



**EXPRO**



# PRODUCTION MONITORING

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No matter how complicated your flow regime, Expro's expertise in production logging technology will help you optimise your reservoir performance.

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[exprogroup.com](http://exprogroup.com)

# PRODUCTION MONITORING

Production monitoring is undertaken throughout the life of a well:

- for production or injection profiling
- to investigate the reasons for excess water or gas production
- to identify and assess the effects of mechanical failures

Swift, accurate production measurement within wells is crucial in order to maximise cost-effective hydrocarbon extraction. Expro's conventional production logging tools provide the most comprehensive and efficient range of flow, fluid identification, and reservoir monitoring information.

With the capability to provide services over a wide-range of wells, both on **land and offshore**, Expro can provide rigless intervention with our core mechanical or e-line methods, as well as coiled tubing, to optimise production monitoring.

Expro can support throughout the entire well lifecycle, from initial design through to eventual abandonment:

- Downhole video monitoring
- Well integrity monitoring
- **Production monitoring**
- Production optimisation
- Well abandonment





# Multiple array production suite (MAPS)

In complicated flow regimes, particularly within deviated and horizontal wells, conventional production logging tools are often inadequate. Phase segregation and mixing can occur in many wells, even those with limited deviation.

Lighter phases migrate to the high side of the well, with heavier phases to the low side. This separation may result in phases travelling at different velocities and directions. Multi array production suite (MAPS) tools can measure individual phase hold-ups and velocities, estimate the volumetric flow of each phase, providing vital information for reservoir management.

MAPS is a landmark innovation in well logging technology, adding an entirely new dimension to optimising production. It enables the user to deploy multiple sensors to build a clearer and more accurate picture of the flow regime, resulting in superior reservoir management.

Array tools deploy sensors on bowsprings around the circumference of the well, to identify the phase type and measure its velocity. The tools are flexible and adaptable – collapsible to pass through restrictions without the need for any motors.

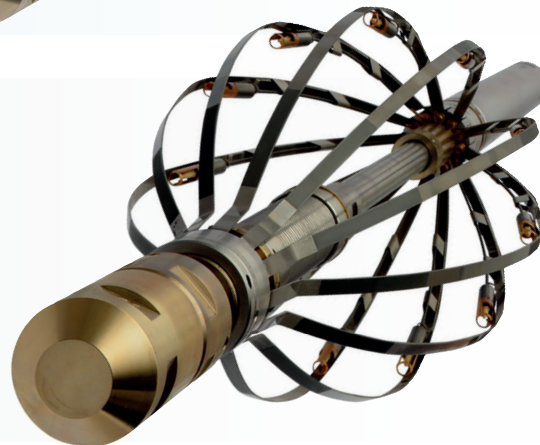
## Capacitance Array Tool (CAT)

The **Capacitance Array Tool (CAT)** consists of 12 miniature capacitance sensors, mounted on collapsible bowsprings to provide fluid identification for the entire wellbore. Different dielectric constants enable identification of oil, gas and water.



## Resistance Array Tool (RAT)

An array of 12 micro resistance sensors within the **Resistance Array Tool (RAT)** determines water hold up across the wellbore. Saline water is conductive, whereas oil and gas are non-conductive. The sensors measure the resistance of the fluid between the probe tips, which can detect very small and fast moving bubbles.



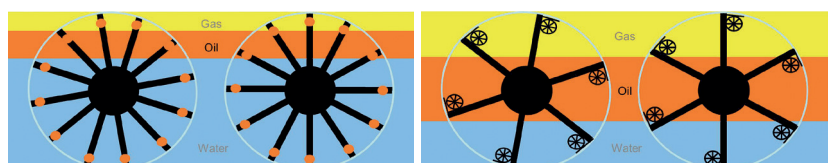
## Spinner Array Tool (SAT)

The **Spinner Array Tool (SAT)** features six miniature turbines deployed on bowspring arms, enabling discreet local fluid rates to be measured at 600 intervals around the wellbore to determine the velocities of each individual fluid layer.



## MAPS – array mounted sensor positions

It is important to note that the sensors are not directly on the wall of the well, however mounted far enough in to absorb the main flow of the well, rather than the boundary area which can be significantly thinner.

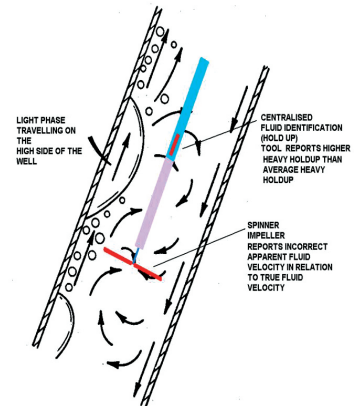


MAPS has the ability to see small hold ups (RAT and CAT)

# Conventional logging

Expro provide a full range of centre-mounted production **logging tools**. These provide accurate downhole measurements in order to maximise cost-effective hydrocarbon analysis.

Our collection of centre-mounted sensors include: capacitance; temperature; multiple sizes and types of flow meters; pressure; casing collar locator; gamma ray; fluid density inertia; and inclinometer/accelerometer.



## Leak detection

Pinpointing the **location of a leak** requires the correct technology and expertise to ensure that accurate information supports remedial action to be planned and implemented.

Leaks in the tubing or casing of a well can have a dramatic impact on economic viability and ultimately, cause serious issues with the safety, integrity, productivity, and long-term profitability of the well.

If the leak is in a casing collar, packer, or other external seal, Expro can add temperature and flow meter sensors to identify the leak.

## Spectral flow analysis

Expro works in partnership with TGT Oilfield Services to further enhance production logging services. SPEC-RFA\* is a high definition noise logging tool, designed to identify the flow behind casing in production and injection wells. It can provide information on reservoir flow units behind one or multiple barriers by recording noise patterns in a wide frequency range. The characteristics of the recorded noise is used to differentiate between formation and wellbore flow. When combined with our production logging tools, the active perforations and active zones behind the casings can be identified as a full production diagnostic.



# Log data analysis

Expro's in-house experts provide the best log data interpretation, which is key to any production logging job. Located around the globe, we can provide express analysis, quick-look reports and follow up interpretation from both Expro operations, as well as third-party run tools.

