



KONGSBERG

EM[®] 304 MKII Multibeam Echo Sounder

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Full ocean depth 26 kHz

The EM304 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, EM302, and a **new redesigned wide band transmit transducer** increasing the depth and coverage. The system can be tailored to **almost any required size**.

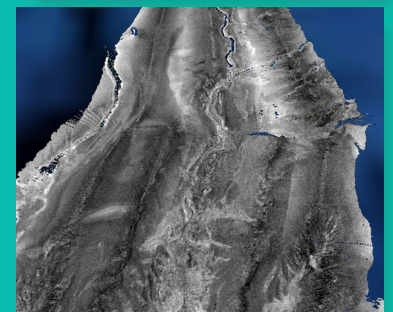
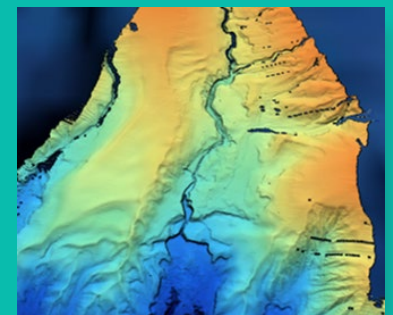
The largest standard size, 0.3 x 0.5 degrees, gives the ultimate system performance in terms of resolution and range, while a smaller 4 x 4 degrees solution can be installed on any vessel of opportunity. The EM304 MKII performs accurate, high resolution seabed mapping in shallow waters to full ocean depth. A low noise echo sounder, EM304 MKII delivers superior data requiring minimal post-processing.

Full seabed coverage

Compared to the EM302, the EM304 MKII has an **increase of 75% swath performance at 6000m**. 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.

Key Features

- Frequency range 20-32 kHz
- Clean and high resolution data
- Modular and flexible design
- Roll, pitch and yaw stabilization in real time
- Transmit and receive nearfield focusing
- Marine mammal protection
- Ice windows available
- Sub Bottom Profiler integration available
- Backscatter calibration service available



Technical Specifications

Common Options*	0.3° x 0.5°	0.5° x 1°	0.6° x 1°	1° x 2°	2° x 4°	4° x 4°
TX Length	10.1 m	6.8 m	4.9 m	3.4 m	1.8 m	0.9 m
RX Length	6.6 m	3.3 m	3.3 m	1.7 m	0.9 m	0.9 m
No. of TX modules	24	16	12	8	4	2
No. of RX modules	16	8	8	4	2	2
Max no. of beams per ping	1600	1600	1600	1024	512	512
TX beamwidth	0.3°	0.45°	0.6°	0.9°	1.8°	3.6°
Rx Beamwidth	0.46°	0.9°	0.9°	1.9°	3.7°	3.7°

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 unit.

Frequency range	20 to 32 kHz	Roll stabilized beams	±15°	Transmitter Unit dimensions (W x H x D) and weight	606 x 898 x 612 mm	70-96 kg
Max ping rate	>5 Hz	Pitch stabilized beams	±10°	Receiver Unit dimensions (W x H x D) and weight	488 x 285 x 240 mm	21 kg
Swath coverage sector	Up to 150°	Yaw stabilized beams	±10°	Beam patterns	High density equidistant and equiangular	

Clean, high resolution data

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.

Ice windows

Acoustic ice protection windows can be offered for vessels going to the ice edge and for ice breakers. TX and RX ice windows are made of polyether urethane, reinforced with titanium rods, available in 70 mm thickness.

Upgrade path

EM302 users can upgrade to the EM304 MKII in two stages. First, the topside electronics can be replaced. Second, the transducer arrays are replaced. This allows operators the flexibility to upgrade the system within both budget and scheduling constraints.



Front top image from NOAA Ocean Exploration. Data images from Ifremer. Left, Kongsberg Discovery custom designed portable gondola in galvanized steel.