

Quatro Quadraplex Mud Pump

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Designed for Demanding Drilling Today, and into the Future.

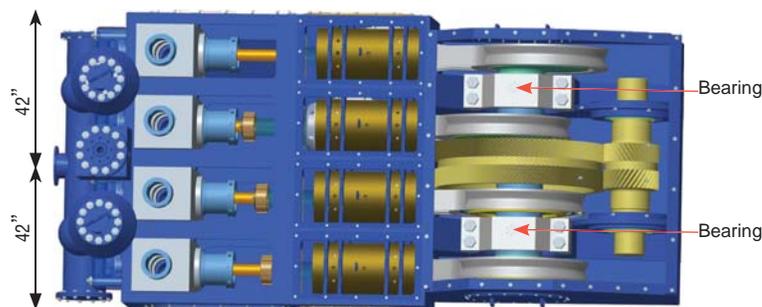
Field proven since its introduction in 2006, the White Star Quatro™ 4-piston quadraplex mud pump represents a quantum improvement over conventional triplex mud pumps. Consider the inherent flaws in triplex mud pumps – wide, heavy designs that are expensive to transport; crankshaft and bearing failure leading to costly rebuilds; high-vibration operation; limited flow rates and pressure capabilities; and short product life cycles. The advanced Quatro goes beyond the limitations of triplex pumps, delivering reliable high-flow, high-pressure pumping performance that meets the needs of drilling operations, today and long into the future.

■ Overview

- New “Quatro X”
- Standard 7500 PSI rating above 1600hp
- Smoothest discharge in the industry
- Easy 45-minute fluid module replacement in the field
- Only 84” wide and easily fits on standard width trailer
- Fully assembled crankshaft with no cast or welds
- **Pump house:**
 - Up to 2450 hp electric and 1600 hp mechanical, 24” walk around and under 100,000 lbs

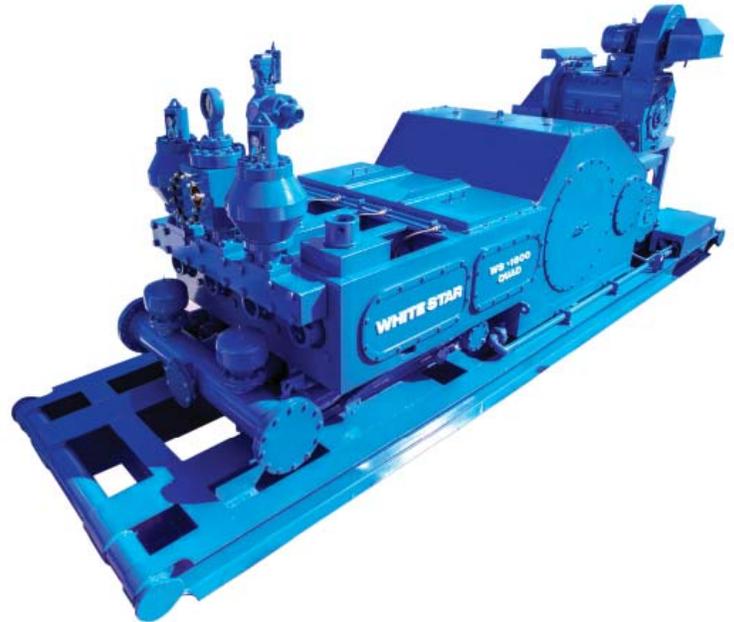
■ Innovative Design

The transition from a “triplex” to “quadraplex” naturally balances the pump. The fourth cylinder improves crankshaft timing, which means a smoother running pump with less vibration. The innovative and compact frame is designed to efficiently carry load forces directly to the “double roller” bearing. The modern bearing placement between cylinders reduces load and flexing of the frame and crankshaft, improving bearing, crankshaft and gear life.



■ Fully Assembled Crankshaft

Fully machined and assembled crankshaft. No castings or welding. Shortest distance between cylinder and bearing of any mud pump. Virtually eliminates crankshaft flex.



■ Offshore

The 2450 hp Quatro’s compact unitizations weigh 25- 50% less than a triplex 2200 hp pump and requires 50% less pump room space. The Quatro: a better pump in half the space.

■ Quality Construction

The Quatro boasts a quality workmanship that is second to none, with all components manufactured from the highest grade materials. All parts and components have mill cert traceability and go through a rigorous three-step quality assurance and quality control screening.

■ Industry Leading Flow Rates

The QuatroX achieves a 1597 GPM continuous duty flow rate at industry standard piston speeds and without over-running the pump.

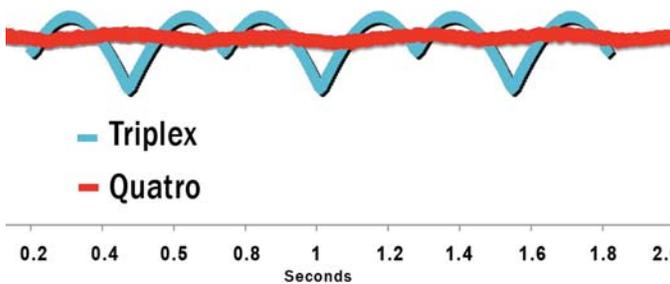
■ Revolutionary Fluid End Modules

The Quatro’s fluid modules sitting inside the frame are in a class of their own. The innovative seal assemblies and revolutionary module mounting system, with only six bolts to remove, reduces module changes from hours to just minutes . . . it’s all about up time!

■ Near Zero Pulse. Better MWD

The Quatro's unique placement of pulsation dampeners removes the pulse before it arrives at the strainer cross and escapes downhole. This means near zero-pulse discharge and the lowest levels of vibration and mud noise, for exceptional MWD performance.

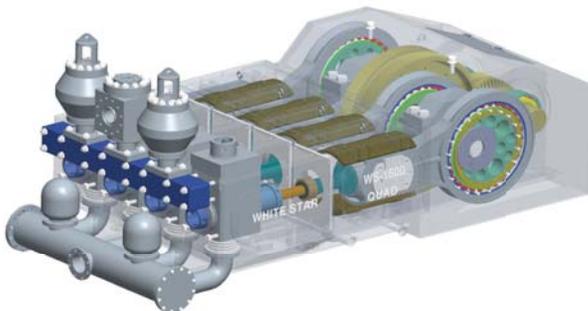
Pump Pulsation Comparison Quatro vs Triplex



Quadruplex actual real-time data ref test Houston May 30th, 2009

The Quatro's almost pulse-free discharge is shown in red, overlaid against the typical theoretical discharge pulse and vibration of a triplex pump shown in blue. The Quatro's discharge data, obtained by the proprietary White Star Smart Safety Alarm System's Data Acquisition Sensors, further illustrates this pump's ultra smooth flow. To witness the Quatro's almost perfect discharge, visit whitestarpump.com/1800 or contact White Star to schedule a live demonstration.

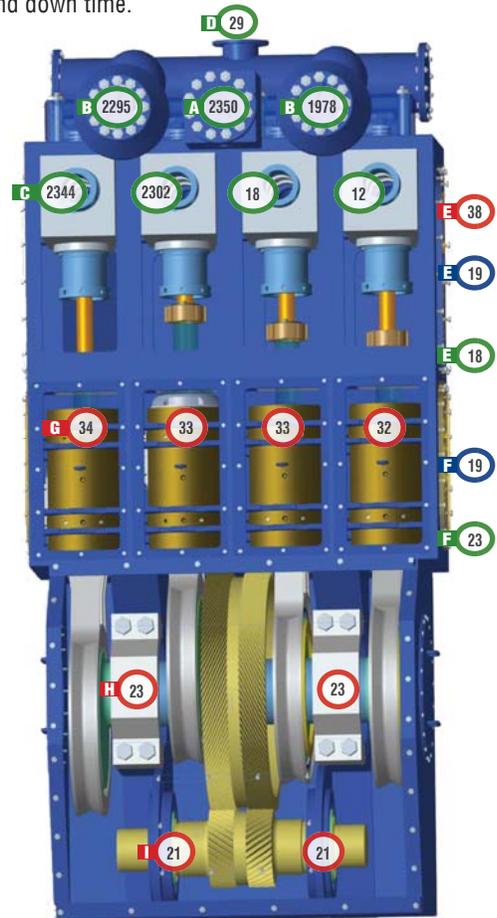
For more on mud pump pulses, please read a recent article in Upstream Pumping Solutions magazine (Fall 2010): "Anatomy of a Mud Pump Pulse"



■ Real Time Monitoring that Reduces Downtime and Costs.

The WSP "Pump System Monitor"

Designed to detect and warn the operator of problems and maintenance issues in real-time, both locally and remotely. The WSP's proprietary data system allows the operator to closely monitor all aspects of the mud pump system. The data acquisition sensors will detect deviations from normal operating conditions and alert the operator long before they are perceivable by humans, thus creating a larger time window for preventing critical failures. Sensing whether the top or bottom valve in a particular cylinder is starting to leak or stick with 100% accuracy, the Pump System Monitor will reduce guesswork and down time.



- A. Discharge pressure (PSI)
- B. Pulsation dampener pressure (PSI)
- C. Fluid module pressure (PSI)
- D. Intake pressure (PSI)
- E. Liner rinse pressure (PSI), flow (GPM), and temperature (Celsius)
- F. Oil lube pressure (PSI) and flow (GPM)
- G. Cross head and guide temperature (Celsius)
- H. Bearing temperature (Celsius)
- I. Pinion bearing temperature (Celsius)

■ Warranty

- Field commissioning at no additional cost
- 10 year limited warranty against manufacturers defect

More information on the science and field experience behind the advanced features of the Quatro can be found at whitestarpump.com or by speaking directly with your local White Star Pump Company agent.

■ Unique Bearing Placement for Long Life.

The Quatro's radically different placement of the bearings along structural panels inside the pump, and between the cylinders, also delivers a number of key advantages:

- Reduced peak bearing load
- Reduced crankshaft loading
- Extended bearing life
- Reduced pump vibration
- A more stable, structurally supported crankshaft

■ Lighter Weight. Smaller Footprint.

The Quatro features a unique, 4-piston design, and is much lighter and more compact than any standard mud pump. It features an 82" fully unitized width, compared to a triplex, pump, which can be 140" wide. It offers a 1597 GPM flow rate and can handle pressures up to 10,000 psi, meeting the requirements of even the most demanding drilling operations. And the Quatro's fluid modules can be replaced in as little as 23 minutes – that's 15 times faster than with conventional triplex mud pumps.

■ Worm Drive Option Adds Simplicity and Reliability.

The White Star Quatro™ is available with an ultra-efficient worm drive option, which provides for an extremely simple design and adds to the durability and reliability of the pump. This unique worm drive option eliminates the need for many moving parts often required in pump unitization, such as belts, chains, reduction gearing, right-angle drives, and more. Because worm drive will not work on 3-piston machines, you won't find this cost-saving feature on any triplex mud pump, anywhere. It is only available on advanced Quatro quadraplex 4-piston mud pumps.

■ Reduced Peak Bearing Load For Extended Pump Life.

The Quatro reduces peak bearing load by as much as 40.3% compared to triplex mud pumps. How? On the Quatro, bearings are located along structural panels inside the pump, between each pair of pistons. This unique configuration provides up to three times fewer stress cycles on the crankshaft and reduces loads on the bearings for extended crankshaft and bearing life and longer intervals between rebuilds.



The Quatro™ Quadraplex Mud Pump is Available in 1300, 1600, 2000 & 2450 HP Models at up to 10,000 psi

■ HalfDrive™ 2-Cylinder Shut Down System Saves Fuel.

An optional 2-cylinder shut down system, which can reduce pump discharge by 50%, is also available on all Quatro mud pumps. This HalfDrive™ option eliminates the need for a costly gearbox in mechanical drive systems, and can reduce flow rates while still maintaining proper engine RPMs.

■ No Lower Overall Cost of Ownership. Anywhere.

The Quatro not only performs on the rig, it performs on the bottom line, delivering reduced downtime, and faster, more efficient drilling performance. You won't find a high-performance mud pump that offers a lower overall life cycle cost. No matter where you look.