Multi-Zone ResTraq

SSS 000004-006

Reservoir Surveillance

Qteq's Multi-Zone ResTraq reservoir surveillance systems provide continuous, real-time measurements of wellbore pressure across one or more formations, from a single well.

ResTraq's multi-drop sensor technology platform is highly flexible, enabling a variety of pressure sensor types to be incorporated into a freely-configurable, modular and extendable system architecture.

ResTraq equipment selection is tailored to suit in-situ well conditions, with a broad menu of equipment options to choose from.

This pressure gauge architecture also easily integrates with multi-zone feed-through zonal isolation packers and other completions accessories, such as WEGs, Nipples, SSDs and Pump-Out Plugs. Multi-Zone ResTraq systems can be installed in both open hole and cased hole wells.

Features and Benefits

- A variety of pressure sensor types can be accommodated to suit survey objectives. The gauges can be housed in sensor mandrels for deployment on casing or completion tubing, or can be clamped to coil tubing using special sensor protectors.
- Each gauge can be connected to a dedicated TEC, allowing multiple gauges to be deployed on combination of casing and/or completion tubing and/or coil tubing in a single well.
- Alternatively, multiple gauges can also be connected to a single common TEC, with all gauges deployed on casing or completion tubing or coiled tubing in a single well.
- 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 instrument cables are terminated inside a flameproof surface junction box, with armoured cable used to carry the signals from the downhole sensors to the Surface Data Acquisition system for added protection.
- The Surface Data Acquisition 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.

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

Decodes digital signals transmitted by the downhole gauges and applies calibration 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.

Gauge Mandrel **TSS 000003**

Comprises a pocket welded to a short pup joint to protect gauges during deployment and to insulate them from excessive vibration during well life.

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 multi-strand 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.

Cross Coupling Protectors (CCP) **TSS 000005**

Designed to secure the downhole electrical TEC to the casing, completion tubing or coil tubing, and protect it from damage during deployment and well completion operations across all casing and pipe connections and other external upsets.

Completion Packer **TSS 030001**

Qteq's hydraulic-set cased hole Completion Packer is an industry proven packer design, activated using tubing pressure, and is retrievable through straight tensile pull. Triple seal elements provide redundancy for all well conditions, where packer element material selection is based upon anticipated well conditions. Casing slips, once activated, ensure zero movement throughout packer life.

Sliding Sleeve **TSS 030002**

Qteq's CMD & CMU Sliding Sleeves are high performance, equalizing sleeves, which allow communication between tubing and annulus for circulation, sampling or selective zone production. When required, the sleeve is shifted open using standard wireline techniques and shifting tools. The flow area of the flow ports exceeds the cross section of the tubing above, leaving the tubing as the main restriction for flow of gases and liquids.

Profile Nipples **TSS 030003**

Qteq's X and XN Nipple Profiles are industry standard profiles that can perform a variety of tasks. The nipples can be used to run plugs for temporary well abandonment, hang memory gauges for short to long term pressure and temperature monitoring and setting artificial lift systems, amongst many other applications. Qteq has a wide variety of sizes and seal bores available to suit all requirements and applications.

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Wireline Entry Guide & Pump Out Plug **TSS 000004**

Qteq's Wireline Entry Guide (WEG) proven industry design enables wireline-deployed toolstrings to re-enter a tubing string safely, with no risk of hang-up. Without this device, wireline operators could face difficulties exiting open or cased hole sections below the tubing string. Qteq also provides a Pump Out Plug (POP) that allows completion packers to be set through applied tubing pressure. The POP can be configured to activate at pressures exceeding minimum packer setting pressures.

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.

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.