

Application Note

Discovering the redefined EM multibeam series



KONGSBERG

If hydrographic surveying is your task, we have the best solutions

Why choosing Kongsberg Maritime multibeam products?

We are the leading manufacturer of multibeam echosounder systems for seabed mapping. No other manufacturer provides a product range that includes models for all water depths and virtually any seabed mapping application. The benefit of our multibeam echo sounders is that they map the seafloor by a fan of narrow acoustic beams, thus providing an actual 100% coverage of the bottom. The resulting seabed maps are more detailed than those obtained with competing multibeam products. The maps/charts are also produced faster, reducing your ship survey time.

Unmatched high accuracy and amazing resulting products

Our multibeam echo sounders are professional tools for precision mapping of the seabed, complying with the performance standards defined by the International Hydrographic Organization's performance standards, S-44 Edition 5. Our instruments are all characterized by high mapping productivity in combination with exceptionally high sounding accuracy, and a dense pattern of soundings to cover the seafloor in order to reveal all details on the bottom. In addition to the soundings, the multibeam echo sounders produce seabed image data similar to a side scan sonar image. This dataset is useful for characterizing the seabed material properties and sometimes for detecting small features not visible in the sounding data.

The End of Data Cleaning (Our multibeams are very clean)

All systems are supported by robust bottom detection algorithms developed over the years that have no match in our business area. We are proud that our systems are recognized by many customers to collect the cleanest multibeam datasets on the globe. Surveying to charting made easy!

The new EM Series in a nutshell

Shallow water surveys

The **EM 2040** Multibeam Echo Sounder is the true wide band high resolution multibeam echo sounder (200 - 400 kHz) with the highest resolution in the market. The first system to bring all the advanced features of deep water multibeams to the near bottom sounding environment, hence it is capable of complete roll, pitch and yaw stabilization, dual swath, FM transmit pulses for deeper water depth ranges, nearfield focusing on both transmit and receive etc.

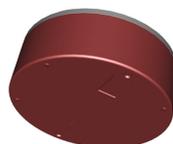
The **EM 2040C (Compact)** is a shallow water multibeam echosounder based on the EM 2040 technology, an ideal tool for any high resolution mapping and inspection applications. The receiver and transmitter are integrated in a common sonar head, with the same dimensions as the former EM 3002 model.

Model	Frequency	Min/Max Depth	Max Swath Width	Available Configuration
EM 2040C (Compact)	200 - 400 kHz	0.5 - 490 m	Single Head: 4.3xDepth/ 525m / 130 degrees Dual Head: 10xDepth/ 625m / 200 degrees	1°x1° Single and Dual head
EM 2040	200 - 400 kHz	0.5 - 600 m	Single RX: 5.5xDepth/ 800m / 140 degrees Dual RX: 10xDepth/ 900m / 200 degrees	0.4°x0.7° 0.7°x0.7° Single and Dual RX array configuration for increased swath. Single and dual swath capability for increased seafloor coverage

EM 2040 TX/RX Array



EM 2040C Single Head



EM 2040C Dual Head



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Mid/Deep water surveys

The **EM 710** multibeam echosounder is a high to very high resolution seabed mapping system capable of meeting all relevant survey standards. The system configuration can be tailored to the user's requirement, allowing for choice of beam widths as well as transmission modes. The minimum survey depth is from less than 3 meters below the transducers, and the maximum depth is approximately 2000 meters, somewhat dependant upon array size. Across track coverage (swath width) is up to 5.5 times water depth, to a maximum survey depth more than 2000 meters. The reduced performance versions EM 710S (shallow) and EM 710RD (reduced depth) are upgradable to full performance (see table below for details).

Model	Frequency	Min/Max Depth	Max Swath Width	Available Configuration
EM 710RD Short CW pulses only, restricted to 600 m water depth.	70 - 100 kHz	3 - 600 m	5.5xDepth / 1100 m / 140 degrees	1°x2°, 2°x2°* *Short CW transmit pulses
EM 710S CW pulses only	70 - 100 kHz	3 - 1000 m	5.5xDepth / 1800 m / 140 degrees	0.5°x1°, 1°x1°, 1°x2° and 2°x2°* *CW transmit pulses
EM 710 Full performance version	70 - 100 kHz	3 - 2000 m	5.5xDepth / 2300 m / 140 degrees	0.5°x1°, 1°x1°, 1°x2° and 2°x2°* *CW and FM transmit pulses

Deep/Very Deep water surveys

Our new **EM 302** Multibeam Echo Sounder is designed to map almost all of the ocean floors excepting the deep trenches with an unsurpassed resolution and accuracy. The system is cost effective, reliable, and easy to operate. It is the better system in comparison to full ocean depth multibeam echo sounders such as the EM 122 when most mapping is done at depths less than 2-3000 m, and on smaller vessels where it would be impracticable to install the transducers of a full ocean depth system.

The **EM 122** is designed to perform seabed mapping to full ocean depth with an unsurpassed resolution, coverage and accuracy. It uses the same transducers as in the EM 120 but with new electronics and software. Compared with the EM 120 the EM 122 has up to four times the resolution in terms of sounding density through inclusion of multiping capability and more than twice the number of detections per swath. In typical ocean depths a sounding spacing of about 50 m across and along is achievable. The achievable swath width of the EM 122 is in the order of 30,000 m, or about 25% more than possible with the EM 120. This is obtained by using long FM chirps which gains about 15 dB in signal to noise ratio compared to CW pulses.

Model	Frequency	Min/Max Depth	Max Swath Width	Available Configuration
EM 302	30 kHz	10 - 7000 m	5.5xDepth / 8 km / 143 degrees	0.5°x1°, 1°x1°, 1°x2°, 2°x2°, 2°x4° & 4°x4°* * Other customer specific configuration available on request
EM 122	12 kHz	20 - 11000 m	6xDepth/ 35 km / 143 degrees	0.5°x1°, 1°x1°, 1°x2°, 2°x2° & 2°x4°* *Other customer specific configuration available on request

EM 710 Transportable Array



EM 302 - Gondola Installation



EM 122 - Gondola Installation



xDepth - Multiple of Water Depth

CW - Continuous Wave pulses FM - Frequency Modulated pulses

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