Piston Pump Technology

Above, outside the well or sump

Blackhawk Top-Head-Driven piston pumps are powered by electricity, pneumatics or an air hose. The modular drive makes a small or big pump easy and safely outside the well or sump. Because motors and mechanics can be easily three tiers of a pump’s power, the principal treatment is power instead of oil.

Inside the pump

Low flow with multi-fluid like the pump and reducing the level of

• The dynamic, flexible shaft, designed to be a new pump, rugged, specifically designed for a corresponding suction in pump head, is the main pump to pull the motor and be located outside of motor.

• Motor is placed at the bottom of the well, a need for

Software field/Centralized oil and water flow, to return to the pump.

• Permanent magnet drive, Live discharge tee, is the final step

Joist stands, built to the pump and to make sure the pump is in a clear flow to the input, and to allow for proper fluid return.

• Motor and pump is located outside of the pump and up the inner pipe with each side. This is allowing for the outside of the head as one fluid is pulled through through.

Top-Head-Driven Piston Pumps

Pump Any Fluid

• Remediation

• Latchate

• Landfill Gas

• Elevated Temperature

• Compliance

• Chem aggressive

• Offshore

• Oilfield

• Process

All power & maintenance work outside the well, sump or pipe.

Piston Pump Advantages

Positive Displacement

Because a positive displacement (pump) is bulky, decreases the power and increases the cycle time on the pump. There is another style of positive displacement, but downsizing technology is pumping the fluid with the suction is a very simple method to pump. Flows are produced by the pump and feeds steady 24v panel variances to systems. Use conductivity liquid level control and provides power, if needed anywhere in the different applications.

Reciprocating Pistons

Reciprocating pumps are positive displacement pumps that are in the small and medium sized. They are highly efficient, require less power, and made to work at all pressures. Most parts of the piston when the cylinder is not on the head, there is more fluid in the suction DISPLACEMENT PUMP IS A SIMPLE CYLINDER, 3 PORTS, WITH THE SUCTION AND DISCHARGE side, in the piston there is not much fluid. The accurate part of the pump is the head and rods.

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Piston Pump Technology

Above, outside the well or sump
Blackhawk and displacement reciprocating piston pumps are powered by electricity, gasoline or air. Also, please note that they are designed to be highly efficient, requiring less power to perform the same work as other types of pumps.

Inside the pump
Low-flow sucking fluid into the pump via the intake valve.
• The piston, rod and valve are all designed to efficiently transfer the fluid.

Air Supply Kit
• Air Supply Kit
• Air Filter
• Valve Kit

Accessories

Top-Head-Drive Piston Pumps

Pump Any Fluid
• Remediation
• Larchate
• Landfill Gas
• Elevated Temperature
• Compliance
• Chem-aggressive
• Offshore
• Oilfield
• Process

All power & maintenance cleanly maintained outside the well, sump or pipe.

Positive Displacement

Because a positive displacement pump is simply a cylinder or a pump, there is very little friction. If the cylinder is closed, the fluid flows until it reaches pressure.

Reciprocating Piston

Reciprocating pumps are reciprocating piston pumps that do the same work but are more efficient. They require less power and are more efficient than other types of pumps.

More power: Piston pumps are used in situations where a large amount of power is needed. They are designed to handle large volumes of fluid, making them ideal for larger applications.

Piston Pump Advantages
• Pumps any fluid, even viscous.
• Pumps to any angle, even vertical.
• Pumps to bottom of tank, even suctionless.
• Infection-free — changes in pressure.
• Low oil/air loss.
• Low oil carry-over.

General Applications and Common Power Options

Application
• Tankage transfer
• Fuel
• Lubrication
• Water
• Gas
• Chemicals

Power
• Electric
• Gasoline
• Air

For more information or to order, please contact us at 630.469.4916. Visit our website at blackhawkco.com.
Piston Pump Technology

Above, outside the well or sump
Blackhawk pump and displacement reciprocating piston pumps are powered by electricity, pneumatics or an air source.

The air source power units and oil by pumps can be safely outside the well or sump. Because motors and electrically can be safely placed as long as they are not in contact with the suction and discharge pipes, the principal variation is to provide an external power source.

Inside the pump
Low flow affecting fluid into the pump while maintaining the desired stroke.

The discharge rod drop, mixing it is a part of the package specifically outside the pump for the specific case of pump being less than a cubic meter and piston projects outward at the top.

Piston or plate through air to the first valve.

Valve seat with both piston and fluid valve open reliably in slow and fast cycle through the valve, and then close to prevent fluid return.

Mechanical or pneumatic connections. Lift up the valve plate with each stroke.

Fluid being discharged below the head as each piston is pushed through the stroke.

Piston Pump Ranges
Apollo-AC Electric
- UP STROKE
  - 15 bbl/day
  - 1,500 ft
  - 2-3/8; 2-7/8 in
  - Downhole

Solar 2.7 / 10.2
- 3,888 / 14,172
- 400 / 122
- 2 / 4.8

Pneumatic 5.0 / 18.9
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Piston Pump Advantages
- Pumps for any fluid, vacuum applications.
- Pumps to any angle, even upward.
- Pumps to bottom of tanks, submerged and other applications.
- Inefficiency by virtue of the constant-volume pump.
- Can be run dry without harm.

All power & maintenance clearly outside the well, sump or pipe.

Piston Pump Technologies

Positive Displacement
Because a positive displacement (piston) pump is bulky, very high flow rate is a key consideration in design.

There are several styles of positive displacement, but they all share the same principle. The intake is the first valve into the pump at the suction creates increase and displace the discharge, determined by the constant-volume fluid being displaced or equal amount of flow displacement.

Reciprocating Piston

Reciprocating piston pumps are a positive displacement pump that transfers fluid. They apply efficiency, are very powerful, and are used for delivery of high viscosity fluids.

Main parts of a reciprocating pump include the cylinder to hold a plunger or piston, which is moved back and forth by a reciprocating motion. The suction and discharge side are the piston stroke back and forth, the discharge side is the cylinder's opposite end.

Reciprocating piston pumps, but with a smaller piston and take little space. The forward stroke is the fluid enters and flows through the inlet valve. The fluid is displaced by the check valve. On the back stroke the fluid flows and then through the discharge valve.

What is a Piston Pump?

Like other positive-displacement/constant-volume types, Blackhawk pumps deliver steady DC current.

All drivers customizable to special needs
- Oilfield stripper wells, gas
- Explosion-proof electric, solar, pneumatic
- Landfill methane dewatering
- Solar, pneumatic

Other low-flow applications
- All drivers customizable to special needs
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Penn State

California Oilfield

Applications

Positive displacement
- Oilfield stripper wells
- Gas
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Other low-flow applications
- All drivers customizable to special needs
- Oilfield stripper wells
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**Why Blackhawk?**

Blackhawk's line of electric and solar driven submersible pump packages for land-based environments. Electric, solar- and pneumatically driven submersibles provide a consistent flow rate for your application.

**Pneumatic**

- Low maintenance, longer intervals
- Quick servicing
- All-weather drivers
- No worker contact with liquid
- Simple installation
- Operator-set controls & meters

**Solar**

- Easily adjustable
- Pump at any angle to horizontal
- Elevated temperatures
- Unaffected by chemical wear
- Fits into enclosed vault
- Floating product remediation

**Pneumatic & Anchor ET Electric**

- Resistant to viscous, oily liquids from aggressive environments
- Less maintenance, longer intervals
- All service outside well, sump or pipe
- Floating product remediation

**Electric**

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**Can't Keep Your Pump Running?**

- No need to own or operate expensive equipment.
- We provide a high-quality pump

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- Fits into enclosed vault
- Remote, closed sites

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### Why Blackhawk?

Blackhawk is the largest manufacturer and a leader in the oil field drive industry. We design, manufacture, and sell proven, reliable, and efficient drive solutions. Our drive systems are available in a variety of standard and custom configurations to meet your application needs. We offer a wide range of products, including electric, pneumatic, and solar pumps, to provide the ideal solution for any oil field application.

### Three Pump-Driver Technologies

<table>
<thead>
<tr>
<th>Category</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic</td>
<td>Blackhawk's innovative Rhino MiniJack™ Piston Oilfield Pump is designed to remove hot, liquid hydrocarbons from any depth. This pump is powered by electric motors, and it can operate in a variety of environments, including offshore and remote locations.</td>
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<tr>
<td>Electric</td>
<td>Blackhawk's electric drivers are designed to provide efficient and reliable performance. These drivers are available in a variety of sizes and configurations, and they are suitable for a wide range of applications.</td>
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<tr>
<td>Solar</td>
<td>Blackhawk's solar-powered drive systems are designed to provide reliable performance even in remote and challenging environments. These systems can be used for a variety of applications, including oil well production, water dewatering, and environmental remediation.</td>
</tr>
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</table>

### Cost Effectiveness

- **Ruggedness & Reliability:** Blackhawk's pumps and drivers are designed to withstand harsh operating conditions, ensuring long-term reliability and low maintenance costs.
- **Easy to Install:** Blackhawk's pumps and drivers are designed for easy installation, reducing the need for expensive installation services.
- **Quick Servicing:** Blackhawk's pumps and drivers are designed for quick servicing, minimizing downtime and maximizing productivity.
- **Portable:** Blackhawk's pumps and drivers are designed to be portable, allowing for easy transport and deployment.

### Pneumatic Drivers

- **Blackhawk's V-2 Elevated Temp Motor:** Designed for high-temperature and high-pressure applications, this motor can operate at temperatures up to 150°F (65°C) and pressures up to 300 psi (21 bar).
- **Blackhawk's V-2 Elevated Temp Oil Jet:** Designed for use in offshore and remote locations, this oil jet is capable of handling fluids up to 300°F (149°C) and pressures up to 300 psi (21 bar).

### Electric Drivers

- **Blackhawk's V-2 Electric Motor:** Designed for use in electrical motor applications, this motor is capable of delivering high torque and efficiency, making it ideal for use in a variety of applications.
- **Blackhawk's V-2 DC Motor:** Designed for use in DC motor applications, this motor is capable of delivering high torque and efficiency, making it ideal for use in a variety of applications.

### Solar Drivers

- **Blackhawk's V-2 Solar Motor:** Designed for use in solar-powered applications, this motor is capable of delivering high efficiency and reliability, making it ideal for use in a variety of applications.
- **Blackhawk's V-2 Solar DC Motor:** Designed for use in solar-powered DC motor applications, this motor is capable of delivering high efficiency and reliability, making it ideal for use in a variety of applications.

### Other Options

- **MiniJack Removal System:** Designed to remove hot, liquid hydrocarbons from any depth, this system is capable of handling fluids up to 300°F (149°C) and pressures up to 300 psi (21 bar).
- **Piston Pump:** Designed for use in a variety of applications, including oil well production, water dewatering, and environmental remediation.
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Blackhawk is the largest manufacturer and a leader in the oil field drive industry. We design, manufacture, and sell proven, reliable, and efficient drive solutions. Our drive systems are available in a variety of standard and custom configurations to meet your application needs. We offer a wide range of products, including electric, pneumatic, and solar pumps, to provide the ideal solution for any oil field application.
Why Blackhawk?

Blackhawk's innovative Rhino MiniJack™ Piston Oil Pump is a broad-duty pump designed for high lift, with the proven reliability of a piston pump but with the energy efficiency of a micropump to reduce energy and costs. For those seeking to maximize the recovery of oil and water, the MiniJack is an excellent choice. It is designed for years of trouble-free service in difficult environments and is known for its quiet operation and minimal emissions.

Three Pump-Driver Technologies

Pneumatic

Blackhawk's innovative pneumatic pumps are designed for the most demanding applications, offering a wide range of options and features to meet specific needs. The pneumatic V-2 model 103 is available in a low-flow configuration, providing flexibility for various applications.

Electric

Blackhawk's electric pumps are engineered for maximum efficiency and reliability, offering a variety of options to suit different needs. The electric V-2 model 101 is designed to handle larger flow rates and can be adjusted to meet specific requirements.

Solar

Blackhawk's solar-powered pumps are perfect for remote locations and areas where traditional power sources are not available. The solar V-2 model 102 provides flexibility and reliability in areas with limited access to the grid.

Steady Flow to Submersible Depth

For applications requiring submersible pumps, Blackhawk offers a variety of products to meet specific needs. From compact models to larger systems, Blackhawk has the pumps to meet the challenge.

Land-Based

Blackhawk's land-based pumps are designed for a variety of applications, ranging from small to large-scale operations. These pumps are equipped with advanced features to ensure maximum efficiency and reliability.

Offshore

Blackhawk's offshore pumps are specifically designed for challenging environments, whether in the open ocean or in remote locations. These pumps are engineered for durability and performance, ensuring reliability in even the most demanding conditions.

Rhino MiniJack® Oilfield Piston Pump

Blackhawk's innovative Rhino MiniJack™ Piston Oil Pump is a broad-duty pump designed for high lift, with the proven reliability of a piston pump but with the energy efficiency of a micropump to reduce energy and costs. For those seeking to maximize the recovery of oil and water, the MiniJack is an excellent choice. It is designed for years of trouble-free service in difficult environments and is known for its quiet operation and minimal emissions.
Blackhawk is the originator and No. 1 producer of:

- Safety
- Adaptability
- Cost Effectiveness

- Steady Flows to Submergence Depth
- Depths to 800 feet / 240 meters
- Toughest downhole components
- All-weather drivers
- No power in well
- Fits any well casing
- Choose materials of construction
- Refurbishment, seal replacement, lease programs
- Simple installation
- Low maintenance, longer intervals

**V-2 Model 103**
84 ft / 25 m

**V-2 Model 101**
7.6

- **Electric**
  - Driver Electric
  - Blackhawk’s electric drivers: Electric Pumps are a highly reliable nodal driver for stake system applications or utilizing conventional sucker rods. Drives can be configured to meet specific needs.
  - Anechoic (no sound, no vibration)
  - Modular: varies in size, applications include:
  - Landfill
  - Oilfield
  - Refinery
  - Process
  - Power and Efficiency
  - No replacement of mechanical packers
  - Low maintenance and efficiency
  - Energy savings
  - Extends sucker-rod life (150% more)

- **Pneumatic**
  - Designed above–grade drivers — no compressed air enters the well or discharge.
  - Designed operator-set prior to operation, with pneumatic drivers, it is a breeze.
  - Levitron: Blackhawk’s V-2 pneumatic for landfills, high operating pressure (8 bars), a special diaphragm design to seal any previous stuffing box leakage and reduce friction and risk of well stoppage.

- **Solar**
  - Driver Solar
  - Drivers Solar have a hydraulically activated single stage plunger pump driven by a linear actuator powered by one or more solar panels, successfully operating in locations without electrical power.

- **Rimini-MiniJet Oilfield Piston Pump**
  - The Rimini-MiniJet Oilfield Piston Pump offers the same low cost solution to oilfield pump problems. It offers the same benefits as the V-2 series, but in pre-assembled, ready-to-run units.

- **Elevated-Temp Pumps**
  - 150°F to 350°F

**Land-Based**
- **V-2 Pneumatic**
  - V-2 Pneumatic Edge Pneumatic
  - V-2 Pneumatic V-2 ET

**Offshore**
- **Rhino MiniJet**
  - Oilfield Piston Pump

**Landfills**
- **V-2 Pneumatic**
  - V-2 Pneumatic

**Landfills Remaining in Place, Stabilizing, Reparing, Cleaning or Draining**
- **Landfill**

**Ports, Docks, Berths, Conveyors, and Conveying Systems**
- **Pneumatic & Electric**
  - Both pumps offer two 1 HP versions and can be driven by a ball-screw actuator utilizing incoming power.

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## Piston Pump Technology

Above, outside the well or sump, Blackhawk's positive-displacement piston pumps are powered by electricity, gas, air or solar power. The all-weather pump models and of big size can be clearly and safely situated outside the well or sump. Because motor and mechanics are technically free from risk of leakage at sea, the principal treatment is to make seawater-tight.

### Inside the pump

- **Low-flow submersible fluid:** Fluid the pump to a depth below the penetration of the water column.
- **The diaphragm:** Suction, needle to suction, is for a constant volume, especially suitable for a particular application in pump head. When the pump is stopped, it opens and various parts are assembled. See below.
- **Fluid:** Fluid is transported through or into the well at a constant volume. Suction valve & SS ball is open, fluid flow is interrupted.
- **Action:** Fluid is pulled into the suction valve & SS ball, fluid flow is interrupted. Fluid is pulled into the suction valve & SS ball, fluid flow is interrupted.
- **Fluid:** Fluid is pulled into the suction valve & SS ball, fluid flow is interrupted.

### Applications

- **Oilfield stripper wells, gas:** Pumps gas, water, and steam.
- **Explosion-proof electric, solar, pneumatic:** Pumps up any angle, every direction.
- **Pumps to bottom of tank, etc.:** Can pump very long, high pressure.
- **Closed:** Fluid can be stored.
- **Open:** Fluid can be sent into the suction valve & SS ball, fluid flow is interrupted.
- **Foot valve:** Used to control flow.

### Positively Displacement

- **Positive-displacement pumps:** Positively displace fluid in an expansive and contractive manner, which is very suitable for transferring liquids, gases and even solids. It is relatively safe, conservative, and more efficient in transfer.

### Positive Displacement

Positive displacement pumps can be safely used in a large variety of industries because of their energy efficiency, high efficiency, durability, and versatility. They can be used to transfer a wide range of fluids, from liquids and gases to solids and slurries. They are also capable of handling high pressures and temperatures, making them a popular choice for industries such as oil and gas, chemical processing, and food and beverage.

### Reciprocating Piston

Reciprocating piston pumps are positive-displacement pumps that work by a piston moving up and down in a cylinder. The piston creates a force that pushes fluid through the pump. These pumps are efficient and can handle a wide range of fluids, including viscosities and slurries.

### Piston Pump Advantages

- **No air or pressure contacts fluid:** Fluid is safely and efficiently transferred.
- **Pumps:** Pumps can pump up to 300 ft, high pressure.
- **Can pump very long, high pressure:** Fluid can be stored.
- **Closed:** Fluid can be stored.
- **Open:** Fluid can be sent into the suction valve & SS ball, fluid flow is interrupted.
- **Foot valve:** Used to control flow.

### General Applications and Common Power Options

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<tr>
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### Accessories

- **Air Supply Kit:** Provides air supply for the pump.
- **Foot Valve:** Used to control flow.
- **Spring Rod/Valve:** Maintains pressure in the system.
- **Cylinder Oiler:** Injects tiny, pre-determined amounts of oil into the pump to prevent wear.

### What is a Piston Pump?

A piston pump is a type of positive-displacement pump that works by a piston moving up and down in a cylinder. The piston creates a force that pushes fluid through the pump. These pumps are efficient and can handle a wide range of fluids, including viscosities and slurries.

### Related Information

- **Positive displacement pumps:** These pumps are used to transfer a wide range of fluids, from liquids and gases to solids and slurries. They are also capable of handling high pressures and temperatures, making them a popular choice for industries such as oil and gas, chemical processing, and food and beverage.

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**Blackhawk Electric 2in Pneumatic**

**V-2 Elevated-Temp**

**Neptune Offshore**

**Apollo-Solar Anchor Electric**

**Apollo-AC Speed Control**

**Discharge Kit**

**Injects tiny, pre-determined amounts of oil into the pump to prevent wear.**

**Cylinder oiler:** Injects tiny, pre-determined amounts of oil into the pump to prevent wear.

**Foot valve:** Used to control flow.

**Air Supply Kit:** Provides air supply for the pump.

**Spring Rod/Valve:** Maintains pressure in the system.

**Cylinder Oiler:** Injects tiny, pre-determined amounts of oil into the pump to prevent wear.

**Application:**

- **Industrial琵stors:** Gas, Diesel, Electric, Solar, Pneumatic
- **Submersible琵stors:** AC, DC, Solar, Pneumatic
- **Pressure琵stors:** AC, DC, Solar, Pneumatic
- **Rotary琵stors:** AC, DC, Solar, Pneumatic

**Power Options:**

- **Plant琵stors:** AC, DC, Solar, Pneumatic
- **Industrial琵stors:** Gas, Diesel, Electric, Solar, Pneumatic
- **Submersible琵stors:** AC, DC, Solar, Pneumatic
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