TUNING FORK DENSITY

The Tuning Fork Density (TFD) tool is a non-radioactive and compact fluid-density measurement device that utilizes the inertial response characteristics of a vibrating stainless steel tuning fork to determine the density of wellbore fluid mixtures. Operated near its natural frequency by a piezoceramic stack and control electronics, the tuning fork's frequency and amplitude of vibration provide accurate density measurements, regardless of whether the fluid is static or flowing.

Applications

- Fluid phases identification
- Production profiling
- Free gas indication
- Localization of fluid levels

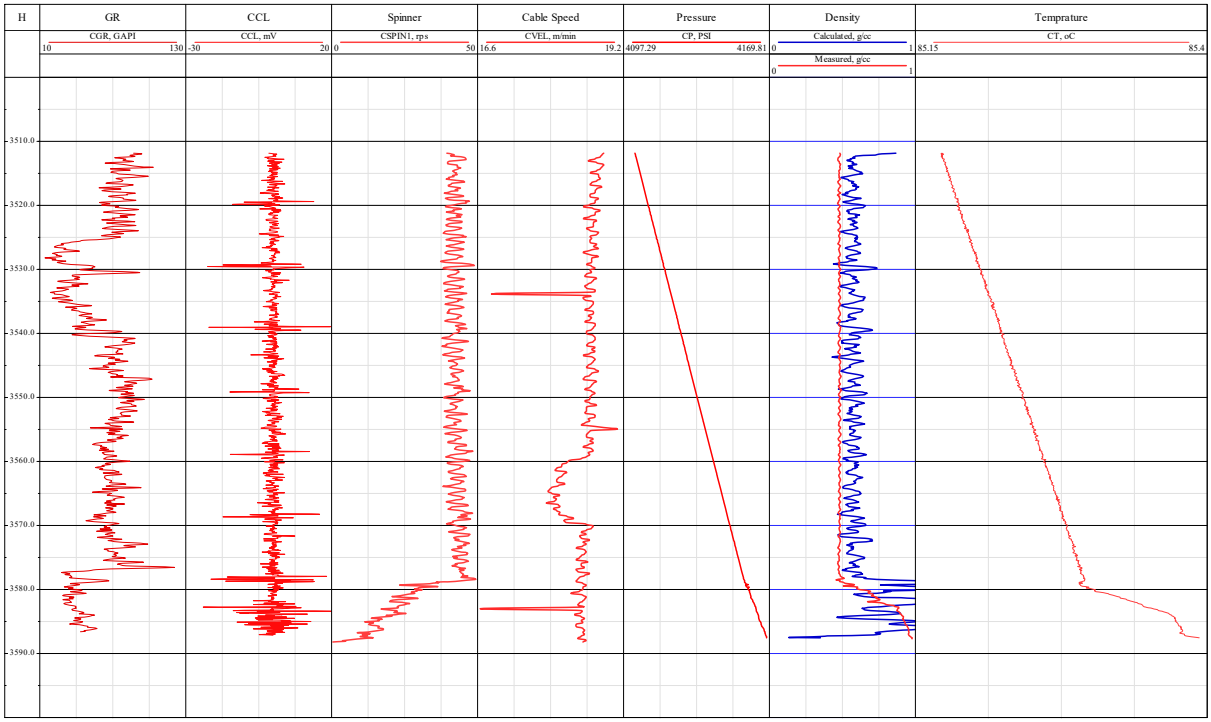
Advantages

- Suitable for high flow rate wells
- Fully autonomous
- Non-radioactive

Tool Specifications	
Resolution	0.001 g/cc
Accuracy	0.03 g/cc
Measurements range	0.0-1.4 g/cc
Maximum operating pressure	14,500 PSI (100 MPa)
Maximum operating temperature	150°C (304°F)
Tool OD	1.65 in (42 mm)
Tool length	3.12 ft (0.95 m)
Tool weight	15.4 lbs (7.0 kg)
Connections	15/16 SR
Operational time	Over 100 hrs
H_2S resistance	6% standard (25% optional)
Surface read-out / Memory	Fully autonomous (memory mode)

TUNING FORK DENSITY

The tool offers several advantages, including accurate fluid identification and reliable performance in horizontal and highly deviated wells. It is well-suited for high-flow environments and operates autonomously. As a non-radioactive device, it provides a safer, more environmentally friendly alternative to traditional density measurement tools, with minimal regulatory concerns.
TFD also serves as a reliable standalone indicator for free gas. It can also be combined with the North Side Fluid Phase Evaluation Tool (FPET) for high-precision fluid phase evaluation in a gas-oil-water environment.



The TFD data interpretation is more accurate and less noisy compared to the calculated density from the pressure gradient (same as column 6 on the chart above), allowing better distinction of fluid phases and constructing an accurate production profile.