

# Hydrocarbon sensor systems

**PIPELINE MONITORING** To improve detection efficiency and to eliminate the need to introduce additional potential pollutants to underwater pipeline systems CONTROS has developed a new leak detection method, a "Hydrocarbon Sniffer System", called HydroC™.

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The global demand for energy challenges the offshore oil & gas industry to go for deeper regions and the arctic areas. However, environmental awareness and concern puts the focus on effective and reliable monitoring systems to avoid leaks and spills of harmful fluids.

Subsea production systems are getting more and more common for these applications. Globally subsea pipelines and production systems are becoming a major concern as authorities are less tolerant to leaks of polluting material into the marine environment. In this respect, the ability to detect and also to locate any leakage of oil or gas to the surrounding water and environment is of utmost importance to safeguard a green and healthy planet.

At a depth of 3,000 meters operation of a subsea production installation is a great challenge and a high risk. Not only are the costs for deep sea installation high, but the risk for the environment is evident – is it possible to detect or repair a leak?

Subsea field development and long pipeline transport may be the only alternative to develop a deep sea installation; if sufficient water depths, infrastructure on the seafloor can be advantageous. However, in Arctic areas where the surface ice and iceberg conditions can be problematic. Subsea processing is regarded as an efficient way to safe energy; reduce the use of chemicals and to reduce discharge of produced water.

In the past three main methods of subsea leak detection have been used for leaks where obvious visual signs of large leaks such as bubbles, large clouds, etc. are either not present or have failed to locate these problems. These three main methods used are fluorometric measurement, pig-systems (not useable for all types of pipelines of today) and passive acoustics, which listen

for ultrasound created by fluid leaking under pressure.

The systems mostly used these days for permanent monitoring or pipeline inspection by ROV (Remotely Operated Vehicle) or AUV (Autonomous Underwater Vehicle) seem all to have disadvantages in detecting very small and non visible oil or gas leaks.

In an effort to find new leak detection methods that improve detection efficiency and also eliminate the need to introduce additional potential pollutants to pipeline systems, CONTROS has been working on a "Hydrocarbon Sniffer System" called HydroC™ for the last five years. This unique system which is now available has a worldwide patented optical analysing system. Hydrocarbon molecules diffuse through a special membrane (which keeps the water out) and enters into the detector chamber. The adsorption of light in gas leads to change of intensity which is measured electronically. The HydroC™ can detect the higher order chain of hydrocarbons or just CH<sub>4</sub> if Methane is of primary interest; which is a huge advantage as CH<sub>4</sub> is the smallest molecule in nearly every crude oil and natural gas.

A system can consist of one HydroC™ or an array of sniffers, current meters and other instrumentation required covering a large subsea installation or an area of manifolds. This HydroC™ system is unaffected by turbidity or other interferences such as H<sub>2</sub>S or any other gaseous substances in the environment. This system was developed specifically to allow fast, real-time and in-situ detection of dissolved and gaseous hydrocarbons/methane in water, whatever the source. It has been successful used in hydrocarbon surveys and pipeline inspections to water depth up to 3,000 metres worldwide.

The very high sensitivity (down to 30 nmol/l) of the HydroC™



Monitoring of critical paths and pipelines

system also makes it ideal for the detection of methane seepage from the seabed. Here it is also widely used for the exploration and the production process of methane hydrates in different projects around the world. CONTROS is also partner of the German Gashydrate Organisation ([www.german-gashydrate.org](http://www.german-gashydrate.org)) where another CONTROS HydroC™ instrument for CO<sub>2</sub> detection is used for the CO<sub>2</sub> sequestration process, which has become an important topic for the international oil companies. The calibrated HydroC™ (Hydrocarbon or CO<sub>2</sub>) plug & play system records data either internally or externally in units of hydrocarbon or methane concentration. By careful logging around an area of leakage from a pipeline, the seabed or a manifold, an estimate of the amount

of leaking gas or oil can be made directly. HydroC™ is in use by several pipeline inspection companies and CONTROS has close cooperation with the leading ROV manufacturers to equip their inspection ROVs with the latest leak detection technology. In summary CONTROS provides offshore pipeline inspection and long term monitoring solutions. HydroC™ leak detection product line, field experience and advanced data management systems meet demanding regulatory requirements and enhancing safety during production from subsea production systems.

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