

The DAPC Backpressure Pump

Automated Pressure Drilling (APD™) delivers new levels of service for constant bottomhole pressure control, pressure stability, and the mitigation of the risks that can lead to critical drilling events. Designed around the Dynamic Annular Pressure Control™ (DAPC™) system the APD service for constant bottomhole pressure control provides operators a suite of pressure management tools that enable them to save on rig time that would otherwise be spent controlling lost circulation and influx, and freeing stuck pipe.

The DAPC system incorporates a dedicated, on-demand pump to supply backpressure whenever needed, ensuring pressure stability and constant bottomhole pressure when the flow rate drops below safe levels.

Around-the-clock Backpressure Supply

The DAPC system protects against potentially critical well control events from developing when the flow rate is unexpectedly interrupted by stalled drilling motors, plugged downhole tools, pump failure, and lost circulation.

Continuous monitoring of the flow rate into and out of the well* by the DAPC pressure manager mitigates drilling risks. If the pressure manager detects a drop in flow below the programmed level it alerts the operator and automatically starts the auxiliary pump to stabilize the surface backpressure and maintain a constant bottomhole pressure.

Automated Pressure Drilling services are the only pressure management services that deliver around-the-clock pressure stability and constant bottomhole pressure control with actively supplied backpressure.

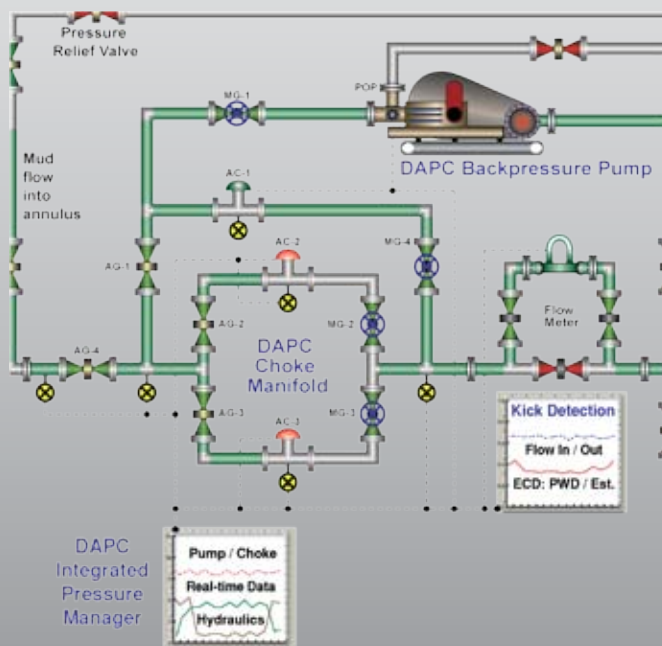
*Optional flow meter required for flow-out monitoring.

Automated Backpressure Supply

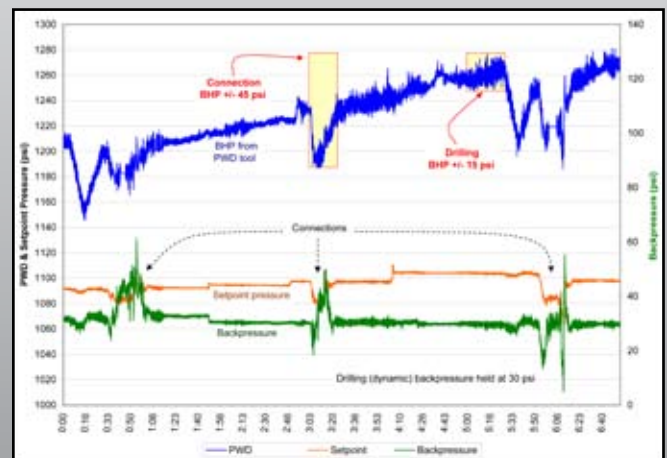
The DAPC system supplies its own backpressure, as needed for constant bottomhole pressure, with an automated triplex pump under control of the DAPC pressure manager. The pump is connected to the DAPC manifold through the auxiliary choke, AC-1 (see illustration). As it pumps mud at a constant rate through the auxiliary choke the pressure manager makes the necessary adjustments to the choke to achieve the required amount of backpressure.

The active main choke (AC-2 or AC-3) maintains backpressure during normal drilling operations using rig supplied mud flow. Whenever the flow rate drops or stops completely the DAPC system automatically acts. It pumps drilling fluid from rig supply tanks to the auxiliary choke and closes the active choke. While mud is being pumped through the manifold it also pumps mud through the rotating control head into the well and keeps the annulus full.

The pump is fitted with a pressure relief and check valve to prevent overpressure and back flow from the well.



Piping and instrumentation drawing of a DAPC system in connection mode in which drilling fluid is supplied by the backpressure pump through AC-1.



Pressure plot illustrating the ability of the DAPC system to stabilize the BHP during the transition from drilling to connections and control the BHP within small, pre-set pressure windows.

AUTOMATED BOTTOMHOLE PRESSURE CONTROL



High pressure triplex pump

Certified DNV 2.7-1/T3, Zone II, ATEX-certified, built in a DNV crash frame

The Dynamic Annular Pressure Control™ system gives operators new levels of pressure stability to achieve increased levels of drilling performance and predictability in challenging conditions.

With the backpressure pump under its control the DAPC system can instantly supply needed pressure when unexpected changes in drilling conditions cause the flow rate to fall below safe levels.

The DAPC system goes beyond passive pressure trapping. It actively supplies backpressure at the level required to maintain a constant bottomhole pressure, real-time, all the time.

Automated Backpressure Pump Technical Data and Specifications

Pump Type

150 ARP - P60, Triplex

Pump Specifications

General

- Nominal Flow: 86.1 gpm (326 lpm)
- Operating Pressure: 2,030 psi (140 bar)
- Pumping Medium: Water
- NPSH: 44 psi (3 bar)
- Water Temperature (Max): 104°F (40°C)
- Drive: 83 kW
- Driving Speed: 1,500 rpm
- Cylinders: 3
- Manual Spill Valve
- Dimensions: 11.5' x 5.9' x 5.9' (3.5m x 1.8m x 1.8m)
- Weight: 8,819 lbs (4,000 kg)

Construction

- Stainless steel pump head
- Hardened stainless steel valves
- Stainless steel cylinders
- Ceramic plungers
- Friction-free seal
- 0.25 gal (1-litre) nitrogen-charged pulsation dampener

High Pressure Discharge

- 5,000 psi (345 bar) x 2" (101.6mm) check valve on outlet with Weco 1502
- Automatic reset safety relief valve fitted to pump; set at 10% over normal working pressure
- Pressure tested and certified

Suction Line

- Suction flow stabilizer with combined filter (5 x 100µm 20" elements)
- Suction, 4" fig 200-thread half, changeable to 6" if needed
- Quick service suction screen
- Electrically direct driven boost pump w/3-way switch
- Bypass returned to main tank system

Electric Motor

- 90 kW rated for ATEX/Class II 2 G EExd IIB T4
- Manufactured per Directive 94/9/EC
- Cooling: IP 55-rated, totally enclosed, fan-ventilated
- Output: 90 kW continuous power at 1,500 rpm
- Speed: 1,500 rpm (approx.)
- Voltage: 440 to 480 V/AC 50 Hertz

On-Board Control and Monitoring System

- High oil temperature
- Low oil pressure
- Low inlet water pressure
- Excessive vibration

EExd Shutdown System

Automatic shutdown of main/boost pump motor when:

- High oil temperature
- Low oil pressure
- Low inlet water pressure
- Excessive vibration



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