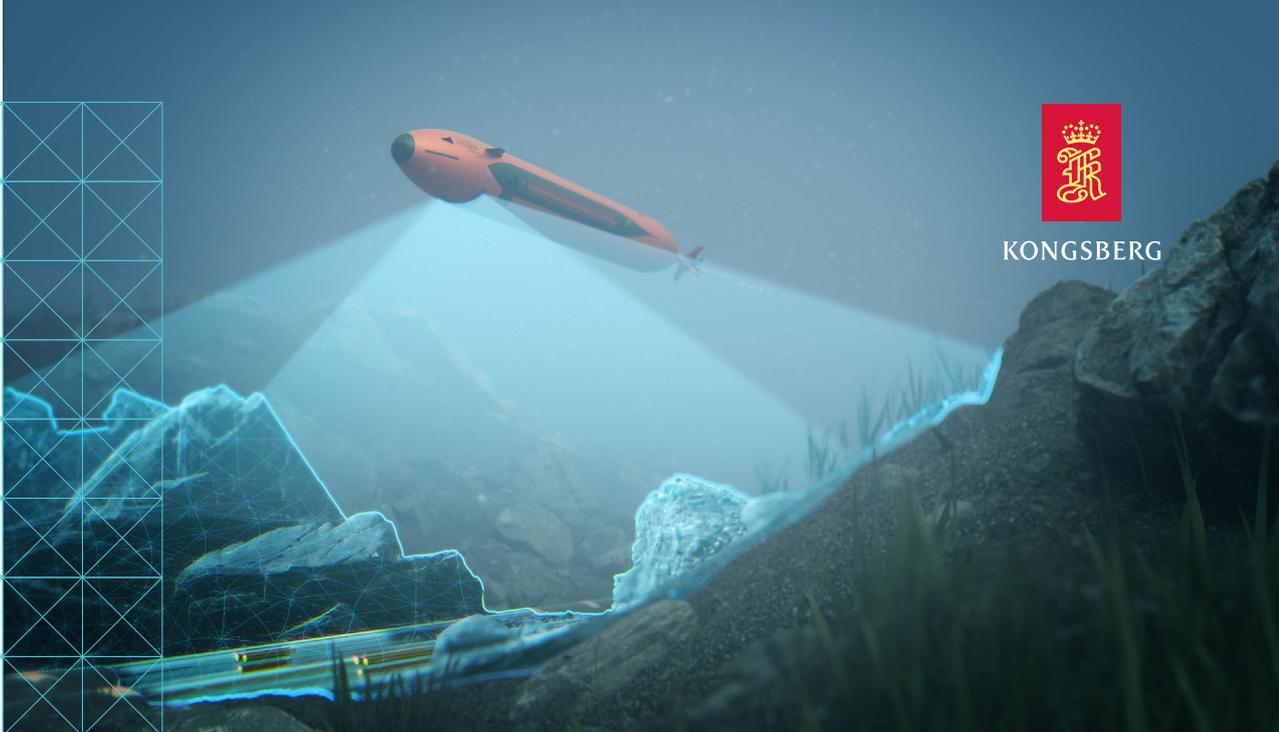




KONGSBERG

# HUGIN® ENDURANCE AUV



## HUGIN® ENDURANCE

HUGIN® Endurance is the newest member of the HUGIN AUV family and enables unsupervised shore-to-shore operations over long ranges.

HUGIN Endurance can be configured with a range of sensors focused on mission capabilities and situational awareness. This includes the proven hydro-acoustic instruments for mapping and inspection purposes, such as the KONGSBERG HISAS family of synthetic aperture sonars and the EM® family of multibeam. Both underwater and surface awareness sensors are used for autonomous decision making.

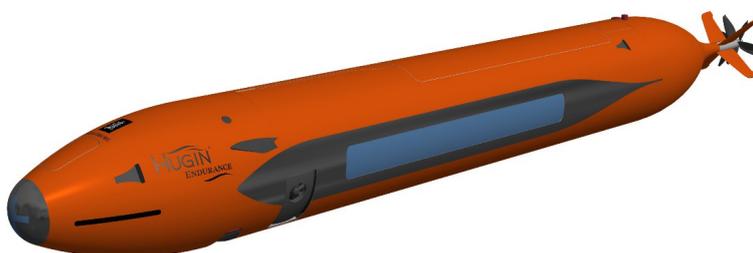
HUGIN Endurance is the largest member of the HUGIN family (Ø1.2 m, 10 m long), yet remains transportable with a standard shipping container. Utilising the latest advances in lithium-ion batteries, mission time has been extended to days and weeks. Combined with KONGSBERG's advanced underwater navigation system Sunstone, HUGIN Endurance collects consistent, high-resolution data without the need for in-mission supervision. This level of autonomy and accuracy reduces the carbon footprint of survey operations by removing the need for a dedicated support vessel. This further mitigates health and safety concerns by relocating personnel onshore and allows the largest potential weather window for any operation.

### PRODUCT EVOLUTION

HUGIN has been continuously evolving since development began in 1991. From the first commercial survey in 1997, KONGSBERG and our partners at the Norwegian Defense Research Establishment (FFI) have been at the forefront of underwater robotic technology. HUGIN Endurance is a new addition to the HUGIN family of AUVs, building on 30 years of experience and providing the most capable commercial offering within the large-diameter AUV segment.

### KEY FEATURES:

- Low carbon footprint
- Uninterrupted shore-to-shore operations; up to 15 days mission duration
- Unsupervised geophysical survey
- 2200 km / 1200 nm mission range
- 1100 km<sup>2</sup> mapped area with combined HISAS and EM bathymetry
- 6000m depth rating
- Sunstone INS with optional Micronavigation aiding for world leading performance
- L&R from shore or ship of opportunity.

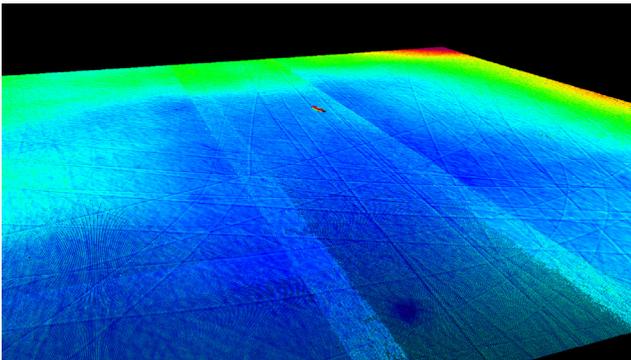


## AUTONOMY AND DATA

HUGIN Endurance is a truly autonomous system, designed to operate for days and weeks without human intervention. Equipped with the latest generation pressure-tolerant Li-Ion battery, sensor redundancy, in-mission processing and Sunstone inertial navigation system with HISAS micronavigation, HUGIN Endurance can collect more consistent, high-quality data than any other commercially available AUV.

The autonomy system controls mission execution, handles unexpected events and failure modes and switches between redundant modes of operation. On the surface, the vehicle uses its Maritime Broadband Radio (MBR), satellite communication system and surface awareness sensors to safely communicate with the remote operating center to report status and receive mission updates.

HUGIN Endurance can be fitted a variety of sensors for different applications. Like the HUGIN Superior vehicle, HUGIN Endurance is also available with the HISAS1032 dual receiver synthetic aperture sonar and a dual receiver EM2040 multi-beam echo sounder. This provides unparalleled seabed mapping efficiency with up to 1000m of continuous bathymetric swath.



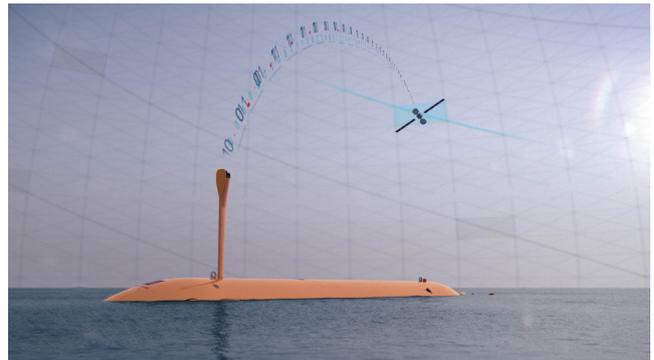
Combined bathymetry swath from EM2040 and HISAS 1032 dual Rx maintains 20cm resolution across a 750m wide swath. Vehicle running at 3.5 knots and 40 m altitude.

HUGIN Endurance can also be fitted with traditional side-scan sonars, sub-bottom profilers, scientific multi-beams and a variety of other active and passive payloads sensors to meet mission requirements.

## CYBER SECURITY AND DATA INTEGRITY

HUGIN Endurance collects vast amounts of data and operate unsupervised for long periods of time. The collected data is stored on redundant media with the possibility to encrypt the data at rest. Secure communication with the remote operating center is handled through the Kognifai infrastructure. This enables remote-control, mission updates and transfer of information from the AUV to the cloud in a secure and reliable fashion. Customers can further integrate with other platforms to support their own data-driven value creation.

HUGIN Endurance enables low carbon shore-to-shore operations for commercial survey. The entire HUGIN family of AUVs provides the opportunity to gather more data, at high resolution and with consistent accuracy and HUGIN Endurance adds to that with the introduction of long range fully autonomous operations.



In-mission data can be transferred via a satellite link or over the KONGSBERG Maritime Broadband Radio (MBR) and then uploaded to the cloud for global distribution and access.

## TECHNICAL HIGHLIGHTS

Endurance	HUGIN Endurance is capable of mission ranges up to 2200 km. This is equivalent to the sailing distance from New York City to Cuba.
Payload capacity	HUGIN Endurance can be fitted with a variety of sensors for different applications, including HISAS1032 dual receiver and EM2040 dual receiver for accurate seabed mapping and inspection. Environmental sensors and 3rd party sensor integrations are also available.
Navigation	HUGIN Endurance comes with the World leading KONGSBERG Sunstone inertial navigation system with HISAS micronavigation, terrain-referenced navigation and single transponder navigation aiding for unsupervised operations.
Surface awareness	HUGIN Endurance uses surface awareness sensors to avoid other marine traffic during communication with the remote operating center.
Remote operations center	HUGIN Endurance supports remote operation through Kognifai. Integration with other data platforms is available.

*Specifications are subject to change without notice.*