



KONGSBERG



## The Complete Modular and Portable MCM System

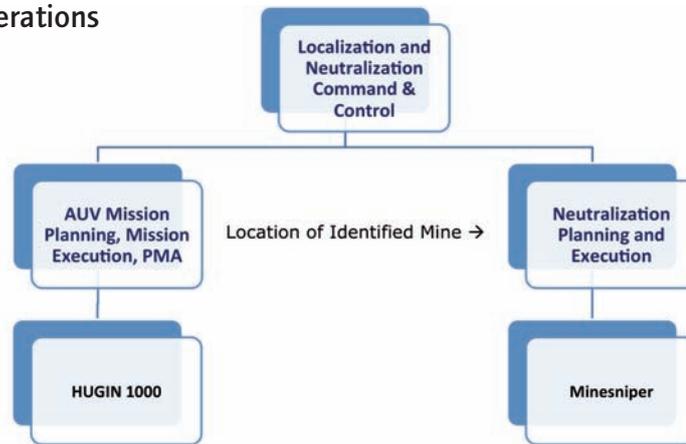
At your service – wherever you are

## SUMMARY

KONGSBERG's modular and portable MCM-system is designed to conduct complete MCM missions from independent platforms. The system consists of the **HUGIN 1000** Autonomous Underwater Vehicle (AUV) as the sensor and the **Minesniper** Mine Identification and Disposal system as the effector. This advanced system covers a wide range of operations like MCM (from detection to destruction), rapid environmental assessment (REA), route survey and high-quality bathymetric mapping.

The modular and portable system is fully containerized into one 20-foot ISO container for storage, maintenance, launch and recovery, and one 10-foot ISO container for mission planning and execution, and post-mission analysis (PMA). Due to the containers small footprint and weight they can be transported by sea, air or land and easily installed onto vessels of opportunity in areas of interest.

## Concept of Operations



## HUGIN 1000 AUV System

KONGSBERG's HUGIN 1000 AUV represents state-of-the-art of available AUV technology. Its many advantages over alternative AUVs are all good reasons why choosing a HUGIN 1000 AUV will give the user an edge. The HUGIN 1000 AUV is rated in steps from 1000 to 4500m, and comprises a tail section for core vehicle systems, modular variable-length mid-sections for batteries and payload sensors, and a nose section which houses a payload electronics pressure vessel and other core vehicle systems.

The HUGIN AUV system is a field-proven tool for the military, providing mine counter-measures (MCM) and rapid environmental assessment (REA) capabilities, and versatile, configurable high-quality data gathering capabilities for marine research. Having been in use by navies and ocean survey and research customers world wide for more than a decade, the HUGIN AUV system has accumulated over 300,000 line km.

The payload system normally include HISAS 1030, EM 2040 or EM 3002, FLS, Camera, Turbidity sensor and ADCP, but can be configured in many different ways depending on operational needs.



*HUGIN 1000 AUV Resting on L&R System (Stinger) Extended from the 20-Foot Container*

The compact 10-foot operations container houses the operator system required for AUV operation and data processing. The Portable AUV System is highly automated, a complete mission including planning, localization, identification and neutralization is controlled by one operator.

AUV operations are run directly from the two ISO containers, with no need to tie into a ship's systems or internal spaces. A KONGSBERG High-Precision Acoustic Positioning (HiPAP) 350 system and a tow-fish transducer for acoustic communication can be included, as well as a KONGSBERG SeaPath system for accurate ship reference position and attitude.



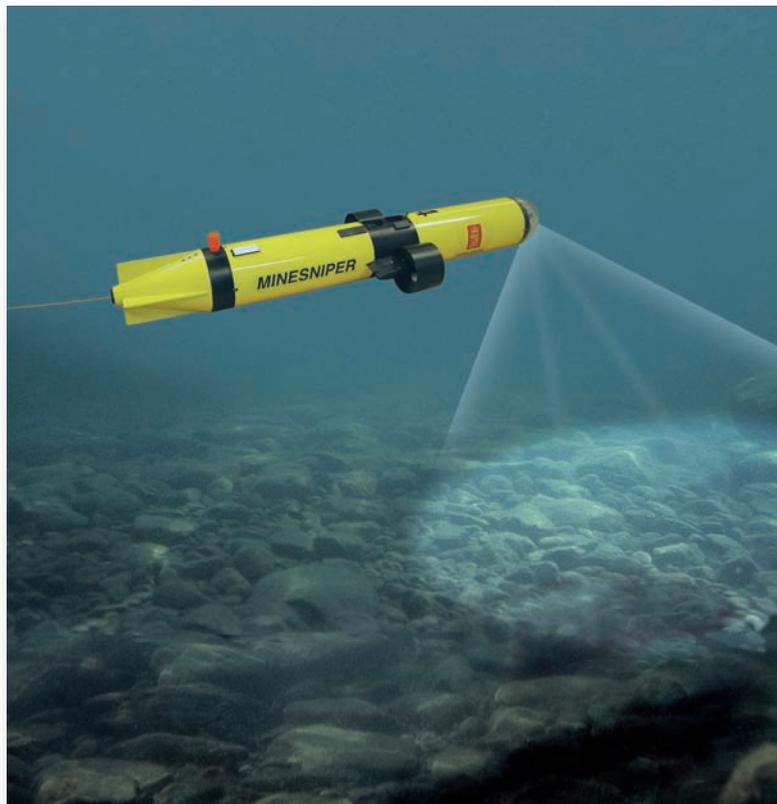
*Inside View of the 10-Foot Operations Container*

### **Minesniper Mine Identification and Mine Disposal System**

KONGSBERG's Minesniper is a lightweight, low cost mine identification and disposal system, utilising an expendable ROV-type weapon for rapid and efficient mine identification and destruction. It is designed to be effective against bottom mines and moored mines in all waters from the shoreline and down to 300m.

The Minesniper is fast and easily launched and can automatically be guided towards the target via the wide band acoustic positioning system (WAP). When close to the target the operator can do the identification through a video camera, and a laser pointer is used to mark an accurate aim-point. The operator can then arm and fire the shaped charge.

The system also includes Inspection and Training vehicles with the same dynamic characteristics as the Minesniper. This gives the operator the possibility to perform training, identification, inspection or surveillance.



*Minesniper in operation*

## HISAS 1030 Payload

KONGSBERG has developed a high-resolution interferometric synthetic aperture sonar called the HISAS 1030. This product represents state-of-the-art SAS technology in the world today, and was developed for the HUGIN 1000 AUV.



*HISAS 1030 Image of Manta Dummy Mine*

As opposed to SSS, SAS resolution is determined by receiver element size, and the range is given by receiver length. By utilizing a coherent combination of sequential pings to synthesise a longer transducer array than would otherwise fit on an AUV, the HISAS 1030 increases along-track resolution by a factor of 10 or more compared to traditional SSS. Due to superior range, the effective area coverage rate (ACR) is increased by a factor of five to 10, yielding up to two square kilometres per hour (the instantaneous ACR is above 2.7 km<sup>2</sup>/hr).

Data products offered by HISAS 1030 include full-swath bathymetry (from interferometry), 3D object rendering and multi-aspect imagery. The HISAS 1030 produces bottom images with a resolution better than 5x5 cm (theoretical maximum resolution is 2x2 cm) at a range of up to 200 m at 4 knots, or 260 m at 3 knots. HISAS 1030 is a COTS KONGSBERG product developed for the HUGIN AUV.

## DATA

	HUGIN 1000	Minesniper
Diameter (m)/Length (m)/Weight (kg)	0.75/4.5/850	0.21/1.65/35
Depth Rating (m)	1000 (w/HISAS 1030)	300
Endurance (hrs)	20 (3 kts)	2
Communication Modes	Acoustic, WiFi, Iridium	Optical Fibre
Weight complete system containers included	13 tons	