

Multi-Zone AquiTraq

SSS 000001-008



Groundwater Monitoring

Groundwater stored in aquifers is an essential resource for agricultural, municipal, industrial, stock and domestic users. Development and production of co-located mineral and energy resources can potentially interfere with those aquifers and threaten quality of life for local communities and wildlife.

Qteq's Multi-Zone AquiTraq monitoring systems enable continuous, long-term fluid level monitoring of one or more discrete aquifers from within a single borehole. This provides an immediate indication of whether nearby O&G and mining operations are drawing down or invading groundwater and deeper aquifer resources.

AquiTraq's multi-drop sensor technology platform combines systems developed for harsh environment applications that have been adapted to provide long-term reliability at an affordable price point in more benign conditions encountered in aquifer boreholes. The technology platform is also highly flexible, enabling a variety of pressure sensor types to be incorporated into a freely-configurable, modular and extendable system architecture.

This pressure gauge architecture easily integrates with multi-zone feed-through zonal isolation packers and other completions accessories, such as WEGs, Nipples, SSDs and Pump-Out Plugs.

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).
- The gauges can either be housed in dedicated sensor mandrels or clamped using special sensor protectors for deployment on casing, completion tubing, or coil tubing.
- Each pressure gauge can be connected to a dedicated TEC, or alternatively, multiple gauges can be connected to a single common TEC.
- Use of an armoured TEC design extends metal-to-metal sealing through the tubing hanger and wellhead systems.
- The TEC armour has strong tensile strength and crush resistance, while still accommodating a small bend radius.
- The pressure gauge multi-drop architecture and completions design enable multi-zone monitoring systems to be deployed without need for TEC splices.
- Each TEC is terminated inside a flameproof surface junction box, with armoured cable used to carry the signals from the downhole sensors to the Surface Data Acquisition (SDA) unit for added protection.
- The SDA unit is housed in an enclosure with suitable zone and climate rating to comply with electrical safety requirements and maintain reliable operation.

Applications

- Monitor aquifer integrity
- Delineate pressure variations between aquifers
- Monitor for communication between aquifers
- Conduct inter-well interference or pulse tests

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.

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.