Bulletin HY30-5502-M1/UK

Service Manual
Series F1

Effective: June, 2006
Supersedes: September, 1999

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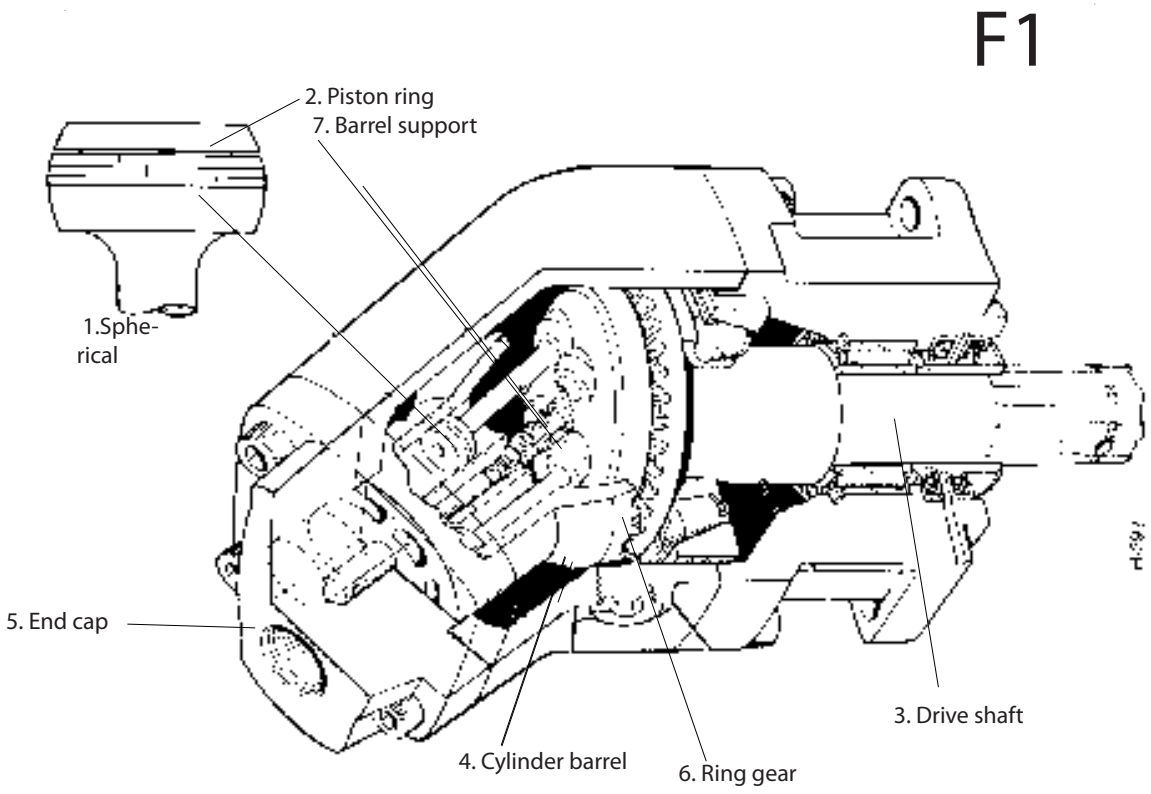
Conversion factors

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

9/5 °C + 32 = °F

Specifications

Frame size	Displ. cm^3/rev	Weight kg	Pressure bar		Shaft speed rpm		Oilflow l/min Shaftspeed rpm		
			Cont.	Interm.	Cont.	Interm.	500	1000	1500
F1-20	19	6,7	250	350	2300	3000	10	20	30
F1-30	28,1	6,9	250	350	2000	2700	15	30	45
F1-40	38,7	9,5	250	350	1800	2400	20	40	60
F1-60	58,2	10	250	350	1500	2200	30	60	90
F1-80	78,2	14	250	350	1300	2000	40	80	120
F1-110	110,1	18	250	350	1300	1800	55	110	165

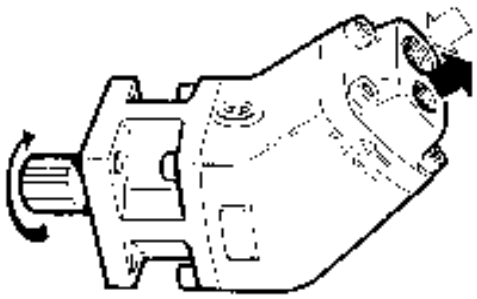


Design and function

F1 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 onlet 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.

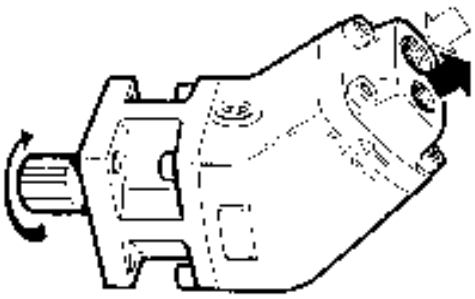
A barrel support (7) with a spring presses the cylinder barrel against the end cap. An internal connection from the housing to the suction port eliminates a separate drain line to the tank. F1 is provided with shaft and connection flange that fits direct to PTO´s with ZF standard.

On the barrel housing the text "Rotation" is found.
An arrow on the end cap opposite this text shows the direction of rotation of the pump shaft.

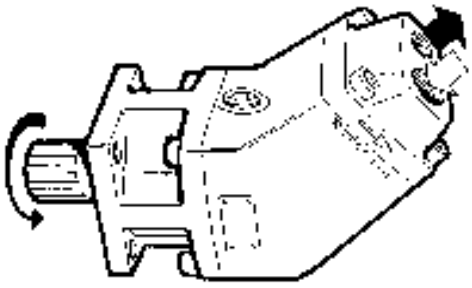


Change of Rotation of Direction

The position of the end cap determines the direction of rotation, and an arrow on the end cap opposite the text "Rotation" indicates the direction of rotation.

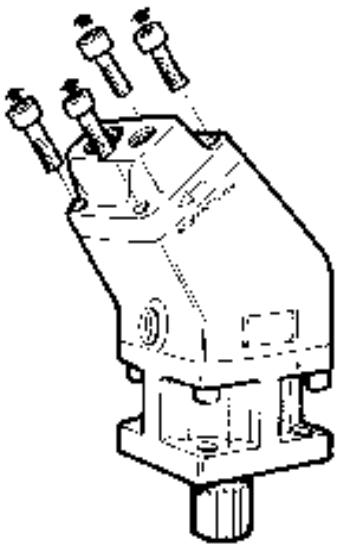


Pump fitted for left - hand rotation

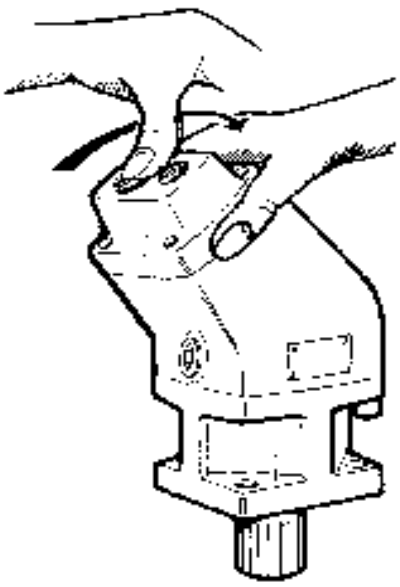


Pump fitted for right - hand rotation

Change of direction of rotation, which means turning the end cap, is carried out as follows:
Fasten the pump so that the connections point upwards.



1.
Remove the four screws holding the end cap, ensuring that the end cap and body do not come apart. The end cap might be raised a little by the spring of the barrel support, but do not lift it because the interior parts may then be displaced, causing a breakdown when the pump is started.



2.
Turn the end cap half a revolution.

3.
Fasten the end cap.
Torques to be used:

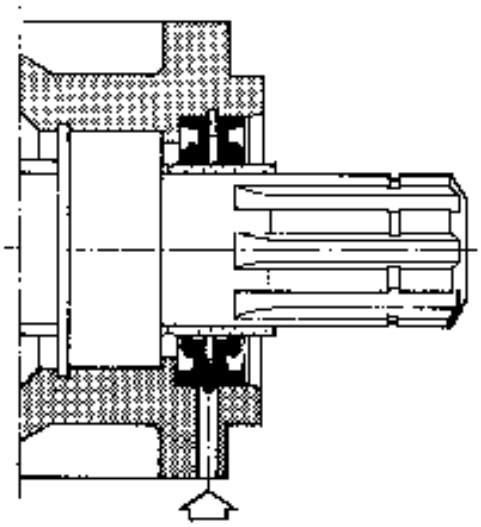
F1-20, -30, -40, -60	60±10 Nm
F1-80, -110	90±10 Nm

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 transmisson 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".



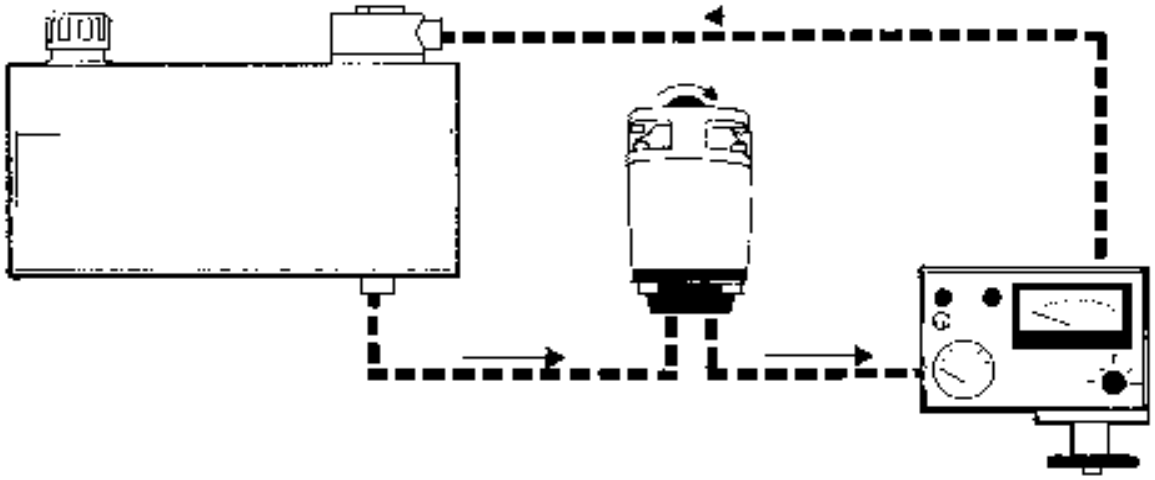
Indication hole

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.

Connecton 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%.

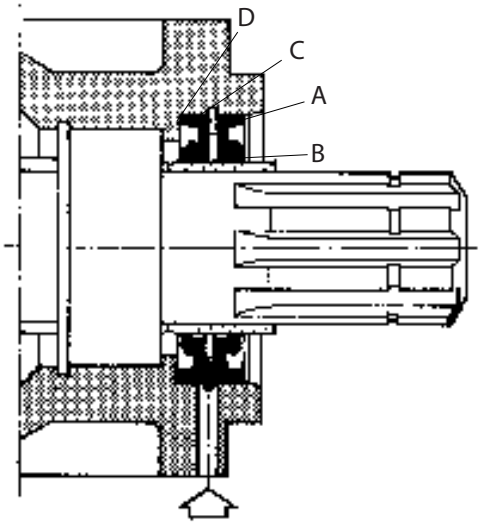
Example:

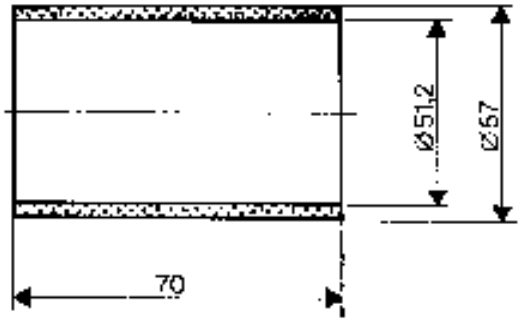
An F1-40 running at 1225 r.p.m. gives - according to the flowmeter. - a flow of 48 l/min.

If the pump is loaded, the flow must not decrease by more than 0,1 x 48 = 4,8 l / min, i.e. the flowmeter should indicated at least 48 - 4,8 = 43,2 l / min. If the flow drops below this limit, the pump is worn out and will have to be

Service Procedures

Exchange of shaft seals





Tool for fitting of shaft seals

1.
Pull out the outer seal ring A,e.g. by means of a screw-driver 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.

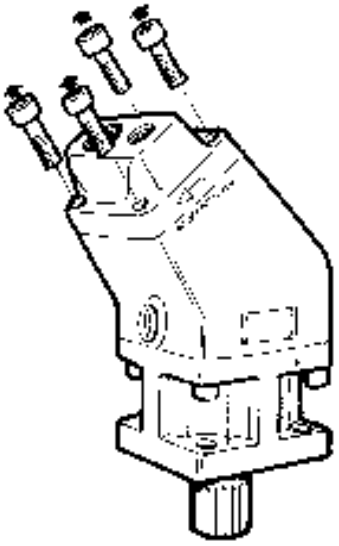
6.
Fit the retaining ring. See to it, that the opening of the retaining ring is placed at the indication hole, which will otherwise be blocked.

7.
Fill out the space between retaining ring and shaft with heat - resistant grease.

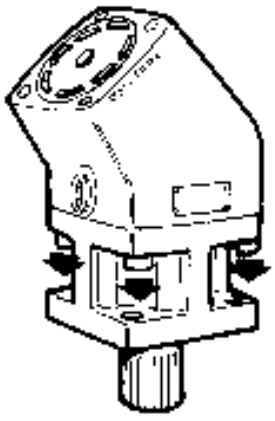
8.
Fit the new outer seal ring.

Disassembly

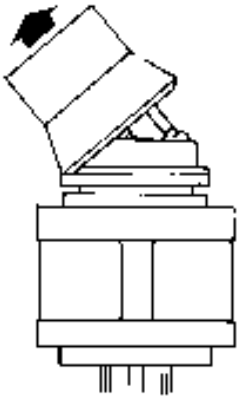
Fasten the pump in a vice.



1.
Loosen the end cap and remove it.

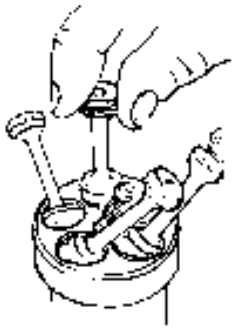


2.
Loosen the screws joining the bearing housing and the barrel housing, and remove the barrel housing.



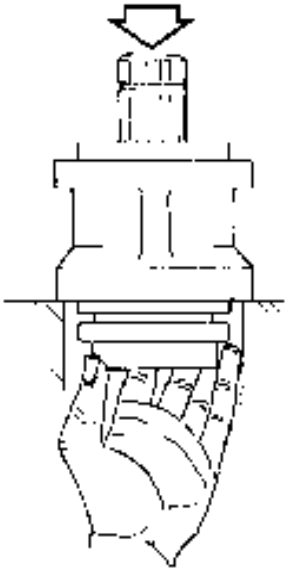
3.
Remove the cylinder barrel.

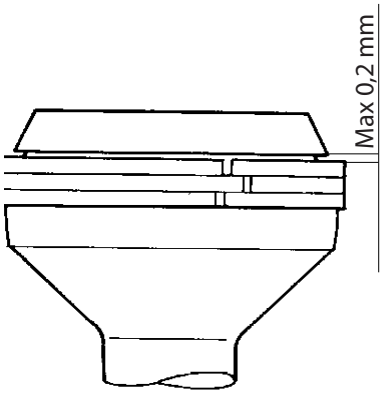
4.
Mark piston and corresponding ball socket to enable correct location when reassembling.



5.
Remove the pistons, which can be lifted out when held parallelly to the drive shaft.

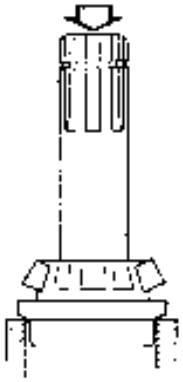
6.
Remove barrel support.





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.

7.
Place the bearing housing on a support, and knock cautiously on the shaft until it can be removed.



Remove the bearing 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 F1 pump is less than normal, the following parts are likely to be worn:

- The surface facing the cylinder barrel on the

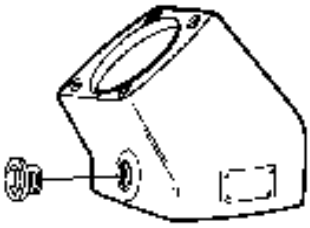
  end cap.

- 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

Assembly

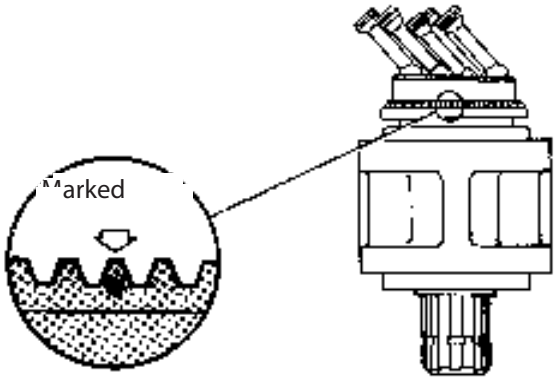


1.
Remove the plug from the barrel housing.

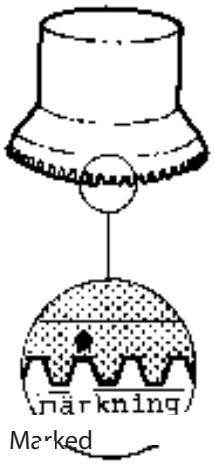
2.
Fit new seal rings in the bearing housing (see earlier instructions, page 6).

3.
Fasten the bearing housing in a vice. Press the shaft assembly into the housing.

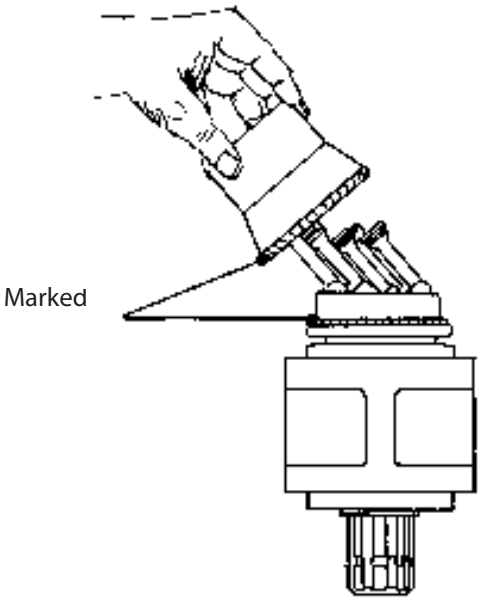
4.
Fit the barrel support and the pistons into their respective ball cups.



5.
Find the marked tooth on the shaft.

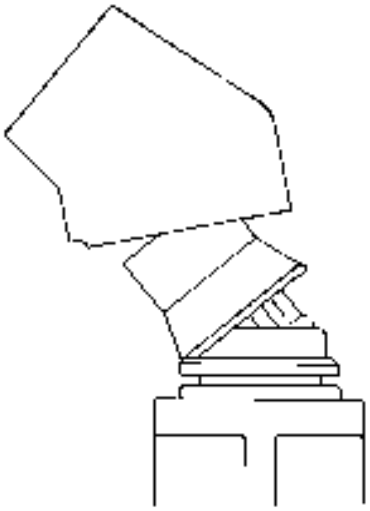


6.
Find the marked tooth space on the cylinder barrel.

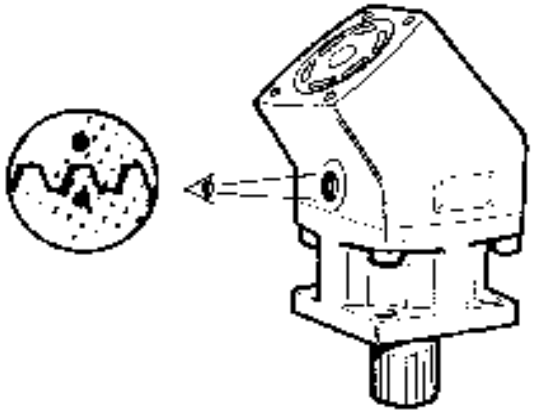


7.
Position the cylinder barrel with its mark opposite the mark of the shaft, and enter the pistons into the cylinders and the barrel support into the centre bore.

8.
Place a gasket on the barrel housing.



9.
Slip the barrel housing over the cylinder barrel. Fit and tighten the screws.



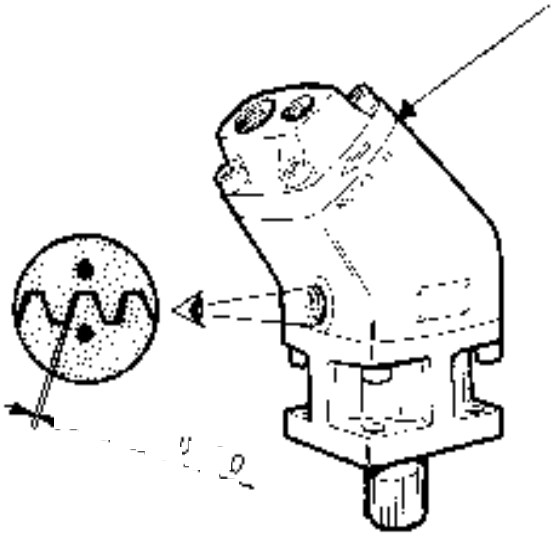
10.
Check through the inspection hole that the two marks are opposite each other. If not, correct this.

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 guage.

The number 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.

The number of gaskets determines the backlash



12.
Fit the end cap so as to enable the correct direction of rotation. Tightin the screws lightly. Check that there is a backlash. If the backlash is unsufficient, fit more gaskets.

Tightening torques:

F1-20 / 30 / 40 / 60 35-45 Nm
F1-80 /110 70-80 Nm

13.
Fit the seal washer and the plug at the inspection hole.

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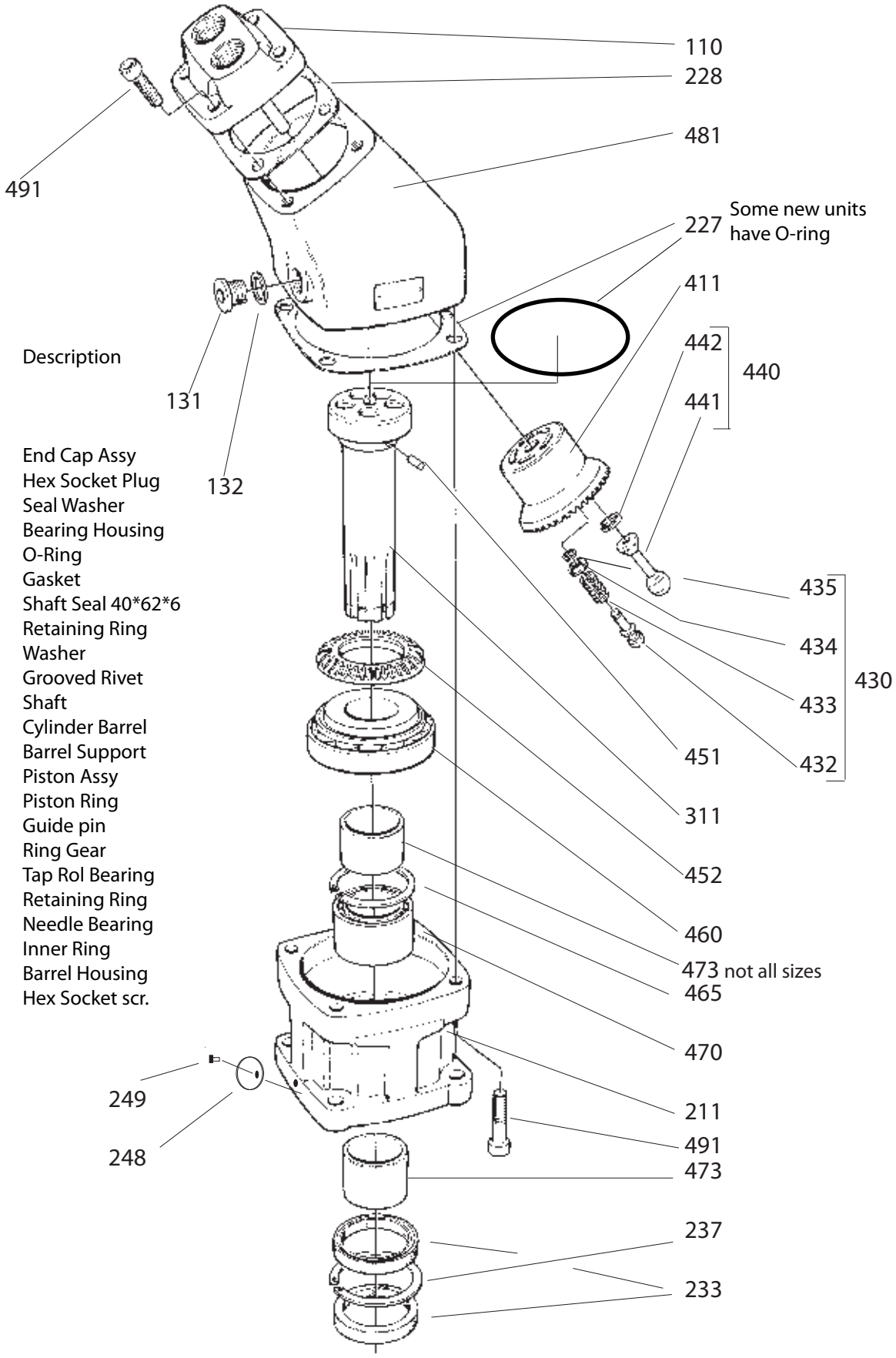

Item	Description
110	End Cap Assy
131	Hex Socket Plug
132	Seal Washer
211	Bearing Housing
227	O-Ring
228	Gasket
233	Shaft Seal 40*62*6
237	Retaining Ring
248	Washer
249	Grooved Rivet
311	Shaft
411	Cylinder Barrel
430	Barrel Support
440	Piston Assy
442	Piston Ring
451	Guide pin
452	Ring Gear
460	Tap Rol Bearing
465	Retaining Ring
470	Needle Bearing
473	Inner Ring
481	Barrel Housing
491	Hex Socket scr.

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