

VP1 Pump



Contents	Page	Chapter
Pump and Line selection	11	2
Specifications	42	
VP1-045/-075 cross section	42	
Installation Dimensions, VP1-045 and -075.....	43	
LS valve block VP1-045/075.....	44	
Through-shaft coupling VP1-045/075.....	44	
VP1-095/-110/-130 cross section	45	
LS control (for VP1-095/-110/-130)	45	
Installation Dimensions, VP1-095/-110/-130	46	
System Information.....	47	
Ordering information.....	47	
VP1 in load sensing systems and Systems comparison	47	
LS load sensing control function and LS control adjustments	48	
Suction fittings	50	10
Installation and start-up for VP1	73	13

Specifications

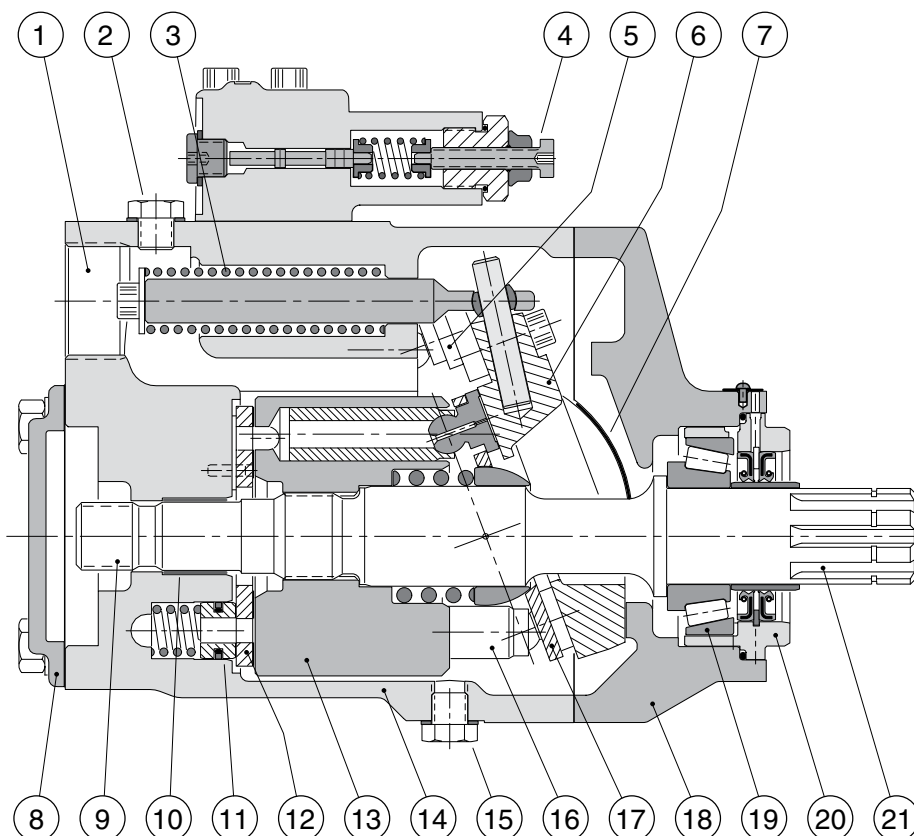
Frame size VP1--	045	075	095	110	130
Displacement [cm ³ /rev]	45	75	95	110	128
Max operating pressure [bar]					
continuous	350	350	400	400	400
intermittent ¹⁾	400	400	420	420	420
Mass moment of inertia J [kgm ²]	0.00606	0.00606	0.00681	0.00690	0.00690
Selfpriming speed ²⁾ [rpm]					
2" suction line, max	2200	1700	1250	1100	900
2 1/2" suction line, max	2400	2100	1750	1500	1300
3" suction line, max	-	-	2200	2100	1900
Max Speed unloaded [rpm]					
(in bypass mode, no flow)	3000	3000	3000	3000	3000
Control type	LS				
Shaft end spline	DIN 5462				
Mounting flange	ISO 7653-1985				
Weight (with control) [kg]	27				

1) Max 6 seconds in any one minute.

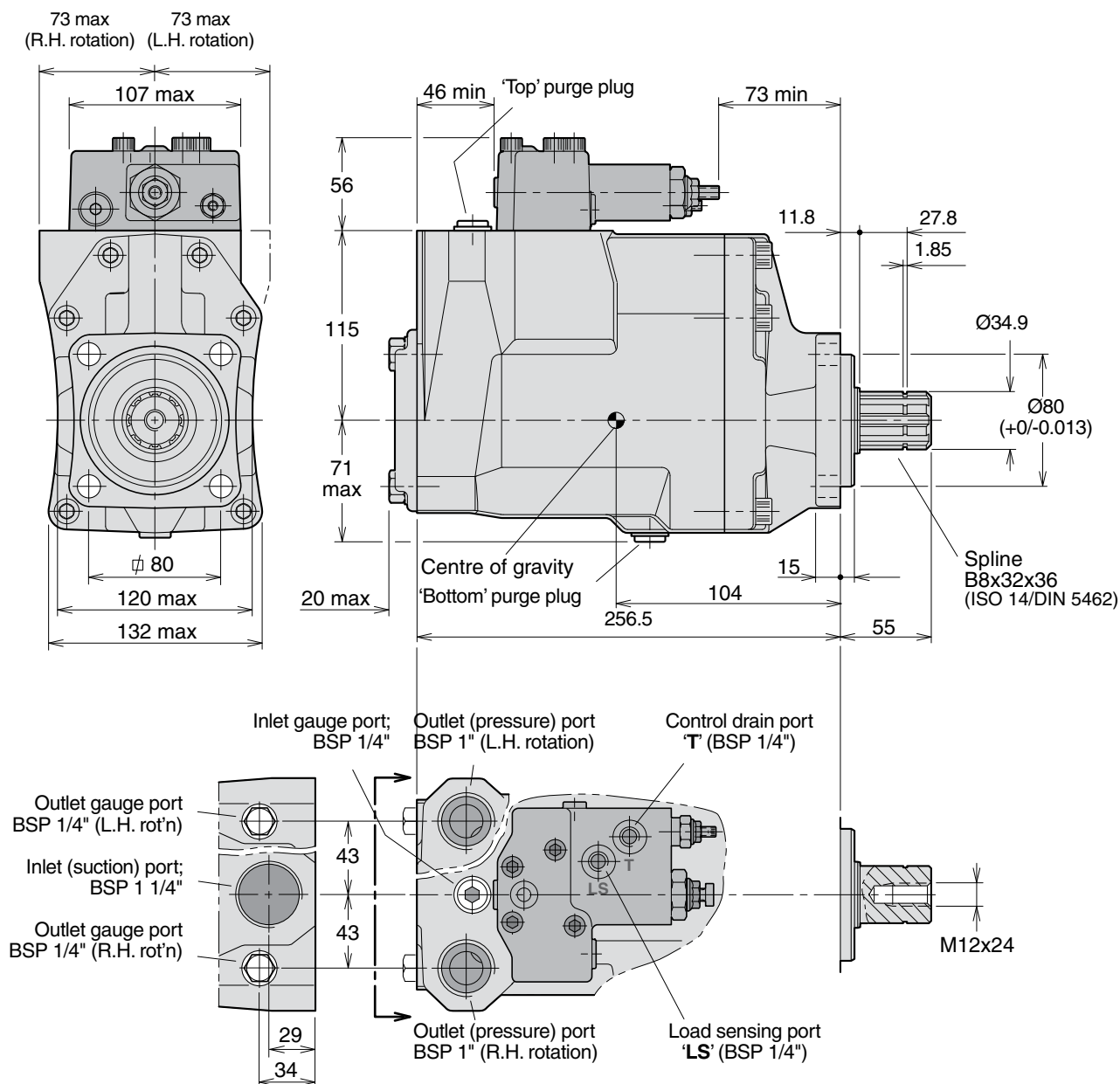
2) At an inlet pressure of 1.0 bar (abs.) with mineral oil at a viscosity of 30 mm²/s (cSt).

VP1-045/-075 cross section

1. Inlet port
2. 'Top' purge plug
3. Return spring
4. Control
5. Setting piston (one of two)
6. Swash plate
7. Bearing shell
8. End cover
9. Spline (for mounting an auxiliary pump)
10. Bearing sleeve
11. Hold-down plunger
12. Valve plate
13. Cylinder barrel
14. Barrel housing
15. 'Bottom' purge plug
16. Piston with piston shoe
17. Retainer plate
18. Bearing housing
19. Roller bearing
20. Shaft seals with carrier
21. Input shaft



VP1-045 and -075



IMPORTANT

The control is *not* drained through the pump case. An external line *must be installed* between the control drain port 'T' and the reservoir.

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

LS valve block VP1-045/075

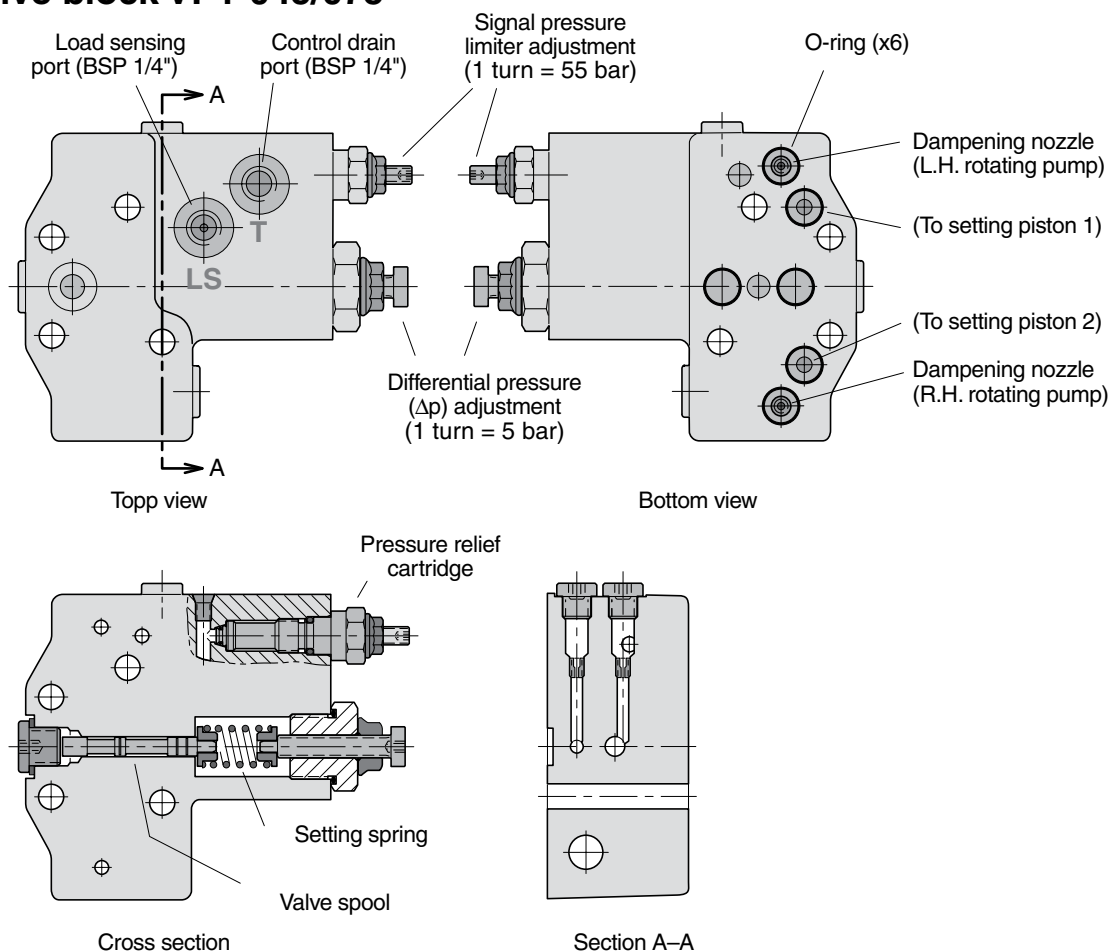


Fig. 2. LS valve block.

Through-shaft coupling VP1-045/075

The VP1 pump has a through-shaft which means that an additional pump, such as a fixed displacement F1, can be installed in tandem with the VP1 by means of an adaptor kit (fig. 3).

NOTE: The bending moment caused by the weight of a tandem assembly normally exceeds that allowed by the PTO. To prevent damage, the auxiliary pump should be supported by a bracket attached to the gearbox; it *must not* be fastened to the truck chassis. Likewise, when the tandem assembly is installed on a separate bracket and driven by a cardan shaft, the auxiliary pump should have a support attached to the pump bracket.

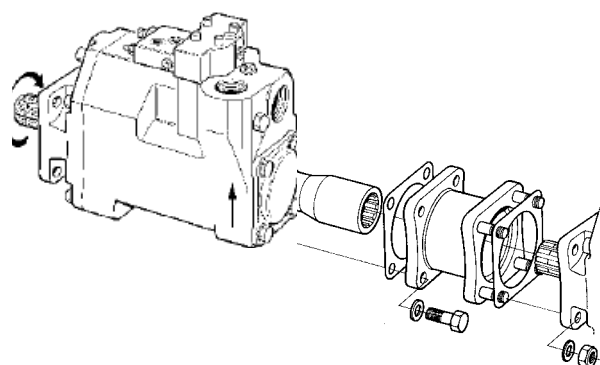


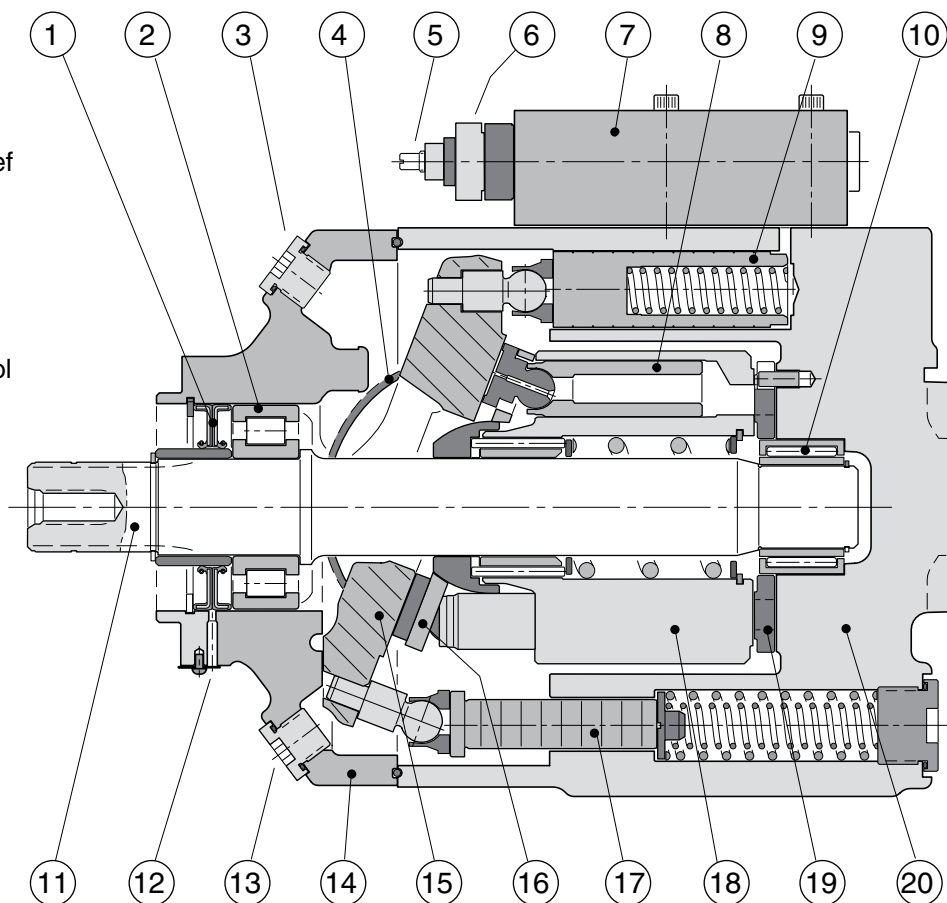
Fig. 3. Adaptor kit (P/N 379 7795) for tandem coupling.

IMPORTANT

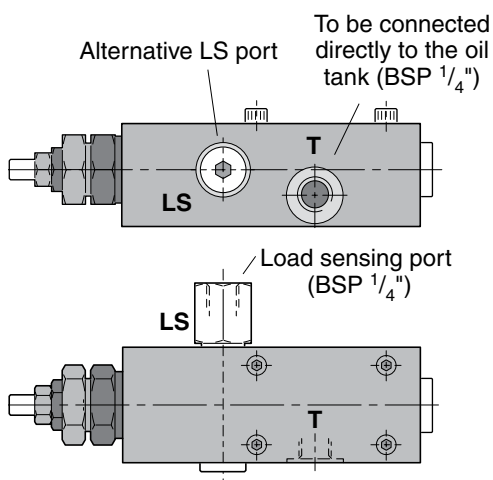
Contact Parker Hannifin for additional information when considering tandem mounting a second VP1 pump.

VP1-095/-110/-130 cross section

1. Shaft seal
2. Roller bearing
3. 'Upper' purge plug
4. Bearing shell
5. Setting screw (pressure relief valve)
6. Setting bushing (standby pressure)
7. Control
8. Piston with piston shoe
9. 'Upper' setting piston (control pressure)
10. Needle bearing
11. Shaft
12. Drain hole, shaft seals
13. 'Lower' purge plug
14. Bearing housing
15. Swash plate
16. Retainer plate
17. 'Lower' setting piston (pump pressure)
18. Cylinder barrel
19. Valve plate
20. Barrel housing

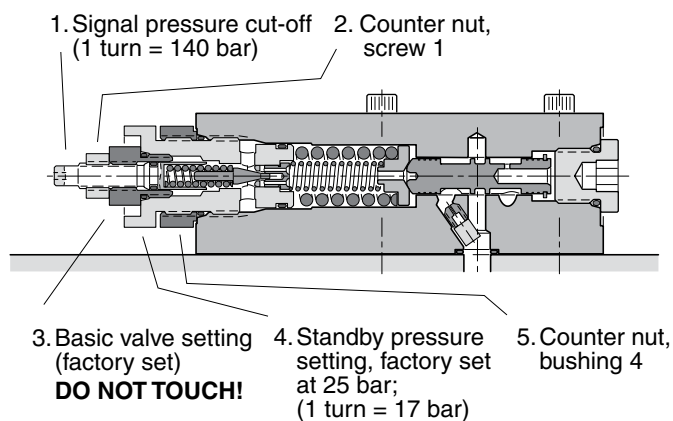


LS control (for VP1-095/-110/-130)



LS control ports.

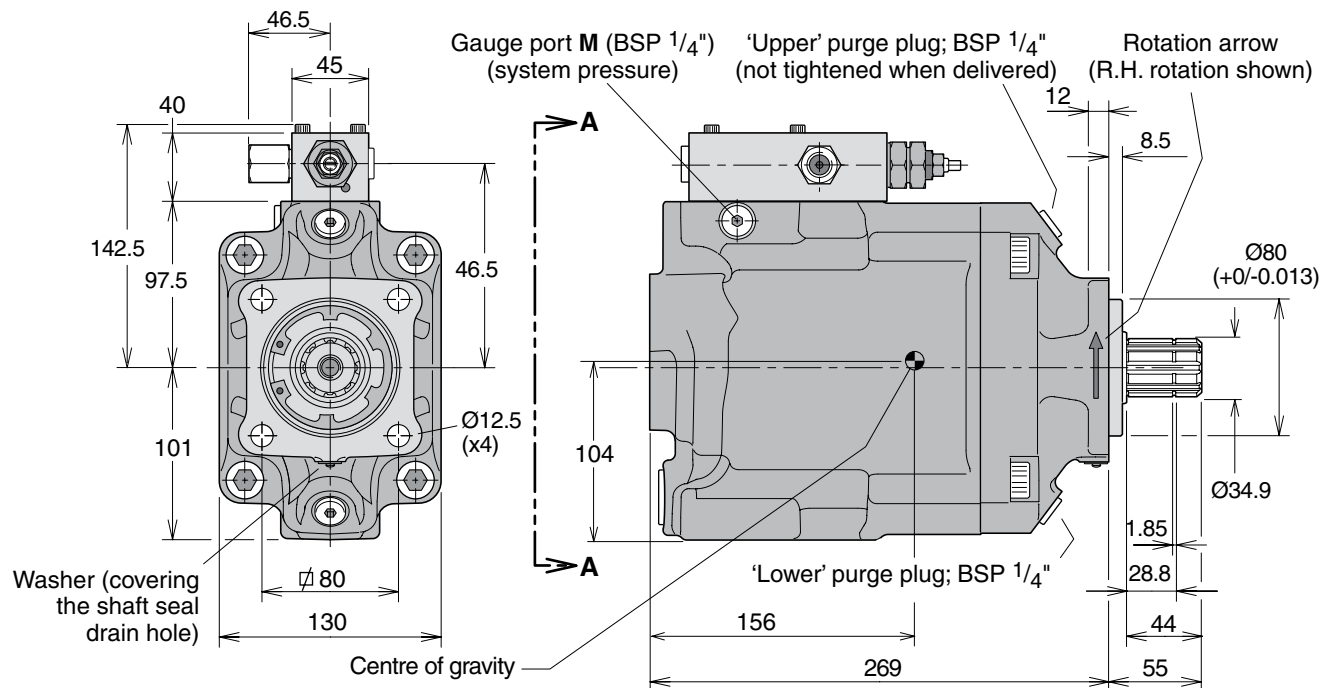
NOTE: Always run a function, after adjusting the standby pressure or the max pressure setting, before you read the value.



LS control cross section.

Item	Wrench / dimension
1	Hex Head Wrench / 4 mm
2	Wrench / 13 mm
3	DO NOT TOUCH
4	Wrench / 27 mm
5	Wrench / 27 mm

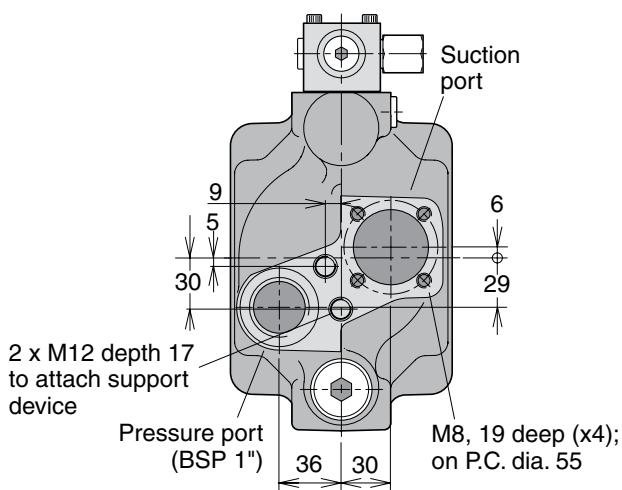
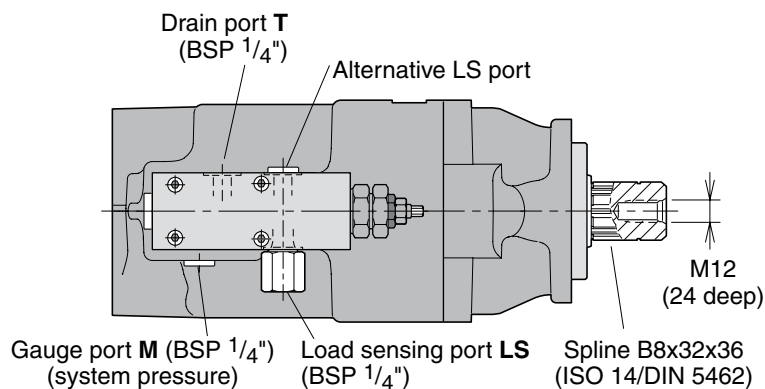
VP1-095/-110/-130



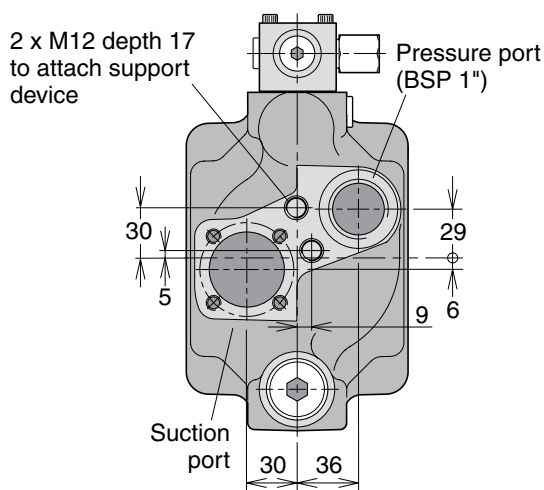
NOTE: The pump **does not** include a suction fitting; it must be ordered separately. See chapter 10.

IMPORTANT!

The control is **not** drained through the pump case; an external drain line must be installed from control port T and, directly, to the oil tank.



View A-A
Left hand rotating pump



View A-A
Right hand rotating pump

Ordering information

Example: **VP1 - 045 - L**

Frame size

045, 075, 095, 110 or 130

Direction of rotation

L Left hand

R Right hand

NOTE:

The VP1 is uni-directional.
Consequently, the desired direction of rotation must be stated *when ordering*.

Standard model numbers

Designation	Ordering no.
VP1-045-R	378 0334
VP1-045-L	378 0335
VP1-075-R	378 0336
VP1-075-L	378 0337
VP1-095-R	378 6000
VP1-095-L	378 6001
VP1-110-R	378 4110
VP1-110-L	378 4111
VP1-130-R	378 4500
VP1-130-L	378 4501

VP1 in load sensing systems

When installed in a load sensing system, the VP1 supplies the correct amount of flow required by the various work functions currently engaged.

This means that energy consumption and heat generation are minimised and much reduced in comparison with a fixed displacement pump used in the same system.

Diagram 1 shows the required power (flow times pressure) in a constant flow system with a fixed displacement pump.

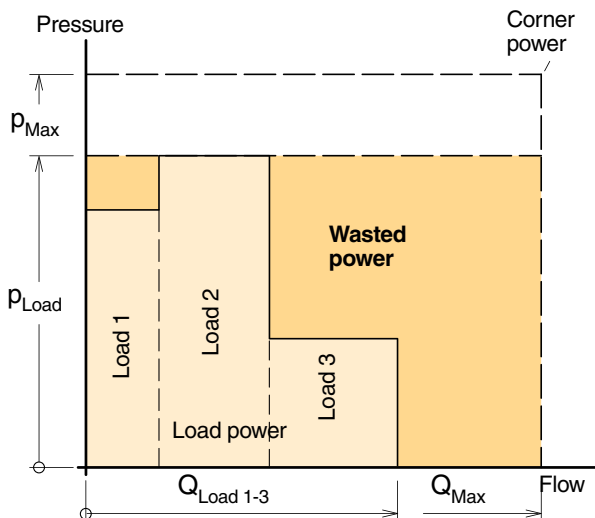


Diagram 1. Constant flow system with a fixed displacement pump.

Diagram 2 shows the sharply reduced power requirement in a load sensing system with a variable displacement pump such as the VP1.

In both cases the pump pressure is slightly higher than what is required by the heaviest load ('Load 2') but the VP1, because of the much smaller flow being delivered, needs only the power indicated by the shaded area 'Load power'.

In a constant flow system, on the other hand, excess fluid is shunted to tank and the corresponding power, 'Wasted power' (shown in diagram 1), is a heat loss.

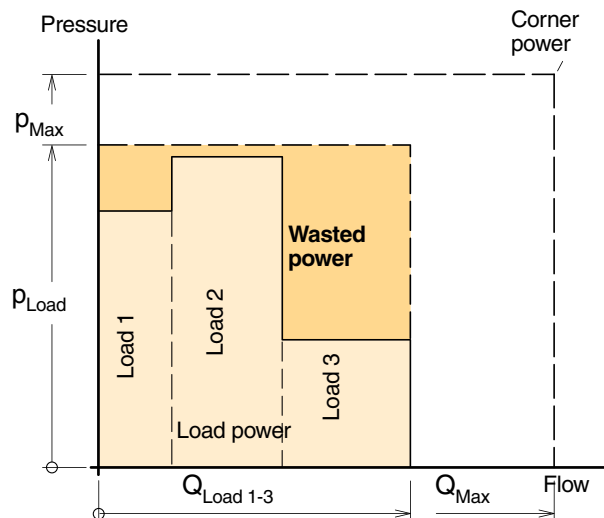


Diagram 2. Constant flow system with a variable displacement pump (e.g. VP1).

Systems comparison

System	Constant flow	Load-sensing
Pump	Fixed displ.	VP1 variable displ.
Pump adjustments	Pressure only	Pressure and flow
Load *	Some influence	Some influence
Energy		
consumption	High	Low
Heat generation	High	Low

* Simultaneous operation of loads with non-equal flows and pressures; refer to the above diagrams.

LS load sensing control function

Refer to corresponding hydraulic schematic below.

A selected 'opening' of the directional control valve spool corresponds to a certain flow to the work function. This flow, in turn, creates a pressure differential over the spool and, consequently, also a Δp between the pump outlet and the LS port.

When the differential pressure decreases (e.g. the directional valve is 'opened' further) the Δp also decreases and the LS valve spool moves to the left. The pressure to the setting pistons then decreases and the pump displacement increases.

The increase in pump displacement stops when the Δp finally reaches the setting (e.g. 25 bar) and the forces acting on the valve spool are equal.

If there is no LS signal pressure (e.g. when the directional valve is in the neutral, no-flow position) the pump only delivers sufficient flow to maintain the standby pressure as determined by the Δp setting.

LS control adjustments

Pressure limiter

Pump size	Factory setting [bar]	Max pressure intermittent [bar]
VP1-045/075	350	400
VP1- 095/110/130	350	420

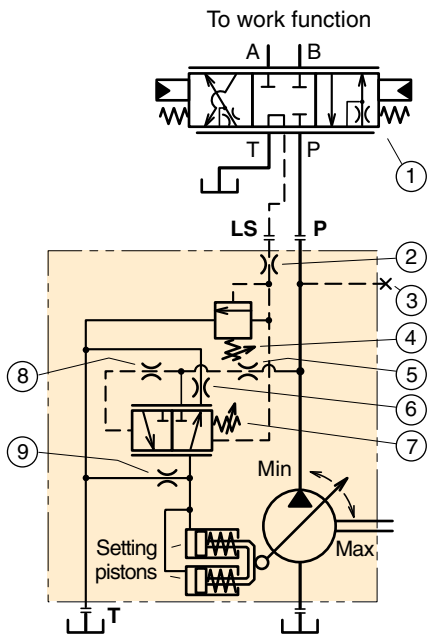
LS load sensing valve

Pump size	Factory setting [bar]	Min pressure [bar]	Max pressure [bar]
VP1-045/075	25	20	35
VP1- 095/110/130	25	15	40

The factory setting, and the standard orifice sizes shown in the corresponding schematic below, will usually provide an acceptable directional valve characteristic as well as system stability.

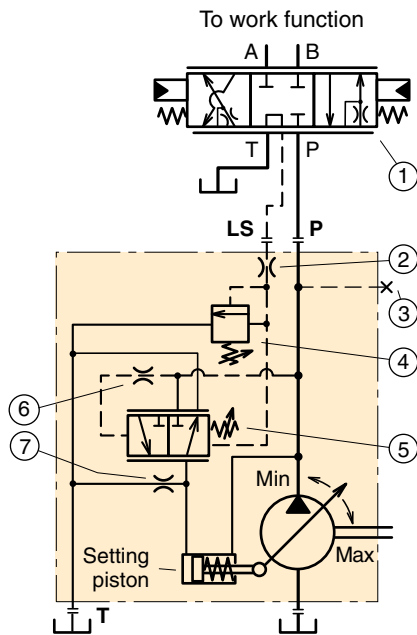
For additional information, contact Parker Hannifin.

Hydraulic schematic for VP1-45/75



1. Directional, load sensing control valve
2. Load signal orifice (1.0 mm; fixed)
3. Gauge port
4. Signal pressure limiter adjustment
5. System pressure dampening nozzle (2.0 mm)
6. Return line nozzle (0.6 mm)
7. Standby (Δp) pressure adjustment
8. System pressure dampening orifice (fixed)
9. Bleed-off nozzle (0.6 mm).

Hydraulic schematic for VP1-095/-110/-130



1. Directional, load sensing control valve
2. Load signal orifice (0.8 mm)
3. Gauge port
4. Signal pressure limiter adjustment
5. Standby (Δp) pressure adjustment
6. System pressure dampening orifice (fixed)
7. Bleed-off nozzle (1.2 mm)

BLA

General information

The BLA boost unit simplifies the building of closed or semi-closed hydrostatic transmissions.

Main features are:

- Replaces conventional charge pump and corresponding valves in many applications
- Allows pump speeds above normal selfpriming speed
- Suitable for system flow rates to 400 l/min
- Includes filter
- Simple construction - no moving/wear parts
- Cost-effective installation
- Small tank size
- Helps in building a low-cost hydrostatic transmission.

Description

In a closed circuit hydrostatic transmission, a charge pump is normally included with the main pump, providing make-up fluid which replaces pump and motor volumetric losses. It also maintains sufficient pump inlet pressure to avoid cavitation.

The BLA boost unit replaces the charge pump in many applications, when the following conditions are met:

- The max-to-min pump flow ratio does not exceed 2:1
- System pressure changes gradually without frequent and pronounced pressure peaks
- The line length between pump and boost unit is relatively short.

There are two basic sizes of the BLA boost unit:

- BLA 4 (to 160 l/min pump flow)
- BLA 6 (to 400 l/min).

The main part of the unit is an aluminium housing with a built-in nozzle and an injector; refer to the cross section to the right.

When fluid flows from the motor outlet port through the unit and to the pump inlet port, the increased fluid velocity between the nozzle and injector creates a low pressure zone causing additional fluid to be drawn from tank into the main circuit.

Also, pressure increases after the injector, allowing the pump to be operated at speeds higher than the self-priming speed. The 'boost pressure' increases with flow.

The housing includes ports that should be connected to the pump and motor drain ports respectively.

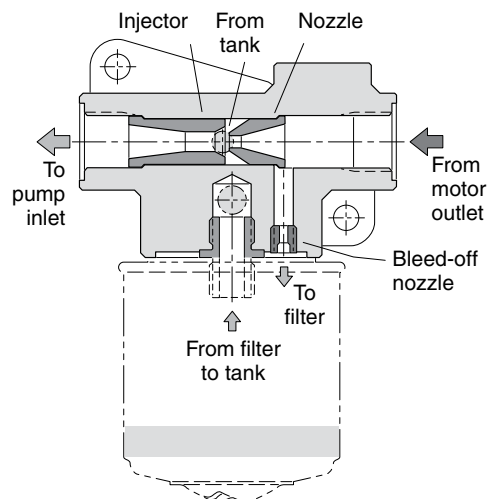
An additional bleed-off nozzle diverts approx. 10% of the main flow through the cartridge filter before being directed to the tank.

Typical applications:

- Fan drives
- Propeller drives
- Generator drives
- Pump drives.

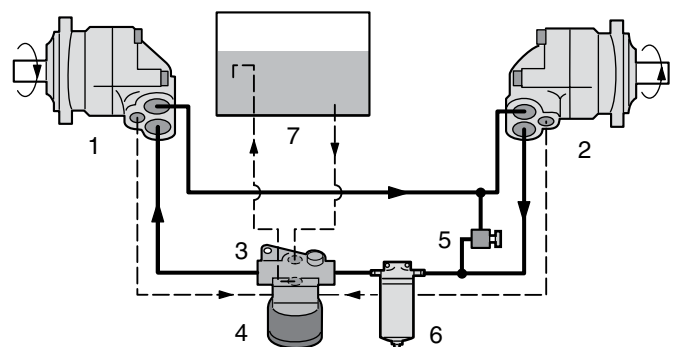
Oil cooling

An oil cooler is usually required in the hydraulic system, in order to remove the heat that is generated in the main circuit. A full-flow oil cooler should be installed in the return line between the motor and the boost unit.



BLA boost unit cross section.

Boost unit installation



- | | |
|--|-------------------------------------|
| 1. Pump | 5. Pressure relief valve |
| 2. Motor | 6. Full-flow filter (when required) |
| 3. Boost unit (with injector and nozzle) | 7. Reservoir |
| 4. Filter cartridge | |

For more information please see our technical catalogue BLA boost unit HY17-8224/UK

Suction fittings

for series F1, F2 and T1 pumps also VP1-095, -110 and -130

A 'suction fitting' consists of a straight, 45°, 90° or 135° suction fitting, clamps, cap screws and O-ring.

Suctions fittings for VP1-045/075 see page 51.

'Straight' suction fittings for F1, F2, T1, VP1-095/-110/-130

Ordering no.	A mm	B mm	C dia. mm (in.)
378 0635 ¹⁾	0	85	38 (1 1/2")
378 0636 ²⁾	17	136	50 (2")
378 0637 ³⁾	25	145	63 (2 1/2")
378 3523 ³⁾	32	174	75 (3")

45° suction fittings for F1, F2, T1, VP1-095/-110/-130

Ordering no.	A mm	B mm	C dia. mm (in.)
378 1234 ¹⁾	60	104	32 (1 1/4")
378 0633 ¹⁾	60	104	38 (1 1/2")
378 0364 ²⁾	67	110	50 (2")
378 0634 ³⁾	75	117	63 (2 1/2")
378 3367 ³⁾	95	138	75 (3")
378 1062	67	110	40
378 0975	67	110	45
378 0965	67	110	48

90° suction fittings for F1, F2, T1, VP1-095/-110/-130

Ordering no.	A mm	B mm	C dia. mm (in.)
378 0978 ¹⁾	126	83	38 (1 1/2")
378 0979 ²⁾	135	83	50 (2")
378 1980 ³⁾	147	83	63 (2 1/2")
378 0976	135	83	45
378 8690 ³⁾	185	83	75 (3")

145° suction fitting for F1, F2, T1, VP1-095/-110/-130

Ordering no.	A mm	B mm	C dia. mm (in.)
378 1867	165	73	50 (2")

1) Recommended for frame size F1-25.

2) Recommended for frame size F1-41,-51,-61,-81, -101.

3) (3 clamps and 3 screws)

Spare parts

Additional Hold-down-clamp kit consists of:

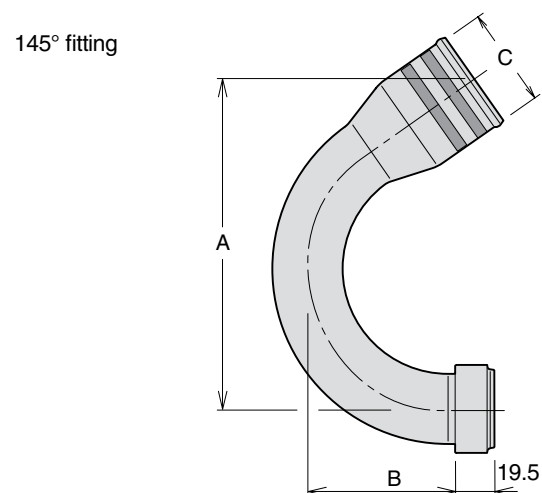
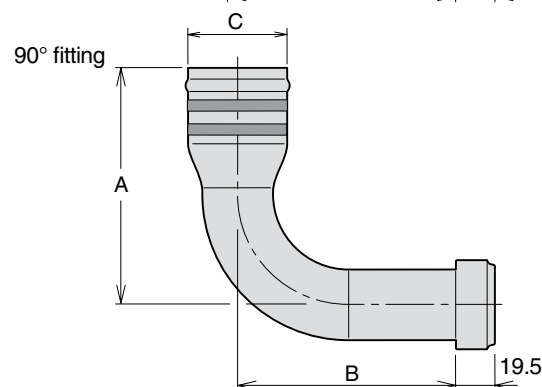
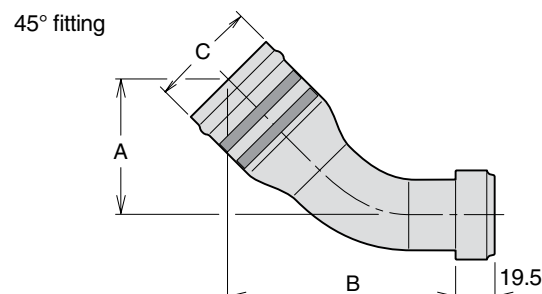
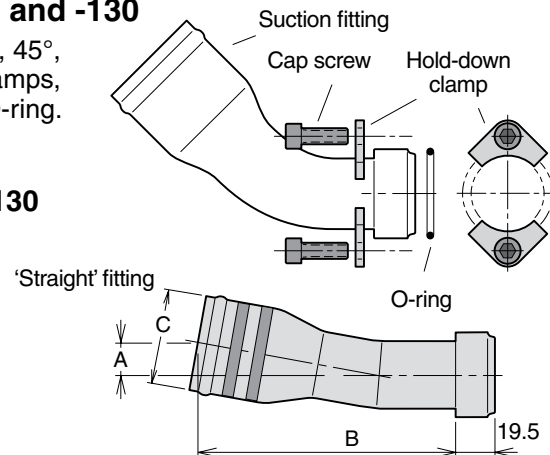
hold-down-clamp cap screw and O-ring

Ordering no. 378 1321

Additional Hold-down-clamp kit for mounting on BPV

Ordering no. 378 2439

NOTE: A suction fitting *must be ordered separately* (not included with the pump).
To choice the correct dimension of suction connection, see chapter 2.

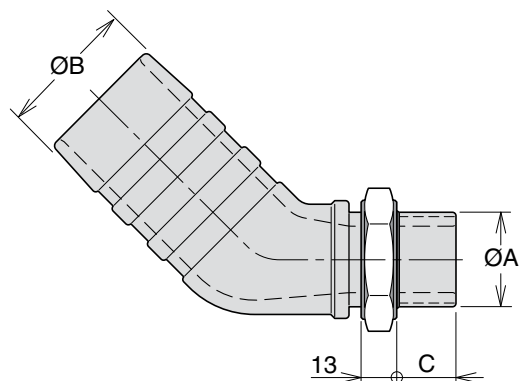


Suitable suction adapters for F1 with BSP port treads

45° adapter

Ordering no.	A mm	B mm	C dia. mm (in.)
00509035016	1"	2"	18
00509035116	1 1/4"	2"	18
00509021916	1 1/4"	2 1/2"	18

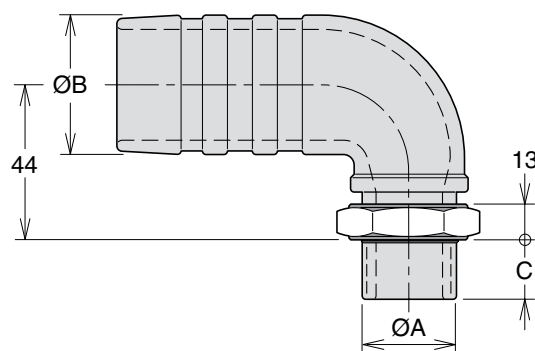
* BSP threads



90° adapter

Ordering no.	A mm	B mm	C dia. mm (in.)
00509034516	1"	2"	18
00509034616	1 1/4"	2"	18

* BSP threads

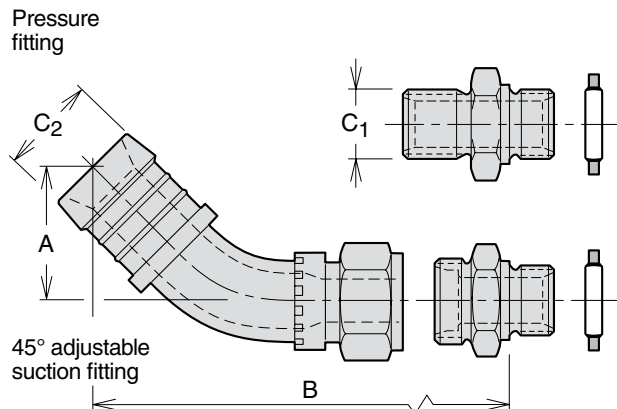


Fitting kits for VP1-045 and -075 pumps

Kits with 45° suction fitting

Pump size.	Ordering no.	C ₁	ØC ₂	A	B
VP1-045/075	379 9563	BSP 3/4"	2"	71	154
VP1-045/075*	379 9562	BSP 1"	2 1/2"	64	147

* Above 100 l/min



10

NOTE: A suction fitting *must be ordered separately* (not included with the pump). To choose the correct dimension of suction connection, see chapter 2.