

WellWatcher Ultra

DTS acquisition system

APPLICATIONS

- Monitoring of
 - reservoir flow contributions and decline
 - gas lift optimization and tubing integrity
 - heavy oil thermal recovery
- Injection profiling
- Riser flow assurance

BENEFITS

- Enhanced recovery and production management through improved reservoir surveillance
- Production allocation and control of production rates and drawdown
- Faster identification of production problems
- Longer-term fiber logging, increasing system life
- Improved reliability and accuracy for high-temperature monitoring systems

FEATURES

- No downhole electronics
- Simple-to-use surface software, with auto-setup and optimization
- Reliable, robust instrument and extended system life
- Fast temperature resolution
- Channel interrogation of 6 doubled-ended or 12 single-ended loops
- Measuring range from 3.73 mi [6 km] to 9.32 mi [15 km]

The WellWatcher Ultra* DTS acquisition system enables local and remote acquisition of data from distributed temperature sensing (DTS) fibers, including both the standard and high-temperature WellWatcher BriteBlue* multimode DTS fibers and the WellWatcher Neon* DTS, DAS, and PT gauge system's fibers. In harsh environments, an accurate single-ended (ASE) version of the WellWatcher Ultra system corrects for losses in accuracy that result when high pressures or temperatures cause optical fiber to deteriorate. In wells where the fiber has degraded, this ASE unit obtains accurate temperature profiles without the need to replace the fiber.

Data acquisition

The acquisition units can interrogate numerous fibers to obtain detailed temperature profiles of a reservoir's performance, with data available as soon as the measurements are taken. The unit measures up to 9.32 mi [15 km] of fiber at a resolution of 3.28 ft [1 m], resolves temperatures to 0.018 degF [0.01 degC], and interrogate numerous fibers from one surface system.

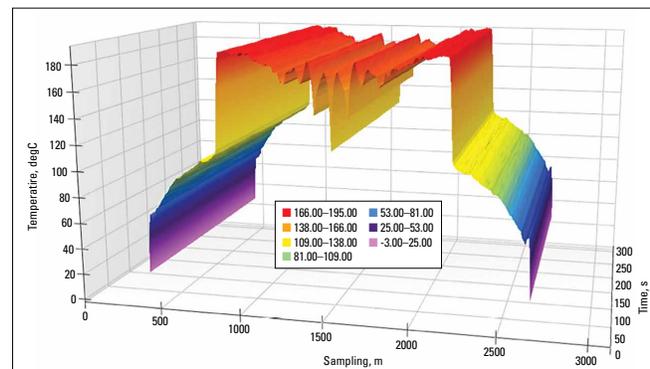
Data profiles, zone data, and alarm triggers

DTS data configuration is typically made up of a combination of profiles, zone data, and real-time alarms. Profiles include temperature measurements—a series of data points—taken at regular intervals along the fiber cable. This information can be used to measure reservoir performance and monitor completion integrity, helping ensure downstream flow. Zone data is statistical information processed according to specification. Zonal areas of interest can be specified to facilitate real-time monitoring in SCADA systems and to trigger alarms for critical indicators.

Data communication, storage, integration, and transfer

Data is communicated via various industry-standard protocols but can be customized by Schlumberger's engineering team to the specifics of a particular installation. A robust database

stores all acquired data onsite with local backup. Various technologies are available to integrate the data seamlessly into any IT environment. Industry-standard technologies such as the Modbus® communication protocol, open-connectivity (OPC), wellsite information transfer standard markup language (WITSML), and SQL database replication can be used to deliver the data in real time to



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.

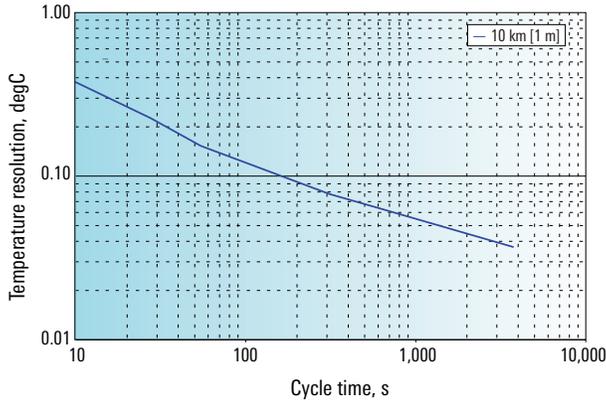
SCADA systems, data historians, the Schlumberger InterACT* global connectivity, collaboration, and information service, or simply to Microsoft® Excel® software on a personal computer.

Data uses

The data are combinable with data obtained by other Schlumberger sensors, and support teams are available to design the best solution for a particular situation.

WellWatcher Ultra

Temperature Resolution Time Required
by Typical WellWatcher Ultra System



The log/log metrology plot shows the time required for a typical WellWatcher Ultra 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.

WellWatcher Ultra System Specifications

Range, mi [km]	9.32 [15]
Spatial resolution, ft [m]	3.28–13.12 [1–4]
Sample interval, ft [m]	1.64–6.56 [0.5–2]
Temperature accuracy, degF [degC]	±0.9 [±0.5] at 0–5 mi [0–8 km]; ±1.8 [±1] at 5–9.32 mi [8–15 km]
Number of loops or fibers	6 double-ended or 12 single-ended
Fiber type	50 um, multimode
DTS unit's physical dimensions	3U 19-in, rack mounted or mobile
Operating temperature, degF [degC]	32 to 104 [0 to 40]
Storage temperature, degF [degC]	–67 to 167 [–55 to 75]
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 10/100/1,000 Base T
DTS to Modbus PLC (programmable logic controller)	Ethernet 10/100/1,000 Base T
Relay contact: 32 per box	
Laser classification	Class 1; (IEC/EN 60825-1 [2014])

**INVISIBLE LASER RADIATION
DO NOT VIEW DIRECTLY
WITH OPTICAL INSTRUMENTS
CLASS 1M LASER PRODUCT**

The above label is affixed to the WellWatcher Ultra DTS acquisition system.

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