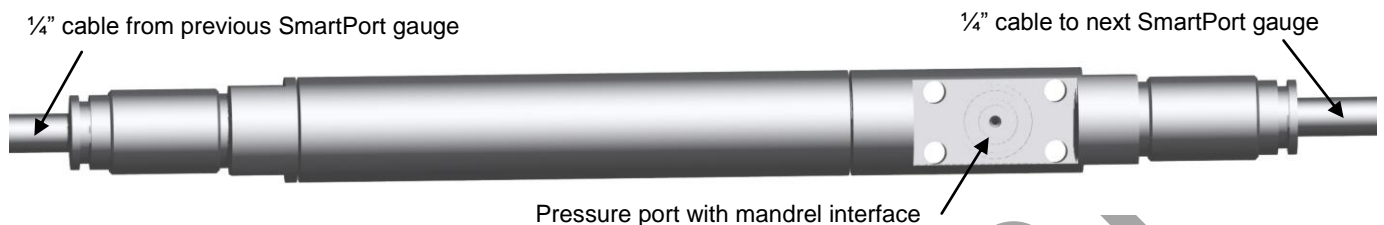


- HPHT fibreoptic gauge
- No downhole electronics
- All metal sealing
- Long life at extreme temperature
- High multi-drop capability
- Annulus, tubing or ported pressure configurations
- Low profile 3/4" design
- Low Cost



Smart Fibres have been developing a multi-drop downhole fibreoptic P/T gauge capability since 2003. Our Downhole SmartCell www.smartfibres.com/docs/Downhole_SmartCell.pdf was first deployed in Oman in 2008, with nine gauges run in hole on a single cable (ref). SmartCell is a diaphragm pressure transducer, providing high resolution measurements at elevated temperatures and moderate pressures.

Some of the applications for multi-drop P/T gauges demand a higher operating pressure or smaller space envelope than SmartCell can offer. In response to these demands we have developed SmartPort, a high pressure fibreoptic P/T gauge with a small 3/4" tubular section. Pressure is communicated via a small pressure port on the gauge body to SmartPort's novel internal optical sensing mechanism (the subject of an international patent application), where pressure and temperature measurements are made using two fibre Bragg grating sensors.

Annulus wellhole pressure and temperature are simply measured by attaching SmartPort to the tubing string and leaving the pressure port open. For formation pressure and temperature measurements, the low profile gauge can be deployed open hole behind the casing. For tubing pressure and temperature measurements, SmartPort can be bolted to a gauge mandrel with the use of dual metal o-ring or c-ring seals. Pressure from alternative locations can be communicated to SmartPort via a tube which seals to the gauge at the mandrel interface.

Multiple SmartPorts can be multiplexed on a 1/4" downhole cable to which the gauges are sealed using pressure testable swaged connections. Optical connection between SmartPort gauges is made using our 3/4" SmartLink product www.smartfibres.com/docs/SmartLink.pdf. Up to 15 SmartPort gauges can be multiplexed on every 2 fibres. So, for instance, 30 gauges can be deployed using a 4 fibre main cable and one downhole 'Y' splitter.

SmartPort Specifications (Preliminary)

Measurement	Pressure and Temperature of annulus, tubing or ported fluid	
Working Pressure Range (psi / bar)	Atmospheric to 15,000 / 1,000 (> 15,000 / 1,000 to follow)	
Overload Pressure	150 %FS	
Working Temperature Range (°F / °C)	0 to 400 / -20 to 200 (> 400 / 200 to follow)	
Pressure Accuracy	< 0.1 %FS	
Pressure Resolution	0.01 %FS	
Temperature Accuracy (°F / °C)	0.2 / 0.1	
Pressure Measurement Drift	at 140 °F / 60 °C	Immeasurable
	at 260 °F / 125 °C	0.1 %FS/yr
	at 400 °F / 200 °C	0.5 %FS/yr*
Multi-drop capability	Up to 15 gauges per 2 fibres	
Wetted Parts	Inconel	
Dimensions (in)	3/4 x 9	

Smart Fibres maintains a policy of continuous improvement so specifications may change without notice.

* Expected performance, not yet verified