OVERVIEW

Operators want maximum recovery, control and safety for the life of their reservoirs, all while under pressure to reduce costs. Methods to monitor reservoir performance without shutting in the well, and the drive to optimize reservoir performance is more critical than ever before. Continuous reservoir pressure and temperature monitoring behind casing would be ideal, but pore pressure measures only during the drilling phase. And injection profiles have costly safety factors, and unmonitored pressure regimes in the overburden results in costly and risky drilling operations.

Until now. The DataSphere™ LinX® monitoring system is a step change in reservoir monitoring enabled by wireless through-casing power and communication. With the LinX system, sensors are permanently placed behind the well barriers – right where they need to be – monitoring without compromising well integrity or changing the well design, and without major revisions to the drilling program.

DataSphere™ LinX® Monitoring System
BEHIND CASING RESERVOIR MONITORING
Here’s how

The LinX monitoring system is a wireless through-wellbore technology that enables the placement of a permanent pressure/temperature gauge behind the casing or liner in the cement, using electromagnetic power and communication to drive and communicate with sensors, without the need for batteries or extra barrier penetrations. Power and communication with surface is provided by industry-standard cable and an IWIS interface card, enabling the system to be combined with traditional downhole monitoring on a single cable.

Behind casing reservoir monitoring

The LinX system senses any pressure/temperature fluctuations in the formation. This enables the operator to detect pressure changes, while producing or injecting, in:

» Overburden
» Caprock
» Reservoir
» Cement

This newly gained knowledge yields significant benefits. Production increases, reduced drilling cost drives down CAPEX, and fewer integrity verification programs lowers OPEX, all while helping ensure safe operation of the well and reducing the risk of costly non-productive time.

How it works

LinX system monitoring is a three-step process powered by electromagnetic currents powering quartz pressure and temperature (P/T) gauge sensors.

1. One sensor and coil are fitted on the casing or liner using a custom casing pup.
2. Another sensor and coil are fitted on the tubing using a custom tubing joint. The tubing-conveyed sensor is then connected to surface via a traditional downhole cable.
3. Using the two coils, electromagnetism powers and communicates with the casing-conveyed sensor.

The electromagnetic transfer of power, does not have the limitations of batteries, enabling unlimited transfer of data over the life of the well as needed for permanent monitoring.

**BENEFITS**

» Requires no periodic integrity tests, saving testing costs, reducing risk and helping eliminate the cost of deferred production
» Provides real-time barrier and in situ reservoir status monitoring
» Enables reservoir and integrity monitoring by continuously providing P/T from caprock and cement
» Less need to compensate insecurity with costly drilling programs
» Customizable to any well design – single, multi-zone, intelligent, standard, subsea, dry tree
» Compatible with the Halliburton ROC™ permanent downhole gauges as both can be run on the same interface card and downhole cable

**Permanent Gauge**

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure range</td>
<td>0-10,000 PSIA</td>
</tr>
<tr>
<td>Temperature range</td>
<td>0-150 °C (32-302 °F)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/- 5 psi / +/- 0.1 °C</td>
</tr>
<tr>
<td>Resolution</td>
<td>&lt; 0.02 psi / &lt; 0.01 °C</td>
</tr>
<tr>
<td>Drift at maximum pressure and temperature (per year)</td>
<td>&lt; 2 psi/yr / &lt; 0.2 °C/yr</td>
</tr>
<tr>
<td>Cable type</td>
<td>1/4” OD Mono-conductor/ TEC</td>
</tr>
<tr>
<td>Gauge diameter</td>
<td>19.05 mm / 3/4-in.</td>
</tr>
<tr>
<td>Gauge material</td>
<td>Inconel 718 / Per NACE MR-0175</td>
</tr>
<tr>
<td>Electrical wellhead requirements</td>
<td>1-pin conductor - 0.75sqmm feedthrough</td>
</tr>
<tr>
<td>Downhole network capacity per cable</td>
<td>12 single / 6 A/B-annulus nodes or combination</td>
</tr>
<tr>
<td>Seals</td>
<td>All primary seals are metal-to-metal seals</td>
</tr>
</tbody>
</table>

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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