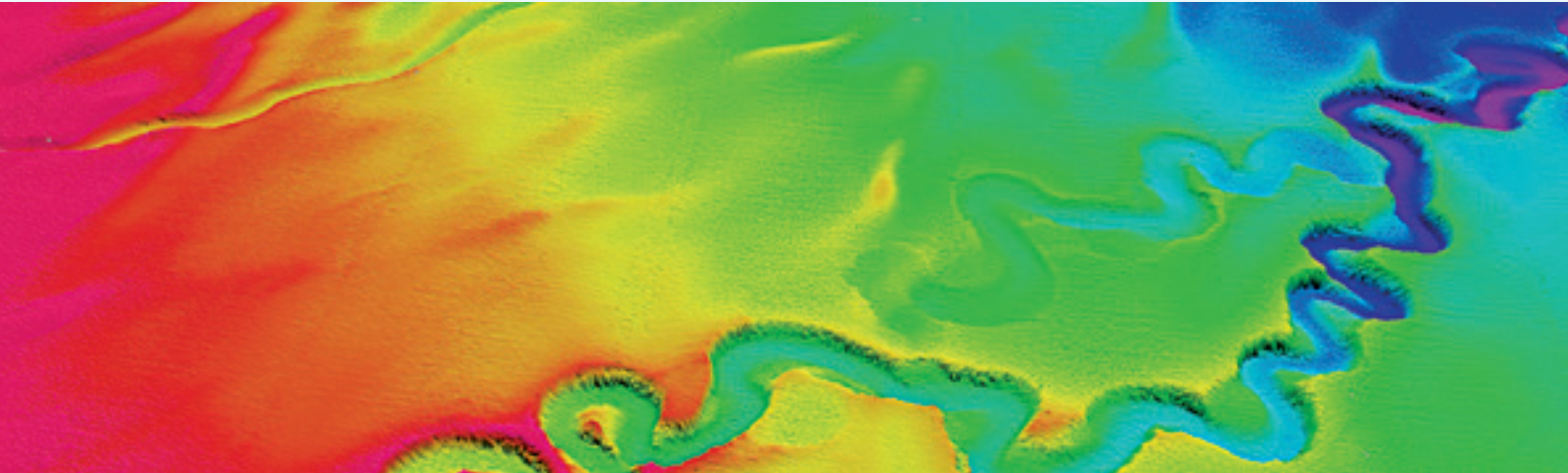


EM[®] 304 MKII



KONGSBERG



20-32 KHZ MULTIBEAM ECHO SOUNDER

The modular, state-of-the-art EM 304 MKII performs accurate, high resolution seabed mapping in shallow waters to full ocean depth. The EM 304 MKII's broad range of functionality supports simultaneous collection of multiple data types, saving time in the planning, execution and analysis phase. A low noise echo sounder, EM 304 MKII delivers superior data requiring minimal post-processing.

Modular and flexible design

The EM 304 MKII consists of new, state-of-the-art electronics and separate transmit and receive transducers in a Mills Cross configuration. It utilizes the same field-proven receive transducer as its predecessor, EM 302, and a new redesigned wide band transmit transducer increasing the depth and coverage. Care has been taken to design a highly modular and flexible solution with compact electronics for easier and faster installation. Due to a flexible transducer design, the system can be tailored to almost any required size. The largest standard size, 0.3 x 0.5 degrees, gives the ultimate system performance in terms of resolution and range, while a smaller 4 x 4 degrees solution can be installed on any vessel of opportunity.

Full seabed coverage

The transmit fan is divided into up to 16 individual sectors in dual swath mode. This allows for unique control of the transmit fan, enabling active stabilization in real time to correct for any yaw and pitch movement of the vessel, while roll stabilization is applied on the receiving beams. The result is a stabilized system for full ensonification of the seabed with equally distributed footprints, even in bad weather conditions, leaving no gaps or holes in the mapped area. All beams are maintained and automatically adjusted according to achievable coverage or operator defined limits. Up to 1600 individual beams are available in dual swath mode where two individual transmitting fans are generated with a small difference in tilt giving a constant sounding

separation alongtrack, resulting in a dense sounding pattern on the seafloor.

Clean, high resolution data

The system fulfils, and even surpasses, IHO S-44 order 1A. Due to the sector transmission technique, the system produces a strong dampening of multi-bounce interference from false echo, resulting in significantly cleaner data. Near-field beam focus is applied in real time, both during transmission and reception. Due to sector transmission the focal point will be individual for each sector, resulting in a much sharper transmit beam over the entire swath. On reception, the focus is applied dynamically for each beam. The result is a much higher resolution representation of the seabed.

The KONGSBERG EM systems

The EM 304 MKII is part of the new EM platform designed for future challenges. The new datagram format supports several new features, such as extended backscatter calibration, with more features and improvements going forward. The new format is supported by KONGSBERG's Kognifai digital open ecosystem.

All KONGSBERG EM multibeam echo sounders ensure the best operating environment to safeguard mammals inhabiting the survey area.

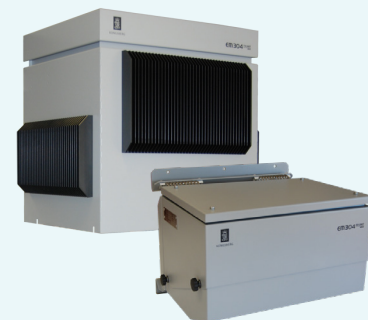
FEATURES

Included Features

- Wide frequency range
- Seabed image
- Water column display and logging
- FM chirp
- Roll, pitch and yaw stabilisation
- Short pulse lengths, large bandwidth
- Transmit and receive nearfield focusing
- Dual Swath
- Mammal Protection

Optional features

- Water column phase logging
- Extra detections



TECHNICAL SPECIFICATIONS

Depth Range	10 metres to Full ocean depth
Operating Frequency	20-32 kHz
Nominal frequency	26 kHz
Swath width	140°
Beam patterns	Equiangular and Equidistant
No. of beams per ping	1600 beams (0.5° and 1° RX), 1024 beams (2° RX), 512 beams (4° RX)
Roll stabilised beams	± 15°
Pitch stabilised beams	± 10°
Yaw stabilised beams	± 10°
Compliant to	IHO S-44 order 1A

Coverage example for EM 304 MKII with bottom type rock (BS = - 20 dB, NL = 45 dB)

Depth	EM 304 MKII 0.5°x0.5°		EM 304 MKII 1°x1°		EM 304 MKII 2°x2°	
	Cold Ocean water	Warm Ocean water	Cold Ocean water	Warm Ocean water	Cold Ocean Water	Warm Ocean water
1400 m	7700 m (5.5x)	7700 m (5.5x)	7700 m (5.5x)	7700 m (5.5x)	7700 m (5.5x)	7700 m (5.5x)
1700 m	9350 m (5.5x)	9350 m (5.5x)	9000 m	9350 m (5.5x)	8000 m	9350 m (5.5x)
3000 m	11100 m	12400 m	9900 m	11100 m	8700 m	9800 m
6000 m	13000 m	14400 m	11200 m	12400 m	9300 m	10500 m
10990 m	10800 m	12600 m	7200 m	9100 m	3500 m	5300 m

KONGSBERG can offer the EM 304 MKII with almost any array length and configuration to match the customer's requirements by combining transmitter and receiver modules so the system fits the vessel, depth range, angular resolution and application.

Examples of some popular EM 304 MKII model versions

Model name	TX Beamwidth	RX Beamwidth	Beams per Ping	Transmitter length	Receiver Length
0.3 x 0.5 degree*	0.3°	0.46°	1600	10.1 metres	6.6 metres
0.5 x 1 degree	0.45°	0.9°	1600	6.8 metres	3.3 metres
0.6 x 1 degree**	0.6°	0.9°	1600	4.9 metres	3.3 metres
1 x 2 degree	0.9°	1.9°	1024	3.4 metres	1.7 metres
2 x 4 degree	1.8°	3.7°	512	1.8 metres	0.9 metres
4 x 4 degree	3.6°	3.7°	512	0.9 metres	0.9 metres

Beamwidth is calculated for nadir sectors in medium depth mode and 1500 m/s sound velocity

* 0.3 x 0.5 degree system is the largest possible system available with two transmitter and receiver units

** 0.6 x 1 degree system is the largest possible system with one transmitter and receiver units

Front page image: Image courtesy of Tomer Ketter, Israel Oceanographic Institute

Kongsberg product: EM 302 Location: Izrael EEZ Depth: 2100m

Specifications subject to change without any further notice.

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