



TI-P135-02

ST Issue 1

## PPC and PPF Pressure Powered Pumps

### Available types

PPC cast iron body and cover, with gunmetal check valves.  
PPF fabricated steel body and cover, with steel check valves.  
Connecting nipples are not supplied with check valves.

### Limiting conditions

Body design conditions PPC - 8.6 bar g (up to 232°C)  
PPF - 8.6 bar g (up to 343°C)\*.

Operating inlet pressure.

Steam, air or gas, 0.34 to 8.6 bar g.

Total lift or back pressure which must be below operating pressure to allow capacity to be achieved.

Height (H) in metres x 0.0981 plus pressure (bar g) in return line, plus downstream piping friction pressure drop in bar calculated at a flow rate of the lesser of six times the actual condensate rate or 20,000 L/h.

Filling head recommended above the pump is 0.3 m.

Minimum filling head 0.15 m (reduced capacity.)

Standard pump operates with liquids of specific gravity 1.0 down to 0.9, specify when ordering for liquid specific gravity from 0.9 to 0.65.

Pump discharge per cycle:- PPC 27 L, PPF 32 L.

Each cycle at a maximum flow rate of 20,000 L/h.

Steam consumption — 3 kg. of steam per 1000 kg liquid pumped.

Air consumption — 6230 L<sub>n</sub> per 1000 kg liquid pumped.

\* ASME stamped — (ASME Boiler and Pressure Vessel Code Section VIII Div 1).

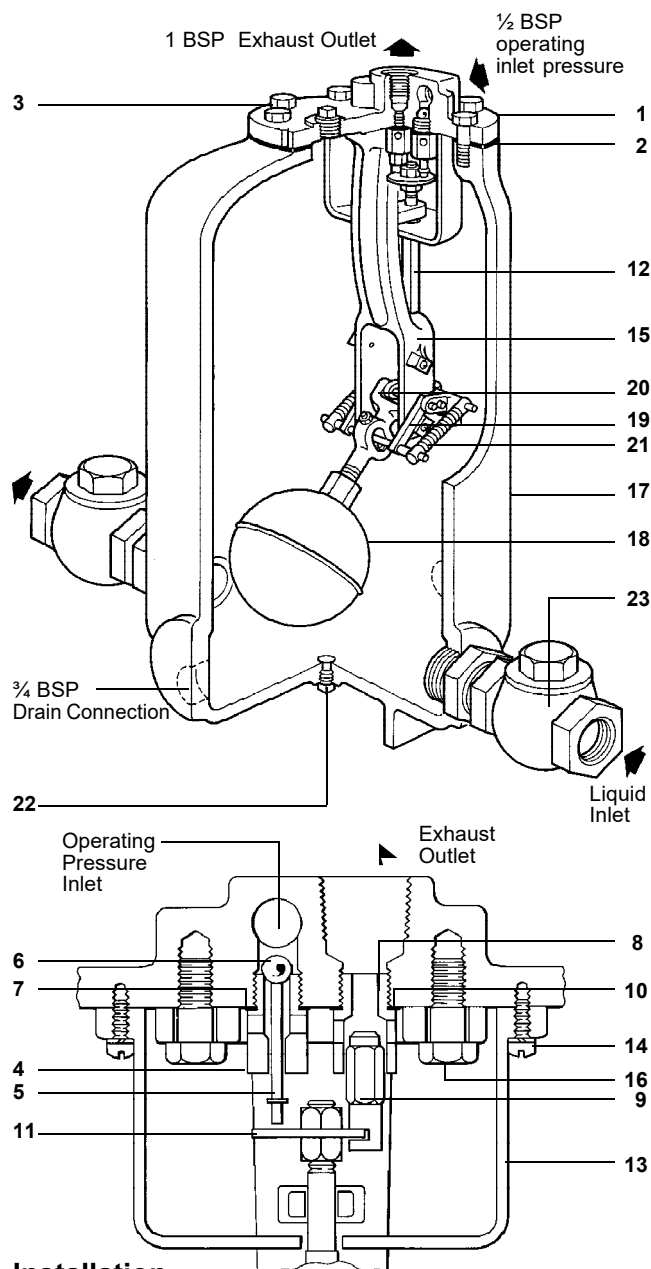
### Sizes and pipe connections

1", 1½", 2" and 3" x 2" PPC Screwed bsp (BS21 - parallel)  
PPF Screwed API

### Materials

No.	Part	Material
1	Cover PPC	Cast Iron ASTM A126 Class B
	PPF	Cast Steel ASTM A216 WCB
2	Cover Gasket	Graphite Union Carbide GHP
3	Cover Screws	Steel SAE 1035 Gr. 5 ½" -13 x1¼"
4	Inlet Valve Seat	Stainless Steel AISI 303
5	Inlet Valve Stem	Stainless Steel AISI 303
6	Inlet Valve Head	Stainless Steel AISI 440
7	Inlet Valve Seat Gasket	Stainless Steel AISI 302
8	Exhaust Valve Seat	Stainless Steel AISI 303
9	Exhaust Valve	Stainless Steel AISI 303
10	Exhaust Valve Seat Gasket	Stainless Steel AISI 301
11	Valve Actuator Disc	Stainless Steel AISI 302
12	Push Rod	Stainless Steel AISI 303
13	Baffle	Cast Iron ASTM A126 Class B
14	Baffle Screws	Stainless Steel AISI 303 ¼" — 20 x ¾"
15	Mechanism Yoke	Cast Iron ASTM A126 Class B
16	Mechanism Yoke Screws	Stainless Steel AISI 304 ½" — 13 x 1¼"
17	Body PPC	Cast Iron ASTM A126 Class B
	PPF	Carbon Steel + ASTM SA414 G
18	Float & Arm	Stainless Steel AISI 304
19	Linkage Mechanism	Stainless Steel AISI 303/304
20	Push Rod Actuator	Stainless Steel AISI 304
21	Spring	Stainless Steel AISI 316
22	Plug ½"	Forged Steel ASTM A105
23	Check Valves PPC	Gunmetal BS 1400 LG1
	PPF	Cast Steel ASTM A216 WCB

+ Alternatives are sometimes used.



### Installation

For best operation any flash steam must be vented or condensed ahead of pump inlet.

Full details are given in the Installation Instructions supplied with each pump.

### Optional extras

**Flow counter** for measuring liquid pumped.

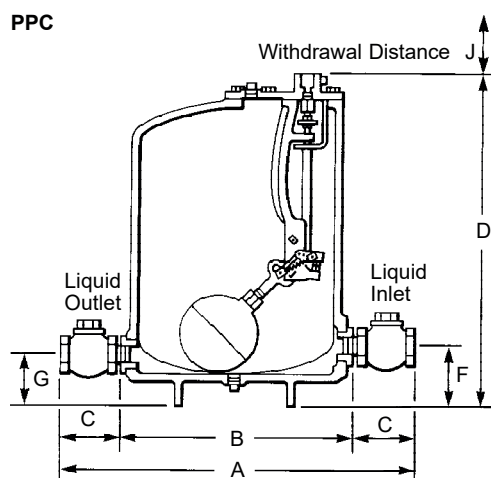
A plugged boss is provided on the pump cover, screwed ½" API for connecting the counter. The flow counter body is brass and must be installed in a vertical position. Flow counter can only be used when pump exhaust is vented to atmosphere.

**Gauge glass with brass cocks.**

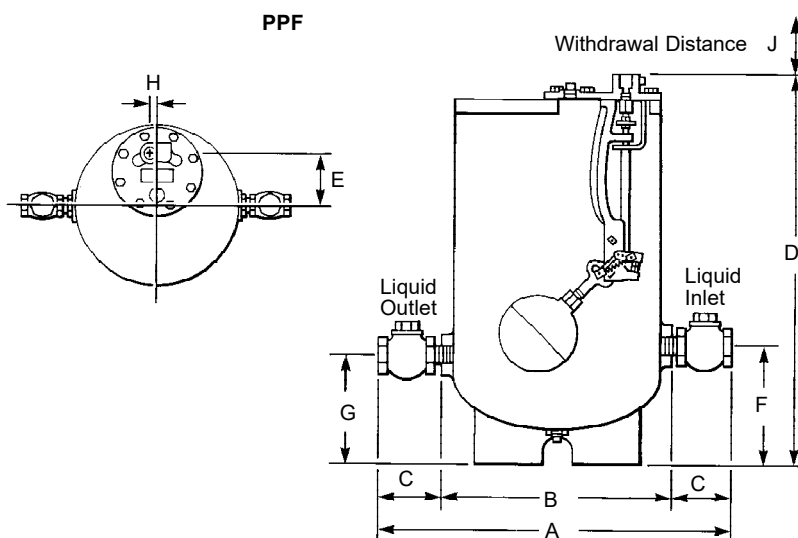
# 9 Condensate pumps

## Mechanical pumps and pumps traps

PPC



PPF



### Dimensions (approximate) in millimetres

#### PPC

Size	A	B	C	D	E	F	G	H	J	Pump Weight	Cv's
1"	648	441	86	633	129	114	99	16	300	100 kg	3.2 kg
1½"	705	438	108	633	129	114	99	16	300	100 kg	5.2 kg
2"	749	413	133	633	129	114	99	16	300	100 kg	7.7 kg
3" x 2"	806	413	181	633	129	114	99	16	300	100 kg	15.9 kg

PPF

Size	A	B	C	D	E	F	G	H	J	Pump Weight	Cv's
1"	743	476	114	798	129	279	264	16	300	70 kg	3.2 kg
1½"	845	473	159	798	129	279	264	16	300	70 kg	5.2 kg
2"	883	448	184	798	129	279	264	16	300	70 kg	7.7 kg
3" x 2"	911	457	181	798	129	279	264	16	300	70 kg	15.9 kg

### How to specify

1 - SPIRAX SARCO Pressure Powered Pump type PPC with cast iron body size 2", complete with gunmetal check valves, and flow counter.

All external connections to be screwed bsp.

**Selection and Sizing** — See TIS 5.202.

### Note

If you are in any doubt about the size of pump required or if the conditions are unusual we will be glad to advise you if you will give us the answers to the following questions:-

- 1) Nature of liquid to be pumped.
- 2) Temperature of liquid to be pumped.
- 3) Quantity to be pumped (L/h).
- 4) Initial lift horizontal distance and net effective lift (i.e. initial lift less subsequent fall in discharge line).
- 5) Operating medium (steam, compressed air or gas).
- 6) Operating pressure available.
- 7) The pump is generally used to drain water from a vented receiver but under certain circumstances can drain a unit from under steam pressure or vacuum. State which.

**Note:** To achieve rated capacity, pump must be installed with check valves as supplied by Spirax Sarco. Use of a substitute check valve may affect the performance of the pump.

### Spare parts for sizes 1", 1½", 2" and 3" x 2"

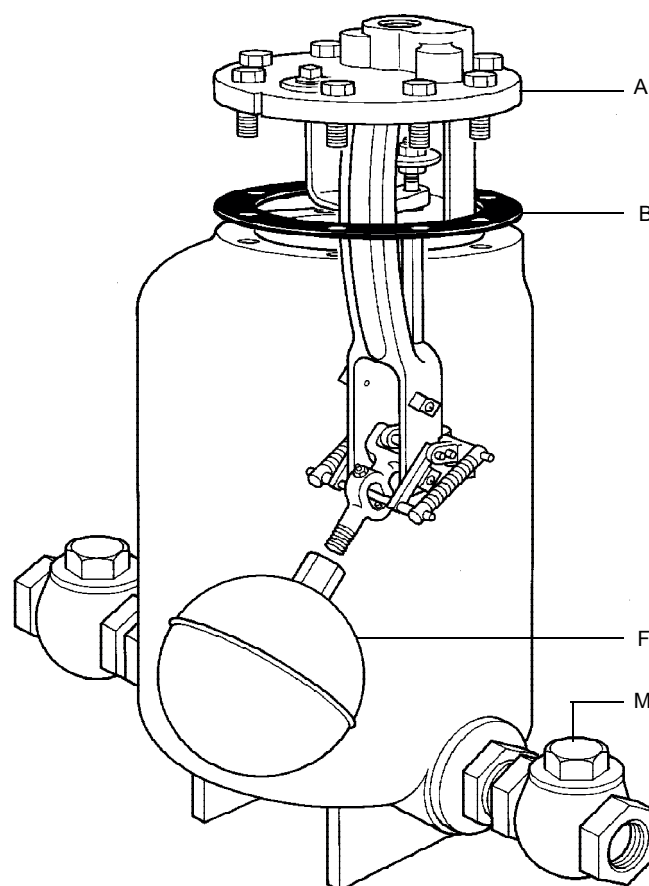
The spare parts available are shown in heavy outline. Parts drawn in broken line are not available as spares.

#### AVAILABLE SPARE

Cover Gasket	B
Float	F
Inlet/Outlet Check Valve (each)	M
Cover and Internal mechanism	A,B,F
Assembly	(complete)

### Recommended tightening torque

Cover bolts — 80/88 Nm



### How to Order

Always order spares by using the description given in the columns headed Available Spare and by stating the size and type of pump.

Example — 1 — Cover Gasket for 2" SPIRAX SARCO PPC Pressure Powered Pump.



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## PPC and PPF Pressure Powered Pumps

### How to select and size

From the inlet pressure, back pressure and filling head conditions given below, select the pump size and check valve package which meets the capacity requirement of the application. Specify pump body, type PPC or PPF. Select optional extras as required. For liquid specific gravities from 0.9 to 0.65 consult Spirax Sarco.

#### Example

Condensate Load	1640 kg/h
Steam pressure available for operating pump	5.2 bar g
Vertical lift from pump to the return piping	9.2 m
Pressure in the return piping (piping friction negligible)	1.7 bar g
Filling head on the pump available	0.3 m

#### Selection

- Calculate "H", the total lift or back pressure, against which the condensate must be pumped. (see overleaf).  
$$= (9.2 \times 0.0981) + 1.7 = 2.6 \text{ bar g.}$$
- From capacity table, with 5.2 bar g inlet pressure and 2.8 bar g back pressure, choose a size 1½ pump which has a capacity of 1725 kg/h.

#### Note from capacity factor charts

- A. Pump capacity filling head is 0.6m:  $1.2 \times 1725 = 2070 \text{ kg/h}$
- B. Pump capacity using compressed air:  $1.12 \times 1725 = 1932 \text{ kg/h}$   
(% Back pressure/Motive pressure is  $2.6 \div 5.2 = 50\%$ )

### Capacity kg/h

When installed with recommended filling head above top of pump of 0.3m (& liquid specific gravity 0.8 - 1.0)

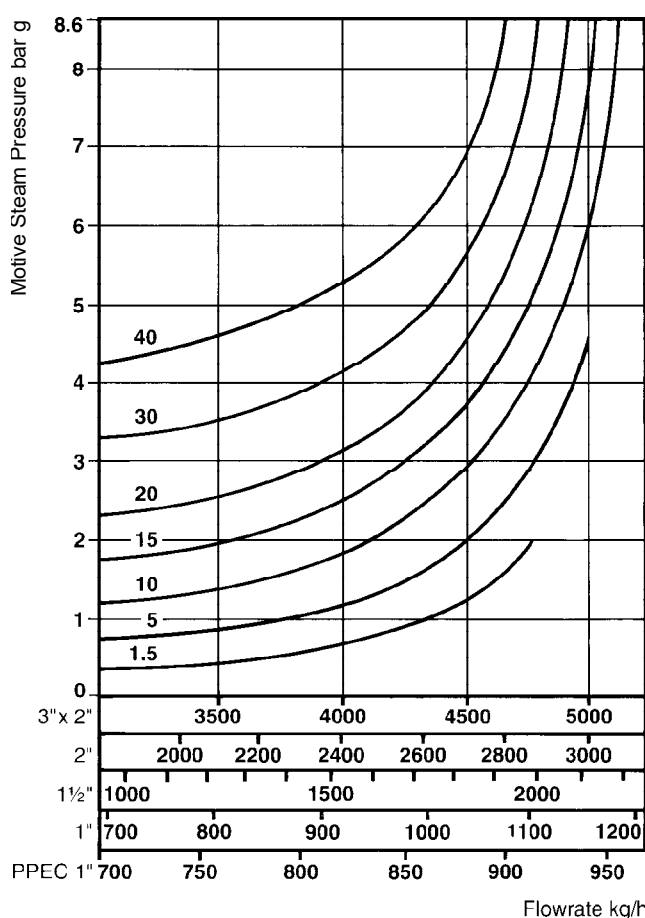
Operating Total Lift or		Capacity (kg/h)			
Inlet Pressure	Back Pressure*	Pump Size			
bar g	bar g	1	1½	2	3 x 2
8.6	1.0	1180	2134	3042	5130
8.6	2.8	1090	2043	2860	4808
8.6	4.1	1044	1768	2724	4626
6.9	1.0	1180	2088	2996	5080
6.9	2.8	1090	1907	2769	4717
6.9	4.1	1000	1634	2633	4490
5.2	1.0	1135	1907	2996	5080
5.2	2.8	1090	1725	2633	4444
5.2	4.1	908	1544	2270	3855
3.4	0.69	1090	1816	2906	4900
3.4	1.7	1044	1680	2633	4444
3.4	2.8	908	1453	2179	3720
1.7	0.34	1044	1907	2769	4717
1.7	0.69	953	1771	2542	4553
1.7	1.0	908	1498	2315	3945
0.69	0.14	908	1498	2315	3945
0.69	0.34	817	1316	1861	3174
0.34	0.14	726	1226	1725	2811

\* Back pressure is the lift height (H) in metres x 0.0981 plus pressure bar g in return line, plus downstream piping friction pressure drop in bar calculated at the lesser of six times the actual flow rate or 20,000 l/h.

### Capacity multiplying Factors for motive gas supplies (other than steam)

10%	20%	30%	40%	50%	60%	70%	80%	90%	% Back pressure Vs Motive pressure (BP/MP)
1.04	1.06	1.08	1.10	1.12	1.15	1.18	1.23	1.28	Capacity Multiplying Factors

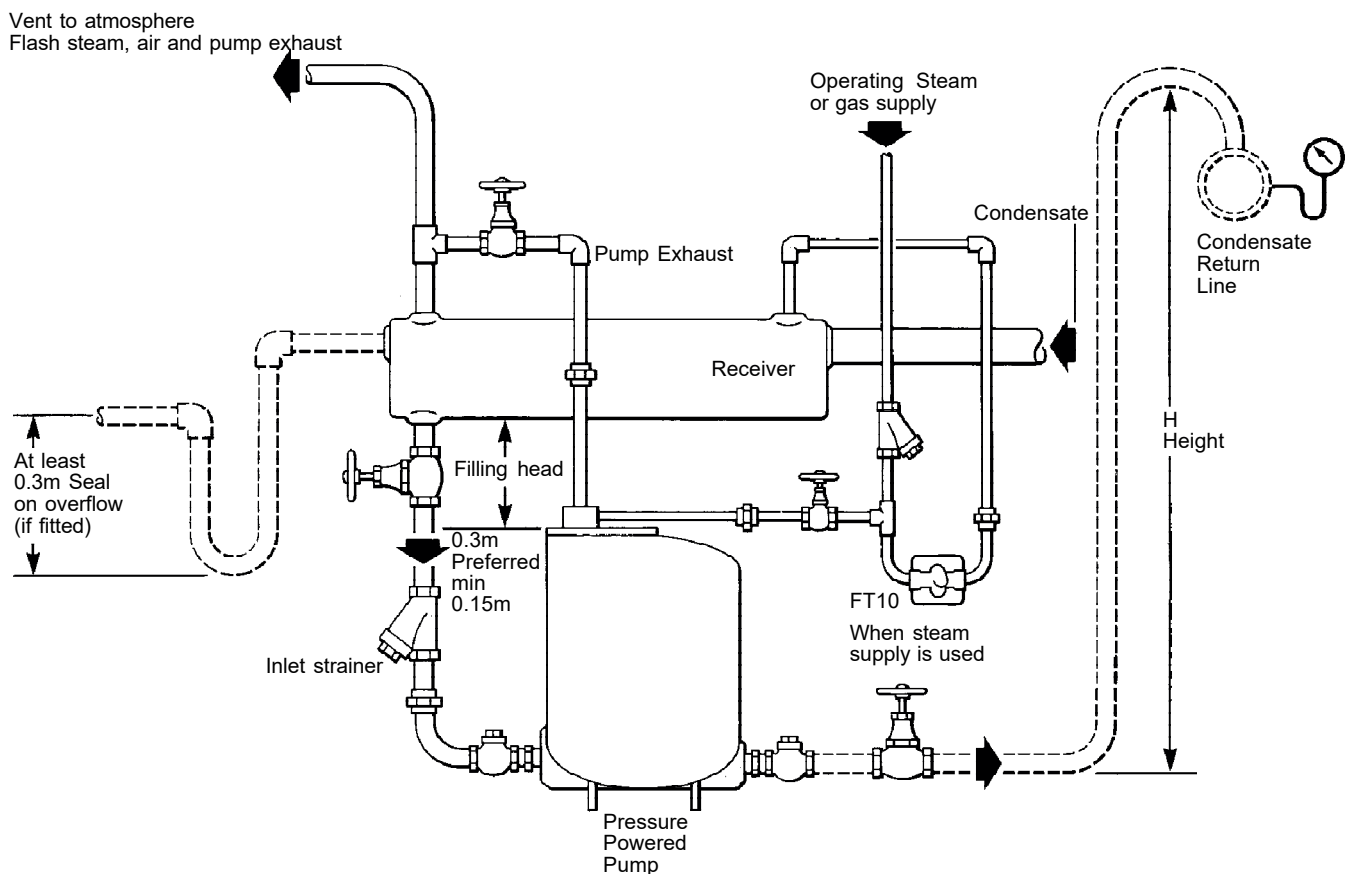
### Capacities



### Capacity multiplying Factors for other filling heads

Filling Head	Capacity multiplying Factors			
	Pump Size			
m	1	1½	2	3 x 2
0.15	0.7	0.7	0.7	0.84
0.3	1.0	1.0	1.0	1.0
0.6	1.2	1.2	1.2	1.08
0.9	1.35	1.35	1.35	1.20
1.2	—	—	—	—
1.8	—	—	—	—
2.1	—	—	—	—

9 Condensate pumps  
Mechanical pumps and pumps traps



Recommended installation of pressure powered pump when fitted to a vented receiver. Flash steam must be vented or condensed ahead of pump inlet. Application details will dictate which of the following options will be necessary to accomplish this.

Inlet reservoir piping

When draining a single piece of equipment and a receiver is not supplied ahead of the pump, install with sufficient piping as given in the table below, and use a 0.3m minimum filling head. This will prevent any flooding of the equipment while the pump is discharging.

Metres of reservoir piping above top of pump when pressure powered pump is installed without a receiver.  
Pump sizes 1, 1½, 2 and 3 x 2.

Liquid Load kg/h	Inlet Check Valve and Pipe Size			
	1	1½	2	3
277 or Less	1.2m			
454	2m	1.2m		
681	3m	1.5m	1.2m	
908	4m	1.8m	1.5m	
1362		3m	2.1m	
1816		3.6m	3m	
2270			3.6m	1.2m
2724				1.5m
3178				1.8m
3632				2.1m
4086				2.4m
4540				2.7m
9994				3m

Inlet receiver capacities

Sufficient receiver volume is needed above the filling head level to accept the condensate reaching the pump during the discharge stroke. The receiver can be a length of pipe of large diameter or a tank. A vent for flash steam and any incondensable gas is essential and an overflow may be provided as shown.

Receiver		Recommended				
Pump Size	Capacity	Suggested Receiver	Min Vent	Overflow		
ins	Litres	Galls	Size using standard Piping	Pipe Size	Pipe Size	Size
1	7	1½	0.60 m 24" of 6"	50	2	40 1½
1½	16	3½	0.65 m 26" of 8"	65	2½	50 2
2	24	5½	0.65 m 26" of 10"	80	3	65 2½
3	39	8½	1.10m 44" of 10"	100	4	80 3