Insert ResTraq

SSS 000011-003

Reservoir Monitoring

Qteq's Insert ResTraq reservoir surveillance systems provide continuous, real-time downhole pressure data. The technology platform is highly flexible, enabling a variety of pressure sensor types to be incorporated into a freely-configurable, modular and extendable system architecture, tailored to suit well conditions.

The system architecture can be deployed through tubing, and without the aid of a workover rig. Insert ResTraq systems can therefore be installed in existing completed production or observation wells, for long-term production monitoring and reservoir surveillance.

This retrofit capability is made possible through use of an innovative capillary suspended system mounted on top of the wellhead. A bottom hole assembly toolstring, housing one or more downhole pressure gauges, is lowered on the end of one or more tubing encapsulated conductor (TEC) cables. This specially armoured TEC cable is spooled from a hydraulic spooling unit to the target sensing depth. Conventional wireline PCE is also used for installation of Insert ResTraq systems in live wells with pressure at the wellhead.

Once at setting depth, the TEC cable is anchored in the capillary suspension system, cut and then terminated into a Wellhead Outlet (WHO), sealed in a port through the Termination Cap. Once the pressure survey has been completed, or if the pressure sensor needs to be replaced, or even upgraded, the Insert ResTraq system can be retrieved using the spooling unit and optional wireline PCE.

This rig-less capability can be significantly more cost-effective than conventional, rig-deployed, permanently installed pressure-monitoring systems.

Features and Benefits

- A variety of pressure sensor types can be accommodated to suit survey objectives.
- Fully welded gauge construction, incorporating an integral pressure-testable cable head.
- Cable head design facilitates a metal-to-metal seal with the downhole tubing encapsulated cable (TEC).
- Multiple gauges can be connected to a single common TEC cable for redundancy purpose.
- The suspended gauge architecture enables systems to be retrofit to existing boreholes and wells.
- Rig-less deployment of suspended gauge systems minimises system cost and installation cost.
- The wall thickness of the armour has strong tensile and crush resistance, while still accommodating a small bend radius.
- The TEC is terminated inside a flameproof surface junction box, with armoured cable used to carry the signals from the downhole sensor to the Surface Data Acquisition (SDA) unit for added protection.
- The SDA system is housed in an enclosure with suitable climate rating to comply with electrical safety requirements and maintain reliable operation.

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Applications

- Reservoir depletion surveillance.
- Coal seam drainage monitoring.
- Production monitoring.
- Interference testing.
- Hydraulic fracture stimulation monitoring.
- Monitor pressure transients during planned and unplanned shutdowns.

Key Components

Digital Pressure & Temperature Gauge **TSS 000001**

Employs a monocrystalline silicon piezo-resistive sensor, with a wheatstone bridge etched into the silicon substrate. This results in excellent long-term stability characteristics and optimises sensor sensitivity. Pressure and temperature measurements are transmitted digitally to the Surface Data Acquisition unit for decoding and archiving.

BHA Assembly **TSS 020001**

Comprises a number of modules that can be freely configured to suit well depth and conditions. The pressure gauges are housed inside hollow perforated housings. Amount and size of weight bars in the BHA Assembly can be adjusted to suit the application and well depths. Roller Guides can also be added to aid installation in deviated wells

Tubing Encapsulated Cable (TEC) **TSS 000004**

Provides a reliable, high performance electrical pathway for transmission of encoded measurements from the digital gauges to surface. The cable is engineered to maintain mechanical and electrical integrity for the life of the well, and comprises an insulated braided conductor inside a pressure-rated control line armour. This armour isolates the insulated conductor from the well environment. The TEC is protected from damage during deployment by means of a thermoplastic encapsulation that is suited to contend with in-situ chemical and temperature conditions.

Wellhead Suspension Assembly **TSS 020003**

Maintains well pressure control during installation and retrieval of the Insert ResTraq system, and throughout its operating life. It is available in a range of pressure ratings, with flanged and threaded connection types available to suit every wellhead.

Wellhead Outlet (WHO) – Type D-10K **TSS 000006**

Designed to facilitate cable feed-through and termination of the downhole electrical TEC through the wellhead. The TEC is fed through the tubing hanger, sealed at both top and bottom sides and then wrapped around the neck of the hanger. The TEC is then routed through a port in the spool piece and into the bore of the wellhead flange.

Gauge Interface Card – Type D-GP **TSS 000007**

Decodes digital signals transmitted by the downhole gauges and applies calibrations files to the decoded data to compute measured pressure and temperature values in the desired units. The computed values, together with diagnostics and system health data, are output through an RS485 interface using Modbus protocol to the PLC.

Surface Data Acquisition (SDA) Unit **TSS 000009**

Comprises one or more Gauge Interface Cards to power one or more digital pressure and temperature gauges in one or more well. Pressure and temperature data computed by each card is presented to a single separate Modbus card. This card is either interfaced to an in-field SCADA system, via a wired connection or wireless RTU system, or to a separate GSM or Iridium modem card within the SDA unit. This card transmits data from all sensors to a 3rd party or dedicated Data Historian and Visualisation Server.