

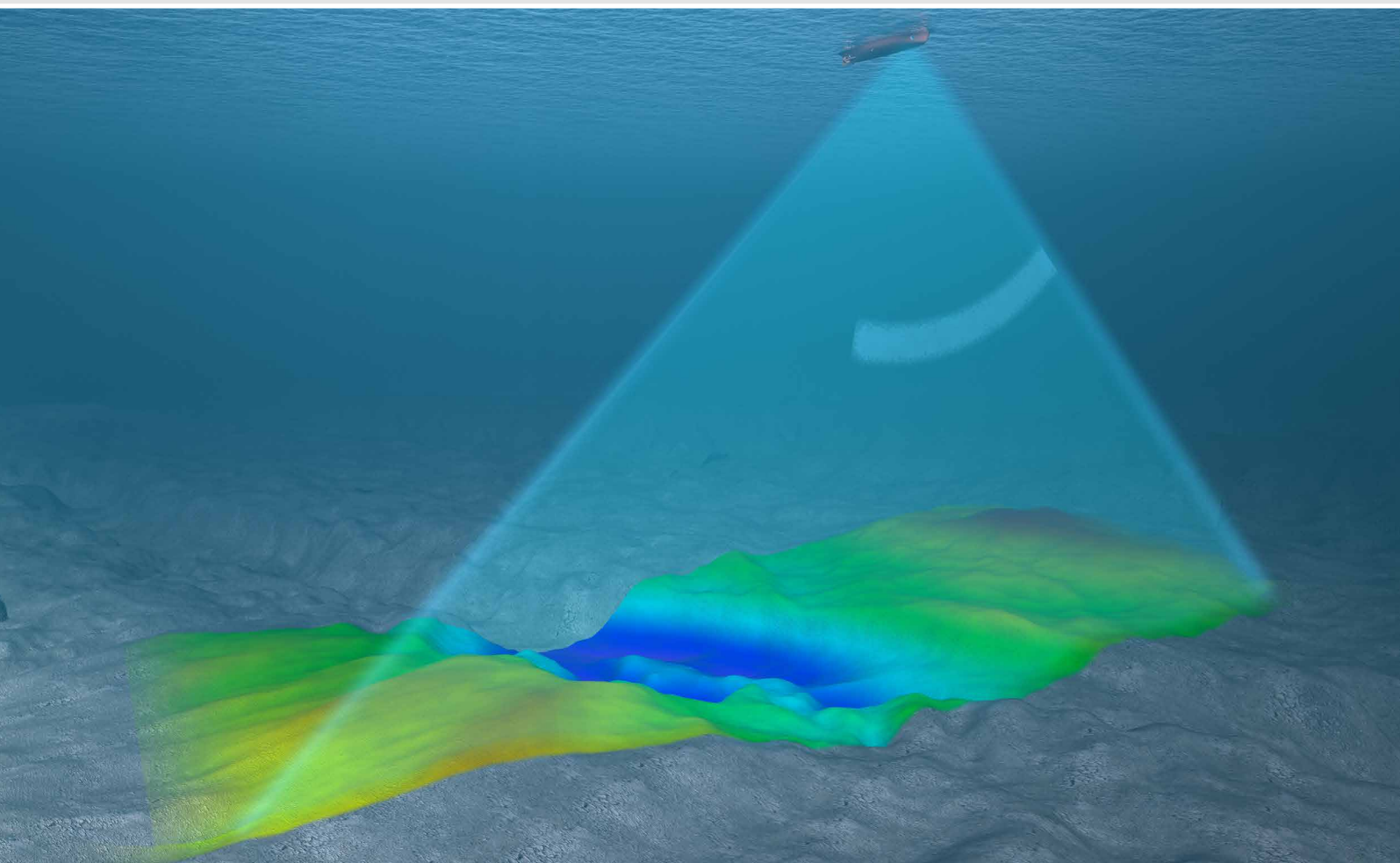
Wärtsilä ELAC SeaBeam 3020

Deep Water Multibeam System



Image: FASSMER

20 kHz | 9,000 m Depth Performance | 10,000 m Swath Coverage | Swept Beam™ | Multi-Ping





Wärtsilä ELAC SeaBeam 3020

Deep Water Multibeam System

ELAC SeaBeam 3020 is the latest generation bathymetric multibeam system from Wärtsilä ELAC Nautik. This advanced system features the patented, revolutionary transmission technique called Swept Beam™, which fully compensates for vessel pitch, roll and yaw motion.

Performance

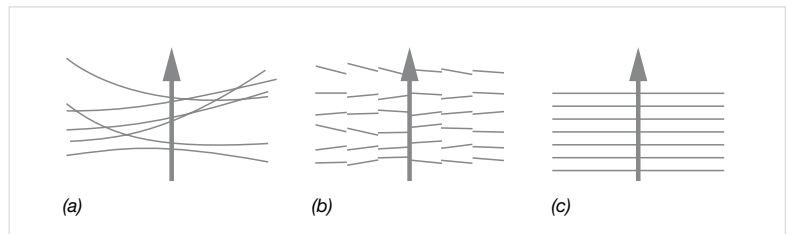
ELAC SeaBeam 3020 is a high-performance deep sea echo sounder, providing excellent bathymetric, bottom backscatter and side scan data due to its innovative sonar processing. At survey speeds of up to 12 knots, the system operates at 20 kHz in water depths ranging from 50 m to 9,000 m.

ELAC SeaBeam 3020 produces bathymetric data that exceed the requirements of the International Hydrographic Organization (IHO) for depths greater than 100 meters.

Swept Beam™ Transmission Technique

ELAC SeaBeam 3020 applies the patented and unique Swept Beam™ transmission technique which fully compensates for roll, pitch and yaw motion of the vessel. For a series of pings, the Swept Beam™ swath footprints are evenly parallel lines without any discontinuities.

In contrast, the sector scan method utilized by competitors produces a couple of hyperbolic curves with overlapping areas in the across-ship direction. At the sector boundaries, discontinuities occur which can lead to data artifacts.



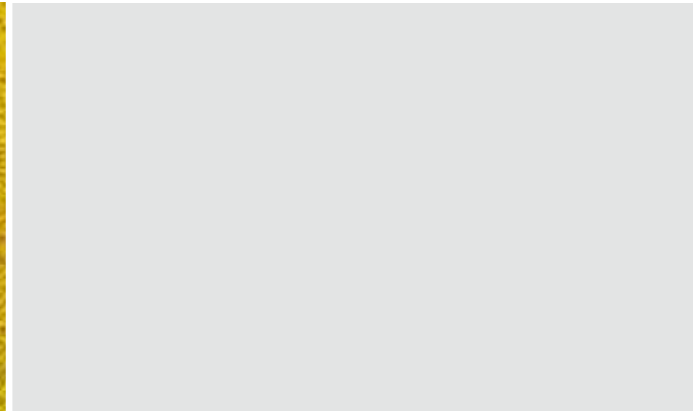
Vessel track without stabilization (a), with sector scan (b) and using Swept Beam™ (c)

Key Features

- Up to 9,000 m Depth Performance**
- Up to 10,000 m Swath Coverage**
- Patented Swept Beam™ Technology**
- Multi-Ping Mode**
- Real-Time Water Column Imaging (WCI)**
- Modular Design for different Beam Widths**



ELAC SeaBeam 3020 multibeam sonar electronics



System Overview

Modular Design for Customized Beam Width Solutions

High-Density Mode

ELAC SeaBeam 3020 has 602 beams in equiangular and multi-ping mode. The swath coverage can be decreased from the maximum down to 60 degrees, leaving the number of reception beams constant. If the coverage is below 60 degrees, the number of beams is decreased.

Transmitter and Receiver Control Units

The transmitter control unit supplies the drive signals to the entire projector array. Each output is separately controlled for power level, phase and frequency. This facilitates programmable shading and steering, as well as transmit beam stabilization using Swept Beam™. The receiver control unit controls the overall ping cycle. It contains the receiver circuits for the hydrophones as well as the signal processor for beamforming, bottom detection and data reduction. The control units are interfaced to the operator station via Ethernet.

Transducer Array

The transducer array includes a projector array and a hydrophone array in a mills cross configuration. The projector array consists of up to 25 identical modules, depending on the along-ship beam width. Typically, the projector array has an along-ship beam width of 1° or 2°. However, also intermediate along-ship beam widths like e.g. 1.5° are possible in order to satisfy specific customer requirements. The projector modules utilize Tonpiz resonators.

The hydrophone array consists of up to 15 identical modules, depending on the across-ship beam width. Typically, the hydrophone array has an across-ship beam width of 1° or 2°. Intermediate across-ship beam widths like e.g. 1.6° are also possible in order to satisfy specific customer requirements.

The hydrophone modules utilize ceramic elements which have broad-band performance to provide excellent phase uniformity across the array and multi-frequency capability.

Operator Station

The operator station, a PC of latest technology, provides a graphical user interface on high resolution TFT monitors for controlling the system using

the Wärtsilä ELAC HydroStar operator software. It communicates with the sonar electronics via Ethernet both for control and reception of sonar data and performs the sound velocity correction, heave compensation, navigation merging and data record construction. A variety of real-time data displays are available for quality control.

Water Column Imaging (WCI) Workstation

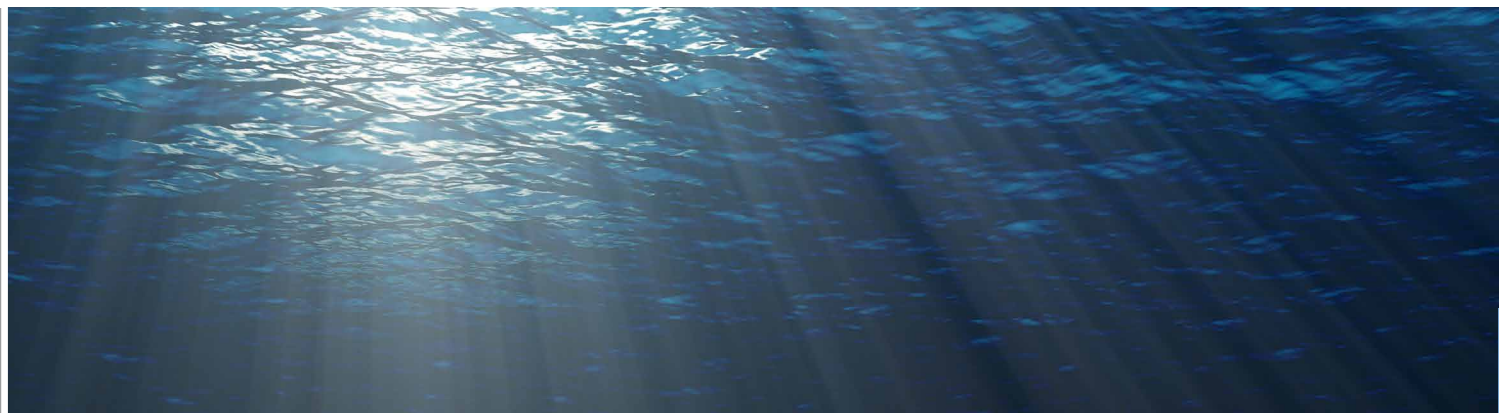
ELAC SeaBeam 3020 is WCI-ready, no extra installation is needed. The Water Column Imaging functionality is utilized via an additional PC workstation that logs WCI data and displays real-time images of backscatter from the water column and sea floor, both below and to the sides of the vessel. The WCI workstation connects to the ELAC SeaBeam 3020 multibeam system via Ethernet, and receives data for each ping from the multibeam.

Bottom Slope Data Interface

ELAC SeaBeam 3020 provides a serial data output of bottom slope data which are based upon the assumption of a plain bottom. These data are calculated via linear regression and are e.g. useful for the automatic steering of a sub-bottom profiler.



Mills cross installation of projector and hydrophone arrays



Specifications and Technical Data

Wärtsilä ELAC SeaBeam 3020 at a Glance

Technical Data		Interfaces	
Operating frequency	20 kHz band	Power	115 V / 60 Hz or 230 V / 50 Hz single-phase
min. depth	50 m below transducers	Motion	RS232/RS422
max. depth	9,000 m	Heading	RS232/RS422
Along-ship beam width	1° or 2° (other beam widths available)	Position	RS232/RS422
Across-ship beam width	1° or 2° (other beam widths available)	Surface sound velocity	RS232/RS422
Pulse length	3 - 20 ms	Sound velocity profile	RS232/RS422
Pulse length modes	Manual and automatic		
max. swath coverage sector	> 140°	Special Output Interfaces	
max. swath coverage	approx. 10,000 m (depending on the ship's own noise and the sea state)	Center depth interface	RS232, ASCII format
Swath coverage modes	Manual and automatic	Bottom slope data interface	RS232, similar to NMEA 0183
Reception beam spacing	Equidistance or equiangular		
max. number of beams	994 (equidistance, multi-ping) 602 (equidiangular, multi-ping)	Stabilization	
Depth accuracy (sonar sensor)	In accordance with IHO for depths greater than 100 meters	Roll	± 10°
		Pitch	± 7°
		Yaw	± 5°

Physical Specifications				
	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
Hydrophone array* 1°/2°	185 / 185	700 / 700	4,739 / 2,648	800** / 400**
Projector array* 1°/2°	266 / 266	4,148 / 2,888	850 / 850	135** / 72**
Hydrophone junction box	726	600	191	42
Projector junction box	395	640	130	20
Receiver control unit	1,949	608	858	370
Transmitter control unit	1,949	608	858	400
Operator station	177 (4 HE)	483 (19" rack)	505	14

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

**without steel and cables