

WellWatcher Ultra

Distributed Temperature System

APPLICATIONS

- Distributed temperature measurements
- Control of production rates and drawdown
- Monitoring
 - Reservoir flow contributions and decline
 - Gas lift optimization and tubing integrity
 - Heavy oil thermal recovery
- Production allocation
- Injection profiling
- Gas lift optimization
- Riser flow assurance

FEATURES

- Fiber-optic distributed temperature sensing technology
- No downhole electronics
- Simple-to-use surface software, with auto-setup and optimization
- Reliable, robust instrument and extended system life
- Best-in-class measurements
 - Fast temperature resolution
 - 15-km [9.32-m] range, 6 doubled-ended or 12 single-ended channel interrogation

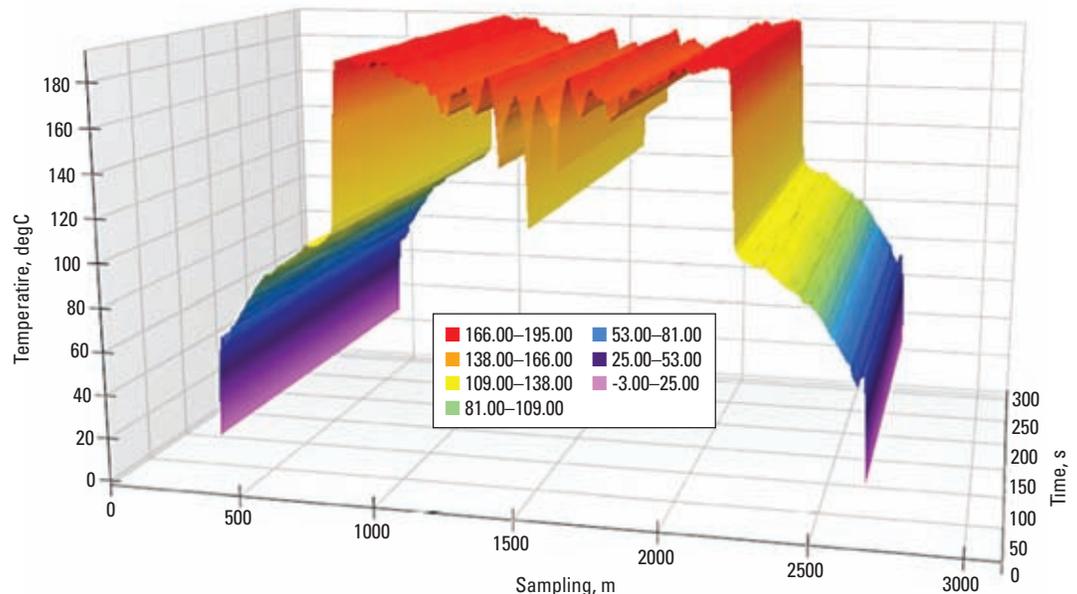
The WellWatcher Ultra* distributed temperature system provides detailed information related to a reservoir's performance through the acquisition of temperature profiles. The extremely versatile system can measure up to 15 km [9.32 mi] of fiber at a meter's resolution, update data in just a few seconds, resolve temperatures to 0.01 degC [0.018 degF], and interrogate numerous fibers from one surface system. The data obtained are available as soon as the measurement is taken. They are communicated via various industry-standard protocols or those customized by Schlumberger's engineering team to the specifics of a particular installation. The data are combinable with data obtained by other Schlumberger sensors, and experts are available to help design the best solution for a particular situation.

ACQUISITION RESULTS

Distributed temperature sensing (DTS) acquisition is configured based on the application. This configuration is typically made up of a combination of profiles, zones, and real-time alarms. Profiles include temperature measurements taken at regular intervals along the fiber. This information can be used to measure reservoir performance and to monitor completion integrity, thereby helping ensure downstream flow. Zonal areas of interest can be specified to facilitate real-time monitoring in SCADA systems and to trigger alarms for critical indicators.

DTS DATA HANDLING

Profile data are temperature measurement profiles of the entire fiber cable consisting of a series of data points. Zone data are statistical data from a particular specified section of the fiber, processed according to specification. Alarm data trigger a signal according to specifications.

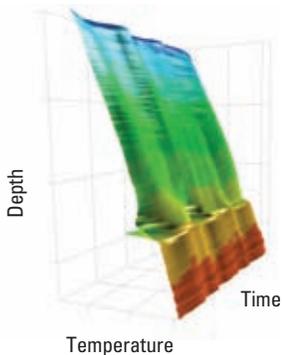


In a heavy oil steam injector, the fiber is connected to the acquisition unit at both ends (for a double-ended configuration) to provide a completely compensated correction for any losses in the fiber. This arrangement helps ensure the maximum life for the monitoring system in this aggressive working environment.

WellWatcher Ultra Distributed Temperature System

BENEFITS

- Permanent in-well reservoir monitoring
- Enhanced recovery through improved reservoir surveillance
- Improved production management
- Faster identification of production problems through best-in-class temperature resolution
- Cost-effective transient analysis
 - Fewer interventions
 - Improved optics, allowing fiber logging for a longer time, increasing system life
- Improved reliability and accuracy for high-temperature monitoring systems



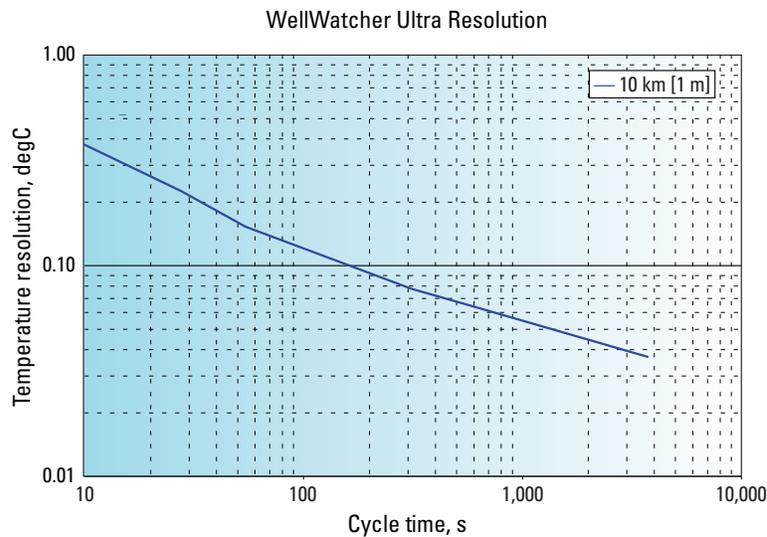
In a gas injection well with a slugging injection valve, distributed temperature measurements can quickly identify a problem valve, saving time during valve replacement and minimizing lost production.

IT INTEGRATION

The WellWatcher Ultra DTS acquisition unit has a robust database that stores all acquired data on site with local backup. In addition, various technologies are available to integrate the data seamlessly into any IT environment. Industry-standard technologies such as the Modbus communication protocol, OPC open connectivity, wellsite information transfer standard markup language (WITSML), and SQL database replication can be used to deliver the data in real time to SCADA systems, data historians, the Schlumberger InterACT* real-time monitoring and data delivery secure Web service, or simply to Microsoft Excel® software on a personal computer.

IT INTEGRATION SUCCESS

A Schlumberger client had a fiber-optic DTS installed in a production field and wanted to integrate the data into its IT environment. The client wanted the data stored and viewable locally but required that the information be quickly accessible from the main office. With the WellWatcher Ultra DTS acquisition unit, the well profiles could be stored locally, the WITSML files provided locally for quick retrieval, and the data uploaded into the reservoir management system. Modbus output provided basic system alarms linked directly to the local control room to help ensure asset integrity.



The log/log metrology plot shows the time required for a typical WellWatcher Ultra DTS acquisition unit out of calibration to reach certain temperature resolutions for 10 km of fiber. Additional optimization is possible to further improve results, depending on the application requirements.

Specifications

Range, km [mi]	15 [9.32]
Spatial resolution, m [ft]	1–4 [3.3–13.1]
Sample interval, m [ft]	0.5–2 [1.64–6.56]
Calibration accuracy, degC [degF]	±0.5 [±0.9] at (0–8 km); ±1 [±1.8] at (8–12 km)
Number of loops or fibers	6 double-ended or 12 single-ended
Fiber type	50 μ m, multimode
DTS physical dimensions	3U 19-in, rack mounted or mobile
Operating temperature, degC [degF]	0 to 40 [32 to 104]
Storage temperature, degC [degF]	–20 to 65 [–4 to 149]
Relative humidity, %	5–85 (noncondensing)
Power	AC, 90–253 V (optional DC, 24 V); Typical steady state: 50 W; maximum: 150 W
DTS communications	
DTS to PC	Ethernet 100/1000 Base T
DTS to Modbus PLC	Ethernet 10/100 Base T
Relay contact: 32 per box	RS485
Laser classification	Class 1m; (IEC/EN 60825-1 [2001])

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