MPD Fluid-Extraction System

Continuously extracts mud samples under pressure for accurate gas-composition analysis and reservoir characterization

Applications

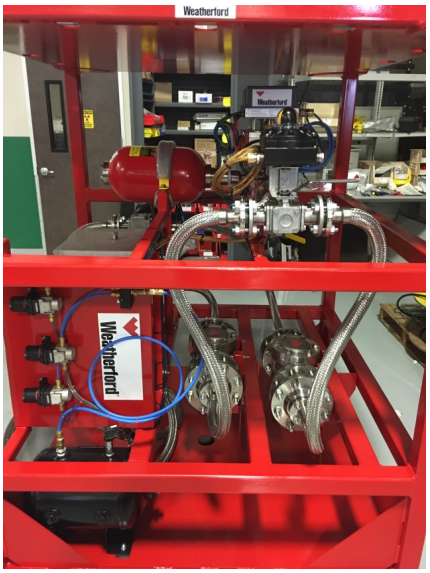
- Managed pressure drilling (MPD)

Features and Benefits

- The MPD fluid-extraction system enables accurate gas-composition analysis and reservoir characterization without interrupting operations.
- The system operates as a closed loop to prevent gas in mud expansion and surface loss, which can result in lower gas readings.
- Advanced gas data obtained by the system enables better control and kick detection. The data also supplements core-sample analysis, formation-fluid testing, geo-pressure predictions, and logging-while-drilling and measurement-while-drilling data sets.
- Gas data can also be used to estimate fluid density and mobility, formation tops, lithological changes, reservoir compartmentalization-seal-structural barriers, and water-contact points.
- Gas-analysis methods enhance the identification of net pay zones and changes in hydrocarbon fluid.
- The system is suited for onshore and offshore operations, including deepwater, extended-reach, high-pressure, high-temperature, shale, and ultra-viscous-hydrocarbon reservoirs.
- The system is adaptable to different sizes of MPD pipework.
- Dual control panels (PLCs) provide redundancy in case of failure.
- A unique expansion bladder system avoids gas flashes throughout the extraction process.
- The system has more than 50 fail-safe modes.
- All electrical components are certified for ATEX/IECEX Zone 1 operations.
- A web interface from the main control panel remotely controls the system for enhanced safety.

Tool Description

The Weatherford MPD fluid-extraction system continuously extracts mud samples under pressure for accurate gas-composition analysis and reservoir characterization.



The control module of the MPD fluid-extraction system includes a PLC, which reduces sample pressure to less than 10 psi (0.07 MPa) for conventional gas-detection methods.

The extraction tree of the MPD fluid-extraction system controls input pressure and closes off the system in the event of over-pressurization.

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MPD Fluid-Extraction System

Tool Description (continued)

The system comprises an extraction tree and control module. The extraction tree can be fitted in various flanges on the MPD manifold by using a spool adapter. It includes an inner tubing that acts as a primary cuttings strainer, as well as a series of automated valves, limit switches, pressure gauges, and pressure sensors. These devices act together to control the input pressure and to close off the system in the event of over-pressurization.

The control skid includes a PLC, dual-basket solids strainer, pressure-reducing control valves, switches, and positioners. The PLC controls the valves to reduce the sample pressure to less than 10 psi (0.07 MPa) for conventional gas-detection methods.

The objective of extracting a sample of mud under pressure is to analyze the fluid-gas content. This is achieved using a constant volume trap or heated constant volume trap system along with a high-speed chromatograph and total gas device on the downstream section.

Specifications

Electrical	
Main power	108 to 220 Vac at 20A maximum, 50 to 60 Hz
Instrumentation	24 Vdc at 5A maximum
Pressure	
Sample extraction module	Class 600 up to 1,224 psig (8.4 MPa) at 212°F (100°C)
Control skid	Class 150 up to 235 psig (1.6 MPa), maximum at 200 psig (1.4 MPa)
Pneumatics	Operation at 100 psig (0.7 MPa), maximum at 200 psig (1.4 MPa)
Temperature	
Process	–4° to 212°F (–20° to 100°C)
Maximum surface temperature for pipework	212°F (100°C)
Maximum surface temperature for instrumentation	158°F (70°C)
Ambient rating	–4° to 131°F (–20° to 55°C)

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