HIGH PRESSURE HYDRAULIC PISTON PUMPS & POWER UNITS

F & D FIXED-DISPLACEMENT SERIES
- F98 - 2.64 cipr (43.3 cc/rev.) Pump
- D58 - .88 cipr (14.4 cc/rev.) Pump

F & D TWO-STAGE SERIES
- F98x - 2.64 cipr (43.3 cc/rev.) “High-Low” Pump
- D58x - .88 cipr (14.4 cc/rev.) “High-Low” Pump

COMPLETE PUMP, CONTROL VALVE, AND FLUID RESERVOIR ASSEMBLIES

WILLIAMS® MACHINE AND TOOL
204 Plastic Lane • Monticello, IA 52310-9472 USA • Telephone: (319) 465-3537 • Fax: (319) 465-5279
E-mail: info@energymfg.com • Web site: www.williamsmachineandtool.com
**Model D58 - 6 - 21 Qt.**

- **Pump type**: Axial, fixed displacement, 8 piston
- **Displacement**: 0.88 cipr (14.4 cc/rev.)
- **Maximum recommended drive speed**: 1,800 rpm
- **Minimum flow @ 1,800 rpm**: 6 gpm (22.7 lpm)
- **Working pressure range**: 500 to 5,000 psig (34 to 345 bar)
- **Dual relief valves (one for each rotation)**: Factory preset
- **Shaft rotation**: Bi-rotational
- **Shaft size**: 1" (25.4 mm) with .25" (6.35 mm) Woodruff Key
- **Cylinder port size**: 1/2" NPT
- **Actuation methods**: Lever with push-pull cable, air pilot, and electrical push button
- **Reservoir size**: 21 qt. (19.9 L)
- **Shipping weight (approximate)**: 82 lbs. (37.3 kg)

**Model F98 - 6 - 21 Qt.**

- **Pump type**: Axial, fixed displacement, 8 piston
- **Displacement**: 2.64 cipr (43.3 cc/rev.)
- **Maximum recommended drive speed**: 1,300 rpm
- **Minimum flow @ 1,300 rpm**: 12.5 gpm (47.3 lpm)
- **Working pressure range**: 500 to 5,000 psig (34 to 345 bar)
- **Dual relief valves (one for each rotation)**: Factory preset
- **Shaft rotation**: Bi-rotational
- **Shaft size**: 1" (25.4 mm) with .25" (6.35 mm) Woodruff Key
- **Cylinder port size**: 1/2" NPT
- **Actuation methods**: Lever with push-pull cable, air pilot, and electrical push button
- **Reservoir size**: 21 qt. (19.9 L)
- **Shipping weight (approximate)**: 82 lbs. (37.3 kg)

### SPECIFICATION EXAMPLES

**Model D58X - 6 - 21 Qt.**

- **Pump type**: Axial, split flow, 8 piston
- **Displacement**: 0.88 cipr (14.4 cc/rev.)
- **Maximum recommended drive speed**: 1,800 rpm
- **Low flow (high pressure)**: 1.5 gpm (5.7 lpm)
- **High flow (low pressure)**: 10 gpm (37.9 lpm)
- **Maximum recommended drive speed**: 1,000 rpm
- **Low flow (high pressure)**: 2.5 gpm (9.5 lpm)
- **High flow (low pressure)**: 10 gpm (37.9 lpm)
- **Factory preset relief valves**
- **Specify pressure settings required when ordering:
  - High-volume, low-pressure relief
  - Low-volume, high-pressure relief
  - Unloading (hi-low) valve
- **Directional control valve**: Double acting
- **Actuation methods**: Lever with push-pull cable, air pilot, and electrical push button
- **Reservoir size**: 21 qt. (19.9 L)
- **Shipping weight (approximate)**: 82 lbs. (37.3 kg)

**Model F98X - 6 - 21 Qt.**

- **Pump type**: Axial, split flow, 8 piston
- **Displacement**: 2.64 cipr (43.3 cc/rev.)
- **Maximum recommended drive speed**: 1,300 rpm
- **Low flow (high pressure)**: 1.5 gpm (5.7 lpm)
- **High flow (low pressure)**: 10 gpm (37.9 lpm)
- **Maximum recommended drive speed**: 1,000 rpm
- **Low flow (high pressure)**: 2.5 gpm (9.5 lpm)
- **High flow (low pressure)**: 10 gpm (37.9 lpm)
- **Factory preset relief valves**
- **Specify pressure settings required when ordering:
  - High-volume, low-pressure relief
  - Low-volume, high-pressure relief
  - Unloading (hi-low) valve
- **Directional control valve**: Double acting
- **Actuation methods**: Lever with push-pull cable, air pilot, and electrical push button
- **Reservoir size**: 21 qt. (19.9 L)
- **Shipping weight (approximate)**: 82 lbs. (37.3 kg)

### Pump Specifications

<table>
<thead>
<tr>
<th>Pressure Setting</th>
<th>High Flow GPM</th>
<th>Low Flow GPM</th>
<th>Minimum Horsepower</th>
<th>Electric Motor</th>
<th>Gasoline Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>6 GPM (22.7 LPM)</td>
<td>0.88 cipr (14.4 cc/rev.)</td>
<td>1.8 hp (2.4 kW)</td>
<td>4 hp (5.4 kW)</td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>1.5 GPM (5.7 LPM)</td>
<td>0.26 cipr (4.3 cc/rev.)</td>
<td>1.0 hp (0.7 kW)</td>
<td>2.0 hp (1.5 kW)</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Minimum</td>
<td>Required Electric Motor</td>
<td>2.5 hp (1.9 kW)</td>
<td>6 hp (4.5 kW)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Setting</th>
<th>High Flow GPM</th>
<th>Low Flow GPM</th>
<th>Minimum Horsepower</th>
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<th>Gasoline Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>6 GPM (22.7 LPM)</td>
<td>0.88 cipr (14.4 cc/rev.)</td>
<td>1.8 hp (2.4 kW)</td>
<td>4 hp (5.4 kW)</td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>2.5 GPM (9.5 LPM)</td>
<td>0.43 cipr (6.8 cc/rev.)</td>
<td>0.5 hp (0.4 kW)</td>
<td>1.0 hp (0.7 kW)</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Minimum</td>
<td>Required Electric Motor</td>
<td>1.0 hp (0.7 kW)</td>
<td>2.5 hp (1.9 kW)</td>
<td></td>
</tr>
</tbody>
</table>

The pump operates at a pressure of 1,800 RPM and is capable of producing up to 6 GPM (22.7 LPM) at high pressure and 2.5 GPM (9.5 LPM) at low pressure.
**Valve Options**

<table>
<thead>
<tr>
<th></th>
<th>F98</th>
<th>D58</th>
<th>F98X</th>
<th>D58X</th>
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<tbody>
<tr>
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</table>

No control valve – rather a cover plate with 1/2” NPT pressure and return ports. The control valve can then be mounted in a remote position. The Williams® model 1000 or 2000 control valves can be utilized if this feature is desired.

Standard 4-way control valve (double acting). 1/2” NPT ports standard. SAE ORB ports available upon request.

4-way control valve same as (–6), except including one cylinder port relief. 1/2” NPT ports standard. SAE ORB ports available upon request.

Standard 3-way control valve (single acting). 1/2” NPT ports standard. SAE ORB ports available upon request.

4-way control valve with a secondary relief valve to protect a downstream (series) function operating at a lower pressure. 1/2” NPT ports standard. SAE ORB ports available upon request.

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**Unit Dimensions & Reservoir Volumes**

<table>
<thead>
<tr>
<th></th>
<th>15 Qt. (14.2 L)</th>
<th>21 Qt. (19.9 L)</th>
<th>27 Qt. (25.6 L)</th>
<th>40 Qt. (37.9 L)</th>
<th>40H Qt. (37.9 L)</th>
<th>60 Qt. (56.8 L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>18.38” (46.7 cm)</td>
<td>20.75” (52.7 cm)</td>
<td>20.75” (52.7 cm)</td>
<td>28.75” (73 cm)</td>
<td>20.75” (52.7 cm)</td>
<td>28.75” (73 cm)</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>11.25” (28.6 cm)</td>
<td>12” (30.5 cm)</td>
<td>12” (30.5 cm)</td>
<td>12” (30.5 cm)</td>
<td>12” (30.5 cm)</td>
<td>12” (30.5 cm)</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>11.875” (30.2 cm)</td>
<td>13.5” (34.3 cm)</td>
<td>16.5” (41.9 cm)</td>
<td>16.5” (41.9 cm)</td>
<td>22.25” (56.5 cm)</td>
<td>22.25” (56.5 cm)</td>
</tr>
<tr>
<td>&quot;D&quot;</td>
<td>15.375” (38.9 cm)</td>
<td>17.75” (45.1 cm)</td>
<td>17.75” (45.1 cm)</td>
<td>25.75” (65.4 cm)</td>
<td>17.75” (45.1 cm)</td>
<td>25.75” (65.4 cm)</td>
</tr>
<tr>
<td>&quot;E&quot;</td>
<td>8.25” (21 cm)</td>
<td>9” (22.9 cm)</td>
<td>9” (22.9 cm)</td>
<td>9” (22.9 cm)</td>
<td>9” (22.9 cm)</td>
<td>9” (22.9 cm)</td>
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<tr>
<td>&quot;F&quot;</td>
<td>8.375” (21.3 cm)</td>
<td>10” (25.4 cm)</td>
<td>13” (33 cm)</td>
<td>13” (33 cm)</td>
<td>13” (33 cm)</td>
<td>18.75” (47.6 cm)</td>
</tr>
<tr>
<td>&quot;G&quot;</td>
<td>10” (25.4 cm)</td>
<td>10.75” (27.3 cm)</td>
<td>10.75” (27.3 cm)</td>
<td>10.75” (27.3 cm)</td>
<td>10.75” (27.3 cm)</td>
<td>10.75” (27.3 cm)</td>
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<tr>
<td>&quot;H&quot;</td>
<td>5” (12.7 cm)</td>
<td>5” (12.7 cm)</td>
<td>5” (12.7 cm)</td>
<td>5” (12.7 cm)</td>
<td>5” (12.7 cm)</td>
<td>5” (12.7 cm)</td>
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<tr>
<td>&quot;I&quot;</td>
<td>1.5” (3.8 cm)</td>
<td>1.5” (3.8 cm)</td>
<td>1.5” (3.8 cm)</td>
<td>1.5” (3.8 cm)</td>
<td>1.5” (3.8 cm)</td>
<td>1.5” (3.8 cm)</td>
</tr>
<tr>
<td>&quot;J&quot;</td>
<td>2.375” (6 cm)</td>
<td>4.75” (12.1 cm)</td>
<td>4.75” (12.1 cm)</td>
<td>12.75” (32.4 cm)</td>
<td>4.75” (12.1 cm)</td>
<td>12.75” (32.4 cm)</td>
</tr>
<tr>
<td>&quot;K&quot;</td>
<td>41” (1 cm) x 1” (2.5 cm)</td>
<td>41” (1 cm) x 1” (2.5 cm)</td>
<td>41” (1 cm) x 1” (2.5 cm)</td>
<td>41” (1 cm) x 1” (2.5 cm)</td>
<td>41” (1 cm) x 1” (2.5 cm)</td>
<td>41” (1 cm) x 1” (2.5 cm)</td>
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<tr>
<td>&quot;L&quot;</td>
<td>1.75” (4.4 cm)</td>
<td>1.75” (4.4 cm)</td>
<td>1.75” (4.4 cm)</td>
<td>1.75” (4.4 cm)</td>
<td>1.75” (4.4 cm)</td>
<td>1.75” (4.4 cm)</td>
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<tr>
<td>&quot;M&quot;</td>
<td>25” (6 cm) x .88” (2.2 cm)</td>
<td>25” (6 cm) x .88” (2.2 cm)</td>
<td>25” (6 cm) x .88” (2.2 cm)</td>
<td>25” (6 cm) x .88” (2.2 cm)</td>
<td>25” (6 cm) x .88” (2.2 cm)</td>
<td>25” (6 cm) x .88” (2.2 cm)</td>
</tr>
<tr>
<td>&quot;N&quot;</td>
<td>4.5” (11.4 cm)</td>
<td>4.5” (11.4 cm)</td>
<td>4.5” (11.4 cm)</td>
<td>4.5” (11.4 cm)</td>
<td>3.88” (9.9 cm)</td>
<td>4.5” (11.4 cm)</td>
</tr>
<tr>
<td>&quot;O&quot;</td>
<td>1” (2.5 cm)</td>
<td>1” (2.5 cm)</td>
<td>1” (2.5 cm)</td>
<td>1” (2.5 cm)</td>
<td>1” (2.5 cm)</td>
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</table>
FOR DIRECT COUPLING TO GASOLINE ENGINE
(with integral 6 to 1 gear reduction)

“F” SERIES

Model No. F98X - 6 - 15
Two-Stage Piston Pump Unit

Pump type ................................................................. axial, split flow, 8 piston
Maximum displacement ........................................... 2.64 cipr (43.3 cc/rev.)
Recommended drive speed ....................................... 600 rpm
High flow (low pressure) ........................................... 6 gpm (22.7 lpm)
Low flow (high pressure) .......................................... 1.5 gpm (5.7 lpm)
Working pressure range ................................. 500 to 6,000 psig (34 to 345 bar)

Factory preset relief valves
Specify pressure settings required when ordering:
– High-volume, low-pressure relief
– Low-volume, high-pressure relief
– Unloading (hi-low) valve

Shaft rotation ...................................................... bi-rotational
Shaft size ......................................................... 1” (25.4 mm) with .25” (6.35 mm) Woodruff Key
Directional control valve ........................................ double acting
(Convertible to single acting)
Ports ................................................................. 1/2” NPT
Actuation methods: Lever with push-pull cable,
air pilot, and electrical push button ................................ available

Reservoir size .................................................... 15 - 60 qt. (14.2 - 56.8 L)
Shipping weight (approximate, with 15 qt. [14.2 L] res.) .... 80 lbs. (36.4 kg)

UNIT FEATURES

Williams® F98 (and F98X, two-stage) and DS8 (and DS8X, two-stage) are members of our eight piston wobble plate pump series. The following presents some of the features and benefits of these pumps and their corresponding valves and reservoir units.

Because of its design, the overall efficiencies of this piston pump remain relatively constant over a wide range of operating conditions. In addition, the “wobble plate” method of actuating the pistons provides good contamination tolerance.

1. The pump barrel is designed to withstand high working pressures and is machined from a solid casting.
2. The pistons are hardened and ground, assuring maximum efficiency.
3. Needle bearings (front and rear) support the main shaft.
4. Piston contact plate is hardened and ground 52100 bearing steel and is supported by a heavy duty needle bearing.
5. Two heavy-duty roller bearings made of hardened 52100 steel are used for thrust bearings. All moving surfaces operate in oil.
6. Wobble plate is made of 52100 hardened and ground bearing steel.
7. The unit contains two shaft seals. The outer seal is mounted in reverse to prohibit foreign materials from damaging the inner seal.
8. The pump front plate is designed to serve as a mounting flange for the pump. The inside surface is machined to provide a smooth surface for sealing the pump in the fluid reservoir.
9. 1” (25.4 mm) diameter hardened and ground main shaft. Bi-rotational operation.
10. Hardened steel exhaust valve seats. Outlet check valves in each piston port prevent flow backwards through pump under stalled conditions.
11. Relief valve cartridge is preset at the factory as specified by the customer. The cartridge can be removed and replaced with another of a different pressure setting.
12. Mounted on top of the oil reservoir are the high pressure directional control valves. The valve bodies are machined from a solid casting. Included in the machined casting are 1/2” NPT ports, integral independent oil flow return, individual relief porting, and a load check port. The valve spools are hardened, chromed, centerless ground and select honed fitted. Spools are balanced and self-centering for smooth and positive actuation. Spools also contain lands for fine metering.

13. The oil filler pipe on top of the reservoir is covered with an efficient removable air filter type breather cap.
14. A sealing gasket is used between the front pump plate and reservoir surface to prevent leaking.
15. The reservoir is designed to hold an appropriate amount of fluid for specific applications. Please refer to reservoir specifications for exact volumes.
16. Elongated holes are provided in the mounting base of the reservoir to facilitate mounting.
17. The high low (two-stage) feature is available on the F98X or D58X pumps. Please refer to F98X or D58X specifications for additional information.

The Williams® Hydraulic Piston Power Units are designed to include a pump, control valve, and reservoir. This combination produces an efficient and practical unit that can be economically used in the end products of many original equipment manufacturers (OEMs).

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<table>
<thead>
<tr>
<th>Units</th>
<th>Pressure Setting</th>
<th>Gasoline Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>High Flow 6 GPM (22.7 LPM)</td>
<td>500 psig (34 bar)</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>Low Flow 1.5 GPM (5.7 LPM)</td>
<td>750 psig (52 bar)</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>Minimum Horsepower (kW) Required</td>
<td>1,000 psig (69 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,250 psig (86 bar)</td>
</tr>
</tbody>
</table>
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The pump produces approximately 6 gpm (22.7 lpm) at 600 RPM and at pressures up to “A” [its low pressure setting], while consuming roughly “C” [horsepower (kW)]. When the load resistance increases the operating pressure above “A,” the unloading valve will automatically reduce outlet flow by approximately 75%, thus limiting the overall horsepower required.

The pump now produces 1.5 gpm (5.7 lpm) at 600 rpm at any pressure up to “B,” [its high pressure setting], and requires roughly the same horsepower. When the operating pressure drops below “A,” the unit will automatically resume 6 gpm (22.7 lpm) output.