

## Capacitance/Temperature/Flow (CTF)



Part of the Short Combination Tool string (SCT), the CTF combines three sensors together—capacitance water holdup, temperature, and flowmeter—with a single electronics section.

### Description

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.

### Features

- Three sensor measurements combined in a single tool
- Quantitative downhole fluid holdup measurement
- Surface readout or memory operation
- Requires CTF compatible bottom end spinner
- Leak and cross-flow detection
- Combinable with other Ultrawire\* PL tools



# Capacitance/Temperature/Flow (CTF)

Specifications		
Model	CTF004	CTF005
Temperature rating	350°F (177°C)	
Pressure rating	15,000 psi (103.4 MPa)	
Tool diameter	1 <sup>11</sup> / <sub>16</sub> in. (43 mm)	1 <sup>3</sup> / <sub>8</sub> in. (35 mm)
Tool length	18.5 in. (470 mm)	18.5 in. (470 mm)
Tool weight	5.4 lb (2.45 kg)	4 lb (1.8 kg)
Toolbus	Ultrawire*	
Current consumption	33 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°F (+/- 0.56°C)	
Temperature resolution	0.006°F (0.003°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	



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