

# AMBS

## ACOUSTIC MONITORING BUOY SYSTEM



KONGSBERG

### MONITORING UNDERWATER IMPULSIVE NOISE IN REAL-TIME

Man-made noise is often a side effect of many offshore operations, for example, noise from piling during installation of wind farms or noise from decommissioning activities. Such noise has the potential to create an impact on marine life. The project developer or operator is required to remain compliant with environmental regulations governing the amount of sound emitted into the underwater environment.

To aid this process, Kongsberg Maritime have designed and developed the Acoustic Monitoring Buoy System (AMBS) that monitors underwater construction and operational noise levels in “real time”.

#### Regulations and Statutes

A number of countries regulate the levels of man-made sound that may be emitted into the underwater environment during the construction phase of a project. The German Federal Maritime and Hydrographic Agency (BSH) require that the sound pressure level (SPL) and the sound exposure level (SEL) be monitored at a distance of 750m from the point of impact piling. The United States National Marine Fisheries Service (NMFS) specify threshold levels in terms of sound pressure levels and sound exposure level for the onset of both permanent deafness and temporary deafness for species of whale, dolphins and seals. In this case, the distance is not specified.

#### Rapid deployment and easy operation

The AMBS buoyside unit is mounted on a mooring buoy which is located at the appropriate distance from the noise source. The hydrophone is deployed at the required depth. The BSH require that the hydrophone is located 2-3m above the seabed while the NMFS do not specify a depth. Where depths are not specified, a location at half water depth would be recommended in shallow waters.

#### Recording

Powered by rechargeable batteries, AMBS can operate for 30 hours, passively recording acoustic activity while deployed from

a suitable buoy. Real-time data is transmitted from the Buoyside unit to the Topside unit by a radio UHF modem. The two units can be separated by up to 20 km line-of-sight. In practice, the Topside unit is often installed on the piling vessel so that the engineer monitoring the noise levels is in regular contact with the project engineer. The AMBS can be switched on and off remotely to conserve battery life. The buoy batteries can be recharged or replaced to allow for rapid re-deployment.

#### Defined frequency range, quality data

The AMBS system has a broadband frequency range of 50Hz to 80 kHz for noise measurement. Recordings are stored, processed and transmitted to the Topside unit on board the vessel. On completion, the data stored on the Buoyside unit can be recovered for post-processing, if required.

The Topside GUI displays sound pressure level and sound exposure level using a 3-colour traffic light system. When the lights are green, noise levels meet statutory requirements.

Amber lights indicate threshold levels are being approached. When the lights turn red, noise levels have been breached and a pre-agreed mitigation process is implemented.



## APPLICATIONS

AMBS can be deployed to monitor real-time acoustic activity during many offshore operations including:

- Offshore wind farm installation
- Seabed piling operations
- Drilling and platform decommissioning
- Acoustic baseline surveys
- Seismic exploration activities
- Cable and pipeline trenching
- Environmental monitoring



Topside Unit

Buoy side Unit

## TECHNICAL SPECIFICATIONS

### Buoy side Unit Equipment

Frequency range	50Hz to 80kHz
Maximum deployment period	Duty cycle dependant
Operating temperature	-2°C to +35°C
Operation	Remote Switch On/Off
Sampling rate	250 kS/s
Data resolution	16 Bit stored in packed binary form (on the Buoy side unit)
Data storage	256 Gbytes - solid state drive on the Buoy side unit. Capacity dependant upon receiving computer
Amplitude range	50 dB to 180 dB re 1µPa
Buoy Location	GPS coordinates transmitted to monitoring vessel
Data link	UHF RF transmission
Power	Lithium battery with solar charging.

### Topside Unit Hardware

Laptop computer  
Data link using UHF RF Transmission  
UHF Antennae

### Topside User Interface

Continuous sampling with remote switch On and Off.  
Displays predicted battery duration and data storage use.

Data resolution	1/20th Octave data on Topside system for both SPL Peak-Peak and SEL
Location	GPS time and position shown on display

### Physical Dimensions

Both the Buoy side and Topside units come installed in watertight, ruggedised cases rated to IP66 (International Protection Marking). The cases are designed to be fitted inside the customer's buoy.

### Nominal dimensions

41cm x 33cm x 18cm

### Typical Buoy Mechanical Requirements

The mooring buoy needs to be fitted with 12 V DC and an inverter. This may be achieved by a 85Ah battery. Solar panels fitted to the buoy may be used to maintain battery voltage levels. Kongsberg engineers can provide advice on mooring buoy suitability.

*Specifications subject to change without any further notice.*

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