

spirax/sarco®

Pressure Powered Pumps Selection and Sizing

How to Select & 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. Select optional extras as required.

For GPM, multiply the capacities below by 0.002.

For kg/h, multiply the capacities below by 0.454.

For liquid specific gravities from 0.9 to 0.65, consult Spirax Sarco.

* Back pressure is the lift height (H) in feet x 0.433 plus psig in return line, plus downstream piping friction pressure drop in psig, calculated based on the maximum instantaneous discharge rate of the respective pump selected. (See TIS Sheets)

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

Condensate load	3000 lb/h
Steam pressure available for operating pump	75 psig
Vertical lift from pump to the return piping	30 feet
Pressure in the return piping (piping friction negligible)	25 psig
Filling head on the pump available	6 inches

Solution:

1. Calculate "H", the total lift or back pressure, against which the condensate must be pumped. = (30 x 0.433) + 25 = 38 psig
2. From capacity table, with 75 psig inlet pressure and 40 psig back pressure, choose a 1-1/2" pump with stainless steel check valves, which has a capacity of 3300 lb/h.

Note from capacity multiplying factor charts:

- A. Pump capacity if filling head is 24 in: 1.3 x 3,300 = 4290 lb/h
- B. Pump capacity using compressed air: 1.12 x 3,300 = 3696 lb/h (% back pressure is 38 ÷ 75 = 50%)

Capacity lb/h When installed with recommended filling head above top of pump.

Operating Inlet Pressure psig	Total Lift Back Pressure psig	Filling head 6"				Filling head 24 "
		Liquid Specific Gravity 0.9 to 1.0				Liquid Specific Gravity 0.9 to 1
		Single pump PPEC				High Capacity PPF-P
		Check Valve Size		Check Valve Size		Check Valve Size
1" Bronze	1-1/2" Bronze	1" Stn. Stl.	1-1/2" Stn. Stl.	4"		
300	20					
300	40					
300	60					
300	80					
300	100					
300	120					
300	150					
250	20					
250	40					
250	60					
250	80					
250	100					
250	120					
250	150					
200	15					
200	40					
200	60					
200	80					
200	100					
200	120					
200	150					
150	15					48,100
150	40					43,800
150	60					39,500
150	80					34,800
150	100					29,600
150	120					22,200
125	15	2,100	3,400	2,600	5,100	47,800
125	40	1,900	2,900	2,400	4,500	43,200
125	60	1,700	2,500	2,200	4,050	38,100
125	80	1,500	2,100	1,900	3,100	32,500
125	100	1,300	1,600	1,700	2,650	25,800
125	115	1,200	1,350	1,350	1,900	
100	15	2,100	3,400	2,550	4,950	47,100
100	40	1,800	2,800	2,300	4,000	41,700
100	60	1,600	2,400	2,200	3,250	35,400
100	80	1,400	1,800	1,750	2,500	27,700
75	15	2,100	3,300	2,500	4,800	46,300
75	40	1,700	2,500	2,200	3,300	39,100
75	60	1,300	2,000	2,000	2,450	
50	10	2,000	3,300	2,400	4,400	46,100
50	25	1,700	2,700	2,150	3,350	39,700
50	40	1,400	2,000	1,650	2,100	
25	5	2,000	3,400	2,700	5,000	45,300
25	10	1,700	3,000	2,350	3,800	39,900
25	15	1,400	2,600	1,800	3,300	
10	2	1,900	3,000	2,200	3,000	
10	5	1,600	2,600	1,900	2,600	
5	2	1,500	2,400	1,700	2,400	

* For Capacity Multiplying Factors for Motive Gas Supplies and Other Filling Heads see back side of this page.
** Capacity shown when fitted with specified check valves only.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.
In the interests of development and improvement of the product, we reserve the right to change the specification.

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Pressure Powered Pumps™ Installation Details

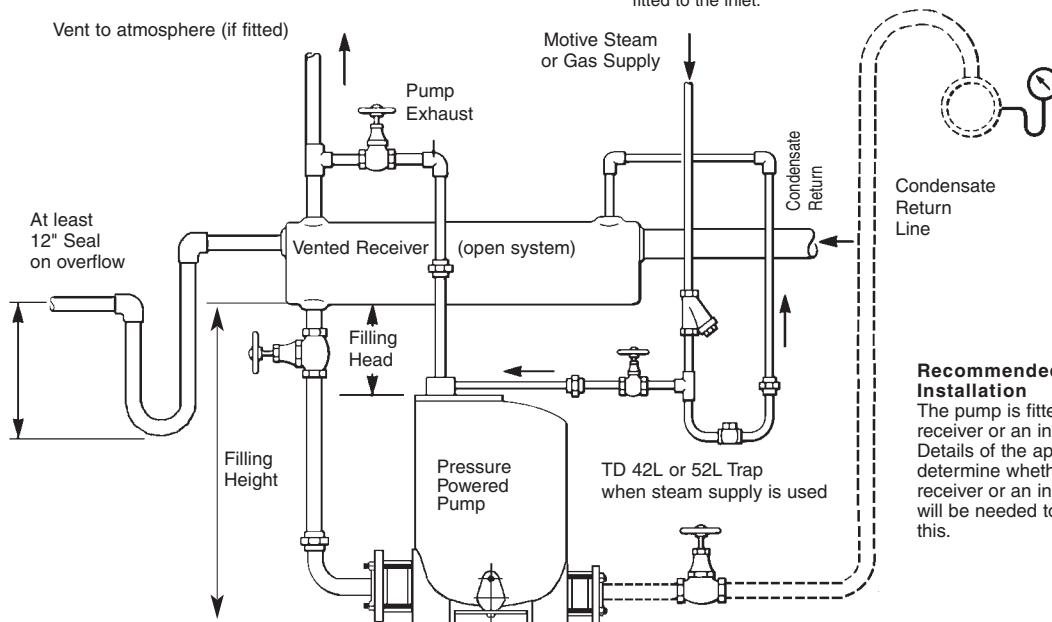
Capacity Multiplying Factors for Motive Gas Supply (other than steam)

1" PPEC										
10%	20%	30%	40%	50%	60%	70%	80%	90%	% Backpressure Vs. Motive Pressure (BP/MP)	
1.10	1.13	1.16	1.20	1.25	1.30	1.35	1.40	1.45	Capacity Multiplying Factors	
1-1/2" PPEC										
10%	20%	30%	40%	50%	60%	70%	80%	90%	% Backpressure Vs. Motive Pressure (BP/MP)	
1.00	1.00	1.03	1.09	1.18	1.20	1.33	1.45	1.50	Capacity Multiplying Factors	

Capacity Multiplying Factors for other Filling Heads

Capacity Multiplying Factors			
Filling Head type	Check valve and piping size, pump		
Inches	mm	1"&1-1/2" PPEC	
0	0	0.7	
6	152	1.0	
12	305	1.1	
18	457	1.2	
24	610	1.3	
36	914	1.5	
48	1219		
60	1524		

* When using a PPEC below 6" filling head, a swing check valve must always be fitted to the inlet.



Vented Receiver (Open System)

To drain condensate from a single or multiple source an "open" system, a vented receiver should be installed in a horizontal plane above and ahead of the pump. Sufficient receiver volume is needed above the filling head level to accept the condensate reaching the receiver during the pump discharge stroke. More important, the receiver must be sized to allow sufficient area for complete flash steam separation from the condensate. The chart below shows proper vented receiver sizing (per criteria set forth in the A.S.H.R.A.E. Handbook) based on the amount of flash steam present. If the receiver is sized as shown below, there will be sufficient volume for condensate storage and sufficient area for flash steam separation. The receiver can be a length of large diameter pipe or a tank.

Pump Size – up to 3"x2"

Flash Steam	Pipe Size	Vent Line Diameter
up to –	Diameter	Length
75 lb/h	4"	36"
150 lb/h	6"	36"
300 lb/h	8"	36"
600 lb/h	10"	36"
900 lb/h	12"	36"
1200 lb/h	16"	36"
2000 lb/h	20"	36"

Inlet Reservoir Piping (Closed System)

To drain condensate from a single piece of equipment in a "closed" system, a reservoir should be installed in a horizontal plane above and ahead of the pump. Sufficient reservoir volume is needed above the filling head level to accept the condensate reaching the reservoir during the pump discharge stroke. The chart below shows minimum reservoir sizing, based on condensate load, needed to prevent equipment flooding during the pump discharge stroke. The reservoir can be a length of large diameter pipe or a tank.

Pump Size – up to 3"x2"

Liquid lb/h	Reservoir Pipe Size				
	3"	4"	6"	8"	10"
500 or Less	2'				
1000	2'				
1500	3'	2'			
2000	3.5'	2'	1'		
3000		3'	2'		
4000		4'	2'	1'	
5000		6'	3'	2'	
6000			3'	2'	
7000			3'	2'	
8000			4'	2'	
9000			4.5'	3'	2'
10,000			5'	3'	2'
11,000			5'	3'	2'

Condensate Recovery
Non-Electric Pumps

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