

Capacitance/Temperature/Flow (CTF)

Combines three sensors together – capacitance water holdup, temperature and flowmeter – with a single electronics section

Applications

- Identify water entry into hydrocarbon flow
- Locate hydrocarbon/ water interface in shut-in well conditions
- Detect hydrocarbon entry into water
- Quantitative downhole fluid holdup measurement
- Distinguish producing zones from nonproducing zones
- Time-lapse shut-in or flowing temperature surveys to evaluate injection and production intervals
- Location of fluid movement behind pipe
- Leak and cross-flow detection
- Injection and production flow profiling

Features and Benefits

- Combinable with other Sondex **Ultrawire™ production logging tools**
- Three sensor measurements combined in a single tool
- Surface readout or memory operation
- Requires CTF compatible bottom end spinner

The Sondex **Capacitance/Temperature/Flow (CTF004) tool** combines three sensors together—capacitance water holdup, temperature, and flowmeter— with a single electronics section.

The sensor combination provides all three measurements in a short tool section, ensuring they are effectively taken from the same depth in the well, unlike the sensors on a standard PL string that are a much greater distance apart.

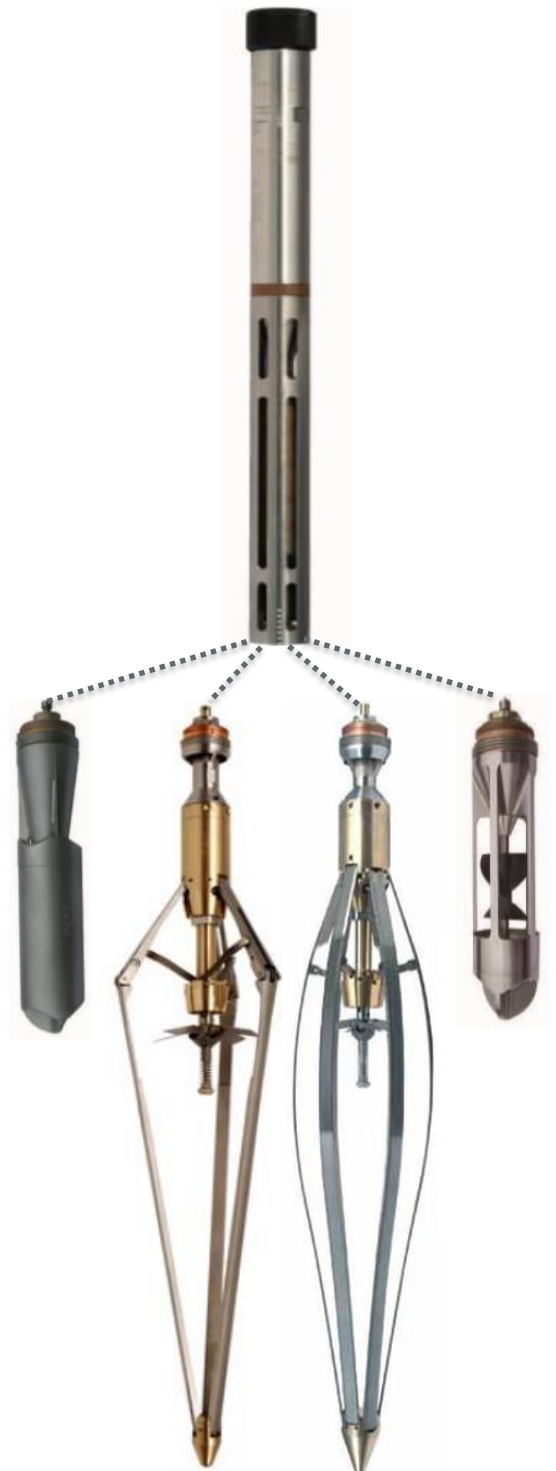
Capacitance Water Holdup:

Hydrocarbons and water have different dielectric constants. The output frequency of the probe responds to the average dielectric constant of the fluid as it passes between the cage of the tool and the inner probe. From this, the downhole water-hydrocarbon ratio can be derived.

Temperature: A platinum-resistance temperature probe responds quickly and accurately to changes in fluid temperature.

Flowmeter Electronics:

Interchangeable spinner mechanical sections are fitted to the bottom of the CTF; dual magnets and Hall effect sensors are used to detect rotation of the impeller. The signal response is converted by the flowmeter electronics, within the CTF, and output as spinner velocity.



Specifications

CTF004

Temperature rating	350°F (177°C)
Pressure rating	15,000 psi (103.4 MPa)
Tool diameter	1 11/16 in. (43 mm)
Tool length	18.5 in. (470 mm)
Tool weight	5.4 lb (2.45 kg)
Toolbus	Ultrawire production logging tool
Current consumption	23 mA
Holdup measure point	5.3 in. (135 mm)
Temperature measure point	7.2 in. (183 mm)
Holdup range	0–45% water holdup
Holdup resolution	1%
Temperature accuracy	+/- 1.0°F (+/- 0.5°C)
Temperature resolution	0.006°F (0.004°C)
Temperature response	0.5 seconds in turbulent fluid
CFB spinner threshold	1.7 ft/min (0.01 m/s)
CFS spinner threshold	5.0 ft/min (0.03 m/s)
Spinner output	10 pulses/rev (directional)
Materials	Corrosion resistant throughout