

Wireless Fluid Level Monitoring

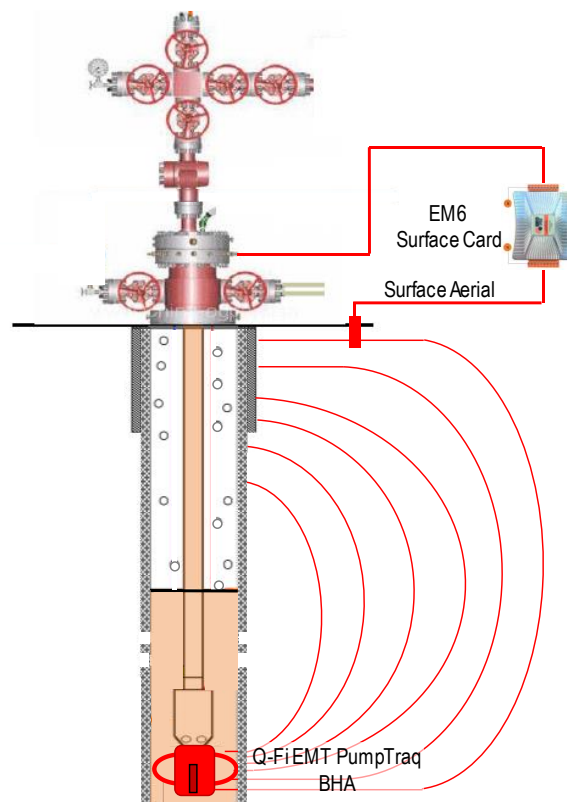
In many cases, the cleat system of undisturbed coals will be water filled and subjected to a hydrostatic head that exceeds the desorption pressure of gas occupying pores in the coal matrix. Therefore, water must be removed to lower the hydrostatic head below the gas desorption pressure to initiate coal seam gas (CSG) production. This is achieved by incorporating some form of submersible pump in the CSG well completion design.

Qteq's Q-Fi EMT PumpTraq system is a breakthrough wireless downhole technology for monitoring the water level above the pump. The system employs electromagnetic telemetry (EMT) to transmit pump intake pressures through the surrounding overburden. The EM signal is detected at surface using one or more ground antenna, connected to an EM6 Surface Receiver Card. This card decodes the EM signal and outputs extracted pressure data as either a 4-20mA signal or via a Modbus interface.

This data is used to safeguard against the pump-off condition, which can cause rapid failure of submersible pumps, resulting in frequent, costly CSG well workovers.

The data is also used to prevent rapid well pumpdown during pump start-up operations, which can induce solids production. Using Q-Fi EMT PumpTraq to maintain the water level a minimum safe distance above the pump inlet also enables CSG operators to accelerate dewatering timeframes.

Q-Fi EMT PumpTraq has been custom-designed for CSG environments, and employs the same pressure



sensor technology incorporated in Qteq's field-proven digital ResTraq pressure gauge technology

The signals output by the EM6 Surface Receiver Card can either be interfaced with the CSG operators' infield networked data communications ecosystem or connected directly to a third-party pump controller.

Very extensive best practices have also been developed to ensure reliable installation and long-term performance of Q-Fi EMT PumpTraq systems.

Features and Benefits

- Wireless telemetry eliminates need for tubing encapsulated communication cable (TEC) and cross-coupling protectors (CCP), allowing live CSG well workover operations.
- Wireless telemetry also eliminates risk of costly and protracted TEC fishing and CCP milling operations in CSG wells with parted production tubing, and enables PCP completions to be deployed more rapidly.
- Removal of TEC eliminates associated failure modes, thereby improving overall system reliability.
- Eliminating deployment of TEC and CCPs reduces HSE risks (no pinch points, no exclusion zones, no lifting ops.).
- The pressure sensor is set below the PCP, enabling annulus water level to be set closer to the pump intake.
- Customisable, pressure-dependent, smart sampling optimises multi-year battery life.

Applications

- Optimise CSG dewatering strategies.
- Prevent pump-off condition.
- Prevent rapid pumpdown.
- Monitor pressure transients during planned and unplanned shutdowns.

Key Components

Q-Fi EMT Gauge Carrier

TSS 000015

Houses the pressure gauge, EMT electronics and an extended length battery pack. The carrier comprises an electronically non-conducting sleeve sandwiched between metal top and bottom end subs to create an EM antenna with other components of the well completion and casing strings. The Q-Fi EMT Gauge carrier is positioned below the submersible pump and above and the Completion Contact Spring.

Q-Fi EMT Pressure Gauge

TSS 000040

The pressure gauge 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. The EMT electronics converts raw pressure measurements into engineering units and converts the measurement into a binary data stream. An on-board EM transmitter modulates an EM signal with this binary value and injects it into the formation surrounding the well casing via the Q-Fi EMT Gauge Carrier and Completion Contact Spring.

Completion Contact Spring

TSS 030007

This multi-purpose completion accessory forms part of the EM antenna for guiding propagation of the EM signal into the formation surrounding the well.

Centralisers

TSS 000030

Qteq's Centralizers are strategically clamped at various locations on the completion string to provide stand-off shock protection for the Q-Fi EMT Gauge Carrier and maximise contact between the Completion Contact Spring and well casing.

Q-Fi EM6 Surface Receiver Card

TSS 000033

Decodes the digital EM signal transmitted by the downhole Q-Fi EMT Pressure Gauge and detected by surface ground arials connected to the EM6 Receiver Card. The extracted pressure data, together with diagnostics and system health data, are output through an RS485 interface using Modbus protocol to the PLC. Pressure data can optionally be output as a 4-20 mA signal.