

PRO-LOG[™]

WIRELESS THERMAL MAPPING OF THE PAYZONE

PRO-LOG is a wireless temperature monitoring system that permits a continuous high-resolution temperature profile to be gathered from any section of a well. Combining precision and reliability with robustness, PRO-LOG is deployed on perforating guns, tubing, casing, or sand screens, and is adaptable for short or long-term applications.

A WIRELESS ALTERNATIVE TO FIBRE OPTICS

PRO-LOG is constructed with multiple discrete temperature sensors enclosed within a control line (e.g. 1/4") and attached to a memory processor that time stamps and transmits the data. Metrol's PARAGON wireless telemetry system is used to retrieve the selected data to surface.

The PRO-LOG clamping system permits deployment in screens, liners, and can include multiple lines over perforating guns of any size.

PRO-LOG has some distinct advantages over fibre optics DTS:

- > no need to average for high resolution and little inherent noise
- > improved temperature resolution
- > reduced running time and associated risks
- > elimination of packer/surface penetrations and leak paths
- > targeted data collection i.e. installation is only required across the zone of interest

DEPLOYMENT AND INTEGRATION WITH PARAGON

PRO-LOG is ideal for monitoring the flowing temperature profile of the perforations during DST and completion operations.

Integrated with Metrol's PARAGON, the system provides a reliable, field-proven method of communication.

Data from PRO-LOG is transmitted up the well to the Metrol Surface Package.

Real time data analysis can take place on site, or transferred to Metrol's onshore data centre for enhanced thermal modelling and flow profile analysis.

A WIRELESS ALTERNATIVE TO PLT

- > PRO-LOG can be sized and configured for the particular length of the producing zone, on TCP guns between packers, and part of a multi-zone test
- > PRO-LOG profiles the flow and can see after flow cooling effects, cross flow during build-ups, preferential flow, gas entry, and water influx
- > PRO-LOG captures entire well test data, including at maximum flow rates when wireline intervention is not possible

PRO-LOG is not disadvantaged by:

- > risks of wireline in hole
- > well deviation
- > inability to drop TCP guns
- > sand control assemblies such as screens and well architecture

Under the above circumstances a PLT would be either impossible or high risk.

REAL TIME ENHANCED THERMAL MAPPING

PRO-LOG captures unexpected events that would otherwise have gone unnoticed:

- > DST observations (including acid wash)
- > Uniform cooling across producing zone
- > Distinct variations in relative permeability
- > Exothermic reactions (heating)
- > Sudden clean-up of section of reservoir not previously contributing



APPLICATIONS

- > Distributed temperature measurement
- > Perforating verification
- > Sandface monitoring
- > Production and injection profiles
- > Gas and water breakthrough detection and monitoring
- > Crossflow detection and monitoring
- > Real-time flow profiling
- > Enhanced flow monitoring during DST's
- > Cement integrity-thermal profiling
- > Leak detection
- > External casing monitoring
- > Inner and outer annulus monitoring
- > Sandscreen monitoring
- > Clean-up monitoring
- > Hydrate monitoring
- > Flow profiling to help fluid ID and optimise bottomhole sampling ORIGIN
- > Gas lift monitoring
- > Frac observation/gravel pack deployment

FEATURES & BENEFITS

- > Wireless system with no wellhead or packer penetrations
- > Eliminates leak paths
- > Simple to run unlike DTS fibre optic cable
- > Improved resolution over DTS
- > Deployable on perforating guns
- > Eliminates PLT's
- > Reservoir profiling below obstructions such as artificial lift pumps
- > Permanent or temporary deployment
- > Continuous flow profiling throughout operation
- > Externally mounted giving full access through the tubing
- > Combinable with FLOW-SURE devices to manage your well
- > Suitable for single and multiple packer configurations
- > Can be run with multiple strings
- > Deployable beneath permanent packers without failure prone wet-connects
- > Suitable for use with casing and/or tubing string of varying sizes
- > Autonomous tools permit tool redundancy at each location
- > Duplex communication for data collection from multiple devices
- > Rig cost savings and HSE benefits

SPECIFICATIONS

Temperature Range:	-20 to 150°C (302°F)
Memory Capacity:	Up to 2 million data sets
Sample rate:	2 min - 24hrs (in-hole configurable for power saving)
Duration:	30 days to multi-year (10 year, battery pack & temperature dependent)
Initial Accuracy:	0.1°C
Resolution:	0.004°C
Long Term System Drift:	<0.15°C/year (@125°C)
Sensor to sensor drift:	<0.1°C/year (@125°C)
Sensor tubing diameter:	1/4" (3/8" for perforating guns)
Sensors per line:	80
Max line length:	400m
Sensor spacing:	0.25m to 10m
Available Pressure Rating:	18,000psi; 25,000psi (upon request)

