



***Service Manual  
ASM 3.1 - F12  
F12-030 until -110***

*Catalog 9129 8249-12  
August 2003, GB*



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## General information

F12 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 F12 conforms to current ISO and SAE mounting flange and shaft end configurations. A very compact cartridge version is also available.

Frame sizes: F12-30, -40, -60, -80 and -110.

Thanks to the unique spherical piston design, F12 motors can be used at unusually high shaft speeds. Operating pressures to 480 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 F12 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 F12 very tolerant to high 'G' forces and torsional vibrations.

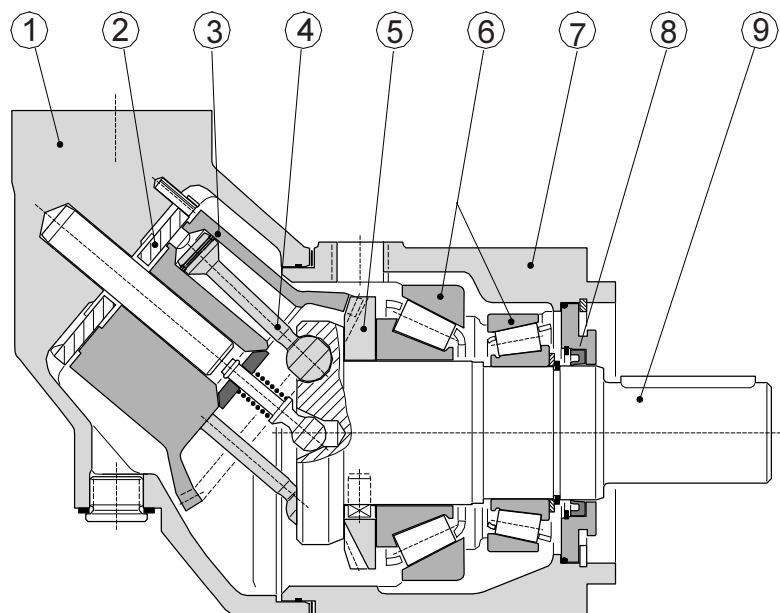
Heavy duty roller bearings permit substantial external axial and radial shaft loads.

The F12'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.

## F12 cross section

1. Barrel housing
2. Valve plate
3. Cylinder barrel
4. Piston with piston ring
5. Timing gear
6. Tapered roller bearing
7. Bearing housing
8. Shaft seal
9. Output/input shaft



## Specifications

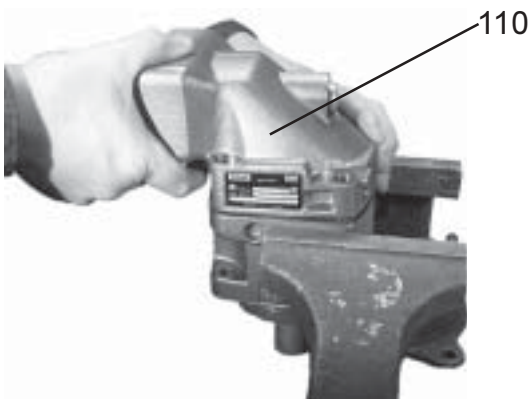
Frame size	F12-30	-40	-60	-80	-110
<b>Displacement</b> [cm <sup>3</sup> /rev]	30.0	40.0	59.8	80.4	110.1
<b>Motor operating speed</b> [rpm]					
max intermittent	7 100	6 400	5 600	5 200	4 700
max continuous	5 600	5 000	4 300	4 000	3 600
min continuous	50				50
<b>Max pump selfpriming speed<sup>1</sup></b> L or R function; max [rpm]	2 850	2 650	2 350	2 350	2 200
<b>Torque</b> (theor.) at 100 bar [Nm]	47.6	63.5	94.9	128	175
<b>Motor input flow</b>					
max intermittent [l/min]	213	256	335	418	517
max continuous [l/min]	168	200	257	322	396
<b>Output power</b> (motor)					
max intermittent [kW]	110	130	175	220	270
max continuous [kW]	70	85	110	153	165
<b>Operating pressure</b>					
max intermittent [bar]	480				480
max continuous [bar]	420				420
<b>Max case pressure</b> shaft seal type H, 1500 rpm [bar]	14	12	12	10	9.5
<b>Main circuit temp.</b> , max [°C]	80				80
min [°C]	-40				-40
<b>Fluid viscosity</b> , max. [mm <sup>2</sup> /s]	1 000				1 000
min. [mm <sup>2</sup> /s]	8				8
<b>Fluid contamination level</b> (ISO code 4406)	18/13				18/13
<b>Mass moment of inertia</b> (x10 <sup>-3</sup> ) [kg m <sup>2</sup> ]	1.7	2.9	5.0	8.4	11.2
<b>Weight</b> [kg]	12	16.5	21	26	36

<sup>1</sup>) Valid at sea level.

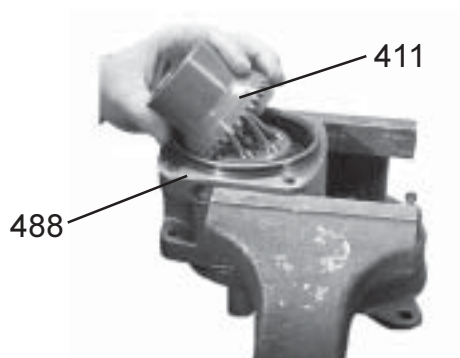
## Disassemble



Fasten the unit in a vice. Loosen the 4 bolts (item 491).



Lift off the barrel housing (item 110). Make sure that the valve plate doesn't fall out when lifting the barrel housing off.



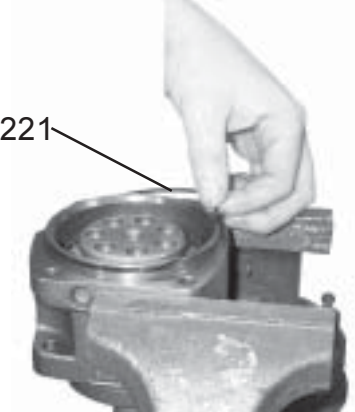
Lift off the cylinder barrel (item 411). Take the shim (item 488) away.



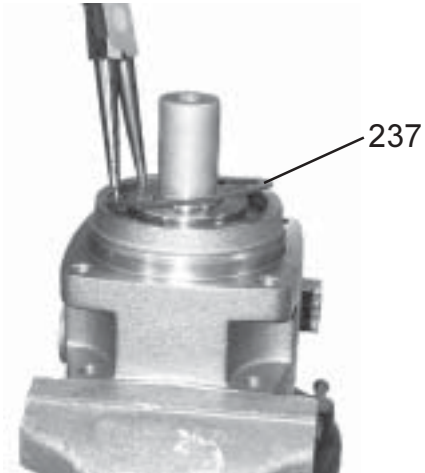
Lift off the barrel support (item 430).



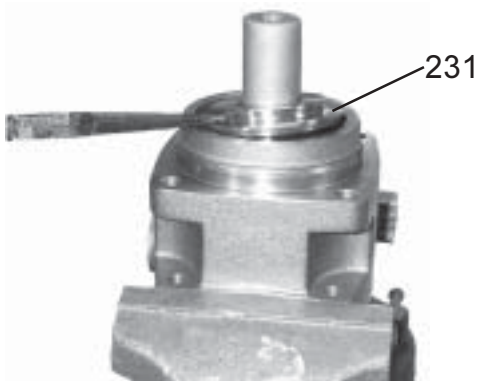
Remove the pistons (item 440).



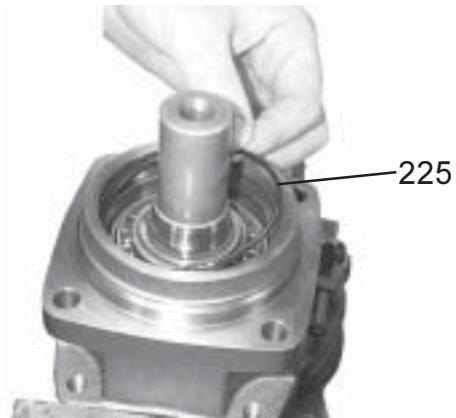
Remove the O-ring (item 221).



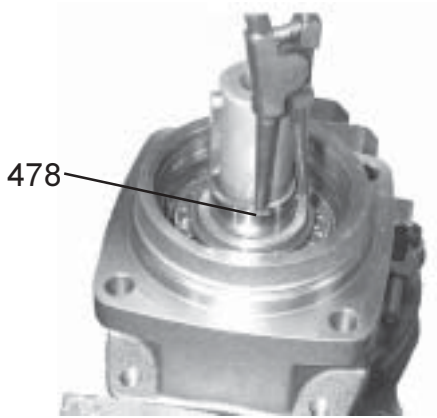
Remove the retaining ring (item 237).



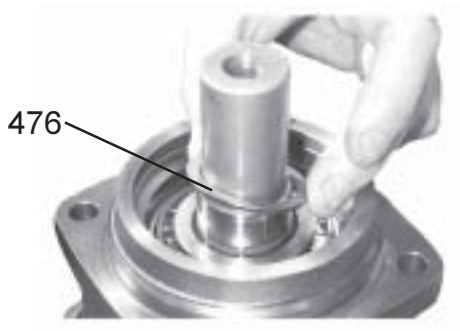
Remove the seal carrier (item 231).



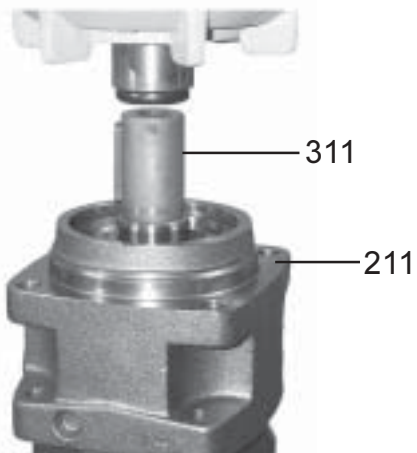
Remove the O-ring (item 225).



Remove the retaining ring (item 478).

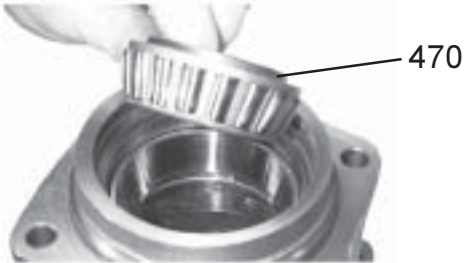


Lift off the spacer washer (item 476).



Place the bearing housing (item 211) on a tube.  
Push out the shaft (item 311) with a press.





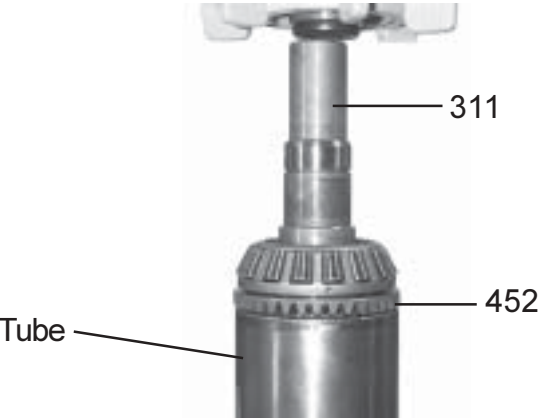
Remove the small tapered roller bearing (item 470).



Tap the small bearing ring off with a mandrel.



Tap the large bearing ring off with a mandrel.



Place the ring gear (item 452) on a tube.  
Push out the shaft (item 311) with a press.

## Assemble



Push on the tapered roller bearing (item 460) and the ring gear (item 452) on the shaft with a press. Use a tube (see page 16).



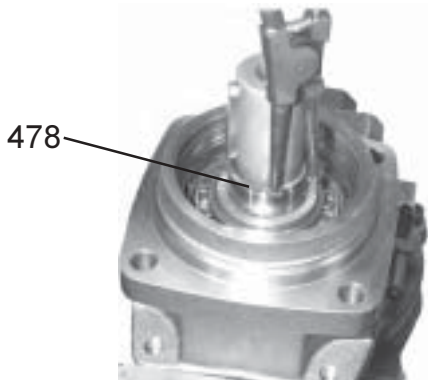
Push on the bearing ring (item 460) in the bearing housing (item 211) with a press. Use a tube to match the outer diameter off the bearing ring.



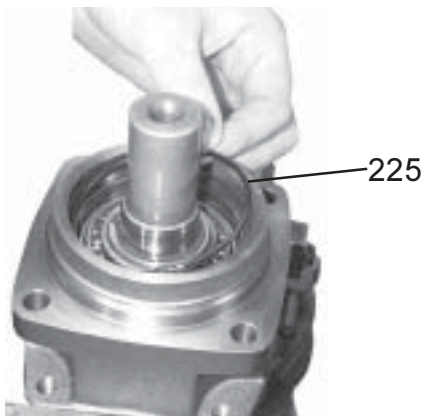
Push on the bearing ring (item 470) in the bearing housing (item 211) with a press. Use a tube to match the outer diameter off the bearing ring.



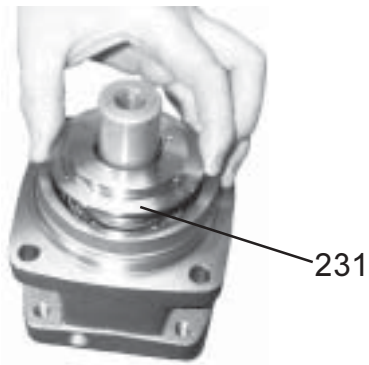
Push on the Bearing (item 470) with a press until correct preload is achieved. Install the spacer washer (item 476).



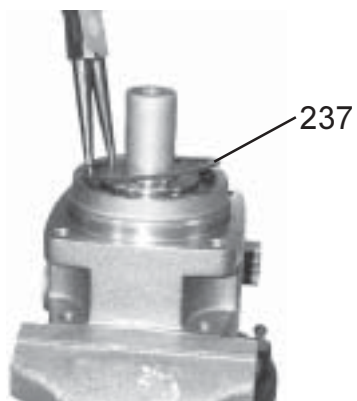
Install the retaining ring (item 478).



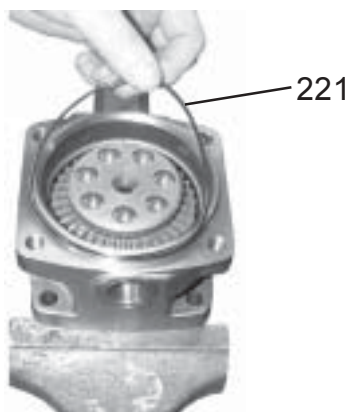
Install the O-ring (item 225).



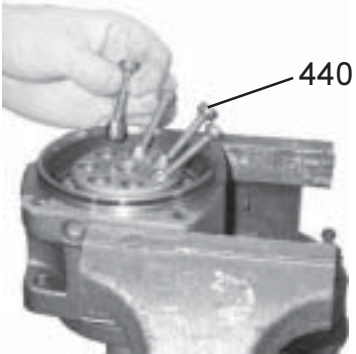
Install the seal carrier (item 231).



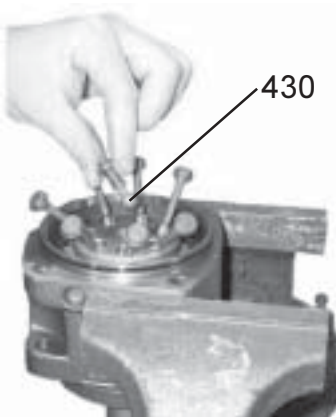
Install the retaining ring (item 237).



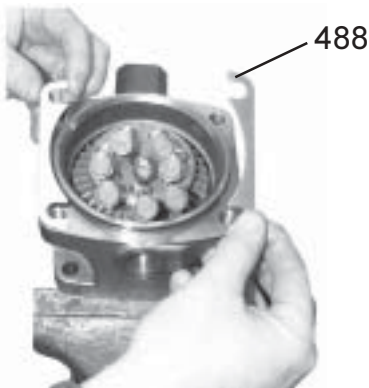
Install the O-ring (item 221).



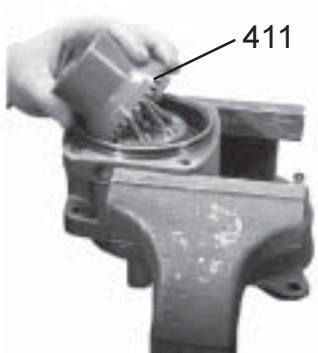
Install the pistons (item 440).



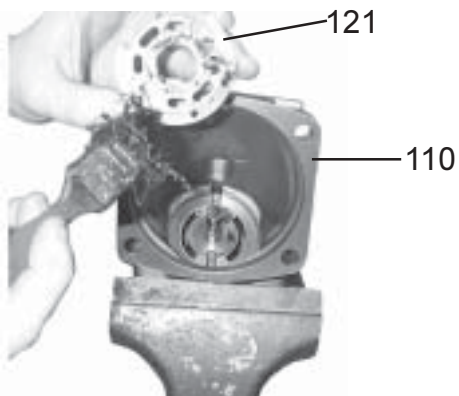
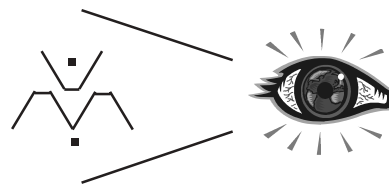
Install the barrel support (item 430).



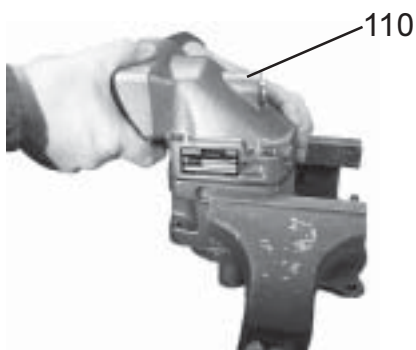
Install the shim (item 488).



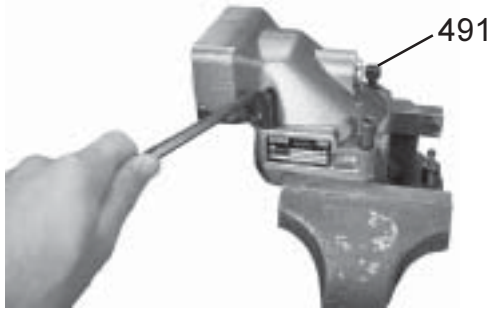
Install the cylinder barrel (item 411). Ensure correct timing. (Marking, punch mark)



Put some grease on the valve plate (item 121) and install it into the barrel housing (item 110).  
Make sure you have installed the valve plate correct (see page 18).



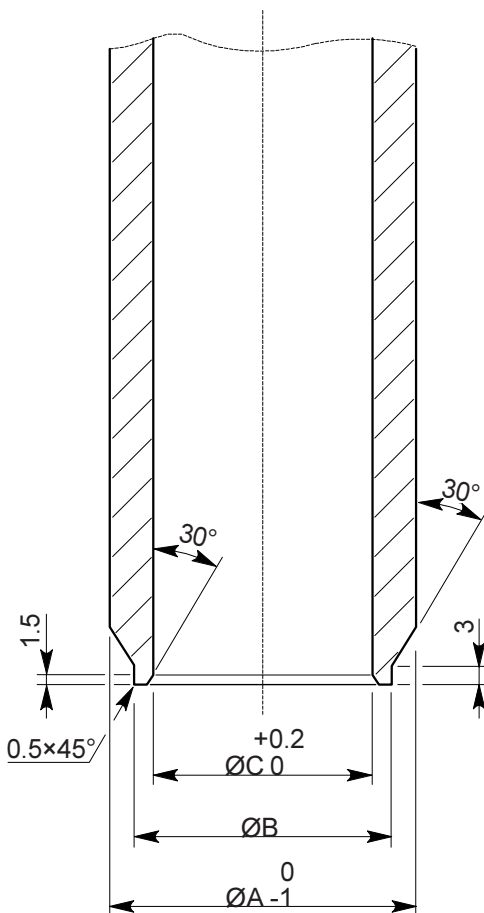
Install the barrel housing (item 110).



Fasten the 4 bolts (item 491) to specified torque.

F12-030	60 ± 10 Nm
F12-040	60 ± 10 Nm
F12-060	60 ± 10 Nm
F12-080	105 ± 20 Nm
F12-110	105 ± 20 Nm

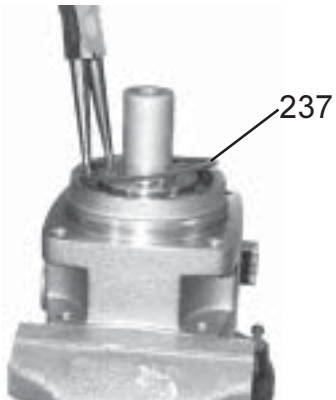
**Tools to be used to facilitate the installation of the tapered roller bearings.**



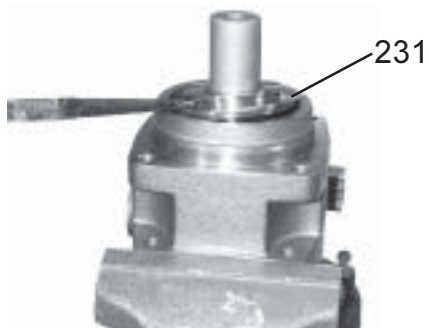
Type	$\varnothing A$	$\varnothing B$	$\varnothing C$
F12-030	60	49	42
F12-040	65	58	52
F12-060	73	64	57
F12-080	74	70	62
F12-110	82	75	67



## Change of shaft seal



Remove the retaining ring (item 237).



Remove the seal carrier (item 231).






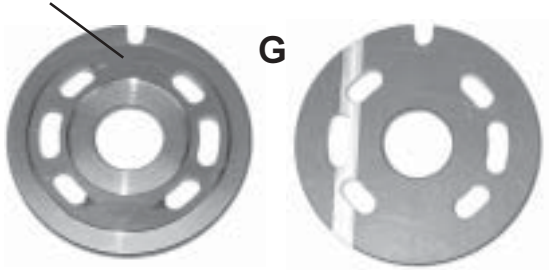

Tap the shaft seal out with hammer and mandrel.



Tap the new shaft seal back with a tube and a hammer.  
The outside diameter on the tube is 65mm.

## Valve plates F12

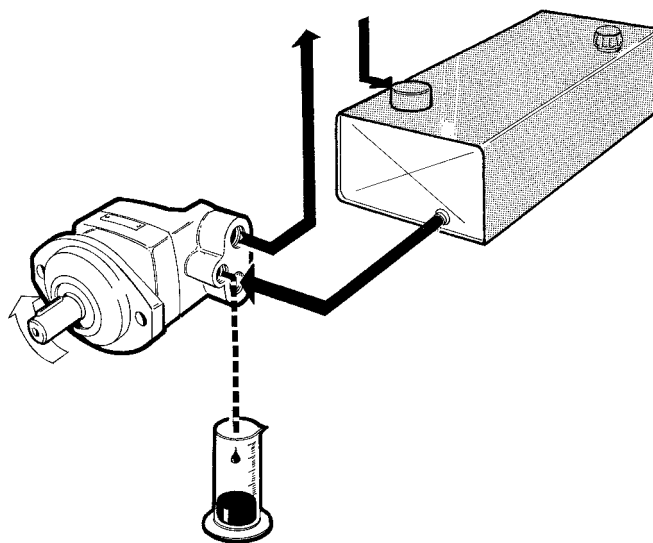
Following valve plates can be fitted in F12.

	<b>M</b>	M = Bi-directional, motor operation
<i>Against cylinder barrel</i>		
	<b>L</b>	L = L.H. rotation, pump operation
	<b>R</b>	R = R.H. rotation, pump operation
<i>Against cylinder barrel</i>		
	<b>G</b>	G = L.H. rotation, internal drain, motor operation
	<b>X</b>	X = Bi-directional, pump operation, high self priming speed
<i>Against cylinder barrel</i>		

## 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 normal speed and pressurize the system to 2000-3000 psi. (150 - 200 bar)

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.



Series	Normal		Max	
	cu.in./min	(l/m)	gpm.	(l/m)
F12-30	24	0.4	.55	2.0
F12-40	30	0.5	.65	2.5
F12-60	43	0.7	.70	2.7
F12-80	61	1.0	.80	3.0
F12-110	61	1.0	.80	3.0

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