HYDRO-PAC

FLEXI-POWER™ High-Pressure Pumps were developed by Hydro-Pac in response to a need for more efficient pressurization of large closed volumes.

FLEXI-POWER™ high-pressure pumps are a combination of our most successful designs. They offer several benefits to the user.

One benefit is the patented sliding-cylinder design that allows replacement of the high-pressure packing without disassembly of the intensifier.

Another benefit is providing greater capacity at lower operating pressures.

For batch process applications, a higher capacity can significantly reduce the pressurization time.

These pumps are available for pressures from 15,000 to 100,000 psi and 10 to 150 hp.

Pump Design

FLEXI-POWER™ High-Pressure Pumps have two basic components, an intensifier and a hydraulic power unit.

The Intensifier, mounted on top of the console, is made up of two process fluid cylinders and a hydraulic drive cylinder. Each cylinder contains a piston.

Tie-rods attach the process fluid cylinders to the hydraulic cylinder. A hydraulic flange and isolation space separate the hydraulic fluid from the process fluid cylinders.

The Hydraulic Power Unit, contained within the console, is made up of an electric motor, hydraulic pump, oil reservoir, directional control valve and other hydraulic components.

The power unit provides pressurized hydraulic oil to the intensifier. The intensifier uses this pressurized hydraulic oil to pump process fluid.

The four-way valve controls the direction of hydraulic oil flow to and from the intensifier.

Intensifier Operation

- Process fluid flows through the inlet check valve and fills the process fluid cylinder.

- Pressurized hydraulic fluid acting on the hydraulic piston strokes the piston assembly to the right. Process fluid in the right cylinder is forced through the discharge check valve. At the same time, fluid flows through the inlet check valve on the left cylinder filling this cylinder.

- At the end of this stroke, the four-way valve changes position and directs pressurized hydraulic fluid to the right side of the hydraulic piston. The piston assembly moves to the left, discharging fluid from the left cylinder.

- The piston assembly reverses direction automatically and the cycle repeats.
Advances

Increased Capacity at Lower Operating Pressure.
FLEXI-POWER™ pumps adjust their stroke rate automatically according to the operating conditions.

This increase in stroke rate makes full use of available horsepower and results in higher capacity when the discharge pressure is low. For batch process applications, a higher capacity can significantly reduce the pressurization time.

Cold Isostatic Pressing
is an ideal application for FLEXI-POWER™ pumps since most of the powder compaction occurs at low pressures. The higher capacity of the FX pump can reduce compaction time by 50% or more in some cases.

FLEXI-POWER™ Pump Efficiency

Conventional, fixed-displacement pumps produce a near-constant flow of process fluid regardless of the discharge conditions. When process pressures are low, a relatively small percent of available horsepower is utilized by the pump. These pumps waste power and time.

FLEXI-POWER™ pumps use most of their available power even when discharge pressures are low. At low discharge pressures, the intensifier strokes faster displacing more fluid.

As pressure increases, FLEXI-POWER™ pumps slow down to produce a higher pressure with the corresponding maximum flowrate.

At the maximum discharge pressure, the FLEXI-POWER™ pump displaces the same amount of process fluid as a conventional fixed-displacement pump.
**Intensifier Design Features**

**Hydro-Pac's Patented Sliding Cylinder Design** enables seal replacement in minutes without major disassembly of the intensifier. The high-pressure seals are pressure energized allowing them to adjust automatically for wear.

To replace seals, detach the pump cylinder from the check valve body. The seals are easily accessible. There is no need to remove the tie-rods or any of the high-pressure tubing connections.

**Inlet and Discharge Check Valves** are housed in a check valve body. The valve seats are reversible. The poppet, guide and spring are a cartridge. The guide accurately aligns the poppet with the seat. Large ports allow free flow of process fluids and reduce pressure drop.

**Hydraulic Drive Features**

*The Hydro-Pac FLEXI-POWER® pump is powered by an advanced hydraulic drive system.*

- Sound-dampening panels enclose the hydraulic drive system. The panels are easily removed.

- The hydraulic drive system allows the machine to be started under full load. Special unloading devices are not required.

- The slow operating speed and low inertia load eliminate the need for special foundations.

- Hydraulic oil is cooled and constantly filtered.

- Oil reservoir is baffled for cooling and foam dispersion, and is furnished with a cleanout cover.

- Entire fluid-power system is enclosed and protected by panels which are easily removed for quick access.
Major Advantages

FLEXI-POWER™ High-Pressure Pumps

Hydraulic Cylinder provides a very long, slow pump stroke and generates the great force needed to achieve high pressures.

Long, High-Force Stroke minimizes the number of cycles required for a given capacity. Fewer cycles equate to longer life.

Slow Speed
- Decreases seal wear
- Encourages cylinder filling during intake stroke
- Increases efficiency
- Reduces turbulence and shock
- Minimizes vibration and foundation requirements

Long Stroke and Low Ratio of clearance volume result in unusually high volumetric efficiency.

Positive Alignment is achieved from the concentric design.

Leak-Before-Failure Design enhances safety.

Simplicity of design eliminates stress concentrations.

Piston Assembly is the only moving part of the intensifier.
Safety

• Pumps are designed and built for maximum safety.
• A pressure-compensated hydraulic pump and backup hydraulic relief valve provide redundant protection against over pressurization of the hydraulic system.
• Protective panels shield the hydraulic-drive system and electric motor.
• Leak-before-failure design of the high-pressure seals enhances safety.

Applications

FLEXI-POWER™ High-Pressure Pumps are ideally suited for:

• Cold isostatic pressing
• Pressure sterilization of food products
• Supercritical extraction
• Pressure testing
• High-pressure chemical reactions
• Well injection
• Material testing
• Hydroforming
• Blowout preventer testing
• Fatigue testing

Hydro-Pac Quality

We are committed to providing the best possible pumps. Some of the many steps taken to ensure the quality of Hydro-Pac pumps are:

• Careful, conservative engineering of all equipment.
• All machines are run at maximum-rated conditions prior to shipment.

Service and Spare Parts

• Trained service technicians are available for field repair.
• We provide training on the operation and maintenance of all our products.
• Complete product overhaul and rebuild can be done at our facility.
• Our computer based inventory allows parts shipment from stock.

Standard Equipment

FLEXI-POWER™ Pumps are furnished as complete units.

• High-pressure intensifier with inlet and discharge check valve
• Electric motor, TEFC, 230/460 v, 3-ph, 60 Hz
• Gauges for oil pressure, level and temperature
• Sensors for low oil level and high oil temperature.
• Heat exchanger for hydraulic oil
• Oil filter
• Suction strainer
• Instruction manual with parts list

Fluids

• Oil
• Soluble oil and water
• Glycol
• Other noncorrosive fluids
• Optional flammable fluids

Utilities

• Electrical: 230/460 v, 3 ph, 60 Hz
  (Other voltages available)
• Cooling water is required. The amount depends on the machine.

Optional Equipment

• Spare-parts kit
• Enclosure for intensifier
• Motor starter
• Pressure gauges for inlet and discharge lines
• Coolant-flow sensor
• Heater for oil reservoir
• Explosion-proof motor and controls
• Special motor and control power
• Complete pump packages
• Installation assistance

Selecting the best FLEXI-POWER™ Pumps for your needs:

Selection of a FLEXI-POWER™ pump for a batch process is complex. Hydro-Pac has developed a computer program for this selection.

This program considers process parameters and models the changing flowrate of the FLEXI-POWER™ pump.

Given the operating conditions, Hydro-Pac can optimize pump selection - a task best accomplished by our computer.
## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Pressure psi</th>
<th>Power hp</th>
<th>Reservoir gal</th>
<th>Length in</th>
<th>Height in</th>
<th>Width in</th>
<th>Weight lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>P15-10FX</td>
<td>15,000</td>
<td>10</td>
<td>30</td>
<td>74</td>
<td>44</td>
<td>26.5</td>
<td>1500</td>
</tr>
<tr>
<td>P15-20FX</td>
<td>15,000</td>
<td>20</td>
<td>40</td>
<td>93</td>
<td>54</td>
<td>26.5</td>
<td>2600</td>
</tr>
<tr>
<td>P15-40FX</td>
<td>15,000</td>
<td>40</td>
<td>70</td>
<td>110</td>
<td>59</td>
<td>34</td>
<td>4000</td>
</tr>
<tr>
<td>P15-60FX</td>
<td>15,000</td>
<td>60</td>
<td>80</td>
<td>122</td>
<td>65</td>
<td>37</td>
<td>7500</td>
</tr>
<tr>
<td>P15-75FX</td>
<td>15,000</td>
<td>75</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9000</td>
</tr>
<tr>
<td>P15-100FX</td>
<td>15,000</td>
<td>100</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9350</td>
</tr>
<tr>
<td>P15-150FX</td>
<td>15,000</td>
<td>150</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Pressure psi</th>
<th>Power hp</th>
<th>Reservoir gal</th>
<th>Length in</th>
<th>Height in</th>
<th>Width in</th>
<th>Weight lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>P30-10FX</td>
<td>30,000</td>
<td>10</td>
<td>30</td>
<td>74</td>
<td>44</td>
<td>26.5</td>
<td>1500</td>
</tr>
<tr>
<td>P30-20FX</td>
<td>30,000</td>
<td>20</td>
<td>40</td>
<td>93</td>
<td>54</td>
<td>26.5</td>
<td>2600</td>
</tr>
<tr>
<td>P30-40FX</td>
<td>30,000</td>
<td>40</td>
<td>70</td>
<td>110</td>
<td>59</td>
<td>34</td>
<td>4000</td>
</tr>
<tr>
<td>P30-60FX</td>
<td>30,000</td>
<td>60</td>
<td>80</td>
<td>122</td>
<td>65</td>
<td>37</td>
<td>7500</td>
</tr>
<tr>
<td>P30-75FX</td>
<td>30,000</td>
<td>75</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9000</td>
</tr>
<tr>
<td>P30-100FX</td>
<td>30,000</td>
<td>100</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9350</td>
</tr>
<tr>
<td>P30-150FX</td>
<td>30,000</td>
<td>150</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Pressure psi</th>
<th>Power hp</th>
<th>Reservoir gal</th>
<th>Length in</th>
<th>Height in</th>
<th>Width in</th>
<th>Weight lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>P60-10FX</td>
<td>60,000</td>
<td>10</td>
<td>30</td>
<td>74</td>
<td>44</td>
<td>26.5</td>
<td>1500</td>
</tr>
<tr>
<td>P60-20FX</td>
<td>60,000</td>
<td>20</td>
<td>40</td>
<td>93</td>
<td>54</td>
<td>26.5</td>
<td>2600</td>
</tr>
<tr>
<td>P60-40FX</td>
<td>60,000</td>
<td>40</td>
<td>70</td>
<td>110</td>
<td>59</td>
<td>34</td>
<td>4000</td>
</tr>
<tr>
<td>P60-60FX</td>
<td>60,000</td>
<td>60</td>
<td>80</td>
<td>122</td>
<td>65</td>
<td>37</td>
<td>7500</td>
</tr>
<tr>
<td>P60-75FX</td>
<td>60,000</td>
<td>75</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9000</td>
</tr>
<tr>
<td>P60-100FX</td>
<td>60,000</td>
<td>100</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9350</td>
</tr>
<tr>
<td>P60-150FX</td>
<td>60,000</td>
<td>150</td>
<td>165</td>
<td>144</td>
<td>75.5</td>
<td>44</td>
<td>9500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Pressure psi</th>
<th>Power hp</th>
<th>Reservoir gal</th>
<th>Length in</th>
<th>Height in</th>
<th>Width in</th>
<th>Weight lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>P100-10FX</td>
<td>100,000</td>
<td>10</td>
<td>30</td>
<td>74</td>
<td>44</td>
<td>26.5</td>
<td>1500</td>
</tr>
<tr>
<td>P100-20FX</td>
<td>100,000</td>
<td>20</td>
<td>40</td>
<td>93</td>
<td>54</td>
<td>26.5</td>
<td>2600</td>
</tr>
<tr>
<td>P100-40FX</td>
<td>100,000</td>
<td>40</td>
<td>70</td>
<td>110</td>
<td>59</td>
<td>34</td>
<td>4000</td>
</tr>
<tr>
<td>P100-60FX</td>
<td>100,000</td>
<td>60</td>
<td>80</td>
<td>122</td>
<td>65</td>
<td>37</td>
<td>7500</td>
</tr>
</tbody>
</table>

Capacity curves are available upon request.