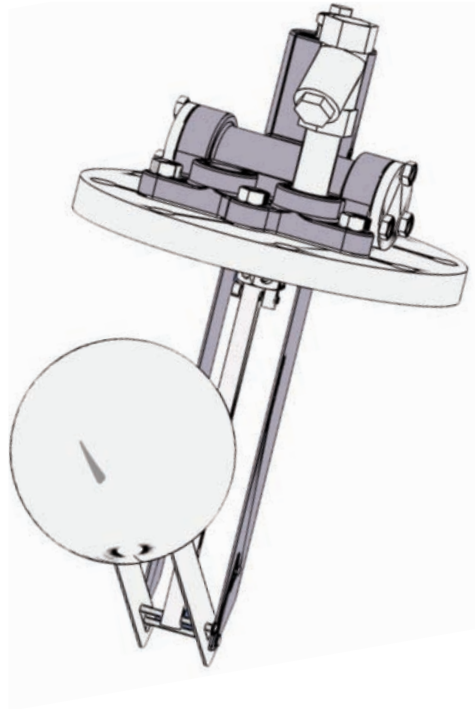




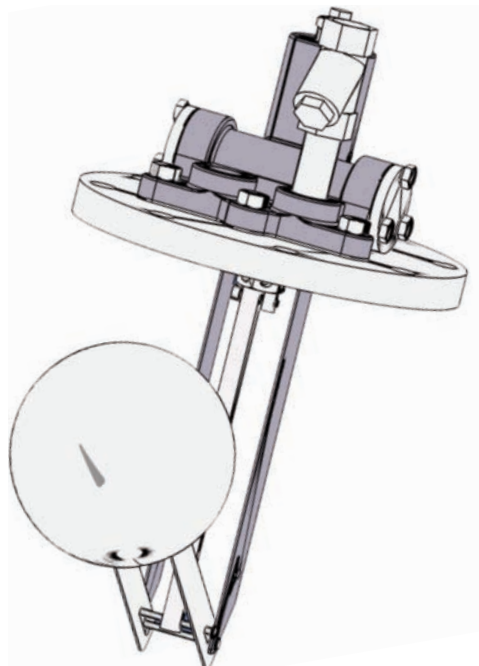
Nicholson

P3 PISTON POWER PUMP



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Patent No. 7,491,035 B2

APPLICATIONS

Collection of Condensate

- Remote locations such as tank farms
- Low pressure and vacuum systems
- Condensate systems with high back pressure
- High capacity process applications such as heat exchangers

Electrical Service is Unavailable or Prohibited

- Remote locations
- Hazardous locations

Submerged Areas

- Sumps or low lying areas
- Manholes

Hazardous Fluids

- Process fluids that may be difficult for conventional electric pump technology to handle

P3 PISTON POWER PUMP NON-ELECTRIC CONDENSATE PUMP

Pressures To 250 PSIG (20.7 barg)
Temperatures to 400°F (204°C)

SPECIFICATION

P3 Pump mechanism shall be of springless design employing no external seals or packing. The P3 mechanism shall have minimal pivot points and movement, minimizing friction and wear. The P3 mechanism shall be of all stainless steel construction and when requested, can be equipped with an external cycle counter.

MODELS

- P3 Replacement Mechanism, High Pressure
- Little Boy - Low Profile, Vertical Tank
- Classic Vertical - Vertical Tank
- Classic Horizontal - Low Profile, Horizontal Tank, High Pressure

MATERIALS OF CONSTRUCTION

Body.....	420 SS
Motive Nipple.....	316 SS
Strainer.....	316 SS
Linkage.....	316 SS
Ball Float.....	316 SS
Gasket.....	Non-Asbestos

OPTIONS

- Glass Water Gage*
- Cycle Counter
- Bronze or Stainless Steel Check Valves *
- Insulating Jacket *
- Supply Pressure Regulator
- Stainless Steel Tanks
- High Temperature *
- High Pressure *

*Available when integrated with pump tank

OPERATING PRINCIPLE

The P3 moves liquid using motive gas. This motive gas can be steam or compressed gas at a higher pressure than the delivery pressure of the pumped liquid. Liquid flows by gravity to the pump housing, in turn displacing steam or gas which exits through the vent valve. Rising fluid level in the pump housing causes the float, which is attached to the pump mechanism, to rise as well. When

the mechanism reaches the top of its travel, a piston assembly simultaneously closes the vent valve and opens the motive pressure valve. The motive gas fills the tank, displacing the fluid to be pumped. Check valves placed at both the inlet and outlet of the pump housing maintain flow direction.

INSTALLATION

1. The pump should be installed using the supplied strainer on the motive port. In “dirty” systems, additional filters or separators should be installed in the motive piping and should be located as far upstream as possible.
2. The pump should be gravity fed, and located at a lower elevation than the source of pumped fluid. The minimum recommended filling head, which is the minimum distance that the top of the pump must be located below the receiver outlet in inches, is listed in the table below:

Minimum Recommended Suction Head (inches)		
Little Boy	Classic Vertical	Classic Horizontal
6	12	12

3. To prevent equipment flooding during the pumping phase on “open systems”, install a vented receiver. For a “closed system”, a reservoir pipe or tank should be used.
4. On an “open system” the exhaust vent should be piped from the ½” NPT port on the pump marked with a “V” to the receiver, or vertically to atmosphere, as directly as possible.
For “closed systems” the vent should be piped to the top of the equipment being drained or outlet piping immediately after the equipment. An air vent should be installed at the high point of the vent line.
NOTE: If long vent runs are required, or if the vent line has low points where water can collect, a drain or drip leg is required to avoid water pockets. On long vertical runs, a drain or drip leg should be provided as close to the pump as possible.
5. Install the motive pressure line to the ½” NPT port on the pump marked with an “S”. A Spence pressure reducing valve is required to reduce motive below the pressure rating of the pump and should be installed as far upstream as possible. It is recommended to reduce motive pressure as low as possible to just

exceed the back pressure. This should not be below 15psi (10psi for air systems).

A Spence safety relief valve is strongly recommended if the source of the motive gas is being reduced from pressure above the maximum allowable pressure of the pump. The standard maximum allowable pressure for each of the models is listed below.

Maximum Allowable Pressure (psig)		
Little Boy	Classic Vertical	Classic Horizontal
150	250*	250

*Obtained with Ductile Iron tank or optional upgrades.

6. Install the pump inlet piping. It is recommended that a strainer and isolation valve be installed directly upstream of the pump to protect the check valves. Flow direction is determined by the orientation of the check valves.
7. Drip traps, piped to the receiver, should be installed if steam is used as the motive force.
8. On sump applications, steam should not be used as the motive supply, as it will condense inside the submerged pump tank instead of properly pressurizing and moving the fluid through.

NOTE: In order to achieve the rated capacity:

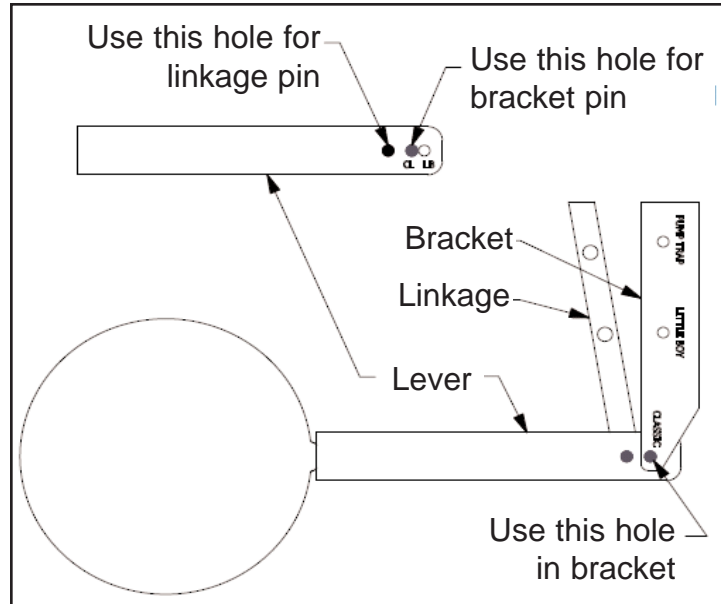
- a. Spence supplied check valves must be used.
- b. If using steam motive, fluid being pumped must be 190 deg F (minimum).

P3 CLASSIC VERTICAL / LITTLE BOY - LINKAGE CONVERSION

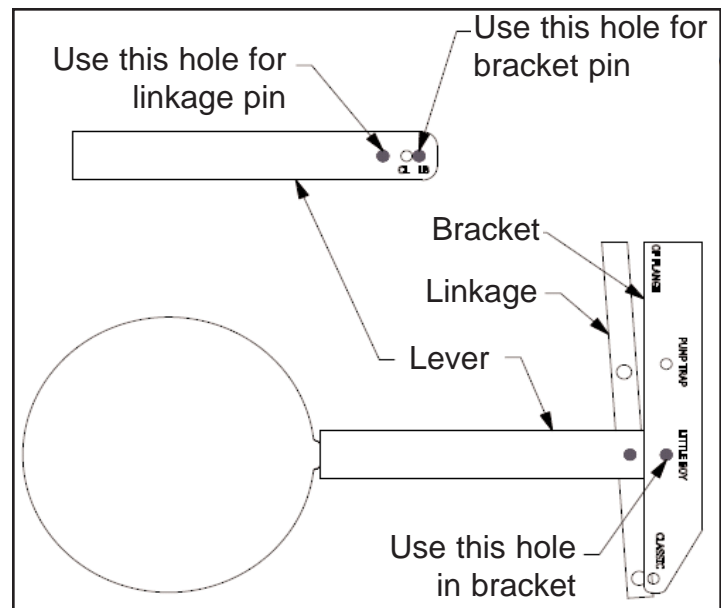
It is possible to convert the P3 Classic Vertical pump configuration to P3 Little Boy pump configuration. Please follow below procedures and refer to diagrams for explanation.

1. Remove the E-Clip and Pin from the Bracket.
2. Gently spread the Lever to separate it from the Pin & Bushing.
3. Remove the Pin & Bushing from the Linkage.
4. Insert the Pin & Bushing into its new hole in the Linkage (see illustration).
5. Gently spread the Lever to “snap” it onto the Pin & Bushing in the proper hole (see illustration).
6. Position the Lever on the Bracket, lining up the proper holes (see illustration).
7. Install the Pin & E-Clip.

CLASSIC VERTICAL



LITTLE BOY



START-UP / SHUT-DOWN

START-UP

1. Blow-down the supplied strainer on the motive connection. This is especially important in a new installation and when a pressure reducing valve (PRV) is used to reduce the steam pressure.
2. Open the motive supply valve slowly. Verify that the drip trap on motive is working correctly, when using steam.
3. Insure the vent piping is free of any type of obstruction (closed valves, scale debris, etc.).
4. Open the isolation valves on the pump inlet and outlet sides, in that order.
5. Open any additional valves upstream of the pump to allow condensate to flow to the pump and fill the tank. Once it is almost full the pump should trip and begin to discharge.
6. Observe proper operation of pump by listening for an audible knocking noise, which is the shifting of the secondary piston, allowing the pump to pressurize. Once the tank has almost emptied you should hear the knocking noise again when the piston shifts back allowing the tank to vent.

CAUTION: ALL INSTALLATION AND MAINTENANCE SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL.

Before removing the cover or mechanism, please make sure the pump is isolated and the internal pressure relieved. The motive, vent, and condensate inlet and outlet lines should be closed before performing any maintenance.

SHUT-DOWN

1. Wait for the venting phase of the cycle.
2. Close inlet isolation valve.
3. Close motive gas supply valve.
4. Close outlet isolation valve.
5. Drain pump tank via drain plug.

MAINTENANCE

1. Isolate the motive pressure, inlet, outlet and vent before performing any maintenance. Loosen the motive and vent connections if mechanism is to be removed.
2. If only the secondary piston needs replacing or cleaning, remove the bolts (14) on the endplate on either side. Insert a screw driver in the end marked with a "V" and push the secondary piston out the opposite side. Care should be taken to not score the cylinder bore. Clean with compressed air and water. Replace with piston kit, if necessary and insert back into pump. When inserting, make sure that:
 - a. The piston is oriented so that the "V" on the piston is on the same side as the "V" on the vent connection.
 - b. The seam of the center seal is facing upward.
 - c. The piston is installed from the end of the pump market with a "V".
3. If removal of the mechanism is required, make a note of its orientation, remove flange bolts and lift from tank. Inspect the mechanism for loose or damaged linkages. Remove any dirt or scale.
4. When reassembling pump, make sure to not put any unnecessary force on the float or the mechanism. Insert the float first into the tank.
5. Inspect pump at least once a year.
6. The most common form of pump failure can be traced to faulty or damaged check valves (usually debris from piping system). Keep your strainers clean!

Description	Part Number
Kit, Primary, Steam	6939982
Kit, Primary, Air	6939982A
Kit Secondary, Steam	6939983
Kit Secondary, Air	6939983A
Float Kit	6939981
Motive Strainer	0050-300Y1TT-A8

TROUBLE SHOOTING

Incorrect installation is typically the reason for poor pump performance. For existing installations that begin to operate poorly, the cause is usually due to a change in the conditions from the original design. When you know the operating conditions and issues that you are experiencing, please follow the below guidelines for possible solutions.

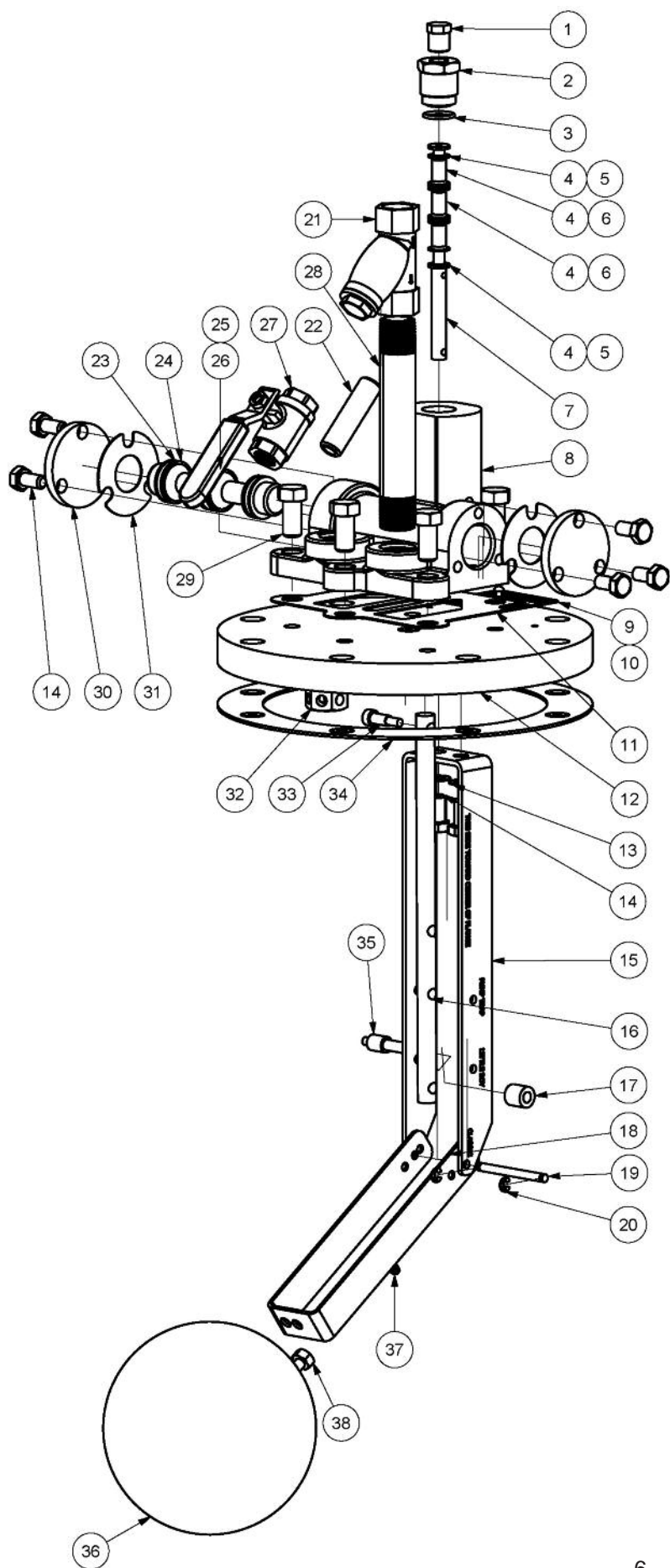
Please make sure that before any maintenance is performed that the pump has been isolated and any pressure has been relieved. This means that the motive pressure should be shut off and the inlet and outlet isolation valves should be closed. If a closed system, the vent isolation valve should also be closed.

CAUTION: ALL INSTALLATION AND MAINTENANCE SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL.

Symptom	Possible Cause	Solution
Pump fills, then stops (does not initiate)	<ul style="list-style-type: none"> a. Outlet check valve frozen b. Outlet piping clogged c. Steam condensing in tank (at startup) 	<ul style="list-style-type: none"> a. Replace check valve b. Inspect outlet piping c. Allow fluid to warm up to required minimum temperature
Pump continues filling, flooding the vent line	<ul style="list-style-type: none"> a. Float has lost its buoyancy b. Primary piston sticking c. Secondary piston sticking d. Motive force terminated 	<ul style="list-style-type: none"> a. Replace float b. Inspect piston, clean if fouled or replace if damaged c. Inspect piston, clean if fouled or replace if damaged d. Determine cause of motive force termination
Pump does not fill, stops pumping	<ul style="list-style-type: none"> a. Inlet check valve frozen 	<ul style="list-style-type: none"> a. Replace check valve
Pump does not fill, steam blowing into outlet piping	<ul style="list-style-type: none"> a. Primary piston sticking b. Secondary piston sticking c. Loss of motive pressure 	<ul style="list-style-type: none"> a. Inspect piston, clean if fouled or replace if damaged b. Inspect piston, clean if fouled or replace if damaged c. Inspect motive piping
Diminished Capacity	<ul style="list-style-type: none"> a. Inlet or outlet check valve fouled b. Steam condensing in tank (at startup) c. Reduced inlet head d. Change in motive pressure e. Increased downstream pressure (high backpressure) 	<ul style="list-style-type: none"> a. Clean or replace check valve b. Allow pumping fluid to warm up c. Inspect inlet piping d. Determine cause of change in pressure e. Inspect downstream piping
Excessive leakage out vent*	<ul style="list-style-type: none"> a. Primary or secondary seals worn b. Pump housing gasket broken 	<ul style="list-style-type: none"> a. Replace primary or secondary piston b. Replace gasket
Receiver floods or overflows	<ul style="list-style-type: none"> a. Change in operating conditions b. Pump failure (see 1 - 5 above) 	<ul style="list-style-type: none"> a. Determine cause of change b. As noted above

* It is normal to see a small amount of discharge from the vent on "open systems", during the filling phase. This is due to the residual steam inside the pump tank being forced out and not from any internal leakage. During the pumping phase, minor blow-by of the seals can be expected and may be more noticeable if using high motive pressure.

PARTS LIST



ITEM	DESCRIPTION	PART NUMBER	QTY	MATERIAL
1	PLUG	04-03772-00	1	STEEL
2	STOP	05-17657-00	1	STAINLESS STEEL
3A	O-RING (STEAM)	05-04011-00	1	EPDM
3B	O-RING (AIR)	05-18294-00	1	VITON
4A	O-RING (STEAM)	05-17654-00	2	EPDM
4B	O-RING (AIR)	05-18297-00	4	VITON
5	PISTON SEAL (AIR)	05-17674-00	2	TFE
6	PISTON SEAL	05-17655-00	2	PLASTIC
7A	PRIMARY (STEAM)	423547	1	416 SS
7B	PRIMARY PIST. (AIR)	423664	1	416 SS
8	MECHANISM	423546	1	420 SS
9	NAMEPLATE	0028418	1	ALUMINUM
10	NAMEPLATE SCR.	0028250	1	STEEL
11	GASKET	05-18197-00	1	TEFLON
12	FLANGE	423462	1	STEEL
13	LOCK WASH.	131004	2	STAINLESS STEEL
14	HEX BOLT	05-17653-00	8	STAINLESS STEEL
15	BRACKET	423463	1	STAINLESS STEEL
16	LINKAGE	423464	1	STAINLESS STEEL
17	SPACER	04-18296-00	1	TEFLON
18	BRACKET	423465	1	STAINLESS STEEL
19	PIVOT PIN	423666	1	STAINLESS STEEL
20	C-CLIP	0040014	2	STAINLESS STEEL
21	STRAIN. (100 MESH)	0050-300Y1TT-A8	1	STAINLESS STEEL
22	NIPPLE	05-02804-00	1	STEEL
23A	U-RING (STEAM)	05-17652-00	2	EPDM
23B	U-RING (AIR)	05-18295-00	2	VITON
24	SEC. SPOOL	423458	1	416 SS
25A	O-RING (STEAM)	05-17650-00	2	EPDM
25B	O-RING (AIR)	05-18299-00	2	VITON
26	PISTON SEAL	05-17651-00	1	PLASTIC
27	1/4" BALL VALVE	0016321	1	BRONZE
28	MOTIVE PIPE	130028-501	1	STAINLESS STEEL
29	HEX BOLT	05-17649-00	5	STAINLESS STEEL
30	END PLATE	423459	2	STAINLESS STEEL
31	END PL. GASK.	05-17660-00	2	TEFLON
32	DIVERTER	05-17656-00	1	STAINLESS STEEL
33	SHOULDER SCR.	05-17658-00	1	STAINLESS STEEL
34	GASKET	0621230	1	GRAPHITE
35	LEVER PIN	423667	1	STAINLESS STEEL
36	FLOAT	0036019	1	STAINLESS STEEL
37	LOCK WASH.	05-18227-00	1	STAINLESS STEEL
38	HEX BOLT	0046630	1	STAINLESS STEEL

P3 PISTON POWER CLASSIC VERTICAL PUMP

SPECIFICATION

Pump shall be a pressure vessel drainer operated by steam, compressed air or other pressurized gas. Body shall be fabricated steel or cast ductile iron. Pump mechanism shall be all stainless steel without external packing or seals. When requested, unit shall be equipped with an external cycle counter, sight glass and insulating jacket.

MAXIMUM OPERATING CONDITIONS

Carbon Steel Tank - Fabricated ASME Sec.VIII Div.I
 PMO: Max. Operating Pressure 200 psig (13.8 barg)
 TMO: Max. Operating Temperature 400°F (204°C)
 PMA: Max. Allowable Pressure 200 psig (13.8 barg)
 TMA: Max. Allowable Temperature 400°F (204°C)

With optional Temperature/Pressure upgrades:
 PMO: Max. Operating Pressure 250 psig (17.2 barg)
 TMO: Max. Operating Temperature 400°F (204°C)
 PMA: Max. Allowable Pressure 250 psig (17.2 barg)
 TMA: Max. Allowable Temperature 400°F (204°C)

Ductile Iron Tank - Cast ASME B16.42
 PMO: Max. Operating Pressure 250 psig (17.2 barg)
 TMO: Max. Operating Temperature 400°F (204°C)
 PMA: Max. Allowable Pressure 250 psig (17.2 barg)
 TMA: Max. Allowable Temperature 400°F (204°C)

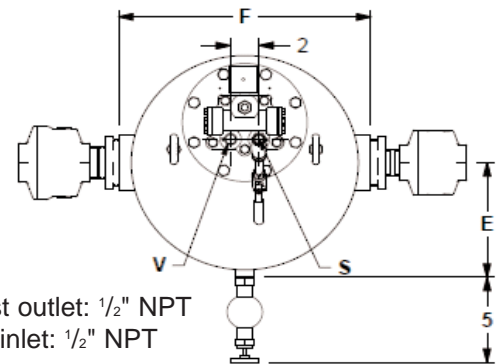
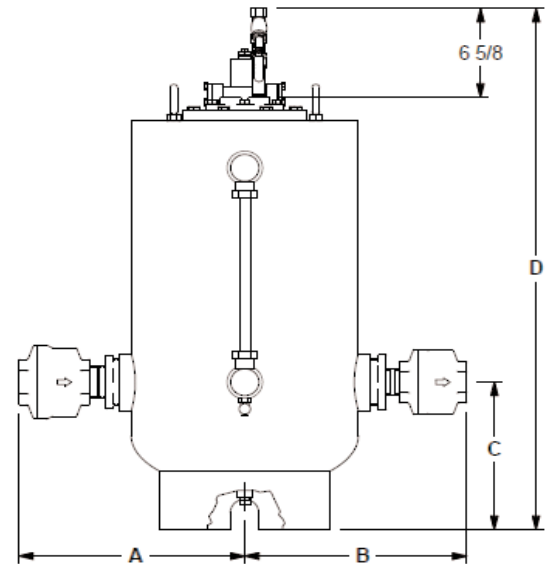
MATERIALS OF CONSTRUCTION

Tank Weldment	Steel or Ductile Iron
Trip Mechanism w/Flange	St/SS
Gasket	Graphite
Bolt, Hex Head	Steel
Eye Bolt	Steel
Nut	Steel
Nameplate	Aluminum
Drive Screw	Steel
Pipe Plug, 1/2" NPT	Steel
Water Level Gage	Bronze
Inlet Reducer	Steel
Inlet Nipple	Steel
Inlet Check Valve	Bronze/Stainless Steel
Outlet Reducer	Steel
Outlet Nipple	Steel
Outlet Check Valve	Bronze/Stainless Steel

OPERATING CHARACTERISTICS

Pump Discharge per Cycle: 7.8 - 8.6 Gal
 Max. Instantaneous Discharge Rate: 90 GPM (w/2" outlet check)
 Steam Consumption: ~3 lbs per 1000 lbs. of hot condensate pumped
 Air Consumption: ~100 SCF per 1000 lbs. of liquid pumped
 Recommended Filling Head: 12"

Canadian Registration # 1352.9C



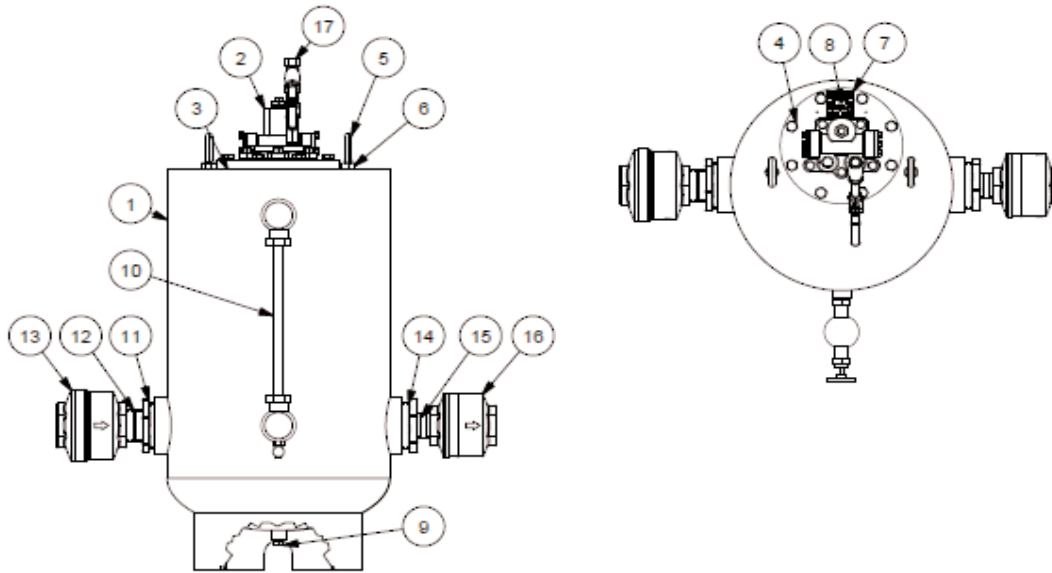
Exhaust outlet: 1/2" NPT
 Motive inlet: 1/2" NPT

Connections:
 1" x 1" to 3" x 2" Screwed

STEEL DIMENSIONS							
SIZE	INCHES (mm)						WEIGHT lbs(kg)
	A	B	C	D†	E	F	
1" X 1"	13-3/8 (340)	13-3/8 (340)	11 (279)	39-1/8 (993)	9 (278)	17-3/4 (451)	192 (87)
1-1/2" X 1-1/2"	14-3/4 (375)	14-3/4 (375)	11 (279)	39-1/8 (993)	9 (278)	17-3/4 (451)	194 (88)
2" X 2"	15 (381)	15 (381)	11 (279)	39-1/8 (993)	9 (278)	17-3/4 (451)	197 (89)
3" X 2"	16-1/2 (419)	15 (381)	11 (279)	39-1/8 (993)	9 (278)	17-3/4 (451)	209 (95)
DUCTILE IRON DIMENSIONS							
SIZE	INCHES (mm)						WEIGHT lbs(kg)
	A	B	C	D†	E	F	
1" X 1"	13-7/8 (352)	13-1/8 (333)	7 (178)	37 (940)	7-5/8 (194)	15-3/4 (400)	260 (118)
1-1/2" X 1-1/2"	15 (381)	14-1/4 (362)	7 (178)	37 (940)	7-5/8 (194)	15-3/4 (400)	260 (118)
2" X 2"	15-1/4 (387)	14-1/2 (368)	7 (178)	37 (940)	7-5/8 (194)	15-3/4 (400)	259 (117)
3" X 2"	15-1/4 (387)	15-3/4 (400)	7 (178)	37 (940)	7-5/8 (194)	15-3/4 (400)	269 (122)

†Allow additional 21" clearance for maintenance.

P3 CLASSIC VERTICAL PUMP PARTS LIST



Parts List	Classic Vertical					
Item No.		Material	1" x 1"	1 1/2" x 1 1/2"	2" x 2"	3" x 2"
1	Classic Vertical Pump Tank	Steel	0014164	0014164	0014164	0014164
		DI	423620	423620	423620	423620
2	P3 Mechanism w/Flange, w/o Cycle Counter	Steam service	6939903	6939903	6939903	6939903
		Air service	6939923	6939923	6939923	6939923
2a	P3 Mechanism w/Flange, w/ Cycle Counter	Steam service	6939913	6939913	6939913	6939913
		Air service	6939933	6939933	6939933	6939933
3	Gasket	Graphite	05-02372-01	05-02372-01	05-02372-01	05-02372-01
4	Bolt, Hex Head (Qty 8)	Steel	0046626	0046626	0046626	0046626
5	Eye Bolt (Qty 8)	Steel	0030396	0030396	0030396	0030396
6	Nut (Qty 2)	Steel	0621230	0621230	0621230	0621230
7	Nameplate	Aluminum	0028418	0028418	0028418	0028418
8	Drive Screw	Steel	0028250	0028250	0028250	0028250
9	Pipe Plug, 1/2" NPT	Steel	0000194	0000194	0000194	0000194
10	Water Level Gage	Bronze	0018134	0018134	0018134	0018134
11	Inlet Reducer	Steel	05-15043-00	05-15042-00	05-15123-00	-
12	Inlet Nipple	Steel	05-02807-00	05-15404-00	05-15121-00	05-15416-00
13	Inlet Check Valve	Bronze	0016315	0016314	0016313	0016312
		Stainless Steel	0016294	0016295	0016292	0016293
14	Outlet Reducer	Steel	05-15043-00	05-15042-00	05-15123-00	05-15123-00
15	Outlet Nipple	Steel	05-02807-00	05-15404-00	05-15121-00	05-15121-00
16	Outlet Check Valve	Bronze	0016315	0016314	0016313	0016313
		Stainless Steel	0016294	0016295	0016292	0016292
17	Motive Strainer	Stainless Steel	0050-300Y1TT-A8	0050-300Y1TT-A8	0050-300Y1TT-A8	0050-300Y1TT-A8
	Cycle Counter		0016343	0016343	0016343	0016343
	Insulating Jacket		0014162	0014162	0014162	0014162

P3 PISTON POWER CLASSIC HORIZONTAL PUMP SPECIFICATION

Pump shall be a pressure vessel drainer operated by steam, compressed air or other pressurized gas to 250 psig. Body shall be fabricated steel ASME code to 250 psi or cast ductile iron. Pump mechanism shall be all stainless steel without external packing or seals. When requested, unit shall be equipped with an external cycle counter, sight glass and insulating jacket.

MAXIMUM OPERATING CONDITIONS

PMO: Max. Operating Pressure 250 psig (17.2 barg)
 TMO: Max. Operating Temperature 400°F (204°C)
 PMA: Max. Allowable Pressure 250 psig (17.2 barg)
 TMA: Max. Allowable Temperature 400°F (204°C)

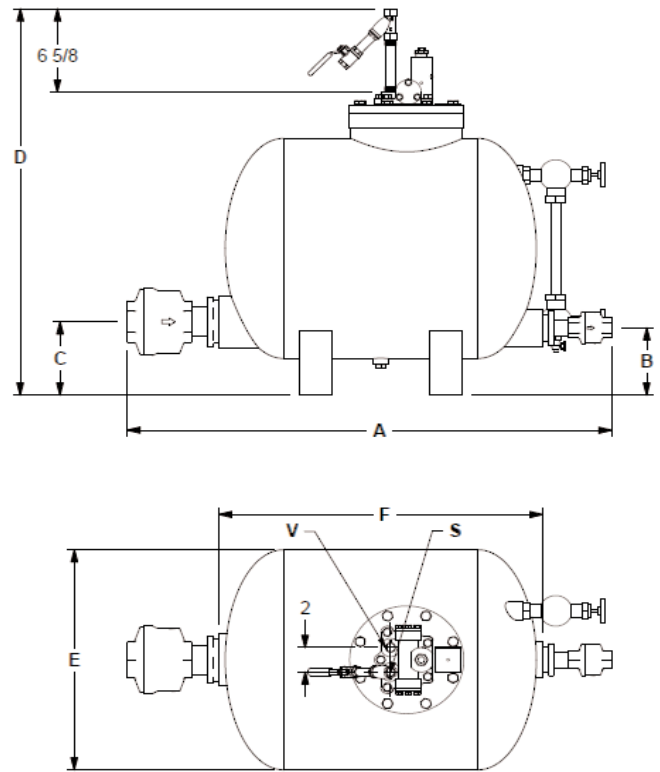
MATERIALS OF CONSTRUCTION

Tank Weldment	Steel or Ductile Iron
Trip Mechanism w/Flange	Stl/SS
Gasket	Graphite
Bolt, Hex Head	Steel
Nameplate	Aluminum
Drive Screw	Steel
Pipe Plug, 1/2" NPT	Steel
Water Level Gage	Bronze
Inlet Reducer	Steel
Inlet Nipple	Steel
Inlet Check Valve	Bronze/Stainless Steel
Outlet Reducer	Steel
Outlet Nipple	Steel
Outlet Check Valve	Bronze/Stainless Steel

OPERATING CHARACTERISTICS

Pump Discharge per Cycle: 8.8 - 11 Gal
 Max. Instantaneous Discharge Rate: 90 GPM
 (w/2" outlet check)
 Steam Consumption: ~3 lbs per 1000 lbs.
 of hot condensate pumped
 Air Consumption: ~100 SCF per 1000
 lbs. of liquid pumped
 Recommended Filling Head: 12"

Canadian Registration # 1351.9C



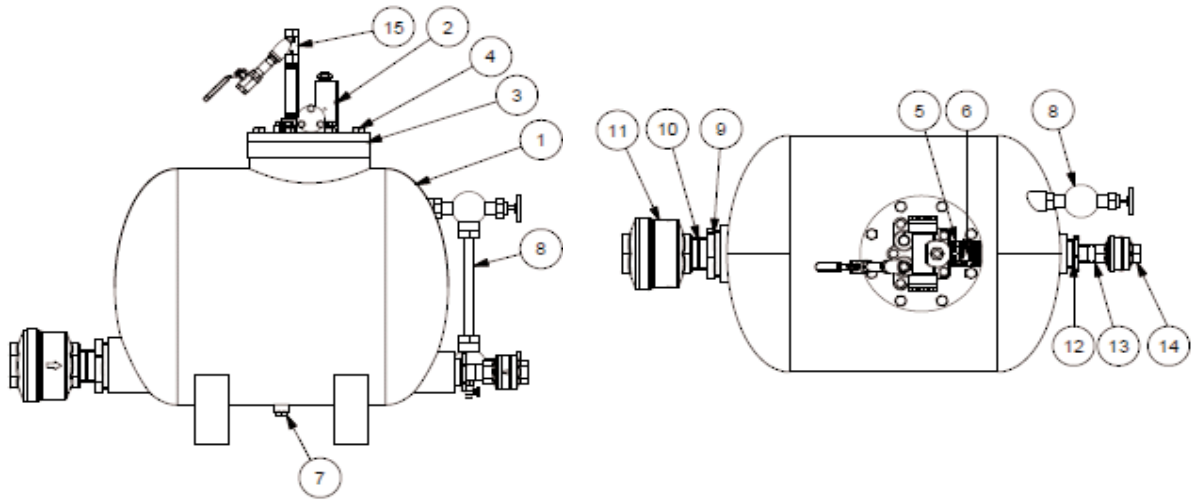
Exhaust outlet: 1/2" NPT
 Motive inlet: 1/2" NPT

Connections:
 1" x 1" to 3" x 2" Screwed

STEEL DIMENSIONS							
SIZE	INCHES (mm)						WEIGHT lbs(kg)
	A	B	C	D†	E	F	
1" X 1"	34-1/4 (879)	5-1/2 (140)	6 (152)	30-5/8 (778)	18 (457)	25 (635)	198 (90)
1-1/2" X 1-1/2"	36-3/4 (933)	5-1/2 (140)	6 (152)	30-5/8 (778)	18 (457)	17-3/4 (451)	202 (92)
2" X 2"	37-1/8 (943)	5-1/2 (140)	6 (152)	30-5/8 (778)	18 (457)	17-3/4 (451)	207 (94)
3" X 2"	38-1/4 (971)	5-1/2 (140)	6 (152)	30-5/8 (778)	18 (457)	17-3/4 (451)	214 (97)

†Allow additional 21" clearance for maintenance.

P3 CLASSIC HORIZONTAL PUMP PARTS LIST



Parts List	Classic Horizontal					
Item No.	Description	Material	1" x 1"	1 1/2" x 1 1/2"	2" x 2"	3" x 2"
1	Classic Horizontal Pump Tank	Steel	0014184	0014184	0014184	0014184
2	P3 Mechanism w/Flange, w/o Cycle Counter	Steam service	6939903	6939903	6939903	6939903
		Air service	6939923	6939923	6939923	6939923
2a	P3 Mechanism w/Flange, w/ Cycle Counter	Steam service	6939913	6939913	6939913	6939913
		Air service	6939933	6939933	6939933	6939933
3	Gasket	Graphite	0621230	0621230	0621230	0621230
4	Bolt, Hex Head	Steel	05-17571-00	05-17571-00	05-17571-00	05-17571-00
5	Nameplate	Aluminum	0028418	0028418	0028418	0028418
6	Drive Screw	Steel	0028250	0028250	0028250	0028250
7	Pipe Plug, 1/2" NPT	Steel	0000194	0000194	0000194	0000194
8	Water Level Gage	Bronze	0018135	0018135	0018135	0018135
9	Inlet Reducer	Steel	05-15043-00	05-15042-00	05-15123-00	-
10	Inlet Nipple	Steel	05-02807-00	05-15404-00	05-15121-00	05-15416-00
11	Inlet Check Valve	Bronze	0016315	0016314	0016313	0016312
		Stainless Steel	0016294	0016295	0016292	0016293
12	Outlet Reducer	Steel	05-15448-00	05-15449-00	-	-
13	Outlet Nipple	Steel	05-02807-00	05-15404-00	05-15121-00	05-15121-00
14	Outlet Check Valve	Bronze	0016315	0016314	0016313	0016313
		Stainless Steel	0016294	0016295	0016292	0016292
15	Motive Strainer	Stainless Steel	0050-300Y1TT-A8	0050-300Y1TT-A8	0050-300Y1TT-A8	0050-300Y1TT-A8
	Cycle Counter		0016343	0016343	0016343	0016343
	Insulating Jacket		0014216	0014216	0014216	0014216

P3 PISTON POWER LITTLE BOY PUMP SPECIFICATION

Pump shall be a pressure vessel drainer operated by steam, compressed air or other pressurized gas to 150 psig. Body shall be fabricated steel, cast ductile iron or 304ss. When requested, unit shall be equipped with an external cycle counter and sight glass and insulating jacket.

MAXIMUM OPERATING CONDITIONS

Carbon Steel Tank - Fabricated ASME Sec.VIII Div.I

PMO: Max. Operating Pressure	150 psig	(10.3 barg)
TMO: Max. Operating Temperature	370°F	(188°C)
PMA: Max. Allowable Pressure	150 psig	(10.3 barg)
TMA: Max. Allowable Temperature	400°F	(204°C)

Stainless Steel Tank - Fabricated ASME Sec.VIII Div.I

PMO: Max. Operating Pressure	125 psig	(8.6 barg)
TMO: Max. Operating Temperature	370°F	(188°C)
PMA: Max. Allowable Pressure	125 psig	(8.6 barg)
TMA: Max. Allowable Temperature	400°F	(204°C)

Ductile Iron Tank - Cast ASME B16.42

PMO: Max. Operating Pressure	150 psig	(10.3 barg)
TMO: Max. Operating Temperature	370°F	(188°C)
PMA: Max. Allowable Pressure	250 psig	(17.2 barg)
TMA: Max. Allowable Temperature	400°F	(204°C)

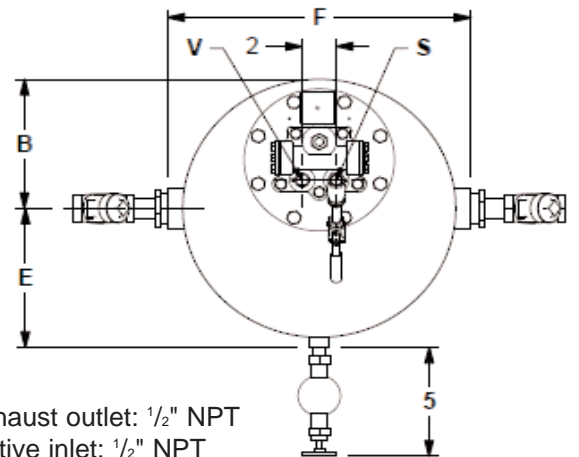
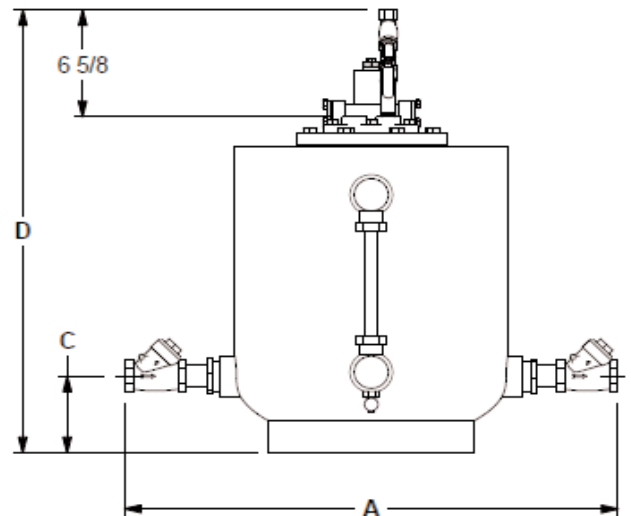
MATERIALS OF CONSTRUCTION

Tank Weldment	Steel, Ductile Iron or 304ss
Trip Mechanism w/Flange	St/SS
Gasket	Graphite
Bolt, Hex Head	Steel
Nameplate	Aluminum
Drive Screw	Steel
Water Level Gage	Bronze
Inlet Reducer	M. Iron
Inlet Nipple	Steel
Inlet Check Valve	Bronze/Stainless Steel
Outlet Reducer	M. Iron
Outlet Nipple	Steel
Outlet Check Valve	Bronze/Stainless Steel

OPERATING CHARACTERISTICS

Pump Discharge per Cycle:	4.2 - 5.1 Gal
Max. Instantaneous Discharge Rate:	60 GPM (w/1½" outlet check)
Steam Consumption:	~3 lbs per 1000 lbs. of hot condensate pumped
Air Consumption:	~100 SCF per 1000 lbs. of liquid pumped
Recommended Filling Head:	6"

Canadian Registration # 1353.9C



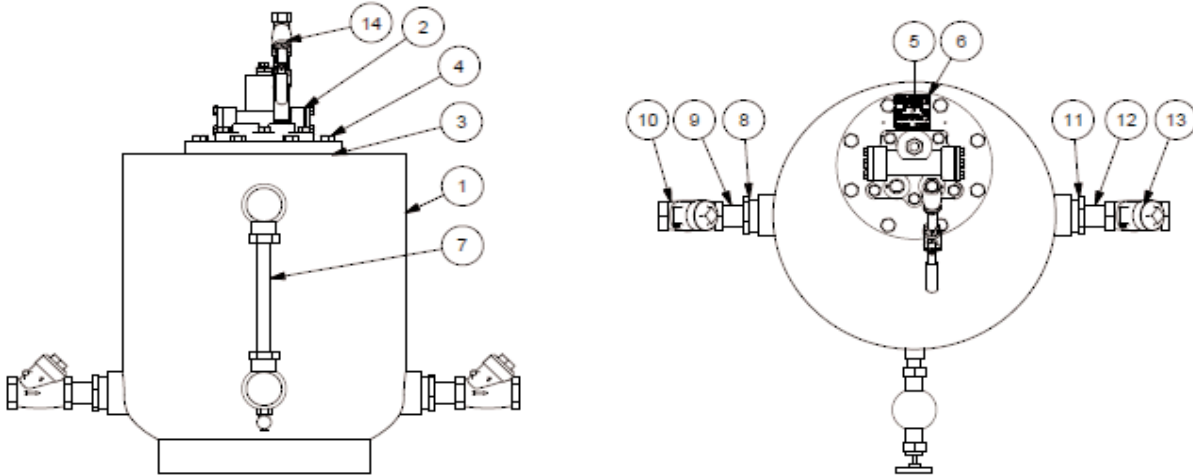
Exhaust outlet: ½" NPT
Motive inlet: ½" NPT

Connections:
1" x 1" to 1½" x 1½" NPT

CARBON / STAINLESS STEEL DIMENSIONS							
SIZE	INCHES (mm)						WEIGHT lbs(kg)
	A	B	C	D†	E	F	
1" X 1"	26-3/4 (679)	8 (203)	5 (127)	27-5/8 (702)	9 (229)	17-3/4 (451)	145 (66)
1-1/2" X 1-1/2"	29-1/2 (749)	8 (203)	5 (127)	27-5/8 (702)	9 (229)	17-3/4 (451)	155 (71)
DUCTILE IRON DIMENSIONS							
SIZE	INCHES (mm)						WEIGHT lbs(kg)
	A	B	C	D†	E	F	
1" X 1"	26 (660)	7-3/8 (187)	3 (76)	24-3/4 (629)	7-1/2 (191)	15-1/2 (394)	173 (78)
1-1/2" X 1-1/2"	28-3/4 (730)	7-3/8 (187)	3 (76)	24-3/4 (629)	7-1/2 (191)	15-1/2 (394)	173 (78)

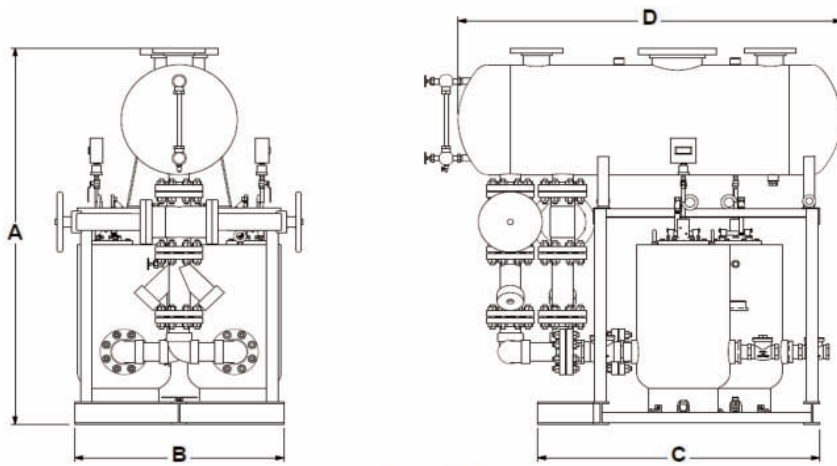
†Allow additional 18" clearance for maintenance.

P3 LITTLE BOY PUMP PARTS LIST

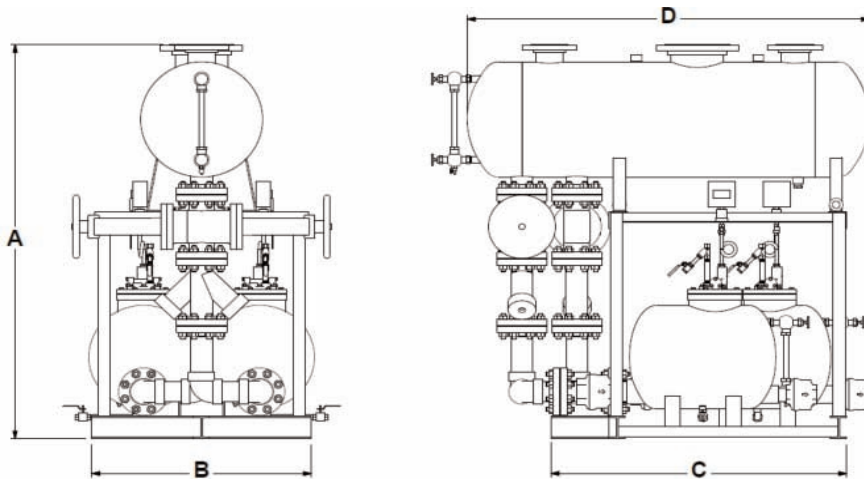


Parts List	Little Boy			
Item No.	Description	Material	1" x 1"	1 1/2" x 1 1/2"
1	Little Boy Pump Tank	Steel	0014189	0014189
		DI	423544	423544
2	P3 Mechanism w/Flange, w/o Cycle Counter	Steam Service	6939904	6939904
		Air Service	6939924	6939924
2a	P3 Mechanism w/Flange, w/ Cycle Counter	Steam Service	6939914	6939914
		Air Service	6939934	6939934
3	Gasket	Graphite	0621230	0621230
4	Bolt, Hex Head	Steel	0046626	0046626
5	Nameplate	Aluminum	0028418	0028418
6	Drive Screw	Steel	0028250	0028250
7	Water Level Gage	Bronze	0018133	0018133
8	Inlet Reducer	Malleable Iron	05-15396-00	-
9	Inlet Nipple	Malleable Iron	05-02807-00	05-15404-00
10	Inlet Check Valve	Bronze	0016315	0016314
		Stainless Steel	0016294	0016295
11	Outlet Reducer	Steel	05-15396-00	-
12	Outlet Nipple	Steel	05-02807-00	05-15404-00
13	Outlet Check Valve	Bronze	0016315	0016314
		Stainless Steel	0016294	0016295
14	Motive Strainer	Stainless Steel	0050-300Y1TT-A8	0050-300Y1TT-A8
	Cycle Counter		0016343	0016343
	Insulating Jacket		0014214	0014214

P3 PISTON POWER PUMP SKID MOUNTED SYSTEM



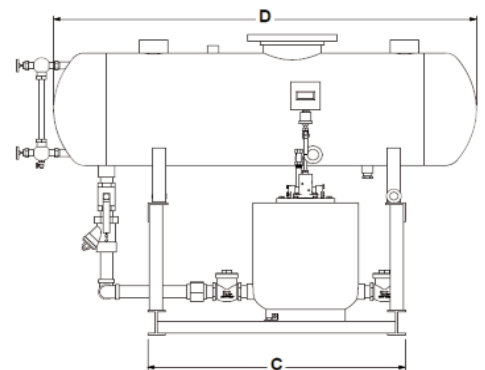
CLASSIC VERTICAL



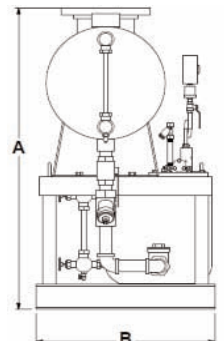
CLASSIC HORIZONTAL

Where the condensate load exceeds the capacity of one P3 Piston Power Pump, multiple pumps may be used in tandem. Skid mounted units may be simplex (one pump), duplex (two pumps), triplex (three pumps) or quadruplex (four pumps). The units are equipped with a receiver, P3 Pump(s) and all necessary piping fully connected and ready for use.

		DIMENSIONS					
STYLE	Configu- ration	Receiver Gallons	Inches (mm)				Weight lb (kg)
			A	B	C	D	
Little Boy	Simplex	25	45 5/8 (1159)	27 (686)	39 (991)	54 (1372)	618 (280)
		65	50 7/8 (1292)	27 (686)	39 (991)	64 (1626)	878 (398)
Classic, Vertical	Simplex	25	61 1/8 (1553)	30 (762)	39 (991)	54 (1372)	920 (417)
		65	66 3/8 (1686)	30 (762)	39 (991)	64 (1626)	1134 (514)
Classic, Vertical	Duplex	65	66 7/16 (1688)	36 (914)	48 1/2 (1232)	66 (1676)	1220 (553)
		80	68 7/16 (1738)	36 (914)	48 1/2 (1232)	66 (1676)	1771 (803)
Classic, Horizontal	Simplex	25	61 1/8 (1553)	30 (762)	39 (991)	54 (1372)	990 (449)
		65	66 3/8 (1686)	30 (762)	39 (991)	64 (1626)	1150 (522)
Classic, Horizontal	Duplex	65	66 7/16 (1688)	36 (914)	48 1/2 (1232)	66 (1676)	1743 (791)
		80	68 7/16 (1738)	36 (914)	48 1/2 (1232)	66 (1676)	1791 (812)



LITTLE BOY



CONDENSATE COMMANDER PUMP CAPACITY TABLE*

P3 - Piston Power Pump Capacity Table* (lbs/hr)										
Motive Pressure		Back Pressure		Fill Head 6"		Fill Head 12"				Fill Head 12"
				Little Boy		Classic Vertical & Classic Horizontal				Classic Duplex
psig	barg	psig	barg	1 X 1	1.5 X 1.5	1 X 1	1.5 X 1.5	2 X 2	3 X 2	3 x 2
250	17.2	40	2.76			3000	4300	8700	9200	18400
		60	4.14			2750	4050	5600	6050	12100
		80	5.52			2650	4000	4850	5100	10200
		100	6.90			2350	3700	4000	4700	9400
		120	8.28			2200	3600	3950	4100	8200
		150	10.34			2050	3450	3650	3800	7600
		175	12.07			1900	3300	3400	3550	7100
		200	13.79			1850	3300	3350	3450	6900
		225	15.52			1700	3000	3050	3200	6400
200	13.8	40	2.76			3450	4900	10000	10600	21200
		60	4.14			3200	4700	6500	7050	14100
		80	5.52			2900	4550	4950	5250	10500
		100	6.90			2700	4250	4600	4900	9800
		120	8.28			2500	4150	4450	4650	9300
		150	10.34			2300	3900	4100	4300	8600
		175	12.07			2150	3750	3800	4000	8000
150	10.3	25	1.72	2400	3000	4100	5900	12000	12700	25400
		40	2.76	2300	2600	3900	5350	7400	7950	15900
		60	4.14	2200	2250	3500	5100	6200	6500	13000
		80	5.52	2050	2050	3150	4800	5350	5500	11000
		100	6.90	1900	1950	2800	4400	4500	4750	9500
		120	8.28	1800	1800	2450	4050	4100	4300	8600
125	8.6	25	1.72	2500	3050	3350	7750	10900	12300	24600
		40	2.76	2300	2700	3250	6500	8300	8800	17600
		60	4.14	2150	2500	3150	5500	6200	6500	13000
		80	5.52	2000	2150	3050	4800	5750	6200	12400
		100	6.90	1900	1900	2900	4100	5000	5300	10600
		115	7.93	1800	1750	2750	3600	4500	4650	9300
100	6.9	15	1.03	3950	5950	4950	9100	11900	15550	31100
		25	1.72	3450	4300	4400	7300	10200	12200	24400
		40	2.76	2900	3450	4000	6100	7650	9200	18400
		60	4.14	2450	2850	3650	4600	5450	6000	12000
		80	5.52	2100	2350	3300	4000	4650	5100	10200
75	5.2	15	1.03	4000	7400	5100	8700	13700	16200	32400
		25	1.72	3400	6300	4300	7250	10100	12200	24400
		40	2.76	2950	5000	3700	6000	7500	9000	18000
		60	4.14	2850	3450	3350	4700	5200	5650	11300
50	3.5	10	0.69	4000	7650	4900	9050	12450	13200	26400
		25	1.72	3350	5500	4050	7000	7900	8400	16800
		40	2.76	2950	4000	3500	5500	5850	6250	12500
25	1.7	5	0.34	4100	7700	4650	8600	12800	16050	32100
		10	0.69	4000	6600	4400	7700	11100	12150	24300
		15	1.03	3750	5700	4000	6700	8550	8800	17600
10	0.7	2	0.14	4000	8200	4400	8350	12200	13250	26500
		5	0.34	3600	7150	3900	7250	7950	8450	16900

* Capacities shown are obtained with factory supplied check valves and based on 1/2" motive steam and 1/2" vent line pumping hot condensate. For other multiplex capacities, consult factory.
For Kg/Hr multiply by .454