

Spinner Array Tool (SAT)



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

Description

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) 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.

The SAT004/005 are new designs that incorporate 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.

Features

- Greater tolerance to well debris
- Reduced tool diameter
- Easier to service and maintain
- Cross-sectional velocity profiling
- 3D imaging of velocity profile with MAPview software
- Phase velocities in segregated fluid streams in deviated and horizontal wells
- Memory and surface readout operation
- Simultaneous operation with other Ultrawire* tools
- Combinable with other MAPS tools
- Optional Rotational Alignment Sub (RAS)
- Production Inclinerometer Accelerometer (PIA) recommended



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Model	SAT004	SAT005
Temperature rating	350°F (177°C)	
Pressure rating	15000 psi (103.4 MPa)	
Tool diameter	1.72 in. (43.69 mm)	2.125 in. (53.98 mm)
Tool length	45.5 in. (1.156 m)	
Tool weight	17.2 lb (7.8 kg)	
Toolbus	Ultrawire	
Current consumption	25 mA	
Pipe range	Up to 7 in. casing	
Number of sensors	6	
Spinner diameter	0.4 in. (10.16 mm)	0.6 in. (15.24 mm)
Sensor measure point	16.5 in. (419 mm)	
Relative bearing accuracy	5°	
Relative bearing dev range	5° to 175°	
Materials	corrosion resistant	

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