



Bulletin HY30-5519-M1/UK

Service Manual Series F2

Effective: September, 2010
Supersedes: February, 2009



List of contents	Page
Specifications, design and function	3
Operation check	4
Change of shaft seals.....	5
Disassembling	6-7
Wear check.....	8
Assembling.....	9-10
Split view	11

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 ³	= 0.061024 in ³
1 m	= 3.2808 feet
1 mm	= 0.03937 in
9/5 °C + 32 = °F	



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.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application, including consequences of any failure, and review the information concerning the product or system in the current product catalogue. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

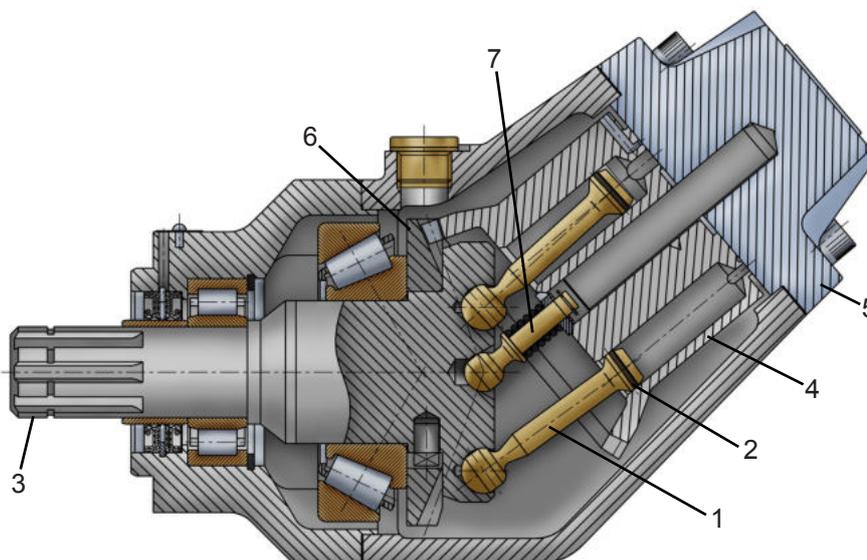
Offer of Sale

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

Specifications

Frame size	F2-42/42	F2-53/53	F2-55/28	F2-70/35	F2-70/70
Displacement (cm³/rev)					
Port A	43	54	55	69	68
Port B	41	52	28	36	68
Max operating pressure (bar)					
intermittent	400	400	400	400	350
continuous	350	350	350	350	300
Max shaft speed (rpm) (unloaded pump; low pressure)	2550	2550	2550	2550	2550
Max selfpriming speed (rpm) Ports A ¹⁾²⁾ and B ¹⁾²⁾ pressurised	1800	1800	1800	1800	1650
Port A ²⁾ unloaded, pressure in port B	2100	2100	2100	2100	2100
Input power (kW)					
max intermittent ³⁾	100	126	100	126	131
max continuous	88	110	88	110	112
Weight (kg)	19	19	19	19	19

- 1) Valid with 2 1/2" inlet (suction) line;
with 2" inlet line: 53/53 and 70/35 max 1100 rpm
42/42 and 55/28 max 1400 rpm. (q≈120l/min)
- 2) Measured at 1.0 bar abs. inlet pressure.
Please note: A lower inlet pressure affects pump performance.
- 3) Max 6 seconds in any one minute.



Design and function

F2 is a piston pump with spherical pistons (1) including piston rings (2). The pistons are working at the angle of 40° to the shaft (3). When the shaft rotates, the pistons move up and down in the cylinder barrel (4), forcing the oil to pass from the inlet port to the outlet in the end cap (5). A ring gear (6) connects the cylinder barrel to the drive shaft, causing these to rotate at the same speed.

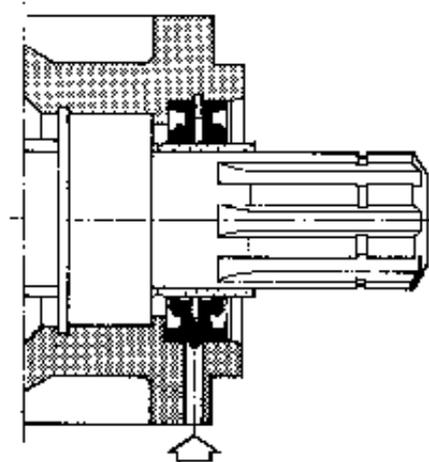
A barrel support (7) with a spring presses the cylinder barrel against the end cap. An internal connection from the housing to the suction port eliminates a separate drain line to the tank. F2 is provided with shaft and connection flange that fits direct to PTO's with ZF standard.

Operation Check

Check of Shaft Seal

The pump has two shaft seals - the inner one sealing the hydraulic oil in the housing, and the outer one the transmission oil when the pump is fitted to a PTO. If any of the sealrings leak, the oil will come out through an indication hole.

Check that no oil is dripping out of the indication hole, when the pump is in operation. If there is a leakage from the sealrings, they must be exchanged, See chapter "Exchange of shaft seals".



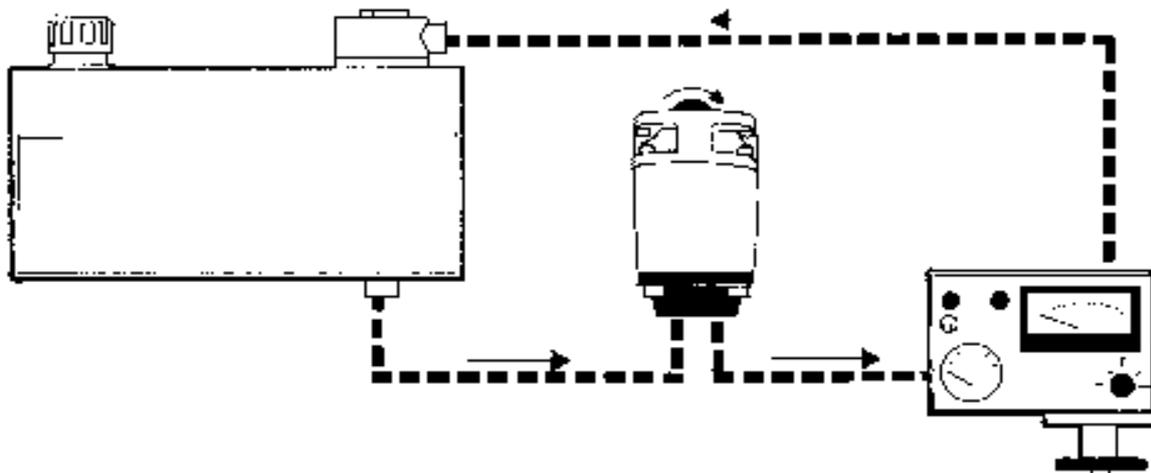
Indication hole

Note: A heavy leakage can be caused by a worn-out pump, whereby high pressure oil will come out into the housing in such large quantities that the sealring might be damaged. If there is a steady stream of oil from the indication hole, the pump is probably damaged and will have to be replaced.

Checking the Flow from the Pump

The flow from the pump can be checked by means of a test instrument comprising a flowmeter and a relief valve.

Connection of test instrument



When the pump is running at about 800 - 1400 r.p.m. and is loaded up to 150 - 200 bar, the flow must not decrease by more than 10%.

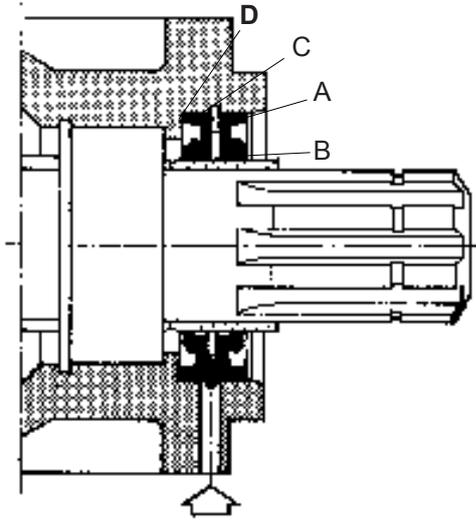
Example:

We recommend to test both circuits/ports, as an example test of port A is described.

An F2-70/35 running at 1200 r.p.m. gives - according to the flowmeter. - a flow of 82 l/min in port A. If the pump is loaded, the flow must not decrease by more than $0,1 \times 82 = 8,2$ l / min, i.e. the flowmeter should indicated at least $82 - 8,2 = 73,8$ l / min. If the flow drops below this limit, the pump is worn out and have to be replaced / repaired.

Service Procedures

Exchange of shaft seals



1.
Pull out the outer seal ring A, e.g. by means of a screwdriver by piercing the wall of the seal. Take care not to damage the sealing surface B of the shaft.
2.
Loosen the retaining ring C.
3.
Pull out the inner seal ring D in the same way as the outer one.
4.
Check that the sealing surface of the shaft is undamaged. If damaged, the pump has to be taken apart and the slewe has to be replaced.
5.
Push on the new inner sealring.
6.
Fit the retaining ring. See to it, that the opening of the retaining ring is placed at the indication hole, which will otherwise be blocked.
7.
Fill out the space between retaining ring and shaft with heat - resistant grease.
8.
Fit the new outer seal ring.

Disassembly

Fasten the pump in a vice.

1.
Loosen the end cap and remove it.

2.
Loosen the screws joining the bearing housing and the barrel housing, and remove the barrel housing.

3.
Remove the cylinder barrel.



4.
Remove the pistons, which can be lifted out when held parallelly to the drive shaft.

5.
Remove barrel support.

6.
Carefully knock the shaft end against the table until the housing comes loose.

7.
Remove the bearing and ring gear from the shaft.



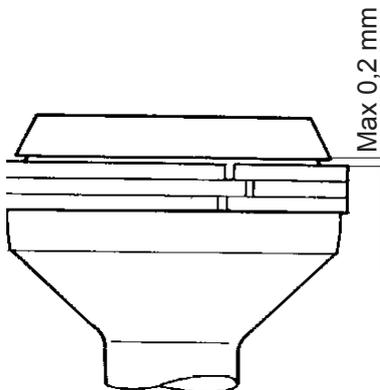
Checking and Replacement

Clean all parts when the pump has been disassembled. Check carefully for wear and damage. Replace all gaskets and seal rings.

If the oil flow from the F2 pump is less than normal, the following parts are likely to be worn:

- The surface facing the cylinder barrel on the end cap.
- The end surface of the cylinder barrel.
- The piston rings

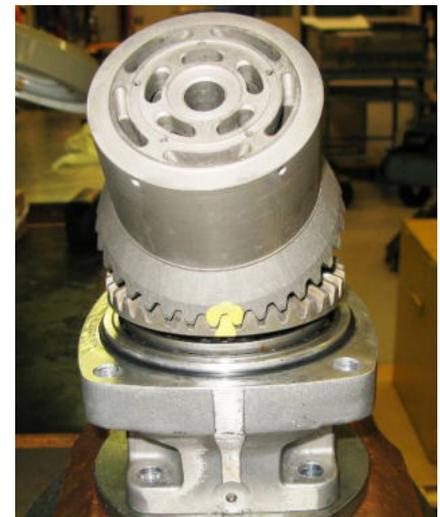
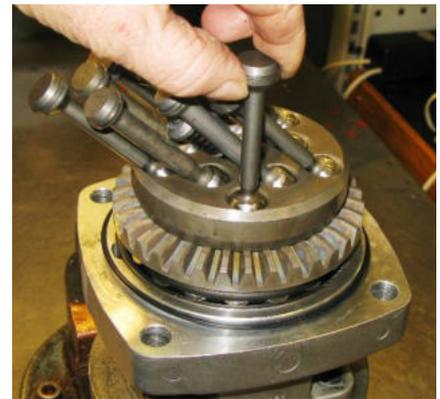
Scores and marks on these parts will always decrease the performance of the pump. Always replace them by new parts, when necessary.



The laminated piston rings should always be replaced at a major overhaul (due to fatigue), and if the play between piston and new rings is more than 0,2 mm also the piston should be replaced.

Assembly

1.
Remove the plug from the barrel housing.
2.
Fit new seal rings in the bearing housing (see earlier instructions, page 5).
3.
Fasten the bearing housing in a vice. Mount the shaft assembly into the housing.
Place an O-ring on the barrel housing.
4.
Fit the barrel support and the pistons into their respective ball sockets.
5.
Position the cylinder barrel with its mark opposite the mark of the shaft, and enter the pistons into the cylinders and the barrel support into the centre bore.
9.
Slip the barrel housing over the cylinder barrel. Fit and tighten the screws. Make sure that the cylinder barrel with its mark is opposite the mark of the shaft.



10.

Fit the end cap, make sure that the guide pin on the end cap corresponds to the guide hole on the barrel housing so correct direction of rotation is achieved. Check through the inspection hole that the two marks are opposite each other. If not, correct this.

Tighten the screws lightly. Check that there is a backlash. If the backlash is insufficient, fit more gaskets.

Tightening torques:

F2-All sizes	90±10 Nm
--------------	----------

11.

The backlash of the gear must be 0,05 - 0,30 mm . This play can be checked through the inspection hole, with a feeler gauge.

The number and thickness of gaskets between end cap and bearing housing determines the backlash.

When assembling, use the same number of gaskets as found at the disassembly. If the number is unknown, try with 2 gaskets (1 thick and 1 thin).

12.

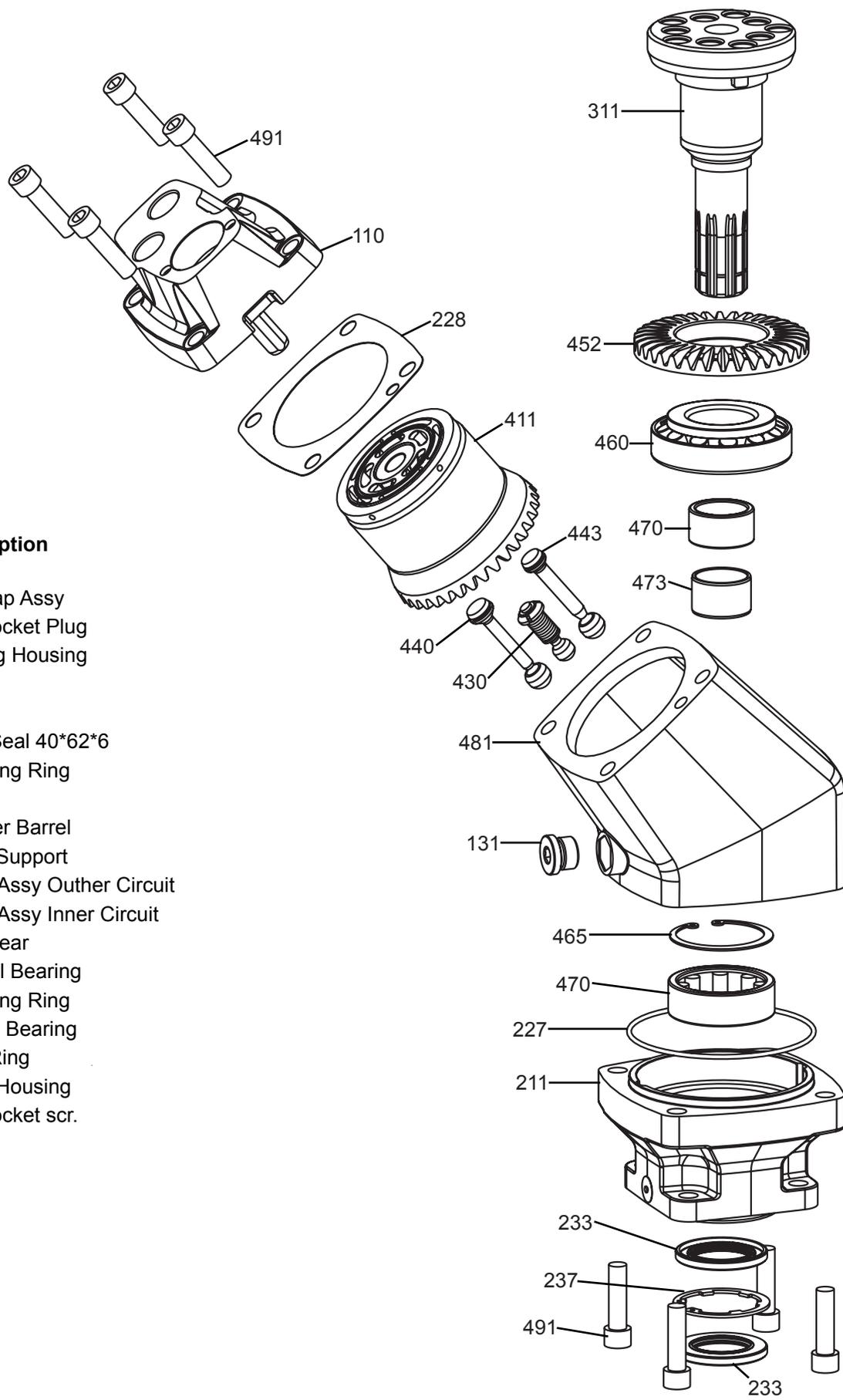
Fit the plug at the inspection hole (20-35 Nm). Test the pump in the test stand. Always fill the pump with oil before start up.



The number and thickness of gaskets determines the backlash



Item	Description
110	End Cap Assy
131	Hex Socket Plug
211	Bearing Housing
227	O-Ring
228	Gasket
233	Shaft Seal 40*62*6
237	Retaining Ring
311	Shaft
411	Cylinder Barrel
430	Barrel Support
440	Piston Assy Outer Circuit
443	Piston Assy Inner Circuit
452	Ring Gear
460	Tap Rol Bearing
465	Retaining Ring
470	Needle Bearing
473	Inner Ring
481	Barrel Housing
491	Hex Socket scr.





Parker Hannifin
Pump and Motor Division
Flygmotorvägen 2
SE-461 82 Trollhättan
Sweden
Tel: +46 (0)520 40 45 00
Fax: +46 (0)520 371 05
www.parker.com