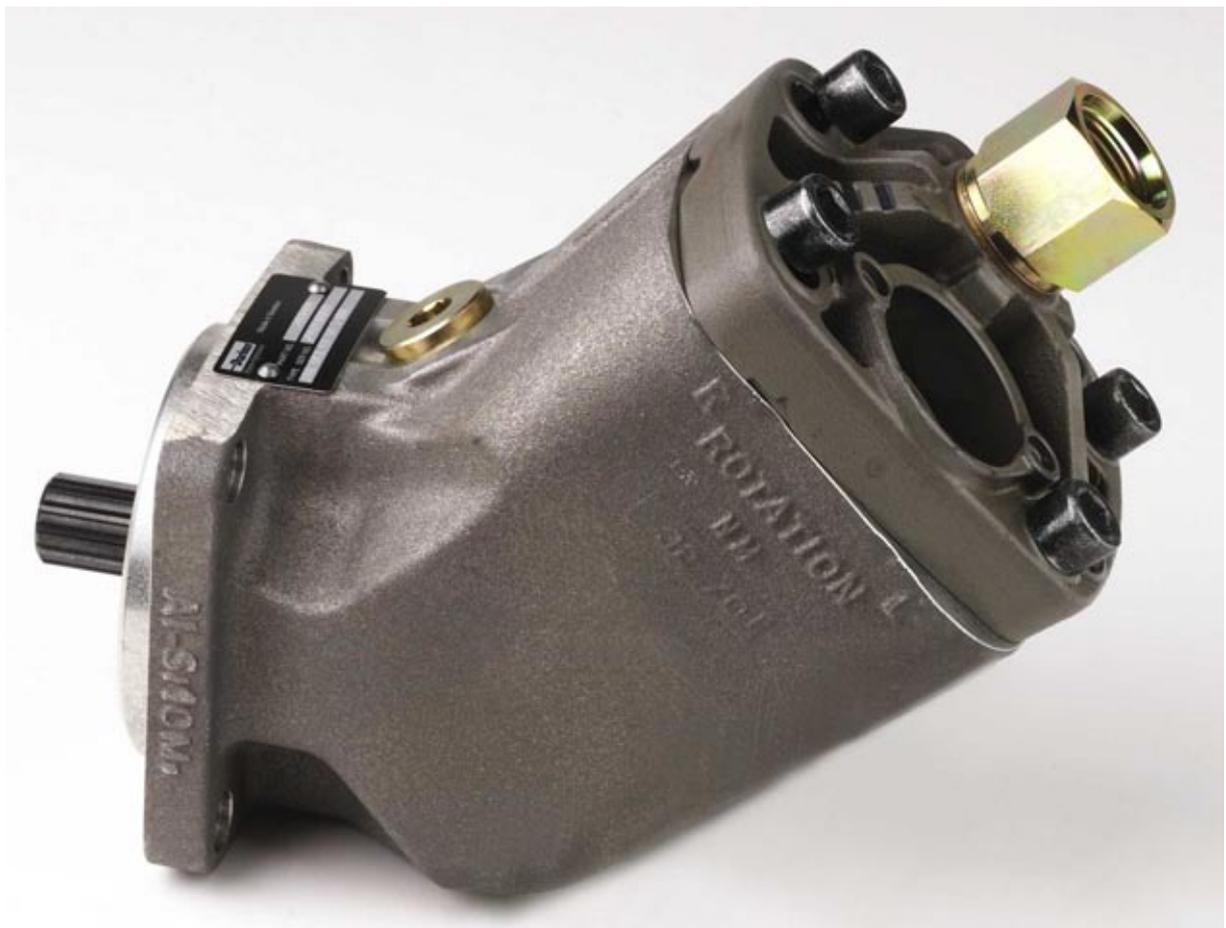




Bulletin HY30-5509-M1/UK

Service Manual Series F01 SAE

Effective: November, 2006
Supersedes: June, 2006



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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 ³	= 0.061024 in ³
1 m	= 3.2808 feet
1 mm	= 0.03937 in
0 °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 pro- aspects of your application, including consequences of any failure, and review the information concerning the product or system 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".

F1

The F1 offers many additional values for operators of cargo cranes, container lifts, skip loaders, forest cranes, concrete mixers and similar truck applications.

Series F1 is a very efficient and straight forward pump design with unsurpassed reliability. Its small envelope size makes for a simple and inexpensive installation requiring a minimum of piping.

New features of the F1 are:

- Higher selfpriming speeds
- Operating pressures to 350 bar (5000 psi)
- New frame sizes to meet market requirements
- Higher overall efficiency
- Increased reliability
- Reduced noise level
- Possible leakage paths reduced
- Easier to change direction of rotation
- Smaller installation dimensions
- Low force pulsations

... thanks to:

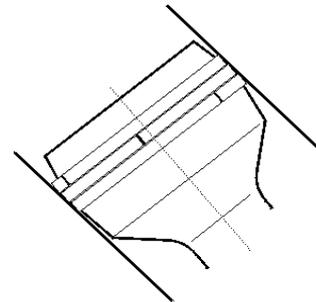
- 45° bent-axis angle
- Optimal inlet port geometry
- New ball and roller bearings
- Single housing design

All of this in addition to previous F1 features:

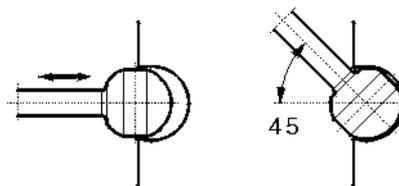
- Spherical pistons - high speeds
- Laminated piston rings - low leakage
- Positive synchronization with timing gear
- Installation above the reservoir level possible
- Tolerates low temperatures and high temperature shocks
- Shaft end and mounting flange meet the SAE standard



F1-25/-41/-51/-61.



F1 piston with laminated piston rings.

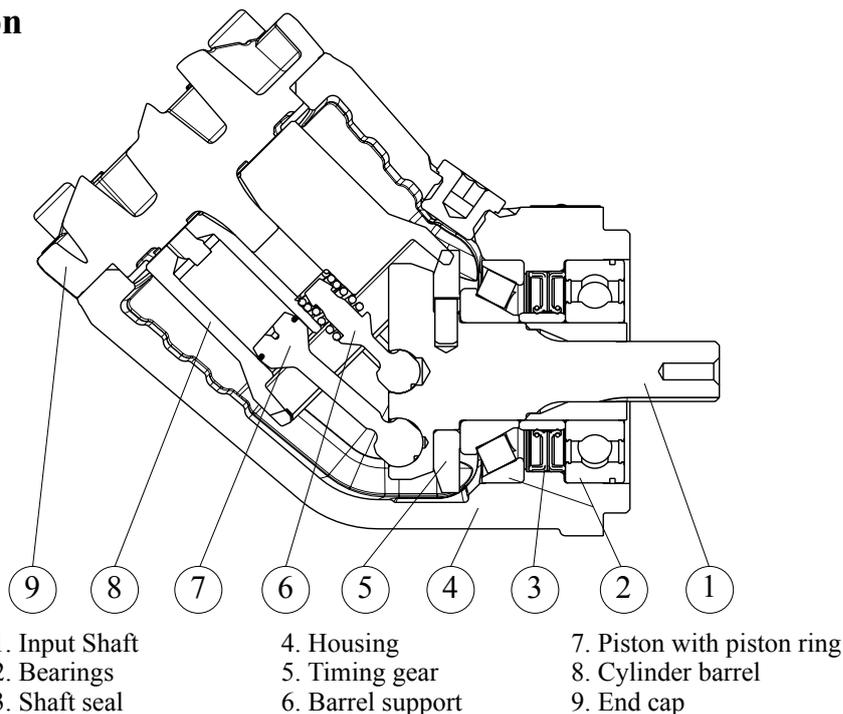


F1 piston-to-shaft locking.

F1 frame size	25	41	51	61
Displacement [cm ³ /rev]	24	38	49	61
[cu in/rev]	1.46	2.32	2.99	3.72
Max flow ¹⁾				
at 350 bar [l/min]	62	91	108	134
at 5000 psi [gpm]	16.4	24.1	28.5	35.4
Max operating pressure				
continuous [bar]	350	-----		350
[psi]	5000	-----		5000
Shaft speed [rpm]				
- short circuited pump (low press.)	2700	2700	2700	2700
- max speed at 350 bar (5000 psi) ²⁾	2600	2400	2200	2200
Torque				
at 350 bar [Nm]	137	217	280	349
at 5000 psi [lbf ft]	101	160	206	257
Input power				
- continuous [kW]	29	43	50	63
[hp]	39	57	67	84
Weight [kg]	8.5	8.5	8.5	8.5
[lb]	19	19	19	19

- 1) Theoretical values
- 2) Valid at an inlet pressure of 1.0 bar/15 psi (absolute) when operating on mineral oil at a viscosity of 30 mm²/s (cSt) (150 SUS).

Pump cross section



- 1. Input Shaft
- 2. Bearings
- 3. Shaft seal
- 4. Housing
- 5. Timing gear
- 6. Barrel support
- 7. Piston with piston ring
- 8. Cylinder barrel
- 9. End cap

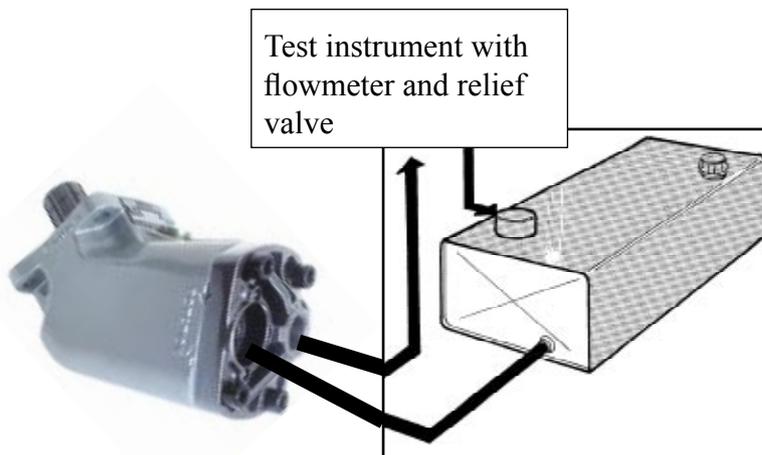
Design and function

F1 is a piston pump with spherical pistons (7) including piston rings (7). The pistons are working at the angle of 45° to the shaft (1). When the shaft rotates, the pistons move up and down in the cylinder barrel (8), forcing the oil to pass from the inlet port to the outlet in the end cap (9). A ring gear (5) connects the cylinder barrel to the drive shaft, causing these to rotate at the same speed.

A barrel support (6) 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.

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.



When the pump is running at about 800 - 1400 rpm and is loaded up to 2100 - 2800 psi (150 - 200 bar), the flow must not decrease by more than 10%.

Example: An F01-041 running at 1225 rpm gives - according to the flowmeter - a flow of 13US gallon/min (48 l / min).

If the pump is loaded, the flow must not decrease by more than $0,1 * 13 = 1,3$ US gallon/min ($0,1 * 48 = 4,8$ l / min), i.e. the flowmeter should indicated at least $13 - 1,3 = 11,7$ US gallon/min ($48 - 4,8 = 43,2$ l / min). If the flow decrease more than 1,3 US gallon / min (4,8 l / min) the pump is damaged and have to be replaced or repaired.

The table below shows minimum flow at 1000 rpm and 2100 - 2800 psi (150 - 200 bar) pressure.

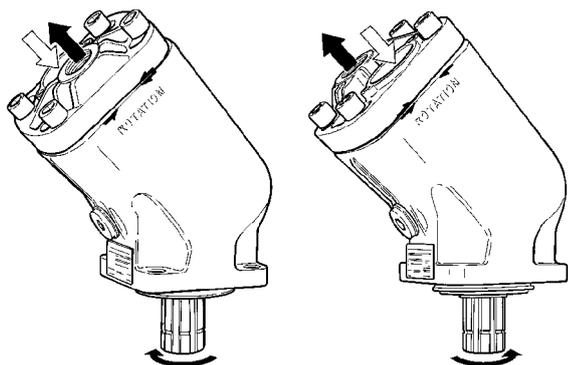
Size	Rpm	Min. flow (l / min)	Min. flow US gallon / min
F01-025	1000	21,6	5,7
F01-041	1000	34,2	9,0
F01-051	1000	44,1	11,6
F01-061	1000	54,9	14,5

Instruction for change of rotation direction.

It has come obvious that there might be a risk that the gear teeth in the gear synchronisation may come teeth to teeth when the end cap is tightened after that it has been loosen and turned for change of rotation direction. This may cause deformation of the centre shaft on the end cap.

Therefore change of rotation direction shall be done according to below instruction.

- Place the pump in a table vice with the shaft downwards.
- Disassemble the drain plug to be able to see gear synchronisation.
- Loosen the end cap screws.
- Change rotation direction by turning the end cap about 180 degrees.
- Tighten the end cap screws by 65lb ft (90 Nm) and check that gear teeth are in grip during this operation.
- Turn the shaft at least one revolution to secure that gear synchronisation is correct. If the gear synchronisation is faulty it is not possible to rotate the pump by hand.
- Assemble drain plug and tighten with 15lb ft (20 Nm).



Left hand rotation Right hand rotation

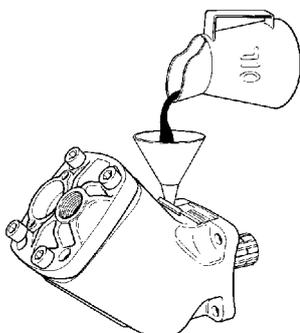
Direction of rotation

The factory assembled direction of rotation, appears on the label and by arrows on the material. (R=Right L=Left)

The pictures above show direction of flow vs. shaft rotation. The direction of rotation can be changed (i.e. from right hand to left hand) by turning the end cap.

Remove the four cap screws and turn the end cap about half a turn while making sure it stays in contact with the barrel housing.

Re-fit the cap screws and torque to 65 ± 7 lb ft (90 ± 10 Nm).



Before start-up, the housing must be filled with hydraulic fluid.

Start-up

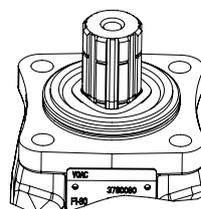
Make sure the entire hydraulic system is clean before filling it with a recommended hydraulic fluid.

In particular, make sure the pump is filled (to at least 50%) by connecting the suction hose and undo the hexagon plug until oil appears.

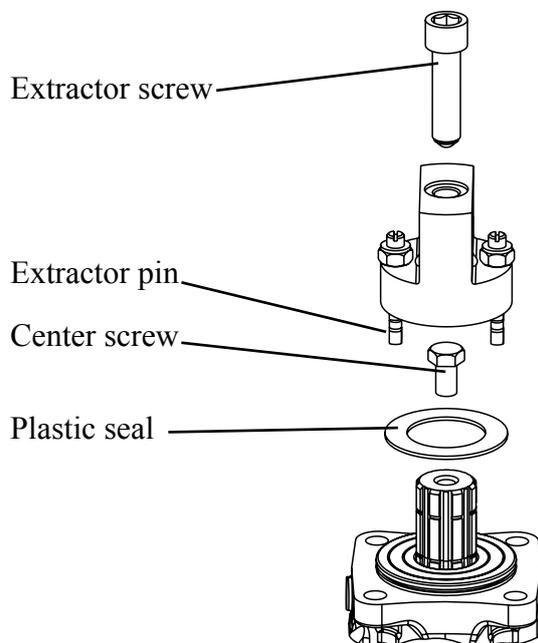
Torque the hexagon plug to 22 ± 4 lb ft (30 ± 5 Nm).

Disassembling

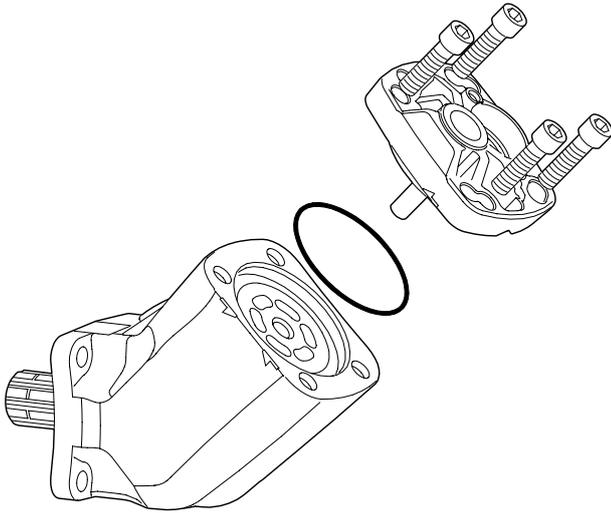
1. Fasten the barrel housing in a vice with the shaft upwards.



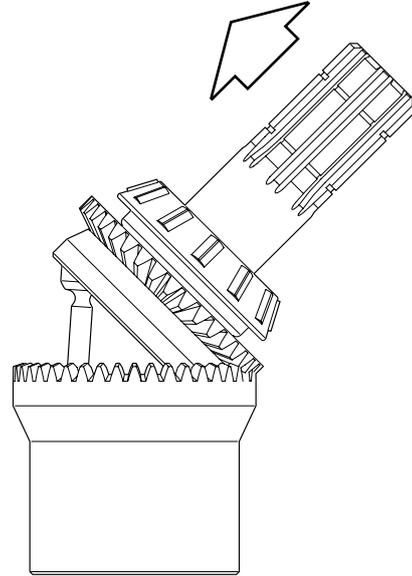
2. Disassemble the plastic seal fitted on the roller bearing and fasten the center screw a couple of turns. Take the mandrel which comes with the disassembling,- reassembling tool and deform the ball cage until it is possible to turn the mandrel 90°, down in the ball cage. Place the tool over the shaft end with the extractor pins inserted in the bearing. Turn the extractor pins 90° and screw the extractor screw down until the bearing comes loose. Remove the O-ring which is fitted under the bearing.



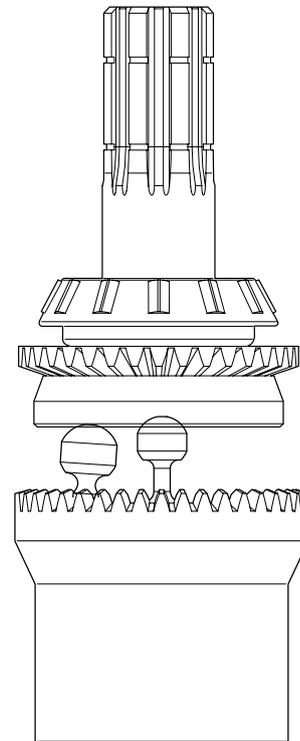
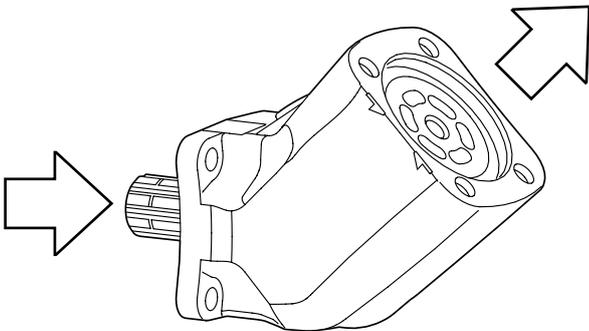
4.
Disassemble the end cap.



6.
Angle the shaft up and disassemble it together with pistons and barrel support. The barrel support is kept in position in the barrel with a snap function.

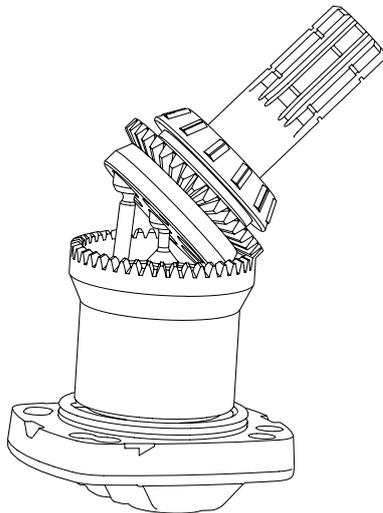


5.
Take out the shaft, the pistons, the barrel support and the cylinder barrel from the barrel housing. Disassemble the cassette seal from the barrel housing.

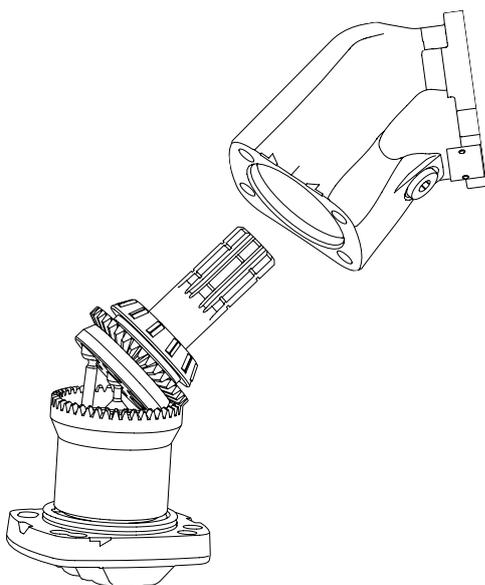


Assembling

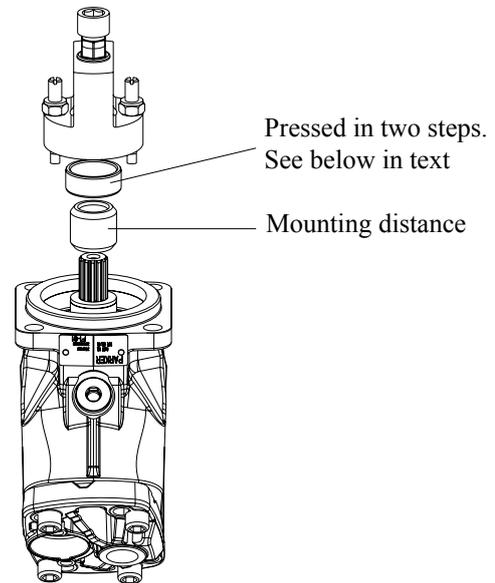
1. Fasten the end cap in a vice with the center shaft upwards.



2. Place the pistons and the barrel support in the cylinder barrel. Place the shaft over the pistons and on the barrel support. Turn the package 180° and shake down the pistons into the piston holes in the shaft, then angle 45°. Turn the package back and reassemble the cylinder barrel on the end cap. Ensure correct timing. (Marking, punch mark)

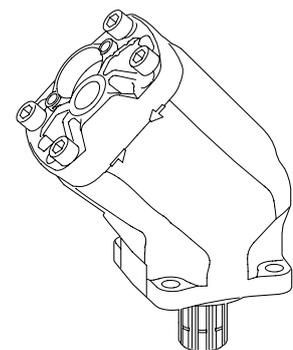


3. Reassemble the barrel housing and shim if so are necessary to achieve correct back-lash. Ensure correct rotation. Tighten at least two screws. Check the timing by loosening the purge plug and control "mark, punchmark".

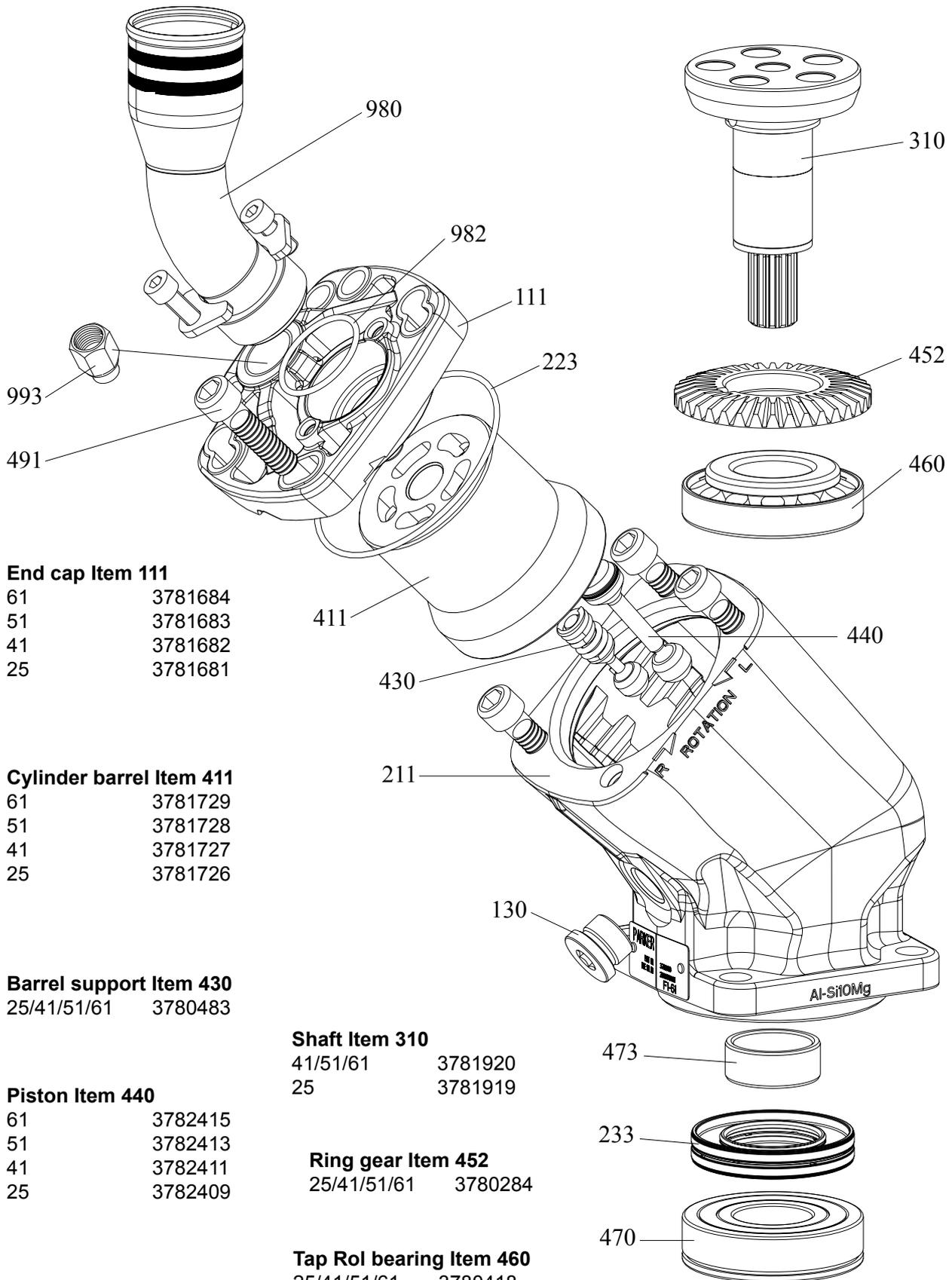


4. Fasten the package in a vice with the shaft end upwards. Place the inner ring on to the shaft. The inner ring is pressed down in two steps. **First step** with the assemble tool alone. **Second step** with assemble tool together with the distance ring to reach final position for the inner ring. Lubricate the outer diameter of the cassette seal with hydraulic oil. Place the cassette seal together with the bearing on to the shaft. Take the assembly tool and place it on the bearing. Fasten the assembly screw a couple of turns. Pull down the bearing together with cassette seal by turning the nut as far as possible. Fasten all screws and make sure that correct torque is achieved. (65±7lb ft, 90±10Nm)

Turn the shaft at least on rev. to ensure correct mounting.



Split View / Spare Parts



End cap Item 111

61	3781684
51	3781683
41	3781682
25	3781681

Cylinder barrel Item 411

61	3781729
51	3781728
41	3781727
25	3781726

Barrel support Item 430

25/41/51/61	3780483
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Piston Item 440

61	3782415
51	3782413
41	3782411
25	3782409

Shaft Item 310

41/51/61	3781920
25	3781919

Ring gear Item 452

25/41/51/61	3780284
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Tap Rol bearing Item 460

25/41/51/61	3780418
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Bearing housing Item 211

25/41/51/61	3781806
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Spare Part Kits and Tools

Items included in the Seal Kits	
130, 223, 233, 236, 238, 465, 470, 473, 982.	
Unit	Part no.
F1-25, -41, -51, -61,	3780862

***Note! Item 236, 238 and 465 are for ISO version.**

Items included in the Spare Part Kits for the 5-piston version.	
111, 130, 223, 233, 236, 238, 411, 430, 440, 465, 470, 473, 982.	
Unit	Part no.
F1-25	3781844
F1-41	3781845
F1-51	3781846
F1-61	3781847

Item	Part no.
993	3781358

Parts Specification

<u>Item</u>	<u>Description</u>
111	End Cap
130	Hex Socket Plug
211	Bearing Housing
223	O-ring
233	Shaft Seal
234	O-ring
236*	Protective Washer
238*	Waved Spring Washer
310	Shaft
411	Cylinder Barrel
430	Barrel Support
440	Piston
452	Ring Gear
460	Tapered Roller Bearing
465*	Retaining Ring
470	Roller Bearing
473	Inner Ring
491	Hex Socket Screw
980	Suction Fitting
982	O-ring
993	Pressure Port Adapter

Detail	Part no.
Disassembling, -Reassembling Tool	3780917
Extra Tool Kit SAE	3783146

Note! for SAE version you need both part numbers!!



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