

## DIRECT

DIRECT is a drop in replacement servo pulsar module that is fully compatible with the QDT -Tensor MWD system. It incorporates cutting-edge technologies to achieve significant improvements in performance.

DIRECT features a rotary shear valve that provides exceptional performance in high solids and high LCM environments. It minimizes the pressure loss through the servo module, thus allowing greater forces to be imparted to the main valve assembly. The wiping action of the rotary shear valve clears away any compacted debris and ensures unobstructed flow through the system.

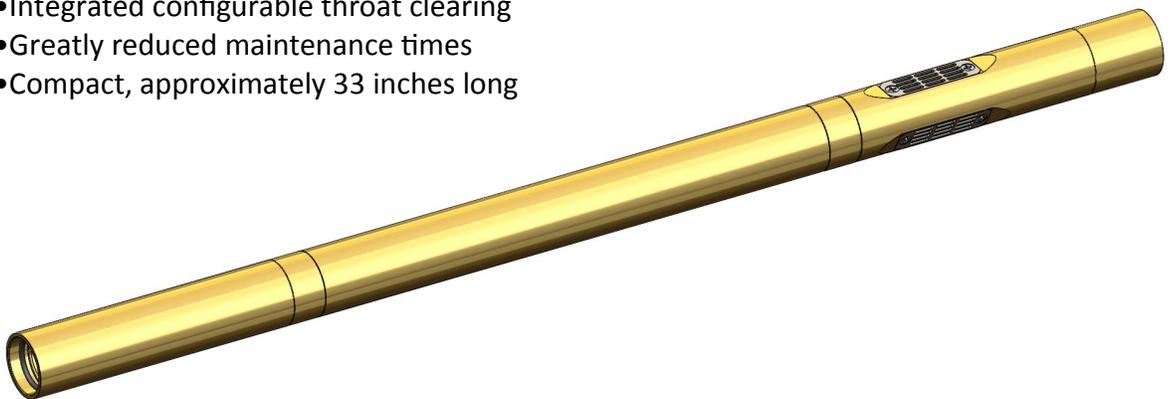
DIRECT eliminates the need for a hydro-statically compensated section in the servo pulsar module with the use of a proprietary high-pressure, low-friction sealing system. This dramatically reduces maintenance and service cycle-times and greatly increases system reliability.

These improvements are coupled to a compact, modular and rugged pulsar driver with built in performance and maintenance tracking capabilities.

DIRECT has incredibly low-power consumption and greatly increases the battery life of the QDT-Tensor MWD system. Nominal power consumption of the DIRECT servo pulsar system is approximately one fifth of the original QDT-Tensor servo pulsar, and one half that of currently available products.

## FEATURES AND BENEFITS

- High wear rotary shear servo valve
- UnCompensated design with no oil filling or evacuation
- Exceptional performance in LCM and high solids
- Ultra efficient, ~3 Joules per pulse (~120mAmp\*sec per pulse)
- 50-300% Increase in battery life vs. currently available products
- Integrated configurable flow switch
- Integrated configurable throat clearing
- Greatly reduced maintenance times
- Compact, approximately 33 inches long



| Specifications             |  |
|----------------------------|--|
| Nominal Length             | 35.36in (898mm)                                    |
| Housing O.D.               | 1.88in (47.6mm)                                    |
| Power Supply               | 20-30VDC   |
| Power Consumption          | ~3mA Standby, ~120mAmp*sec/Pulse@25V               |
| Shock Limit                | 1000g, 0.5msec, ½ sine all axes                    |
| Vibration Limit            | 5-30Hz@1in double amplitude, 30-500Hz 20g all axes |
| Operating Temperature      | 0° to 150°C (32° to 302°F)                         |
| Hydrostatic Pressure (max) | 15,000psi (103,421kPa)                             |
| Operating Pulse Width      | 0.600-2.00sec (controlled by QDT Compatible SEA)   |
| Flow Switch                | Axes used, thresholds and delays configurable      |

| Data Stored in Memory                     |   |
|---|---|
| Serial Number and Manufacturing Variables | Job Powered On Time                     |
| Lifetime Power On Time                    | Job Circulating Time                    |
| Lifetime Circulating Time                 | Job Energy Consumption                  |
| Lifetime Energy Consumed                  | Job Number of Pulses                    |
| Lifetime Number of Pulses                 | Flow Switch Configuration Variables     |
| Part Level Maintenance Interval Tracking  | Throat Clearing Configuration Variables |

| Additional Details  |   |
|---|---|
| The three axis flow switch is configurable for number of axes used (either x, y, z, xy, xz, yz or xyz), triggering thresholds, triggering delays and state machine hysteresis controls. | Throat clearing is a feature where the SLICK Servo Pulsar can be made to pulse independently of the QDT-Tensor compatible SEA on PUMPS ON to allow for actuation of the main valve prior to SYNC. |

