Hydraulic Motor/Pump
Series F11/F12
Fixed Displacement
Hydraulic motor/pump
Series F11/F12

Basic formulas for hydraulic motors

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

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

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

Conversion factors
1 kg ................................................................. 2.20 lb
1 N ............................................................... 0.225 lbf
1 Nm ......................................................... 0.738 lbf ft
1 bar .............................................................. 14.5 psi
1 l ...................................................... 0.264 US gallon
1 cm³  ....................................................... 0.061 cu in
1 mm ............................................................. 0.039 in
1°C ............................................................. 5/9(°F-32)
1 kW ............................................................ 1.34 hp

Basic formulas for hydraulic pumps

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

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

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

Conversion factors
1 lb ............................................................... 0.454 kg
1 lbf .......................................................... 4.448 N
1 lbf ft ................................................... 1.356 Nm
1 psi .................................................. 0.068948 bar
1 US gallon .............................................. 3.785 l
1 cu in .................................................. 16.387 cm³
1 in .................................................... 25.4 mm
1°F ................................................... 9/5°C + 32
1 hp ................................................... 0.7457 kW

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.”
## General product information
General information and design, Bearing life, F11/F12 Fan motors, F11/F12 in saw motor applications, Parker Power Boost

### Series F11
Bent axis piston pump/motor with fixed displacement

### Series F12
Bent axis piston pump/motor with fixed displacement

## Accessories
Flushing valves, FV13 flushing valve block, Integrated pressure relief valve, SR pressure relief/anticavitation valve block, SV pressure relief valve block, MV Anti-cavitation valve, Speed sensor, BLA Boost units

## Installation and start up information
F11, F12

### Change History for edition 2019
- Pages 27 and 29: Plug dimension for Main port A and B.
- Pages 27 and 29: Plug dimension for drain port C and D.
- Page 45: Ordering code 00 deleted. F12-250 prepared for speed sensor
- Pages 48 and 54: Port for speed sensor shown plugged.
- Page 67: New MV Anti-cavitation valve / make up valve block.
- Page 67: New speed sensor data
Series F11
F11 is a bent-axis, fixed displacement motor/pump. It can be used in numerous applications in both open and closed loop circuits. The F11 series is available in sizes 5, 6, 10, 12, 14 and 19 cc (0.3 to 1.16 cu in/rev).

F11 Features
• Max intermittent pressure up to 420 bar (6090 psi) and continuous operating pressure up to 350 bar (5075 psi)
• Thanks to low weight pistons and a compact design of the rotating parts, the F11 tolerates very high speeds, up to 14000 rpm
• CETOP, ISO, SAW and SAE versions

Series F12
F12 is a bent-axis, fixed displacement motor/pump. It can be used in numerous applications in both open and closed loop circuits. The F12 series is available in sizes 30, 40, 60, 80, 90, 110, 125, 152, 162, 182 and 250 cc (1.83 to 14.8 cu in/rev).

F12 Features
• Max intermittent pressure up to 480 bar (6960 psi) and continuous operating pressure up to 420 bar (6090 psi)
• The 7 or 9 piston design provides high start-up torque and smooth motor operation
• ISO, CETOP, SAW, Cartridge and SAE versions

General Features
• The laminated piston ring offers important advantages such as unbeatable efficiency and thermal shock resistance
• High allowable speeds and operating pressures means high output power
• The unique piston locking, timing gear and bearing set-up as well as the limited number of parts add up to a very robust design with long service life and, above all, proven reliability.
• The 40° angle between shaft and cylinder barrel allows for a very compact, lightweight motor/pump.
• Small envelop size and a high power-to-weight ratio
• The motor version has highly engineered valve plates for high speed and low noise
• The pump version has highly engineered valve plates for increased self priming speed and low noise, available with left and right hand rotation.
• The F11’s and F12’s have a simple and straightforward design with very few moving parts, making them very reliable motors/pumps.
• Our unique timing gear design synchronizes shaft and cylinder barrel, making the F11/F12 very tolerant to high ‘G’ forces and torsional vibrations.
• Heavy duty roller bearings permit substantial external axial and radial shaft loads.
Bearing life

General information
Bearing life can be calculated for that part of the load/life curve (shown below) that is designated 'Bearing fatigue', 'Rotating group fatigue and wear' and 'Other' caused by material fatigue, fluid contamination, etc. should also be taken into consideration when estimating the service life of a motor/pump in a specific application.

Bearing life calculations are mainly used when comparing different frame sizes. Bearing life, designated B₁₀ (or L₁₀), is dependent of system pressure, operating speed, external shaft loads, fluid viscosity in the case, and fluid contamination level.

The B₁₀ value means that 90% of the bearings survive, at a minimum, the number of hours calculated. Statistically, 50% of the bearings will survive at least five times the B₁₀ life.

Life expectancy (logarithmic scale)

Bearing fatigue

Rotating group fatigue and wear

System pressure

Other causes

Hydraulic unit life versus system pressure.

Required information
When requesting a bearing life calculation from Parker Hannifin, the following information (where applicable) should be provided:
- A short presentation of the application
- F11 or F12 size and version
- Duty cycle (pressure and speed versus time at given displacements)
- Low system pressure
- Case fluid viscosity
- Life probability (B₁₀, B₂₀, etc.)
- Operating mode (pump or motor)
- Direction of rotation (L or R)
- External shaft loads (Forces, Gear, Belt, Cardan or none)

For forces please provide:
- Axial load, Fixed radial load, Bending moment, Rotating radial load and distance flange to radial load.

For Gear please provide:
- Pitch diameter, Pressure angle, Spiral angle, Distance flange – gearwheel (mid) and Gearwheel spiral direction (R or L).

For Belt please provide:
- Pretension, Coefficient of friction, Angle of contact, Distance flange – pulley (mid) and Diameter pulley.

For Cardan please provide:
- Shaft angle, Distance flange – first joint and distance between joints
- Angle of attack (\(\alpha\)) as defined below

Bearing life calculation
An application is usually governed by a certain duty or work cycle where pressure and speed vary with time during the cycle.

In addition, bearing life depends on external shaft forces, fluid viscosity in the case and fluid contamination.

Parker Hannifin has a computer program for calculating bearing life and will assist in determining F11 or F12 motor/pump life in a specific application.

The direction (\(\alpha\)) of the radial load is positive in the direction of rotation as shown.

To obtain maximum bearing life, the radial load should, in most cases, be located between 170° and 190°.
F11/F12 Fan motors

F11/F12 motors, in frame sizes -5 to -40 cc (0.3 to 2.44 cu in/rev), are common in Fan applications. Some typical options are, built in check valve, pressure relief valve, cartridge flange and tapered shaft (refer to the schematic to the right).

The fan motor can be operated at very high speeds without reliability problems. The fan is usually installed directly on the motor shaft without additional bearing support. The F11/F12 has up to 95% overall efficiency which reduces the diesel consumption and minimizes the cooling demand.

Fan motor circuit

Because of the built-in anti cavitation valve, either left hand (L) or right hand (R) rotation must be specified when ordering the motor.

When the pump flow to the motor is shut off and the motor is operating at very high speeds, it is important that sufficient return port back pressure is available (port B in the schematic to the right).

The anti cavitation valve will then open and direct flow to the motor inlet port. If the inlet pressure is insufficient, motor cavitation will be experienced.

In an open circuit, back pressure can be created by a counter pressure valve installed in the return line; preferably, it should be pilot operated to minimize power losses. A back pressure of about 10 bar is sufficient in most applications.

For more drawings illustrating motors with make-up valve, see chapters 2, F11 and 3, F12.

For more info about integrated pressure relief valves, see page 63.

Example of ordering code

F11-010-MB-CV-K-000-MUVL-00

MUVL = Make up/anti cavitation valve, counter clockwise rotation

MUVR = Make up/anti cavitation valve, clockwise rotation
F11/F12 in saw motor applications
Series F11/F12 motors have proven suitable for demanding applications such as chain saws. Primarily due to the 40° bent-axis design, spherical pistons (with laminated piston rings) and gear synchronization, very high speeds are permissible. Not even low temperatures at start-up affect reliability.

Because of the built-in anti cavitation valve, either left hand (L) or right hand (R) rotation must be specified when ordering the motor.

When the pump flow to the motor is shut off and the motor is operating at very high speeds, it is important that sufficient return port back pressure is available. The anti cavitation valve will then open and direct flow to the motor inlet port. If the inlet pressure is insufficient, motor cavitation will be experienced.

To further enhance the saw function and, at the same time, reduce weight, cost and installation dimensions, a specific saw motor has been developed (frame sizes F11-6, -10, -12, -14 19, F12-30 and -40; refer to the illustration to the right) which is specifically dedicated to bar saws. The motor allows the saw bar bearings to be mounted directly on the motor housing, and the sprocket installs on the motor shaft without additional bearings. Catalog MSG30-8245/UK

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 with a B in last field in model code. Ex below. F11-019-SB-CS-K-000-MUWL-B0
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### Specifications

#### Hydraulic motor/pump

**Series F11**

<table>
<thead>
<tr>
<th>Frame size F11</th>
<th>-005</th>
<th>-006</th>
<th>-010</th>
<th>-012</th>
<th>-014</th>
<th>-019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Displacement</strong></td>
<td>[cm³/rev]</td>
<td>4.9</td>
<td>6.0</td>
<td>9.8</td>
<td>12.5</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>[cu in/rev]</td>
<td>0.30</td>
<td>0.37</td>
<td>0.60</td>
<td>0.76</td>
<td>0.87</td>
</tr>
<tr>
<td><strong>Operating pressure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>max intermittent</td>
<td>[bar]</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td>[psi]</td>
<td>6 000</td>
<td>6 000</td>
<td>6 000</td>
<td>6 000</td>
<td>6 000</td>
</tr>
<tr>
<td>max continuous</td>
<td>[bar]</td>
<td>350</td>
<td>350</td>
<td>350</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>[psi]</td>
<td>5 000</td>
<td>5 000</td>
<td>5 000</td>
<td>5 000</td>
<td>5 000</td>
</tr>
<tr>
<td><strong>Motor operating speed</strong></td>
<td>[rpm]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>max intermittent</td>
<td>14 000</td>
<td>11 200</td>
<td>11 200</td>
<td>10 300</td>
<td>9 900</td>
<td>8 900</td>
</tr>
<tr>
<td>max continuous</td>
<td>12 800</td>
<td>10 200</td>
<td>10 200</td>
<td>9 400</td>
<td>9 000</td>
<td>8 100</td>
</tr>
<tr>
<td>min continuous</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Max pump selfpriming speed</strong></td>
<td>[rpm]</td>
<td>4 600</td>
<td>–</td>
<td>4 200</td>
<td>3 900</td>
<td>3 900</td>
</tr>
</tbody>
</table>

#### Motor input flow

| max intermittent | [l/min] | 69 | 67 | 110 | 129 | 142 | 169 |
|                 | [gpm] | 18.2 | 17.7 | 29.1 | 34.1 | 37.5 | 44.6 |
| max continuous | [l/min] | 63 | 61 | 100 | 118 | 129 | 154 |
|                 | [gpm] | 16.6 | 16.1 | 26.4 | 31.2 | 34.1 | 40.7 |

#### Drain temperature

| max | [°C] / [° F] | 115/239 | 115/239 | 115/239 | 115/239 | 115/239 | 115/239 |
| min | [°C] / [° F] | -40/-40 | -40/-40 | -40/-40 | -40/-40 | -40/-40 | -40/-40 |

#### Theoretical torque at 100 bar

| [Nm] | 7.8 | 9.5 | 15.6 | 19.8 | 22.7 | 30.2 |
| [lbf ft] | 5.8 | 7.0 | 11.5 | 14.6 | 16.8 | 22.3 |

#### Mass moment of inertia

| (x10⁻³) [kg m²] | 0.16 | 0.39 | 0.39 | 0.40 | 0.42 | 1.1 |
| (x10⁻²) [lbft²] | 0.38 | 0.92 | 0.92 | 0.95 | 1.00 | 2.61 |
| **Weight** [kg] | 4.7 | 6.5 | 6.5 | 7.5 | 7.5 | 11 |
| [lb] | 10.4 | 14.3 | 14.3 | 16.5 | 16.5 | 24.3 |

1) Intermittent: max 6 seconds in any one minute.
2) Selfpriming speed valid at sea level. Find more info on page 11
3) See also installation information. Page 69
Efficiency
Because of its high overall efficiency, driving a motor/pump from series F11 requires less fuel or electric power. Also, it allows the use of a small reservoir and heat exchanger, which in turn reduce cost, weight, and installation size.

The diagrams to the right show volumetric and mechanical efficiencies of an F11-5 motor.

F11-19 motors can be equipped with Power Boost which in high speed applications can decrease the mechanical losses by up to 15%, see page 7.

Contact Parker Hannifin for efficiency information on a particular F11 frame size that is being considered.

Noise level
Series F11 feature low noise levels from low to high speeds and pressures.

The noise level is measured in a semi-anechoic room, 1 m behind the unit. As an example, the diagram to the right shows the noise level of an F11-005.

The noise level for a particular motor/pump may vary ±2 dB(A) compared to what is shown in the diagram.

NOTE: Noise information for F11/F12 frame sizes are available from Parker Hannifin.
Selfpriming speed and required inlet pressure

Series F11
In pump applications, the F11 with function L (counter clockwise rotation) or R (clockwise rotation) is normally used. The L and R (pump) provide the highest self priming speeds (see table) as well as the lowest noise level. The M and H (motor) function can also be used as a pump, in either direction, but at a lower self priming speed.

Operating above the self priming speed (refer to Diagram 1) requires increased inlet pressure. As an example, at least 1.0 bar is needed when operating the F11-19-M as a pump at 3500 rpm. An F11 used as a motor (e.g. in a hydrostatic transmission), may sometimes operate as a pump at speeds above the selfpriming speed; this requires additional inlet pressure. Insufficient inlet pressure can cause pump cavitation resulting in greatly increased pump noise and deteriorating performance.

<table>
<thead>
<tr>
<th>Function</th>
<th>L or R</th>
<th>M</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>F11-5</td>
<td>4600</td>
<td>3800</td>
<td>3200</td>
</tr>
<tr>
<td>F11-6</td>
<td>4200</td>
<td>3100</td>
<td>2700</td>
</tr>
<tr>
<td>F11-10</td>
<td>3900</td>
<td>3100</td>
<td>2700</td>
</tr>
<tr>
<td>F11-12</td>
<td>3900</td>
<td>-</td>
<td>3000*</td>
</tr>
<tr>
<td>F11-14</td>
<td>3900</td>
<td>-</td>
<td>3000*</td>
</tr>
<tr>
<td>F11-19</td>
<td>3500</td>
<td>2400</td>
<td>2100</td>
</tr>
</tbody>
</table>

* Valve plate S

Diagram 1. Min required inlet pressure for Motor.

Diagram 2. Min required inlet pressure for Pump.

The inlet pressure can be charged by external pump, pressurized reservoir or using BLA Boost unit
Find more info about the BLA unit at page 68.
### Hydraulic motor/pump

**Series F11**

#### Ordering codes

**F11**

- Frame size
- Function
- Main ports
- Mounting flange
- Shaft
- Shaft seal
- Version number
- Option
- Option

**F11-CETOP**

- Frame size
- Function
- Main ports
- Mounting flange
- Shaft
- Shaft seal
- Version number
- Option
- Option

#### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
<th>Displacement (cm³/rev)</th>
<th>Displacement (cu in/rev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>005</td>
<td>Motor</td>
<td>4.9</td>
<td>0.30</td>
</tr>
<tr>
<td>006</td>
<td>Motor</td>
<td>6.0</td>
<td>0.37</td>
</tr>
<tr>
<td>010</td>
<td>Motor</td>
<td>9.8</td>
<td>0.60</td>
</tr>
<tr>
<td>012</td>
<td>Motor</td>
<td>12.5</td>
<td>0.76</td>
</tr>
<tr>
<td>014</td>
<td>Motor</td>
<td>14.3</td>
<td>0.87</td>
</tr>
<tr>
<td>019</td>
<td>Motor</td>
<td>19.0</td>
<td>1.16</td>
</tr>
</tbody>
</table>

**Frame size**

- Code: Displacement (cm³/rev) Displacement (cu in/rev)
- 005: 4.9 0.30
- 006: 6.0 0.37
- 010: 9.8 0.60
- 012: 12.5 0.76
- 014: 14.3 0.87
- 019: 19.0 1.16

**Frame size**

- Code: Function
- M: Motor
- Q: Motor, low noise
- S: Motor, high speed
- H: Motor, high pressure
- R: Pump, clockwise rotation
- L: Pump, counter clockwise rotation

**Frame size**

- Code: Main ports
- B: BSP threads
- U: SAE, UN threads

**Frame size**

- Code: Shaft* seal
- V: FPM, high pressure, high temperature

**Frame size**

- Code: Shaft
- K: Metric key
- J: Metric key
- P: Metric key
- A: Spline, DIN 5480
- D: Spline, DIN 5480
- S: Spline, SAE
- V: Tapered shaft

*See also dimensional drawings on pages 15-23.

**Frame size**

- Code: Shaft
- Option
- _K_: Available
- _L_: Optional
- _T_: Not available

**Frame size**

- Code: Option
- 000: Standard
- MUVR: Make up/Anti cavitation valve clockwise rotation
- MUVL: Make up/Anti cavitation valve counter clockwise rotation

**Frame size**

- Code: Option
- _P_: Prepared for speed sensor
- _B_: Power Boost and Prepared for speed sensor
- _T_: Painted Black

**NOTE:** All combinations are not valid, please contact Parker Hannifin.
# Hydraulic motor/pump

## Ordering codes

### Series F11

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Function</th>
<th>Main ports</th>
<th>Shaft seal</th>
<th>Shaft</th>
<th>Version number</th>
<th>Option page</th>
</tr>
</thead>
<tbody>
<tr>
<td>F11-ISO</td>
<td></td>
<td></td>
<td></td>
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</table>

### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Displacement (cm³/rev)</th>
<th>Displacement (cu in/rev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>006</td>
<td>6.0</td>
<td>0.37</td>
</tr>
<tr>
<td>010</td>
<td>9.8</td>
<td>0.60</td>
</tr>
<tr>
<td>012</td>
<td>12.5</td>
<td>0.76</td>
</tr>
<tr>
<td>014</td>
<td>14.3</td>
<td>0.87</td>
</tr>
</tbody>
</table>

### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Motor</td>
</tr>
<tr>
<td>Q</td>
<td>Motor, low noise</td>
</tr>
<tr>
<td>S</td>
<td>Motor, high speed</td>
</tr>
<tr>
<td>H</td>
<td>Motor, high pressure</td>
</tr>
<tr>
<td>R</td>
<td>Pump, clockwise rotation</td>
</tr>
<tr>
<td>L</td>
<td>Pump, counter clockwise rotation</td>
</tr>
</tbody>
</table>

For other versions, contact Parker Hannifin.

### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Shaft*</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Metric key</td>
</tr>
<tr>
<td>J</td>
<td>Metric key</td>
</tr>
<tr>
<td>P</td>
<td>Metric key</td>
</tr>
<tr>
<td>A</td>
<td>Spline, DIN 5480</td>
</tr>
<tr>
<td>D</td>
<td>Spline, DIN 5480</td>
</tr>
<tr>
<td>V</td>
<td>Tapered shaft</td>
</tr>
</tbody>
</table>

For other versions, contact Parker Hannifin.

### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Shaft seal</th>
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</thead>
<tbody>
<tr>
<td>V</td>
<td>FPM, high pressure, high temperature</td>
</tr>
</tbody>
</table>

For other versions, contact Parker Hannifin.

### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Option</th>
</tr>
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<tbody>
<tr>
<td>000</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>

For other versions, contact Parker Hannifin.

### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Standard</td>
</tr>
<tr>
<td>B_</td>
<td>Power Boost and Prepared for speed sensor</td>
</tr>
<tr>
<td>T</td>
<td>Painted Black</td>
</tr>
</tbody>
</table>

*See also dimensional drawings on pages 25-29.

---

**NOTE:** All combinations are not valid, please contact Parker Hannifin.
**Ordering codes**

**Hydraulic motor/pump**

**Series F11**

---

**Frame size**

<table>
<thead>
<tr>
<th>Code</th>
<th>Displacem. (cm³/rev)</th>
<th>Displacem. (cu in/rev)</th>
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</thead>
<tbody>
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<td>010</td>
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<td>012</td>
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<td>014</td>
<td>14.3</td>
<td>0.87</td>
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<tr>
<td>019</td>
<td>19.0</td>
<td>1.16</td>
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**Frame size 6 10 12 14 19**

<table>
<thead>
<tr>
<th>Code</th>
<th>Main ports</th>
</tr>
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<tbody>
<tr>
<td>U</td>
<td>SAE, UN threads x x x x</td>
</tr>
<tr>
<td>B</td>
<td>BSP threads  (x) (x) (x) (x)</td>
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**Frame size 8 10 12 14 19**

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</thead>
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<td>S</td>
<td>SAE flange x x x x</td>
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**Frame size 6 10 12 14 19**

<table>
<thead>
<tr>
<th>Code</th>
<th>Shaft seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>FPM, high pressure, high temperature x x x x</td>
</tr>
</tbody>
</table>

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**Frame size 0 0 0 0 0**

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<thead>
<tr>
<th>Code</th>
<th>Option</th>
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</thead>
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<td>Standard x x x x</td>
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**Frame size 0 0 0 0 0**

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</tr>
<tr>
<td>B</td>
<td>Power Boost and Prepared for speed sensor  (x) (x) (x) (x)</td>
</tr>
<tr>
<td>T</td>
<td>Painted Black  (x) (x) (x) (x)</td>
</tr>
</tbody>
</table>

---

**NOTE:** All combinations are not valid, please contact Parker Hannifin.
**Installation dimensions**

**Series F11**

**F11-5**
(CETOP versions)

**Main port A**
(BSP 1/2"

**Main port B**
(BSP 1/2"

**Drain port C**
(BSP 1/4"

**Flange C**

Type K key shaft

Key 6x6x30
(0.24x0.24x1.18 metric key)

**Main ports Code U**

**Main port A**
3/4"-16 UNF
O-ring boss;
SAE J514d

**Main port B**
3/4"-16 UNF
O-ring boss;
SAE J514d

**Drain port C**
9/16"-18 UNF
O-ring boss;
SAE J514d

**Approx. center of gravity**

**Type C mounting flange**

**W18x1,25x13x9g**

**Type D**

**spline shaft (DIN 5480)**

**Approx. center of gravity**

**Key 6x6x30**
(0.24x0.24x1.18 metric key)
Hydraulic motor/pump
Series F11

F11-006, -010
(CETOP versions)

Installation dimensions

Main port A (BSP 3/4")
Main port B (BSP 3/4")
Drain port C (BSP3/8")
Flange C

Drain port D (BSP3/8")

Approx. center of gravity

Type C mounting flange

Catalogue MSG30-8249/US
Hydraulic motor/pump
Series F11

F11-006, -010
(CETOP versions)

Installation dimensions

Shaft options

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

Key 8x7x35 (0.31x0.28x1.38 metric key)

Type K key shaft (Std)

Key 6x6x35 (0.24x0.24x1.38 metric key)

Type J key shaft (Opt.)

Spline shaft D
W20x1.25x14x9g; DIN 5480

Spline shaft A
W 25x1.25x18x9g
DIN 5480

Tapered key shaft "V"
SAE J744 22-3 (B)

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden
Hydraulic motor/pump
Series F11

F11-012
(CETOP versions)

Main port B
(BSP 3/4")

Main port A
(BSP 3/4")

Drain port D
(BSP 3/8")

Drain port D
(BSP 3/8")

Flange C

Catalogue MSG30-8249/US
Installation dimensions
F11-012
(CETOP versions)

Installation dimensions

Hydraulic motor/pump
Series F11

Shaft options

Type K key shaft
(Std)

Key 6x6x35
(0.24x0.24x1.38 metric key)
M6 ; 0.47 deep
Ø0.7878
Ø0.7872

Type J key shaft
(Opt.)

Key 8x7x35
(0.31x0.28x1.38 metric key)
M10 ; 0.63 deep
Ø0.9844
Ø0.9841

Spline shaft D
W20x1.25x14x9g;
DIN 5480

Spline shaft A
W 25x1.25x18x9g
DIN 5480

Tapered key shaft "V"
SAE J744 22-3 (B)

Make up/Anti cavitation valve
(MUVL or MUVR optional;
clockwise rotation shown)
Hydraulic motor/pump
Series F11

F11-014
(CETOP versions)

Main port A
(BSP 3/4")

Main port B
(BSP 3/4")

Drain port C
(BSP 3/8")

Drain port D
(BSP 3/8")

Main port
A
(BSP 3/4")

(1.26)

4.02

2.09

6.18 max

3.94

Ø3.9370

Ø3.9349

R0.02

4.02

1.81

1.18

5.24

6.18 max

0.31

0.55

0.37

Type C mounting flange

Ø0.51 (x2)

COW

39° (x4)

4.92

5.91

(Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden)
F11-014
(CETOP versions)

Speed sensor (optional)

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

Shaft options

Tapered key shaft “V”
SAE J744 22-3 (B)
Hydraulic motor/pump
Series F11

F11-019
(CETOP version)

Installation dimensions

**F11-019**

<table>
<thead>
<tr>
<th>Dimension (inches)</th>
<th>Value</th>
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<tbody>
<tr>
<td>Main port A (BSP 3/4&quot;)</td>
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</tr>
<tr>
<td>Main port B (BSP 3/4&quot;)</td>
<td>6.50 max</td>
</tr>
<tr>
<td>Drain port C (BSP3/8&quot;)</td>
<td>0.91</td>
</tr>
<tr>
<td>Drain port D (BSP3/8&quot;)</td>
<td>0.98</td>
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<tr>
<td>Ø4.4094/4.4073</td>
<td>3.46</td>
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<tr>
<td>Ø0.55 (x2)</td>
<td>0.43</td>
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<tr>
<td>Ø6.77 max</td>
<td>0.43</td>
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<tr>
<td>5.51</td>
<td>0.39</td>
</tr>
<tr>
<td>4.96</td>
<td>0.39</td>
</tr>
<tr>
<td>R0.05 max</td>
<td>0.39</td>
</tr>
<tr>
<td>Type C mounting flange</td>
<td>5.51</td>
</tr>
</tbody>
</table>

Approx. center of gravity

Catalogue MSG30-8249/US
Pump & Motor Division Europe
Trollhättan, Sweden
Hydraulic motor/pump
Series F11

F11-019
(CETOP version)

Installation dimensions

Shaft options

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

Speed sensor (optional)

Type K
key shaft

Key 8x7x35
(0.31x0.28x1.38
metric key)

M8 : 0.63 deep

Ø0.9846
Ø0.9841

Spline shaft D
W 25x1.25x18x9g
DIN 5480

2.40
2.56

25°

W 25x1.25x18x9g
DIN 5480

0.14
1.65

1.10

1.30

1.06

4.33

5.91

6.42 max

(5.91)
F11-006, -010
(ISO versions)
Hydraulic motor/pump
Series F11

F11-006, -010
(ISO versions)

Installation dimensions

Shaft options

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

Side ports M (both sides)
M22x1.5
14 deep min
ISO 9974-1
Only for F11-010
Hydraulic motor/pump
Series F11

F11-012
(ISO versions)

Main port A
M26x1.5
0.63 deep min
ISO 9974-1

Main port B
M26x1.5
0.63 deep min
ISO 9974-1

Drain port
M16x1.5
0.47 deep min
ISO 9974-1

Installation dimensions

Catalogue MSG30-8249/US
Hydraulic motor/pump
Series F11

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden

26
**F11-012**  
(ISO versions)

**Shaft options**

**Type K key shaft**  
(Std)

**Key 6x6x35**  
(0.24x0.24x1.38  
metric key)

**M6 ; 0.47 deep**

**0.91**  
**0.7878**  
**0.7872**

**Type J key shaft**  
(Opt.)

**Key 8x7x35**  
(0.31x0.28x1.38  
metric key)

**M10 ; 0.63 deep**

**0.9844**  
**0.9841**

**Spline shaft D**

W20x1.25x14x9g;  
DIN 5480

**Spline shaft A**

W 25x1.25x18x9g  
DIN 5480

**Tapered key shaft "V"**

SAE J744 22-3 (B)
F11-014
(ISO versions)

Main port A
M26x1.5
0.63 deep min
ISO 9974-1

Main port B
M26x1.5
0.63 deep min
ISO 9974-1

Drain port C
M16x1.5
(depth 0.47;
ISO 9974-1)

Drain port D
M16x1.5
(depth 0.47;
ISO 9974-1)

Flange I
(ISO 3019/2)

Type I mounting flange (ISO 3019/2)
**F11-014**  
(ISO versions)

### Installation dimensions

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

**Side ports M (both sides)**  
M22x1.5  
14 deep min  
ISO 9974-1

**Main port A and B**  
M22x1.5  
16 deep min  
ISO 9974-1

**Drain port C and D**  
M12x1.5  
14 deep min;  
ISO 9974-1

**Shaft options**

- **Key 8x7x35**  
  (0.31x0.28x1.38 metric key)

- **Key 6x6x35**  
  (0.24x0.24x1.38 metric key)

- **Spline shaft D**  
  W25x1.25x18x9g  
  (DIN 5480)

- **Tapered key shaft “V”**  
  SAE J744 22-3 (B)

---

**Parker Hannifin**  
Pump & Motor Division Europe  
Trollhättan, Sweden
Hydraulic motor/pump
Series F11

F11-006, -010
(SAE versions)

Main port A
1\(\frac{1}{16}\)"-12 UN O-ring boss; SAE J514d

Drain port
\(\frac{9}{16}\)"-18 UNF O-ring boss; SAE J514d

Main port B
1\(\frac{1}{16}\)"-12 UN O-ring boss; SAE J514d

Drain port
\(\frac{9}{16}\)"-18 UNF O-ring boss; SAE J514d

Flange S
size 101-2 SAE B SAE J744c

Main port A
1\(\frac{1}{16}\)"-12 UN O-ring boss; SAE J514d

Drain port
\(\frac{9}{16}\)"-18 UNF O-ring boss; SAE J514d

Main port B
1\(\frac{1}{16}\)"-12 UN O-ring boss; SAE J514d

Drain port
\(\frac{9}{16}\)"-18 UNF O-ring boss; SAE J514d

Flange S
size 101-2 SAE B SAE J744c
Hydraulic motor/pump
Series F11

F11-006, -010
(SAE versions)

Catalogue MSG30-8249/US
Installation dimensions

Shaft options

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

Tapered key shaft "V"
SAE J744 22-3 (B)

Speed sensor (optional)

Installation dimensions

Type
K
key shaft
(Std)

Type J key shaft
(Opt.)

Type S spline shaft
SAE B, 13T, 16/32 DP
(SAE J498b, class 1; 30° involute spline; flat root, side fit)

Key 6x6x35
(0.24x0.24x1.38 metric key)

Key 8x7x35
(0.31x0.28x1.38 metric key)

M6 : 0.47 deep
Ø0.7878
Ø0.7872
0.89

M10: 0.63 deep
Ø0.9844
Ø0.9841
1.10

Type
S
spline shaft
SAE B, 13T, 16/32 DP
(SAE J498b, class 1; 30° involute spline; flat root, side fit)

Make up/Anti cavitation valve
(MUVL or MUVR optional; clockwise rotation shown)
F11-012
(SAE versions)
Hydraulic motor/pump
Series F11

F11-012
(SAE versions)

Installation dimensions

Shaft options

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

Speed sensor
(optional)

Type S spline shaft
SAE B, 13T, 16/32 DP
(SAE J498b, class 1; 30° involute spline; flat root, side fit)

Tapered key shaft "V"
SAE J744 22-3 (B)
F11-014
(SAE versions)

Main port A
1\(\frac{1}{16}\)-12 UN
O-ring boss; SAE J514d

Main port B
1\(\frac{1}{16}\)-12 UN
O-ring boss; SAE J514d

Drain port C
3/16"-18 UNF
O-ring boss; SAE J514d

Drain port D
3/16"-18 UNF
O-ring boss; SAE J514d

Type S mounting flange SAE 'B' (SAE J744c)
Hydraulic motor/pump
Series F11

F11-014
(SAE versions)

Installation dimensions

Shaft options

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

Type T key shaft
Size 25-1 (B–B)
(SAE J744c)

Type S spline shaft
SAE B, 13T, 16/32 DP
(SAE J498b, class 1; 30° involute spline; flat root, side fit)

Tapered key shaft "V"
SAE J744 22-3 (B)
**Hydraulic motor/pump**

**Series F11**

**F11-019**

(SAE version)

---

**Installation dimensions**

---

* O-ring ports according to SAE J514d
F11-019  
(SAE version)

Installation dimensions

Shaft options

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

Type T key shaft  
SAE 'B-B' (SAE J744c)

Type S spline shaft  
SAE B, 13T, 16/32 DP  
(SAE J498b, class 1;  
30° involute spline;  
flat root, side fit)
## Content

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## Specifications

### Hydraulic motor/pump

#### Series F12

<table>
<thead>
<tr>
<th>Frame size F12</th>
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<th>-040</th>
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<th>-080</th>
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#### Operating pressure

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</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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</tr>
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<td>[bar]</td>
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#### Motor operating speed [rpm]

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<tbody>
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<td>L or R function; max</td>
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<td>2500</td>
<td>2300</td>
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<td>2200</td>
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<td>1700</td>
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<td>[rpm]</td>
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</table>

#### Motor input flow [l/min]

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<th></th>
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<tbody>
<tr>
<td><strong>max intermittent</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>[l/min]</td>
<td>219</td>
<td>268</td>
<td>347</td>
<td>426</td>
<td>465</td>
<td>528</td>
<td>575</td>
<td>608</td>
<td>648</td>
<td>728</td>
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<td>[gpm]</td>
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<tr>
<td>[l/min]</td>
<td>201</td>
<td>244</td>
<td>317</td>
<td>386</td>
<td>428</td>
<td>484</td>
<td>525</td>
<td>547</td>
<td>583</td>
<td>655</td>
</tr>
<tr>
<td>[gpm]</td>
<td>53.1</td>
<td>64.5</td>
<td>83.7</td>
<td>102.0</td>
<td>113.1</td>
<td>127.9</td>
<td>138.7</td>
<td>144.5</td>
<td>154.0</td>
<td>173.0</td>
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</table>

#### Drain temperature [°C]

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<tbody>
<tr>
<td><strong>max</strong>, max</td>
<td>115</td>
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<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
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<tr>
<td>[° F]</td>
<td>239</td>
<td>239</td>
<td>239</td>
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<td>239</td>
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#### Theoretical torque at 100 bar [Nm]

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</thead>
<tbody>
<tr>
<td>[lbf ft]</td>
<td>35.1</td>
<td>46.9</td>
<td>70.0</td>
<td>94.2</td>
<td>108.9</td>
<td>129.0</td>
<td>146.4</td>
<td>177.8</td>
<td>189.6</td>
<td>213.2</td>
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<tr>
<td>[Nm]</td>
<td>47.6</td>
<td>63.5</td>
<td>94.9</td>
<td>127.6</td>
<td>147.6</td>
<td>174.8</td>
<td>198.4</td>
<td>241</td>
<td>257</td>
<td>289</td>
</tr>
</tbody>
</table>

#### Mass moment of inertia (x10⁻³) [kg m²]

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</thead>
<tbody>
<tr>
<td>[kg m²]</td>
<td>1.7</td>
<td>2.9</td>
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<td>11.2</td>
<td>11.2</td>
<td>21</td>
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#### Weight [kg]

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<tbody>
<tr>
<td>L or R function; max</td>
<td>3150</td>
<td>2870</td>
<td>2500</td>
<td>2300</td>
<td>2250</td>
<td>2200</td>
<td>2100</td>
<td>1700</td>
<td>1600</td>
<td>1500</td>
</tr>
<tr>
<td>[rpm]</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Intermittent: max 6 seconds in any one minute.
2) Selfpriming speed valid at sea level. Find more info on page 42
3) See also installation information. Page 69
Efficiency
Because of its high overall efficiency, driving a motor/pump from series F12 requires less fuel or electric power.

Also, it allows the use of a small reservoir and heat exchanger, which in turn reduce cost, weight, and installation size.

The diagrams to the right show volumetric and mechanical efficiencies of an F12-030 motor.

F12-030 motors can be equipped with Power Boost which in high speed applications can decrease the mechanical losses by up to 15%, see page 7.

Contact Parker Hannifin for efficiency information on a particular F12 frame size that is being considered.

Noise level
Series F12 feature low noise levels from low to high speeds and pressures.

As an example, the diagram to the right shows the noise level of an F12-030 pump/motor.

The noise level is measured in a semi-anechoic room, 1 m behind the unit.

The noise level for a particular motor/pump may vary ±2 dB(A) compared to what is shown in the diagram.

NOTE: Noise information for F12 frame sizes are available from Parker Hannifin.
Selfpriming speed and required inlet pressure

Series F12

When operating the F12 as a pump (with L or R valve plate) above the selfpriming speed, the inlet must be pressurized. Increased noise and deteriorating performance may otherwise be experienced.

Diagrams 2 and 3 shows required pump inlet pressure vs. shaft speed.

The F12 motor (type M valve plate) sometimes operates as a pump e.g. when used in a propel transmission and the vehicle is going downhill.

Minimum required inlet pressure versus shaft speed is shown in the diagrams.

The inlet pressure can be charged by external pump, pressurized reservoir or using BLA Boost unit.

Find more info about the BLA unit at page 68.

Diagram 2. Min. required pump (F12-L or -R) inlet press.

Diagram 3. Min. required motor (F12-M) inlet pressure.
Hydraulic motor/pump
Series F12

**Ordering codes**

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Function</th>
<th>Main ports</th>
<th>Mounting flange</th>
<th>Shaft seal</th>
<th>Shaft number</th>
<th>Option</th>
<th>Version number</th>
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<tbody>
<tr>
<td>F12-ISO</td>
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**Frame size**

<table>
<thead>
<tr>
<th>Code</th>
<th>Displacem. (cm³/rev)</th>
<th>Displacem. (cu in/rev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>030</td>
<td>30.0</td>
<td>1.83</td>
</tr>
<tr>
<td>040</td>
<td>40.0</td>
<td>2.44</td>
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<tr>
<td>060</td>
<td>60.0</td>
<td>3.65</td>
</tr>
<tr>
<td>080</td>
<td>80.0</td>
<td>4.91</td>
</tr>
<tr>
<td>090</td>
<td>90.0</td>
<td>5.68</td>
</tr>
<tr>
<td>110</td>
<td>110.0</td>
<td>6.72</td>
</tr>
<tr>
<td>125</td>
<td>125.0</td>
<td>7.63</td>
</tr>
<tr>
<td>152</td>
<td>149.8</td>
<td>9.14</td>
</tr>
<tr>
<td>162</td>
<td>163.1</td>
<td>9.95</td>
</tr>
<tr>
<td>182</td>
<td>179.8</td>
<td>11.11</td>
</tr>
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</table>

**Frame size 30 40 60 80 90 110 125 152 162 182**

<table>
<thead>
<tr>
<th>Code Function</th>
<th>Main ports</th>
<th>Mounting flange</th>
<th>Shaft seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Motor</td>
<td>x x x x x x x x x x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S Motor, high speed</td>
<td>(x) (x) (x) - - - - (x) (x) (x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R Pump, clockwise rotation</td>
<td>(x) (x) (x) (x) (x) (x) (x) (x) (x) (x)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Pump, counter clockwise rotation</td>
<td>(x) (x) (x) (x) (x) (x) (x) (x) (x) (x)</td>
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<td></td>
</tr>
</tbody>
</table>

For other versions, contact Parker Hannifin

<table>
<thead>
<tr>
<th>Frame size 30 40 60 80 90 110 125 152 162 182</th>
<th>Main ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>F SAE 6000 psi flange</td>
<td>x x x x x x x x x x</td>
</tr>
<tr>
<td>D SAE 6000 psi Horizontal</td>
<td>- - - - - - - (x) (x) (x)</td>
</tr>
<tr>
<td>A SAE 6000 psi Axial</td>
<td>- - - - - - - (x) (x) (x)</td>
</tr>
<tr>
<td>K SAE 6000 psi Rear</td>
<td>- - - - - - - (x) (x) (x)</td>
</tr>
<tr>
<td>M SAE 6000 psi Side</td>
<td>- - - - - - - (x) (x) (x)</td>
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**Frame size 30 40 60 80 90 110 125 152 162 182**

<table>
<thead>
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<th>Code Main ports</th>
<th>ISO flange</th>
<th>ISO 200 flange</th>
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<tr>
<td>F</td>
<td>- - - - - - - x x x x</td>
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</tbody>
</table>

**NOTE:** All combinations are not valid, please contact Parker Hannifin

x: Available
(x): Optional
–: Not available
1) F12-110 and -125: Accessory valve block (page 62)
2) Pressure setting on page 63

For other versions, contact Parker Hannifin
Hydraulic motor/pump
Series F12

**Ordering codes**

**F12-Cartridge**

<table>
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<tr>
<th>Frame size</th>
<th>Code</th>
<th>Displacem. (cm³/rev)</th>
<th>Displacem. (cu in/rev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>030</td>
<td></td>
<td>30.0</td>
<td>1.83</td>
</tr>
<tr>
<td>040</td>
<td></td>
<td>40.0</td>
<td>2.44</td>
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<tr>
<td>060</td>
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<td>59.8</td>
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<td>080</td>
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<td>93.0</td>
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<tr>
<td>110</td>
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<td>110.1</td>
<td>6.72</td>
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<tr>
<td>125</td>
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**Frame size**

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
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</thead>
<tbody>
<tr>
<td>M</td>
<td>Motor x x x x x x</td>
</tr>
<tr>
<td>S</td>
<td>Motor, high speed (x) (x) - - - -</td>
</tr>
</tbody>
</table>

For other versions, contact Parker Hannifin

**Version number**

<table>
<thead>
<tr>
<th>Code</th>
<th>Shaft*</th>
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<tbody>
<tr>
<td>C</td>
<td>DIN Spline, Std. x x x x x x</td>
</tr>
<tr>
<td>K</td>
<td>Metric key, Option (x) (x) (x) (x) (x) (x)</td>
</tr>
<tr>
<td>J</td>
<td>Metric key, Option - - - - - -</td>
</tr>
<tr>
<td>B</td>
<td>Spline DIN 5480 - - - (x) (x) (x)</td>
</tr>
<tr>
<td>V</td>
<td>Tapered shaft (x) (x) (x) - - -</td>
</tr>
</tbody>
</table>

*See also dimensional drawings on page 50.

**Frame size**

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>F</td>
<td>SAE 6000 psi flange x x x x x x</td>
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**Frame size**

<table>
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<td>C</td>
<td>Cartridge x x x x x x</td>
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**Frame size**

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<th>Code</th>
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<tbody>
<tr>
<td>V</td>
<td>FPM, high pressure, high temperature x x x x x</td>
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</table>

**NOTE:** All combinations are not valid, please contact Parker Hannifin
**Hydraulic motor/pump**

**Series F12**

### Ordering codes

**F12**

- **Frame size**
- **Function**
- **Main ports**
- **Mounting flange**
- **Shaft seal**
- **Shaft**
- **Version number**
- **Option**
- **Option**

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<th>80</th>
<th>90</th>
<th>110</th>
<th>125</th>
<th>152</th>
<th>162</th>
<th>182</th>
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<tr>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>(x)</td>
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<td>(x)</td>
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*See also dimensional drawings on pages 52 - 59.*

### Frame size

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<tr>
<th>Code</th>
<th>Frame size</th>
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<th>Displacement (cu in/rev)</th>
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</thead>
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<tr>
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<td>30.0</td>
<td>1.83</td>
<td></td>
</tr>
<tr>
<td>040</td>
<td>40.0</td>
<td>2.44</td>
<td></td>
</tr>
<tr>
<td>060</td>
<td>59.8</td>
<td>3.65</td>
<td></td>
</tr>
<tr>
<td>080</td>
<td>80.4</td>
<td>4.91</td>
<td></td>
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<td>090</td>
<td>93.0</td>
<td>5.68</td>
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<td>110.0</td>
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<td>125.0</td>
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<tr>
<td>152</td>
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<td></td>
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<td>163.1</td>
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### Frame size

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<th>Function</th>
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<td>M</td>
<td>Motor</td>
</tr>
<tr>
<td>S</td>
<td>Motor, high speed</td>
</tr>
<tr>
<td>O</td>
<td>Pump, clockwise rotation</td>
</tr>
<tr>
<td>L</td>
<td>Pump, counter clockwise rotation</td>
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</tbody>
</table>

### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Main ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>SAE 6000 psi flange</td>
</tr>
<tr>
<td>U</td>
<td>SAE UN threads</td>
</tr>
<tr>
<td>F</td>
<td>SAE 6000 psi flange</td>
</tr>
<tr>
<td>D</td>
<td>SAE 6000 psi flange</td>
</tr>
<tr>
<td>A</td>
<td>SAE 6000 psi flange</td>
</tr>
<tr>
<td>K</td>
<td>SAE 6000 psi flange</td>
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<tr>
<td>M</td>
<td>SAE 6000 psi flange</td>
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### Frame size

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<th>Mounting flange</th>
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<tr>
<td>R</td>
<td>4 bolt</td>
</tr>
<tr>
<td>T</td>
<td>2 bolt</td>
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### Frame size

<table>
<thead>
<tr>
<th>Code</th>
<th>Shaft seal</th>
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</thead>
<tbody>
<tr>
<td>V</td>
<td>FPM, high pressure, high temperature</td>
</tr>
</tbody>
</table>

**NOTE:** All combinations are not valid, please contact Parker Hannifin.

---

For other versions, contact Parker Hannifin.
Hydraulic motor/pump
Series F12

F12-30, -40, -60, -80, -90, -110 and -125
(ISO versions)

Installation dimensions

Port A

Port B

Port C

Port D

Port E

Type I mounting flange
(ISO 3019/2)

Shaft option D (Z)

Shaft option V (F12-30)

Shaft option V (F12-40)

Shaft option V (F12-60)

Type D (Z) spline shaft

Tapered key shaft "V"

SAE J744 32-3 (C)

Key 3.13x3.13x10.20

Tapered key shaft "V"

SAE J744 38-3 (C-C)

Key 3.76x3.76x17.50

Tapered key shaft "V"

SAE J744 44-3 (D&E)

Key 4.37x4.37x20.00

Shaft option V (F12-80)

Shaft option V (ISO versions)

Flushing valve (optional)

Speed sensor (optional)

Type K (P) Key shaft

1) Port C
Inspection/drain port

Speed sensor
(optional)

F12-30 only

Type I flange

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden
### Installation dimensions

**Series F12**

<table>
<thead>
<tr>
<th>Dim.</th>
<th>F12-30</th>
<th>F12-40</th>
<th>F12-60</th>
<th>F12-80</th>
<th>F12-10-125</th>
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<tbody>
<tr>
<td>A1</td>
<td>3.48</td>
<td>4.46</td>
<td>4.46</td>
<td>5.01</td>
<td>5.57</td>
</tr>
<tr>
<td>B1</td>
<td>4.65</td>
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<td>5.75</td>
<td>6.22</td>
<td>7.09</td>
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<tr>
<td>C1</td>
<td>4.65</td>
<td>5.59</td>
<td>5.67</td>
<td>6.10</td>
<td>7.09</td>
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<td>0.53</td>
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<tr>
<td>A2</td>
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<td>4.92</td>
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<td>5.71</td>
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<td>B2</td>
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* Metric thread (x depth in inches)
1) Spline shaft type D
2) Spline shaft type Z
3) Max operating pressure 5100 psi 350 bar

### Screw thread (DIN 5480)

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<th>Type Z (optional)</th>
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### Metric key shaft (in mm)

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<th>Type J (opt.)</th>
<th>Type V (opt.)</th>
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1) Spline shaft type D
2) Spline shaft type Z
3) Max operating pressure 5100 psi 350 bar
F12-152, -162 and -182
(ISO versions)

Main ports type F
(90 deg Vertical)

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<table>
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<th>Shaft G and H</th>
<th>Shaft D, Z, K and P</th>
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<td>B2 1.97</td>
<td>1.57</td>
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Shaft options K and G

Shaft option P

Shaft option D

Shaft options Z and H

Key
0.55x0.35x2.76

M16x2-6H
O1.9665±k6
(+0.00007/ 2.102)

M16x2-6H
O1.77165±k6

M16x31
W45x2x21x9g (DIN 5480)

M22x1.5
Case Port D

Mounting Flange
ISO 3019

M22x1.5
Case Port C

Thread for speed sensor (plugged)

Main ports 1 1/2" (2x)

Thread
M16x2 - 6H (8x)
Depth 1.06

Approx. Centre of gravity

Shaft option P

Shaft option D

Shaft options Z and H

Thread
M16x2 - 6H

Deair and Flushing Port E

Thread
7/16-20 UNF-2B

Main ports type F

Installation dimensions

Hydraulic motor/pump
Series F12

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden

Catalogue MSG30-8249/US
Hydraulic motor/pump
Series F12

F12-152, -162 and -182
(ISO versions)

Installation dimensions

Main ports type A
(180 deg Vertical)

Main ports 1 1/2" (2x)

Thread M16x2 - 6H (8x)
Depth 1.06

Main ports type D
(90 deg Horizontal)

Main ports 1 1/4" (2x)

Thread M14x2 - 6H (8x)
Depth 0.75

Main ports type K
(40 deg rear)

Main ports 1 1/4" (2x)

Thread M14x2 - 6H (8x)
Depth 0.75

Main ports type M
(Side ports)

Main ports 1 1/4" (2x)

Thread M14x2 - 6H (8x)
Depth 0.75
Installation dimensions

F12-30, -40, -60, -80, -90, -110 and -125 (Cartridge versions)

Type C mounting flange

Flushing valve (optional)

Speed sensor (optional)

Port C

Inspection/drain port

Port D

Type C spline shaft

See table

Flushing valve (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)

Port C

Inspection/drain port

Type C mounting flange

Speed sensor (optional)

Port C

Inspection/drain port

Flushing valve (optional)
Hydraulic motor/pump
Series F12

### Installation dimensions

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1) Key shaft type K
2) Key shaft type B (opt.).

### Ports

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<td>M10 (0.79)</td>
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<td>M14 (1.02)</td>
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<td>D, E thread(**)</td>
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<td>M18 x1.5</td>
<td>M22 x1.5</td>
<td>M22 x1.5</td>
<td>M22 x1.5</td>
</tr>
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</table>

A, B: ISO 6162  *) Metric thread x (depth in inches)  **) Metric thread x pitch in mm.

### Spline shaft (DIN 5480)

<table>
<thead>
<tr>
<th>Type C (standard)</th>
<th>Type B (optional)</th>
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</thead>
<tbody>
<tr>
<td>F12-30</td>
<td>W30x2x14x9g</td>
</tr>
<tr>
<td>-40</td>
<td>W30x2x14x9g</td>
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<tr>
<td>-60</td>
<td>W30x2x14x9g</td>
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<td>-80</td>
<td>W40x2x18x9g</td>
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<td>-90</td>
<td>W40x2x18x9g</td>
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<td>W40x2x18x9g</td>
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<tr>
<td>-125</td>
<td>W40x2x18x9g</td>
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</tbody>
</table>

### Metric key shaft (in mm)

<table>
<thead>
<tr>
<th>Type K (std)</th>
<th>Type J (opt.)</th>
<th>Type V (opt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F12-30</td>
<td>Ø30</td>
<td>-</td>
</tr>
<tr>
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<td>Ø30</td>
<td>Ø35</td>
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<tr>
<td>-60</td>
<td>Ø35</td>
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<tr>
<td>-80</td>
<td>Ø40</td>
<td>-</td>
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<tr>
<td>-90</td>
<td>Ø40</td>
<td>-</td>
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<tr>
<td>-110</td>
<td>Ø45</td>
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<tr>
<td>-125</td>
<td>Ø45</td>
<td>-</td>
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### O-ring dimensions (in mm)

<table>
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<th>127x4</th>
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<tr>
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<td>150x4</td>
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<td>-60</td>
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<td>-125</td>
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</table>
**Catalogue MSG30-8249/US**

**Hydraulic motor/pump**

**Series F12**

**F12-30, -40, -60, -80, -90, -110 and -125**

(SAE versions with 4 bolt flange)

---

**Shaft option S (U)**

Type S (U) spline shaft

See table

<table>
<thead>
<tr>
<th>R8</th>
<th>Q8</th>
</tr>
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</table>

**Shaft option V (F12-30)**

<table>
<thead>
<tr>
<th>19.29</th>
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<th>12.19</th>
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<tbody>
<tr>
<td>Ø1.57</td>
<td>1-12 UNF-2A</td>
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</table>

Tapered key shaft "V"

SAE J744 32-3 (C)

**Shaft option V (F12-40)**

<table>
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<tr>
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<tr>
<td>Ø1.57</td>
<td>1 1/8˝-12 UNF-2A</td>
<td>Ø12.50</td>
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Tapered key shaft "V"

SAE J744 38-3 (C-C)

**Shaft option V (F12-60)**

<table>
<thead>
<tr>
<th>27.95</th>
<th>38.19</th>
<th>15.62</th>
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<tbody>
<tr>
<td>Ø1.57</td>
<td>1 1/4˝-12 UNF-2A</td>
<td>Ø17.50</td>
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</table>

Tapered key shaft "V"

SAE J744 44-3 (D&E)

---

**Type S (SAE 4 bolt) mounting flange**

**Flushing valve (optional)**

**Type T key shaft**

**Port C**

1) Port C

Inspection/drain port

---

**Port A**

**Port B**

**Port D**

**Port C**

**Port E**

(third drain port)

F12-110 and -125 barrel housing

(SAE version)

---

**Shown:** F12-80 with 4 bolt flange

---

**Speed sensor (optional) F12-30 only**

1) Port C

Inspection/drain port

---

**Speed sensor (optional)**

F12-30 only
Hydraulic motor/pump
Series F12

Installation dimensions

<table>
<thead>
<tr>
<th>Dim.</th>
<th>F12-30</th>
<th>F12-40</th>
<th>F12-60</th>
<th>F12-80</th>
<th>F12-90</th>
<th>F12-110</th>
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<tbody>
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<tr>
<td>D9*</td>
<td>5/16&quot;-24 3/8&quot;-24 3/8&quot;-24 1/2&quot;-20 5/8&quot;-18</td>
<td></td>
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<td>1.000/</td>
<td>1.250/</td>
<td>1.250/</td>
<td>1.500/</td>
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<td>-</td>
<td>-</td>
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<td>2.68</td>
</tr>
</tbody>
</table>

* UNF-2B thread
1) Spline shaft type S
2) Spline shaft type U
3) Max operating pressure 350 bar

### Main ports A and B, type U (optional)

| F12-30 | 1 1/16" - 12 UN3) |
| F12-40 | 1 5/16" - 12 UN3) |
| F12-60 | 1 5/16" - 12 UN3) |
| F12-80 | 1 5/16" - 12 UN3) |
| F12-90 | 1 5/16" - 12 UN3) |
| F12-110| 1 5/8" - 12 UN3) |

### Key shaft (SAE J744)

<table>
<thead>
<tr>
<th>F12</th>
<th>T (standard)</th>
<th>R (optional)</th>
<th>V (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30</td>
<td>SAE 'B'-B'  (Ø1 1/4&quot;)</td>
<td>-32-3</td>
<td></td>
</tr>
<tr>
<td>-40</td>
<td>SAE 'C'  (Ø1 1/4&quot;)</td>
<td>-38-3</td>
<td></td>
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<td>-60</td>
<td>SAE 'C'  (Ø1 1/4&quot;)</td>
<td>-44-3</td>
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<tr>
<td>-80</td>
<td>SAE 'C'-C' (Ø1 1/4&quot;)</td>
<td>SAE 'D'  (Ø1 1/2&quot;)</td>
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<tr>
<td>-90</td>
<td>SAE 'C'-C' (Ø1 1/4&quot;)</td>
<td>SAE 'D'  (Ø1 1/2&quot;)</td>
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<tr>
<td>-110</td>
<td>SAE 'D'  (Ø1 1/4&quot;)</td>
<td>-44-3</td>
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<tr>
<td>-125</td>
<td>SAE 'D'  (Ø1 1/4&quot;)</td>
<td>-44-3</td>
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### Mounting flange (SAE J744)

<table>
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<tr>
<th>S (standard)</th>
<th>R (optional)</th>
</tr>
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<tbody>
<tr>
<td>F12-30</td>
<td>SAE 'B', 4 bolt</td>
</tr>
<tr>
<td>-40</td>
<td>SAE 'C', 4 bolt</td>
</tr>
<tr>
<td>-60</td>
<td>SAE 'C', 4 bolt</td>
</tr>
<tr>
<td>-80</td>
<td>SAE 'C', 4 bolt  SAE 'D', 4 bolt</td>
</tr>
<tr>
<td>-90</td>
<td>SAE 'D', 4 bolt  SAE 'D', 4 bolt</td>
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<tr>
<td>-110</td>
<td>SAE 'D', 4 bolt</td>
</tr>
<tr>
<td>-125</td>
<td>SAE 'D', 4 bolt</td>
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</table>

### Spline shaft (SAE J498b, class 1, flat root, side fit)

<table>
<thead>
<tr>
<th>S (standard)</th>
<th>U (opt.)</th>
<th>F (optional)</th>
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<tbody>
<tr>
<td>F12-30</td>
<td>-</td>
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</tr>
<tr>
<td>-40</td>
<td>-</td>
<td>-</td>
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<tr>
<td>-60</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-80</td>
<td>SAE 'C'-C' (17T, 12/24 DP)</td>
<td>SAE 'D'-C'  (14T, 12/24 DP3)  SAE 'D'  (13T, 18/16 DP)  SAE 'D'  (13T, 8/16 DP)  SAE 'D'-C'  (14T, 12/24 DP3)  SAE 'D'  (13T, 8/16 DP)</td>
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<tr>
<td>-90</td>
<td>SAE 'C'-C' (17T, 12/24 DP)</td>
<td>SAE 'D'-C'  (14T, 12/24 DP3)  SAE 'D'  (13T, 8/16 DP)  SAE 'D'-C'  (14T, 12/24 DP3)  SAE 'D'  (13T, 8/16 DP)</td>
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<tr>
<td>-110</td>
<td>SAE 'D'  (13T, 8/16 DP)</td>
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<tr>
<td>-125</td>
<td>SAE 'D'  (13T, 8/16 DP)</td>
<td>-</td>
</tr>
</tbody>
</table>

** UN thread x (depth in inches)

1) Spline shaft type S
2) Spline shaft type U
3) Max operating pressure 350 bar
Hydraulic motor/pump
Series F12

F12-152, -162 and -182
(SAE versions)

Installation dimensions

Thread
M16x2 - 6H (8x)
Depth 1.06

1.56

0.72

3.98

1.44

3.13

1.97 (+0/-0.005)

1.27

0.50

9.17

0.50

Main ports type F
(90 deg Vertical)

Approx. Centre
of gravity

Straight Thread
1-1/16-12UN-2B
Case Port D

Mounting Flange
Code S
SAE J744 Size
152-4 (D)

Ø6.00 (±0.002)

4.04

8.07

7.48

7.86

6.36

3.18

2.13

0.50

0.32

0.26

Shaft option T

Ø2.24 min

R0.32

R0.03

2.63 2.13

Type T key shaft
SAE‘D’
(SAE J744c)

0.50

0.32

0.26

Shaft option S

R0.16

1.38

5/8-11UNC
depth 1.38

1.75 (+/-0.002)

Shaft option F

R0.16

1.37

SAE J498b
15T -8/16 DP

5/8-11UNC
depth 1.18

1.97 (+/-0.005)

Thread
7/16-20 UNF-2B
Straight Thread
Case Port C

Straight Thread
1-1/16-12UN-2B
Deair and Flushing
Port E

Straight Thread
1-1/16-12UN-2B

Main ports type F

1 1/2” (2x)

0.32 0.50

Ø0.83 (4x)

0.83

5.32

11.93

9.17

3.13

1.97 (+0/-0.005)

Installation dimensions
Installation dimensions

Hydraulic motor/pump
Series F12

F12-152, -162 and -182
(SAE versions)

Main ports type A
(180 deg Vertical)

Main ports type D
(90 deg Horizontal)

Main ports type K
(40 deg rear)

Main ports type M
(Side ports)
Hydraulic motor/pump
Series F12

**Installation dimensions**

**F12-250**
(SAE version)

*6000 psi flange (SAE J518c)*

**Metric thread**

---

- **Main port A**: (1\(\frac{1}{2}\)"
- **Main port B**: (1\(\frac{1}{2}\)"
- **Drain port D**: (BSP \(\frac{3}{4}\)"
- **Drain port C**: (BSP \(\frac{3}{4}\)"

---

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
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<td>Height 1</td>
<td>13.23</td>
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<tr>
<td>Height 2</td>
<td>5.55</td>
</tr>
<tr>
<td>Width</td>
<td>3.98</td>
</tr>
<tr>
<td>Center of gravity</td>
<td>3.125</td>
</tr>
<tr>
<td>(\phi) 15.54</td>
<td>(x2)</td>
</tr>
<tr>
<td>(\phi) 6.0000</td>
<td>(x4)</td>
</tr>
</tbody>
</table>

---

- **M16**: **(x8)** 1.38 deep
- **\(\phi\) 0.83**: **(x4)** 7.87 max

---

- **Type S mounting flange**
  - SAE 'D' (SAE J744c)

---

* Plugged with steel plug
* **6000 psi flange (SAE J518c)**
* **Metric thread**
F12-250 Options (SAE version)

Shaft option K

Type K key shaft (metric; not SAE)

M16; deep 1.22

Shaft option T

Type T key shaft (SAE key)

Shaft option D

Type D spline shaft
W50x2x24x9g
DIN 5480 side fit

Shaft option F

Type F spline shaft
SAE J498b, class 1;
15T-8/16 DP;
fillet root, side fit

Shaft option S

Type S spline shaft
SAE J498b, class 1;
30° involute spline;
13T-8/16 DP;
flat root, side fit
**F12-30, -40, and -60**  
(SAE versions with 2 bolt flange)

**Installation dimensions**

**Hydraulic motor/pump**  
**Series F12**

-Shown: F12-60 with 2 bolt flange

**Shaft option S**  
Type S spline shaft

**Shaft option V (F12-30)**  
Tapered key shaft "V"  
SAE J744 32-3 (C)

**Shaft option V (F12-40)**  
Tapered key shaft "V"  
SAE J744 38-3 (C-C)

**Shaft option V (F12-60)**  
Tapered key shaft "V"  
SAE J744 44-3 (D&E)
**Installation dimensions**

**Hydraulic motor/pump Series F12**

<table>
<thead>
<tr>
<th>Dim.</th>
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<th>F12-40</th>
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<tr>
<td>E10</td>
<td>0.39</td>
<td>0.63</td>
<td>0.63</td>
</tr>
<tr>
<td>F10</td>
<td>0.39</td>
<td>0.61</td>
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</tr>
<tr>
<td>A11</td>
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<tr>
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</tr>
<tr>
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<td>0.98</td>
<td>1.02</td>
<td>0.87</td>
</tr>
<tr>
<td>D11</td>
<td>0.25</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>E11</td>
<td>1.30</td>
<td>1.65</td>
<td>1.65</td>
</tr>
<tr>
<td>F11</td>
<td>4.000/</td>
<td>5.000/</td>
<td>5.000/</td>
</tr>
<tr>
<td></td>
<td>3.998</td>
<td>4.998</td>
<td>4.998</td>
</tr>
<tr>
<td>G11</td>
<td>7.46</td>
<td>7.76</td>
<td>8.43</td>
</tr>
<tr>
<td>H11</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
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<td>1.89</td>
<td>1.89</td>
</tr>
<tr>
<td>K11</td>
<td>2.80</td>
<td>3.03</td>
<td>3.21</td>
</tr>
<tr>
<td>L11</td>
<td>1.25</td>
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<td>1.50</td>
</tr>
<tr>
<td>M11</td>
<td>0.10</td>
<td>0.16</td>
<td>0.16</td>
</tr>
<tr>
<td>N11</td>
<td>6.06</td>
<td>6.34</td>
<td>7.03</td>
</tr>
<tr>
<td>Q11</td>
<td>1.02</td>
<td>1.06</td>
<td>1.06</td>
</tr>
<tr>
<td>R11</td>
<td>1.30</td>
<td>1.89</td>
<td>1.89</td>
</tr>
<tr>
<td>A12</td>
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</tr>
<tr>
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<td>0.937</td>
<td>0.937</td>
</tr>
<tr>
<td>D12</td>
<td>5/16&quot;*24</td>
<td>3/8&quot;*24</td>
<td>3/8&quot;*24</td>
</tr>
<tr>
<td></td>
<td>1.000/</td>
<td>1.250/</td>
<td>1.250/</td>
</tr>
<tr>
<td></td>
<td>0.998</td>
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<td>1.248</td>
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<td>6.34</td>
<td>7.03</td>
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<td>H12</td>
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<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>J12</td>
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<td>0.75</td>
</tr>
<tr>
<td>K12</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
</tr>
<tr>
<td>L12</td>
<td>0.71</td>
<td>0.79</td>
<td>0.79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dim.</th>
<th>F12-30</th>
<th>F12-40</th>
<th>F12-60</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Ports**

<table>
<thead>
<tr>
<th>Ports</th>
<th>F12-30</th>
<th>F12-40</th>
<th>F12-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B size</td>
<td>19 (3/4&quot;)</td>
<td>19 (3/4&quot;)</td>
<td>19 (3/4&quot;)</td>
</tr>
<tr>
<td>Screw thread *)</td>
<td>3/8&quot;*16 (0.87)</td>
<td>3/8&quot;*16 (0.79)</td>
<td>3/8&quot;*16 (0.87)</td>
</tr>
<tr>
<td>C thread</td>
<td>3/4&quot;*16</td>
<td>7/8&quot;*14</td>
<td>7/8&quot;*14</td>
</tr>
<tr>
<td>D thread</td>
<td>3/4&quot;*16</td>
<td>7/8&quot;*14</td>
<td>7/8&quot;*14</td>
</tr>
</tbody>
</table>

A, B (main ports): SAE J518c (6000 psi)
C, D (drain ports): O-ring boss (SAE J514)

*) UN thread x (depth in inches)

**Main ports A and B, type U (optional)**

<table>
<thead>
<tr>
<th>F12-30</th>
<th>F12-40</th>
<th>F12-60</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

O-ring ports according to SAE J514d

**Mounting flange T (SAE J744)**

<table>
<thead>
<tr>
<th>F12-30</th>
<th>F12-40</th>
<th>F12-60</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Spline shaft S**

(SAE J498b, class 1, flat root, side fit)

<table>
<thead>
<tr>
<th>F12-30</th>
<th>F12-40</th>
<th>F12-60</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key shaft (SAE J744)**

<table>
<thead>
<tr>
<th>T (Standard)</th>
<th>V (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F12-30</td>
<td>32-3</td>
</tr>
<tr>
<td>-40</td>
<td>38-3</td>
</tr>
<tr>
<td>-60</td>
<td>44-3</td>
</tr>
</tbody>
</table>

1) UNF-2B thread
6) Max operating pressure 350 bar
## Content

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Page</th>
</tr>
</thead>
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<tr>
<td>FV13 flushing valve block</td>
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</tr>
<tr>
<td>Integrated pressure relief valve</td>
<td>63</td>
</tr>
<tr>
<td>Possible pressure settings</td>
<td>63</td>
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<td>SR pressure relief / make-up anti-cavitation valve</td>
<td>64</td>
</tr>
<tr>
<td>SV pressure relief valve, Dimensions</td>
<td>66</td>
</tr>
<tr>
<td>MV Anti-cavitation valve / make up valve block</td>
<td>67</td>
</tr>
<tr>
<td>Speed sensor</td>
<td>67</td>
</tr>
<tr>
<td>BLA Boost Units</td>
<td>68</td>
</tr>
</tbody>
</table>
Integrated flushing valve (F12-30, -40, -60, -80, -90)

**General information**

The integrated flushing valve supplies the motor with a cooling flow through the case which may be required when operating at high speeds and power levels.

In a closed loop hydrostatic transmission the flushing valve secures that cool fluid from the charge circuit is constantly added to the main circuit.

The flushing valve consists of a 'three-position', three-way spool valve which connects the low pressure side of the main hydraulic circuit with the motor case. The valve opens at a pressure differential between port A and port B of approximately 14 bar (200 psi).

In order to limit the flow, a nozzle with an orifice is available from Parker Hannifin. The diagram to the right shows flow versus differential pressure.

For general advise when flushing might be needed, see page 69.

---

**Flow versus pressure differential (port A or B to tank).**

---

**Ordering code**

F12    080 – MF – IV – K – 000 – L130 – P0

Standard F12 ordering code  
(for F12-30, -40, -60, -80, -90)

---

**NOTE:** FV13 flushing valve block for F12-110 shown on next page.
FV13 flushing valve block (for F12-110, -125)
The FV13 for the F12-110 / -125 motor has the same function as the integrated flushing valve for the other F12 frame sizes. The valve block mounts between the motor port flange and the split-flange tube/hose connectors utilizing 'long' mounting screws (screw size M14x75 or 1/2"-13 UNC based on split-flange height as shown below).
The FV13 flushing valve kit contains the required O-rings (shown below) but no screws, split-flanges or tube/hose connectors.

FV13 installation

FV13 Ordering code

FV13 restrictor nozzles

When required, a nozzle is utilized to restrict the flow through the F12-110, -125 motor case. The nozzle installs in the drilled and tapped (M10x1.0) drain line located in the valve block as shown to the left. The diagram on page 61 shows flushing flow versus differential pressure for selected orifice sizes.
The following table lists currently available nozzles and the corresponding FV13 ordering code designation.
Integrated pressure relief valve
(F12-030, -040, -060)

Integrated pressure relief valves are available for F12-030, F12-040 and F12-060. These are designed to protect the motor from short duration pressure spikes. The motor could be ordered with non-adjustable pressure setting between 210 - 420 bar (3050 - 6090 psi). The motor has to be ordered as unidirectional, L or R, and this is specified in the ordering code as example below.

F12-030-MS-SV-S-000-P28L-P0
P=Pressure relief valve, 28 = 280 bar, L = left

Possible pressure settings

<table>
<thead>
<tr>
<th>Code</th>
<th>Pressure bar</th>
<th>Pressure psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>210</td>
<td>3050</td>
</tr>
<tr>
<td>23</td>
<td>230</td>
<td>3340</td>
</tr>
<tr>
<td>25</td>
<td>250</td>
<td>3625</td>
</tr>
<tr>
<td>28</td>
<td>280</td>
<td>4060</td>
</tr>
<tr>
<td>30</td>
<td>300</td>
<td>4350</td>
</tr>
<tr>
<td>33</td>
<td>330</td>
<td>4785</td>
</tr>
<tr>
<td>35</td>
<td>350</td>
<td>5075</td>
</tr>
<tr>
<td>38</td>
<td>380</td>
<td>5510</td>
</tr>
<tr>
<td>40</td>
<td>400</td>
<td>5800</td>
</tr>
<tr>
<td>42</td>
<td>420</td>
<td>6090</td>
</tr>
</tbody>
</table>

Diagram for PLC082 pressure relief valves integrated in F12-030

Pressure override characteristic

Diagram for PLC182 pressure relief valves integrated in F12-040 and F12-060

Pressure override characteristic
SR pressure relief anti-cavitation valve

The SR pressure relief/make-up valve block for series F12 motors is designed to protect the motor and the main hydraulic lines from short duration pressure spikes. The valve block also provides an excellent make-up function.

The valve block installs directly on the motor port flange, and is available in 3 sizes:
1 3/4” for F12-30/-40/-60
2 1” for F12-80, -90
3 1 for F12-110 , -125

The SR valve block consists of a housing containing two high pressure relief cartridges and two separate check valves for anti-cavitation. Cartridges are available in non-adjustable pressure settings between 280 and 420 bar (4000 and 6000 psi respectively).

A make-up port (G) is also provided. In certain operating conditions, the motor (when operating as a pump) may cavitate because of insufficient inlet pressure.

To prevent this, the G port should be pressurized. Contact Parker Hannifin for further information.

The pressure drop through the main ports (A–A’ or B–B’) is low. As an example, the pressure drop on size 1 (3/4”) is 0.45 bar (6.5 psi) at 175 l/min (45 gpm), and on size 2 (1”) 0.7 bar (10 psi) at 250 l/min (65 gpm).

NOTE: The valve block includes main port O-rings (facing the motor) but no mounting screws.
Pressure relief/anticav. valve for F12-motors  Series F11/F12

SR pressure relief anti-cavitation valve, Dimensions

<table>
<thead>
<tr>
<th></th>
<th>Size 1 ((\frac{3}{4})&quot;&quot;)</th>
<th>Size 2 (&quot;1&quot;)</th>
<th>Size 3 (1¼&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.17</td>
<td>2.24</td>
<td>2.24</td>
</tr>
<tr>
<td>B</td>
<td>2.17</td>
<td>2.17</td>
<td>0.98</td>
</tr>
<tr>
<td>C</td>
<td>1.26</td>
<td>1.26</td>
<td>1.02</td>
</tr>
<tr>
<td>D</td>
<td>6.18</td>
<td>6.30</td>
<td>6.30</td>
</tr>
<tr>
<td>E</td>
<td>2.60</td>
<td>2.95</td>
<td>3.27</td>
</tr>
<tr>
<td>F</td>
<td>0.94</td>
<td>1.09</td>
<td>1.25</td>
</tr>
<tr>
<td>G</td>
<td>2.00</td>
<td>2.25</td>
<td>2.63</td>
</tr>
<tr>
<td>H</td>
<td>4.06</td>
<td>4.29</td>
<td>3.46</td>
</tr>
<tr>
<td>J</td>
<td>5.51</td>
<td>5.91</td>
<td>5.31</td>
</tr>
<tr>
<td>K</td>
<td>0.71</td>
<td>0.71</td>
<td>-</td>
</tr>
<tr>
<td>L</td>
<td>0.71</td>
<td>0.71</td>
<td>0.71</td>
</tr>
<tr>
<td>M</td>
<td>3.09</td>
<td>3.15</td>
<td>-</td>
</tr>
<tr>
<td>N</td>
<td>M10</td>
<td>M12</td>
<td>M14</td>
</tr>
<tr>
<td></td>
<td>x18</td>
<td>x20</td>
<td>x23</td>
</tr>
<tr>
<td>P</td>
<td>0.43</td>
<td>0.51</td>
<td>0.61</td>
</tr>
</tbody>
</table>

* Metric thread

SV pressure relief valve

General information
The SV pressure relief valve block for series F12 motors is designed to protect the motor and adjacent hydraulic components from short duration pressure peaks.

It installs directly on the motor port flange and is available in two sizes:
- '1': \(\frac{3}{4}\)"  for F12-30/-40/-60
- "2": 1"  for F12-80/-90

The valve block consists of a housing containing two high pressure relief cartridges with anti-cavitation function. Cartridges are available in non-adjustable pressure settings between 280 and 420 bar (4060 and 6090 psi).

A make-up/drain port, L, is also provided. In certain operating conditions the motor may cavitate because of insufficient inlet pressure. To prevent this, the L port can be pressurized. When there is a risk of over-heating, the L port can also be utilized to take out part of the flow for cooling. Contact Parker Hannifin for further information.

The pressure drop through the main ports (A–A’ or B–B’) is low. As an example, the pressure drop on size 1 (\(\frac{3}{4}\)") is 0.45 bar (6.5 psi) at 175 l/min (45 gpm), and on size 2 (1") 0.7 bar (10 psi) at 250 l/min (65 gpm).

NOTE:
- The valve block includes main port O-rings (facing the motor) but no mounting screws.
- The valve blocks can be used on all versions of series F12 motors.

Hydraulic schematic.
SV pressure relief valve, Dimensions

<table>
<thead>
<tr>
<th>Port A</th>
<th>Port B</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

| Make-up port L (M22x1.5 metric thread) | Ø K (x8) |

<table>
<thead>
<tr>
<th>Dim. [inch]</th>
<th>SV11</th>
<th>SV12</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.60</td>
<td>2.67</td>
</tr>
<tr>
<td>B</td>
<td>1.22</td>
<td>1.22</td>
</tr>
<tr>
<td>C</td>
<td>1.41</td>
<td>1.61</td>
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<tr>
<td>D</td>
<td>1.85</td>
<td>2.01</td>
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<tr>
<td>E</td>
<td>5.12</td>
<td>5.00</td>
</tr>
<tr>
<td>F</td>
<td>2.60</td>
<td>2.95</td>
</tr>
<tr>
<td>G</td>
<td>0.94</td>
<td>1.09</td>
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<tr>
<td>H</td>
<td>2.00</td>
<td>2.25</td>
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<tr>
<td>J</td>
<td>3.90</td>
<td>4.29</td>
</tr>
<tr>
<td>K</td>
<td>0.43</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Weight [lb]:
- SV11: 9.3
- SV12: 11.0
MV Anti-cavitation valve / make up valve block

The make-up valve block for series F12 motors is designed to prevent cavitation inside motor by directing flow to inlet port from return side.

The manifold is uni-directional but can be installed in either motor direction.

The valve block installs directly on the motor port flange, and is available in 2 sizes:

- The valve block consists of one check valve for make-up function.
- The make-up valve opens at a pressure of approx. 0.2 bar.

NOTE: The valve block includes main port O-rings (facing the motor) but no mounting screws.

<table>
<thead>
<tr>
<th>Size</th>
<th>For Motor</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>F12-80, -90</td>
<td>154</td>
<td>82</td>
<td>63</td>
<td>3720140</td>
</tr>
<tr>
<td>1½&quot;</td>
<td>F12-152, -162, -182, -250</td>
<td>208.5</td>
<td>105</td>
<td>47</td>
<td>3784195</td>
</tr>
</tbody>
</table>

Speed sensor

A wide range of speed sensor kits are available for series F11/F12.

The sensors are ferrostat differential (Hall-effect)

On F12 the speed sensor is directed towards the ring gear. On F11 the speed sensor is directed towards the pistons. The sensor output is a square wave signal within a frequency range of 0 Hz to 15 kHz.

NOTE: - All F12 are prepared for speed sensor as standard, but F11 series must be specified in the ordering code refer to pages 12-14 (F11)
- On F11 the pistons position must be known before mounting.
- The speed sensor is also shown in the illustrations on pages 17 to 37 and 46 to 59.

Order number | Electronic | Signals | Installation | Connector | Cable lenght | Installation instruction |
--------------|------------|---------|--------------|-----------|--------------|--------------------------|
3785190      | NPN        | 2       | M12*1 adjustable | Free leads | 1000 mm      | MSG30-8301-INST          |
3722481      | NPN        | 2       | M12*1 adjustable | M12 4 pin  | 260 mm       | MSG30-8303-INST          |
3722480      | NPN        | 1       | M12*1 adjustable | AMP 3 pin  | 338 mm       | MSG30-8304-INST          |
BLA Boost Units

General information
The BLA boost unit simplifies the building of closed or semi-closed hydrostatic transmissions.

Main features are:
- Replaces conventional charge pump and corresponding valves in many applications
- Allows pump speeds above normal selfpriming speed
- Suitable for system flow rates to 400 l/min (106 US gpm)
- Includes filter
- Simple construction - no moving/wear parts
- Cost-effective installation
- Small tank size
- Helps in building a low-cost hydrostatic transmission.

Description
In a closed circuit hydrostatic transmission, a charge pump is normally included with the main pump, providing make-up fluid which replaces pump and motor volumetric losses. It also maintains sufficient pump inlet pressure to avoid cavitation.

The BLA boost unit replaces the charge pump in many applications, when the following conditions are met:
- The max-to-min pump flow ratio does not exceed 2:1
- System pressure changes gradually without frequent and pronounced pressure peaks
- The line length between pump and boost unit is relatively short.

There are two basic sizes of the BLA boost unit:
- BLA 4 (to 160 l/min (42 US gpm) pump flow)
- BLA 6 (to 400 l/min (106 US gpm) pump flow).

The main part of the unit is an aluminium housing with a built-in nozzle and an injector; refer to the cross section to the right.

When fluid flows from the motor outlet port through the unit and to the pump inlet port, the increased fluid velocity between the nozzle and injector creates a low pressure zone causing additional fluid to be drawn from tank into the main circuit.

Also, pressure increases after the injector, allowing the pump to be operated at speeds higher than the self-priming speed. The ‘boost pressure’ increases with flow. The housing includes ports that should be connected to the pump and motor drain ports respectively.

An additional bleed-off nozzle diverts approx. 10% of the main flow through the cartridge filter before being directed to the tank.

Oil cooling
An oil cooler is usually required in the hydraulic system, in order to remove the heat that is generated in the main circuit. A full-flow oil cooler should be installed in the return line between the motor and the boost unit.

For more information please see our technical catalogue BLA boost unit MSG17-8224/UK

Typical applications:
- Fan drives
- Propeller drives
- Generator drives
- Pump drives

BLA Boost units Series F11/F12
**Direction of rotation**
The motor versions are bi-directional.
The pump versions are uni-directional, allowing higher selfpriming speeds (refer to pages 9, 11 and 40, 42).
The illustration to the right shows direction of flow versus shaft rotation. In a motor application, the shaft turns clockwise when port B (black arrow) is pressurized, and counter clockwise when port A (open arrow) is pressurized.
In a pump application where the shaft turns clock-wise, port B is the inlet port and should be connected to tank; when the shaft turns counter clockwise, port A is the inlet port.

**Hydraulic fluids**
Rates and performance data for series F11/F12 are based on operating with good quality, contamination-free, petroleum-based fluids.
Hydraulic fluids type HLP (DIN 51524), automatic transmission fluids type A, or API CD engine oils can be used.
Fire resistant fluids (when used under modified operating conditions) and synthetic fluids may also be suitable.

**Operating temperature**
The following temperatures should not be exceeded (type V FPM shaft seals):
Main circuit 80 °C 176 °F
Drain circuit: 115 °C 239 °F.
NBR shaft seals (type N) can be used to 90 °C 194 °F drain fluid temperature.
**NOTE:** The temperature should be measured at the utilized drain port.
Continuous operation may require case flushing in order to meet the viscosity and temperature limitations.
The following table shows operating speeds, above which flushing is usually required, as well as suggested flow through the case.

**F11/F12 in series operation**
When running F11/F12 in series at higher pressure levels,
Please contact Parker Hannifin for further information.
Viscosity

The ideal operating range is 15 to 30 mm²/s [cSt]. At operating temperature, the viscosity (of the drain fluid) should be kept above 8 mm²/s [cSt]. At start-up, the viscosity should not exceed 1000 mm²/s [cSt].

Filtration

To obtain the highest service life of the F11/F12, the fluid cleanliness should meet or exceed ISO code 20/18/13 (ISO 4406). During normal operating conditions, a 10 µm (absolute) filter is recommended.

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 (high temperature, low oil viscosity, contaminated oil). The table below shows recommended case pressure as a function of shaft speed.

<table>
<thead>
<tr>
<th>Shaft speed</th>
<th>[rpm]</th>
<th>1500</th>
<th>3000</th>
<th>4500</th>
<th>6000</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td>F11-5, -6, -10, -12, -14, -19</td>
<td>[bar]</td>
<td>0.5 - 10</td>
<td>0.5 - 7.0</td>
<td>1.0 - 5.0</td>
<td>2.0 - 5.0</td>
<td>3.0 - 5.0</td>
</tr>
<tr>
<td></td>
<td>[psi]</td>
<td>7.3-145</td>
<td>7.3-102</td>
<td>14.5-72</td>
<td>29-72</td>
<td>43-72</td>
</tr>
<tr>
<td>F12-30, -40, -60, -80, -90</td>
<td>[bar]</td>
<td>0.5 - 8</td>
<td>0.5 - 6.0</td>
<td>1.0 - 4.5</td>
<td>2.0 - 4.0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>[psi]</td>
<td>7.3-116</td>
<td>7.3-87</td>
<td>14.5-72</td>
<td>29-58</td>
<td>-</td>
</tr>
<tr>
<td>F12-110, -125, -152, -162, -182, -250</td>
<td>[bar]</td>
<td>0.5 - 6</td>
<td>0.5 - 4.0</td>
<td>2.0 - 4.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>[psi]</td>
<td>7.3-87</td>
<td>14.5-58</td>
<td>29-58</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. The case pressure must be equal to or greater than the external pressure on the shaft seal ring.

To secure correct case pressure and lubrication, a spring loaded check valve, 1-3 bar (14.5 - 43.5 psi), in the drain line (shown on next page) is recommended.

Note. Contact Parker Hannifin for information when operating at high speeds.

Required inlet pressure

The motor may operate as a pump under certain conditions. When this occurs, a minimum pressure must be maintained at the inlet port; increased noise and gradually deteriorating performance due to cavitation may otherwise be experienced.

A 15 bar inlet pressure, measured at the motor inlet port, satisfies most operating conditions. Contact Parker Hannifin for more specific information on inlet pressure requirements.
Case drain connections
Series F11/F12 have two drain ports, C and D, while F12-110 and -125 have an additional port, E. The uppermost drain port (such as port C in the illustration below) should always be utilized.

In mounting positions such as ‘shaft up’ (below) a spring loaded check valve should be installed in the drain line in order to insure a sufficiently high oil level in the case. Preferably, the drain line should be connected directly to the reservoir.

Before start-up
Make sure the F11/F12 case as well as the entire hydraulic system is filled with a recommended fluid. The internal leakage, especially at low operating pressures, is not sufficient to provide lubrication at start-up.

NOTE:
- To avoid cavitation and obtain a low noise level as well as reduced heat generation, tubes, hoses and fittings must be adequately dimensioned.
- Preferably, the suction line flow speed should be 0.5 to 1 m/s (1.6 to 3.3 ft/s), and pressure line flow speeds 3 to 5 m/s (9.8 to 16.4 ft/s).
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