

Spinner Array Tool (SAT)

Enables discrete fluid velocity measurements across the wellbore

Applications

- Derivation of different fluid velocities in segregated flow conditions
- Cross-sectional velocity profiling
- Changes of wellbore fluids' hold-ups with time, different production rates, wellbore conditions and deviations
- Injection Flow Measurement

Features and Benefits

- Combinable with other Sondex **Ultrawire™ production logging tools**
- Combinable with other tools of the Multiple Array Product Suite (MAPS)
- Optional Rotational Alignment Sub (RAS)
- Production Inclinerometer Accelerometer (PIA) recommended
- 3D imaging of velocity profile with MAPview software
- Greater tolerance to well debris
- Reduced tool diameter
- Easier to service and maintain
- Memory and surface readout operation

The **Spinner Array (SAT004)** Tool features six miniature turbines deployed on bowspring arms, enabling discrete local fluid velocities to be measured at 60 degree intervals around the wellbore.

Phase segregation occurs in many wells, even those with little deviation from vertical. Lighter phases migrate to the high side of the well, heavier phases to the low side. The individual phases flow at different velocities and possibly in different directions. Historically, correlations have been used to estimate individual phase velocities from the total fluid velocity log. The Spinner Array Tool provides direct measurement of individual phase velocities. Combined with holdup data from the Resistance Array Tool (RAT), Gas Array Tool (GAT) and Capacitance Array Tool (CAT), this forms the Multiple Array Production Suite (MAPS), which makes it possible to provide quantitative estimates of the volumetric flow rate of each phase with a much higher degree of certainty and thus provide vital information for reservoir management.

The turbines use low friction jewelled bearings to reduce the mechanical threshold of the spinner and improve sensitivity to fluid flow. The tool outputs the

direction and speed of spinner rotation. A relative bearing measurement is incorporated to indicate the high side of the well.

This is a new design that incorporates customer feedback from earlier variants. They include new turbines specifically designed to have much higher tolerance to magnetic well debris. The new designs also feature a smaller outer diameter to permit entry into tighter well bores. Numerous features have been incorporated to simplify servicing and lower maintenance cost.



Specifications

	SAT004
Temperature rating	350°F (177°C)
Pressure rating	15,000 psi (103.4 MPa)
Tool diameter	1 11/16 in. (43 mm)
Tool length	45.5 in. (1.156 m)
Tool weight	17.2 lb (7.8 kg)
Toolbus	Ultrawire production logging tool
Current consumption	25 mA
Maximum opening	7 inch casing
Number of sensors	6
Spinner diameter	0.4 in. (10.16 mm)
Sensor measure point	16.5 in. (419 mm)
Relative bearing accuracy	5°
Relative bearing dev range	5° to 175°
Materials	Corrosion resistant throughout