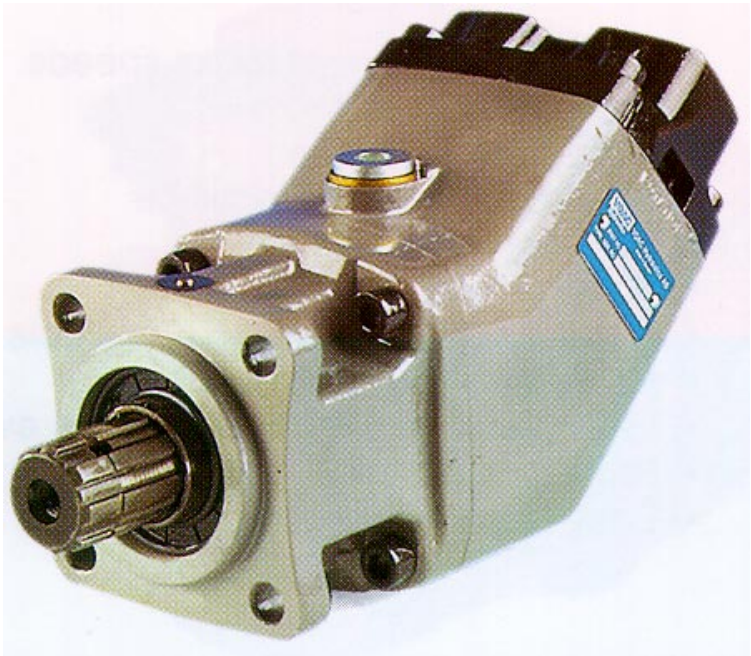
Hydraulic Pump Series F1

Fixed Displacement

Catalog 9129 8201-02
August, 1997 GB



Parker Hydraulics

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Conversion	factors
1 kg	2.20 lb
1 N	0.225 lbf
1 Nm	0.738 lbs ft
1 bar	14.5 psi
1 l	0.264 US gallon
1 cm^3	0.061 cu in
1 mm	0.039 in
9/5 °C + 32	1°F

F1

F1, the 'truck pump', has been developed from our well known series F11 hydraulic pumps/motors. It is specifically designed for various truck applications and offers many unbeatable advantages for forest cranes, concrete mixers, container lifts, skip loaders, cargo cranes, and others.
Series F1 is very efficient. Its design is simple with small installation dimensions and few moving parts which contributes to high reliability and an altogether simpler and less expensive installation.

- High output power despite small envelope size
- High overall efficiency
- Operating pressures to 350 bar
- Compact and low weight
- Can be installed above the reservoir oil level
- Tolerates low temperatures
- Easy to service and dependable

All six frame sizes of series F1 have the same shaft end and mounting flange dimensions, and follow the current ISO standard. Consequently, the F1 can easily be installed on most European trucks.
Our product program also contains a series of PTO's for the F1 pump that fit most truck gearboxes on the market.

Design

Spherical pistons

The lightweight, spherical piston is the key to the so called 40° design, offering many advantages such as:

- Compactness
- Simple construction
- High pressure capability

Laminated piston rings

The three part, laminated piston ring offers:

- Low internal leakage
- Non-sensitivity to thermal shocks

Dependable piston locking

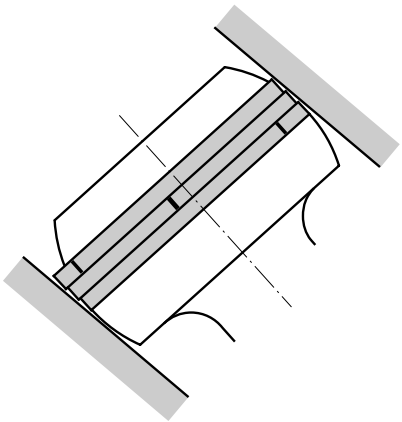
The specially formed piston ball end is secured in the input shaft socket which means:

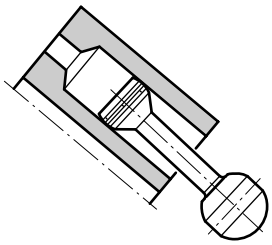
- Fewer parts
- Increased dependability
- Simple assembly and disassembly

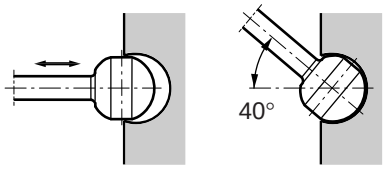
Positive synchronisation

The timing gear between the cylinder barrel and the input shaft contributes to the reliability of the pump.

- Tolerates diesel engine vibrations
- Less piston wear is experienced







Stands external shaft loads

The robust roller bearings permit a pulley or a gear to be mounted directly on the pump shaft without the use of additional bearings.

Few moving parts

Series F1 has a very simple design with few moving parts:

- Cylinder barrel with hold-down device
- Pistons with piston rings
- Shaft with timing gear and bearings

High overall efficiency

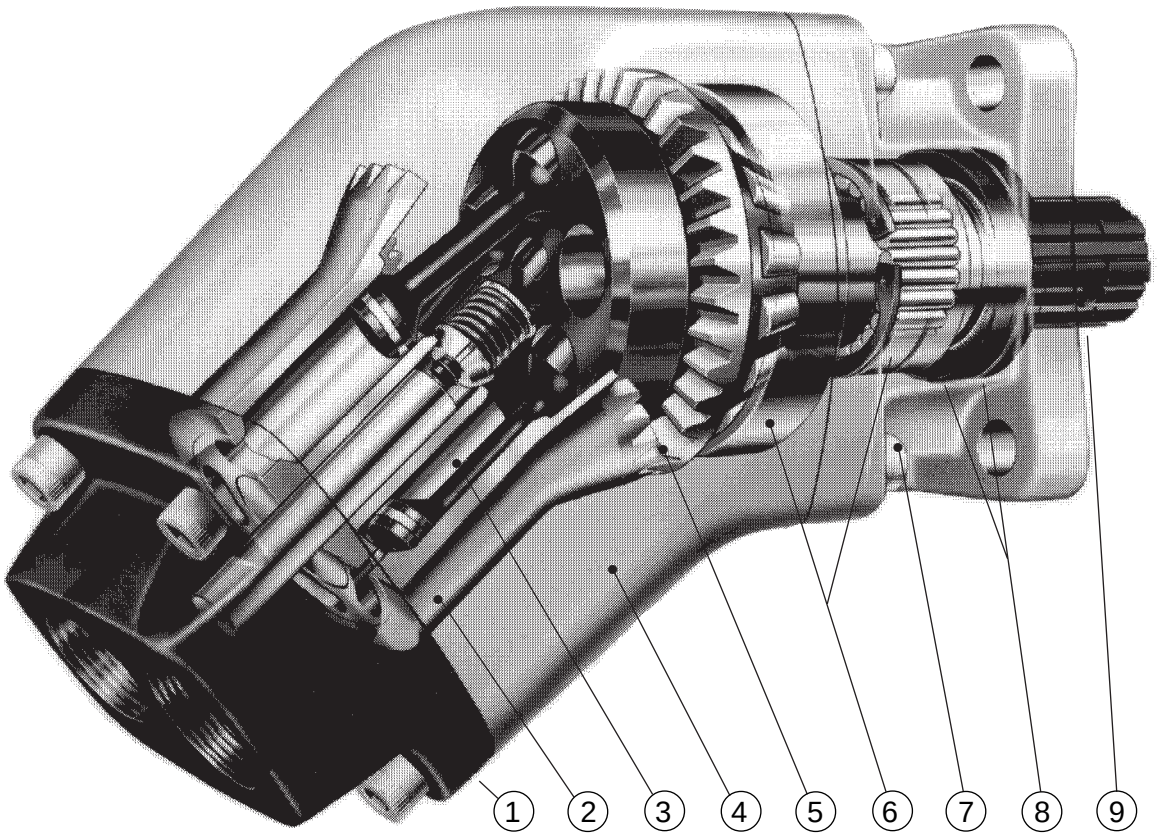
The spherical piston with laminated piston ring offers low leakage and has low mechanical losses.
It leads to a lower power requirement and higher fuel efficiency.

Long life

The piston locking, the timing gear, and the small number of parts contribute to the F1's reputation as a very rugged pump with long life, high reliability, and low service requirement.

Specifications

Frame size	F1-20	F1-30	F1-40	F1-60	F1-80	F1-110
Displacement [cm^3/rev]	19.0	28.1	38.7	58.2	78.2	110.1
Max operating pressure [bar]	350	350	350	350	350	350
Shaft speed [rpm]						
Short circuited pump (low press.)	3000	2700	2400	2200	2000	1800
Max selfpriming speed	2300	2000	1800	1500	1300	1300
Input power [kW]						
Max intermittent	28	36	46	56	66	88
Max continuous	20	26	33	40	47	66
Weight [kg]	6.7	6.9	9.5	10	14	18



Legend

1 End cap
2 Cylinder barrel
3 Piston with piston ring
4 Barrel housing
5 Timing gear
6 Roller bearings
7 Bearing housing with flange
8 Shaft seals
9 Input shaft

Pump and line selection

Pump selection

A suitable pump size for a truck application can be selected as follows:

Operating conditions

As an example, a cargo crane specifies:

- Flow: 60-80 l/min
  Pressure: 230 bar
  Diesel engine speed ≈ 800 rpm

Determine pump speed

A Volvo type BKUH 1123 PTO on gearbox SR 1700, for example, has a gear ratio of 1:1.54.

The pump speed will be:

- 800 x 1.54 ≈ 1200 rpm

Select a suitable pump size

Use diagram 1 and select a pump that will provide 60 - 80 l/min at 1200 rpm.

Follow line 'a' (1200 rpm) until it crosses line 'b' (70 l/min).

- F1-60 is a suitable choice

Required input torque

Make sure the PTO and the gear-box tolerates the pump torque. Use diagram 2 and obtain the pump torque required.

Follow a line from 'c' (230 bar) until it crosses the F1-60 line (the selected pump).

- Read 220 Nm (at 'd')

Note: A rule-of-thumb is to select the highest PTO ratio and the smallest pump size that meets the crane specification without exceeding the pump speed, pressure, and power limitations shown in the specifications on page 4.

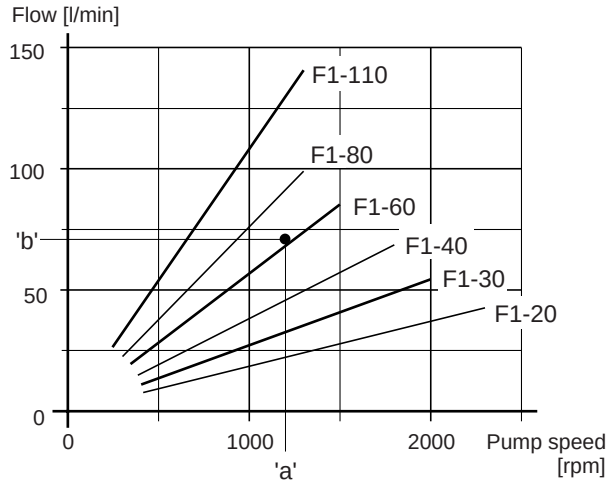


Diagram 1

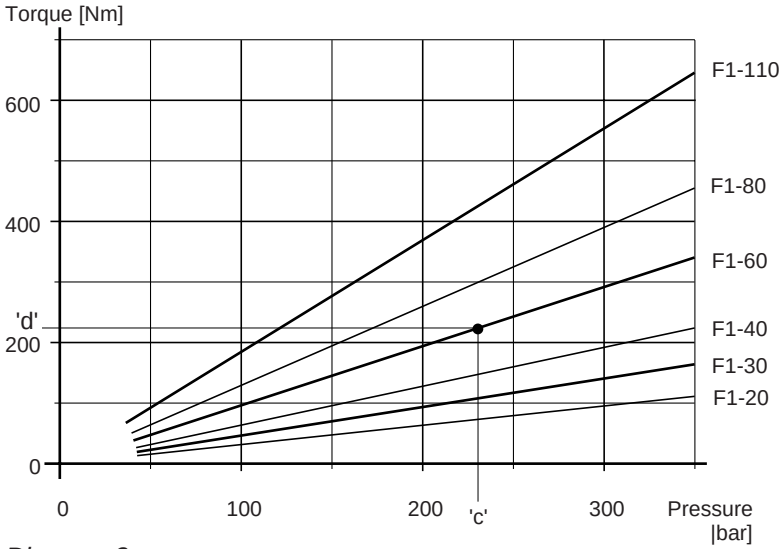


Diagram 2

Pipe/line selection

Flow speeds shown in the table to the right should not be exceeded in order to obtain lowest noise and heat generation.

Select, from the lower table, the smallest line dimension that meets the flow speed recommendations.

- At 70 l/min a 38 mm suction line and a 19 mm pressure line is needed.

Note: Long lines may require larger dimensions.

Line type	Pressure [bar]	Flow speed [m/s]
Suction line	-	0.5 - 1
Pressure line	100 - 300	3 - 5

Fluid flow [l/min]	Flow speed [m/s] at indicated line size 19 mm	25 mm	32 mm	38 mm	50 mm	
25	1.5	*0.8*	*0.5*	*(0.4)*	*(0.2)*	
50	2.9	1.7	*1.0*	*0.7*	*(0.4)*	*Suction line*
75	4.4	2.5	1.6	1.1	*0.6*	
100	(5.9)	3.4	2.1	1.5	*0.8*	
150	(8.8)	(5.1)	3.1	2.2	1.3	Pressure line

Ordering code

Example: **F1 - 80 - R**

F1 frame size
20, 30, 40, 60, 80 or **110**

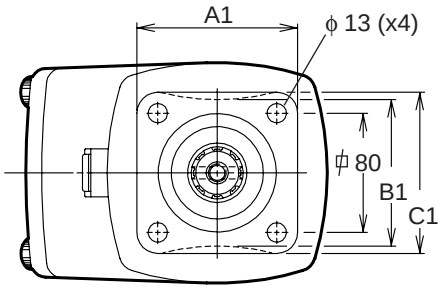
Shaft rotation
R Right hand
L Left hand

Standard versions

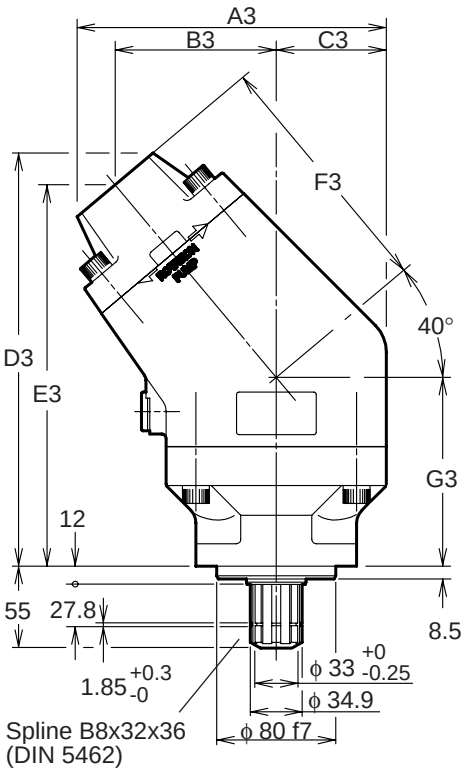
Designation	Ordering no.
F1-20-R	370 4520
F1-30-R	370 4530
F1-40-R	370 3940
F1-60-R	370 3960
F1-80-R	379 6380
F1-110-R	370 9110

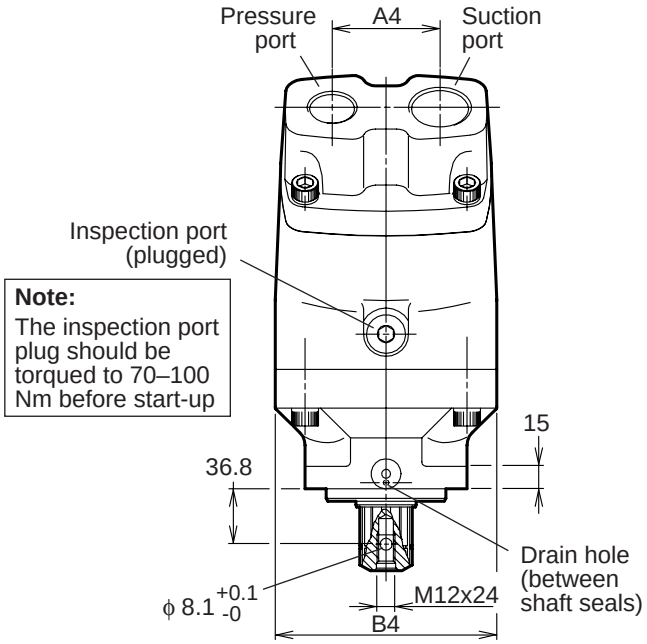
Installations dimensions

(Right hand F1-110 shown)



F1-20/-30/-40/-60/-80/-110 flange

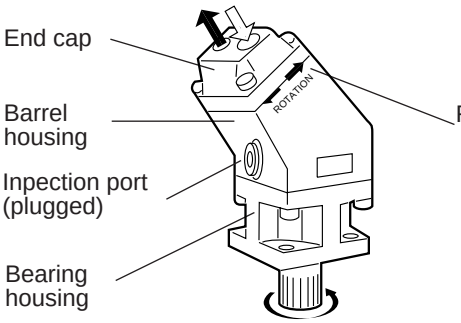




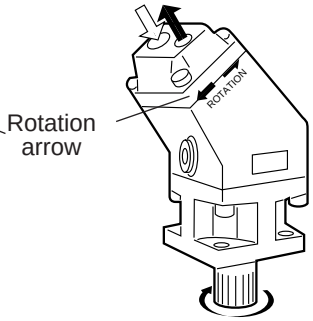
Designation	F1-20	F1-30	F1-40	F1-60	F1-80	F1-110
A1	106	106	109	109	108	109
B1	98	98	98	98	98	109
C1	104	104	109	109	106	109
A3	144	145	163	167	203	208
B3	73	75	82	86	109	109
C3	53	53	60	60	68	74
D3	206	208	234	238	277	277
E3	191	194	217	221	256	256
F3	114	117	128	134	169	169
G3	104	104	119	119	127	127
A4	48	48	60	60	60	72
B4	106	106	114	114	120	148
Pressure port *	1/2"	1/2"	3/4"	3/4"	1"	1"
Suction port *	3/4"	3/4"	1"	1"	1 1/4"	1 1/4"

***** Pressure and suction ports are BSP.

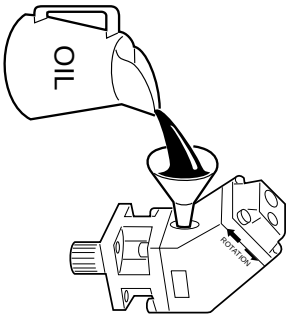
Installation and start-up



Right hand rotation



Left hand rotation



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

Direction of rotation

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 inspection port plug and turn the shaft until the marked teeth of the timing gear and cylinder barrel are visible through the port opening.

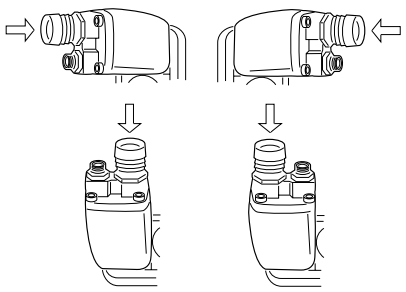
Remove the four cap screws and turn the end cap 180° while making sure it stays in contact with the barrel housing. Re-fit the cap screws and torque to 50 - 70 Nm on F1-20 to -60. For the F1-80 and F1-110 torque to 80 - 100 Nm.

Check that the marked teeth are still properly engaged. Re-fit the plug (use a new washer) and torque to 70 - 100 Nm.

Installation

The robust shaft bearings allow the F1 to be mounted either on a bracket, driven by a belt or a propshaft, or directly on a PTO.

The illustration to the right shows three ways of installing a gear on the F1 shaft. The pump shaft spline end usually fits directly in the PTO internal spline coupling.



Note: - The suction port should always be above the pressure port when the pump is installed above the reservoir oil level.
- During operation, the pump must be filled with oil to at least 50%.

Fluids

The F1 data shown in the specification on page 4 are valid when operating on high quality, mineral based fluid.

Hydraulic fluids type HLP (DIN 51524), ATF (automatic transmission fluids), and API type CD engine oils are suitable.

Fluid temperature

Main circuit: Max 75 ˚C

Viscosity

Recommended viscosity:
20 to 30 mm^2/s (cSt).

Operating viscosity limits:
min 10 mm^2/s, max 400 mm^2/s

At start-up: max 1000 mm^2/s

Drain line

F1 pumps don't need an external drain line as they are internally drained.

Filtration

To obtain the longest F1 life, we recommend:

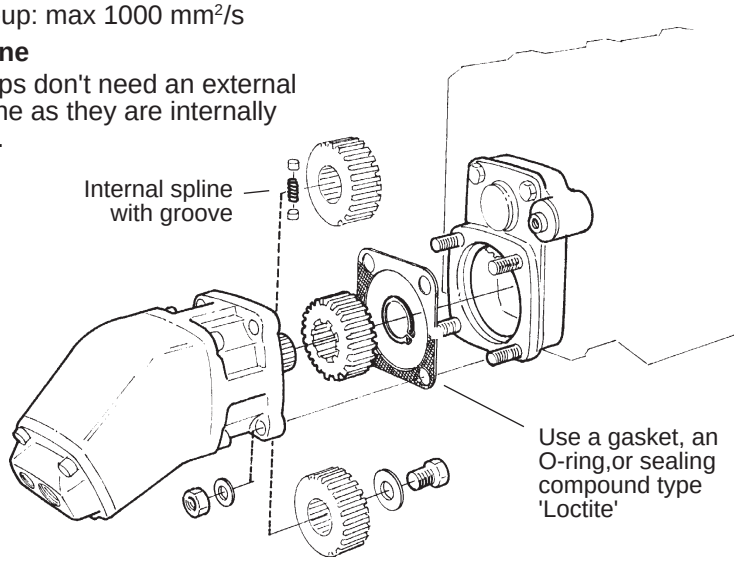
- 25 µm (absolute) in clean environment or at low pressures
- 10 µm (absolute) in contaminated environment or at high pressures

Filtration should follow ISO standard 4406, code 18/13.

Start-up

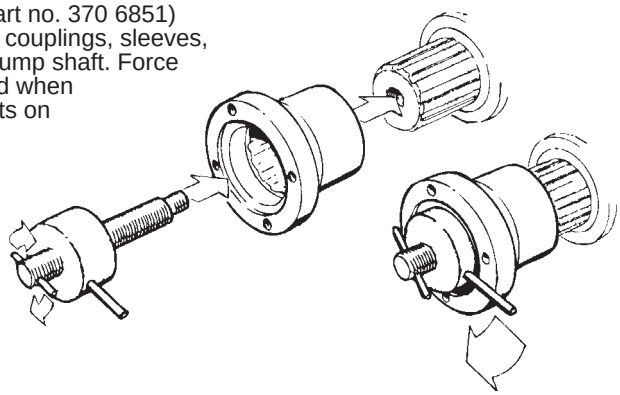
Make sure the entire hydraulic system is clean before filling it with a recommended hydraulic fluid.

The pump must also be filled as the internal leakage does not provide sufficient lubrication at start-up.



Important

Our special tool (part no. 370 6851) facilitates installing couplings, sleeves, and gears on the pump shaft. Force must never be used when installing these parts on the F1 shaft.



Please contact our sales representative:

VOAC Hydraulics Division
S-461 82 Trollhättan
Sweden
Tel +46 520 986 00
Fax +46 520 371 05

Catalog 9129 8201-02
Ed. 1298-9735 GB