

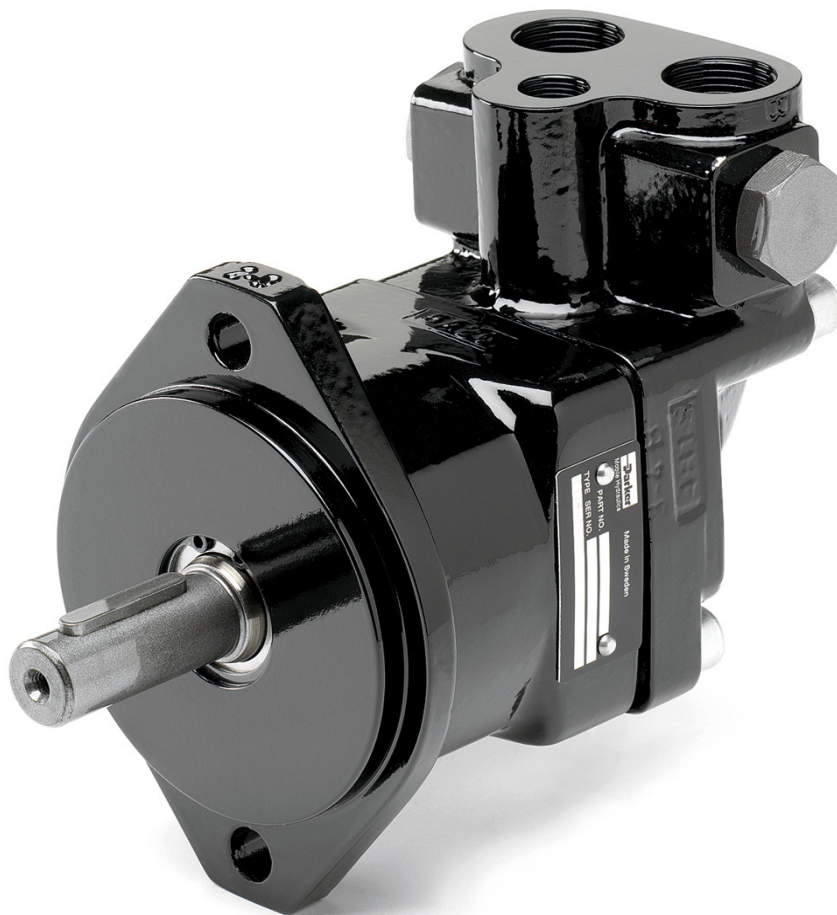


Bulletin HY30-5503-M1/UK

# Service Manual Series F11

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Conversion factors	
1 kg	= 2.2046 lb
1 N	= 0.22481 lbf
1 bar	= 14.504 psi
1 l	= 0.21997 UK gallon
1 l	= 0.26417 US gallon
1 cm <sup>3</sup>	= 0.061024 in <sup>3</sup>
1 m	= 3.2808 feet
1 mm	= 0.03937 in
1 °C	= 1.8°F + 32

 **WARNING**

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

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## General information

F11 is bent axis, fixed displacement heavy-duty motor/pump series. They can be used in numerous applications in both open and closed loop circuits.

Series F11 is available in the following frame sizes and versions:

- F11-5, -6, -10, -12, -14 and -19 with CETOP mounting flange and shaft end.
- F11-6, -10, -12 and -14 with ISO flange and shaft
- F11-6, -10, -12, -14 and -19 with SAE flange and shaft

Thanks to the unique spherical piston design, F11 motors can be used at unusually high shaft speeds. Operating pressures to 420 bar provides for the high output power capability.

The 40° angle between shaft and cylinder barrel allows for a very compact, lightweight motor/pump.

The laminated piston ring offers important advantages such as low internal leakage and thermal shock resistance.

The pump version has highly engineered valve plates for increased selfpriming speed and low noise, available with left and right hand rotation.

The F11 motors produce very high torque at start-up as well as at low speeds.

Our unique timing gear design synchronizes shaft and cylinder barrel, making the F11 very tolerant to high 'G' forces and torsional vibrations.

Heavy duty roller bearings permit substantial external axial and radial shaft loads.

The F11's have a simple and straightforward design with very few moving parts, making them very reliable motors/pumps.

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.

**Note!** F11-150 and -250 have been updated to F12-150 and -250. They can be found in the service manual for F12. We also refer to after sales information, SI 09/01 and SI 09/04.

## Specifications

Size F11	-5	-6	-10	-12	-14	-19
<b>Displacement</b> (cm <sup>3</sup> /rev)	4,9	6,0	9,8	12,5	14,3	19,0
<b>Operating Pressure</b> (bar)						
Max intermittent <sup>1)</sup>	420	420	420	420	420	420
Max continuous	350	350	350	350	350	350
<b>Motor operating speed</b> (rpm)						
Max intermittent <sup>1)</sup>	14000	11200	11200	10300	9900	8900
Max continuous	12800	10200	10200	9400	9000	8100
Min continuous	50	50	50	50	50	50
<b>Max pump self priming speed</b> (rpm)						
L or R operation <sup>2)</sup>	4600	-	4200	3900	3900	3500
<b>Motor input flow</b> (l/min)						
Max intermittent <sup>1)</sup>	69	67	110	129	142	169
Max continuous	63	61	100	118	129	154
<b>Main circuit temp.</b>						
Max (°C)	80	80	80	80	80	80
Min (°C)	-40	-40	-40	-40	-40	-40
<b>Mass moment of inertia</b> (x10 <sup>-3</sup> ) (kg m <sup>2</sup> )	7,8	9,5	15,6	19,8	22,7	30,2
<b>Weight</b> (kg)	4,7	7,5	7,5	8,2	8,3	11

<sup>1)</sup> Intermittent: max 6 seconds in any one minute.

<sup>2)</sup> Self priming speed valid at sea level.

## Operating temperature

The following temperatures should not be exceeded (Type **N** shaft seals): Drain fluid: 90 °C.

FPM shaft seals (type **V**) can be used to 115 °C drain fluid temperature.

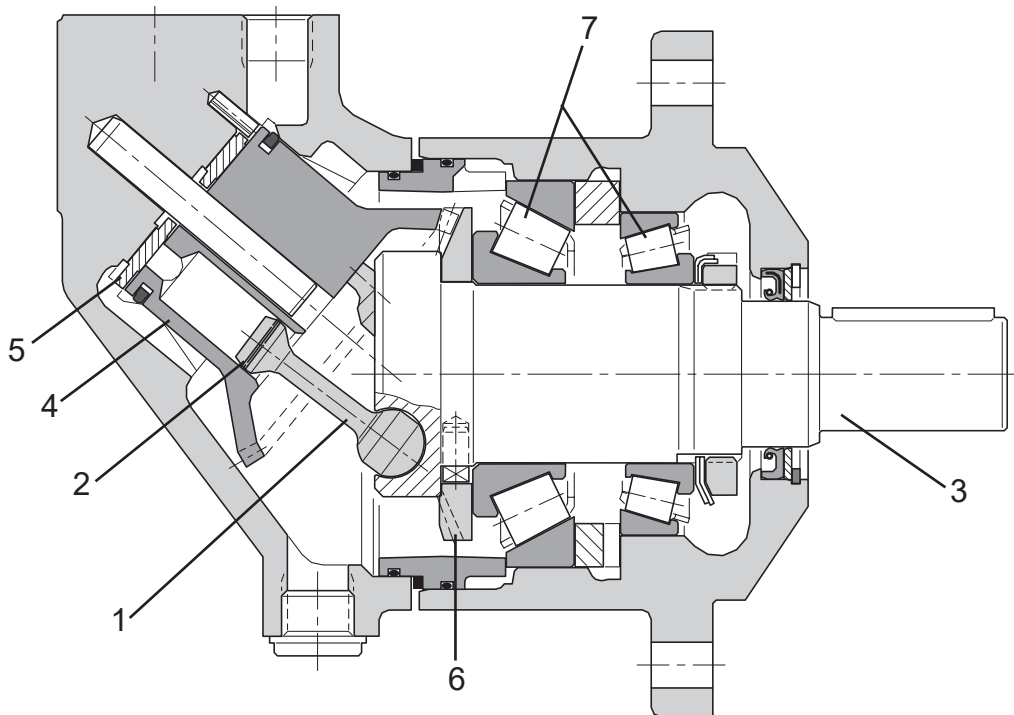
**Note:** The temperature should be measured at the utilized drain port.

Continuous operation may require case flushing in order to meet the viscosity and temperature limitations.

For further information we refer to:  
Catalogue HY30-8249/UK

## Design

Series F11 pumps/motors consist of a rotating group contained in a split housing. Spherical pistons (1) with laminated piston rings (2) operate at a 40° angle relative to the shaft (3). As the shaft turns, the pistons are driven in a reciprocating movement in the cylinder barrel (4). When the unit is used as a pump, the oil passes from the inlet port to the cylinder barrel and is then forced to the outlet port through the pumping action of the pistons. A barrel retaining ring maintains the barrel against the valve plate (5). A ring gear (6) on the shaft meshes with the corresponding teeth of the cylinder barrel (4) so that the cylinder barrel always rotates at the same speed as the shaft (3). The shaft is supported by two heavy duty tapered roller bearings (7).

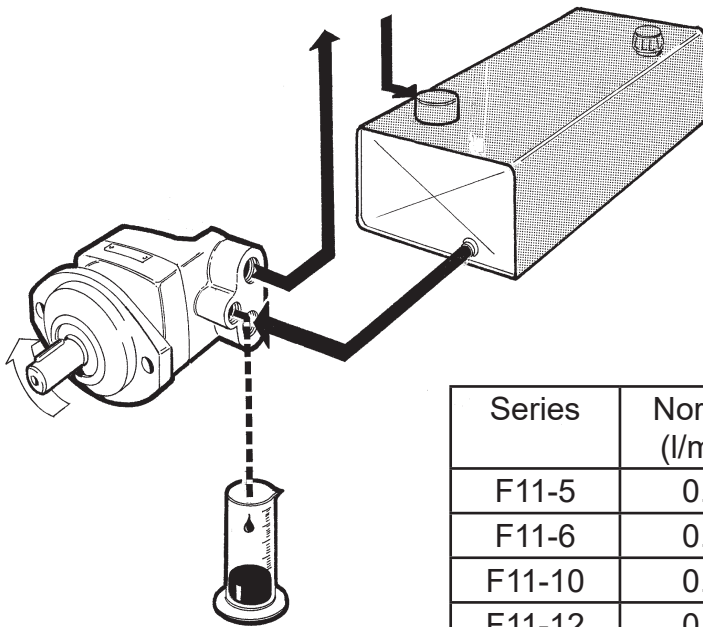


## Operational Check

The general condition of the unit can be established by checking the drain flow. Remove the drain line and keep the drain port above a suitable container. Run the unit at 1000 rpm and pressurise the system to 200 bar (3000 psi)

Measure the drain flow for one minute; if it exceeds the maximum figures shown below, the unit is worn or damaged internally and should be replaced or repaired.

Also, check for leakage at the shaft seal and between the bearing and barrel housings.



**Drain Flow**

Series	Normal (l/min)	Normal (gpm, US)	Max (l/min)	Max (gpm, US)
F11-5	0.3	0.08	0.4	0.12
F11-6	0.3	0.08	0.5	0.13
F11-10	0.5	0.13	0.8	0.21
F11-12	0.6	0.17	1.0	0.26
F11-14	0.6	0.15	1.0	0.26
F11-19	0.8	0.20	1.3	0.35