

# Wärtsilä ELAC KaleidoScope

OpenSonarSuite for submarines



The OpenSonarSuite ELAC KaleidoScope is an advanced, totally integrated sonar system that meets the mission requirements of modern diesel-electric submarines. It offers full spatial, full spectral and full temporal coverage.



# Wärtsilä ELAC KaleidoScope

Ready for third-party algorithm implementation

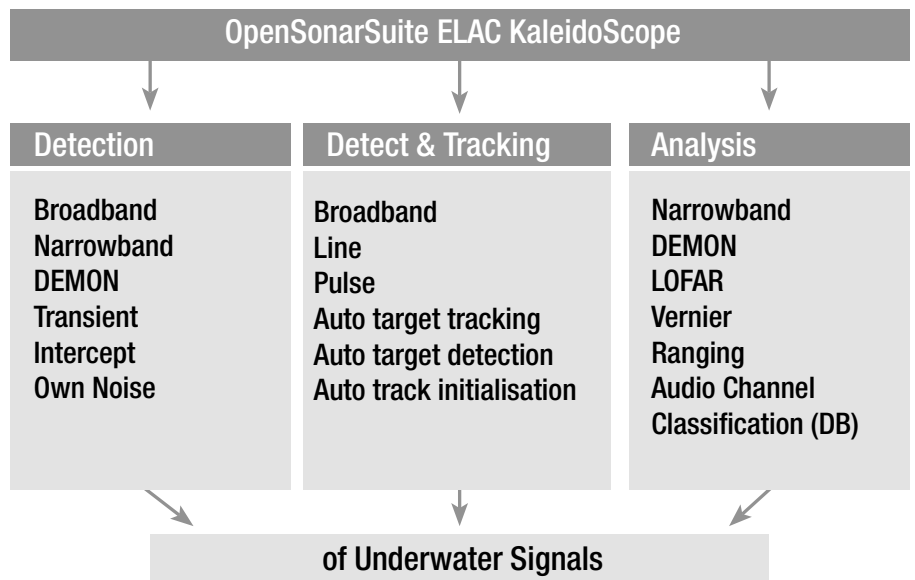
The OpenSonarSuite ELAC KaleidoScope performs integrated surveillance by using acoustic sensors which provide the tracking channels allowing automatic tracking of contacts. The integrated surveillance functionality includes detection, tracking, analysis and classification.

The detection and tracking functionality includes passive sonar narrowband, passive broadband for contact detection, contact tracking and contact correlation.

The analysis functionality integrates passive narrowband, acoustic intercept features, and customer-provided intelligence libraries as well as tools of classification features for track and contact classification.

## System design

ELAC KaleidoScope is based on MOTS hardware and performance-tested software for sonar processing. The wet end parts (hydrophones) are developed in-house and produced and then tested by the German Navy. The modular design allows uncomplicated incorporation for future improvements and reduced lifecycle costs.

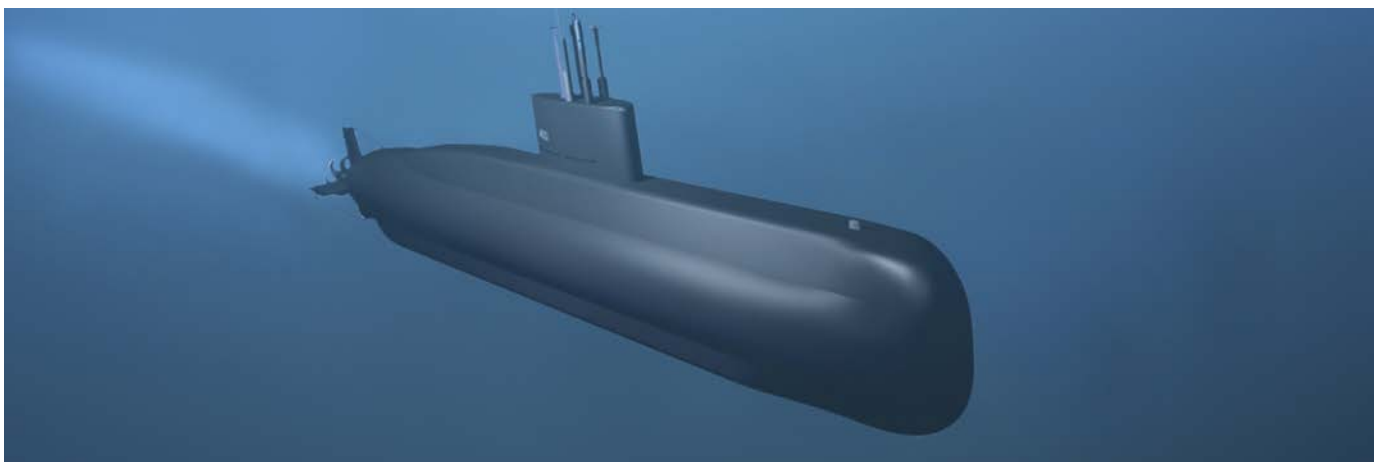


## Key features

Open architecture
Commercial standards
MOTS
Military-hardened
Opportunities to include technical innovations*
Allowing rapid change and insertion of new capabilities*

\* no need for industry support; customer-owned and secret intellectual properties

ELAC KaleidoScope is based on proven design utilised in previous projects. It includes open interfaces to other sensors and is ready for integration into a third-party combat management system. The human-machine interface (HMI) application runs on a PC-based third-party multi-function control console. ELAC KaleidoScope is centred on the hydrophone arrays which transform the acoustical data into electrical data, and the sonar processor which processes the acoustical data to contact information.



# System overview

## Full-spatial and full-spectral coverage

### Cylindrical array sonar (CAS)

The cylindrical array sonar provides medium-range surveillance. This includes broadband and narrowband and transient detection, narrowband and DEMON analysis as well as broadband, narrowband and DEMON tracking.

### Own ship noise measurement equipment (ONM)

The own ship noise measurement equipment monitors the noise generated by the own ship.

### Acoustic intercept sonar (AIS)

Detection and analysis of active sonar pulses. The intercept sonar determines the bearing, performs contact tracking and analysis.

### Flank array sonar (FAS)

The flank array sonar provides long-range surveillance. This includes broadband and narrowband detection, narrowband analysis, passive range estimation as well as broadband and narrowband tracking.

### Mine avoidance sonar (MAS)

Detection and localisation of mines or obstacles is performed by the mine avoidance sonar. It estimates range, bearing and depth information of the detected and tracked objects.

### Active sonar (AS)

The detection and localisation of targets is performed by the active ranging sonar. It estimates range and bearing information of the detected and tracked objects.

### Passive ranging sonar (PRS)

The passive ranging sonar provides a medium-range surveillance and passive range estimation based on detected and tracked contacts. This includes broadband detection.

### Integration of 3rd-party towed array sonar

The towed array sonar provides long-range surveillance. This includes broadband and narrowband detection, narrowband analysis as well as broadband and narrowband tracking.

### Sonar processor

The sonar processor is responsible for all kinds of sonar processing. This includes beamforming, adaptive beamforming, detection, frequency domain processing, analysis, display processing, interfaces to the navigation system, combat system, and many more.



# Specifications and technical data

## Wärtsilä ELAC KaleidoScope at a glance

ELAC KaleidoScope processes separate sonar arrays by analogue to digital conversion of all hydrophone signals with very high dynamic range and with no need of variable gain control.

ELAC KaleidoScope is able to passively detect, track and analyse surface and sub-surface objects, by using broadband analysis, narrowband analysis, DEMON analysis, intercept analysis, transient analysis and range calculation. The tracking process is based on both automatic initialisation and operator

initialisation of tracks. It includes broadband, narrowband line, DEMON line and pulse tracking. Contact data are forwarded to the CMS via Ethernet.

The system has a classification capability that enables the operator to classify the objects detected by the system based on their sound signature. The classification system allows comparison of relevant information for a detected object. The system also allows raw data storing for raw data for reprocessing within the system and external post-processing for later analysis.

