

Extreme-Environment Fiber Optic Pressure & Temperature Sensor

Key Advantages of Sapphire Technology

- Monolithic single-crystal sapphire sensing core
- Ultra-high temperature and pressure capability
- Hermetically sealed Fabry-Perot architecture
- Exceptional long-term stability with minimal drift
- Immune to EMI, corrosion, and harsh chemicals
- Designed for deep downhole and harsh environments

Downhole Applications Require More

Permanent downhole monitoring of pressure and temperature is essential to maximize production and extend well life in oil, gas, and geothermal applications.

Yet these environments present extreme challenges that can compromise conventional sensor performance: high pressure, elevated temperatures, hydrogen exposure, H₂S, and other corrosive species.

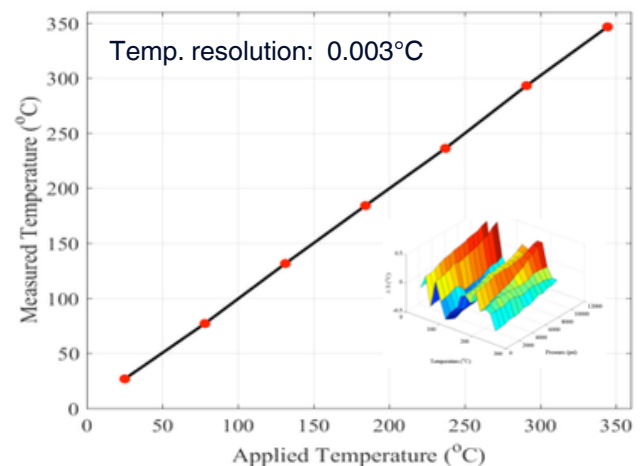
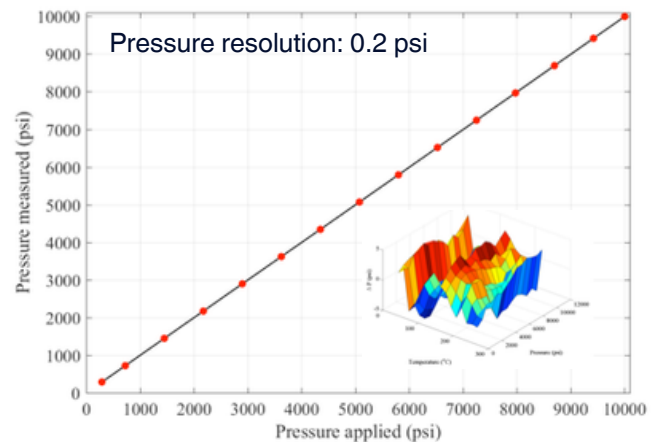
Electrical pressure sensors are typically limited to temperatures below 200°C and face depth constraints due to cable impedance. Traditional optical sensors (FBG or Fabry-Perot designs), often built from silica or multi-material structures, can operate at higher temperatures but remain vulnerable to hydrogen diffusion and mechanical creep under sustained pressure and heat. The result is drift—often significant and cumulative—leading to pressure and temperature inaccuracies over time.

NovaPT™-D



Key Specifications

- Ultra-high, 500°C operating temperature
- Long range sensing capability - 15 km
- 131 MPa maximum pressure (19 kpsi)
- <0.2% F.S. at 300°C per year pressure drift
- 0.0005°C precision, 0.5°C temperature accuracy



NovaPT™-D

Mechanical Configuration and Materials

Standard Sensor Housing

The NovaPT™-D sensor probe is packaged in a 0.75 in (19 mm) diameter housing designed for high-pressure and high-temperature service environments.

Standard Sensor Housing	
Available Materials	SS 316L Alloy 718*
Fiber-Cable Interface	Standard connection to 1/4" fiber cable
For pressure > 10,000 psi	Fiber cable connected directly to the 1/4" diameter tail section of the front 5.5" housing
Connection Methods	Direct welding Customer-specified high-pressure sealing method

*Alloy 718 is recommended for service temperatures exceeding 300 °C, even in non-H₂S environments when elevated temperature stability is required



Small Form Factor Option

A compact housing is available for applications requiring minimal physical footprint. Features include low-profile configuration and versatile optical cable integration. Compatible connection methods include metal compression fittings, laser welding, and customer-specific termination approaches

Dimensions - Small Form Factor	
Diameter	0.375 in
Length	3 in

NovaPT™-D

Technical Specifications

Sensor Performance

Parameter	
Maximum pressure	68.9MPa (10kpsi), 137.9MPa* (20kpsi)
Pressure precision	0.3 psi
Pressure accuracy	±5psi for pressures > 1kpsi
Pressure drift	<5psi at 200°C per year
Temperature precision	0.0005°C
Temperature accuracy	0.5°C
Temperature drift	<0.1°C at 300°C per year
Maximum temperature	200°C, 250°C, 300°C or custom up to 500°C (metal coated optical fiber required)
Sampling rate	1 Hz

*Available for a ¼" tube tail from the 5.5" sensor housing

Environmental

Parameter	Value
Operating temperature	Extreme-environment rated
Chemical compatibility	Corrosive and sour gas
Shock & vibration	Downhole qualified
Sensor dimensions	0.75" (diameter) x 25" (length) 0.375" (diameter) x 3" (length) Option
Sensor packaging material	SS 316L or Alloy 718

Optical Interface

Parameter	Value
Fiber type	9 µm-core Singlemode
Connector	LC/APC
Interrogator compatibility	Sentek Coswave platform

NovaPT™-D

Technical Specifications - Surface Interrogators

Sentek Coswave™

Parameter	
Sensor channels	Up to 15
Maximum sensing distance	15 km
Maximum fiber loss	10 dB one-way
Power supply and consumption	240/110V, 50/60Hz, 5W
Dimension and weight	215 x 205 x 55mm; 1.45kg
Computer interface	Ethernet
Operating environment conditions	0 to 60°C; 10-95% humidity with no condensation

Sentek's Coswave™ interrogator is a compact, ruggedized optical interrogation platform engineered for precision measurements in harsh industrial environments. Built around a thermally stabilized photonic architecture and high-speed digital signal processing electronics, Coswave™ delivers Class I eye-safe output through standard 9 μm singlemode fiber while maintaining exceptional wavelength stability and low noise performance. Operating in the low-loss C-band, the system enables long-range sensing distances up to 15 km with high signal integrity. Its robust construction, wide dynamic range, and fast demodulation capability allow simultaneous, time-resolved pressure and temperature measurements from sapphire-based sensors, making it well suited for high-temperature, high-pressure, and vibration-intensive applications.



Key Features

- Compact, ruggedized optical interrogation platform for harsh industrial environments
- Thermally stabilized photonic architecture for superior wavelength stability
- High-speed digital signal processing for precise, time-resolved measurements
- Low-noise design with wide dynamic range
- Operates in the low-loss C-band for maximum transmission efficiency
- Long-range sensing capability up to 15 km
- Simultaneous pressure and temperature demodulation
- Optimized for high-temperature, high-pressure, and vibration-intensive environments

NovaPT™-D

Fiber Coating Configuration

Max Operating Temperature (°C)	Suggested Fiber Coating
80	Standard Acrylate
150	High-temperature acrylate
300	Polyamide
400	Aluminum or Copper
600	Gold

Ordering Information

Please send your quote request to sales@sentekinstrument.com and specify sensor maximum operating temperature, maximum pressure, housing material (SS316L versus Alloy 718) and interrogator channel count.

