DataSphere™ ROC™ Permanent Downhole Gauges

RELIABLY MONITOR DOWNHOLE CONDITIONS

OVERVIEW

Halliburton DataSphere™ ROC™ permanent downhole gauges (PDGs) help increase productivity through the life of the well or reservoir by providing reliable, real-time permanent monitoring of downhole conditions. Based on an industry-standard, field-proven resonating quartz crystal sensor, ROC gauges can be used for single-or multi-zone monitoring applications. In multi-zone applications, variations of the standard gauge are available, along with dual, triple and quad splitter block assemblies for multi-drop capabilities.
Halliburton has installed more than 1,000 ROC permanent gauge systems – both as standalone systems and as integrated components of a SmartWell® completion system – worldwide.

APPLICATIONS

- Life of well production monitoring
- Life of field reservoir monitoring
- SmartWell completion system optimization
- Artificial lift optimization

BENEFITS

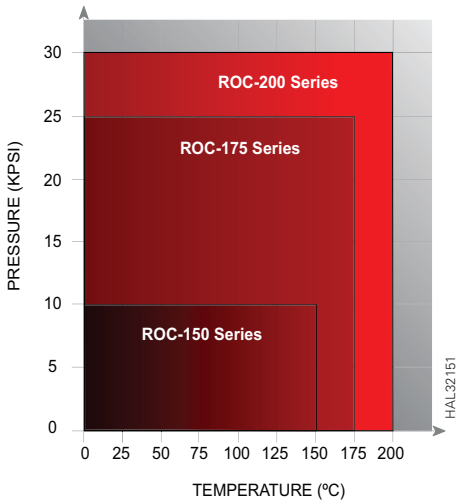
- Obtain continuous pressure and temperature data without the need for well intervention
- Enhance reservoir management
- Increase system reliability using stable pressure/temperature measurements gained from state-of-the-art testing

FEATURES

- Incorporates the most advanced high temperature electronics available in the marketplace
- Accurate quartz pressure/temperature sensor
- Designed for harsh environments up to 30,000 psi
- Dual-pressure testable metal-to-metal sealing arrangement on both gauge and cable termination
- Reduced outside diameter gauge design
- Multi-drop capability on a single tubing-encased conductor (TEC)
- Flow measurements for specific applications
- Hermetically sealed electron beam-welded design

ROC GAUGE DESIGNS

- Quartz transducer
- Hybrid technology
- Maximum 200˚C operating temperature
- Multi-drop capability – up to eight gauges at 30,000 ft downhole cable
- Dual sensor feedthrough capability
- Improved shock and vibration performance
- 0.75-in. OD slimline design availablle



ROC™ gauge environmental chart

MECHANICAL ARRANGEMENT

The ROC gauge mechanical arrangement consists of all "wetted" parts manufactured from high-performance, NACE-compliant corrosion resistant alloys (CRAs).

CABLE TERMINATION

The cable termination is provided with a pressure-testable dual metal-to-metal ferrule seal arrangement for isolating the downhole cable outer metal sheath from the well fluid.

TESTING

The complete ROC gauge (sensor and electronic boards) is independently calibration-checked in our calibration facility. A calibration certificate is included with each gauge and is provided before each installation.

New gauge designs are subjected to a Highly Accelerated Lifetime Test (HALT) program. This program is a series of controlled environmental stresses designed to ensure that stringent criteria are met for thermal shock, mechanical shock, vibration and thermal aging.

During manufacture, all gauges are also subjected to Environmental Stress Screening (ESS) to highlight any defect in functionality prior to installation at the wellsite. This method of screening has proven to be far more effective than "burn-in" techniques.

All ROC gauges are further subjected to pressure tests at elevated temperatures during Factory Acceptance Testing (FAT)

Reliability testing demonstrated 13.55 years at 150°C – exceeding target reliability of 10 years at 150°C.

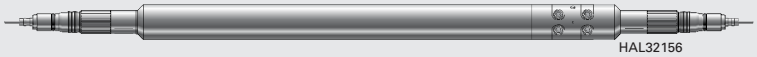
ROC™ Gauge Family - Temperature Performance

Accuracy (˚C)	0.5
Typical Accuracy (˚C)	0.15
Achievable Resolution (˚C/sec)	< 0.005
Repeatability (˚C)	< 0.01
Drift at 177˚C (˚C/year)	< 0.1

ROC™ Gauge Family - Pressure Performance

Pressure Range (psi/bar)	0 to 10,000 / 0 to 690	0 to 16,000 / 0 to 1,100	0 to 20,000 / 0 to 1,380	0 to 25,000 / 0 to 1,725	0 to 30,000 / 0 to 2,070
Accuracy (% FS)	0.015	0.02	0.02	0.02	0.025
Typical Accuracy (% FS)	0.012	0.015	0.015	0.015	0.02
Achievable Resolution (psi/sec)	< 0.006	< 0.008	< 0.008	< 0.010	< 0.010
Repeatability (% FS)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Response Time to FS Step (for 99.5% FS)	< 1 sec	< 1 sec	< 1 sec	< 1 sec	< 1 sec
Acceleration Sensitivity (psi/g – any axis)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Drift at 14 psi and 25˚C (% FS/year)	Negligible	Negligible	Negligible	Negligible	Negligible
Drift at Max. Pressure and Temperature (% FS/year)	0.02	0.02	0.02	0.02	0.025

ROC™ Gauge

Configurations	ROC-150	ROC-175				ROC-200		
	10k	16k	20k	25k	30k	20k	25k	30k
Single Pressure/ Temperature Sensor	 HAL32155							
	√	√	√	√		√	√	
Single Pressure/ Temperature Sensor + Feedthrough	 HAL32156							
	√	√	√	√		√	√	
Dual Pressure/ Temperature Sensor	 HAL32157							
	√	√	√	√		√	√	
Dual Pressure/ Temperature Sensor + Feedthrough	 HAL32158							
	√	√	√	√		√	√	
Dual Pressure/ Temperature Sensor Fully Redundant	 HAL32159							
	√	√	√	√	√	√	√	√
Dual Pressure/ Temperature Sensor Fully Redundant + Feedthrough	 HAL32160							
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Special calibration available upon request								

For more information on any of the details featured here, please email us at completions@halliburton.com

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