Hydraulic Saw Motor
Series F11/F12
Fixed Displacement
Basic formulas for hydraulic motors

Flow (q)

\[ q = \frac{D \times n}{1000 \times \eta_v} \text{ [l/min]} \]

Torque (M)

\[ M = \frac{D \times \Delta p \times \eta_{hm}}{63} \text{ [Nm]} \]

Power (P)

\[ P = \frac{q \times \Delta p \times \eta_t}{600} \text{ [kW]} \]

Basic formulas for hydraulic pumps

Flow (q)

\[ q = \frac{D \times n \times \eta_v}{1000} \text{ [l/min]} \]

Torque (M)

\[ M = \frac{D \times \Delta p}{63 \times \eta_{hm}} \text{ [Nm]} \]

Power (P)

\[ P = \frac{q \times \Delta p \times \eta_t}{600} \text{ [kW]} \]

Conversion factors

<table>
<thead>
<tr>
<th>Unit Conversion</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kg</td>
<td>2.20 lb</td>
</tr>
<tr>
<td>1 N</td>
<td>0.225 lbf</td>
</tr>
<tr>
<td>1 Nm</td>
<td>0.738 lbf ft</td>
</tr>
<tr>
<td>1 bar</td>
<td>14.5 psi</td>
</tr>
<tr>
<td>1 l</td>
<td>0.264 US gallon</td>
</tr>
<tr>
<td>1 cm³</td>
<td>0.061 cu in</td>
</tr>
<tr>
<td>1 mm</td>
<td>0.039 in</td>
</tr>
<tr>
<td>1 °C</td>
<td>(5/9°F-32)</td>
</tr>
<tr>
<td>1 kW</td>
<td>1.34 hp</td>
</tr>
<tr>
<td>1 lb</td>
<td>0.454 kg</td>
</tr>
<tr>
<td>1 lbf</td>
<td>4.448 N</td>
</tr>
<tr>
<td>1 lb ft</td>
<td>1.356 Nm</td>
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<tr>
<td>1 psi</td>
<td>0.068948 bar</td>
</tr>
<tr>
<td>1 US gallon</td>
<td>3.785 l</td>
</tr>
<tr>
<td>1 cu in</td>
<td>16.387 cm³</td>
</tr>
<tr>
<td>1 in</td>
<td>25.4 mm</td>
</tr>
<tr>
<td>1 °F</td>
<td>(9/5°C + 32)</td>
</tr>
<tr>
<td>1 hp</td>
<td>0.7457 kW</td>
</tr>
<tr>
<td>Content</td>
<td>Page</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>General Information</td>
<td>4</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>The optimal saw motor</td>
<td>4</td>
</tr>
<tr>
<td>Benefits</td>
<td>4</td>
</tr>
<tr>
<td>Technical information</td>
<td>5</td>
</tr>
<tr>
<td>Saw motor versions</td>
<td>5</td>
</tr>
<tr>
<td>Parker Power Boost</td>
<td>5</td>
</tr>
<tr>
<td>Specifications</td>
<td>6</td>
</tr>
<tr>
<td>Ordering codes</td>
<td>7</td>
</tr>
<tr>
<td>Installation dimensions</td>
<td></td>
</tr>
<tr>
<td>F11-6 and -10 saw motor version without make up valve</td>
<td>8</td>
</tr>
<tr>
<td>F11-6 and -10 saw motor version with make up valve</td>
<td>9</td>
</tr>
<tr>
<td>F11-12 and -14 saw motor version with make up valve</td>
<td>10</td>
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<tr>
<td>F11-19 saw motor version with make up valve</td>
<td>11</td>
</tr>
<tr>
<td>F12-30 saw motor version with make up valve</td>
<td>12</td>
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<tr>
<td>F12-40 saw motor version without make up valve</td>
<td>13</td>
</tr>
<tr>
<td>F12-60 motor versions</td>
<td>13</td>
</tr>
<tr>
<td>Installation information</td>
<td>14</td>
</tr>
<tr>
<td>Case drain connections</td>
<td>14</td>
</tr>
</tbody>
</table>
Introduction

Parker Hannifin offers an extensive range of components suitable for forestry machines and can assist with an optimal technical solution to obtain the most cost-efficient system.

Based on many years of experience from forestry applications, product development has been focused on helping manufacturers obtain the best possible performance from their machines. Many of our products have, therefore, been developed in direct and close cooperation with customers.

Parker Hannifin holds a leading position when it comes to product and application knowledge, dedicated to serve the forestry machine market.

We have components such as pumps, cylinders, motors, directional control valves, remote controls and electronic equipment for most of the hydraulic functions on any forestry machine.

The optimal saw motor

Series F11/F12 motors have proven extremely reliable in demanding applications such as bar (chain) saw drives. Primarily due to the 40 degree bent-axis design, spherical, light weight pistons (with laminated piston rings) and timing gear, extremely high speeds can be allowed, and the reliability is not affected even by low-temperature start-ups.

To further enhance the saw function and, at the same time, reduce weight, cost and installation dimensions, Parker has developed a motor which is specifically dedicated to bar saws. Based on the well proven F11/F12 design, the saw motor permits saw bar bearings to be mounted directly on the motor housing, and the chain spur gear installs on the motor shaft without the need for additional bearings.

The saw flange has integrated ports for auxiliary functions.

Benefits

• Simple installation - lower cost
• Sturdier saw bar support
• Lower overall weight
• Much more compact installation
• Same mounting flange installation dimensions for all sizes
Saw motor versions
The saw motor is available in eight sizes, 6, 10, 12, 14, 19, 30, 40 and 60 cm³/rev. Motors between 6 to 30 cm³/rev are equipped with an integrated, large capacity make-up (anti-cavitation) valve. The valve reduces the risk of cavitation when the pump supply is suddenly shut off while the motor is still running at high speed. A counter-pressure of around 10 bar (measured in port B in the exemplified schematic below) is recommended.

The make-up valve makes the motor directional; when ordering, either R (right hand/clockwise) or L (left hand/counter clockwise) rotation must be specified.

When ordering a motor with make up valve, it is to be specified in product code. Ex below.
F12-030-SF-WS-X-284-MUVL-B0

Parker Power Boost
A high speed F11 or F12 motor could be optimized with a Power Boost™, which means less fluid friction and oil compression. This can reduce power losses by up to 5 kW. The improved efficiency generates less heat, reducing the need for cooling and consequently improves fuel consumption.

Parker Power Boost is available for size F11-006, -010, -012, -014, -019 and F12-030.

When to order a motor with Power Boost it is to be specified in product code. Ex below.
F12-030-SF-WS-X-284-MUVL-B0
### Specifications

**Hydraulic Saw Motor**

**Series F11/F12**

#### Frame size F11/F12

<table>
<thead>
<tr>
<th>Frame size F11/F12</th>
<th>-006</th>
<th>-010</th>
<th>-012</th>
<th>-014</th>
<th>-019</th>
<th>-030</th>
<th>-040</th>
<th>-060</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement [cm³/rev]</td>
<td>6.0</td>
<td>9.8</td>
<td>12.5</td>
<td>14.3</td>
<td>19.0</td>
<td>30.0</td>
<td>40.0</td>
<td>59.8</td>
</tr>
<tr>
<td>Max Operating pressure [bar]</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>480</td>
<td>480</td>
</tr>
<tr>
<td>Max Motor operating speed [rpm]</td>
<td>11 200</td>
<td>11 200</td>
<td>10 300</td>
<td>9 900</td>
<td>8 900</td>
<td>8600</td>
<td>6700</td>
<td>5800</td>
</tr>
<tr>
<td>Drain temperature[^3], max [°C]</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
</tr>
<tr>
<td>Theoretical torque at 100 bar [Nm]</td>
<td>9.5</td>
<td>15.6</td>
<td>19.8</td>
<td>22.7</td>
<td>30.2</td>
<td>47.6</td>
<td>63.5</td>
<td>94.9</td>
</tr>
<tr>
<td>Mass moment of inertia</td>
<td>(x10⁻⁵) [kg m²]</td>
<td>0.39</td>
<td>0.39</td>
<td>0.40</td>
<td>0.42</td>
<td>1.1</td>
<td>1.7</td>
<td>2.9</td>
</tr>
<tr>
<td>Weight [kg]</td>
<td>7.5</td>
<td>7.5</td>
<td>8.2</td>
<td>8.3</td>
<td>11</td>
<td>12</td>
<td>16.5</td>
<td>21</td>
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</table>

[^3]: See also installation information. Page 14

#### Chain 0.404”

<table>
<thead>
<tr>
<th>Sprocket No of teeth</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
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<tbody>
<tr>
<td>Motor speed rpm</td>
<td>10700</td>
<td>9800</td>
<td>9000</td>
<td>8400</td>
<td>7850</td>
<td>7350</td>
<td>6900</td>
<td>6550</td>
<td>5900</td>
<td>5350</td>
</tr>
<tr>
<td>F11-006 l/min</td>
<td>66</td>
<td>60</td>
<td>55</td>
<td>51</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>F11-010 l/min</td>
<td>107</td>
<td>98</td>
<td>90</td>
<td>84</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>F11-012 l/min</td>
<td>–</td>
<td>125</td>
<td>115</td>
<td>107</td>
<td>100</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>F11-014 l/min</td>
<td>–</td>
<td>143</td>
<td>131</td>
<td>123</td>
<td>115</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>F11-019 l/min</td>
<td>–</td>
<td>–</td>
<td>174</td>
<td>163</td>
<td>152</td>
<td>143</td>
<td>134</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>F12-030 l/min</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>240</td>
<td>225</td>
<td>211</td>
<td>201</td>
<td>181</td>
<td>164</td>
</tr>
<tr>
<td>F12-040 l/min</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>267</td>
<td>241</td>
<td>218</td>
</tr>
<tr>
<td>F12-060 l/min</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>360</td>
<td>326</td>
</tr>
</tbody>
</table>

#### Chain 3/4”

<table>
<thead>
<tr>
<th>Sprocket No of teeth</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor speed rpm</td>
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<td>5700</td>
<td>5050</td>
<td>4550</td>
<td>4150</td>
<td>3800</td>
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<tr>
<td>F12-030 l/min</td>
<td>199</td>
<td>174</td>
<td>155</td>
<td>139</td>
<td>127</td>
<td>116</td>
</tr>
<tr>
<td>F12-040 l/min</td>
<td>265</td>
<td>233</td>
<td>206</td>
<td>186</td>
<td>169</td>
<td>155</td>
</tr>
<tr>
<td>F12-060 l/min</td>
<td>–</td>
<td>348</td>
<td>308</td>
<td>278</td>
<td>253</td>
<td>232</td>
</tr>
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</table>
## Ordering codes

### Series F11/F12

#### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
<th>Main ports</th>
<th>Shaft seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>006*</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>010*</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>012*</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>014*</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>019*</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>030**</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>040**</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>060**</td>
<td>Motor</td>
<td>x</td>
<td>-</td>
</tr>
</tbody>
</table>

* F11
** F12

### Displacement

<table>
<thead>
<tr>
<th>Code</th>
<th>Frame size (cm³/rev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>006*</td>
<td>6.0</td>
</tr>
<tr>
<td>010*</td>
<td>9.8</td>
</tr>
<tr>
<td>012*</td>
<td>12.5</td>
</tr>
<tr>
<td>014*</td>
<td>14.3</td>
</tr>
<tr>
<td>019*</td>
<td>19.0</td>
</tr>
<tr>
<td>030**</td>
<td>30.0</td>
</tr>
<tr>
<td>040**</td>
<td>40.0</td>
</tr>
<tr>
<td>060**</td>
<td>59.8</td>
</tr>
</tbody>
</table>

### Main ports

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
<th>Main ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Motor</td>
<td>BSP threads</td>
</tr>
<tr>
<td>S</td>
<td>Motor, high speed</td>
<td>SAE 6000 psi</td>
</tr>
</tbody>
</table>

### Shaft seal

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
<th>Shaft seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Saw motor flange</td>
<td>PTFE, high speed</td>
</tr>
<tr>
<td>C</td>
<td>CETOP / Cartrige</td>
<td>PTFE, high speed</td>
</tr>
</tbody>
</table>

### Version number

<table>
<thead>
<tr>
<th>Code</th>
<th>Option</th>
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<tr>
<td>0000</td>
<td>Standard</td>
</tr>
<tr>
<td>MUVR</td>
<td>Make up/Anti-cavitation valve clockwise rotation</td>
</tr>
<tr>
<td>MUVL</td>
<td>Make up/Anti-cavitation valve counter clockwise rotation</td>
</tr>
</tbody>
</table>

### Shaft

<table>
<thead>
<tr>
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<th>Shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Metric key (Std)</td>
</tr>
<tr>
<td>P</td>
<td>Metric key (25 mm)</td>
</tr>
<tr>
<td>X</td>
<td>Metric key (Saw motor flange)</td>
</tr>
</tbody>
</table>

### Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>B_</td>
<td>Power Boost</td>
</tr>
<tr>
<td>_T</td>
<td>Painted Black</td>
</tr>
</tbody>
</table>

### Notes

- Available (x): Optional - - Not available
F11-6 and -10 saw motor version without make up valve
Installation dimensions

Hydraulic Saw Motor
Series F11/F12

F11-6 and -10 saw motor version with make up valve

Catalogue MSG30-8245/UK
Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden

Make up/Anti cavitation valve (MUVL or MUVR optional; clockwise rotation shown)

View C–C

Main ports
BSP 3/8"-A (straight thread)

Drain ports
BSP 1/8"-A (straight thread; min 14 mm deep)

Scale 2:1

BSP 3/4"-A (straight thread)

BSP 3/8"-A

Dimensions:
- Ø80 g6 (-0.010/-0.029)
- Ø115 h8 (-0.010/-0.029)
- Ø12.5 ±0.1
- Ø123 (max)
- 71.5 ±0.1
Installation dimensions

F11-12 and -14 saw motor version with make up valve

Catalogue MSG30-8245/UK

Hydraulic Saw Motor
Series F11/F12

Scale 2:1

Main ports
BSP 3/4"-A (straight thread)

Drain ports
BSP 5/8"-A (straight thread)

Make up/Anti cavitation valve (MUVL or MUVR optional; clockwise rotation shown)

Installation dimensions
F11-19 saw motor version with make up valve

Installation dimensions

**Scale 2:1**

- **BSP 3/4”-A** (straight thread)
- **Drain ports**
  - **BSP 3/8”-A** (straight thread)
  - **BSP 1/8”** (x2) (straight thread; min 14 mm deep)
- **Make up/Anti cavitation valve** (MUVL or MUVR optional; clockwise rotation shown)
- **Main ports**
  - **BSP 1/2”-A** (straight thread)
  - **Drain ports**
    - **BSP 3/4”-A** (straight thread)
- **BSP 1/8”** (x2) (straight thread; min 14 mm deep)
- **M8 (16 deep)**
- **Ø80 g6 (-0.010/-0.029)**
- **Ø115 h8 (+0/-0.054)**
F12-30 saw motor version with make up valve

Make up/Anti cavitation valve (MUVL or MUVR optional; clockwise rotation shown)

Main ports A and B SAE J518c 6000 psi

Scale 2:1
Installation dimensions

F12-40 saw motor version without make up valve

F12-60 motor versions
For dimensional drawings we refer to main catalogue F11/F12 HY30-8249, pages 46 to 53.
Hydraulic fluids
The saw motor data shown in the specification are valid when operating on a high quality, mineral based fluid with a minimum of contamination.
Hydraulic fluids type HLP (DIN 51524), ATF (automatic transmission fluid), and API type CD engine oils are suitable.

Operating temperature
The fluid temperature in the main hydraulic system must not exceed 70 °C; the drain fluid must not exceed 115 °C. **NOTE:** Fluid temperature should be measured at the utilized motor drain port.

Case pressure
The service life of the shaft seal ring is affected by the speed of the motor and the case drain pressure and it can decrease with an increase in the frequency of pressure peaks.
Note, seal life can be shorter at unfavourable operating conditions (cavitation, over speed, high temperature, low oil viscosity, contaminated oil).
The case pressure must be equal to or greater than the external pressure on the shaft seal ring.

Case drain connections
Series F11/F12 has two drain ports, C and D.
To secure correct case pressure and lubrication a spring loaded check valve in the drain line is recommended.

F12

F11

Viscosity
The ideal viscosity for the saw motor is 15–30 mm²/s (cSt). When the hydraulic system has reached full operating temperature, the drain fluid viscosity must not be lower than 8 mm²/s.
(measured at the utilized motor drain port).
Max start-up viscosity: 1 000 mm²/s.

Filtration
Long saw motor life can be expected if fluid cleanliness meets or exceeds 'ISO code 20/18/13' (according to ISO 4406).
Under normal operating conditions a filtration level of 10 μm (absolute) is recommended.
WARNING – USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Offer of Sale

Please contact your Parker representation for a detailed "Offer of Sale".
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