

## *Mag648 used for Maritime Perimeter Surveillance*

### **Objectives**

To detect small magnetic field fluctuations caused by movement of nearby ferromagnetic objects, thus indicating the presence of divers or small vessels

### **Instrumentation**

- Mag648S low power, submersible, three-axis magnetic field sensor.

### **Applications**

- To protect high value assets and prevent unauthorised access to controlled areas.

### **Background**

Surveillance and security are important factors in protecting high value assets and strategic locations. Detection is the first line of defence and a complete solution employs multiple techniques.

In the maritime environment, acoustics and sonar are commonly deployed to detect clandestine activity. Increasingly, however, magnetics are being used to augment the detection and discrimination of targets in environments where acoustics and sonar struggle.

Divers or small vessels carrying any ferromagnetic objects will cause an interaction with the Earth's magnetic field as they move around. It is these small, detectable variations that help provide the distinction between a diver and marine life that sonar and acoustics cannot necessarily make.

Sonar systems use active sensing to detect targets: the sensor emits a signal which is then reflected back and received. This can alert a target to the presence of a detection system. Magnetic field sensors are passive sensors, emitting no signal. This makes it harder for an intruder to detect the system or realise when they have been detected, thus increasing the discretion of the surveillance system.



### Method

The Mag648S is the ideal sensor for use in this application. Its low power consumption of <20mW means that it is well suited for use in battery operated systems.

The Mag648S is mounted inside a housing containing batteries and a control unit which monitors and processes the signals from the sensor. The assembly is then positioned on the sea floor in the desired configuration with multiple sensor assemblies. The number and arrangement of sensors depends on the nature of the entire system. If the system is for protecting a harbour entrance then the sensor assemblies would be arranged in a line at up to 20m separations.

Static fields caused by metal objects emplaced in the harbour walls – for instance iron reinforcements – can be offset by signal processing, and the Mag648S's DC to 30Hz bandwidth prevents interference from 50/60Hz mains power signals. This set-up will allow small variations to be detected without producing false signals.

With the sensors arranged across the harbour entrance, any fluctuations that are detected generate a signal in the nearest sensors and are relayed to a central control system. This control system determines the target's location from the sensors that have been activated. In conjunction with other detection methods, the target can then be identified and a response team can be dispatched.