

Sentry IMS (Integrity Monitoring Sonar) has been developed to automatically warn of integrity breaches around subsea oil and gas assets. The system is capable of monitoring more than one billion cubic feet of seawater, with 360° of coverage from a single sensor location, operating without the need for skilled sonar operators to monitor the system. Sentry IMS is designed to be very sensitive and is capable of detecting leaks below 1 barrel per day at ranges in excess of 500 metres.

Latest Generation Active Sonar

Sentry is an active sonar which works by projecting a short-duration high-bandwidth ultrasonic pulse into the water and listening for echoes from any objects such as subsea structures, ROVs or hydrocarbon leaks. The advanced software in Sentry is then capable of discriminating and localising a potential leak from all the other sonar targets. When such a leak is detected, the system automatically produces an audible and visible alarm. Data on the leak characteristics and position are shown on a display and can also be exported to other monitoring or control systems via an Ethernet link.

Early Warning

Early warnings of small leaks can allow operators to schedule investigations and take control actions in a timely manner. The system can detect gas outflows at the seafloor which may never surface in the vicinity of the platform because the gas has been absorbed into the seawater as it rises. It can also alert an operator to oil that may only break surface many miles from the hydrocarbon source due to a combination of great water depth and local currents.

Wide Area Coverage

Unlike single point chemical sensors, Sentry is not dependent on being 'in the flow' of gas or oil. Similarly, it does not need to be within visual range as would be the case for

Sentry IMS at a glance

- 360 degree, high volume coverage from a single point
- Localises integrity breaches at the time of detection
- Reliable automated algorithms with low false alarm rates
- Early warning to allow intervention
- Sensitive to small leaks at ranges in excess of 500 metres
- ROV deployable package suitable for long term subsea deployment
- Multiple sonar heads can be interfaced together to increase coverage
- Detects leaks despite high or low differential pressure

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video inspection using an ROV. When compared to passive systems, Sentry can detect low differential pressure leaks that are silent and which can't be picked up with passive hydrophones. This allows the system to monitor the seabed for natural seeps, as well as leaks arising during drilling, production or decommissioning activities. The sonar has a user configurable detection radius of up to 1,500 metres (5,000 feet).

High Performance

Indicative performance predictions for both oil and gas detection, at a typical deep water installation, are shown in the graphs to the right. In practice many leaks will be a dual-phase mixture of oil and gas, which will make any oil leak more detectable than it might appear from the data presented. At a gas/oil ratio of 1,000, a tiny dual-phase oil leak of 0.1 barrels per day would then be detectable at a leak-to-sonar range in excess of 500 metres.

Fully Automated Software

The Sentry IMS software is based on the proven architecture and detailed design of Sonardyne's Sentinel IDS, the world's best-selling Intruder Detection Sonar, offering both high reliability detection and classification algorithms, which are field proven and best in class. Very importantly, Sentry does not require a trained sonar expert to adjust the sonar parameters. It has been designed to provide robust, reliable detection in all conditions without constant tweaking. The software is intuitive, simple to understand and automatically advises status/capability in real-time.

If hydrocarbons (or indeed other gases/fluids) are detected, Sentry produces an audible and visible alarm. Data on the leak position is displayed and can also be automatically transmitted to remote monitoring stations via an Ethernet link. The system constantly records any gas or oil detections, thus providing a log of events which can subsequently be played back.

Sentry can support a secure external interface allowing alerts and monitoring status to be distributed globally as required. The same interface can also allow remote support by experienced Sonardyne engineers.

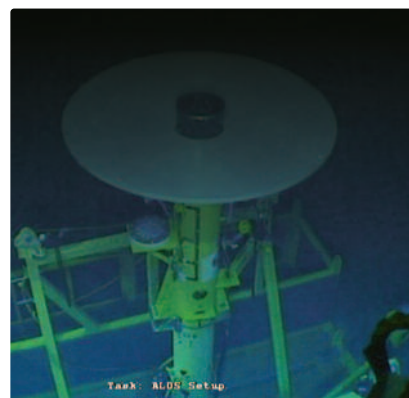
Why choose active over passive sonar

Sentry is an active sonar, i.e. it does not just passively listen for leaks. Compared to a hydrophone solution, the sonar does not need to discriminate the different sounds that could be made from a leaking flange or valve stem from background noise; it is monitoring the actual leak directly.

The active sonar allows Sentry to positively detect the location of the leak and so accurately report the co-ordinates of the leak and display the location on a chart backdrop of the subsea asset layout.

Power and Communications Configurability

An engineered subsea power and communications module outside of the sonar head can be provided to allow integration with other systems, such as field deployed data networks. These interfaces can be engineered to meet individual customers' specifications. In addition, the system is also available as a battery powered remote solution known as Sentry B.

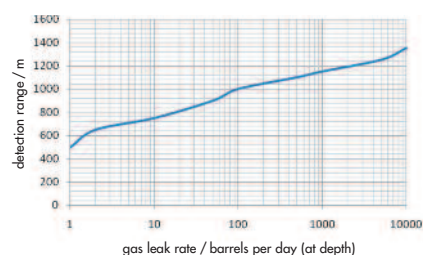


Sonar Head

The Sentry sonar head is manufactured from Grade 5 Titanium making it suitable for long term permanent installation. Data is transferred to the surface via single mode fibre-optic cable.

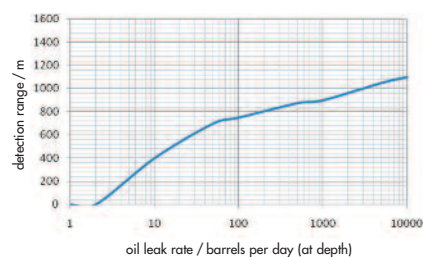
Gas Detection Performance

Predicted detection range vs. gas leak rate



Oil Detection Performance

Predicted detection range for 'dead' oil



Sentry Command Workstation

Sentry does not require a trained sonar expert to adjust the sonar parameters.

