

# MULTIBEAM ECHO SOUNDER



KONGSBERG

## EM<sup>®</sup> 712

The EM 712 multibeam echo sounder is a high to very high resolution seabed mapping system capable of meeting all relevant survey standards. The minimum acquisition depth is from less than 3 m below its transducers, to a maximum of 3600m dependent upon array size. Across track coverage (swath width) is up to 5.5 times water depth, with a maximum of up to 4400 m.

### FEATURES

- Very high resolution
- Wide frequency range
- FM chirp
- Roll, pitch and yaw stabilisation
- Transmit nearfield focusing
- Receive nearfield focusing
- Seabed image
- Dual swath
- Modular design
- Water column display
- Water column logging
- Extra detections

### Echo sounder models

There are four basic versions of the EM 712 system, with different range performances:

- EM 712 - Full performance version
- EM 712 USV - Full performance for Unmanned Surface Vehicles (USV)
- EM 712S - CW pulse forms only
- EM 712RD - Reduced Depth (600m), no Export License required

### EM 712 USV - reinvented for USVs

A constraint of many USVs is available space, and the EM 712 USV tackles this by introducing a new smart subsea compartment for parts of the system which normally are installed above the waterline. The compartment houses the electronics for both the transmit- and receive antenna and it fits well within the footprint of the transducer arrangement. Space required for the topside is reduced and the solution also significantly reduces the number of cables running from the wet end up to the topside. Based on the customer's requirements, the transducer cables will be customized in length.

### Choice of beamwidths

The transmit and receive beamwidth depends upon the chosen transducer configuration with 0.25°, 0.5°, 1° and 2° transmitter arrays and 0.5°, 1° and 2° receiver arrays available as standard.

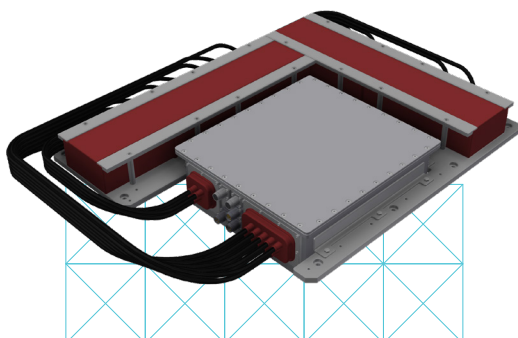
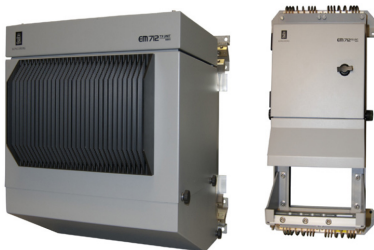
### Innovative acoustic principles

The EM 712 operates at the frequency range of 40 to 100 kHz. The transmit fan is divided into three individual sectors to maximize range capability, but also to suppress interference from multiples of strong bottom echoes. The effect of this is that strong reflectors outside the current TX sector will get twice the sidelobe suppression on TX and RX when compared to sounders with only one wide TX sector.

The sectors are transmitted sequentially within each ping, and uses distinct frequencies or waveforms. EM 712S and EM 712RD both use CW pulses of different lengths. The full performance version, EM 712, supports even longer, compressible waveforms (FM sweep).

### Fully stabilized and focused beams

The system applies beam focusing to both transmit and receive beams in order to obtain the maximum resolution even inside the acoustic near-field of the antenna. During transmission, focusing is applied individually to each transmit sector with a focus point on the range defined by the previous ping, to retain the angular resolution in the near field. Dynamic focusing is applied to all receive beams. Roll, pitch and yaw stabilization is applied in real time.



## Transducers

The active elements of the EM 712 transducers are based upon composite ceramics, a design which has several advantages, in particular increased bandwidth and tighter performance tolerances. Normal transducer mounting is flush with the hull, in a blister or in a gondola. The 1° x 2° and 2° x 2° versions can be mounted on a pole for portable deployment.

## Electronics

The EM 712 electronics system is a true wideband design consisting of Transmitter Unit, Receiver Unit, Processing Unit and Hydrographic Work Station. The transmitter circuits are fully programmable to support any frequency or pulse form. The use of FM sweep as a pulse form allows for more energy per pulse and thus increased range performance, without any sacrifice of range resolution. Filters, correlators and beamformers are fully implemented, and the beam forming method is by time delays, to allow for the wide frequency band of the system.

### TECHNICAL SPECIFICATIONS

Frequency range	40 to 100 kHz	Roll stabilised beams	±15°			
Max ping rate	30 Hz	Pitch stabilised beams	±10°			
Swath coverage sector	Up to 140°	Yaw stabilised beams	±10°			
Beam patterns	Equiangular and equidistant					
	EM 712 0.25° x 0.5°	EM 712 0.5° x 1°	EM 712S 1° x 2°	EM 712 RD		
Max depth	3600 m	3200 m	1800 m	600 m		
Min depth	3 m	3 m	3 m	3 m		
CW transmit pulses	0.2 to 2 ms	0.2 to 2 ms	0.2 to 2 ms	0.2 ms		
FM sweep pulse	Yes	Yes	No	No		
	0.25° x 0.5°	0.5° x 0.5°	0.5° x 1°	1° x 1°	1° x 2°	2° x 2°
EM 712 Max coverage summer	4400 m	4200 m	3950 m	3700 m	3550 m	3350 m
EM 712 Max depth summer	3600 m	3400 m	3200 m	3100 m	2900 m	2800 m

Estimated depth and coverage for EM 712 is based on BS= -20 dB, NL= 35 dB, f = 40 kHz

Transducer choices*	0.25° x 0.5°	0.5° x 0.5°	0.5° x 1°	1° x 1°	1° x 2°	2° x 2°
TX Length**	3880 mm	1940 mm	1940 mm	970 mm	970 mm	490 mm
RX Length**	1940 mm	1940 mm	970 mm	970 mm	490 mm	490 mm
Max no. of beams per ping (Dual swath mode)	1600	1600	800	800	400	400

\* EM 712 RD is only available with the 2° Receiver array configurations.

\*\* All EM 712 transducer Width x Depth is 224mm x 118mm

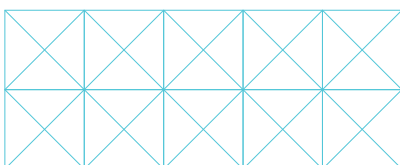
Transmitter Unit dimensions (W x H x D) and weight	600 x 380 x 600 mm	67.5 kg
Receiver Unit dimensions (W x H x D) and weight	250 x 350 x 260 mm	11 kg
EM 712 USV Subsea Transceiver Unit dimensions (W x H x D) and weight	600 x 227 x 650 mm	150 kg

Specifications subject to change without any further notice.

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Front page image courtesy of Shom, France

BHO Beautemps-Beaupré EM 712, 0.5 x 1 Degree System



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