



Tuning Fork Density (TFD)

The Tuning Fork Density (TFD) tool is designed to measure the density of the fluid (gas to liquid) at the fork. The fork is contained in a cage to offer protection. The tool comes in two versions. The Standard 1.38 inch version can be combined with the other production logging sensors. There is also a Flashed 1.44 inch version which is a stand-alone sensor system.

The TFD sensor operates by measuring the effect of the fluid on a resonant fork. As the density of the fluid changes, the resonant frequency of the tuning fork also changes. The resonant frequency is measured and presented in grams/cc density of the fluid contacting the fork.

The tuning fork's resonant frequency is related to the density of the fluid around the tines of the fork. The density of gas is essentially 0.0g/cc, water is 1.0 g/cc or higher and oil is between 0.75 and 0.9 g/cc, so gas is easily detected. The tuning fork density sensor provides a non-nuclear alternative to the nuclear density (gamma ray) measurement sensors. The density measurement is not affected by inclination as are all the pressure-based density tools.

In addition to the TFD sensor, the module has a capacitance measurement sensor. This sensor is designed to measure the dielectric constant of the fluid or gas. This measurement is used as an indicator of fluid type at the sensor, particularly water detection.



Tuning Fork Sensor

TECHNICAL SPECIFICATIONS		
Tool Type	Standard 1.38 in (3.5 cm) TFD-A	Flashed 1.44 in (3.66 cm) TFD-B
Length	38 in (96.5 cm)	115 in (292.1 cm)
O. D.	1.375 in (3.49 cm)	1.44 in (3.66 cm)
Maximum Pressure	15,000 psi (103,421.35 kPa)	15,000 psi (103,421.35 kPa)
Maximum Temperature	347°F (175°C)	428°F (220°C)
Sensor Range	0.0 grams/cc - 1.2 grams/cc	
Resolution	0.001 grams/cc	
Accuracy	0.003 grams/cc	

Specifications are subject to change without notice.

