

Saturn 3D Radial Probe

Multiple self-sealing ports circumferentially extract fluid to quickly induce and sustain flow for efficient cleanup

APPLICATIONS

- Downhole fluid analysis (DFA)
- Fluid compositional gradient determination
- Formation fluid sampling for laboratory analysis
- Far-field permeability measurement and anisotropy determination
- Pressure transient analysis
- Conventional formation pressure tests

With the industry's largest total surface flow area of 79.44 in² for the 7-in and 9-in versions and 59.49 in² for the 5-in version, the Saturn* 3D radial probe extends formation testing to previously inaccessible fluids in a broad range of challenging environments:

- wide permeability range, extending down to 0.01 mD
- heavy oil
- near-critical fluids
- unconsolidated formations
- thinly laminated formations
- rugose and unstable boreholes.

The drain assembly of the Saturn 3D radial probe positions four self-sealing suction ports at 90° intervals against the borehole wall to pull fluid circumferentially from the reservoir, instead of funneling it to the single access point of a conventional probe. Because fluid is extracted across a large reservoir volume, flow is readily induced and sustained for viscous fluids and in low-mobility formations or uncemented matrix. Filtrate is quickly removed to draw in uncontaminated formation fluid for DFA and sampling.

The Saturn 3D radial probe can perform pressure tests efficiently and conclusively at mobilities as low as 0.01 mD/cP. With minimal storage volume effects and greatly reduced susceptibility to supercharging, the Saturn probe brings unprecedented pressure-testing capability to very tight formations.

The improvement in testing efficiency over conventional probes is distinct at mobilities of 500 mD/cP, with the performance gap expanding as the mobility decreases. At 10 mD/cP the Saturn probe is an enabling technology because even an extralarge-diameter conventional probe can be challenged to move the formation fluid.

The proprietary rubber technology used in the probe assembly provides additional flexibility for sealing in rugose hole conditions in combination with the probe's self-sealing suction ports. The probe assembly also circumferentially supports the formation to enable sampling in unconsolidated formations without the risk of plugging or formation collapse.



The 5-in, 7-in, and 9-in Saturn 3D radial probes.

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	5 in	7 in	9 in
Inlet flow area, in ²	59.49	79.44 Extralarge 7 in: 159.49 [†]	79.44

Measurement Specifications

Output	Ultralow-contamination formation fluids, formation pressure, fluid mobility, downhole fluid analysis, permeability anisotropy		
Logging speed	Stationary		
Mud type or weight limitations	None		
Combinability	Fully integrates with all modules of the MDT Forte* rugged modular formation dynamics tester, MDT Forte-HT* rugged high-temperature tester, MDT* modular formation dynamics tester system, and InSitu Family* reservoir fluid measurement sensors		
Special applications	Low-permeability formations, heavy oil, near-critical fluids, unconsolidated formations, rugose boreholes, high temperatures		

Mechanical Specifications

Temperature rating, degF [degC]	400 [204]	350 [177] 400 [204]	350 [177]
Pressure rating, psi [MPa]	20,000 [138]	20,000 [138] 30,000 [207]	20,000 [138] 30,000 [207]
Differential pressure, psi [MPa]	8,000 [55]	8,000 [55]	8,000 [55]
Borehole size — min., in [cm]	5.875 [14.92]	7.875 [20.0]	9.875 [25.08]
Borehole size — max., in [cm]	7 [17.78]	9.5 [24.13]	14.5 [36.83]
Max. hole ovality, %	20	20	20
Length, ft [m]	5.7 [1.74] With Modular Reservoir Sonde and Electronics (MRSE): 12.4 [3.78]	5.7 [1.74] With MRSE: 12.4 [3.78]	5.7 [1.74] With MRSE: 12.4 [3.78]
Weight in air, lbm [kg]	264 [120]	385 [175]	485 [220]

[†]Available on request

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