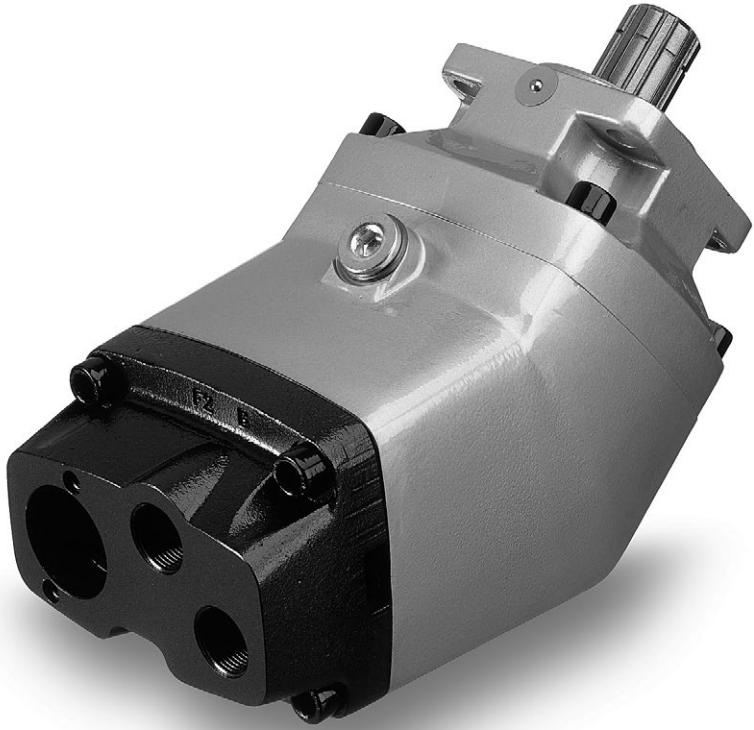


SERVICE/SPARE PARTS SERIES F2

Effective: June, 2024
Supersedes: April, 2024

BASIC FORMULAS FOR HYDRAULIC MOTORS

Flow (q)

$$q = \frac{D \times n}{1000 \times \eta_v} \quad [l/min]$$

Torque (M)

$$M = \frac{D \times \Delta p \times \eta_{hm}}{63} \quad [Nm]$$

Power (P)

$$P = \frac{q \times \Delta p \times \eta_t}{600} \quad [kW]$$

D – displacement [cm^3/rev]

n – shaft speed [rpm]

η_v – volumetric efficiency

Δp – differential pressure [bar] (between inlet and outlet)

η_{hm} – mechanical efficiency

η_t – overall efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

BASIC FORMULAS FOR HYDRAULIC PUMPS

Flow (q)

$$q = \frac{D \times n \times \eta_v}{1000} \quad [l/min]$$

Torque (M)

$$M = \frac{D \times \Delta p}{63 \times \eta_{hm}} \quad [Nm]$$

Power (P)

$$P = \frac{q \times \Delta p}{600 \times \eta_t} \quad [kW]$$

D – displacement [cm^3/rev]

n – shaft speed [rpm]

η_v – volumetric efficiency

Δp – differential pressure [bar] (between inlet and outlet)

η_{hm} – mechanical efficiency

η_t – overall efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

CONVERSION FACTORS

1 kg	2.20 lb
1 N	0.225 lbf
1 Nm	0.738 lbf ft
1 bar	14.5 psi
1 l	0.264 US gallon
1 cm^3	0.061 cu in
1 mm	0.039 in
1°C	$^5/_9$(°F-32)
1 kW	1.34 hp

CONVERSION FACTORS

1 lb	0.454 kg
1 lbf	4.448 N
1 lbf ft	1.356 Nm
1 psi	0.068948 bar
1 US gallon	3.785 l
1 cu in	16.387 cm^3
1 in	25.4 mm
1 °F	$^9/_5$ °C + 32
1 hp	0.7457 kW

Table of Content

If you have questions about the products contained in this catalog, or their applications, please contact: **Pump & Motor Division Europe**
phone +46 (0)520 404 600
parker.com/msge

Extra care is taken in the preparation of this literature, but Parker is not responsible for any inadvertent typographical errors or omissions. Information in this catalog is only accurate as of the date of publication. For a more current information base, please consult the division web site at parker.com/msge.

Catalogue

Truck Hydraulics, MSG30-8200-UK.

Video Tutorial

Watch our Assembly and Dissasembly Video Guide.

GENERAL INFORMATION

Series F2 is a further development of the twin-flow version of series F1, the very first bent-axis truck pump on the market to feature two entirely independent flows.

With a suitable build-up of the hydraulic system, the main advantage with a twin-flow pump is that three different flows can be provided at the same engine speed.

The twin-flow pump makes it possible to further optimize the hydraulic system and offers:

- Less energy consumption
- Reduced risk of system overheating
- Lower weight
- Easier installation
- Smart system solutions

The twin-flow pump makes it possible to operate two work functions that are independent of each other which leads to higher speed and an increased operating precision.

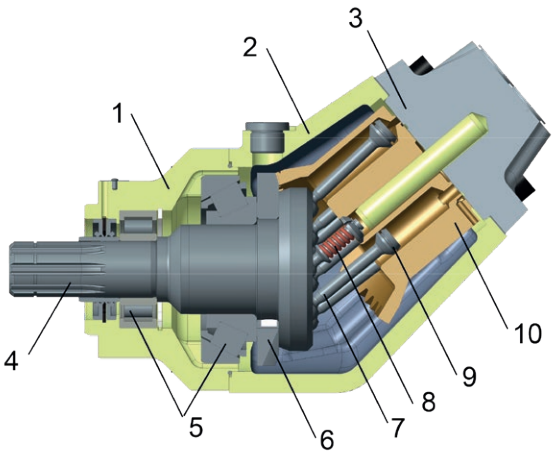
Another requirement can be a large and a small flow, or two equal flows. All of these alternatives are possible with the twin-flow pump.

The pump can be utilised to provide one flow at high system pressure, and, as soon as the pressure has decreased sufficiently, add the flow from the other circuit.

This eliminates the risk of exceeding the PTO power rating and, at the same time, provide an optimal driving function.

F2 CROSS SECTION

1. Bearing Housing
2. Barrel Housing
3. End cap
4. Shaft
5. Bearings
6. Ring gear
7. Spherical pistons
8. Barrel support
9. Piston rings
10. Cylinder barrel

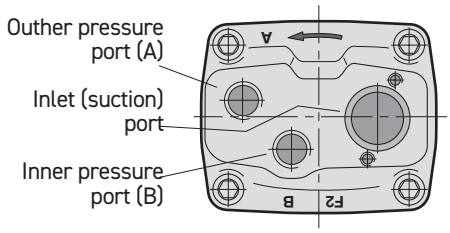


SPECIFICATIONS

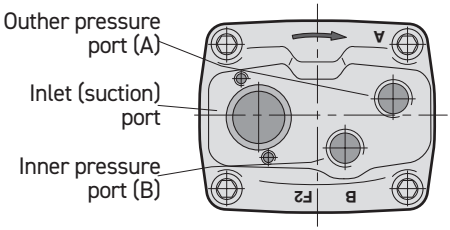
Frame size F2-	42/42	53/53	55/28	70/35	70/70
Displacement [cm³/rev]					
Port A	43	55	55	69	68
Port B	41	52	28	36	68
Max operating pressure [bar]					
continuous	350	350	350	350	300
intermittent [3]	400	400	400	400	350
Mass moment of inertia J [kgm²]	0.0092	0.0091	0.0091	0.0090	0.0104
Max Shaft speed [rpm]					
(unloaded pump; low pressure)	2550	2550	2550	2550	– [3]
Max selfpriming speed [rpm]					
Ports A[1] and B[1] pressurised	1800	1800	1800	1800	1650
Port A[1] unloaded, pressure in port B	2100	2100	2100	2100	2100
Max input power[2] [kW]	100	127	100	126	131
Weight [kg]	19	19	19	19	19

[1] Valid at an inlet pressure of 1.0 bar (abs.) when operating on mineral oil at a viscosity of 30 mm²/s (cSt).
[2] Max 6 seconds in any one minute.
[3] Not suitable for engine-PTO

'Left hand' and 'right hand' end caps



End cap for right hand rotating pump



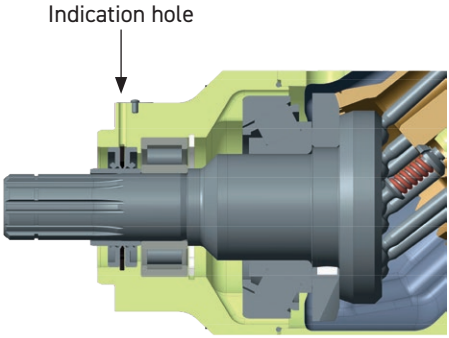
End cap for left hand rotating pump

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".

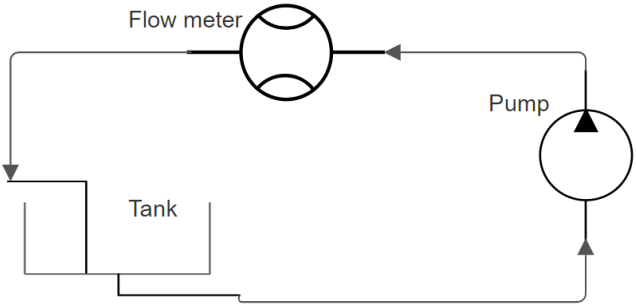


Note: A heavy leakage can be caused by a worn-out pump, whereby high pressure oil will come out into the housing in such large quantities that the sealring might be damaged. If there is a steady stream of oil from the indication hole, the pump is probably damaged and will have to be replaced.

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.

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 %.



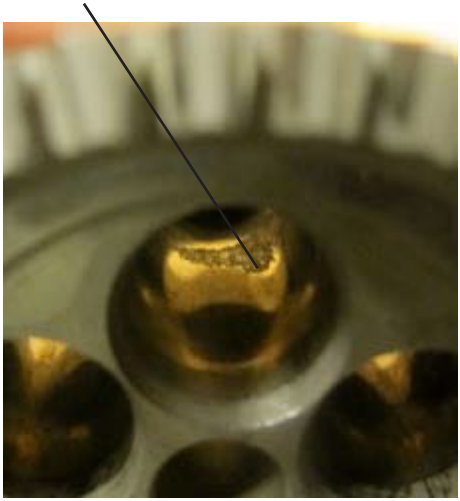
Example:

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 x 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.

CAVITATION



Cavitation marks in the cylinder barrel bores, on the port side or on the end cap depends on air in the oil.

Reasons can be when inlet pressure/flow isn't sufficient. Example when stopping a fan drive and inertia will run the motor.

Why cavitation?

- Too high speed
- Too small suction line

What consequence?

- A metallic sound comes from the system
- Material damage as craters in the goods which contaminate the hydraulic system
- Lift off if severe cavitation
- Shaft seal leakage

CAVITATION

End cap with scratched surface. The damage depends on contaminated oil due to poor filtration, clogged filter, previous break down or bad handling when filling the reservoir.

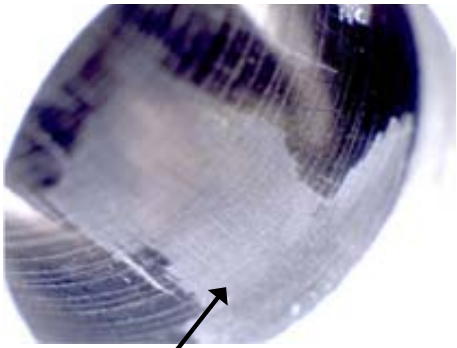
The same damage can be seen on End cap for F1 and F2.

Cylinder barrel with severe damaged surface at the porting. The damage depends on contaminated oil due to poor filtration, clogged filter, previous break down or bad handling when filling the reservoir.

Pistons with worn out piston rings, some of them are missing and the spher is very damaged.

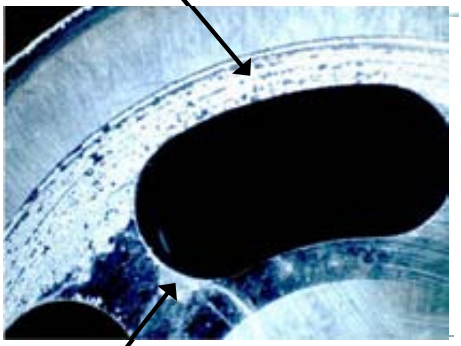
This depends on contaminated oil and/or overspeed/cavitation.

CAVITATION



Severe damage in cylinder bore at the pistons turning point.
Reason is to high speed, the piston is thrown out in the pherferie and breaks through the protecting oil film.

High speed wear



High speed wear at the outher pherferie on the cylinder barrel. The protecting oil film can't withstand the high speed.
There are also cavitation marks on the cylinder barrel.

Cavitation

From the same cylinder barrel there are severe cavitation marks in the cylinder bores due to high speed.

PREPARATION

Before disassembling pump:

- Always keep work space clean
- Always use correct tools
- Make documentation and take photos if required
- Only use standard spare parts from Parker

Steps changing shaft seals:

Exchange of shaft seals.

Steps changing seal kit:

Disassembly 1 - 2.
Assembly 1 – 2, 3, 5 - 13
Exchange of shaft seals.

Steps changing spare parts kit:

Disassembly 1 - 6.
Assembly 1 – 13
Exchange of shaft seals.

TOOLS REQUIRED

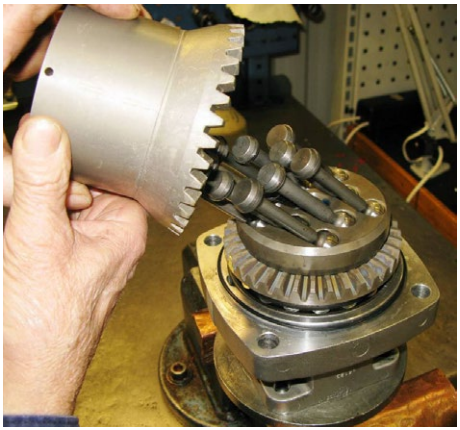
- Retaining ring tool, internal and external
- Hex key
- Plastic hammer
- Mandrel
- Brush
- Hydraulic press

DISASSEMBLY

1. Fasten the pump in a vice.

2. Loosen the end cap and remove it.

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

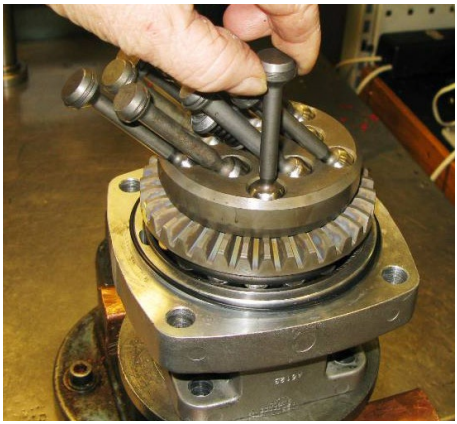


4. Remove the cylinder barrel.

Video Tutorial

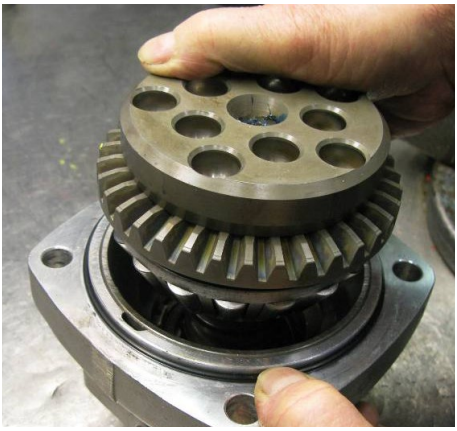
Watch our Assembly and Dissasembly Video Guide.

DISASSEMBLY



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

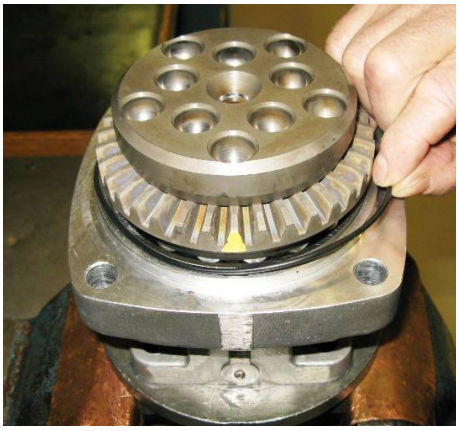
   Remove barrel support.



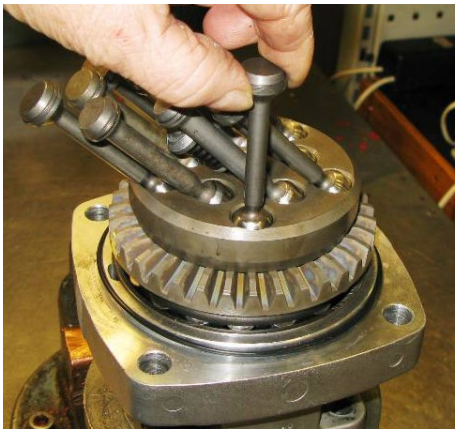
6. Carefully knock the shaft end against the table until the housing comes loose.

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

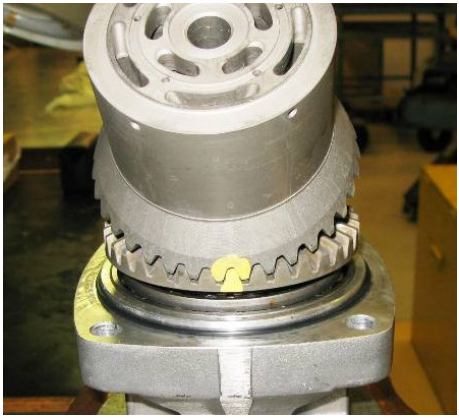
ASSEMBLY



1. Remove the plug from the barrel housing.
   Fit new seal rings in the bearing housing.



2. Fasten the bearing housing in a vice. Mount the shaft assembly into the housing. Place an O-ring on the barrel housing.
   Fit the barrel support and the pistons into their respective ball sockets.



3. 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.

4. 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.

ASSEMBLY

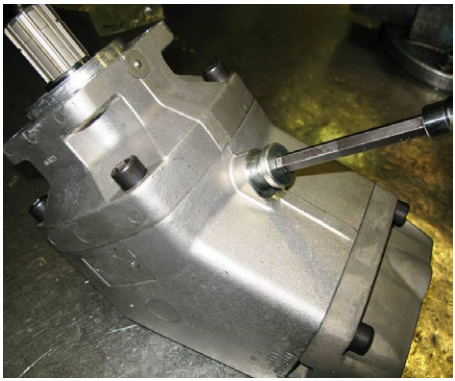
The number and thickness of gaskets determines the backlash

5. Fit the end cap, make sure that the guide pin on the end cap correspons 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.

   Tightin the screws lightly. Check that there is a backlash. If the backlash is unsufficient, fit more gaskets.

   Tightening torques:

   F2-All sizes 90±10 Nm



6. 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.

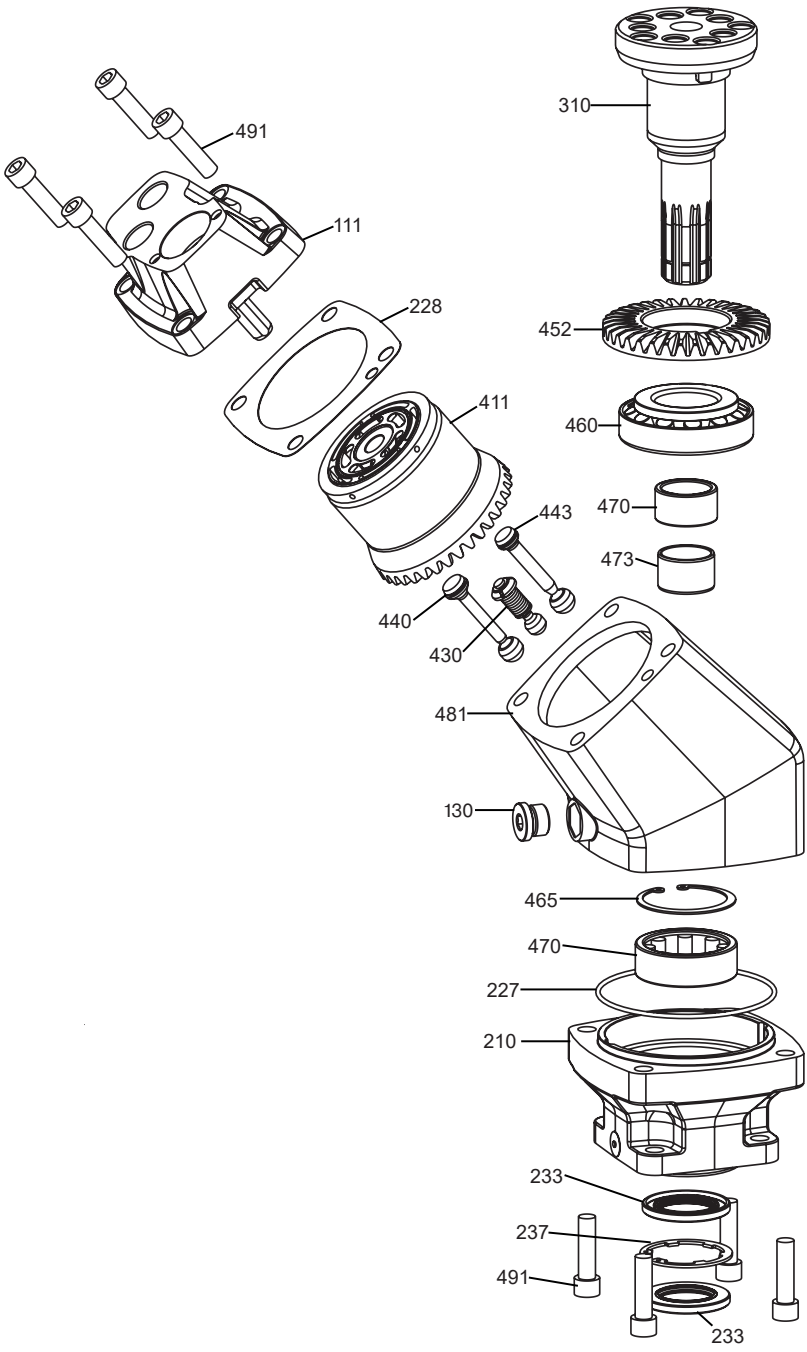
   The number and thickness of gaskets between end cap and bearing housing determines the backlash.

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

7. 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.

NOTES

SPLIT VIEW


491
111
228
411
443
440
430
481
130
310
452
460
470
473
465
470
227
210
233
237
491
233

PART SPECIFICATION

Pos	Part No.	Description	Qty.	Remarks
111		End Cap	1	End Cap Assy
130		Hex Socket Plug	1	No Spare Part, Hex Socket Plug G1/2
210		Bearing Housing	1	No Spare Part
227		O-ring	1	Seal Kit, O-ring 124*2,5
228		Gasket	1	Seal Kit
233		Shaft Seal	1	Seal Kit
237		Protective Washer	1	Seal Kit
310		Shaft	1	No Spare Part
411		Cylinder Barrel	1	Spare Part Kit
430		Barrel Support	1	No Spare Part
440		Piston	1	Spare Part Kit
443		Piston	1	Spare Part Kit
452		Ring Gear	1	No Spare Part
460		Tapered Roller Bearing	1	No Spare Part
465		Retaining Ring	1	No Spare Part
470		Roller Bearing	1	No Spare Part
473		Inner Ring	1	Spare Part Kit
481		Barrel housing	1	No Spare Part
491		Hex Socket Screw	8	Incl. in End Cap assy and Spare Part Kit, Hex Socket Screw M12*45 10.9

SPARE PART KITS

End Cap assy

Included in End Cap assy is pos no. 491 and no. 111.

Part No.	Qty	Remarks	
3787580	1	R-rotation,	70/70
3787581	1	L-rotation,	70/70
3781442	1	R-rotation,	70/35
3781444	1	L-rotation,	70/35
3781445	1	L-rotation,	53/53
3781446	1	R-rotation,	53/53
3785971	1	R-rotation,	42/42
3785972	1	L-rotation,	42/42
3785968	1	R-rotation,	55/28
3785969	1	L-rotation,	55/28

Spare Parts Kit

The Spare Parts Kits comprise items
111, 227, 228, 233, 411, 440, 443, 473, 491

To fit	Part No.	Serial No.
F2-042/042-R	3785976	
F2-042/042-L	3785977	
F2-055/028-R	3785974	
F2-055/028-L	3785975	
F2-053/053-R	3781569	2000070001
F2-053/053-L	3781568	2000070001
F2-070/035-R	3781570	2000070001
F2-070/035-L	3781571	2000070001
F2-070/070-R	3786350	
F2-070/070-L	3786351	

Seal Kit

To fit	Part No.	Serial No.
F2-all sizes	3783307	Incl. Pos 227, 228, 233, 237

If more parts are required it is normally not profitable to carry out a repair.

Position notification regarding Machinery Directive 2006/42/EC:

Products made by the Pump & Motor Division Europe (PMDE) of Parker Hannifin are excluded from the scope of the machinery directive following the “Cetop” Position Paper on the implementation of the Machinery Directive 2006/42/EC in the Fluid Power Industry.

All PMDE products are designed and manufactured considering the basic as well as the proven safety principles according to:

- ISO 13849-1:2015
- SS-EN ISO 4413:2010

so that the machines in which the products are incorporated meet the essential health and safety requirements.

Confirmations for components to be proven component, e.g. for validation of hydraulic systems, can only be provided after an analysis of the specific application, as the fact to be a proven component mainly depends on the specific application.

Christian Jäger
General Manger
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