PPS71 Quartz Geothermal Tools - Memory / SRO

The PPS71 Quartz Geothermal Tools are designed for extreme, high temperature downhole conditions. The robust electronics combined with vacuum flask technology allow these products to perform at 350 °C (662 °F) continuously, for four hours. The tool measures pressure, temperature, casing collar location, flow profile and gamma ray, and can be configured as either a memory tool or surface read out tool (SRO) tool. The measurements are done with a superior quartz transducer, a fast response resistance temperature detector (RTD), either a continuous or fullbore spinner flowmeter, magnetic CCL and sensitive gamma ray crystal. By combining the downhole measurements with PPS's DepthWatcher (PPS36), a depth versus time recorder, customers have the capability to create synchronized profile logs which have many applications for the end user such as monitoring radioactive tracers in injected fluids, interpreting lithology, estimating shale volume and correlating cores with logged depth.

Features:
- Operating temperatures up to 350 °C (662 °F)
- Fast response RTD temperature sensor
- Continuous or full-bore spinners are available
- Operates in either memory or surface read out mode
- Surface read out mode using e-line is compatible with the Warrior or PPS SRO acquisition system
- Can be combined with PPS36 DepthWatcher if depth measurement is needed

Pressure Measurement

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Quartz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Range</td>
<td>5K psi</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.02%</td>
</tr>
<tr>
<td>Resolution</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Temperature Measurement

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>RTD (Pt1000; 4-wire)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range</td>
<td>300 °C (572 °F)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.5 °C</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 °C</td>
</tr>
</tbody>
</table>

Flow Measurement

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Reed switch/magnetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rate Range</td>
<td>5 – 7,000 RPM</td>
</tr>
<tr>
<td>Accuracy (≥ 20 RPS)</td>
<td>±0.5 revolution</td>
</tr>
<tr>
<td>Accuracy (≤ 20 RPS)</td>
<td>±0.25 revolution</td>
</tr>
<tr>
<td>Resolution (≥ 20 RPS)</td>
<td>0.5 RPS</td>
</tr>
<tr>
<td>Resolution (≤ 20 RPS)</td>
<td>0.1 RPS</td>
</tr>
</tbody>
</table>

Gamma Measurement

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Crystal, NaI (scintillation type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>Typically 1.7 CPS/API</td>
</tr>
</tbody>
</table>
PPS71 Quartz Geothermal Tools

Environmental
Temperature Rating—Standard Housing 177 °C (350 °F) with standard housing
Temperature Rating—Flask Housing 300 °C (572 °F) OD 1.56” | 350 °C (662 °F) OD 1.75”
Downhole Time (OD 1.75”) 4 hours at 350 °C (662 °F) | 6 hours at 300 °C (572 °F)
| 8 hours at 250 °C (482 °F) | 10 hours at 200 °C (392 °F)
Downhole Time (OD 1.56”) 4 hours at 300 °C (572 °F) | 5.5 hours at 250 °C (482 °F)
| 7.5 hours at 200 °C (392 °F)

Memory Tool Specifications
Sampling Rate 0.1 s – 1.8 hrs/per sample
Data Sets Time / Pressure / Temperature / Flow / CCL / Gamma
Memory Capacity 2,000,000 data Sets
Communication Interface USB
Communication Rate 115,200 bits/s
Operation Voltage 5.5 – 7.2 VDC
Battery 165 °C (329 °F) Two C size Li-battery (5 A hr/7.2 V)
Connector Lemo 4 pin with locker

Surface SRO Interface
Data Transmission Rate 9,600 bits per second via standard electrical cable
Data Transmission Distance Up to 7,000 meters via standard electrical cable
Compatibility Warrior 8 and up
Communication Port USB 2.0 to PC
Power Input 100 - 240 VAC
Surface Unit Power Output +60 VDC
Working Temperature -40 °C (-40 °F) to 85 °C (185 °F)
Humidity 90%
Condensation No
Material Aluminum
Connectors 1 AC Power, 1 DC Power, 1 USB Port and 1 Gauge Interface
Dimensions–inches 7.75 (196 mm) x 4 (101 mm) x 3.25 (82 mm)
Interface USB 2.0

Mechanical and Materials
Service H₂S
Outside Diameter–inches 1.56 (39 mm) Memory Only | 1.75 (44 mm)
| 1.83 (46 mm) Memory Only
Overall Length Memory Tool–inches 89.2 (2266 mm)
Overall Length SRO Tool–inches 112 (2845 mm)
Housing Material Inconel 718