

FIBER OPTIC PRESSURE AND TEMPERATURE
SENSORS FOR OIL AND GAS APPLICATIONS



ops^{ens}olutions

Mesure... Improve

OPSENS FIBER OPTIC P/T SENSING SOLUTION

Opsens all-sapphire fiber optic pressure and temperature sensor operates under extreme downhole conditions. It delivers in-situ real-time monitoring of downhole pressure and temperature (up to 300°C) in hydrogen and steam rich environments. It can operate at temperatures as high as 300 °C (572 °F).

Applications

Thermal Recovery Processes

Opsens sensing system is the ideal solution for monitoring downhole pressure and temperature in thermal recovery applications such as steam assisted gravity drainage (SAGD) or cyclic steam stimulation (CSS). The sensors can be deployed on coiled or production tubing in production and injection wells allowing accurate real-time measurements for reservoir surveillance, process optimization or

pump control. Fiber optic based pressure and temperature measurements make the Opsens sensing system an ideal solution for monitoring high temperatures ESP applications or progressive cavity pumps.

Unconventional and Intelligent Wells

Opsens P/T Sensing system can also be used in unconventional wells and intelligent wells. The sensors can be deployed for permanent monitoring and during well interventions.

Opsens offers an outstanding turn-key sensing solution with the OPP-W fiber optic P/T sensor, the WFC multi-fiber cable, the WellSens Gen II multi-channel surface readout unit and a full installation and field support service.

Benefits & Added Value

In-situ and continuous monitoring of the pressure along the producing well helps operators better understand the reservoir condition, rapidly detect steam breakthrough and efficiently diagnose changes in the reservoir. Such optimization of the production process enhances the oil recovery rate and reduces the operating costs associated with steam injection and oil recovery.

Opsens sensing solution is offered in both single and multiple-point configurations. Hence, it gives the operators a large choice of P/T real-time monitoring from monitoring downhole pumps to profiling a producing well.

WellSens Gen II Surface Read out & controller Unit



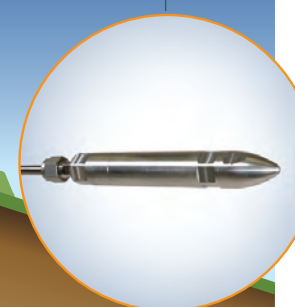
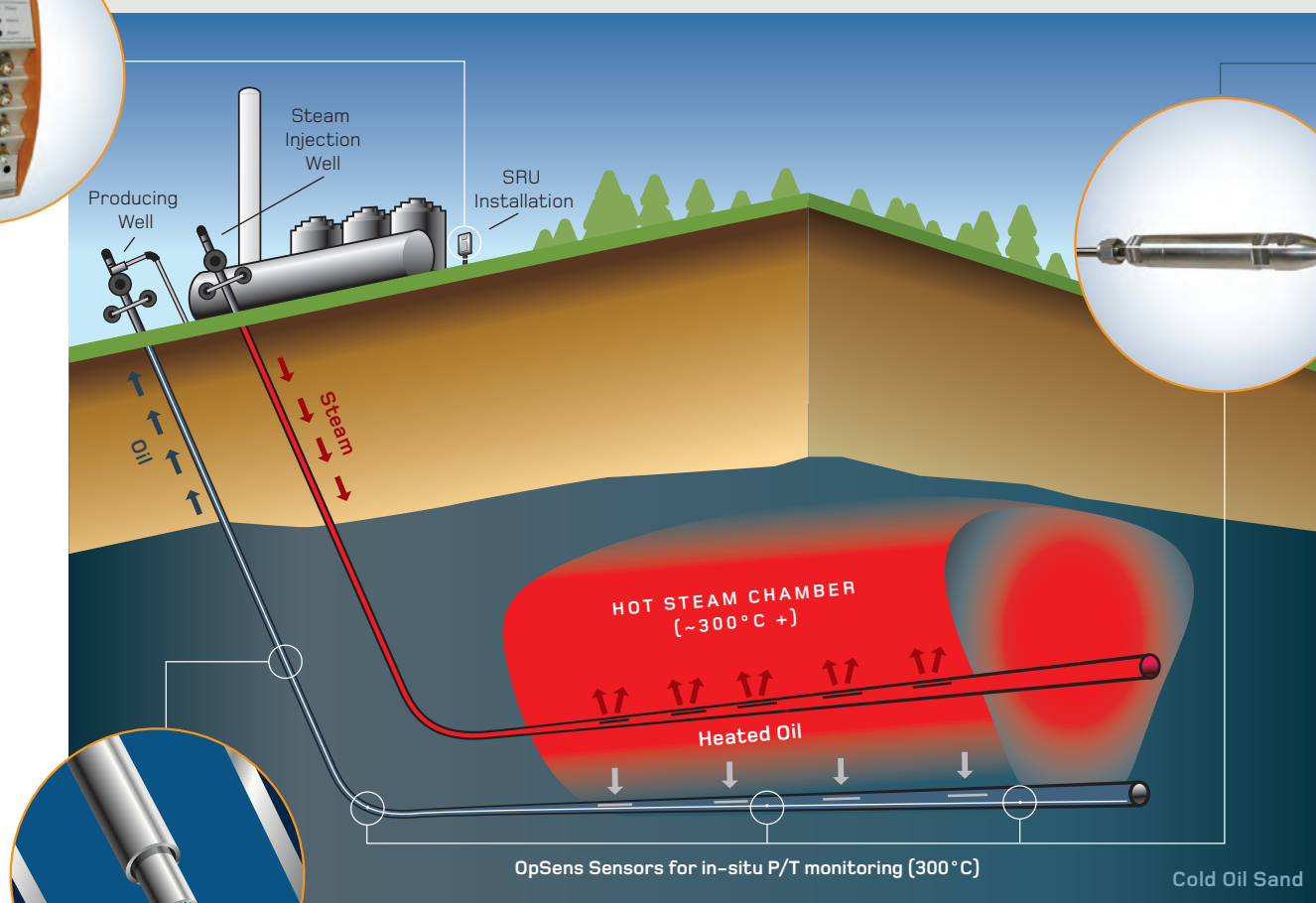
The WellSens Gen II is a robust and reliable multi-channel signal conditioner. It is compatible with Opsens' harsh environment interferometric fiber optic pressure and temperature sensor, the OPP-W. It can operate in a wide range of ambient temperatures from -20°C to +60 °C. The low power consumption, makes it ideal for remote applications operating on solar panels or generators. The modular DIN rail design allows for seamless expansion with growing requirements. The high precision, small foot print, fast sampling rates and ease of use make it the solution of choice for oil field or industrial process applications.

The Opsens' White Light Polarization Interferometry (WLPI) proprietary technology provides a means for making accurate and absolute measurements of the path length difference, which varies as a function of the parameters of interest (pressure or temperature).

The WellSens Gen II is capable of a variety of interface and communications protocols which provides easy integration to DCS systems via RS-232, RS-485, TCP/IP or ModBus or SCPI. It is also offered with an optional LCD display, internal data storage, and can be used independently for direct automation control with programmable alarms, relay logic, and standard analog voltage and currents I/O.



STEAM ASSISTED GRAVITY DRAINAGE (SAGD)



OPP-W Fiber Optic P/T Sensor

The OPP-W is a Fabry-Perot interferometer-based, fiber optic pressure and temperature sensor. The combination of its highly durable core sapphire cell and its rugged Inconel 718 housing makes it the sensor of choice for harsh oil & gas downhole environments such as SAGD, CSS and HT wells.

The OPP-W delivers long term accuracy, durability, low drift and high fidelity pressure and temperature measurements. It offers real time downhole monitoring over long periods of the oil wells' lifetime.

The OPP-W sensor is used in conjunction with Opsens' WFC Fiber cable and Opsens' WellSens signal conditioner surface unit.

For more information, see OPP-W datasheet.

WELLSSENS GEN II SPECIFICATIONS*

Number of channels	Up to 128 channels
Sensors compatibility	OPP-W, OTP-W AND OEP fiber optic cable
Sampling rate	Up to 20 Hz
Output interface	RS-485, RS-232 and Ethernet (TCP/IP)
Communication protocol	Modbus and SCPI
I/O and control option	Various analog and digital outputs (4-20 mA, ±10 V, etc.)
Data storage	Up to 8 Gb (in option)
Display	LCD screen display (in option)
Input power	24 VDC or 85-264 VAC
Consumption	10 W + 1 W x number of channels (Ex.: 16-CH unit = 26 W)
Operating temperature	-20°C to 60°C (-40°C option available on request)
Humidity	95 % non condensing

WFC Fiber Cable

The WFC is a rugged heavy duty fiber cable with up to 8 optical fibers in a protective Stainless Steel 316L or Incoloy 825 multi-tube metal structure.

Opsens proprietary fiber cable design gives the WFC outstanding performance in extreme harsh conditions such as hydrogen and steam rich downhole environments.

WFC FIBER CABLE SPECIFICATIONS*

Fiber count	2 to 8 Optical fibers
Fiber protection	Stainless Steel 316L or Incoloy 825 multi-tube structure
Cable termination	HP/HT connectors
Field fusion splicing	High Temperature resistant (325°C)
Cable length	Up to 3 km continuous length <i>Longer cable available on request</i>

OPP-W SPECIFICATIONS*

Pressure	
Range (absolute)	0 – 8000 kPa (0 - 1200 psi) Other ranges available on request
Accuracy	± 0.2% F.S.
Resolution	0.002% F.S.
Long term stability	0.5 % F.S. per annum at 300 °C
Proof pressure	200% F.S
Diaphragm material	Monocrystalline sapphire
Temperature	
Range	- 40 °C to 300 °C.
Accuracy	± 1.5 °C
Resolution	0.1 °C at zero averaging (0.01 °C at 10 minutes averaging)
Package	
Housing material	Inconel 718
Operating environment	
Hydrogen and steam	Complete immunity
EM/RF/MR/MW susceptibility	Complete immunity

* All specifications are subject to change without prior notification



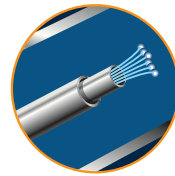
WELLSSENS GEN II

The WellSens Gen II is a robust and reliable multi-channel signal conditioner. It can operate in a wide range of ambient temperatures from -20°C to +60 °C. The modular DIN rail design allows for seamless expansion with growing requirements. The high precision, small foot print, fast sampling rates and ease of use make it the solution of choice for oil field or industrial process applications.



OPP-W FIBER OPTIC P/T SENSOR

Opsens all-sapphire fiber optic pressure and temperature sensor operates under extreme downhole conditions. It delivers in-situ real-time monitoring of downhole pressure and temperature (up to 300°C) in hydrogen and steam rich environments. The OPP-W delivers long term accuracy, durability, low drift and high fidelity pressure and temperature measurements.



WFC FIBER CABLE

The WFC is a rugged heavy duty fiber cable with up to 8 optical fibers in a protective Stainless Steel 316 L or Incoloy 825 multi-tube metal structure. Opsens proprietary fiber cable design gives the WFC outstanding performance in extreme harsh conditions such as hydrogen and steam rich downhole environments.

STATE-OF-THE-ART TURN-KEY FIBER OPTIC SENSING SOLUTION FOR HIGH TEMPERATURE WELLS, UNCONVENTIONAL WELLS AND INTELLIGENT WELLS

FIELD INSTALLATION

- Opsens Solutions offers an outstanding turn-key solution with the rugged OPP-W fiber optic P/T sensor, the WFC multi-fiber cable, the WellSens Gen II multi-channel surface controller unit, and full installation and field support services.
- Opsens Solutions high level technical resources will take care the design, the field deployment service and the field support of your total project.
- We are using various deployment methods : coiled tubing, production tubing and casing conveyed.

« To know more
call us at **+1.780.930.1777**

Email us at info-solutions@opsens.com
or visit us at www.opsens-solutions.com »

opsens ...
Solutions

10456, 176th Street, Suite 201, Edmonton Alberta, Canada T5S 1L3
☎ +1.780.930.1777 📠 +1.780.930.2077
Info-solutions@opsens.com / www.opsens-solutions.com