate without Base Station
- Operate in One App Only
- Integrate with GNSS and SBES
- Stable Hovering



Data Reliability

- Professional Android Bathymetric Software
- High Precision Positioning
- High Precision Echo Sounder
- IHO Standard

Specifications

Physical	Hull Dimension	998mm X 450mm
	Material	Carbon Fiber
	Anti-wave & Wind	3rd Wind Level and 2nd Wave Level
	Indicator Light	Two-color Light
	Video	360° Omnidirectional Video
	Power	40Ah /29.6V, 4 Hours @ 2 m/s
	Anti-collision Sensor	Detection Distance 20 Meters
	Auto-return	Auto-return While Low Battery or Signal Loss
Communication	Data Communication	Standard: Network Bridge for 2 km, RF Point to Point in Real-time Optional: No Distance Limit
	Navigation Mode	Manual or Auto-Pilot
	Data Formats	RTCM3.x, CMR, RINEX 3.02, NMEA-0183, NTRIP Client, NTRIP Caster
Controller	System	Android
	Software	SLHydro Sounder for Android Version
	Display	Real-time Video Display and Echogram Display
Positioning	Satellite System	BDS B1/B2, GPS L1/L2, GLONASS L1/L2, Galileo E1/E5, SBAS, QZSS
	Channel	336
	SBAS Positioning	Horizontal: 0.5 m
	Accuracy	Vertical: 0.85 m
	RTK Positioning	Horizontal: ±8 mm + 1 ppm
	Accuracy	Vertical: ±15 mm + 1 ppm
SBES	Heading Accuracy	0.2° @1 m Baseline
	Sounding Range	0.15 m to 200 m
	Sounding Accuracy	±0.01 m + 0.1% x D (D is the Depth of Water)
	Frequency	200 kHz