Truck Hydraulics

Series GPA, GP1, F1, T1, F2, F3, VP1,
Fixed and Variable Displacement Pumps,
Motors and Accessories

parker.com/pmde

Parker

ENGINEERING YOUR SUCCESS.

Change History for edition 01.2017
Pages 9, 42-46: New F3 pump incorporated.
Page 52: Ordering no. for Black Painted VP1 pumps
Pages 59-64: BPV for F1, T1 and for F2 changed. New design of Manual override.
Pages 49 and 52: Centre of gravity changed, VP1.
Pages 17, 19-21: New GP1-pump. Page 76: New pump pictures for GPA and GP1
Pages 51, 52 and 67: LS-control with alternative drain port T.
Pages 23 and 40: Mass moment of inertia
Pages 59 and 61: BPV-F1 and BPV-F2

On our website, www. parker.com/pmde, you can find:
2D & 3D drawings,
Installation Manuals,
Service Manuals,
Spare Parts Lists

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
$^9/_5$ °C + 32 ..... 1°F
1 kW ..... 1.34 hp

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 tippers, 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

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.

See page 33

Typical T1 applications

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

Pump selection
F1, T1 and F3

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	F1-81 T1-81 F3-81	F1-101 F3-101	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)

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

where: D is pump displacement [cm^3/rev]
n is shaft speed [rpm]

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

where: D is pump displacement [cm^3/rev]
p is utilised pressure [bar]

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden

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

As example a PTO with 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).

- F1-61 is a suitable choice

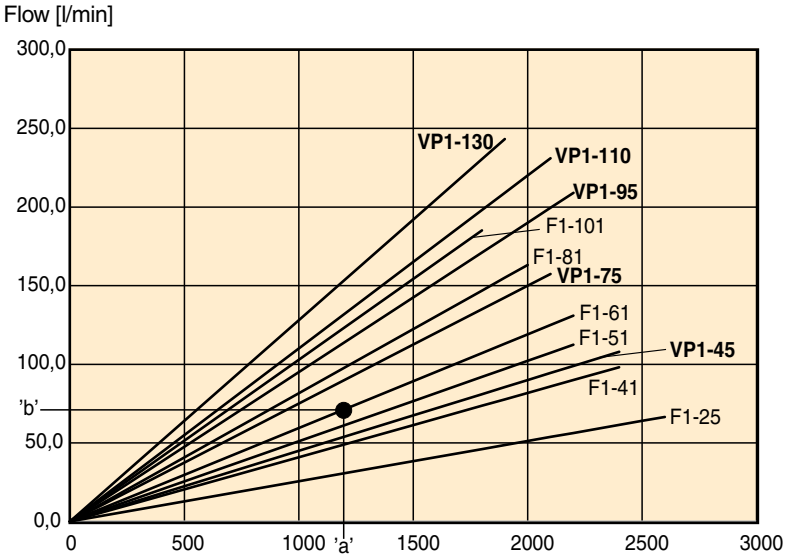


Diagram 1.

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.

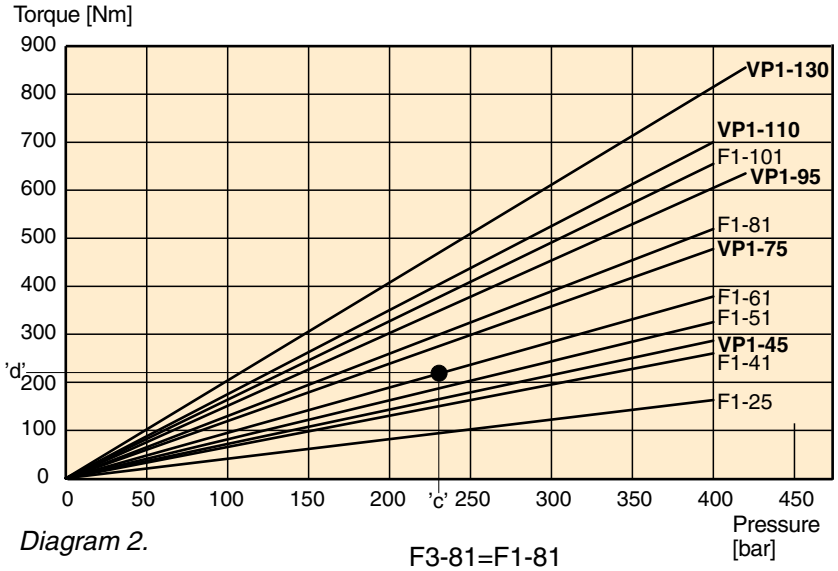


Diagram 2.

F3-81=F1-81
F3-101=F1-101

Line selection
all pumps

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

Flow rate	Flow velocity [m/s] at selected line sizes [mm/inches]						
[l/min]	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*

Inlet (suction) line

Table 1. Outlet (pressure) line

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden

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

Table 2.

Nomogram

Flow - Line dimension - Flow velocity

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"

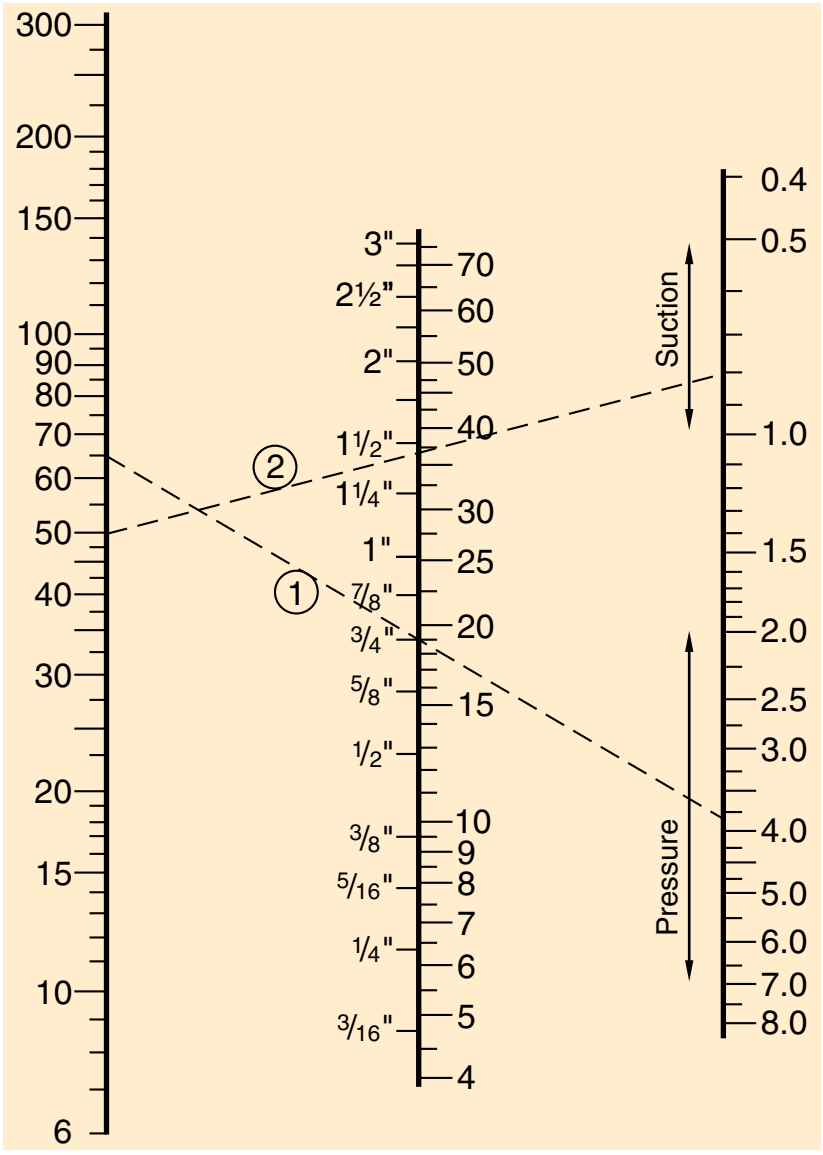


Table 3.

Q = Flow [l/min]

d = internal line diametre [Ø mm]

v = Flow velocity [m/s]

T1 Pump

Contents

Specifications

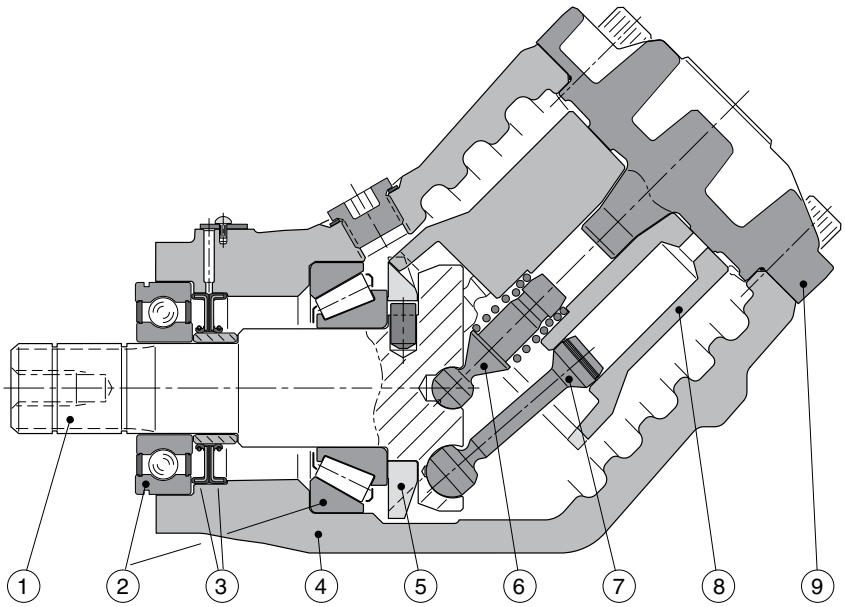
Frame size T1-	81	121
Displacement [cm³/rev]	81.5	118.5
Max flow 1) [l/min]	163 3)	190 3
Max operating pressure [bar]		
continuous	250	250
intermittent	350	350
Shaft speed [rpm]		
- short circuited pump (low press.)	2300	2300
max speed 2)	2000 3)	1600 3)
Torque 1) [Nm]		
at 200 bar	258	376
at 350 bar	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.

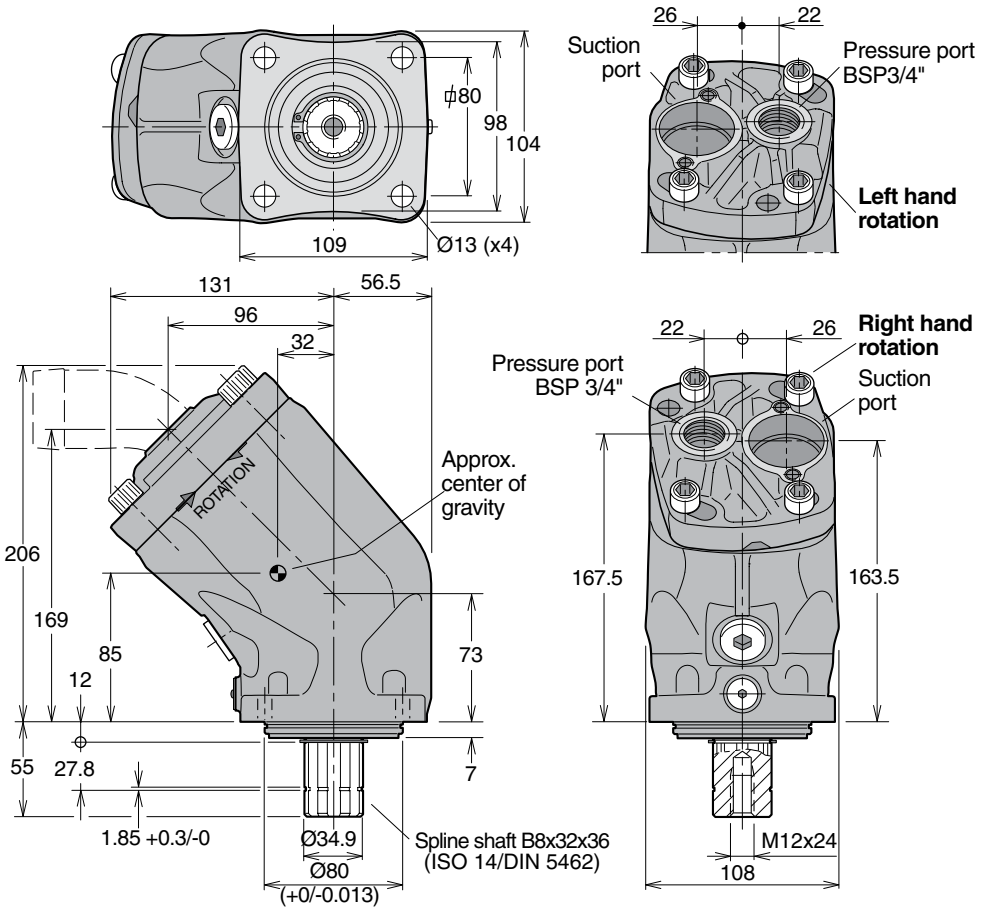
Pump cross section

(T1-121 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

T1-81



5

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
T1-81-L	378 2181
T1-121-R	378 2120
T1-121-L	378 2121

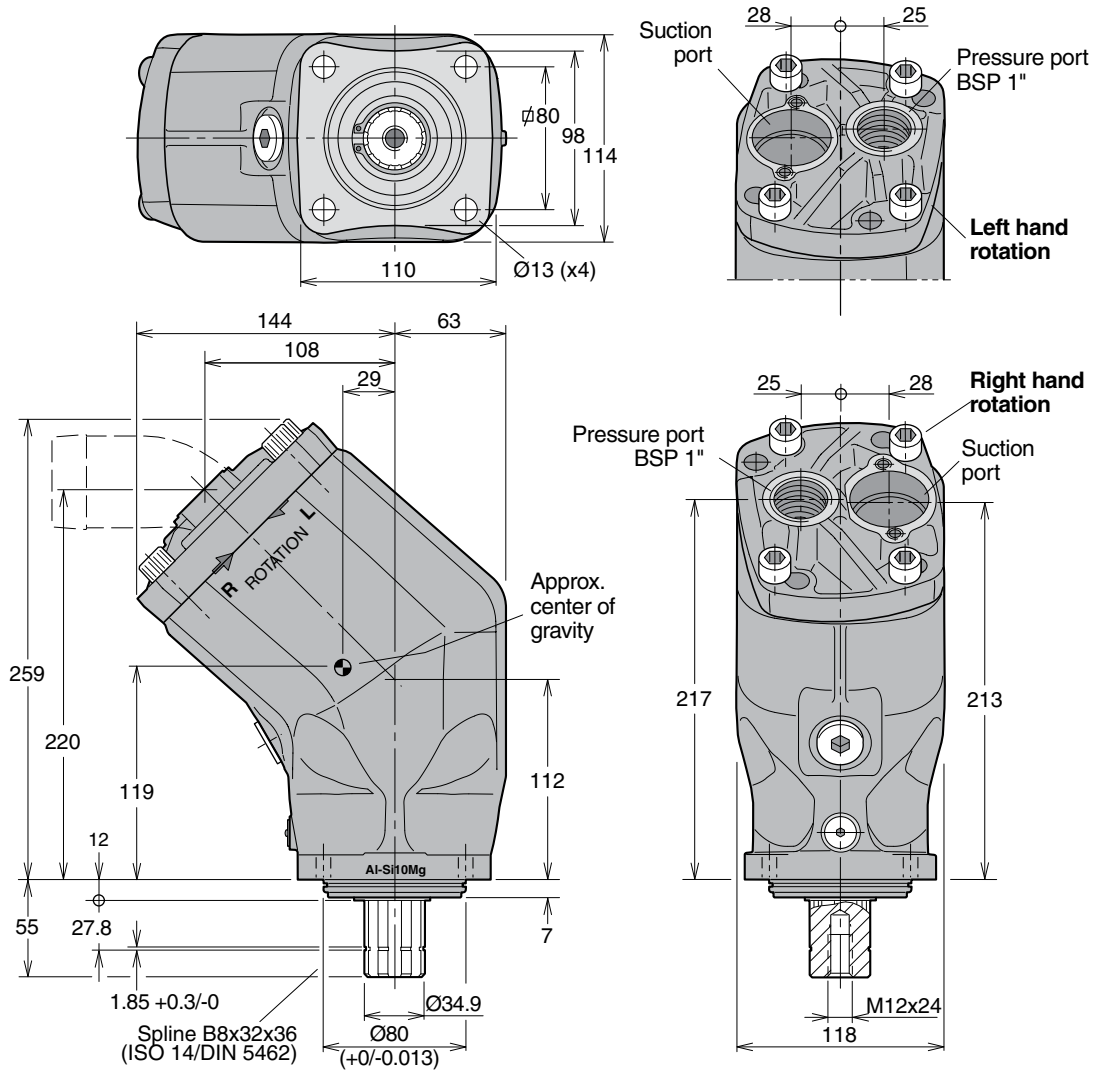
Port size

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 chapter 11.

T1-121


144
63
108
29
259
220
119
12
55
27.8
1.85 +0.3/-0
Spline B8x32x36
(ISO 14/DIN 5462)
Ø80
(+0/-0.013)
Ø34.9
112
7
R ROTATION L
Approx.
center of
gravity
Al-Si10Mg
110
Ø13 (x4)
ϕ80
98
114
28
25
Suction
port
Pressure port
BSP 1"
Left hand
rotation
25
28
Right hand
rotation
Pressure port
BSP 1"
Suction
port
217
213
M12x24
118