

SeaBeam 3050

Mapping the Continental Slope



50 kHz | 3,000 m Depth Performance | 3,500 m Swath Coverage | Multi-Ping Mode | WCI







SeaBeam 3050 Medium Depth Multibeam System

The SeaBeam 3050 multibeam echo sounder collects bathymetric, corrected backscatter, sidescan and Water Column Imaging (WCI) data in medium depth over a wide swath in excess of 140 degrees, meeting all relevant survey standards. Due to its depth performance in combination with wide coverage, SeaBeam 3050 is the ideal hydrographic sensor for mapping the continental slope.

Multi-Ping Technique

A big advantage of the SeaBeam 3050 is the new multiping technique. The system compensates fully for vessel roll, pitch and yaw motion and transmits and processes two swaths in one ping. Bathymetric depth information, amplitude (backscatter) data, WCI data and side scan imagery are acquired by the system in real-time.

The new multi-ping technique allows a higher maximum survey speed without losing 100% bottom coverage by creating two swaths per ping cycle, which is important especially for narrow along-ship beam widths.

For 1° along-ship resolution and 140° swath width SeaBeam 3050 allows for a survey speed of more than 14 knots. On the other hand, at the same survey speed a bottom segment is ensonified two times more often than using a single-ping mode.

The result is a higher data density at the same survey speed. This increases the target detection and classification abilities. A high data density is advantageous for

Key Features

Up to 3,000 m Depth Performance

Up to 3,500 m Bottom Coverage

Multi-Ping Mode

Real-time Water Column Imaging (WCI)

Mobile Version for up to 1.5° x 2° Beam Width

optional: Transducers adapted to Specific Ship's Hull post-processing with modern processing methodologies like CUBE and enhances the quality of the final products.

Performance

The system operates in the 50 kHz frequency band in water depths ranging from 3 m below the transducers to approx. 3,000 m. SeaBeam 3050 can be utilized at survey speeds of up to 14 knots. It has an across-ship swath width of up to 140 degrees. A maximum of 630 beams is provided for each multiping. The depth accuracy of the sonar sensor exceeds the IHO requirements.

Transmission Technique

SeaBeam 3050 uses a transmission technique, which compensates fully for vessel pitch and yaw motion. This is achieved by splitting the transmit fan in several sectors which can be steered individually. This technique achieves full motion compensation and guarantees a stable straight coverage under the vessel.



SeaBeam 3050 multibeam system



System Overview Compact Design for Easy Integration

Transducer Array

The projector array and the hydrophone array are arranged in a mills-cross configuration. Preamplifiers are built in the hydrophone array. The projector array as well as the hydrophone array is split in multiple modules (projector module LSE 330 and hydrophone module KE 15).



Fix and mobile installation

This allows the customization of the required along-ship and across-ship beam widths. The standard installation of the transducer array is flush with the ship hull. A blister or a gondola installation is also possible. For mobile applications of up to $1.5^{\circ} \times 2^{\circ}$ resolution a transducer bracket for pole installation is available.

Transceiver Unit SEE 37

The transceiver unit contains the transmitter and receiver electronics. It consists of the transmitter amplifiers, the transmit beam former and the sonar controller board, which provides the interfaces to the other units and mainly handles all control tasks within the transceiver unit.

Furthermore, the transceiver unit contains the necessary elements for signal conditioning and sonar processing. This includes the Digital Down Conversion (DDC) and the receive beam former as well as information processing like the bottom depth finder, sound velocity correction and alignment correction.

In order to minimize the big data volumes, which are acquired during high-resolution Water Column Imaging (WCI) without information loss related to the wanted signal, specific algorithms and software components are implemented.

Operator Station

The operation station (and also the optional WCI workstation) is typically a high-end marine COTS PC or laptop, which is currently available on the market and which is running under Microsoft Windows. The operator station provides the human machine interface (HMI) to the operator. It shows the various depths, backscatter amplitudes, side scan data, position and other relevant information. Furthermore, it offers the operator the possibility to make appropriate settings for SeaBeam 3050.

The standard sonar HMI application for control and data acquisition is HydroStar ONLINE. The system also supports third party data acquisition software solutions like HYPACK, EIVA, QINSy and Triton.

Water Column Imaging (WCI) Workstation

SeaBeam 3050 is WCI ready, no extra installation is needed. The HydroStar WCI Viewer is a tool for online and offline visualization of high-resolution WCI or stave-oriented raw data. The data formats are open to the public. The HydroStar WCI Viewer software package is adapted to scientific and operational requirements concerning Water Column Imaging.

Gas Bubble Detection

Submarine gas hydrates are of major importance concerning climate change and energy supply. An important basis for gas hydrate exploration is the ability to detect gas bubbles in the water column online and offline. This ability requires the storage and visualization of high-resolution Water Column Image (WCI) data during surveying.

This technical challenge has been addressed by the German lighthouse research project SUGAR (Submarine Gas Hydrate Reservoirs), in which L-3 ELAC Nautik participates as an important industrial partner.





Specifications and Technical Data SeaBeam 3050 at a Glance

Technical Data		Interfaces	Interfaces		
Operating frequency	50 kHz band	Power	115 V/60 Hz or 230 V/50 Hz		
Along track beam width	1°/1.5° or 3°	Mation	single phase		
Across track beam width	1° or 2°	Wouldn	RS232/RS422 or Ethernet		
Pulse length	0.15 ms - 10 ms (0.15 ms only available in single-ping mode)	Position	RS232/RS422 or Ethernet RS232/RS422 or Ethernet		
Pulse length modes	Manual and automatic	Surface sound velocity	RS232/RS422		
Operation modes	Single-ping and multi-ping mode	Sound velocity profile RS232/RS422 or Ethernet			
max. ping rate	50 swaths per second				
max. number of soundings	630 (2 x 315)	Stabilization	Stabilization		
Beam spacing	Fouidistance or equiangular	Roll	±10°		
Range resolution	Down to 2 cm	Pitch	±10°		
Donth accuracy (conar concor)	In accordance with IHO SD44	Yaw	±5°		
Depth accuracy (sonal sensor)	special order				
max. swath coverage sector	140°	Reliability 1° x 1°			
max. coverage (approx.)	3,500 m	System MTBF	3,487 h		
min. depth (below transducer)	3 m	System MTBCF	3,849 h		
max. depth (approx.)	3 000 m	Overall MTTR	0.92 h		
max. range sampling rate	20 kHz (= 10 kHz inphase, quadrature phase)				
Physical Specifications *					

	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)		
Hydrophone array* 1°/2°	125/125	380/380	1,581/792	Without frames and cables 50/25		
Projector array* 1°/1.5°/3°	150/150/150	2,284/1,691/1,098	450/450/450	Without frames and cables 66/44/22		
Transmit and receive unit (permanent installation)*	1,052	607	877	160		
Operator station*	177 (4 HE)	483 (19" rack)	505	14		
Mobile transducer bracket (including transducers)	286	1,928	789	< 312 (without cables)		

*Dimensions may change due to special installation requirements. Please ask for dimensional drawings.