FL25 Application Note

KONGSBERG

We've re-imagined our multimode, multibeam technology for navigation on underwater vehicles. The result is Kongsberg Discovery's FL25—an advanced forward-looking sonar.

Developed through collaboration between Kongsberg Discovery Canada and Kongsberg Discovery Uncrewed Platforms, the FL25 was specifically designed for the HUGIN Edge AUV platform and is intended to replace existing multibeam forward-looking sonar systems across the HUGIN AUV fleet. However, it can be deployed on a wide range of autonomous vehicles, such as AUVs and ASVs.

Extensive testing has validated the FL25's performance across various operational scenarios, from shallow coastal waters to deep-water applications, consistently delivering reliable detection and imaging capabilities.

APPLICATIONS

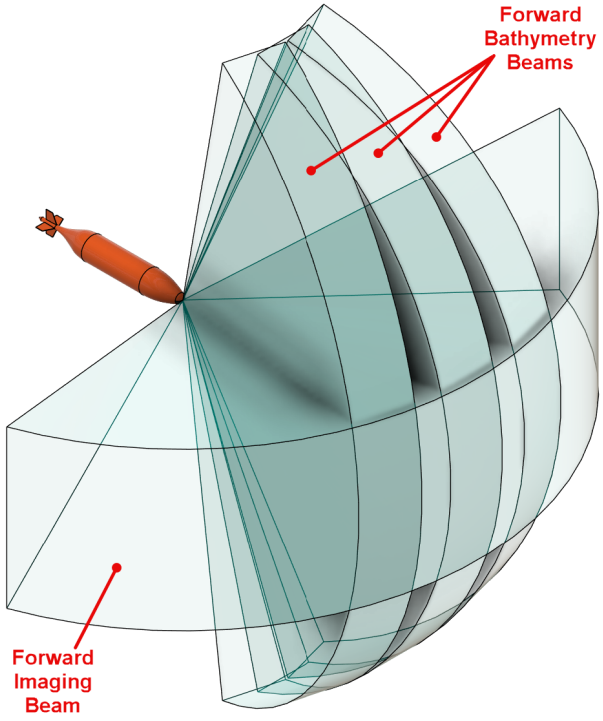
- Navigation assistance in complex terrain
- Collision avoidance for bottom and surface obstacles
- Under-ice operations with surface hazard detection
- Mission planning optimization through multi-directional terrain assessment
- Hazard detection in uncharted shallow waters
- Navigation assistance in coastal environments
- Real-time obstacle avoidance
- Gap-filling survey data collection

The FL25 is a unique “four sonars in one” configuration that provides comprehensive forward-looking capabilities:

- Center forward view for primary navigation
- Port and starboard forward views for expanded terrain assessment
- Fourth transducer providing 140° wide sector plan view coverage for enhanced situational awareness

The three forward-looking transducers enable comprehensive terrain evaluation, allowing mission planning systems to identify the optimal path forward when faced with complex bottom topography or obstacles.

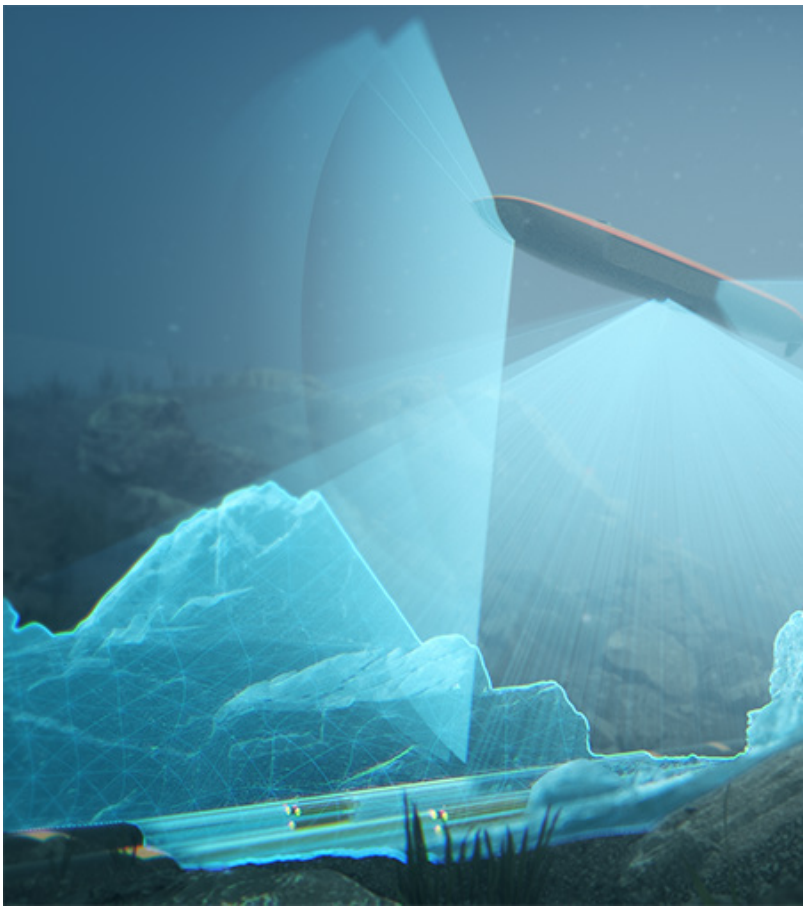
The fourth transducer’s 140° wide sector capability provides advanced navigation assistance, gap-filling survey data collection, and enhanced situational awareness.



Advanced bottom detection

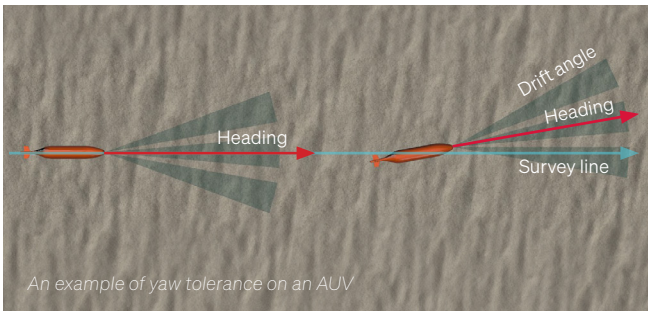
The FL25’s improved bottom detection capabilities provide AUVs with extended reaction time for smooth altitude trajectory planning, significantly enhancing mission safety and efficiency in challenging underwater environments.

The multi-transducer configuration enables the AUV to select optimal routes when encountering steep terrain or obstacles, providing multiple viewing angles for comprehensive environmental assessment. The FL25 provides reliable forward bathymetry detections extending beyond 200 meters and superior performance across diverse bottom types including sand, mud, and rock formations.



Yaw-tolerant forward bathymetry

A critical innovation addresses the common challenge of AUV “crabbing” in cross-currents. When an AUV’s course over ground differs significantly from its heading due to lateral currents, the FL25 maintains accurate forward-looking capability in the actual direction of travel, ensuring reliable obstacle detection regardless of heading variations.



An example of yaw tolerance on an AUV

Expanded field of view

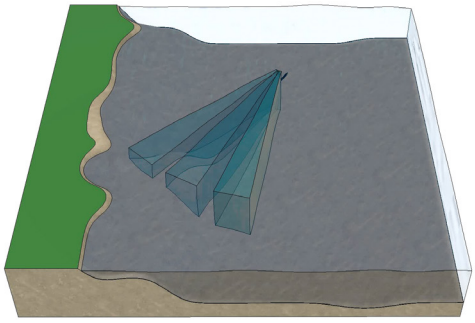
The FL25 features a wider field of view compared to previous systems, providing enhanced information about both bottom topology and near-surface contacts. This capability is particularly valuable for under-ice operations, where surface detection helps determine safe surfacing locations and avoid collisions with ice formations.

Operational examples

Field testing has demonstrated the FL25's effectiveness when installed on survey boats operating in water depths exceeding 60 meters. The system successfully detected and tracked various underwater features while maintaining reliable performance in challenging conditions.

The FL25 has proven capable of detecting and displaying:

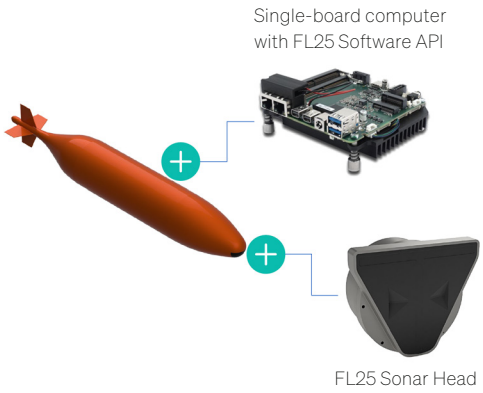
- Underwater pipelines with clear definition
- Rocky bottom formations visible across all four sonar views
- Moving surface vessels, including wake patterns and propeller noise signatures
- Air bubble trails from vessel wakes



Canada's Prime Minister Mark Carney inspects the HUGIN

Testing has also shown successful integration with navigation systems such as the Seapath 130, demonstrating the FL25's compatibility with existing survey and navigation infrastructure.

For autonomous operations, the AUV can interface with the FL25 through the FL25 Software API. This software performs all the processing of the sonar data with a small—but powerful—single-board computer onboard the AUV.

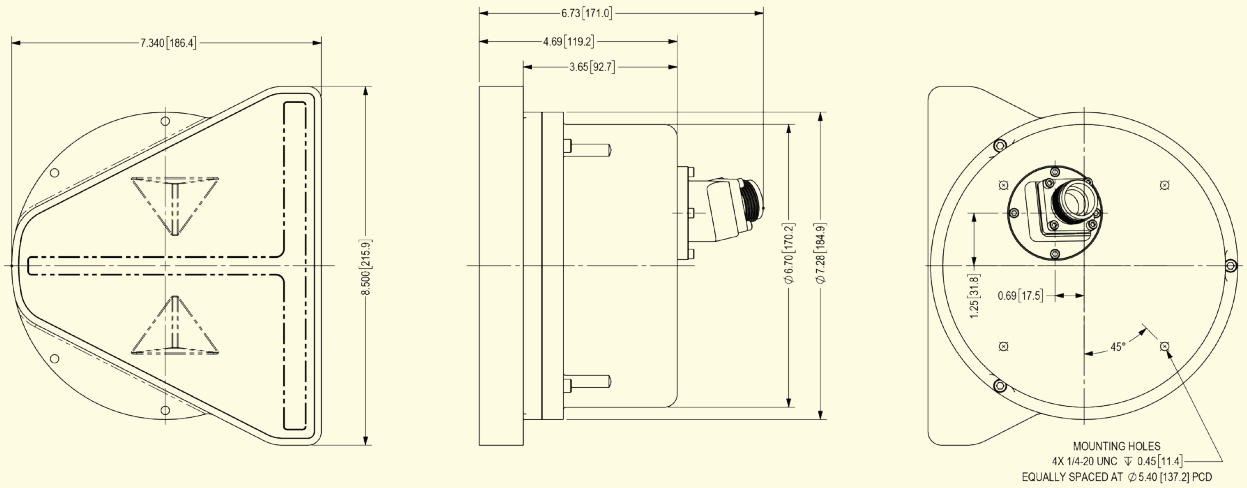


Conclusion

Kongsberg Discovery's latest advancement in underwater sensing technology, the FL25 Forward-Looking Sonar offers enhanced detection range, improved bottom detection across diverse seafloor types, and innovative yaw-tolerant bathymetry capabilities. Its four-transducer configuration provides unprecedented forward-looking coverage for both navigation and collision avoidance applications.

Designed specifically for autonomous underwater vehicle operations but adaptable to autonomous surface vessel applications, the FL25 addresses critical operational challenges while providing a platform for future technological enhancements.

For more information about the FL25 Forward-Looking Sonar and its applications, contact Kongsberg Discovery Canada.



Technical specifications

FL25 922-20320000

Sonar Specifications

Range	0.2 m to 200 m
Range resolution	1.5 cm
Frequency	250 kHz
Pulse types	CW, CHIRP
Update rate	Up to 30 Hz
Max. number of beams	256

Forward Bathymetry

Transmit beamwidth	140° x 10°
Number of transmitters	3
Receive field of view	Center 0°, Port -15°, Starboard 15°
Receive beams	2.2° x 40°

Horizontal Imaging

Transmit beamwidth	140° x 30°
Number of transmitters	1
Receive field of view	140° x 30°
Receive beams	1.7° x 30°

Environmental Specifications

Operating temperature	-4° C to +38° C
Storage temperature	-15° C to +55° C

Interface Specifications

Communication	Ethernet
Data rates	100/1000 Mbps
Input voltage	12 to 36 VDC
Input power	50 W (avg.), peak power < 70 W, mode dependant
Operating system	Windows 10
Synchronization	PRI Sync, 1PPS

Mechanical Specifications

Width	215.9 mm (8.50 in)
Height	171.0 mm (6.73 in)
Length	186.4 mm (7.34 in)
Weight in air	7.8 kg (17.2 lbs)
Weight in seawater	4.8 kg (10.6 lbs)
Depth rating	1000 m (6000 m also available)
Connector type	CRE
Connector model	FRP16M Ti series
Materials	Titanium, Elastomeric Polyurethane

Specifications subject to change without any further notice.

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