



Truck Hydraulics

Series F1, F2, T1
Fixed Displacement Pumps

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

Contents

Pump and line selection

Installation guide lines

Pump and line selection

Page 4-9-3

F1 Pump, ISO

Fixed Displacement - Axial Piston Pump. ISO version

F1

Page 4-9-6

F1 Pump, SAE

Fixed Displacement - Axial Piston Pump. SAE version

F1

Page 4-9-15

F2 Twin-flow pump

Fixed Displacement - Axial Piston Pump

F2

Page 4-9-19

T1 Pump

Fixed Displacement - Axial Piston Pump.

T1

Page 4-9-23

Installation and start up

F1, F2 and T1

Installation and start up

Page 4-9-28

Fittings

Suction Fittings see Truck Accessories (Page 10-3-3)

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
$\frac{9}{5} \text{ }^\circ\text{C} + 32$	1°F
1 kW.....	1.34 hp

Pump selection

F1 and T1

The following table shows pump flow at selected PTO gear ratios and engine rpm's.

PTO gear ratio	Engine speed [rpm]	Pump flow [l/min]						
		F1-25	F1-41	F1-51	F1-61	T1-81 F1-81	F1-101	T1 121
1:0.8	800	16	26	33	38	52	66	76
	900	18	29	37	43	59	74	85
	1000	20	33	41	48	65	82	95
	1100	23	36	45	52	72	91	104
	1200	25	39	49	57	78	99	114
1:1.0	800	20	33	41	48	65	82	95
	900	23	37	46	54	73	93	107
	1000	26	41	51	60	82	103	119
	1100	28	45	56	65	90	113	130
	1200	31	49	61	71	98	123	142
1.1.25	800	26	41	51	60	82	103	119
	900	29	46	57	67	92	116	133
	1000	32	51	64	74	102	129	148
	1100	35	56	70	82	111	141	163
	1200	38	61	77	89	122	154	178
1:1.5	800	31	49	61	71	98	123	142
	900	35	55	69	80	110	139	160
	1000	38	61	77	90	122	154	178
	1100	42	67	84	98	135	170	196
	1200	46	74	92	107	147	185	213

NOTE:

- Make sure max torque and bending moment (due to the weight of the pump) of the utilised PTO are not exceeded. (The approx. center of gravity of the various pump sizes are shown in the installation drawings).
- Make sure max allowed output torque from the PTO is not exceeded.
- Contact Parker Hannifin if the inlet (suction) pressure is believed to be less than 1.0 bar (absolute); insufficient inlet pressure can cause noise and pump damage because of cavitation.

Flow and torque formulas (no regard to efficiency)

$$\text{Flow: } Q = \frac{D \times n}{1000} \text{ [l/min]}$$

where: D is pump displacement [cm³/rev]
 n is shaft speed [rpm]

$$\text{Torque: } M = \frac{D \times p}{63} \text{ [Nm]}$$

where: D is pump displacement [cm³/rev]
 p is utilised pressure [bar]



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 \approx 800 rpm

Determine pump speed

As example a PTO with a Gear Ratio of 1:1.54.

The pump speed will be:

- $800 \times 1.54 \approx 1200$ 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).

- F1-61 is a suitable choice

Required input torque

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

Follow a line from 'c' (230 bar) until it crosses the F1-61 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.

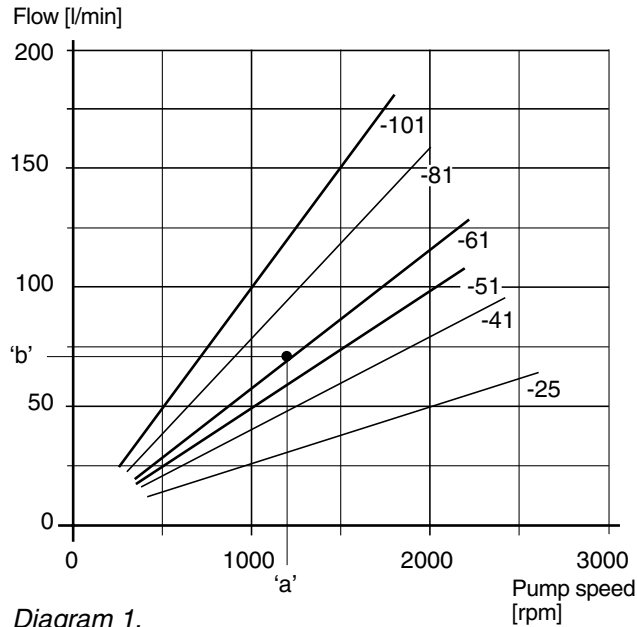


Diagram 1.

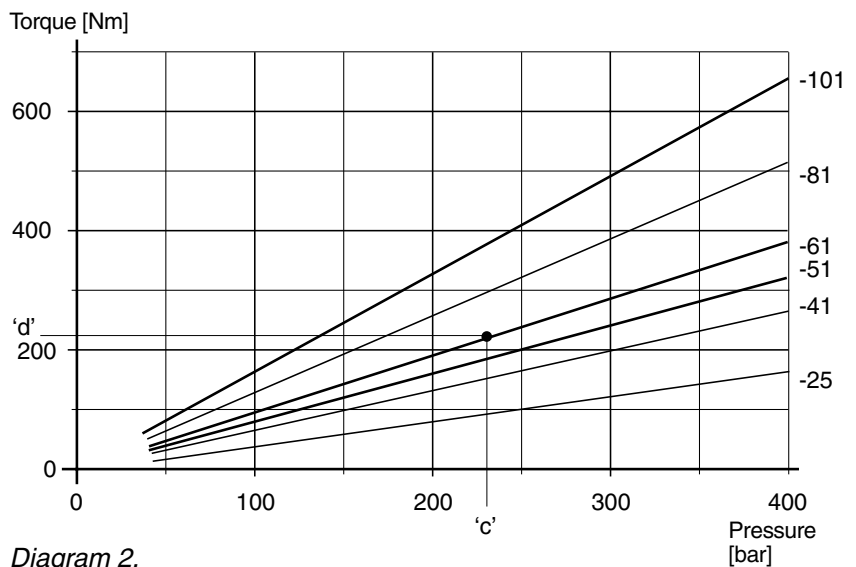


Diagram 2.

**Line selection
 all pumps**

Line type	Flow velocity [m/s]
Inlet (suction)	max 1.0
Outlet (pressure)	max 5.0

Flow rate [l/min]	Flow velocity [m/s] at selected line sizes [mm/inches]							Inlet (suction) line
	19 / 3/4"	25 / 1"	32 / 1 1/4"	38 / 1 1/2"	51 / 2"	64 / 2 1/2"	75 / 3"	
25	1.5	0.8	0.5	0.4	0.2	0.1	0.1	
50	2.9	1.7	1.0	0.7	0.4	0.3	0.2	
75	4.4	2.5	1.6	1.1	0.6	0.4	0.3	
100	5.9	3.4	2.1	1.5	0.8	0.5	0.4	
150	8.8	5.1	3.1	2.2	1.3	0.8	0.5	
200	-	-	4.1	2.9	1.6	1.1	0.7	
250	-	-	5.3	3.7	2.1	1.3	0.9	

Table 1.

Outlet (pressure) line

In order to obtain sufficient inlet (suction) pressure to the pump, low noise level and low heat generation, flow speeds shown in table 2, right, should not be exceeded.

From table 1 (page 13), select the smallest line dimension that meets the flow speed recommendation; example:

- At 100 l/min, a 50 mm suction line and a 25 mm pressure line is needed.

NOTE: Long inlet (suction) lines, low inlet pressure (caused by e.g. a reservoir positioned below the pump) and/or low temperatures may require larger line dimensions.

Alternatively, the pump speed will have to be lowered to avoid pump cavitation (which may cause noise, deteriorating performance and pump damage).

Line type	Flow velocity [m/s]
Inlet (suction)	max 1.0
Outlet (pressure)	max 5.0

Nomogram

Flow - Line dimension - Flow velocity

Table 2.

Example 1
Pressure line
Q = 65 l/min
d = 3/4"
v = 3.8 m/s

Example 2
Suction line
Q = 50 l/min
v = 0.8 m/s
d = 1 1/2"

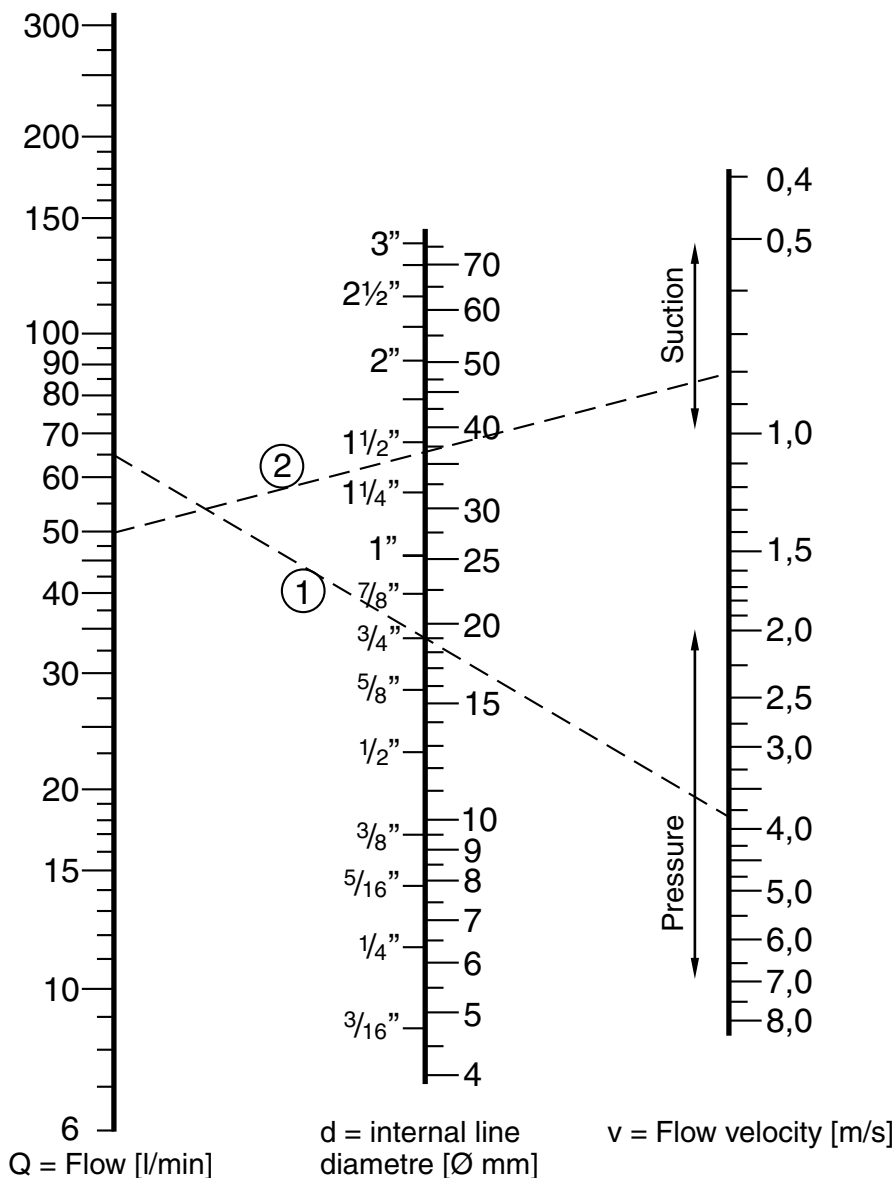


Table 3.

F1 Pump

F1-ISO



Contents	Page 4-9-
Pump and Line selection	3
General Information	7
F1-25 to -101, ISO	8
Specifications and pump cross section	8
Installation Dimensions, F1-25, -41, -51 and -61	9
Ordering code and standard versions	9
Installation Dimensions, F1-81 and -101	10
Port size and standard versions	10
F1-12 ISO with BSP port treads	11
Specifications and pump cross section	11
Installation Dimensions, F1-12 with BSP port treads	12
Ordering code and standard versions	12
Installation Dimensions, F1-25, to -101, all ports are BSP	13-14
Ordering code and standard versions	13
Installation and start up	28

F1 Pump ISO

Series F1 is a further development of our well known 'truck pump', the F1. The F1 offers many additional values for operators of cargo cranes, hook loaders, skip loaders, forest cranes, concrete mixers and similar truck applications.

Series F1 is a very efficient and straight forward pump design with unsurpassed reliability.

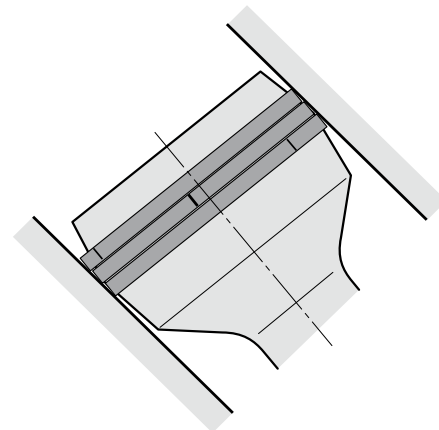
Its small envelope size gives a simple and inexpensive installation.

Features of the F1 are:

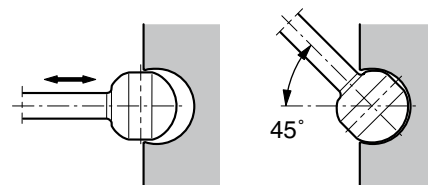
- High selfpriming speeds
- Operating pressures up to 400 bar
- High overall efficiency
- Low noise level
- Small installation dimensions
- Low weight

... thanks to:

- 45° bent-axis angle
- Optimal inlet port geometry in the end cap
- Single housing design
- Spherical pistons - high speeds
- Laminated piston rings - low leakage
- Positive synchronisation with timing gear
- Installation above the reservoir level possible
- Tolerates low temperatures and high temperature shocks
- Shaft end and mounting flange meet the ISO standard for all sizes



F1 piston with laminated piston ring.



F1 piston-to-shaft locking.

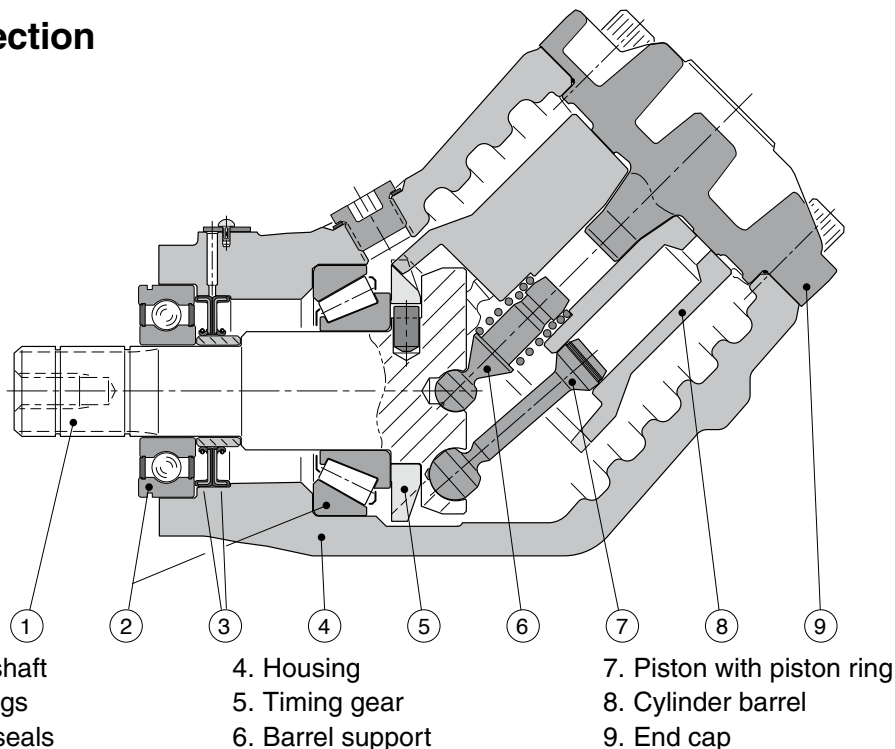
F1-25 to -101, ISO Specifications

F1 frame size	25	41	51	61	81	101
Displacement [cm ³ /rev]	25.6	40.9	51.1	59.5	81.6	102.9
Max flow ¹⁾ [l/min]						
at 350 bar	67	98	112	131	163 ³⁾	185 ³⁾
at 400 bar	56	86	97	113	143	160
Max operating pressure [bar]						
continuous	350	-----				350
intermittent	400	-----				400
Shaft speed [rpm]						
- short circuited pump (low press.)	2700	2700	2700	2700	2300	2300
- max speed at 350 bar ²⁾	2600	2400	2200	2200	2000 ³⁾	1800 ³⁾
at 400 bar ²⁾	2200	2100	1900	1900	1750	1550 ³⁾
Torque ¹⁾ [Nm]						
at 350 bar	142	227	284	331	453	572
at 400 bar	163	260	324	378	518	653
Input power [kW]						
- continuous	31	46	52	61	76	86
- intermittent ⁴⁾	39	57	66	76	95	108
Weight [kg]	8.5	8.5	8.5	8.5	12.5	12.5

- 1) Theoretical values
- 2) Valid at an inlet pressure of 1.0 bar (abs.) when operating on mineral oil at a viscosity of 30 mm²/s (cSt).
- 3) Valid with 2¹/₂" inlet (suction) line.
 With 2" suction line: F1-81 – max 1400 rpm (Q≈120 l/min);
 F1-101 – max 1000 rpm (Q≈120 l/min).
- 4) Max 6 seconds in any one minute.

NOTE: For noise level information, contact Parker Hannifin

Pump cross section

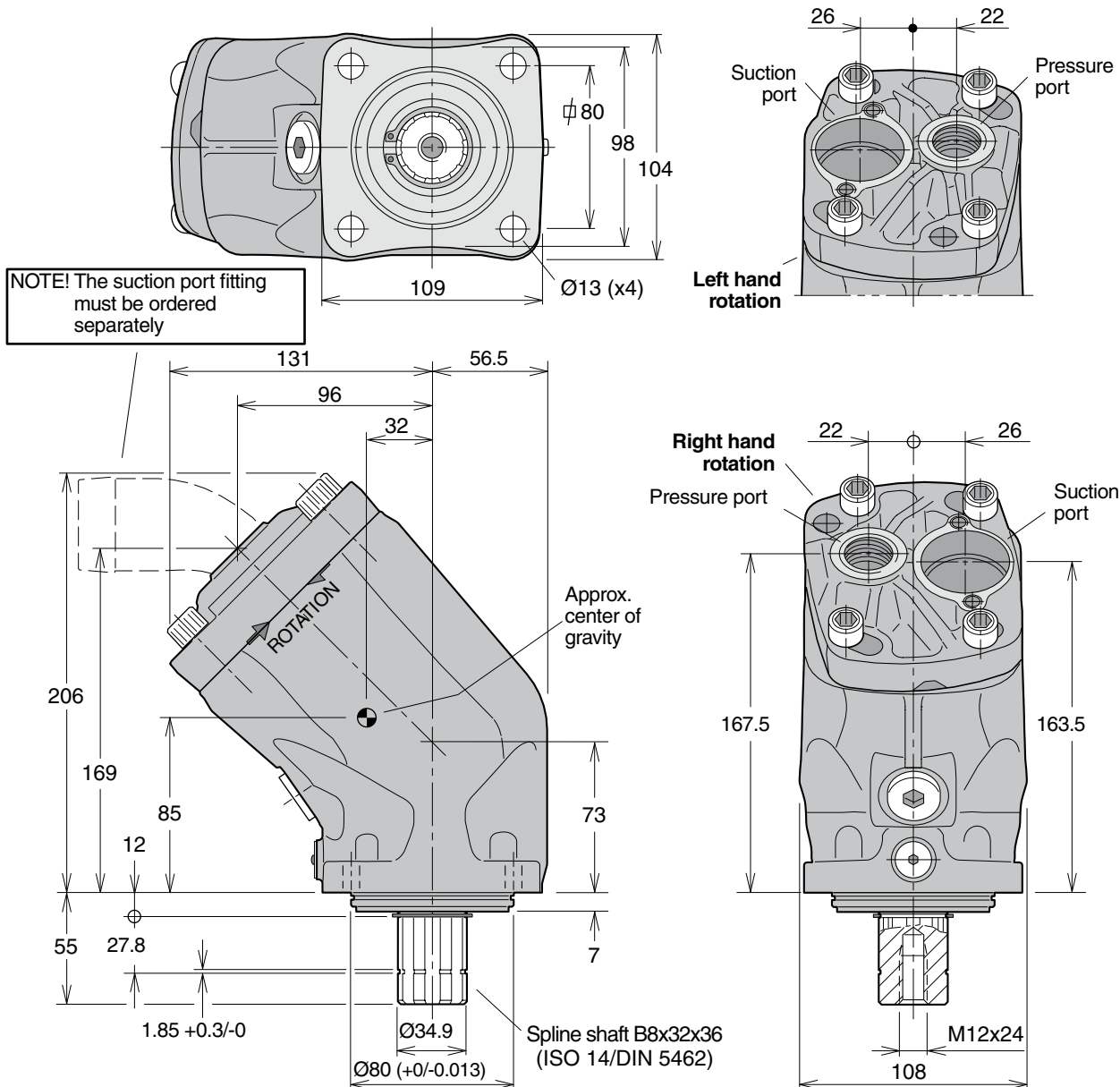


1. Input shaft
2. Bearings
3. Shaft seals

4. Housing
5. Timing gear
6. Barrel support

7. Piston with piston ring
8. Cylinder barrel
9. End cap

F1-25, -41, -51 and -61



4

Ordering code

Example: **F1-61-R**

F1 frame size
25, 41, 51, 61, 81 or 101

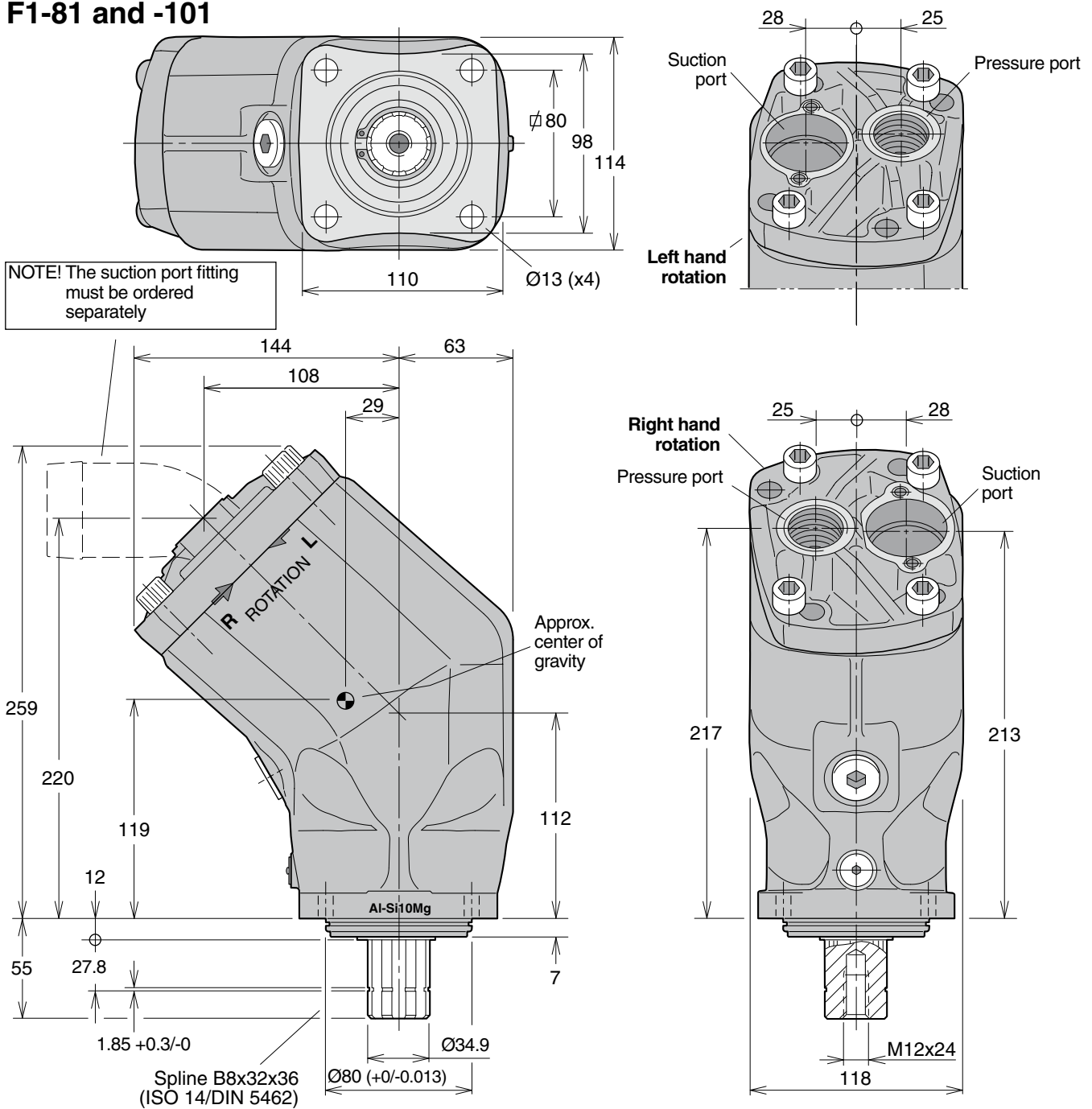
Shaft rotation
R Right hand
L Left hand

Standard versions

Designation	Ordering no.
F1-25-R	378 1024
-L	378 1025
F1-41-R	378 1040
-L	378 1041
F1-51-R	378 1050
-L	378 1051
F1-61-R	378 1060
-L	378 1061

NOTE: The pump **does not** include a suction fitting; it must be ordered separately. See Truck Accessories 10-3.

F1-81 and -101



Port size

F1 frame size	Pressure port ¹⁾
-25	3/4" "
-41	3/4" "
-51	3/4" "
-61	3/4" "
-81	1" "
-101	1" "

1) BSP thread (fitting not included)

Standard versions

Designation	Ordering no.
F1-81-R	378 1080
-L	378 1081
F1-101-R	378 1100
-L	378 1101

NOTE: The pump **does not** include a suction fitting; it must be ordered separately. See Truck Accessories 10-3.

F1-12 ISO with BSP port treads

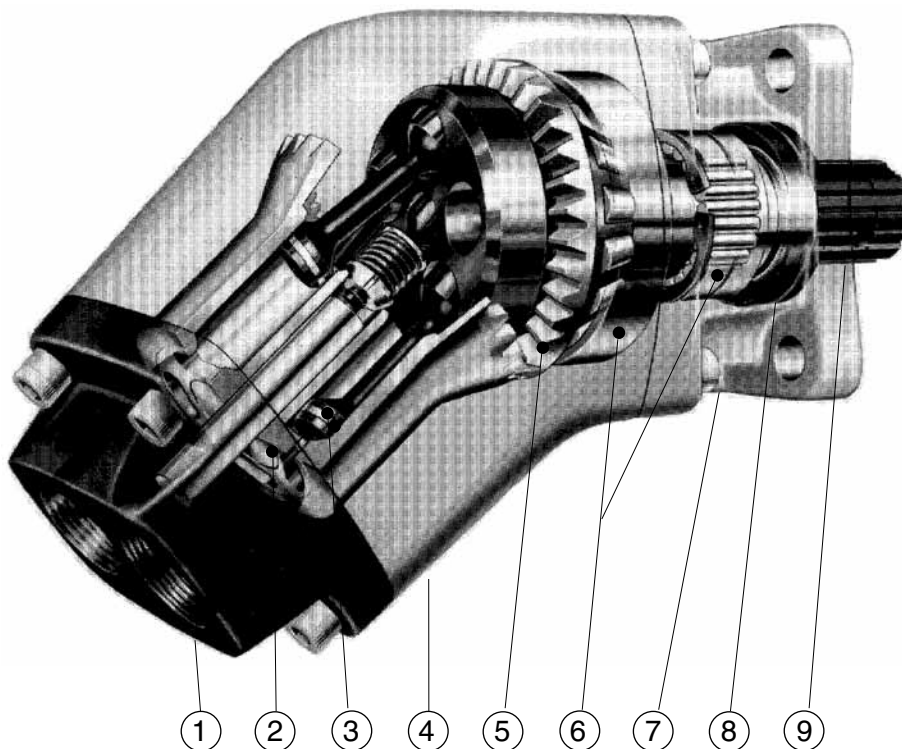
Specifications

F1 frame size	12
Displacement [cm ³ /rev]	12
Max flow ¹⁾ [l/min]	28
Max operating pressure [bar]	350
Shaft speed [rpm]	
- short circuited pump (low press.)	3100
- max selfpriming speed	2300
Torque ¹⁾ [Nm]	67
Input power [kW]	
- continuous	16.1
- intermittent ²⁾	21.7
Weight [kg]	6.7

- 1) Theoretical values
 2) Max 6 seconds in any one minute.

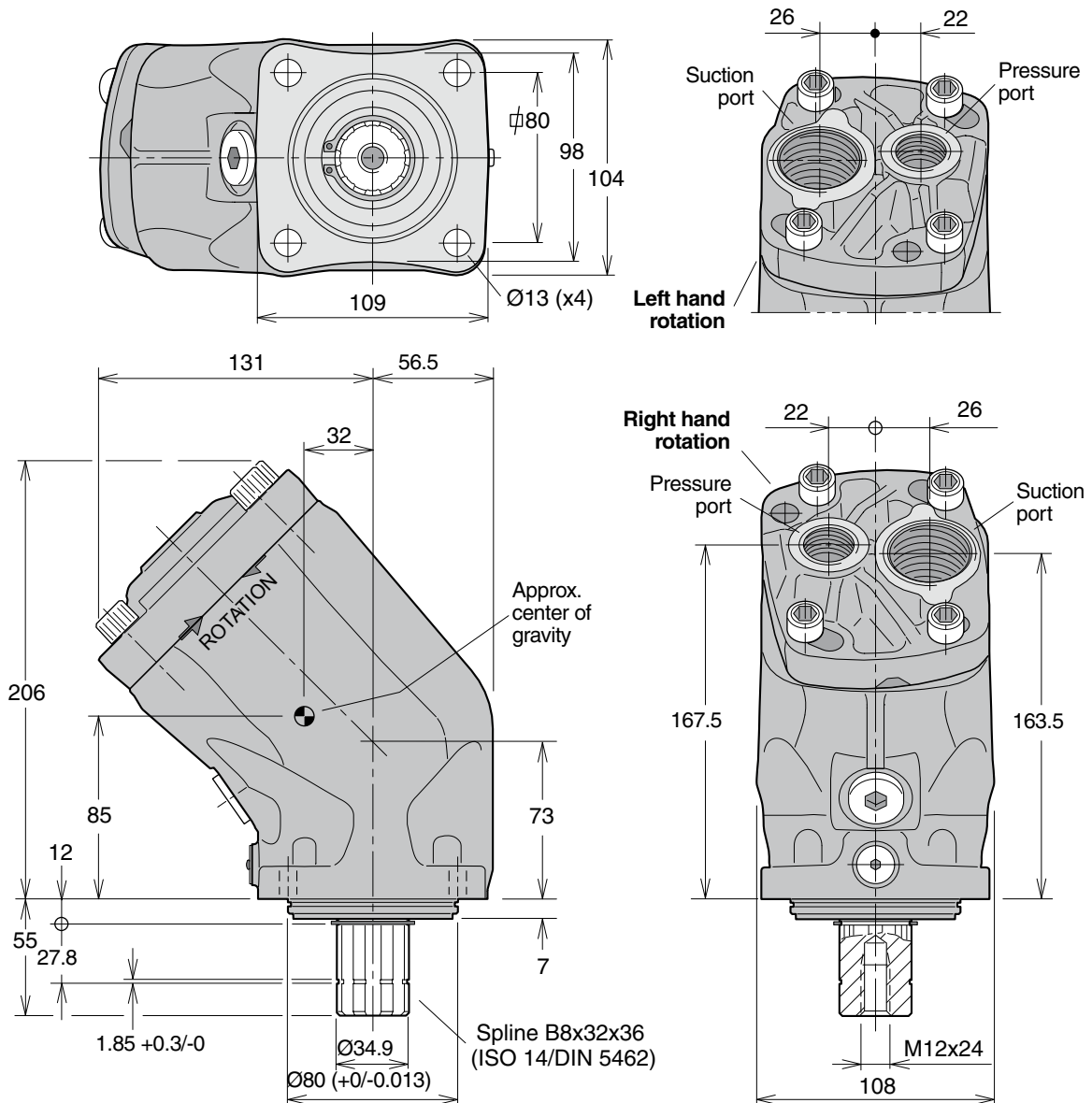
NOTE: For noise level information, contact Parker Hannifin

Pump cross section



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

F1-25, -41, -51 and -61 with BSP port treads



4

Port size (all ports are BSP)

F1 frame size	Pressure port	Suction port
-25	3/4"	1"
-41	3/4"	1"
-51	3/4"	1"
-61	3/4"	1"

Standard versions

Designation	Ordering no.
F1-25-RB	378 4024
-LB	378 4025
F1-41-RB	378 4040
-LB	378 4041
F1-51-RB	378 4050
-LB	378 4051
F1-61-RB	378 4060
-LB	378 4061

Ordering code

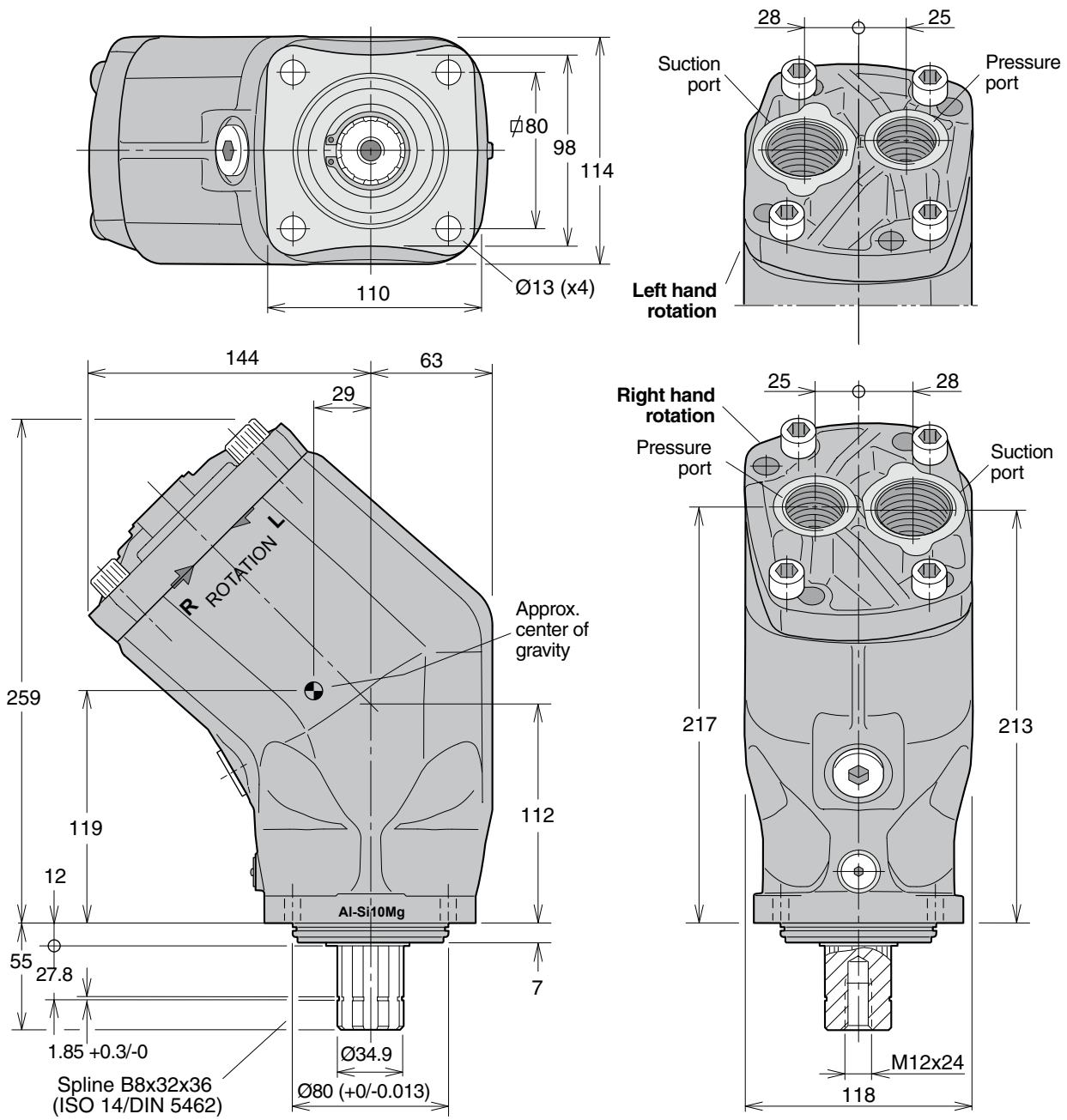
Example: **F1- 81 - RB**

F1 frame size ————— 25, 41, 51, 61, 81 or 101

Shaft rotation/port threads ————— RB Right hand/BSP
 LB Left hand/BSP

NOTE: The pump **does not** include a suction fitting; it must be ordered separately. See Truck Accessories 10-3.

F1-81 and -101 with BSP port treads



Port size (all ports are BSP)

F1 frame size	Pressure port	Suction port
-81	1"	1 1/4"
-101	1"	1 1/4"

Ordering code

Example: **F1-81-RB**

F1 frame size: 25, 41, 51, 61, 81 or 101

Shaft rotation/port threads:
RB Right hand/BSP
LB Left hand/BSP

Standard versions

Designation	Ordering no.
F1-81-RB	378 4080
-LB	378 4081
F1-101-RB	378 4100
-LB	378 4101

NOTE: The pump **does not** include a suction fitting; it must be ordered separately. See Truck Accessories 10-3.

F1 Pump

F1-SAE



4

Contents	Page 4-9-
Pump and Line selection	3
General Information.....	16
F1 Pump SAE.....	16
Pump cross section	16
Specifications	17
Ordering code (SAE)	17
Port size.....	17
Standard SAE versions	17
Installation dimensions, F1-25, -41, -51 and -61 (SAE).....	18
Installation and start up	28

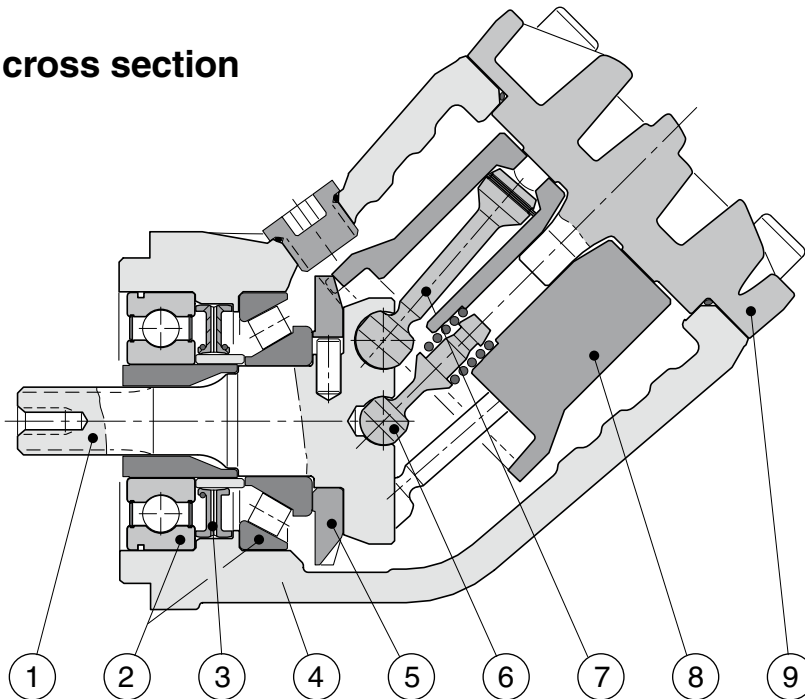
F1 Pump SAE

Features:

- Laminated piston rings - low leakage
- Positive synchronisation with timing gear
- Operating pressure up to 350 bar
- Installation above the reservoir level possible
- Tolerates low temperatures and high temperature shocks
- Shaft end and mounting flange meet the standard SAE-B
- 4 sizes -25 / -41 / -51 / -61 cm³/rev



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

Specifications

F1 frame size	25	41	51	61
Displacement [cm ³ /rev] [cu in/rev]	25.6 1.56	40.9 2.50	51.1 3.12	59.5 3.63
Max flow ¹⁾				
at 350 bar [l/min]	67	98	112	131
at 5000 psi [gpm]	17.7	25.9	29.6	34.6
at 400 bar [l/min]	56	86	97	113
at 5000 psi [gpm]	14.8	22.7	25.6	29.8
Max operating pressure				
continuous [bar]/[psi]	———— 350/5000 ————			
intermittent [bar]/[psi]	———— 400/5800 ————			
Shaft speed [rpm]				
- short circuited pump (low press.)	2700	2700	2700	2700
- max speed at 350 bar ²⁾ /5000 psi ²⁾	2600	2400	2200	2200
at 400 bar ²⁾ /5800 psi ²⁾	2200	2100	1900	1900
Torque ¹⁾				
at 350 bar [Nm]	142	227	284	331
at 5000 psi [lbf ft]	105	168	210	244
at 400 bar [Nm]	163	260	324	378
at 5800 psi [lbf ft]	120	192	239	279
Input power				
- continuous [kW]	31	46	52	61
[hp]	42	62	70	82
- intermittent [kW] ³⁾	39	57	66	76
[hp] ³⁾	52	76	88	102
Weight [kg]	8.5	8.5	8.5	8.5
[lbs]	18.7	18.7	18.7	18.7

- 1) Theoretical values
- 2) Valid at an inlet pressure of 1.0 bar/15 psi (abs.) when operating on mineral oil at a viscosity of 30 mm²/s (cSt)/150 SUS.
- 3) Max 6 seconds in any one minute.

NOTE: For noise level information, contact Parker Hannifin.

Ordering code (SAE)

Example: **F1-61-RU-SV-S**

F1 frame size
25, 41, 51 or 61

Shaft rotation
R Right hand
L Left hand

Port size

F1 frame size	Pressure port ¹⁾
-25	1 1/16"-12 UN
-41	1 1/16"-12 UN
-51	1 1/16"-12 UN
-61	1 1/16"-12 UN

Shaft end
S SAE spline "B" spline

Shaft seal
V FPM

Mounting flange
S SAE "B"

Main port
U SAE O-ring, UN threads

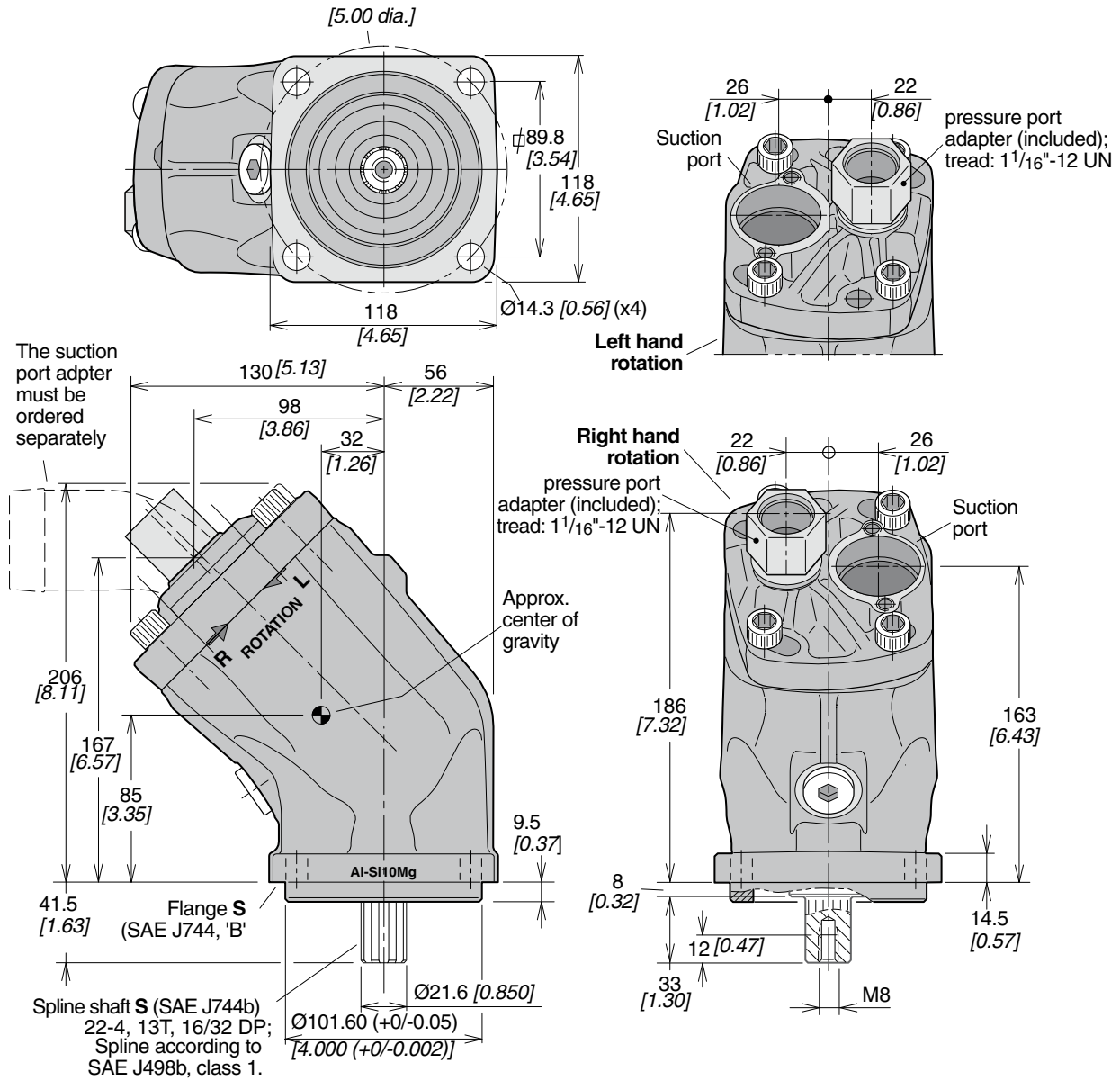
Standard SAE versions

Designation	Ordering no.
F1-25-R	378 1424
-L	378 1425
F1-41-R	378 1440
-L	378 1441
F1-51-R	378 1450
-L	378 1451
F1-61-R	378 1460
-L	378 1461

1) BSP-to-SAE adapter (included).

Installation dimensions, F1-25, -41, -51 and -61 (SAE)

Dimensions in mm [inches]



F2 Twin-flow Pump



4

Contents	Page 4-9-
Pump and Line selection	3
General Information.....	20
F2 Twin-flow pump.....	20
Specifications	21
Installation Dimensions.....	22
Ordering code.....	22
Standard versions.....	22
Installation and start up	28

F2 Twin-flow pump

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 optimise the hydraulic system and offers:

- Less energy consumption
- Reduced risk of system overheating
- Lower weight
- Easier installation
- Standardised 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.



Typical twin-flow applications

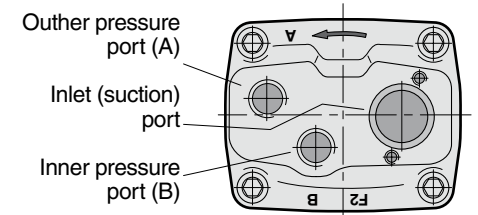
- Large truck loaders
- Forestry cranes
- Hook loaders/lift dumpers
- Tipper/crane combinations
- Refuse collecting vehicles

The pump shaft end/mounting flange meets the ISO standard and suits PTO direct mounting.

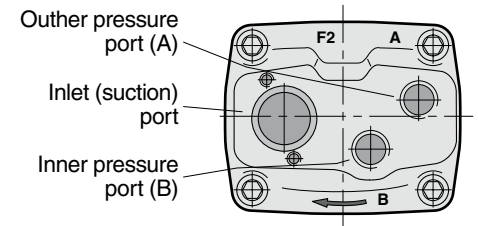
Specifications

Frame size F2-	42/42	53/53	55/28	70/35	70/70
Displacement [cm³/rev]					
Port A	43	54	55	69	68
Port B	41	52	28	36	68
Max operating pressure [bar]					
continuous	350	350	350	350	300
intermittent	400	400	400	400	350
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

'Left hand' and 'right hand' end caps



End cap for right hand rotating pump



End cap for left hand rotating pump

- 1) Valid with 2 1/2" inlet (suction) line;
with 2" inlet line: 53/53 and 70/35 max 1 100 rpm
42/42 and 55/28 max 1400 rpm. (q≈120 l/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.

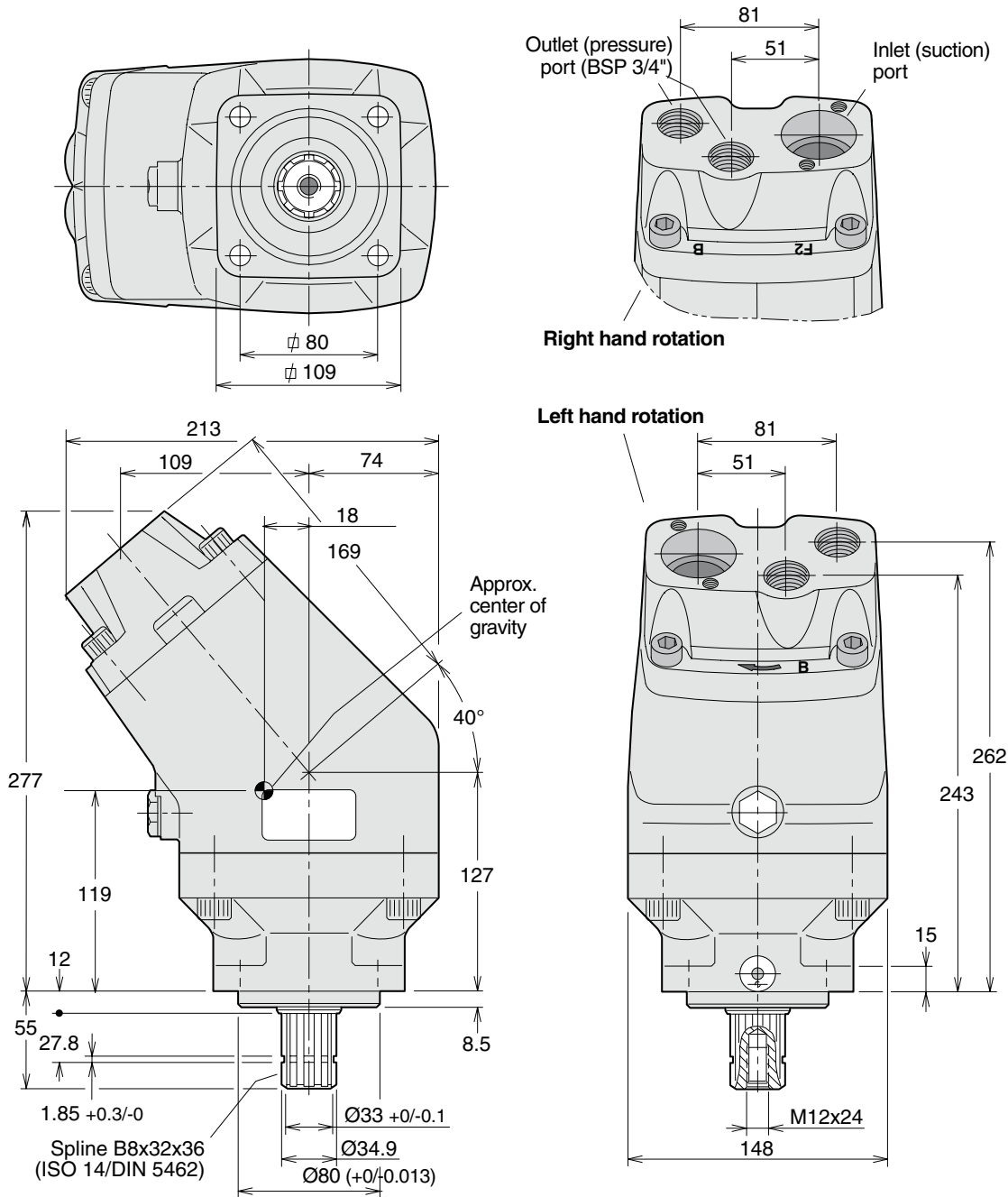
Flow vs. shaft speed (theoretical)

Pump speed [rpm]	800	1000	1200	1400	1600	1800	1900	2000	2100
F2-53/53 flow [l/min]									
Port A	43	54	65	76	86	97	-	-	-
Port B	42	52	62	73	83	94	99	104	109
Total (ports A + B)	85	106	127	149	169	191	-	-	-
Note: 42/42 values is 80% of 53/53 values 70/70 values is 130% of 53/53 values									
F2-70/35 flow [l/min]									
Port A	55	69	83	97	110	124	-	-	-
Port B	29	36	43	50	58	65	68	72	76
Total (ports A + B)	84	105	126	147	168	189	-	-	-
Note: 55/28 values is 80% of 70/35 values									

Shaft torque vs. pressure (theoretical)

Pressure [bar]	150	200	250	300	350
F2-53/53 torque [Nm]					
Port A	129	171	214	257	300
Port B	124	165	206	248	289
Total (ports A + B)	253	336	420	505	589
Note: 42/42 values is 80% of 53/53 values 70/70 values is 130% of 53/53 values					
F2-70/35 torque [Nm]					
Port A	164	219	274	329	383
Port B	86	114	143	171	200
Total (ports A + B)	250	333	417	500	583
Note: 55/28 values is 80% of 70/35 values					





Ordering code

Example: **F2 - 53/53 - L**

Frame size [cm³/rev] _____
42/42
53/53
55/28
70/35
70/70

Direction of rotation _____
L Left hand
R Right hand

Standard versions

Designation	Ordering no.
F2-42/42-R	378 4042
F2-42/42-L	378 4043
F2-53/53-R	378 1453
F2-53/53-L	378 1454
F2-55/28-R	378 4128
F2-55/28-L	378 4129
F2-70/35-R	378 1470
F2-70/35-L	378 1471
F2-70/70-R	378 4070
F2-70/70-L	378 4071

NOTE:

- Before start-up, tighten the inspection port plug to 70–100 Nm.
- To change the direction of rotation, **the end cap must be replaced.**

NOTE: The pump **does not** include a suction fitting; it must be ordered separately. See Truck Accessories 10-3.

T1 Pump



4

Contents	Page 4-9-
Pump and Line selection	3
General Information	24
Pump cross section	24
Specifications	25
Ordering code	25
Standard versions	25
Port size	25
Installation Dimensions	26-27
Installation and start up	28

T1 Pump

The T1 fixed displacement pump is a further development of series T1, which was specifically designed to meet the requirements of light duty truck applications with short, non-frequent operating cycles such as tipper, and small loaders.

The design is very similar to that of the F1 series pumps but is even more compact. It utilises our well proven 45° concepts with spherical pistons and laminated piston rings, offering high volumetric and mechanical efficiencies and, thanks also to the small number of parts, unprecedented reliability.



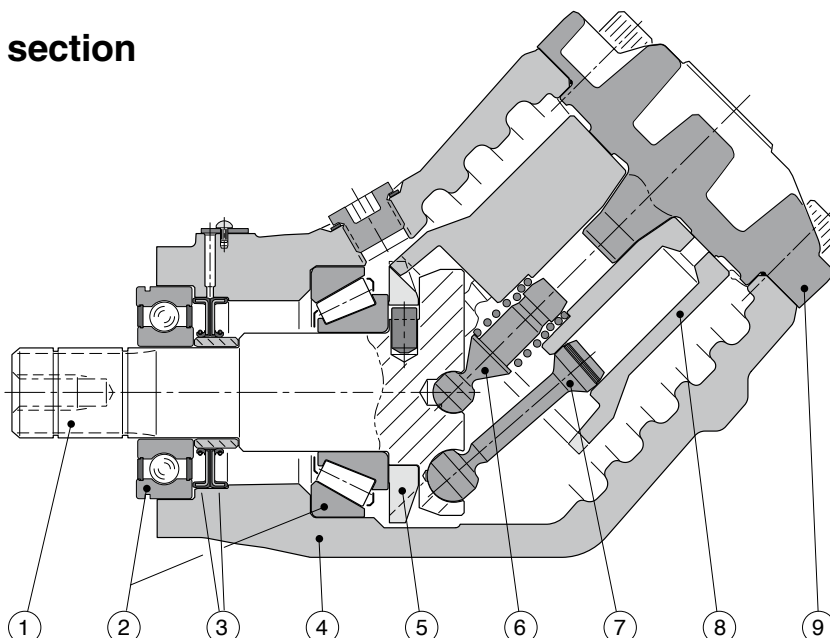
- Shaft speed to 2300 rpm
- Operating pressure up to 350 bar
- High overall efficiency
- Low weight
- Small installation dimensions
- Robust construction

Typical T1 applications

- Front end tippers
- Under body tippers
- Hydraulic system infrequently used and with short cycle times.

The T1, with shaft and mounting flange configuration conforming to the European standard, can be installed on most European truck gearboxes. Suitable power-take-offs are also available from Parker Hannifin.

Pump cross section (T1-81 shown)



1. Input shaft
2. Bearings
3. Shaft seals

4. Housing
5. Timing gear
6. Barrel support

7. Piston with piston ring
8. Cylinder barrel
9. End cap

Specifications

T1 frame size	81	121	
Displacement [cm ³ /rev]	81.5	118.5	
Max flow ¹⁾ [l/min]	163 ³⁾	190 ³⁾	
Max operating pressure [bar]			
	continuous	250	250
intermittent ⁴⁾	350	350	
Shaft speed [rpm]			
	short circuited pump (low press.)	2300	2300
max speed ²⁾	2000 ³⁾	1600 ³⁾	
Torque ¹⁾ [Nm]			
	at 200 bar	258	376
	at 350 bar	453	658
Input power [kW]			
	continuous	54	71
intermittent ⁴⁾	67	89	
Weight [kg]	8.5	12.5	

- 1) Theoretical values
- 2) Valid at an inlet pressure of 1.0 bar (abs.) when operating on mineral oil at a viscosity of 30 mm²/s (cSt).
- 3) Valid with 2 1/2" inlet (suction) line. With 2" suction line:
 T1-81 – max 1400 rpm (Q≈120 l/min);
 T1-121 – max 950 rpm (Q≈120 l/min).
- 4) Max 6 seconds in any one minute.

NOTE:
 For noise level information, contact Parker Hannifin.

4

Ordering code

Example: **T1 - 81 - R**

T1 frame size 81 or 121

Shaft rotation R Right hand
L Left hand

Standard versions

Designation	Ordering no.
T1-81-R	378 2180
-L	378 2181
T1-121-R	378 2120
-L	378 2121

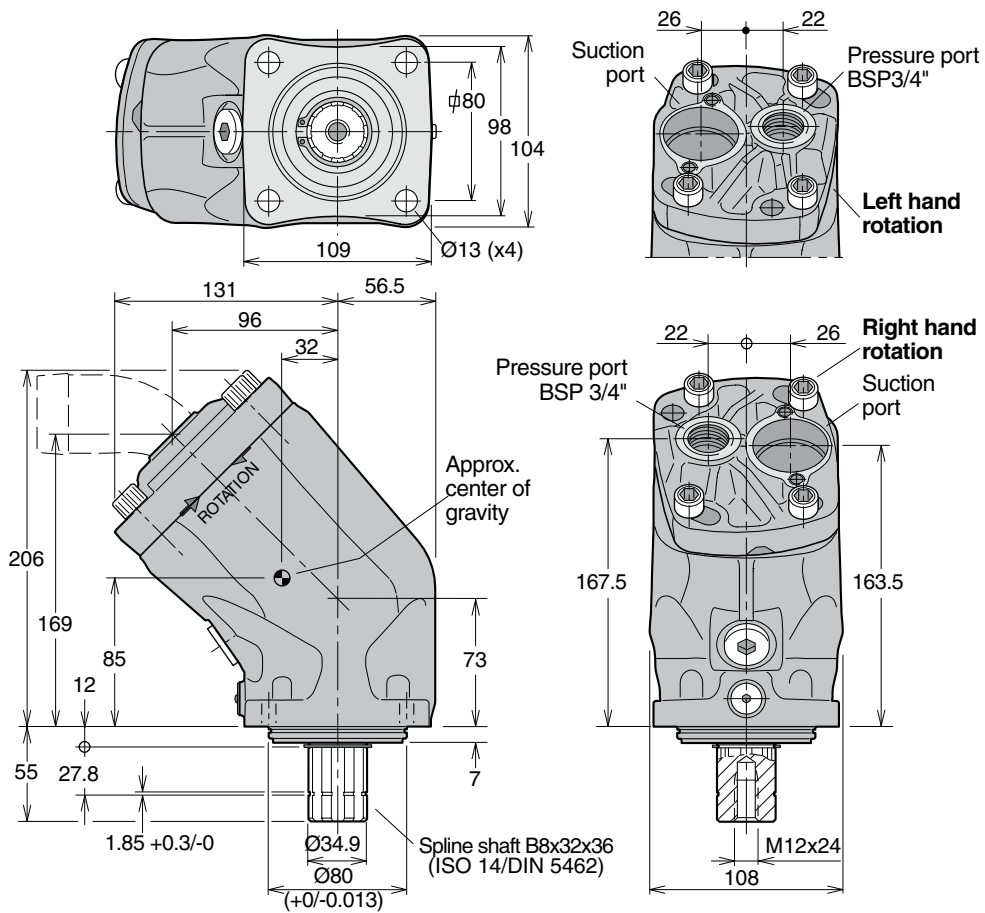
Port size

T1 frame size	Pressure port ¹⁾
-81	3/4"
-121	1"

1) BSP thread (fitting not included).

NOTE: The pump **does not** include a suction fitting; it must be ordered separately. See Truck Accessories 10-3.

T1-81



Installation and start up

Installing couplings, sleeves, and gears on the pump shaft.

This is a short installation and start up information.

To have the complete and latest installation information, always see the installation info supplied together with the pump.

PTO installation

- 'Left hand' and 'Right hand' rotation defined in the illustrations on page 30.
- The driving gear of the PTO and the driven gear of the pump are shown in the illustration below. (A right hand rotating pump is shown).

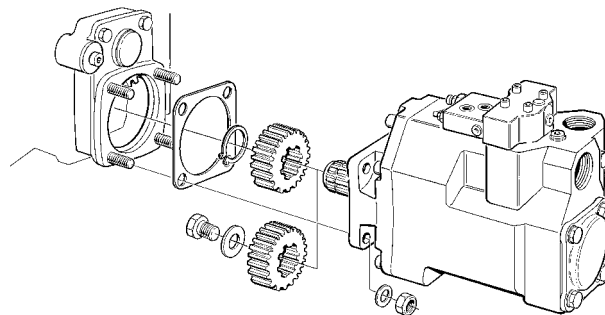
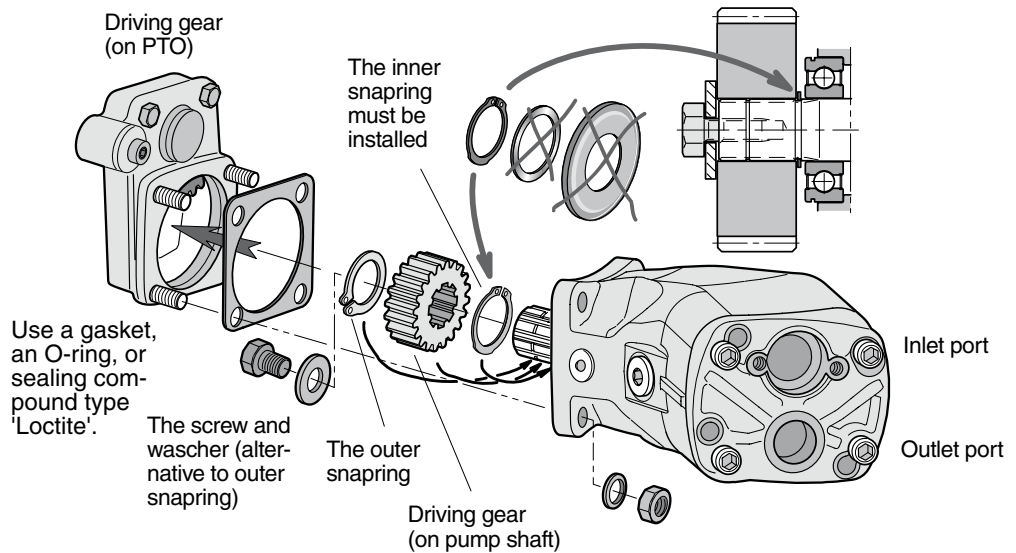


Fig. 6. VP1-to-PTO installation.

IMPORTANT

Use some kind of special tool when you install couplings, sleeves, and gears on the pump shaft. Force must never be used when installing these parts on the F1 shaft.

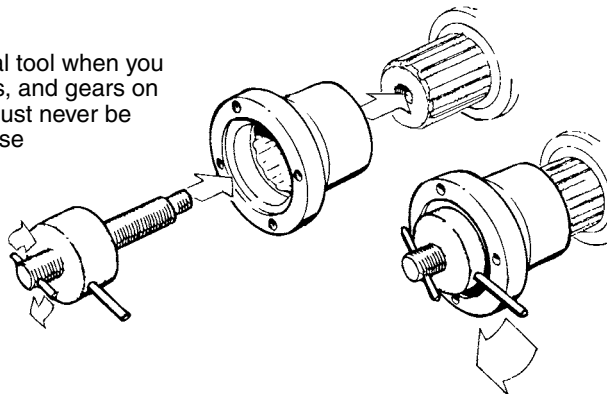
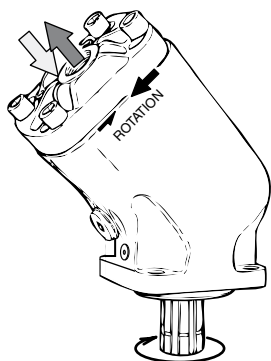


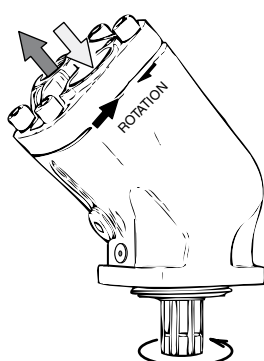
Fig. 7 Mounting tool.

NOTE: When considering installing an F1 on a splitter box, please refer to the installation information provided on pages 16-17, chapter 10-3.

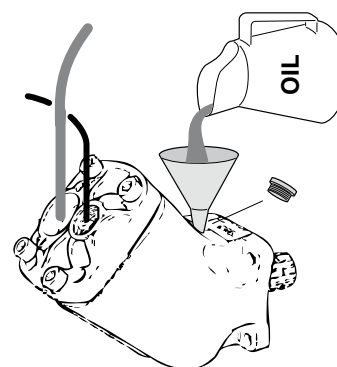
Installation and start-up for F1, F2 and T1



Left hand (L.H.; counter clockwise) rotating pump.



Right hand (R.H.; clockwise) rotating pump.



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 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 80-100 Nm.

Installation

Make sure max torque and bending moment (due to the weight of the pump) of the utilised PTO are not exceeded. (The approx. center of gravity of the various pump sizes are shown in the installation drawings).

The top illustration on page 28 shows two ways of installing a gear on the shaft of fixed displacement pumps. The pump shaft spline end usually fits directly in the PTO internal spline coupling.

NOTE: In order to obtain the longest bearing life, the pump should be installed according to the information shown on page 30 "Pump bearing life".

Fluid viscosity

Recommended viscosity: 20 to 30 mm²/s (cSt).

Operating viscosity limits:

- Min 10 mm²/s; max 400 mm²/s.
- At start-up, max 4000 mm²/s.

Fluids

The fixed displacement pumps data shown in the specifications for each pump are valid when operating on high quality, mineral based hydraulic oil.

Type HLP (according to DIN 51524) hydraulic oil is suitable as well as biologically degradable fluids like natural and synthetic esters and polyalphaolefins.

The utilised hydraulic fluid shall meet one of the following Swedish standards:

- SS 15 54 34
- SMR Hydraulic Oil Standard 1996-2.

Contact Parker Hannifin for further information.

NOTE: - ATF (automatic transmission fluid) and API type CD engine oils may also be useable.
 - Seals are made of nitrile rubber; make sure the utilised fluid is compatible with this material.

Fluid temperature

Main circuit: Max 75 °C.

NOTE: When considering installing an fixed displacement pump on a splitter box, please refer to the installation information provided on pages 16 and 17, chapter 10-3.

Drain line

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

When the pump is mounted in a Engine-PTO we recommend a drain line from the bypassvalve directly to oiltank.

Filtration

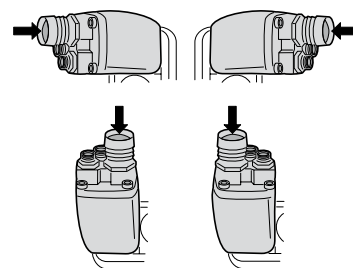
Filtration should follow ISO standard 4406: 1987, code 18/13.

To obtain the longest life of fixed displacement pumps, we recommend an oil cleanliness of 10 µm (absolute).

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%) as the internal leakage does not provide sufficient lubrication at start-up.

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%.



If any oil should drop out of the indication-hole on the pump;

- Stop the system immediately.
- Determine the cause of leakage.
- Replace damaged parts.
- Make sure you have corrected the source of the problem, not only the symptom.

Parker can not be held responsible for damage to PTO, engine and gearbox caused by improper maintenance of the hydraulic system.



Pump bearing life

Bearing life is dependent on how the pump is installed on the PTO as shown in the illustrations below.

A pump mounted according to fig. 1 gives the lowest bearing life; the highest is obtained when installed according to fig. 3.

Parker Hannifin will assist in determining bearing life in a particular application.

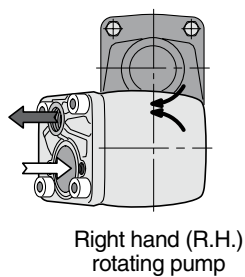
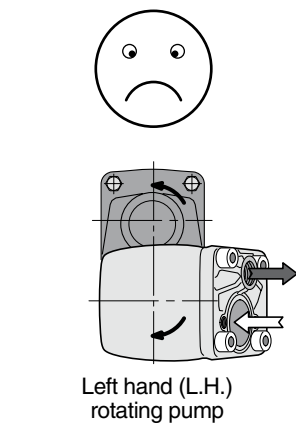


Fig. 1.

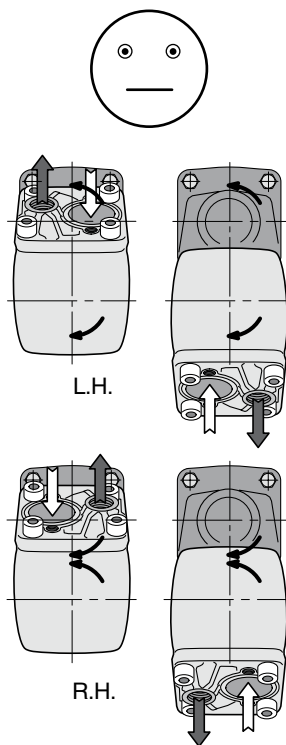


Fig. 2.

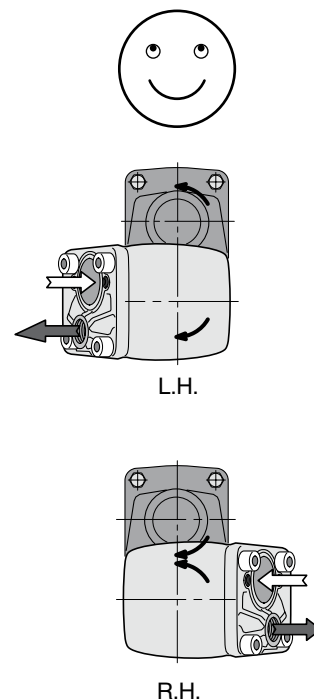


Fig. 3.