

Neptune Oceanographics Ltd

SNIFFIT - Detection of Subsea Gaseous Hydrocarbons

Neptune Oceanographics' unique SNIFFIT system for the detection of subsea leaks of hydrocarbons is a proven, real time, in situ method that has been used world-wide and has many applications in diverse underwater markets. The small, lightweight detector combines with its control unit and Windows based software to warn the user of the presence of gaseous Hydrocarbons (such as methane) ahead of the more obvious physical clues such as the presence of bubbles.

The Sniffit was developed specifically to allow, real time in situ detection of dissolved and gaseous methane in water, whatever the source, and has been successful in hydrocarbon surveys to depths of over 3000m world-wide.

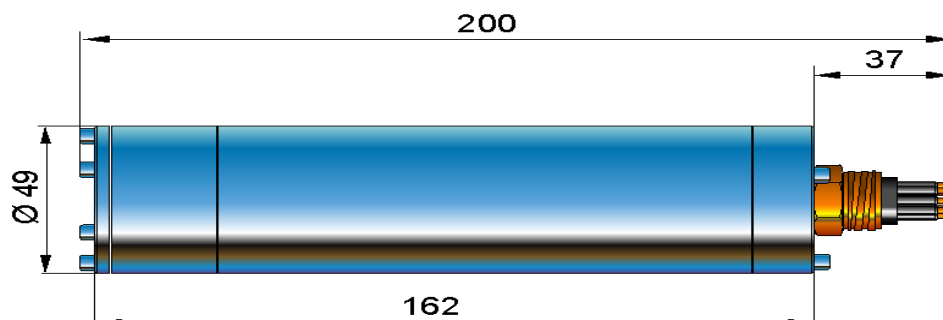
The very high sensitivity of Sniffit makes it ideal for the detection of hydrocarbons leaking from the seabed or pipeline installations.

The sensor can be used as a quick pass for general 'look and see' surveys or used in detail mode to detect the exact location of a subsea leak.

The Sniffit is easily mounted on a ROV, AUV, towed vehicle, manned submarine, cable profiler or can be diver held.

Operational Ranges

Depth	0 – 2000 m
Temperature	2 – 20 °C nominal
Methane	50 nmol/l – 10 µmol/l
MEG	Up to 100%
Power	24 – 36 VDC – current at switch-on 400mA. Operating current consumption – 100mA
Sensor output	Normally RS 485 but analogue and RS232 available
Weight in air	1.5 kg



Explanation of the Sensor Principle for Methane

The hydrocarbon desorbs together with water vapour from the water to the chamber behind the membrane. The liquid water stays outside. The diffusion from water to the gas phase behind the membrane is driven by Henry's law:

$$HCH_4 = pCH_4/XCH_4 \text{ and } XCH_4 = CCH_4/CCH_4+CH_2O$$

The mole-concentration (XCH_4) from in water dissolved hydrocarbon is in a thermodynamic balance with the partial pressure (pCH_4) of methane in the gas phase. For small concentrations of the methane/hydrocarbon in water there is a linear relationship (Henry's Constant) between pCH_4 and XCH_4 . The direction is conditional on the concentration gradient between water and gas phase.

Behind the membrane is a 5 mm thick sinter-metal plate with pores between 0,5 to 25 μm . The sinter-metal supports the membrane against the high pressure in deep water. Because of the micro-pores the hydrocarbon molecules penetrate the sinter-metal plate and react with the oxygen on the surface of the tin-dioxide layer (surface temperature nearly 380 $^{\circ}\text{C}$). This reaction releases free electrons in the layer and the conductivity increases. The change of conductivity depends directly on the hydrocarbon concentration. With a constant current passing through the layer the conductivity is converted to a voltage signal. With an A/D converter the signal is digitised.

Typical Screen Display

