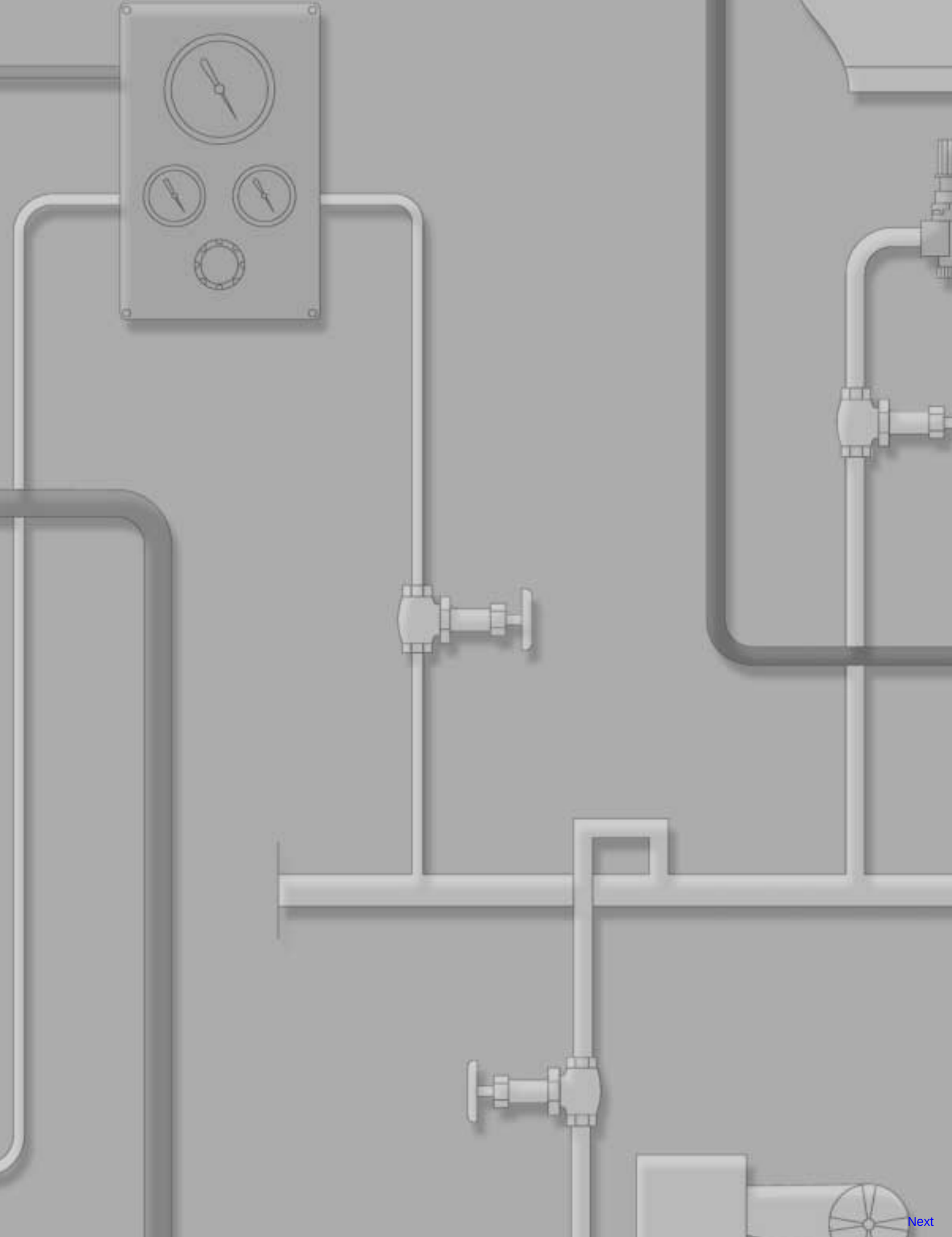
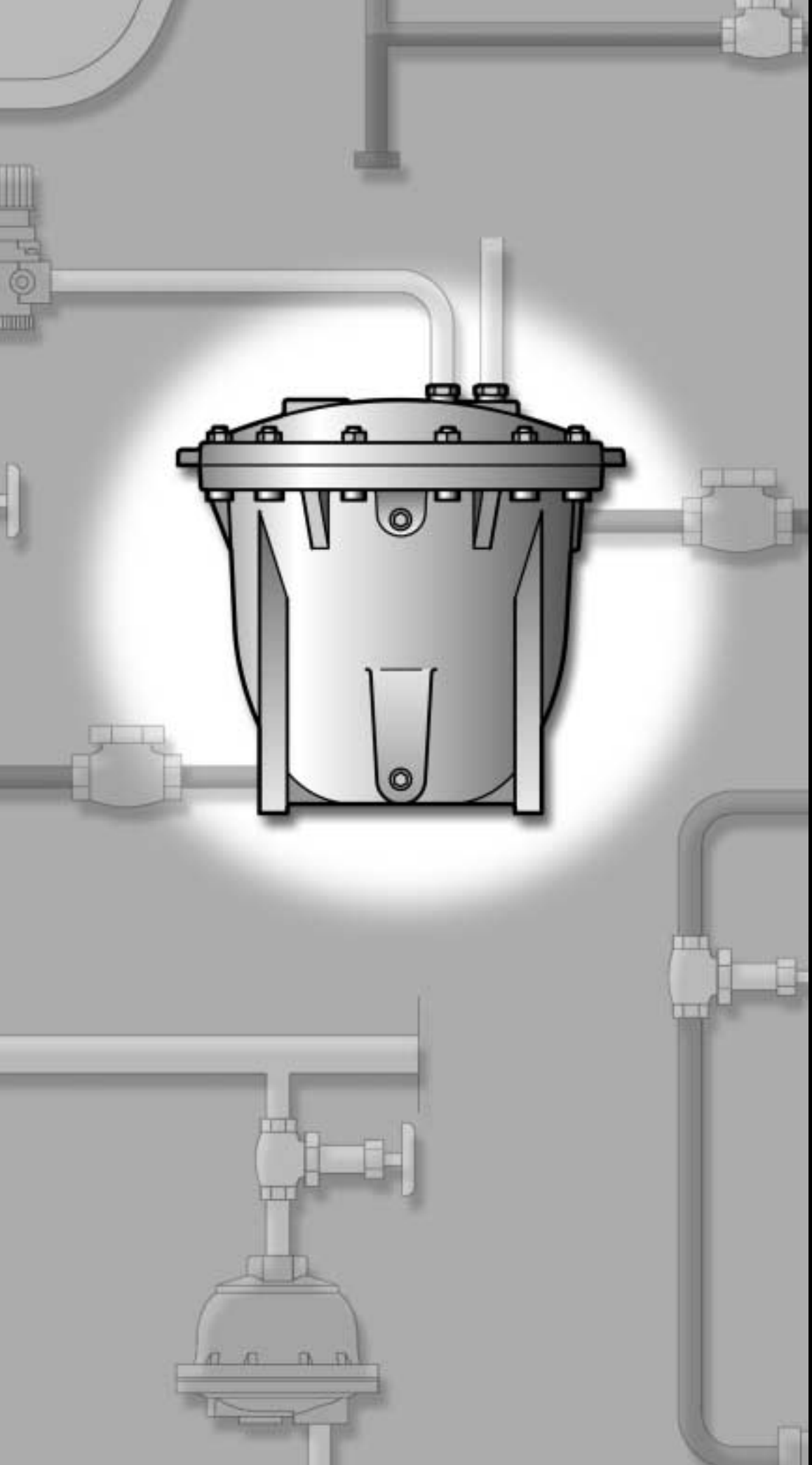


Next



Condensate Recovery Equipment

Armstrong

Armstrong®
Intelligent System Solutions™
STEAM • AIR • HOT WATER

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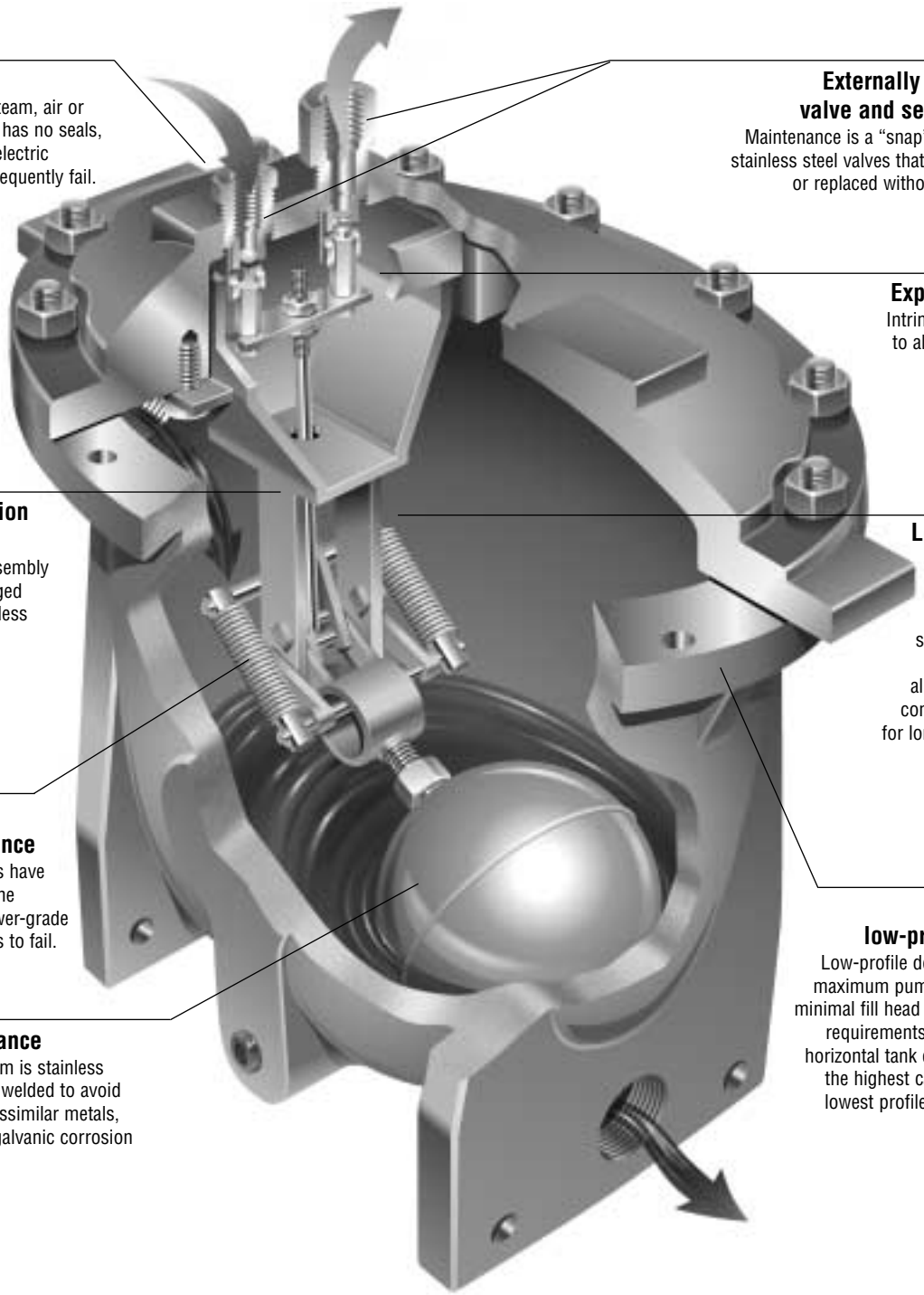
Inside Advantages

Mechanical condensate pumps operate with a spring-assisted float mechanism, which means the springs themselves are a major wear point. Armstrong pumping traps have large-diameter Inconel X-750 springs, which provide superior corrosion resistance and longer service life than those in competitive models. For other inside advantages, see below.

Notice the difference in spring design from the industry standard spring set (left) and the Armstrong Inconel spring set.



Non-electric
Utilizes inexpensive steam, air or gas for operation and has no seals, motors, impellers or electric components, which frequently fail.

Externally replaceable valve and seat assembly
Maintenance is a "snap" with hardened stainless steel valves that can be cleaned or replaced without cap removal.

Explosion proof
Intrinsically safe due to all-stainless steel construction of mechanism.

Wear and corrosion resistance
Mechanism frame assembly is constructed of rugged investment-cast stainless steel components.

Long life and dependable service
Simple float/spring operation and rugged all-stainless steel construction allow for long, trouble-free service life.

Stress chloride corrosion resistance
Inconel X-750 springs have higher resistance to the stress that causes lower-grade stainless steel springs to fail.

Compact, low-profile design
Low-profile design allows for maximum pump capacity with minimal fill head and floor space requirements. PT-300 Series horizontal tank design provides the highest capacity with the lowest profile on the market.

Corrosion resistance
Entire float mechanism is stainless steel. Float is Heliarc welded to avoid the introduction of dissimilar metals, which could lead to galvanic corrosion and float failure.

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Effective Condensate Management = Energy Savings

The most basic part of energy management is utilizing all valuable Btu within the steam system. Depending on the pressure, condensate exiting a trap contains approximately 20% of the heat energy transferred at the boiler in the form of sensible heat. Effective recovery of condensate reduces three tangible costs of producing steam:

- Fuel/energy costs associated with producing steam
- Boiler water make-up and sewage treatment
- Boiler water chemical treatment

These savings can be calculated using the attached savings form. Returning condensate saves money, energy and the environment. Pour money and energy savings back into your plant—not down the drain.

Condensate Recovery Savings Analysis

Location _____ Bldg _____

Energy costs will vary from plant to plant and regions of the world. Values shown are conservative. Complete this form using your facilities' numbers to determine annual savings in your plant by returning condensate. If some costs are not known, use the figures below for conservative estimates.

A) Condensate Load .....= **8,000 lb/hr**

B) Annual Hours of Operation .....= **7,200 hrs per year**

C) Total Water and Sewage Cost .....= **$.005 per gal**

c1) Untreated water and sewage .....= **$.002 per gal**

c2) Water treatment chemicals.....= **$.003 per gal**

D) Make-Up Water Preheating Requirements = **140 Btu/lb**

d1) Condensate Return Temperature .....= **200°F**

d2) Make-Up Water Temperature.....= **60°F**

E) Steam Cost .....= **$ 5.00/1,000 lb**

F) Annual Water Savings .....= **$ 34,532.00**

$$\frac{(A)8000 \times (B)7200 \times (C).005}{8.34 \text{ lb/gal}}$$

G) Savings for Preheating Make-Up Water.....= **$ 40,320.00**

$$\frac{(A)8000 \times (B)7200 \times (D)140 \times (E)5.00}{*1000 \times 1000}$$

H) Cost of Steam to Operate†

Armstrong Pump Trap .....= **$ 864.00**

$$\frac{3 \times (A)8000 \times (B)7200 \times (E)5.00}{1000 \times 1000}$$

I) Total Dollars Saved Annually (F + G - H) ..... = **$ 73,988.00**

J) Payback Period in Years .....= **.27 Years**

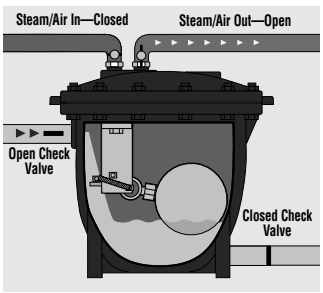
$$\frac{**(\text{cost of equipment/installation}) \$20{,}000}{(I)\ 73{,}988}$$

*Btu/lb from direct steam injection

**Estimated equipment and installation cost

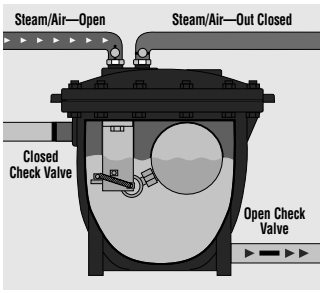
†Cost to operate in example assumes an "open" vented system. If pump trap is used in "closed loop" application, steam operation cost is negligible.

Pumping Trap Operation



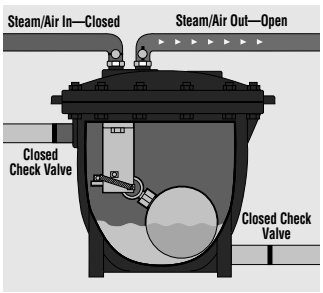
Filling

1. During filling, the steam or air inlet and check valve on pumping trap outlet are closed. The vent and check valve on the inlet are open.



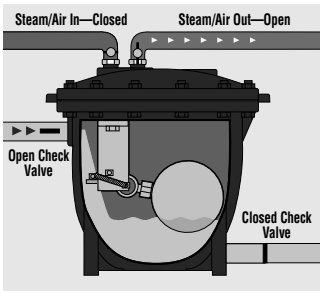
Begin Pumping

2. Float rises with level of condensate until it passes trip point, and then snap action reverses the positions shown in step one.



End Pumping

3. Float is lowered as level of condensate falls until snap action again reverses positions.



Repeat Filling

4. Steam or air inlet and trap outlet are again closed while vent and condensate inlet are open. Cycle begins anew.

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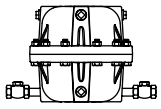
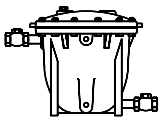
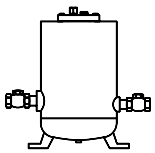
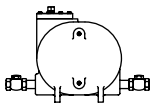
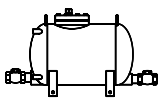
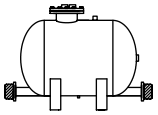
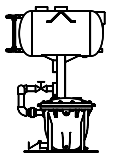
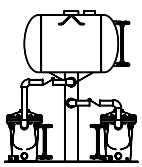
Illustration	Type	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Mechanism Material	Model	Max. Oper. Press. psig	Capacity Range lb/hr	Connection Size				Located on Page
										1"	1-1/2"	2"	3" x 2"	
	**Series PT-100**	Screwed	150	450	ASTM A48 Class 30 Cast Iron	Stainless Steel Inconel X-750 Spring	PT-104	100	1,800	●				CRE-5
	**Series PT-200**	Screwed	150	450	ASTM A48 Class 30 Cast Iron	Stainless Steel Inconel X-750 Spring	PT-204 PT-206	125	2,400 3,700	● 	 ●			CRE-7
	**Series PT-400**	*Screwed	150	650	*Fabricated Steel 150 psi ASME Sec. VIII Design "U" Stamped	Stainless Steel Inconel X-750 Spring	PT-404 PT-406 PT-408 PT-412	125	3,600 5,500 7,400 12,200	●	 ●	 ●	 ●	CRE-9
	**Series PT-3500**	Screwed	150	450	ASTM A48 Class 30 Cast Iron	Stainless Steel Inconel X-750 Spring	PT-3508 PT-3512	125	9,900 14,500			● 	 ●	CRE-11
	**Series PT-300**	Screwed *150# ANSI Flanged *300# ANSI Flanged	150	650 500	*Fabricated Steel 150 psi ASME Sec. VIII Design "U" Stamped	Stainless Steel Inconel X-750 Spring	PT-308 PT-312	125	11,600 16,600			● 	 ●	CRE-13
	**Series PT-500**	*150# ANSI Flanged	150	500	*Fabricated Steel 150 psi ASME Sec. VIII Design "U" Stamped	Stainless Steel with Stainless Steel Springs	PT-516	150	80,000	4" x 4"				CRE-19
	**Series 100, 200, 400, 3500, 300 Packages**	Screwed *150# ANSI Flanged	150	450 or 650	Cast Iron Carbon Steel	Stainless Steel Inconel X-750 Spring	SPT-100 SPT-200 SPT-400 SPT-3500 SPT-300	125	See Pages CRE-15 Thru CRE-17	● ● ●	 ● ●	 ● ● ●	 ● ● ●	CRE-15 Thru CRE-17
	**Series 100, 200, 400, 3500, 300 Packages**	Screwed *150# ANSI Flanged	150	450 or 650	Cast Iron Carbon Steel	Stainless Steel Inconel X-750 Spring	DPT-100 DPT-200 DPT-400 DPT-3500 DPT-300	125	See Pages CRE-15 Thru CRE-17	● ● ●	 ● ●	 ● ● ●	 ● ● ●	CRE-15 Thru CRE-17

*Other connection type, receiver pressure vessel ratings and material type available upon request—consult factory.

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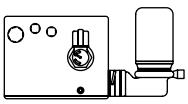
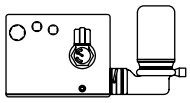
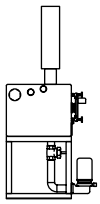
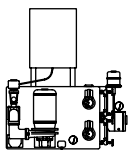
Pumping Trap ID Charts

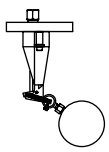
Electric Centrifugal Condensate Pump ID Chart

Illustration	Type	Sq. Ft. EDR	Pump Capacity GPM	Pump Disch. Press.	Motor HP	RPM	Disch. Size Inches	Inlet Size Inches	Receiver Cap. Gallons	Locate Page for Sizing
	**FPS Series**	8,000	12	Max. 20 psig	Simplex 1/3	3,500 RPM Only	3/4"	Simplex and Duplex 2"	FPS Series 7-1/2 - 35 (Steel)	CRE-29
	FPC Series	10,000	15							
	Simplex or Duplex	12,000	18		Duplex 1/3 or 3/4	Single Phase Only	1"		FPC Series 10 - 37 (Cast Iron)	
		20,000	30							
	**AFH-DS Series AFH-DC Series**	1,000 thru 100,000	2 thru 150	10 thru 90	1/3 thru 10	1,750 and 3,500	3/4" thru 2-1/2"	2" thru 4"	AFH-DS Series 15 - 128 (Steel)	Consult factory for proper sizing
	Simplex or Duplex					Single or Three Phase			AFH-DC Series 10 - 125 (Cast Iron)	
	**AFH-PES Series AFH-PEC Series**	6,000 thru 112,000	6 thru 112	10 thru 90	1/3 thru 15	3,500 RPM Only	3/4" thru 2"	2" thru 4"	Elevated AFH-PES Series 15 - 128 (Steel)	Consult factory for proper sizing
	Simplex or Duplex (Temp. to 212°F)					Single or Three Phase			Elevated AFH-PEC Series 15 - 125 (Cast Iron)	

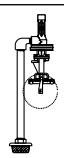
Vacuum Condensate Pump ID Chart

Illustration	Type	Sq. Ft. EDR	GPM Water Only	Rating at 5-1/2" HG Vacuum at 160°F Simultaneous		Pump Discharge Pressure	Motor HP	RPM	Discharge Size Inches	Locate Page for Sizing
				Water GPM	Air CFM					
	**AFH-LRV and AFH-LRV-S Series**	1,000 thru 65,000	7-1/2 thru 97-1/2	7 thru 65	3 thru 22	20 psig thru 30 psig	3/4 thru 7-1/2	3,500 or 1,750	1-1/4" thru 2"	Consult factory for proper sizing
								Single or Three Phase		

Non-Electric Steam/Air Powered Pump Retrofit Assembly

Illustration	Fits Competitors' Mechanical Pumps Listed Below								Page
	Spirax Sarco Models PPC & PPF	Watson McDaniel Models PMPC & PMP	Spence & Nicholson Condensate Commanders	Johnson Corporation Model LMSA	MEPCO/ Dunham Bush	ITT Domestic	Yarway	Clark Reliance	CRE-27

Stainless Steel Sump Ejector

Illustration	Type	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Mechanism Material	Model	Max. Oper. Press. psig	Capacity Range gpm	Discharge	Steam Inlet	Located on Page
	Stainless Steel Sump Ejector	Screwed	175	150 Water	ASTM A351 CF8M	Stainless Steel Inconel X-750 Spring	Stainless Steel Sump Ejector	175	13	3/4" MNPT	1/2" NPT	CRE-34

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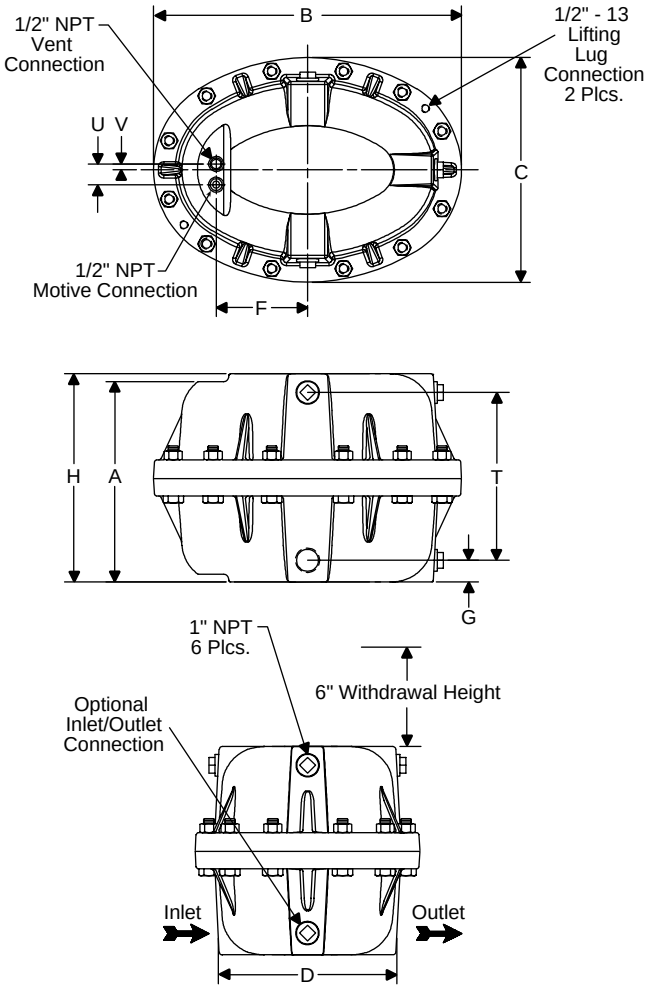
Armstrong® PT-104 Series Mini Pump Trap



The patented Armstrong PT-104 Mini Pump Trap is the smallest non-electric solution that can move condensate or other liquids from lower to higher points and from lower to higher pressures. Condensate can be returned at temperatures well above the 210°F (99°C) limit of conventional electric centrifugal pumps without the headaches of leaking seals or cavitation problems. The PT-104 Mini Pump Trap is the small solution for a big problem.

Features

- Non-electric—Operates using inexpensive steam, air or inert gas
- Low maintenance—No leaking seals, impeller or motor problems, reducing maintenance and downtime
- Small and compact—Low profile body fits in tight space requirements while allowing minimal fill head
- Reduced installation cost—Single trade required for installation and maintenance
- Explosion proof—Standard unit intrinsically safe
- All stainless steel internals—Corrosion resistant with long service life
- Long-lasting Inconel X-750 springs

For a fully detailed certified drawing, refer to CDF #1028.

PT-104 Mini Pump Trap Physical Data

Symbol	in	mm
"A"	12	305
"B"	18-1/2	470
"C"	13-1/2	343
"D"	10-3/4	272
"F"	5-1/2	140
"G"	1-5/16	33
"H"	12-1/2	317
"U"	1-1/4	32
"V"	3/8	9
"T"	10-1/16	256
Weight lb (kg)	140 (64)	
Bronze Check Valves lb (kg)	4 (2)	
Stainless Steel Check Valve lb (kg)		
Maximum Operating Pressure	100 psig (7 bar)	
Maximum Allowable Pressure (vessel design)	150 psig @ 450°F (10 bar @ 232°C)	

PT-104 Mini Pump Trap Materials

Name of Part	Material
Body and Cap	Cast iron ASTM A48 Cl.30
Vent/Inlet Valves	Stainless steel
Mechanism Assembly	Stainless steel
Spring	Inconel X-750
Gasket	Compressed non-asbestos
Bolts	SA 449
Nuts	ASTM A194 Gr.2H
Plug	Cast iron

PT-104 Mini Pump Trap Connection Sizes

Connection	Type	in	mm
Inlet	NPT	1	25
Outlet		1	25
Vent		1/2	15
Motive Pressure		1/2	15
Optional Gauge Glass		1	25
Optional Cycle Counter		1	25

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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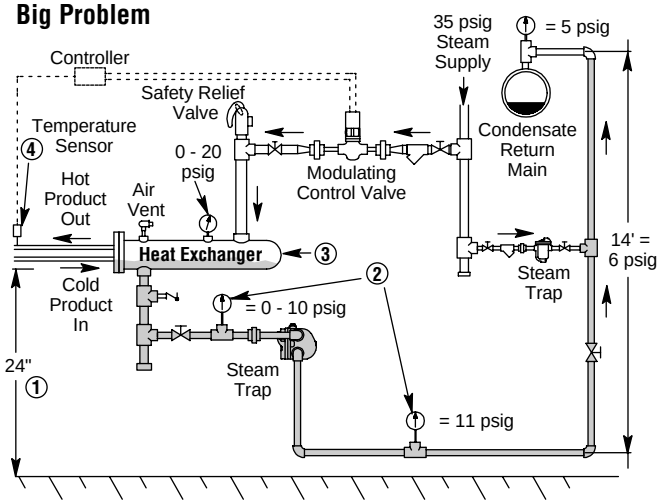
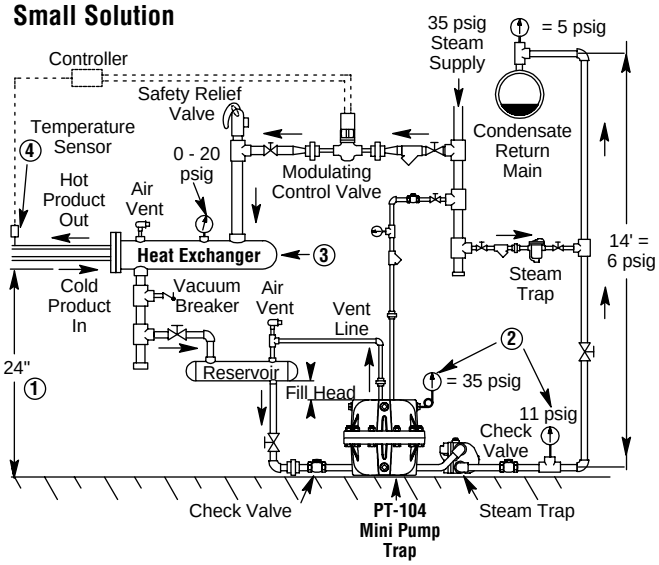
PT-104 Series Mini Pump Trap

Big Problem



Small Solution



Big Problem = Maintenance Headache!

1. Space constraints—Heat exchanger equipment being low to the floor.
2. No condensate drainage—Back pressure exceeds system pressure.
3. Heat exchanger equipment floods, causing equipment damage from:
   - Water hammer—Steam and condensate occupying the same space
   - Corrosion—Non-condensable gases are reabsorbed into the condensate, forming carbonic acid
4. Production loss—Due to inaccurate temperature control.

Small Solution = Long, trouble-free service life for heat exchanger equipment due to condensate and non-condensable gas evacuation.

1. Small and compact—PT-104 Mini Pump Trap fits in tight spaces.
2. Condensate drainage—Motive pressure to PT-104 Mini Pump Trap provides enough pressure to lift condensate to return lines.
3. Heat exchanger is free and clear of condensate due to proper drainage, provided by the PT-104 Mini Pump Trap.
4. Accurate temperature control providing less product loss.

Options

Use of external check valves required for operation of pumping trap.

- Inlet Swing Check Valve
  NPT Bronze ASTM B 62
  Teflon® Disc
  Class 150 (Minimum)
- Outlet Lift Check Valve
  NPT Bronze ASTM B 62
  Teflon Disc
  Class 150 (Minimum)
- In-line Check Valves
  Stainless Steel Non-Slam Check Valves
- Bronze Gauge Glass Assembly
- Armored Steel Gauge Glass Assembly
- Removable Insulation Jacket
- Digital Cycle Counter

Capacity Conversion Factors for Other Filling Heads

Filling Head				
in	**0**	**6**	**12**	*** 24 or greater**
mm	**0**	**150**	**305**	*** 620 or greater**
PT-104 Mini Pump Trap	0.7	1.0	1.2	* Consult factory

*Discharge per cycle typically 2.0 gallons for PT-104.
NOTE: Fill head measured from drain to top of cap. See figures on page CRE-25.

PT-104 Mini Pump Trap Capacities

Motive Pressure		Total Lift or Back Pressure		Filling Head 6" (152 mm) Liquid Specific Gravity .09 - 1.0			
				Steam		Air	
psig	**bar**	**psig**	**bar**	**lb/hr**	**kg/hr**	**lb/hr**	**kg/hr**
15	1.0	5	0.34	1,125	510	2,100	952
25	1.7			1,300	590	2,200	998
50	3.5			1,550	703	2,275	1,032
75	5.0			1,650	748	2,300	1,043
100	7.0			1,400	635	2,350	1,066
25	1.7	15	1.0	650	295	1,900	862
50	3.5			700	363	2,050	930
75	5.0			750	317	2,100	952
100	7.0			800	340	2,150	975
35	2.5	25	1.5	400	181	1,800	816
50	3.5			450	204	1,935	878
75	5.0			500	227	2,050	930
100	7.0			550	249	2,075	941
50	3.5	40	3.0	250	113	1,620	735
75	5.0			300	136	1,850	823
100	7.0			350	159	1,950	884

NOTE: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump case.
See figures on page CRE-25.

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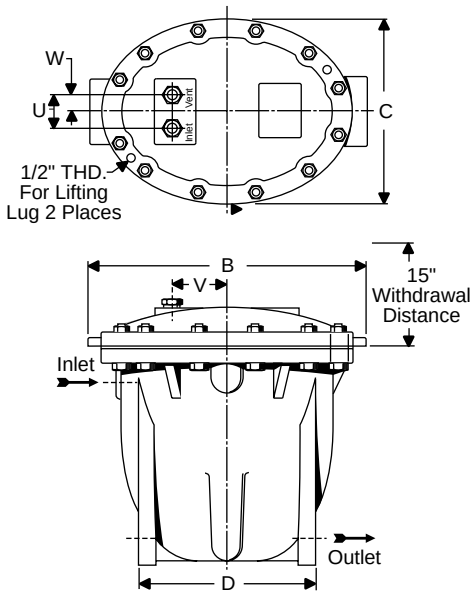
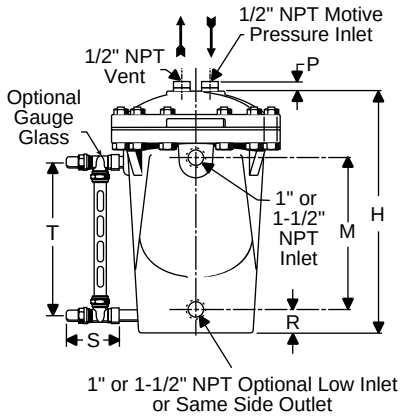
PT-200 Series Low Profile Cast Iron Pump Trap





The Armstrong PT-200 Series Low Profile Pump Trap is a low maintenance, non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned well above the 210°F (99°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

Features

- Non-electric—Uses inexpensive steam, air or gas to operate the pump trap
- Low profile—For tight space requirements
- Explosion proof—Intrinsically safe
- Durable cast iron body for long service life
- Low maintenance—No leaking seals, impeller or motor problems
- All stainless steel internals with durable Inconel X-750 springs
- Externally removable/replaceable seats—Valve and seats can be replaced or cleaned without removing pump cap from body

For a fully detailed certified drawing, refer to CDF #1000.

PT-200 Pumping Trap Physical Data

	PT-204 PT-206	
	in	**mm**
"B"	20-7/16	519
"C"	13-1/2	342
"D"	12-15/16	328
"H"	19	482
"M"	11-35/64	293
"P"	23/32	18
"R"	2-1/32	51
"S"	4-3/8	111
"T"	12	305
"U"	2-1/4	57
"V"	4-1/8	104
"W"	1-1/8	28
Weight lb (kg)	210 (96)	
Number of Body/Cap Bolts	12	
Check Valve Conn. in (mm)	**1 (25)**	**1-1/2 (40)**
Bronze Check Valves lb (kg)	4 (2)	9 (4)
Stainless Steel Check Valves lb (kg)	4 (2)	9 (4)

Maximum Allowable Pressure (Vessel Design) 150 psig @ 450°F (10 bar @ 232°C)
Maximum Operating Pressure 125 psig (9 bar)

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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PT-200 Series Low Profile Cast Iron Pump Trap

PT-200 Pumping Trap Materials	
Name of Part	**Series PT-200**
Body and Cap	Cast iron ASTM A48 Cl. 30
Cap Gasket	Compressed non-asbestos
Bolts	SA-449 Steel
Nuts	Alloy steel ASTM A194 Gr. 2H
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

PT-200 Pumping Trap Connection Sizes				
Model	**Cast Iron**			
	PT-204		**PT-206**	
	in	**mm**	**in**	**mm**
Inlet Connection	1	25	1-1/2	40
Outlet Connection	1	25	1-1/2	40
Optional Low Inlet or Same Side Outlet Connection	1	25	1-1/2	40
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1/2	15	1/2	15
Optional Gauge Glass Connection	1/2	15	1/2	15

PT-200 Pumping Trap Capacities

Motive Pressure		Total Lift or Back Pressure		PT-204 (6" Fill Head) 1" x 1"				PT-206 (6" Fill Head) 1-1/2" x 1-1/2"			
				Steam Motive		Air Motive		Steam Motive		Air Motive	
psig	**bar**	**psig**	**bar**	**lb/hr**	**kg/hr**	**lb/hr**	**kg/hr**	**lb/hr**	**kg/hr**	**lb/hr**	**kg/hr**
15	1.0	5	0.34	1,800	816	2,100	953	2,700	1,225	3,000	1,361
25	1.7			2,025	919	2,300	1,043	3,200	1,451	3,500	1,588
50	3.5			2,100	953	2,500	1,134	3,400	1,542	3,600	1,633
75	5			2,200	998	2,700	1,225	3,500	1,588	3,700	1,678
100	7			2,300	1,043	*	*	3,600	1,633	*	*
125	8.5			2,400	1,089	*	*	3,700	1,678	*	*
25	1.7	15	1	1,500	680	2,000	907	2,400	1,088	2,700	1,225
50	3.5			2,000	907	2,250	1,021	3,200	1,451	3,400	1,542
75	5			2,100	953	2,500	1,134	3,300	1,497	3,500	1,588
100	7			2,110	957	*	*	3,350	1,520	*	*
125	8.5			2,125	964	*	*	3,400	1,542	*	*
35	2.5	25	1.5	1,500	680	1,700	771	2,100	953	2,300	1,043
50	3.5			1,700	771	2,000	907	2,400	1,089	2,600	1,179
75	5			1,900	862	2,300	1,043	2,700	1,225	2,900	1,315
100	7			2,000	907	*	*	2,800	1,270	*	*
125	8.5			2,100	953	*	*	2,900	1,315	*	*
50	3.5	40	3	1,400	635	1,700	771	1,500	680	2,000	907
60	4			1,500	680	2,000	907	2,000	907	2,300	1,043
75	5			1,700	771	2,200	998	2,300	1,043	2,500	1,134
100	7			1,800	816	*	*	2,400	1,089	*	*
125	8.5			1,920	871	*	*	2,500	1,134	*	*
70	4.5	60	4	1,100	499	2,000	907	1,150	522	2,000	907
75	5			1,300	590	2,300	1,043	1,325	601	2,300	1,043
100	7			1,600	726	*	*	1,900	862	*	*
125	8.5			1,720	780	*	*	2,000	907	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page CRE-25. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1.0 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.
*Consult factory.

PT-200 Capacity Conversion Factors for Other Fill Heads

Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm
		0	**0**	**6**	**152**	**12**	**305**	**24**	**610**	**36**	**914**
Model	**PT-204**	0.7		1		1.1		1.3		1.4	
	PT-206	0.7		1		1.1		1.3		1.4	

NOTE: Fill head is measured from drain point to top of cap. See figures on page CRE-25. Discharge per cycle is typically 3.5 gallons for PT-200 Series.

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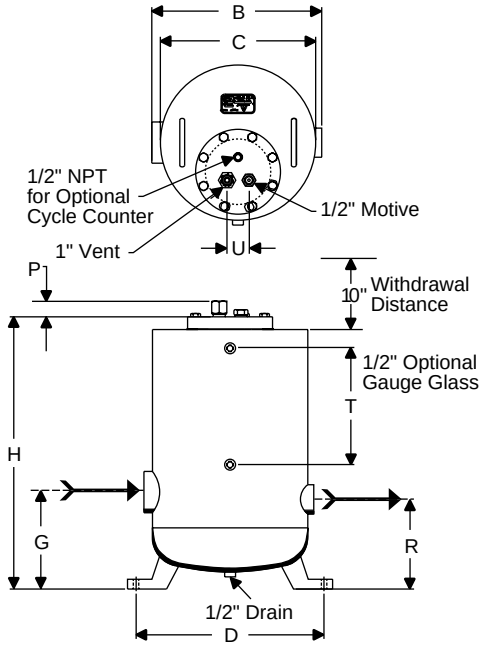
Armstrong® PT-400 Series Vertical Steel Pump Trap



The Armstrong PT-400 Series Vertical Pump Trap is the low maintenance, non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 210°F (99°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

Features

- Non-electric—Uses inexpensive steam, air or gas to operate the pump trap
- Explosion proof—Intrinsically safe
- ASME code stamped carbon steel or stainless steel body vessel
- Low maintenance—No leaking seals, impeller or motor problems
- All stainless steel internals with durable Inconel X-750 springs
- Externally removable/replaceable seats—Valve and seats can be replaced or cleaned without removing pump cap from body

For a fully detailed certified drawing, refer to CDF #1004.

PT-400 Pumping Trap Physical Data

Model Number	PT-404		PT-406		PT-408		PT-412	
	in	mm	in	mm	in	mm	in	mm
"B"	17-1/2	445	17-1/2	445	17-1/2	445	17-1/2	445
"C"	16	406	16	406	16	406	16	406
"D"	19-3/8	492	19-3/8	492	19-3/8	492	19-3/8	492
"G"	10	254	10	254	10	254	10	254
"H"	28	711	28	711	28	711	28	711
"P"	1-5/8	41	1-5/8	41	1-5/8	41	1-5/8	41
"R"	9-1/4	235	9-1/4	235	9-1/4	235	9-1/4	235
"T"	12	305	12	305	12	305	12	305
"U"	2-1/4	57	2-1/4	57	2-1/4	57	2-1/4	57
Weight lb (kg)	166 (75)		166 (75)		166 (75)		166 (75)	
Number of Body/ Cap Bolts	8		8		8		8	
Check Valve Conn. in (mm)	**1 (25)**		**1-1/2 (40)**		**2 (50)**		**3 (75)**	
Bronze Check Valves lb (kg)	4 (2)		9 (4)		16 (7)		29 (13)	
Stainless Steel Check Valves lb (kg)	4 (2)		9 (4)		15 (7)		38 (17)	

Maximum Allowable Pressure (Vessel Design) 150 psig @ 650°F (10 bar @ 343°C)
Maximum Operating Pressure 125 psig (9 bar)

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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PT-400 Series Vertical Steel Pump Trap

PT-400 Pumping Trap Connection Sizes

Model	Vertical Steel							
	PT-404		PT-406		PT-408		PT-412	
	in	mm	in	mm	in	mm	in	mm
Inlet Connection	1	25	1-1/2	40	2	50	3	80
Outlet Connection	1	25	1-1/2	40	2	50	2	50
Motive Pressure Connection	1/2	15	1/2	15	1/2	15	1/2	15
Vent Connection	1	25	1	25	1	25	1	25
Optional Gauge Glass Connection	1/2	15	1/2	15	1/2	15	1/2	15

PT-400 Pumping Trap Capacities

Motive Pressure		Total Lift or Back Pressure		PT-404 (12" Fill Head) 1" x 1"				PT-406 (12" Fill Head) 1-1/2" x 1-1/2"				PT-408 (12" Fill Head) 2" x 2"				PT-412 (12" Fill Head) 3" x 2"			
				Steam Motive		Air Motive		Steam Motive		Air Motive		Steam Motive		Air Motive		Steam Motive		Air Motive	
psig	bar	psig	bar	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0			1,900	862	2,250	1,021	3,100	1,406	3,350	1,520	4,500	2,041	4,850	2,200	7,500	3,402	8,100	3,674
25	1.7			2,500	1,134	2,650	1,202	4,600	2,086	4,875	2,211	6,600	2,994	7,000	3,175	11,000	4,990	11,650	5,284
50	3.5	5	0.34	3,100	1,406	3,225	1,463	4,900	2,222	5,100	2,313	7,100	3,220	7,375	3,345	11,700	5,307	12,150	5,511
75	5			3,400	1,542	3,500	1,588	5,200	2,359	5,300	2,404	7,200	3,266	7,400	3,357	12,000	5,443	12,350	5,602
100	7			3,500	1,588	*	*	5,400	2,449	*	*	7,300	3,311	*	*	12,100	5,488	*	*
125	8.5			3,600	1,633	*	*	5,500	2,495	*	*	7,400	3,357	*	*	12,200	5,534	*	*
25	1.7			2,200	999	2,525	1,145	3,500	1,588	4,025	1,826	5,400	2,449	6,200	2,812	7,200	3,266	8,275	3,753
50	3.5			2,600	1,179	2,800	1,270	4,100	1,860	4,425	2,007	6,300	2,857	6,800	3,084	10,400	4,717	11,250	5,103
75	5	15	1	2,800	1,270	2,950	1,338	4,400	1,996	4,750	2,155	6,500	2,948	6,900	3,130	10,800	4,899	11,450	5,194
100	7			3,100	1,406	*	*	4,800	2,177	*	*	6,700	3,039	*	*	11,000	4,990	*	*
125	8.5			3,200	1,451	*	*	4,900	2,222	*	*	6,800	3,084	*	*	11,200	5,080	*	*
35	2.5			2,000	907	2,350	1,066	2,900	1,315	3,425	1,554	4,200	1,905	4,950	2,245	6,900	3,130	8,150	3,697
50	3.5			2,400	1,088	2,675	1,213	4,000	1,814	4,500	2,041	5,800	2,631	6,400	2,903	9,700	4,400	10,850	4,921
75	5	25	1.5	2,600	1,179	2,800	1,270	4,300	1,950	4,550	2,064	6,000	2,721	6,500	2,948	10,000	4,536	10,900	4,944
100	7			2,800	1,270	*	*	4,700	2,132	*	*	6,100	2,767	*	*	10,200	4,626	*	*
125	8.5			2,900	1,315	*	*	4,800	2,711	*	*	6,400	2,903	*	*	10,400	4,717	*	*
50	3.5			1,900	862	2,350	1,066	3,300	1,451	4,050	1,837	4,350	1,973	5,350	2,427	5,800	2,631	7,125	3,232
60	4			2,200	999	2,600	1,179	3,600	1,633	4,250	1,927	5,100	2,313	6,000	2,722	6,900	3,130	8,150	3,697
75	5	40	3	2,400	1,088	2,675	1,213	4,000	1,814	4,475	2,030	5,700	2,585	6,375	2,892	7,600	3,447	8,500	3,856
100	7			2,500	1,135	*	*	4,200	1,905	*	*	6,000	2,721	*	*	8,100	3,674	*	*
125	8.5			2,700	1,225	*	*	4,500	2,041	*	*	6,200	2,612	*	*	8,500	3,856	*	*
70	4.5			1,800	816	2,400	1,088	3,200	1,451	4,300	1,950	3,800	1,724	5,050	2,291	5,000	2,268	6,650	3,016
75	5			2,000	907	2,450	1,111	3,500	1,588	4,650	2,109	4,100	1,859	5,175	2,347	5,400	2,450	6,900	3,130
100	7	60	4	2,300	1,233	*	*	3,700	1,678	*	*	4,500	2,041	*	*	6,000	2,722	*	*
125	8.5			2,400	1,088	*	*	3,800	1,724	*	*	4,800	2,177	*	*	6,400	2,903	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page CRE-25. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.
*Consult factory.

PT-400 Series Pumping Trap Materials

Name of Part	Series PT-400*
Body and Cap	Fabricated steel 150 psi ASME Sec. VIII design "U" stamped
Cap Gasket	Compressed non-asbestos
Bolts	SA-449 steel
Nuts	None
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc-plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

*Series PT-400 is available in all stainless steel. Consult factory.

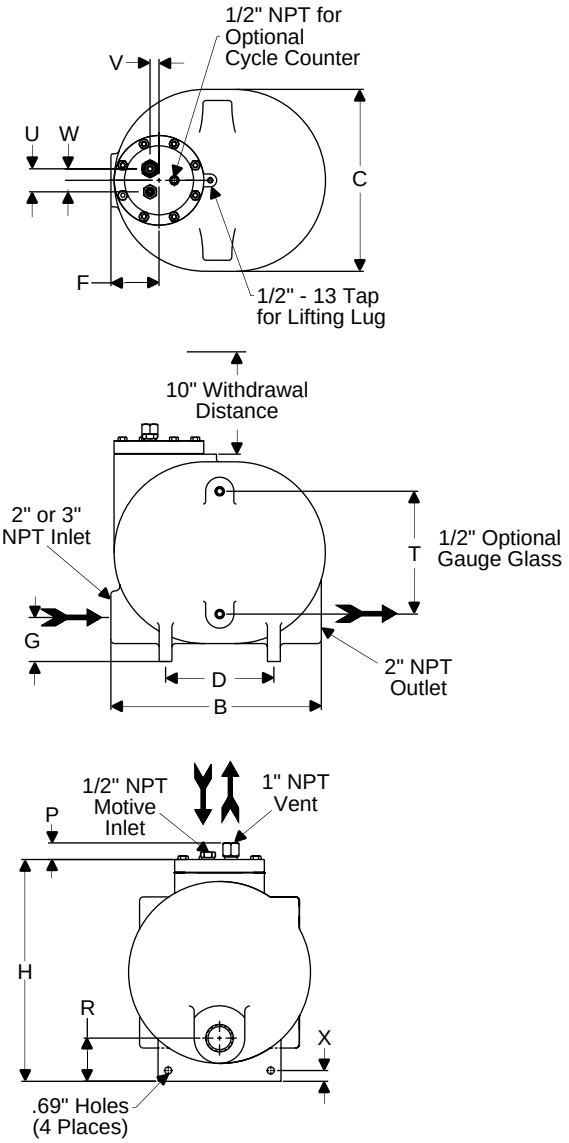
PT-400 Capacity Conversion Factors for Other Fill Heads

Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	24	610	36	914
Model	PT-404	0.7		0.85		1.0		1.3		1.4	
	PT-406	0.7		0.85		1.0		1.2		1.35	
	PT-408	0.7		0.85		1.0		1.2		1.35	
	PT-412	0.7		0.85		1.0		1.08		1.2	

NOTES: Fill head is measured from drain point to top of cap. See figures on page CRE-25. Discharge per cycle is typically 7.8 gallons for PT-400 Series.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Armstrong® PT-3500 Series Low Profile Pump Trap



The Armstrong PT-3500 Series Low Profile Pump Trap is the low maintenance, non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 210°F (99°C) limit of conventional electric pumps without the headaches of leaking seals or cavitation problems.

Features

- Non-electric—Uses inexpensive steam, air or gas to operate the pump trap
- Low profile—For tight space requirements
- Explosion proof—Intrinsically safe
- Durable cast iron body for long service life
- Low maintenance—No leaking seals, impeller or motor problems
- All stainless steel internals with durable Inconel X-750 springs
- Externally removable/replaceable seats—Valve and seats can be replaced or cleaned without removing pump cap from body

PT-3500 Series Pump Trap Physical Data

		PT-3508 and PT-3512	
		in	mm
"B"		20-1/4	514
"C"		17-3/4	451
"D"		10-9/16	268
"F"		4-3/4	120
"G"		4-5/16	110
"H"		21-11/16	550
"P"		1-5/8	41
"R"		4-5/16	110
"T"		12	305
"U"		2-1/4	27
"V"		7/8	22
"W"		1-1/4	32
"X"		1-1/16	27
Weight		**PT-3508**	**PT-3512**
Pump Trap Weight	**lb (kg)**	244 (111)	243 (110)
Bronze Check Valve		16 (7)	29 (13)
Stainless Check Valve		15 (7)	38 (17)

Maximum Operating Pressure: 125 psig (9 bar)
Maximum Allowable Pressure: Cast iron 150 psig @ 450°F (10 bar @ 232°C)

PT-3500 Series Low Profile Pump Trap Connection Sizes

Model Number	PT-3508		PT-3512	
	in	mm	in	mm
Inlet Connection	2	50	3	80
Outlet Connection	2	50	2	50
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1	25	1	25
Gauge Glass Connection	1/2	15	1/2	15

For a fully detailed certified drawing, refer to CDF #1041.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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PT-3500 Series Low Profile Pump Trap

PT-3500 Series Low Profile Pump Trap Capacities

Operating Inlet Pressure		Total Lift or Back Pressure		Filling Head 12" (305 mm) Liquid Specific Gravity 0.09 - 1.0							
				PT-3508 2" x 2"				PT-3512 3" x 2"			
				Steam		Air		Steam		Air	
psig	bar	psig	bar	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	6,100	2,767	8,100	3,674	8,300	3,765	10,300	4,627
25	1.7			8,700	3,946	9,300	4,818	12,100	5,489	12,950	5,874
50	3.5			8,900	4,037	9,675	4,389	13,400	6,078	14,000	6,350
75	5			9,200	4,173	9,800	4,452	13,700	6,214	14,300	6,486
100	7			9,400	4,264	*	*	14,000	6,350	*	*
125	8.5			9,900	4,491	*	*	14,400	6,532	*	*
25	1.7	15	1	6,300	2,858	8,200	3,719	8,100	3,674	9,800	4,445
50	3.5			8,200	3,719	10,400	4,717	11,600	5,262	12,600	5,715
75	5			9,200	4,173	11,100	5,035	12,500	5,670	13,300	6,033
100	7			9,600	4,354	*	*	12,600	5,715	*	*
125	8.5			9,800	4,445	*	*	13,400	6,078	*	*
35	2.5	25	15	6,100	2,767	7,900	3,583	7,600	3,447	9,900	4,491
50	3.5			7,100	3,221	9,600	4,355	10,000	4,536	10,650	4,831
75	5			8,600	3,901	10,800	4,899	11,200	5,080	12,200	5,534
100	7			8,700	3,946	*	*	11,450	5,194	*	*
125	8.5			9,100	4,128	*	*	11,600	5,262	*	*
50	3.5	40	3	5,000	2,268	6,500	2,948	6,200	2,812	8,500	3,856
60	4			5,900	2,676	7,400	3,357	7,700	3,493	9,400	4,264
75	5			6,650	3,016	8,300	3,765	8,700	3,946	10,600	4,800
100	7			7,200	3,266	*	*	9,100	4,128	*	*
125	8.5			7,800	3,538	*	*	9,400	4,264	*	*
75	5	60	4	4,500	2,042	6,300	2,858	5,900	2,676	8,700	3,946
100	7			5,500	2,495	*	*	6,500	2,948	*	*
125	8.5			5,700	2,586	*	*	6,900	3,130	*	*

NOTES: Published capacities based on use of external check valves supplied by Armstrong. Although motive pressures are shown at high pressure differential (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 12 - 15 psig (0.65 - 1.0 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam).
*Consult factory.

PT-3500 Capacity Conversion Factors for Other Fill Heads

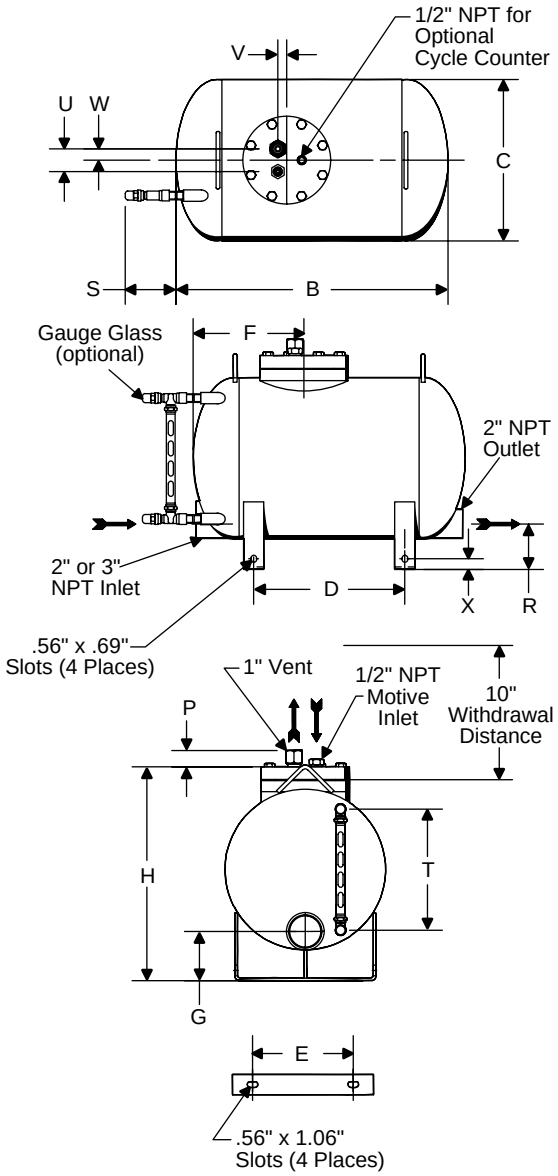
Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	18	457	24	610	36	914
Model	PT-3508	0.7		0.85		1.0		1.1		1.2		1.35	
	PT-3512	0.7		0.85		1.0		1.04		1.08		1.2	

NOTE: Fill head measured from drain point to top of cap. See figures on page CRE-25. Discharge per cycle is typically 10 gallons for PT-3500 Series.

PT-3500 Series Low Profile Pump Trap Materials

Name of Part	Material
Body	Cast iron - ASTM A48 class 30
Cap	Carbon steel SA-516-70
Cap Gasket	Compressed non-asbestos
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc-plated steel
Plug	Steel
Mechanism Assembly: Float and Springs	Stainless steel

Armstrong® PT-300 Series Horizontal Steel, Low Profile Pump Trap



The Armstrong PT-300 Series Horizontal, Low Profile Pump Trap is the low maintenance non-electric solution to move condensate or other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 210°F (99°C) limit of conventional electric condensate pumps without the headaches of leaking seals or cavitation problems.

Features

- Non-electric—Uses inexpensive steam, air or gas to operate the pump trap
- Low profile—For tight space requirements
- High capacity—Provides highest capacity in the industry, moving 12 gallons per pump cycle
- Explosion proof—Intrinsically safe
- ASME code stamped 150/300 carbon steel or stainless steel body vessel
- Low maintenance—No leaking seals, impeller or motor problems
- All stainless steel internals with durable Inconel X-750 springs
- Externally removable/replaceable seats—Valve and seats can be replaced or cleaned without removing pump cap from body

For a fully detailed certified drawing, refer to CDF #1001.

PT-300 Pumping Trap Physical Data

Model Number	PT-308 PT-312	
	in	mm
"B"	27	686
"C"	16	406
"D"	15	381
"E"	13	330
"F"	11	279
"G"	5-7/16	138
"H"	21-3/16	538
"P"	1-5/8	41
"R"	4-13/16	122
"S"	5-1/32	128
"T"	12	305
"U"	2-1/4	57
"V"	7/8	22
"W"	1-1/4	32
"X"	1-1/16	27
Face to Face	27-1/2*	698
Weight lb (kg)	154 (70)	
Number of Body/Cap Bolts	8	
Check Valve Conn. in (mm)	**2 (50)**	**3 (75)**
Bronze Check Valves lb (kg)	16 (7)	29 (13)
Stainless Steel Check Valves lb (kg)	15 (7)	38 (17)

Maximum Allowable Pressure (Vessel Design): 150 psig @ 650°F (10 bar @ 343°C)
Maximum Operating Pressure: 125 psig (9 bar)
*Tolerance +/- 1/2"

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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PT-300 Series Horizontal Steel, Low Profile Pump Trap

PT-300 Pumping Trap Materials	
Name of Part	**Series PT-300***
Body and Cap	Fabricated steel 150 psi ASME Sec. VIII design "U" stamped
Cap Gasket	Compressed non-asbestos
Bolts	SA-449 steel
Nuts	None
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Valve Assembly Washers	Zinc plated steel
Plug	Steel
Mechanism Assembly	Stainless steel
Springs	Inconel X-750

*Series PT-300 is available in all stainless steel. Consult factory.

PT-300 Pumping Trap Connection Sizes				
Model	**Horizontal Steel**			
	PT-308		**PT-312**	
	in	**mm**	**in**	**mm**
Inlet Connection	2	50	3	80
Outlet Connection	2	50	2	50
Motive Pressure Connection	1/2	15	1/2	15
Vent Connection	1	25	1	25
Optional Gauge Glass Connection	1/2	15	1/2	15

PT-300 Pumping Trap Capacities

Motive Pressure		Total Lift or Back Pressure		PT-308 (12" Fill Head) 2" x 2"				PT-312 (12" Fill Head) 3" x 2"			
				Steam Motive		Air Motive		Steam Motive		Air Motive	
psig	**bar**	**psig**	**bar**	**lb/hr**	**kg/hr**	**lb/hr**	**kg/hr**	**lb/hr**	**kg/hr**	**lb/hr**	**kg/hr**
15	1.0	5	0.34	6,900	3,130	9,200	4,173	9,000	4,082	12,300	5,579
25	1.7			10,200	4,622	10,900	4,944	13,200	5,987	14,200	6,441
50	3.5			10,600	4,808	11,100	5,035	15,100	6,849	15,800	7,167
75	5			10,800	4,898	11,300	5,126	15,300	6,940	16,100	7,303
100	7			11,200	5,080	*	*	15,500	7,031	*	*
125	8.5			11,600	5,261	*	*	16,600	7,530	*	*
25	1.7	15	1	7,000	3,175	10,100	4,581	9,000	4,082	11,200	5,080
50	3.5			9,600	4,354	10,900	4,944	12,800	5,806	13,800	6,260
75	5			10,750	4,876	11,100	5,035	14,200	6,441	15,000	6,804
100	7			10,900	4,944	*	*	14,300	6,486	*	*
125	8.5			11,300	5,125	*	*	15,100	6,849	*	*
35	2.5	25	1.5	7,100	3,221	9,200	4,173	8,100	3,674	11,500	5,216
50	3.5			8,300	3,765	10,200	4,627	10,200	4,627	12,750	5,783
75	5			10,100	4,581	11,000	4,989	12,500	5,670	13,500	6,123
100	7			10,200	4,627	*	*	12,700	5,761	*	*
125	8.5			10,300	4,672	*	*	13,000	5,897	*	*
50	3.5	40	3	5,700	2,585	7,600	3,447	6,600	2,994	9,800	4,445
60	4			6,600	2,994	8,800	3,992	8,400	3,810	10,500	4,763
75	5			7,600	3,447	10,100	4,581	9,800	4,445	12,700	5,761
100	7			8,400	3,810	*	*	10,100	4,581	*	*
125	8.5			9,400	4,264	*	*	10,300	4,672	*	*
70	4.5	60	4	4,500	2,041	7,000	3,175	6,000	2,722	10,200	4,627
75	5			4,700	2,132	7,100	3,221	6,400	2,903	10,400	4,717
100	7			6,400	2,903	*	*	7,100	3,221	*	*
125	8.5			6,600	2,994	*	*	7,400	3,357	*	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page CRE-25. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.
*Consult factory.

PT-300 Capacity Conversion Factors for Other Fill Heads											
Fill Head		**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**
		0	**0**	**6**	**152**	**12**	**305**	**24**	**610**	**36**	**914**
Model	**PT-308**	0.7		0.85		1.0		1.2		1.3	
	PT-312	0.7		0.85		1.0		1.08		1.2	

NOTES: Fill head is measured from drain point to top of cap. See figures on page CRE-25.
Discharge per cycle is typically 12 gallons for PT-300 Series.

From institutional low pressure steam heating to industrial process critical heat transfer, Armstrong's engineered condensate pump trap packages provide the most efficient and cost-effective solution to customers' condensate recovery requirements.

Armstrong Engineered Condensate Pump Trap Packages provide the following benefits:

- Reduce piping layout, detailed engineering and procurement
- Minimize field labor
- Prevent installation errors and safety mishaps
- Shorten overall project lead times
- Single source responsibility
- Lower total cost of ownership for the customer

To optimize the return on your condensate investment, consider Armstrong Engineered Pump Trap Package Solutions.

Pumping Trap Receiver Package Capacities

Motive Pressure	Total Lift or Back Pressure	SPT-104RP 1" x 1"		DPT-104RP 1" x 1"		SPT-204RP 1" x 1"		DPT-204RP 1" x 1"		SPT-404RP 1" x 1"		DPT-404RP 1" x 1"		SPT-206RP 1-1/2" x 1-1/2"		DPT-206RP 1-1/2" x 1-1/2"	
		Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive
psig	psig	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
15	5	1,125	2,100	2,250	4,200	1,800	2,100	3,600	4,200	1,900	2,250	3,800	4,500	2,700	3,000	5,400	6,000
25		1,300	2,200	2,600	4,400	2,025	2,300	4,050	4,600	2,500	2,650	5,000	5,300	3,200	3,500	6,400	7,000
50		1,550	2,275	3,100	4,550	2,100	2,500	4,200	5,000	3,100	3,225	6,200	6,450	3,400	3,600	6,800	7,200
75		1,650	2,300	3,300	4,600	2,200	2,700	4,400	5,400	3,400	3,500	6,800	7,000	3,500	3,700	7,000	7,400
100		1,400	2,350	2,800	4,700	2,300	*	4,600	*	3,500	*	7,000	*	3,600	*	7,200	*
125		*	*	*	*	2,400	*	4,800	*	3,600	*	7,200	*	3,700	*	7,400	*
25	15	650	1,900	1,300	3,800	1,500	2,000	3,000	4,000	2,200	2,525	4,400	5,050	2,400	2,700	4,800	5,200
50		700	2,050	1,400	4,100	2,000	2,250	4,000	4,500	2,600	2,800	5,200	5,600	3,200	3,400	6,400	6,800
75		750	2,100	1,500	4,200	2,100	2,500	4,200	5,000	2,800	2,950	5,600	5,900	3,300	3,500	6,600	7,000
100		800	2,150	1,600	4,300	2,110	*	4,220	*	3,100	*	6,200	*	3,350	*	6,700	*
125		*	*	*	*	2,125	*	4,250	*	3,200	*	6,400	*	3,400	*	6,800	*
35	25	400	1,800	800	3,600	1,500	1,700	3,000	3,400	2,000	2,350	4,000	4,700	2,100	2,300	4,200	4,600
50		450	1,935	900	3,870	1,700	2,000	3,400	4,000	2,400	2,675	4,800	5,350	2,400	2,600	4,800	5,200
75		500	2,050	1,000	4,100	1,900	2,300	3,800	4,600	2,600	2,800	5,200	5,600	2,700	2,900	5,400	5,800
100		550	2,075	1,100	4,150	2,000	*	4,000	*	2,800	*	5,600	*	2,800	*	5,600	*
125		*	*	*	*	2,100	*	4,200	*	2,900	*	5,800	*	2,900	*	5,800	*
50	40	250	1,620	500	3,240	1,400	1,700	2,800	3,400	1,900	2,350	3,800	4,700	1,500	2,000	3,000	4,000
60		265	1,730	530	3,460	1,500	2,000	3,000	4,000	2,200	2,600	4,400	5,200	2,000	2,300	4,000	4,600
75		300	1,850	600	3,700	1,700	2,200	3,400	4,400	2,400	2,675	4,800	5,350	2,300	2,500	4,600	5,000
100		350	1,950	700	3,900	1,800	*	3,600	*	2,500	*	5,000	*	2,400	*	4,800	*
125		*	*	*	*	1,920	*	3,840	*	2,700	*	5,400	*	2,500	*	5,000	*
70	60	*	*	*	*	1,100	2,000	2,200	4,000	1,800	2,400	3,600	4,800	1,150	2,000	2,300	4,000
75		*	*	*	*	1,300	2,300	2,600	4,600	2,000	2,450	4,000	4,900	1,325	2,300	2,650	4,600
100		*	*	*	*	1,600	*	3,200	*	2,300	*	4,600	*	1,900	*	3,800	*
125		*	*	*	*	1,720	*	3,440	*	2,400	*	4,800	*	2,000	*	4,000	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page CRE-25. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1.0 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.

*Consult factory.

Custom packages available upon request—consult factory.

Metric Conversion Formulas

Convert lb/hr to kg/hr—By dividing by 2.2046 Example: 1,800 lb/hr ÷ 2.2046 = 816 kg/hr

Convert psig to bar—By dividing by 14.5 Example: 15 psi ÷ 14.5 = 1.03 bar

Convert psig to kg/cm²—By dividing by 14.22 Example: 15 psi ÷ 14.22 = 1.05 kg/cm²

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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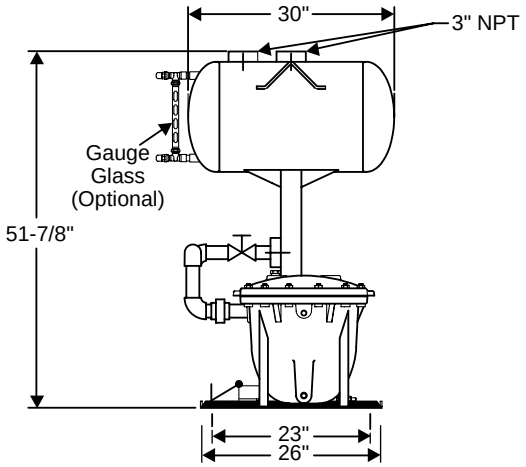
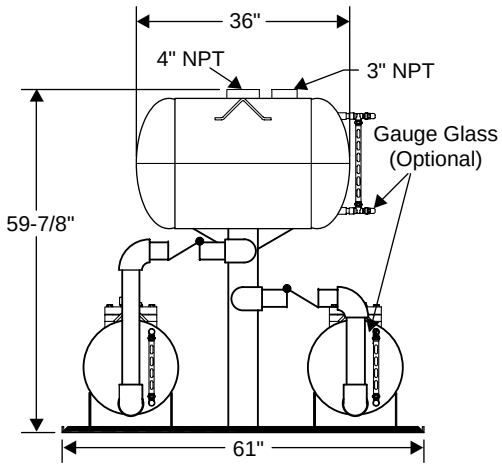


SPT-200RP



DPT-300RP

For a fully detailed certified drawing, refer to:
SPT-400RP/DPT-400RP CDF #1005
SPT-3500RP/DPT-3500RP CDF #1046

Pumping Trap Receiver Package Capacities

Motive Pressure	Total Lift or Back Pressure	SPT-406RP 1-1/2" x 1-1/2"		DPT-406RP 1-1/2" x 1-1/2"		SPT-408RP 2" x 2"		DPT-408RP 2" x 2"		SPT-3508RP 2" x 2"		DPT-3508RP 2" x 2"		SPT-308RP 2" x 2"		DPT-308RP 2" x 2"	
		Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive
psig	psig	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
15	5	3,100	3,350	6,200	6,700	4,500	4,850	9,000	9,700	6,100	8,100	12,200	16,200	6,900	9,200	13,800	18,400
25		4,600	4,875	9,200	9,750	6,600	7,000	13,200	14,000	8,700	9,300	17,400	18,600	10,200	10,900	20,400	21,800
50		4,900	5,100	9,800	10,200	7,100	7,375	14,200	14,750	8,900	9,675	17,800	19,350	10,600	11,100	21,200	22,200
75		5,200	5,300	10,400	10,600	7,200	7,400	14,400	14,800	9,200	9,800	18,400	19,600	10,750	11,300	21,500	22,600
100		5,400	*	10,800	*	7,300	7,450	14,600	14,900	9,400	*	18,800	*	10,900	*	21,800	*
125		5,500	*	11,000	*	7,400	*	14,800	*	9,900	*	19,800	*	11,600	*	23,200	*
25	15	3,500	4,025	7,000	8,050	5,400	6,200	10,800	12,400	6,300	8,200	12,600	16,400	7,000	10,100	14,000	20,200
50		4,100	4,425	8,200	8,850	6,300	6,800	12,600	13,600	8,200	10,400	16,400	20,800	9,600	12,200	19,200	24,400
75		4,300	4,550	8,600	9,100	6,500	6,900	13,000	13,800	9,200	11,100	18,400	22,200	10,800	13,100	21,600	26,200
100		4,800	*	9,600	*	6,700	*	13,400	*	9,600	*	19,200	*	11,200	*	22,400	*
125		4,900	*	9,800	*	6,800	*	13,600	*	9,800	*	19,600	*	11,600	*	23,200	*
35	25	2,900	3,425	5,800	6,850	4,200	4,950	8,400	9,900	6,100	7,900	12,200	15,800	7,100	9,200	14,200	18,400
50		4,000	4,500	8,000	9,000	5,800	6,400	11,600	12,800	7,100	9,600	14,200	19,200	8,300	11,200	16,600	22,400
75		4,400	4,730	8,800	9,500	6,000	6,500	12,000	13,000	8,600	10,800	17,200	21,600	10,100	12,700	20,200	25,400
100		4,700	*	9,400	*	6,100	*	12,200	*	8,700	*	17,400	*	10,200	*	20,400	*
125		4,800	*	9,600	*	6,200	*	12,400	*	9,100	*	18,200	*	10,300	*	20,600	*
50	40	3,300	4,050	6,600	8,100	4,350	5,350	8,700	10,700	5,000	6,500	10,000	13,000	5,700	7,600	11,400	15,200
60		3,600	4,250	7,200	8,500	5,100	6,000	10,200	12,000	5,900	7,400	11,800	14,800	6,600	8,800	13,200	17,600
75		4,000	4,475	8,000	8,950	5,700	6,375	11,400	12,750	6,650	8,300	13,300	16,600	7,600	10,100	15,200	20,200
100		4,200	*	8,400	*	6,000	*	12,000	*	7,200	*	14,400	*	8,400	*	16,800	*
125		4,500	*	9,000	*	6,400	*	12,800	*	7,800	*	15,600	*	9,400	*	18,800	*
70	60	3,200	4,300	6,400	8,600	3,800	5,050	7,600	10,100	4,300	6,100	8,600	12,200	4,500	7,000	9,000	14,000
75		3,500	4,650	7,000	9,300	4,100	5,175	8,200	10,350	4,500	6,300	9,000	12,600	4,700	7,100	9,400	14,200
100		3,700	*	7,400	*	4,500	*	9,000	*	5,500	*	11,000	*	6,400	*	12,800	*
125		3,800	*	7,600	*	4,800	*	9,200	*	5,700	*	11,400	*	6,600	*	13,200	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page CRE-25. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1.0 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.
*Consult factory.
Custom packages available upon request—consult factory.

Metric Conversion Formulas

Convert lb/hr to kg/hr—By dividing by 2.2046 Example: 1,800 lb/hr ÷ 2.2046 = 816 kg/hr

Convert psig to bar—By dividing by 14.5 Example: 15 psi ÷ 14.5 = 1.03 bar

Convert psig to kg/cm²—By dividing by 14.22 Example: 15 psi ÷ 14.22 = 1.05 kg/cm²

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Engineered Solutions—
Armstrong Condensate Pump Trap Packages

Pumping Trap Receiver Package Capacities

Motive Pressure	Total Lift or Back Pressure	SPT-412RP 3" x 2"		DPT-412RP 3" x 2"		SPT-3512RP 3" x 2"		DPT-3512RP 3" x 2"		SPT-312RP 3" x 2"		DPT-312RP 3" x 2"	
		Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive	Steam Motive	Air Motive
psig	psig	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
15	5	7,500	8,100	15,000	16,200	8,300	10,300	16,600	20,600	9,000	12,300	18,000	24,600
25		11,000	11,650	22,000	23,320	12,100	12,950	24,200	25,900	13,200	14,200	26,400	28,400
50		11,700	12,150	23,400	24,300	13,400	14,000	26,800	28,000	15,100	15,800	30,200	31,600
75		12,000	12,350	24,000	24,700	13,700	14,300	27,400	28,600	15,300	16,100	30,600	32,200
100		12,100	*	24,200	*	14,000	*	28,000	*	15,500	*	31,000	*
125		12,200	*	24,400	*	14,400	*	28,800	*	16,600	*	33,200	*
25	15	7,200	8,275	14,400	16,550	8,100	9,800	16,200	19,600	9,000	11,200	18,000	22,400
50		10,400	11,250	20,800	22,500	11,600	12,600	23,200	25,200	12,800	13,800	25,600	27,600
75		10,800	11,450	21,600	22,900	12,500	13,300	25,000	26,600	14,200	15,000	28,400	30,000
100		11,000	*	22,000	*	11,000	*	22,000	*	14,300	*	28,600	*
125		11,200	*	22,400	*	11,300	*	22,600	*	15,100	*	30,200	*
35	25	6,900	8,150	13,800	16,300	7,600	9,900	15,200	19,800	8,100	11,500	16,200	23,000
50		9,700	10,850	19,400	21,700	10,000	10,650	20,000	21,300	10,200	12,750	20,400	25,500
75		10,000	10,900	20,000	21,800	11,200	12,200	22,400	24,400	12,500	13,500	25,000	27,000
100		10,200	*	20,400	*	11,450	*	22,900	*	12,700	*	25,400	*
125		10,400	*	20,800	*	11,600	*	23,200	*	13,000	*	26,000	*
50	40	5,800	7,125	11,600	14,250	6,200	8,500	12,400	17,000	6,600	9,800	13,200	19,600
60		6,900	8,150	13,800	16,300	7,700	9,400	15,400	18,800	8,400	10,500	16,800	21,000
75		7,600	8,500	15,200	17,000	8,700	10,600	17,400	21,200	9,800	12,700	19,600	25,400
100		8,100	*	16,200	*	9,100	*	18,200	*	10,100	*	20,200	*
125		8,500	*	17,000	*	9,400	*	18,800	*	10,300	*	20,600	*
70	60	5,000	6,650	10,000	13,300	5,700	8,500	11,400	17,000	5,000	10,200	12,000	20,400
75		5,400	6,900	10,800	13,800	5,900	8,700	11,800	17,400	6,400	10,400	12,800	20,800
100		6,000	*	12,000	*	6,500	*	13,000	*	7,100	*	14,200	*
125		6,400	*	12,800	*	6,900	*	13,800	*	7,400	*	14,800	*

NOTES: Published capacities are based on the use of external check valves supplied by Armstrong. Fill head measured from drain point to top of pump cap. See figures on page CRE-25. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10 - 15 psig (0.65 - 1.0 bar) above discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher differential is used, stainless steel check valves are recommended.
*Consult factory.
Custom packages available upon request—consult factory.

Metric Conversion Formulas

Convert lb/hr to kg/hr—By dividing by 2.2046 Example: 1,800 lb/hr ÷ 2.2046 = 816 kg/hr

Convert psig to bar—By dividing by 14.5 Example: 15 psi ÷ 14.5 = 1.03 bar

Convert psig to kg/cm²—By dividing by 14.22 Example: 15 psi ÷ 14.22 = 1.05 kg/cm²

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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Sizing and Selection—PT-100/200/300/3500/400 Series

The Armstrong non-electric pump trap is sized based on actual condensate load (lb/hr or kg/hr) being pumped. The following steps are used to size the pump.

1. Determine the total condensate load to be pumped in lb/hr or kg/hr. See table on page CRE-12 for conversion factors.
2. Determine the total back pressure the pump will operate against. Total back pressure is the sum of the following:
   - Vertical lift expressed in psig. See conversion formula below to convert lift to psig
   - Existing pressure in condensate return line or D.A. tank
   - Frictional loss from pipe, valves and fittings
3. Determine type of motive gas to be used (steam, air or other inert gas) and pressure available.

Example:

- Condensate load = 7,100 lb/hr (3,221 kg/hr).
- Total back pressure = 25 psig (1.5 bar) (25 foot vertical lift = 10.8 psig, 14 psig in condensate return line).
- Motive pressure is steam at 50 psig (3.5 bar).

Solution: Model PT-3508
Find 25 psig total lift or back pressure in column two of Low Profile Pump Trap Capacities table on page CRE-12. Then find 50 psig motive pressure in column one. Move across the capacity table until you reach a model number with the correct capacity. A PT-3508 has been highlighted above for this example.

Either a closed reservoir pipe or a vented receiver is required for proper condensate storage during the pump-down cycle of the pumping trap.

For vented/open system receiver sizing:

- Determine the pressure from where the condensate is being discharged.
- Determine condensate load.

Reference Percentage of Flash Steam chart on page CRE-23 to find the pressure that corresponds with the discharge condensate pressure. For this example, use 15 psig.

Follow 15 psig on the horizontal axis where it intersects the curve. Move left from the intersecting lines to the vertical axis for the percentage of flash steam that is created. For this example it will be 3% (see shaded area on Percentage of Flash Steam chart).

Multiply 3% by the condensate load. Using example above 7,100 lb/hr. 7,100 x .03 = 213 lb/hr flash steam.

Using the Vented Receiver Sizing table on page CRE-23, find the amount of flash steam in column one. Follow the table across to determine the size of the vented receiver. (See shaded area on Inlet Reservoir Pipe Sizing table—page CRE-23 for this example.)

For closed reservoir piping:
1. Determine condensate load (using example above 7,100 lb/hr).

Reference the inlet reservoir pipe sizing for closed systems on page CRE-23. Find 7,100 lb/hr in column one. Move horizontally across to find proper pipe size. (Note length or diameter may be slightly enlarged when capacity falls between given condensate loads in column one.) Selection is shaded.

Accessories

Use of external check valves required for operation of pumping trap.

- **Inlet Swing Check Valve**
  —NPT Bronze ASTM B62
  —Teflon® Disc
  —Class 150 (Minimum)
- **Outlet Lift Check Valve**
  —NPT Bronze ASTM B62
  —Teflon® Disc
  —Class 150 (Minimum)
- **Inline Check Valves**
  —Stainless Steel Non-Slam Check Valves

  (Recommended for use when pressure differential is greater than suggested 10-15 psi and when using air as motive gas.)
- **Bronze Glass Gauge Assembly with Protective Bronze Rods**
- **Armored Steel Gauge Glass Assembly**
- **Removable Insulation Jacket**
- **PRV Station**
- **Receivers**

NOTE: The above applies to all models.

Digital Cycle Counter

Features

- Totalizer is UL recognized, CSA certified
- 5-year lithium battery life
- Eight-digit counter readout
- Both totalizer and housing are NEMA 4 rated, for protection against dust particles and water
- Easily installed on pumping traps
- Optional auxiliary contacts available upon request
- Push-button reset on face or key lock reset for security
- Rated for temperatures up to 353˚F
- Closed loop option available

Reference Bulletin No. AFH-237.

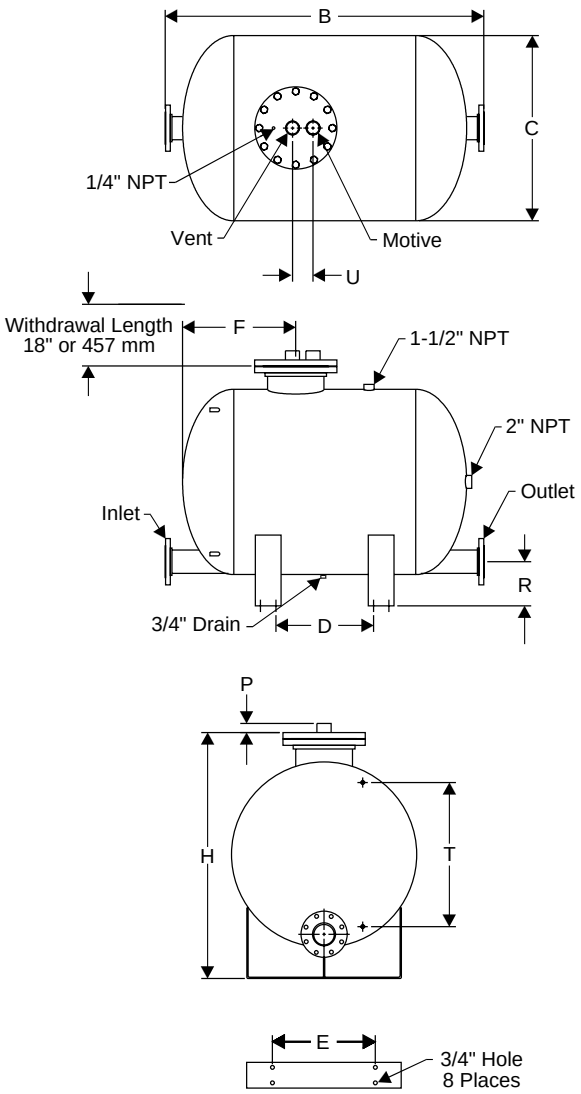
Metric Conversion Formulas

Convert lb/hr to kg/hr—By dividing by 2.2046 Example: 1,800 lb/hr ÷ 2.2046 = 816 kg/hr

Convert psig to bar—By dividing by 14.5 Example: 15 psi ÷ 14.5 = 1.03 bar

Convert psig to kg/cm²—By dividing by 14.22 Example: 15 psi ÷ 14.22 = 1.05 kg/cm²

Armstrong® PT-516 High Capacity Pump Trap



Effective recovery and return of hot condensate are essential to overall plant efficiency while conserving energy. Large amounts of condensate provide the best opportunities to save energy.

The Armstrong PT-516 High Capacity Pump Trap is the low maintenance, non-electric solution to moving large amounts of condensate and other liquids from low points, low pressures or vacuum spaces to an area of higher elevation or pressure. Condensate can be returned at temperatures well above the 210°F (99°C) limit of conventional electric pumps without the headaches of leaking seals or cavitation.

Features

- Non-electric—Uses inexpensive steam, air or gas to operate the pump trap
- No leaking seals/packings, impeller wear, electrical or motor problems—Reduces maintenance and downtime
- Single trade installation or repair reduces installation and maintenance costs
- Direct spring/float actuated mechanism—No maintenance intensive diaphragm operated valve mechanism
- Compression spring design—Reduces downtime, ensures performance and reliability
- Rugged stainless steel internals—Durable and corrosion resistant for enhanced service life
- Closed loop—No motive steam or flash steam loss, therefore capturing and returning all valuable Btu back to the system (see General Applications on page CRE-25)
- Safety—Pump can be placed in flooded pits without fear of electrocution or circuit breaker defaults
- Explosion proof—Standard unit intrinsically safe without additional cost

For a fully detailed certified drawing, refer to CDF #1017.

PT-516 High Capacity Pump Trap Physical Data		
	in	**mm**
Inlet Connection	4 150# ANSI Flg.	100 150# ANSI Flg.
Outlet Connection	4 150# ANSI Flg.	100 150# ANSI Flg.
Motive Connection	2 NPT	50 NPT
Vent Connection	2 NPT	50 NPT
Gauge Glass Conn.	1/2 NPT	15 NPT
"B"	62	1,574
"C"	36	914
"D"	19-1/16	484
"E"	20	508
"F"	22	559
"H"	48	1,219
"P"	1-3/4	44
"R"	8-3/4	222
"T"	28	711
"U"	4	100
Weight	807	366
Number of Bolts	12	12

Maximum Operating Pressure on standard unit: 150 psig (10 bar).
For higher pressure, consult factory.
Maximum Allowable Pressure (standard vessel deisgn): 150 psig @ 500°F (10 bar @ 277°C).
300 psi (21 bar) vessel available upon request.

PT-516 Capacity Conversion Factors for Other Fill Heads												
Fill Head	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**
	0	0	6	152	12	305	16	406	24	610	36	914
PT-516	0.7		0.75		0.8		0.85		1.0		1.08	

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PT-516 High Capacity Pump Trap

Typical Applications

- Low pressure heating systems
- Process heat exchanger or coils with modulating steam control
- Remote installations (tracing, tank farms or remote coils)
- Systems under vacuum
- Hazardous (explosion proof) areas
- Caustic environments
- Sumps or submersed areas

PT-516 High-Capacity Pump Trap Materials

Name of Part	Description
Cap, Body, Bolting	Fabricated steel 150 psi ASME Sec. VIII design "U" stamp coded
Cap Gasket	Compressed non-asbestos
Inlet Valve Assembly	Stainless steel
Vent Valve Assembly	Stainless steel
Mechanism Assembly: Frame, Float and Spring	Stainless steel

NOTES: 300 psi ASME vessel available upon request. PT-516 available in all stainless steel. Consult factory.

Armstrong PT-516 Pump Trap Sizing and Selection

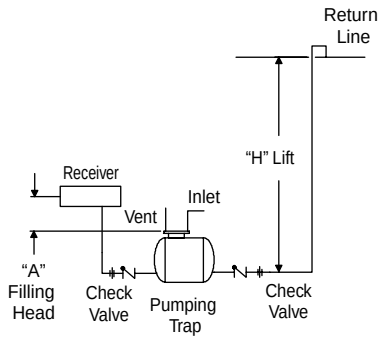
PT-516 Pump Trap Capacities

Motive Pressure		Total Lift or Back Pressure		4" x 4" Connections 24" Fill Head			
				Steam Motive		Air Motive	
psig	bar	psig	bar	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	28,962	13,137	57,619	26,136
25	1.7			37,162	16,857	61,911	28,083
35	2.5			42,563	19,307	64,738	29,365
50	3.5			48,288	21,903	67,735	30,725
60	4			51,214	23,231	69,267	31,420
70	4.5			53,688	24,138	70,562	32,007
75	5			54,796	24,855	71,142	32,270
100	7			59,414	26,950	73,559	33,366
125	8.5			62,995	28,575	*	*
150	10.34			65,922	29,902	*	*
25	1.7	15	1	36,720	16,656	50,783	23,035
35	2.5			40,611	18,421	54,293	24,627
50	3.5			45,196	20,501	58,013	26,315
60	4			47,740	21,655	59,915	27,177
70	4.5			50,005	22,682	61,523	27,907
75	5			51,054	23,159	62,243	28,233
100	7			55,675	25,254	65,243	29,594
125	8.5			59,552	27,013	*	*
150	10.34			62,923	28,542	*	*
35	2.5	25	1.7	29,212	13,251	46,238	20,973
50	3.5			33,413	15,156	50,962	23,116
60	4			35,672	16,181	53,376	24,211
70	4.5			37,646	17,076	55,418	25,138
75	5			38,548	17,485	56,313	25,544
100	7			42,454	19,257	60,141	27,280
125	8.5			45,649	20,706	*	*
150	10.34			*	*	*	*
50	3.5	40	3	26,210	11,889	41,244	18,708
60	4			27,353	12,407	44,028	19,971
70	4.5			28,319	12,846	46,382	21,039
75	5			28,752	13,042	47,435	21,517
100	7			30,555	13,860	51,828	24,022
125	8.5			31,954	14,494	*	*
150	10.34			33,097	15,013	*	*
70	4.5	60	4	25,973	11,781	32,026	14,527
75	5			26,373	11,963	33,514	15,202
100	7			28,042	12,720	40,951	18,575
125	8.5			29,336	13,307	*	*
150	10.34			30,394	13,787	*	*
100	7	80	5.5	23,892	10,837	34,893	15,827
125	8.5			24,231	10,991	*	*
150	10.34			24,570	11,145	*	*

NOTES: Published capacities above are based on **actual** steam testing using a minimum 200°F condensate. Published capacities are based on the use of external check valves supplied by Armstrong.
*Consult factory.

Application Data

1. Fluid to be pumped: _____
2. Temperature of fluid to be pumped: _____ ❑ °F ❑ °C
3. Specific gravity: _____
4. Required flow rate: _____ ❑ lb/hr ❑ GPM ❑ kg/hr
5. Equipment pressure: _____ a) ❑ Constant ❑ Modulation
   b) ____ psig Min. _____ to Max. _____
   c) ❑ psig ❑ kg/cm²
6. Fill head distance (A): _____ ❑ Inches ❑ Millimeters
7. Discharge condensate return line size: _____ ❑ Inches ❑ Millimeters
8. Motive gas: _____ ❑ Steam ❑ Air ❑ Gas
9. Motive pressure available: _____ ❑ psig ❑ kg/cm ❑ Other _____
10. Return line pressure: _____ ❑ psig ❑ kg/cm ❑ Other _____
11. Vertical lift (H): _____ ❑ Feet ❑ Meters
12. Can pump be vented to atmosphere? ❑ Yes ❑ No
13. Is there a condensate reservoir? ❑ Yes ❑ No If yes, what size? _____
14. Is reservoir vented? ❑ Yes ❑ No
15. Would you like Armstrong to quote on a packaged pre-piped engineered system? ❑ Yes ❑ No



All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Armstrong® Pumping Trap Sizing Information for All Models

Pump Trap Sizing Charts

Motive Pressure	Back Pressure	PT-104		PT-204		PT-404		PT-206		PT-406		PT-408	
		Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air
15	5	1,125	2,100	1,800	2,100	1,900	2,250	2,700	3,000	3,100	3,350	4,500	4,850
25		1,300	2,200	2,025	2,300	2,500	2,650	3,200	3,500	4,600	4,875	6,600	7,000
50		1,550	2,275	2,100	2,500	3,100	3,225	3,400	3,600	4,900	5,100	7,100	7,375
75		1,650	2,300	2,200	2,700	3,400	3,500	3,500	3,700	5,200	5,300	7,200	7,400
100		1,400	2,350	2,300	n/a	3,500	n/a	3,600	n/a	5,400	n/a	7,300	n/a
125		n/a	n/a	2,400	n/a	3,600	n/a	3,700	n/a	5,500	n/a	7,400	n/a
25	15	650	1,900	1,500	2,000	2,200	2,525	2,400	2,700	3,500	4,025	5,400	6,200
50		700	2,050	2,000	2,250	2,600	2,800	3,200	3,400	4,100	4,425	6,300	6,800
75		750	2,100	2,100	2,500	2,800	2,950	3,300	3,500	4,300	4,550	6,500	6,900
100		800	2,150	2,110	n/a	3,100	n/a	3,350	n/a	4,800	n/a	6,700	n/a
125		n/a	n/a	2,125	n/a	3,200	n/a	3,400	n/a	4,900	n/a	6,800	n/a
35	25	400	1,800	1,500	1,700	2,000	2,350	2,100	2,300	2,900	3,425	4,200	4,950
50		450	1,935	1,700	2,000	2,400	2,675	2,400	2,600	4,000	4,500	5,800	6,400
75		500	2,050	1,900	2,300	2,600	2,800	2,700	2,900	4,400	4,750	6,000	6,500
100		550	2,075	2,000	n/a	2,800	n/a	2,800	n/a	4,700	n/a	6,100	n/a
125		n/a	n/a	2,100	n/a	2,900	n/a	2,900	n/a	4,800	n/a	6,200	n/a
50	40	250	1,620	1,400	1,700	1,900	2,350	1,500	2,000	3,300	4,050	4,350	5,350
60		n/a	n/a	1,500	2,000	2,200	2,600	2,000	2,300	3,600	4,250	5,100	6,000
75		300	1,850	1,700	2,200	2,400	2,675	2,300	2,500	4,000	4,475	5,700	6,375
100		350	1,950	1,800	n/a	2,500	n/a	2,400	n/a	4,200	n/a	6,000	n/a
125		n/a	n/a	1,920	n/a	2,700	n/a	2,500	n/a	4,500	n/a	6,400	n/a
70	60	n/a	n/a	1,100	2,000	1,800	2,400	1,150	2,000	3,200	4,300	3,800	5,050
75		n/a	n/a	1,300	2,300	2,000	2,450	1,325	2,300	3,500	4,650	4,100	5,175
100		n/a	n/a	1,600	n/a	2,300	n/a	1,900	n/a	3,700	n/a	4,500	n/a
125		n/a	n/a	1,720	n/a	2,400	n/a	2,000	n/a	3,800	n/a	4,800	n/a

Pump Trap Sizing Charts, Continued

Motive Pressure	Back Pressure	PT-3508		PT-308		PT-412		PT-3512		PT-312	
		Steam	Air	Steam	Air	Steam	Air	Steam	Air	Steam	Air
15	5	6,100	8,100	6,900	9,200	7,500	8,100	8,300	10,300	9,000	12,300
25		8,700	9,300	10,200	10,900	11,000	11,650	12,100	12,950	13,200	14,200
50		8,900	9,675	10,600	11,100	11,700	12,150	13,400	14,000	15,100	15,800
75		9,200	9,800	10,750	11,300	12,000	12,350	13,700	14,300	15,300	16,100
100		9,400	n/a	10,900	n/a	12,100	n/a	14,000	n/a	15,500	n/a
125		9,900	n/a	11,600	n/a	12,200	n/a	14,400	n/a	16,600	n/a
25	15	6,300	8,200	7,000	10,100	7,200	8,275	8,100	9,800	9,000	11,200
50		8,200	10,400	9,600	12,200	10,400	11,250	11,600	12,600	12,800	13,800
75		9,200	11,100	10,800	13,100	10,800	11,450	12,500	13,300	14,200	15,000
100		9,600	n/a	11,200	n/a	11,000	n/a	11,000	n/a	14,300	n/a
125		9,800	n/a	11,600	n/a	11,200	n/a	11,300	n/a	15,100	n/a
35	25	6,100	7,900	7,100	9,200	6,900	8,150	7,600	9,900	8,100	11,500
50		7,100	9,600	8,300	11,200	9,700	10,850	10,000	10,650	10,200	12,750
75		8,600	10,800	10,100	12,700	10,000	10,900	11,200	12,200	12,500	13,500
100		8,700	n/a	10,200	n/a	10,200	n/a	11,450	n/a	12,700	n/a
125		9,100	n/a	10,300	n/a	10,400	n/a	11,600	n/a	13,000	n/a
50	40	5,000	6,500	5,700	7,600	5,800	7,125	6,200	8,500	6,600	9,800
60		5,900	7,400	6,600	8,800	6,900	8,150	7,700	9,400	8,400	10,500
75		6,650	8,300	7,600	10,100	7,600	8,500	8,700	10,600	9,800	12,700
100		7,200	n/a	8,400	n/a	8,100	n/a	9,100	n/a	10,100	n/a
125		7,800	n/a	9,400	n/a	8,500	n/a	9,400	n/a	10,300	n/a
70	60	n/a	n/a	4,500	7,000	5,000	6,650	n/a	n/a	6,000	10,200
75		4,500	6,300	4,700	7,100	5,400	6,900	5,900	8,700	6,400	10,400
100		5,500	n/a	6,400	n/a	6,000	n/a	6,500	n/a	7,100	n/a
125		5,700	n/a	6,600	n/a	6,400	n/a	6,900	n/a	7,400	n/a

Notes: Published capacities are based on the use of external check valves supplied by Armstrong Fluid Handling. Fill head measured from drain point to top of pump cap. Although motive pressures are shown at high pressure differentials (difference between motive inlet pressure and total lift or back pressure), it is preferable to use a motive pressure of 10-15 psig above the discharge (outlet) pressure. This ensures longevity of economical (brass) check valves and reduces both venting time and temperature differential (on steam). If a higher motive differential is used, stainless steel check valves are recommended.

Capacity based on 200°F (93°C) hot condensate.

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Pumping Trap Sizing Information

Armstrong®

Closed Loop Receiver Sizing

Condensate Load lb/hr	Reservoir Pipe Diameter (in)					
	2"	3"	4"	6"	8"	10"
up to	Length of Pipe (feet)					
1,000	4-1/2	2	1-1/2			
1,500	7	3	2			
2,000	9	4	2-1/2			
3,000	13-1/2	6	3-1/2	2		
4,000	18	8-1/2	5	2-1/2		
5,000		10	6	3	1-1/2	
6,000		12	7	3-1/2	2	
7,000		14-1/2	8-1/2	4	2	
8,000		16-1/2	9-1/2	4-1/2	2-1/2	1-1/2
9,000			11	5	3	2
10,000			12	5-1/2	3	2
11,000			13	6	3-1/2	2
12,000			14	6-1/2	4	2-1/2

Note: When draining condensate from a single piece of equipment in a closed system to achieve maximum energy efficiency, a reservoir should be installed horizontally above and ahead of the pump trap. Sufficient reservoir volume is required above the filling head level to hold condensate during the pump trap discharge cycle. The chart above shows the minimum reservoir sizing, based on the condensate load, to prevent equipment flooding during the pump trap discharge cycle.

Capacity Conversion Factors for Other Fill Heads

Fill Head		in	mm	in	mm	in	mm	in	mm	in	mm
		0	0	6	152	12	305	24	610	36	914
Model	PT-104	0.7		1		1.2		*		*	
	PT-204					1.1		1.3		1.4	
	PT-206										
	PT-308			0.85		1		1.2		1.3	
	PT-312							1.08		1.2	
	PT-3508							1.2		1.35	
	PT-3512							1.08		1.2	
	PT-404							1.3		1.4	
	PT-406							1.2		1.35	
	PT-408										
	PT-412							1.08		1.2	
	PSP-100			n/a		0.85		1		1.15	
	PT-516	*									

*Consult factory.

Vented Receiver Sizing

Flash Steam lb/hr	Receiver Diameter	Receiver Length	Vent Line Diameter
up to			
75	4"		1-1/2"
150	6"		2"
300	9"		2-1/2"
600	10"	36	3"
900	12"		4"
1,200	16"		6"
2,000	20"		8"

Note: When draining from single or multiple pieces of equipment in an open system, vented receiver should be installed horizontally above and ahead of the pump trap. In addition to sufficient volume above the fill head of the pump trap to hold the condensate during the pump trap cycle, the receiver must also be sized to allow enough area for flash steam and condensate separation. An overflow could also be added when required. The minimum recommended water seal is 12". The chart above shows proper receiver tank sizing based on flash steam present.

PT-516 Pump Trap Capacities

Motive Pressure		Total Lift or Back Pressure		4" x 4" Connections 24" Fill Head			
				Steam Motive		Air Motive	
psig	bar	psig	bar	lb/hr	kg/hr	lb/hr	kg/hr
15	1.0	5	0.34	28,962	13,137	57,619	26,136
25	1.7			37,162	16,857	61,911	28,083
35	2.5			42,563	19,307	64,738	29,365
50	3.5			48,288	21,903	67,735	30,725
60	4			51,214	23,231	69,267	31,420
70	4.5			53,688	24,138	70,562	32,007
75	5			54,796	24,855	71,142	32,270
100	7			59,414	26,950	73,559	33,366
125	8.5			62,995	28,575	*	*
150	10.34			65,922	29,902	*	*
25	1.7	15	1	36,720	16,656	50,783	23,035
35	2.5			40,611	18,421	54,293	24,627
50	3.5			45,196	20,501	58,013	26,315
60	4			47,740	21,655	59,915	27,177
70	4.5			50,005	22,682	61,523	27,907
75	5			51,054	23,159	62,243	28,233
100	7			55,675	25,254	65,243	29,594
125	8.5			59,552	27,013	*	*
150	10.34			62,923	28,542	*	*
35	2.5	25	1.7	29,212	13,251	46,238	20,973
50	3.5			33,413	15,156	50,962	23,116
60	4			35,672	16,181	53,376	24,211
70	4.5			37,646	17,076	55,418	25,138
75	5			38,548	17,485	56,313	25,544
100	7			42,454	19,257	60,141	27,280
125	8.5			45,649	20,706	*	*
150	10.34			*	*	*	*
50	3.5	40	3	26,210	11,889	41,244	18,708
60	4			27,353	12,407	44,028	19,971
70	4.5			28,319	12,846	46,382	21,039
75	5			28,752	13,042	47,435	21,517
100	7			30,555	13,860	51,828	24,022
125	8.5			31,954	14,494	*	*
150	10.34			33,097	15,013	*	*
70	4.5	60	4	25,973	11,781	32,026	14,527
75	5			26,373	11,963	33,514	15,202
100	7			28,042	12,720	40,951	18,575
125	8.5			29,336	13,307	*	*
150	10.34			30,394	13,787	*	*
100	7	80	5.5	23,892	10,837	34,893	15,827
125	8.5			24,231	10,991	*	*
150	10.34			24,570	11,145	*	*

NOTES: Published capacities above are based on **actual** steam testing using a minimum 200°F condensate. Published capacities are based on the use of external check valves supplied by Armstrong.
*Consult factory.

Reservoir and Vented Receiver Sizing— PT-100/200/300/3500/400 Series

Inlet Reservoir Pipe Sizing for Closed Systems

Condensate Load		Reservoir Pipe Diameter											
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
lb/hr	kg/hr	2	50	3	75	4	100	6	150	8	200	10	250
up to		Length of Pipe											
		ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
500	227	4	1.2	2-1/2	0.7	1-1/2	0.4						
1,000	453	4-1/2	1.4	2	0.6	1-1/2	0.4						
1,500	680	7	2.1	3	0.9	2	0.6						
2,000	907	9	2.7	4	1.2	2-1/2	0.7						
2,500	1,134	11	3.4	5	1.5	3	0.9	1-3/4	0.5				
3,000	1,360	13-1/2	4.1	6	1.8	3-1/2	1.1	2	0.6				
4,000	1,814	18	5.5	8-1/2	2.6	5	1.5	2-1/2	0.7				
5,000	2,268			10	3.0	6	1.8	3	0.9	1-1/2	0.4		
6,000	2,722			12	3.7	7	2.1	3-1/2	1.1	2	0.6		
7,000	3,175			14-1/2	4.4	8-1/2	2.6	4	1.2	2	0.6		
8,000	3,629			16-1/2	5.0	9-1/2	2.9	4-1/2	1.4	2-1/2	0.7	1-1/2	0.4
9,000	4,082					11	3.4	5	1.5	3	0.9	2	0.6
10,000	4,536					12	3.7	5-1/2	1.7	3	0.9	2	0.6
11,000	4,990					13	4.0	6	1.8	3-1/2	1.1	2	0.6
12,000	5,443					14	4.3	6-1/2	2.0	4	1.2	2-1/2	0.7

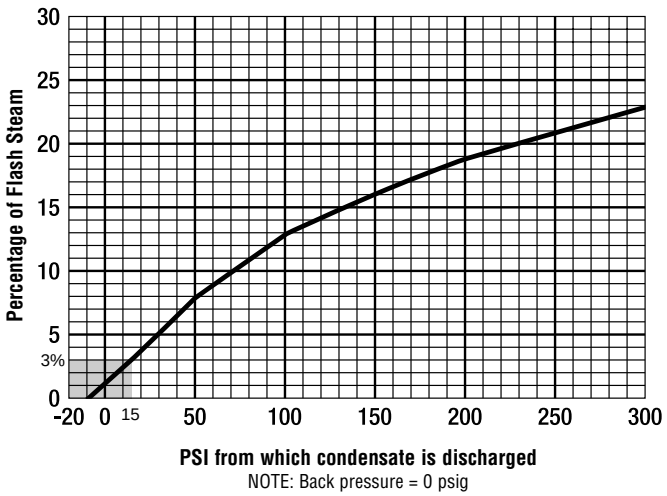
NOTE: When draining condensate from a single piece of equipment in a **closed system**, to achieve maximum energy efficiency a reservoir should be installed horizontally above and ahead of the pump trap. Sufficient reservoir volume is required above the filling head level to hold condensate during the pump trap discharge cycle. The chart above shows the minimum reservoir sizing, based on the condensate load, to prevent equipment flooding during the pump trap discharge cycle.

Vented Receiver Sizing for Open Systems

Flash Steam		Receiver Diameter		Receiver Length		Vent Line Diameter	
lb/hr	kg/hr	in	mm	in	mm	in	mm
up to							
75	34	4	102			1-1/2	40
150	68	6	152			2	50
300	136	9	229	36	914	2-1/2	65
600	272	10	254			3	75
900	408	12	300			4	100
1,200	544	16	405			6	150
2,000	907	20	508			8	200

NOTE: When draining from single or multiple pieces of equipment in an **open system,** a vented receiver should be installed horizontally above and ahead of the pump trap. In addition to sufficient holding volume of the condensate above the fill head of the pump trap to hold the condensate during the pump trap cycle, the receiver **must** also be sized to allow enough area for flash steam and condensate separation. An overflow could also be added when required. The minimum recommended water seal is 12" (300 mm). This table shows proper receiver tank sizing based on flash steam present. See the chart at right to calculate the percentage of flash steam at a given pressure drop.

Percentage of Flash Steam Formed When Discharging Condensate to Reduce Pressure



NOTE: Back pressure = 0 psig

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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Reservoir and Vented Receiver Sizing— PT-516 Series High Capacity

Armstrong®

Either a closed reservoir pipe or a vented receiver is required for proper condensate storage during the pump-down cycle of the pumping trap. Refer to the tables for sizing.

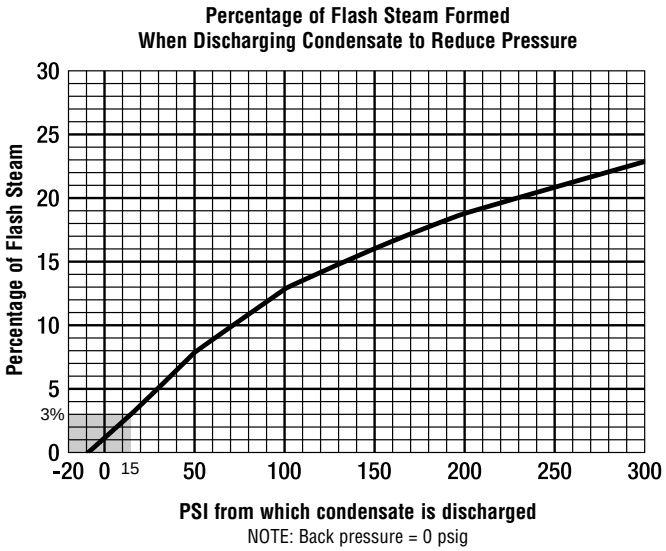
For Closed Reservoir Piping

1. Determine condensate load.
   Example 30,000 lb/hr:
   - Reference the Inlet Reservoir Pipe table top right. Find the 30,000 lb/hr condensate load in column one. Move across the columns to find the proper pipe sizing.

For Vented Receiver Sizing

1. Determine the pressure from where the condensate is being discharged.
2. Determine condensate load.
   - Reference the chart below to find the pressure that corresponds with the discharge condensate pressure. For this example, use 15 psig.
   - Follow 15 psig to where it intersects the "0" psig curve. Move to the left from intersecting lines for the percentage of flash that will be created. For this example, it will be 3%.
   - Multiply the 3% by the condensate load. For this example, it is 30,000 lb/hr. Thus, 30,000 x .03 = 900 lb/hr of flash steam.

Using the Vented Receiver table bottom right, find the amount of flash steam in column one. Follow the table across to determine the sizing of the vented receiver.



NOTE: Back pressure = 0 psig

PT-516 Inlet Reservoir Pipe Sizing for Closed Systems

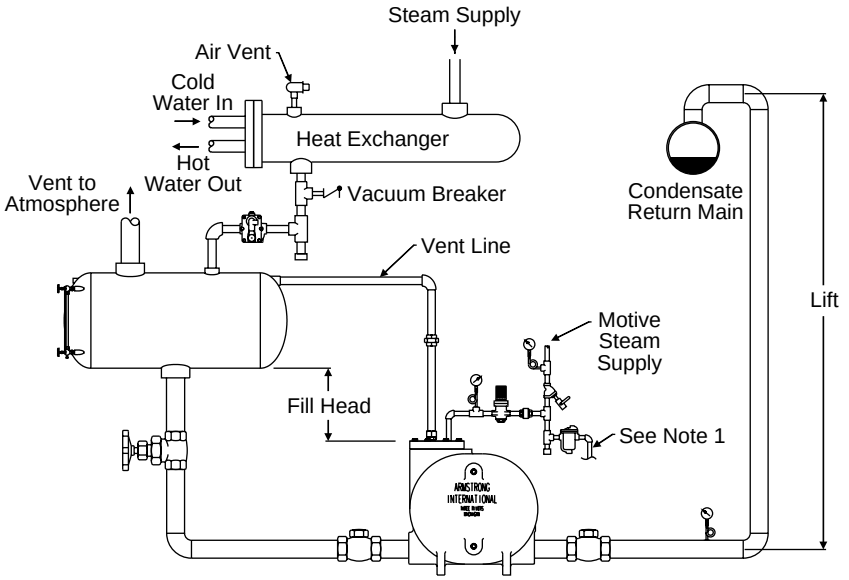
Condensate Load lb/hr	Reservoir Pipe Diameter (in)					
	8	10	12	16	20	24
up to	Length of Pipe (feet)					
10,000	6-1/2	6	5	3	2	
20,000	12	11-1/2	10	7	4	
30,000		12	10-1/2	9	6	4
40,000		17	14	12	8	6
50,000			16	13	9	6
60,000				15	11	8
70,000					15	10

NOTE: When BP/MP is less than 50%, the reservoir diameters above can be reduced by 1/2" (15 mm). When draining condensate from a single piece of equipment in a **closed system,** to achieve maximum energy efficiency (see Closed System figure on page CRE-25) a reservoir should be installed horizontally above and ahead of the pump trap. Sufficient reservoir volume is required above the filling head level to hold condensate during the pump trap discharge cycle. The table above shows the minimum reservoir sizing, based on the condensate load, to prevent equipment flooding during the pump trap discharge cycle.

PT-516 Vented Receiver for an Open System

Flash Steam lb/hr	Receiver Diameter (in)	Receiver Length (in)	Vent Line Diameter (in)
up to			
1,000	16	60	6
2,000	20	60	8
3,000	24	60	8
4,000	26	60	10
5,000	28	60	10
6,000	30	72	12
7,000	32	72	12
8,000	36	72	14

NOTE: When draining from single or multiple pieces of equipment in an **open system,** a vented receiver should be installed horizontally above and ahead of the pump trap (see Open System figure on page CRE-25). In addition to sufficient holding volume of the condensate above the fill head of the pump trap to hold the condensate during the pump trap cycle, the receiver must also be sized to allow enough area for flash steam and condensate separation. An overflow could also be added when required. The minimum recommended water seal is 12" (305 mm). The table above shows proper receiver tank sizing based on flash steam present. See chart left to calculate the percentage (%) of flash steam at a given pressure drop.

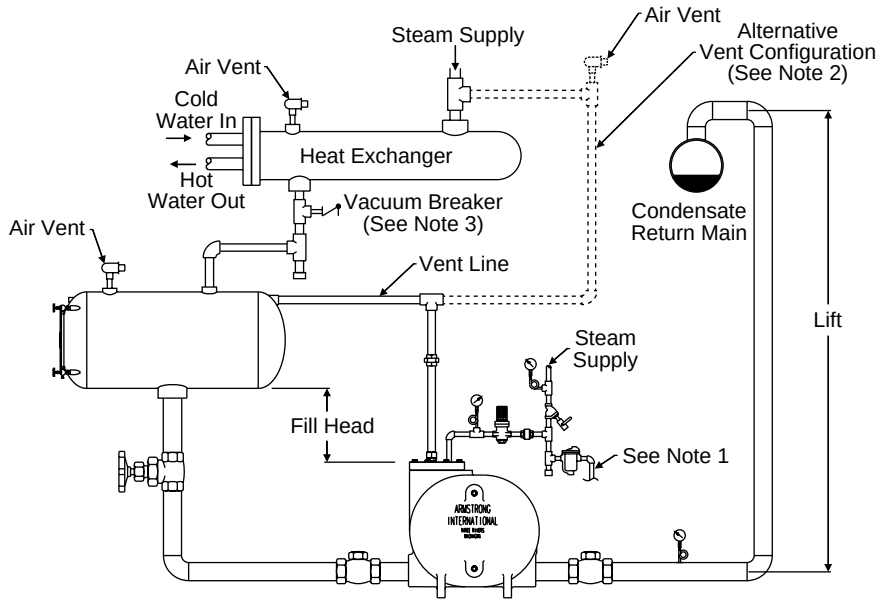


Multiple or single traps discharging to vented receiver.

OPEN SYSTEMS

For the majority of applications, a steam trap is recommended on each piece of heat exchange equipment. The steam trap, or traps, discharge to a vented receiver where flash steam will be vented to the atmosphere. The pump trap is located downstream and below the vented receiver, allowing for proper fill head height. See tables on page CRE-23 and CRE-24 for vented receiver and vent sizing for an open system.

Note 1: Drip trap may be discharged into the receiver, the return line or to the drain.



Draining steam coil or heat exchanger when pressure is lower than return line pressure. Note that a steam trap is not required in this application. If steam pressure exceeds the return line pressure, a steam trap would be required on the discharge side of the pump trap. Request installation and operation manual IB-100.

CLOSED SYSTEMS

Applications exist where it is desirable to tie the vent line back into the heat exchange space, equalizing the pressure in the heat exchanger, reservoir/piping and the pump trap. This allows water to flow by gravity down to the pump where it can be returned. Valuable Btu remain within the system due to no flash steam loss to the atmosphere through the vent. Closed system applications can also be used to drain liquid from the equipment under a vacuum. See installation and operation manual IB-100. See tables on pages CRE-23 and CRE-24 for reservoir pipe sizing.

Note 1: If steam motive is used, the drip trap may be discharged into the return line or to the drain.

Note 2: Vent piping from the pump trap can be connected to the inlet side of the equipment being drained if the pressure drop across the equipment is less than .5 psi (0.03 bar) and there is a minimum of 24" (609 mm) of fill head present.

Note 3: A vacuum breaker must be installed if the vent piping from the pump trap is connected to the receiver. If the equipment modulated down to a sub-atmospheric condition, the vacuum breaker will open to equalize the system and provide adequate drainage.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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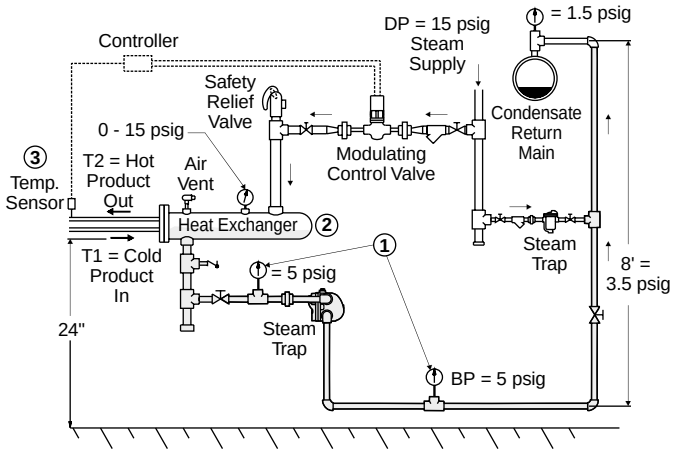
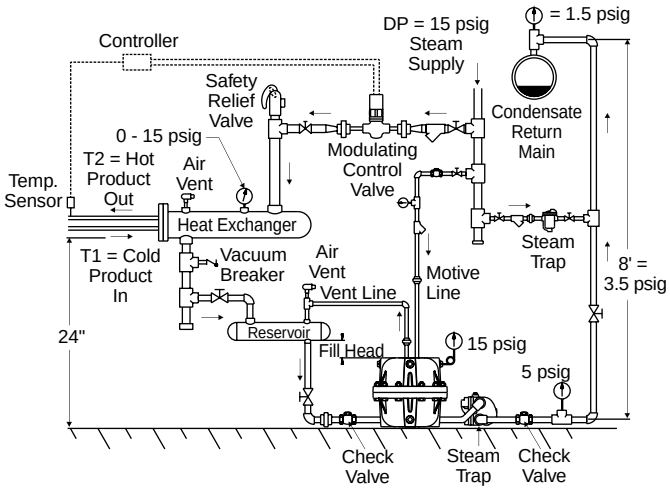
Condensate Drainage From Modulated Steam/Temperature Controlled Equipment





Problem: "Stall" Condition on Modulated Steam Control

Modulated steam controls are required to change steam pressure in the heat exchanger to control accurate product output temperature. Due to these varying steam pressure changes, a stall condition exists in all heat exchangers where condensate cannot flow through the steam trap due to insufficient pressure differential. Under the stall condition, partial or complete flooding will occur. Reference figure above noting the stall conditions and problems that can occur.

Armstrong Solution

The Armstrong pump trap and steam trap combination is the total solution to the stall condition by removing condensate under all system conditions. When the steam system pressure is sufficient to overcome the back pressure, the steam trap operates normally. When the system pressure falls to the stall condition, the pump trap operates and pumps condensate through the steam trap. Temperature control and condensate drainage are assured under all system conditions. **NOTE:** The pump trap is sized for the stall conditions.

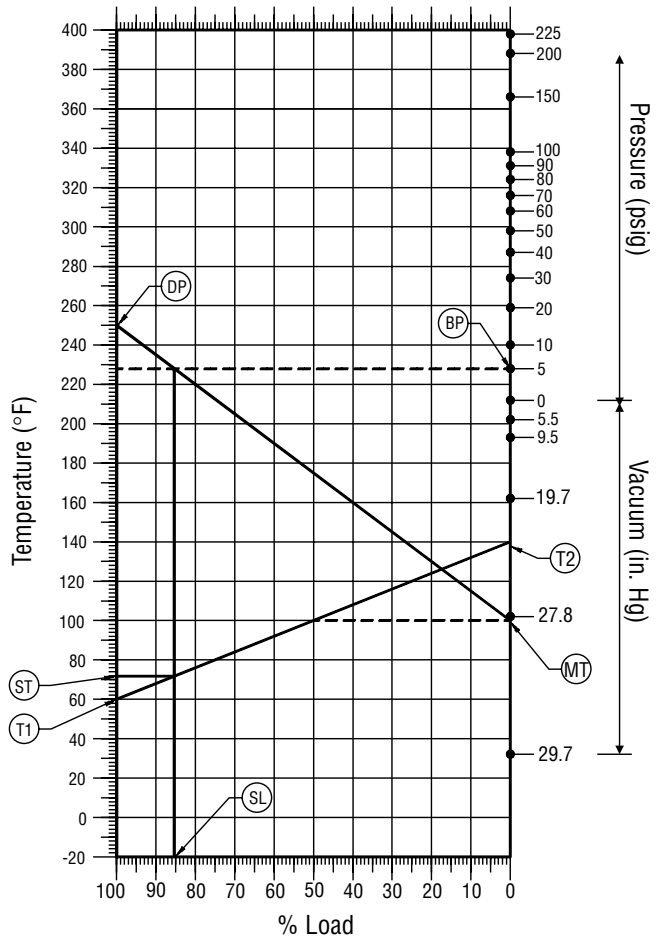
Problems

1. Stall condition—no condensate drainage due to insufficient pressure to move condensate through the steam trap
2. Heat exchange equipment floods causing equipment damage from:
   - Water hammer due to steam and condensate occupying the same space
   - Corrosion due to carbonic acid forming from sub-cooled condensate reabsorbing trapped carbon dioxide and non-condensable gases
3. Inaccurate temperature control

Stall Chart

Use of the stall chart on right will determine the point where flooding will occur.

Application information required:	**Example**
DP = design pressure to heat exchanger	15 psig
BP = back pressure	5 psig
T1 = incoming temperature	60°F
T2 = exit temperature	140°F
Stall Information:	
SL = stall load %	85%
ST = stall load temperature	72°F



Armstrong® Non-Electric Steam/Air Powered Pump Retrofit Assembly

Do you experience maintenance problems with non-electric steam/air powered pumps?

Are you dumping valuable condensate because of frequent maintenance?

Do you experience spring failures?

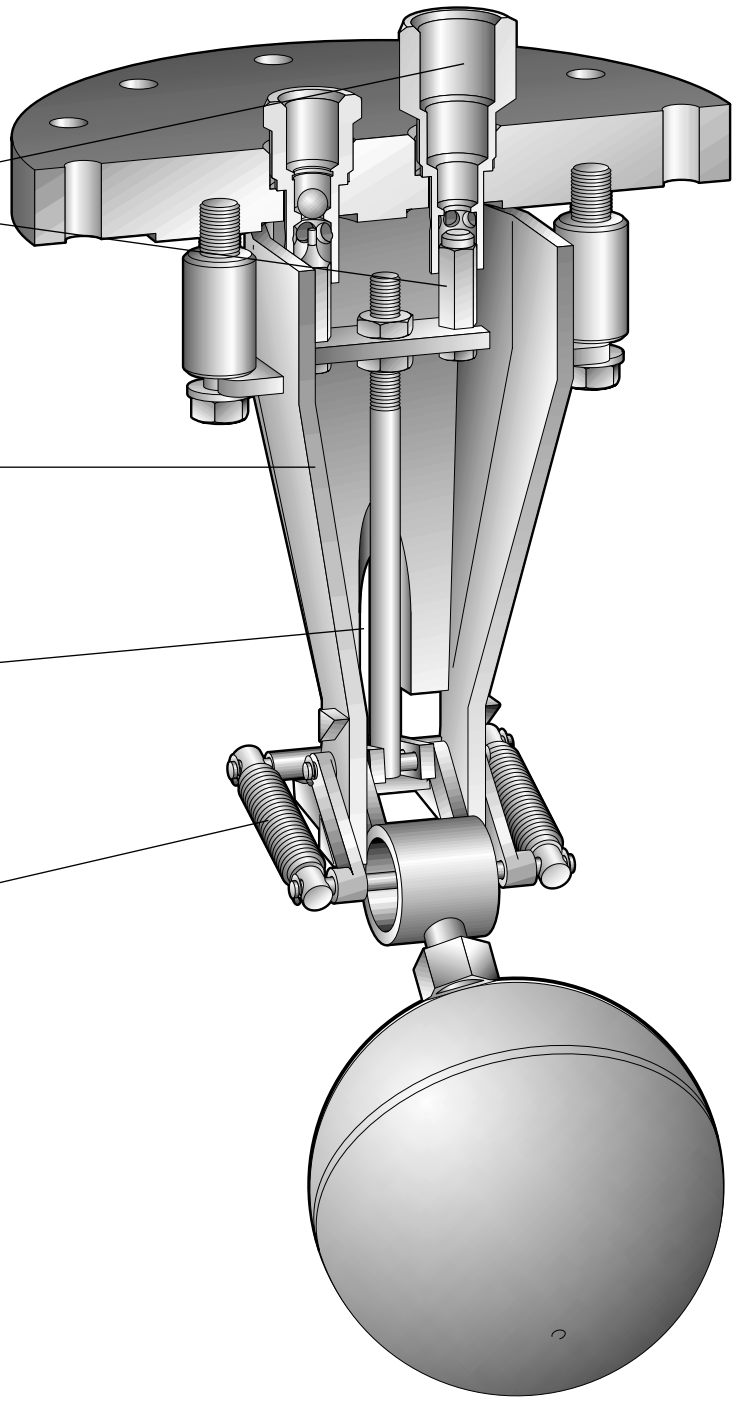
Do you have to remove the complete cap assembly to view, clean or replace the motive or vent valve?

Externally replaceable valve and seat assembly
Maintenance is a snap with stainless steel valves that can be cleaned or replaced without cap removal.

Wear and corrosion resistance
Mechanism frame assembly is constructed of rugged investment-cast stainless steel components.

Long life and dependable service
Simple float/spring operation and rugged all stainless steel construction allow for long, trouble-free service life.

Stress chloride corrosion resistance
Inconel X-750 springs have higher resistance to the stress that causes lower-grade stainless steel springs to fail.



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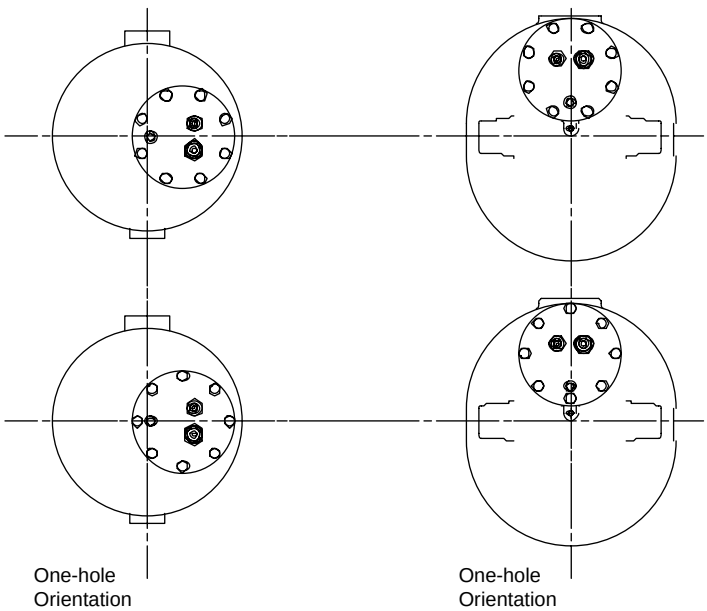
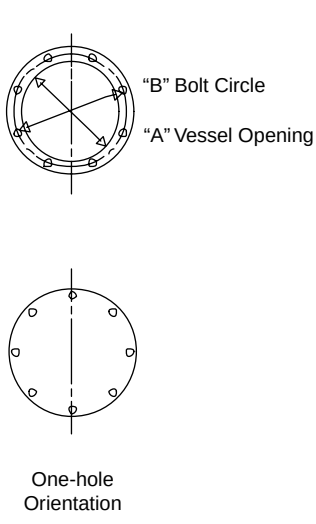
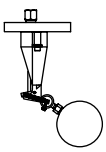
Non-Electric Steam/Air Powered Pump Retrofit Assembly

Armstrong's non-electric steam/air powered pump retrofit cap and mechanism assembly fits most competitive models. To ensure proper fit, please provide the following information:

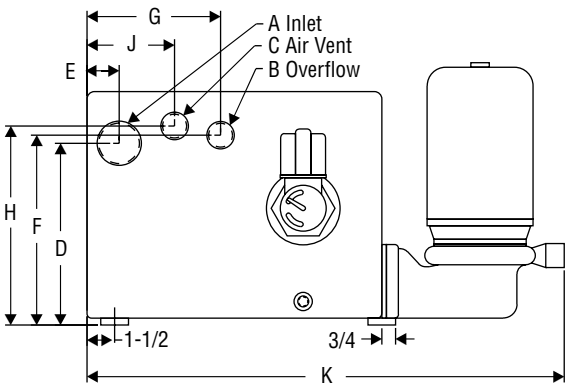
- Manufacturer's name: _____
- Manufacturer's model number: _____
- Number of bolt holes in cap: _____
- Bolt circle dimension "B": _____
- Inside diameter of vessel opening "A": _____
- Bolt hole orientation (one hole or two holes): _____

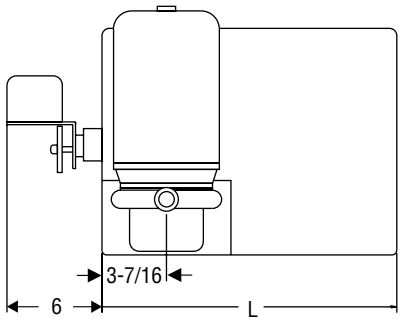




Non-Electric Steam/Air Powered Pump Retrofit Assembly								
Illustration	**Fits Competitors' Mechanical Pumps Listed Below**							
	Spirax Sarco Models PPC & PPF	Watson McDaniel Models PMPC & PMP	Spence & Nicholson Condensate Commanders	Johnson Corporation Model LMSA	MEPCO/ Dunham Bush	ITT Domestic	Yarway	Clark Reliance

Armstrong® FPC & FPS Series Electric Condensate Pumps





The Armstrong FPC (cast iron) and FPS (steel) electric condensate pumps are offered as packaged units, pre-assembled, wired and factory tested.

Quality components such as the cast bronze impellers, dependable float switches and heavy wall receivers provide smooth, trouble-free operation. All major components are easily accessible for quick and simple maintenance.

Duplex units are offered to assure longer service life, system overload protection and back-up capability.

Features

- Available with cast iron or steel condensate receivers
- Drip-proof enclosures on motors
- Choice of simplex and duplex units
- 3500 RPM motors provide low inertia for intermittent operation
- Float switches with stainless steel float and rod provide optimum levels in the receiver for pump operation
- Factory wired for 115 volt, can be field wired for 230/1/60 operation
- Adapter flanges available to connect a new pump to an existing manufacturer's condensate receiver
- Bronze impellers are cast one-piece construction trimmed and balanced to design capacities
- Available accessories:
  - Inlet suction strainer
  - Discharge pressure gauges
  - Discharge check valve and gate valve
  - Magnetic starter
  - Thermometer
  - Water gauge glass with shut-off valves and protective rod guards

For pre-assembled packaged electric condensate pumps, contact your local Armstrong Representative.

For a fully detailed certified drawing, refer to list below.

FPC-112	**CDF #1008**	**FPC-118/218**	**CDF #1009**
FPC-115/218	**CDF #1011**	**FPC-130/230**	**CDF #1010**

Specifications—Cast Iron Receiver Condensate Pumps

Model No.		Pump GPM	Standard Motor Voltage*	Maximum Pump Discharge, psig	Pump Discharge Nozzle Size	Pump HP	Receiver Size Gallons	sq ft EDR
Simplex	Duplex							
FPC-112	—	12	115V/1Ph 3500 RPM	20	3/4"	1/3	10	8,000
FPC-115	—	15					15	10,000
FPC-118	FPC-218	18					25	12,000
FPC-130	FPC-230	30			1"	3/4	37	20,000

*Can be field wired to 230V/1Ph/50Hz

Additional units for larger capacities and higher pressures available upon request—consult factory.

Dimensions—Cast Iron Receiver Condensate Pumps

Receiver Size Gallons	Receiver Size (in)	A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	G (in)	H (in)	J (in)	K (in)	L (in)	Drain (in)
10	16 x 13-1/2 x 12-5/16	2	1-1/4	1-1/4	9-7/8	1-3/4	10-5/16	7-1/4	10-13/16	4-3/4	25	13-1/2	1/2
15	16 x 19 x 12-5/16	2	1-1/4	1-1/4	9-7/8	1-3/4	10-5/16	7-1/4	10-13/16	4-3/4	25	19	1/2
25	19 x 24-1/2 x 13-1/2	2	1-1/4	1-1/4	10-1/4	1-3/4	11-1/4	5-1/4	12	8-1/4	28	24-1/2	1/2
37	20 x 28 x 17-1/4	3	1-1/2	1-1/2	14-1/4	2-11/16	15-1/4	6-3/16	16	8-11/16	29	28	1/2

Additional units for larger capacities and higher pressures available upon request—consult factory.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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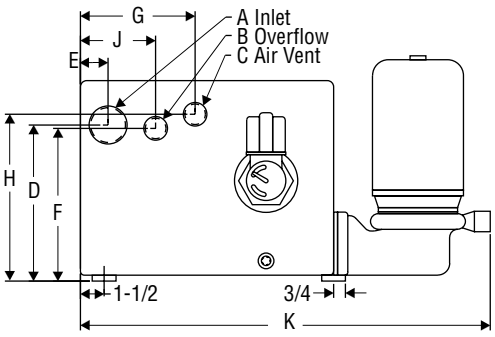
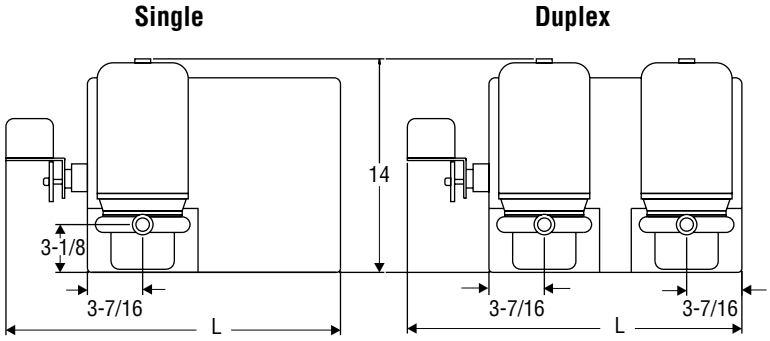
FPC & FPS Series Electric Condensate Pumps





Sizing Condensate Pumps

Step 1—Determine the condensing rate of the system:

Where: C = Condensing Rate in lb/hr
F_1 = Conversion to GPM = 500
F_2 = Conversion to EDR = .0005

Formula: $C \div F_1 = GPM$
$GPM \div F_2$ = sq. ft. EDR

Example: 2000 lb/hr ÷ 500 = 4 GPM
4 GPM ÷ 0.0005 = 8,000 sq. ft. EDR

Step 2—Apply a 3:1 safety factor by multiplying by 3

Example: 4 GPM x safety factor of 3 = 12 GPM
Select a pump with a 12 GPM rating with a sq. ft. EDR of 8,000

Step 3—Determine system back pressure

The total back pressure is determined by vertical lift, system pressure on the discharge side of the pump, plus frictional loss through pipe, valves and fittings.

Vertical lift, 2.31 ft. = 1 psig + system pressure (psig) + frictional loss (psig) = total system back pressure.

Select a pump that has a maximum discharge pressure greater than the total system back pressure calculated for the system.

Special Notes:

- Floor mounted condensate receivers have a maximum operating temperature rating of 200°F. Higher temperature applications will require that the receiver be elevated to achieve proper net positive suction head (NPSH).
- Duplex units are typically sized for system redundancy, using a mechanical alternator for less wear on each pump.
- For systems that require vacuum pumps, control panels, high performance motors and special condensate receivers, consult the factory for engineering and pricing assistance.
- Condensate receivers are typically sized for one to three minutes of storage capacity.
- The condensate receiver that is mounted to the pump must always remain vented to the atmosphere.

NPSH is critical to the proper operation of an electric condensate pump. NPSH is the measure of how close the suction passage of the pump is to boiling. NPSH can be calculated by the following formula: $NPSH = H_s + H_p - H_v - H_f$

Where:
H_s = static head of the liquid at the pump suction
H_v = vapor pressure of the liquid at the pump suction

H_p = absolute pressure above the static head of the liquid
H_f = friction loss in the suction piping

For a fully detailed certified drawing, refer to list below.

FPS-112	**CDF #1006**	**FPS-118/218**	**CDF #1007**
FPS-115/215	**CDF #1007**	**FPS-130/230**	**CDF #1007**

Specifications—Steel Receiver Condensate Pumps

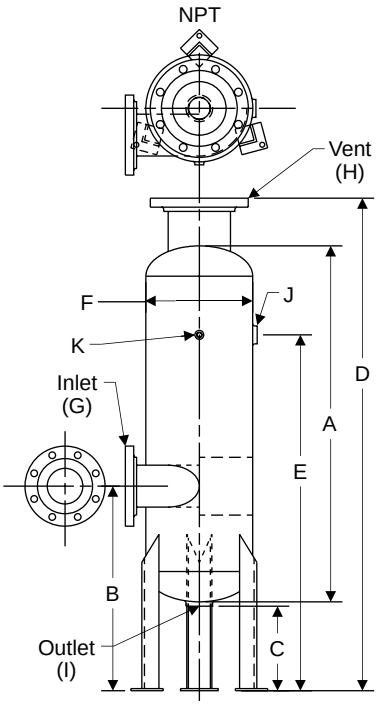
Model No.		Pump GPM	Standard Motor Voltage*	Maximum Pump Discharge psig	Pump Discharge Nozzle Size	Pump HP	Receiver Size Gallons	sq ft EDR
Simplex	Duplex							
FPS-112	—	12	115V/1Ph 3,500 RPM	20	3/4"	1/3	7-1/2	8,000
FPS-115	—	15					15	10,000
FPS-118	FPS-218	18					21	12,000
FPS-130	FPS-230	30			1"	3/4	35	20,000

*Can be field wired to 230V/1Ph/50 Hz

Dimensions—Steel Receiver Condensate Pumps

Receiver Size Gallons	Receiver Size (in)	A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	G (in)	H (in)	J (in)	K (in)	L (in)	Drain (in)
7-1/2	12-1/4 x 12-1/4 x 12-1/4	2	1-1/4	1-1/4	10-1/8	1-3/4	9-15/16	4-3/4	10-5/8	7-1/4	23-1/8	20	1/2
15	16 x 16 x 13	2	1-1/4	1-1/4	10-7/8	1-3/4	10-11/16	4-3/4	11-3/8	7-1/4	26-7/8	24	1/2
21	18-1/4 x 18-1/4 x 15-1/4	2	1-1/4	1-1/4	13-3/8	1-3/4	13-3/16	4-3/4	13-7/8	7-1/4	20-1/8	26	1/2
35	20-1/4 x 20-1/4 x 20-1/4	3	1-1/2	1-1/2	17-1/2	2-7/8	17	7-1/8	18	10-1/8	31-1/8	28	1/2

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.



Features

- ASME coded and stamped vessels
- Standard pressure rating 150 psi (other pressure ratings available upon request)
- Standard models are designed and sized to cover a wide range of applications and loads
- Flash vessels are designed to provide low velocity flash steam with no water carryover
- Quick payback for flash recovery investment
- **Special tanks available upon request**

For a fully detailed certified drawing, refer to CDF #1023.

Flash Steam Savings Analysis

Part I: Determining the amount of flash steam produced

A. Condensate Load — A = _____ lb/hr.

B. Annual hours of operation — B = _____ hrs/yr.

C. Steam Cost — C = _____ $/1,000 lbs.

D. Flash steam percentage from chart (on page CRE-32) — D = _____ %

E. Flash steam produced:

D x A = flash steam produced — E = _____ lb/hr.

Part II: Determining dollar value of the flash steam

F. Annual flash steam savings:

$$F = \frac{E \times B \times C}{1{,}000}$$

F = _____ $/yr.

Physical Data—Standard Design Model AFT

Model No.	AFT-6		AFT-8		AFT-12		AFT-16	
	in	mm	in	mm	in	mm	in	mm
A	36	914	36	914	40	1,016	48	1,219
B	21	533	21	533	23	584	26	660
C	9-1/2	241	9-1/2	241	9-1/2	241	9-1/2	241
D	51	1,295	52	1,321	55-3/8	1,407	63-1/2	1,613
E	36	914	36	914	40	1,016	48	1,219
F	6	150	8	203	12	305	16	406
G	2	50	3	80	4	102	6	150
H	2-1/2	65	4	102	6	150	6	150
I	1-1/2	40	1-1/2	40	2	50	2	50
J	3/4	20	1	25	1-1/2	40	2	50
K	1/2	15	1/2	15	1/2	15	1/2	15

NOTE: Connections "G" and "H" are 150 lb. flanges. All others are NPT. All flash tanks are ASME coded for 150 psig (10 bar). Special sizes available upon request.

Capacities—Standard Design Model AFT

Model No.	Maximum Condensate Load		Maximum Flash Load	
	lb/hr	kg/hr	lb/hr	kg/hr
AFT-6	2,000	907	500	227
AFT-8	5,000	2,268	1,000	454
AFT-12	10,000	4,536	2,000	907
AFT-16	20,000	9,072	3,000	1,361

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Flash Recovery Vessels

How much flash steam is available?

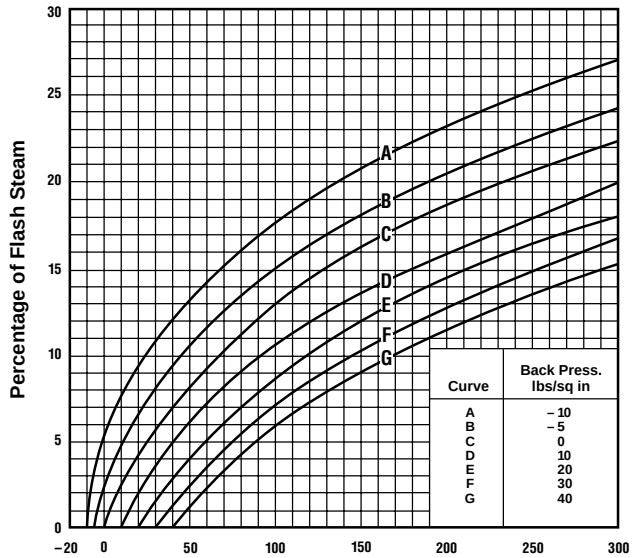
1. Follow horizontal axis right to primary discharge pressure.
2. Follow vertically up to secondary pressure curve.
3. Move left to “Percentage of flash steam.”

Example:
Condensate load = 10,000 lb/hr
Primary pressure = 100 psig
Secondary pressure = 10 psig

Percentage of flash = 10.6%
Secondary steam load = 1,060 lb/hr
(10,000 lb/hr x .1060 = 1,060 lb/hr)

Selection:
Model AFT-12

Percentage of Flash Steam Formed When Discharging Condensate to Reduced Pressure



Application Information

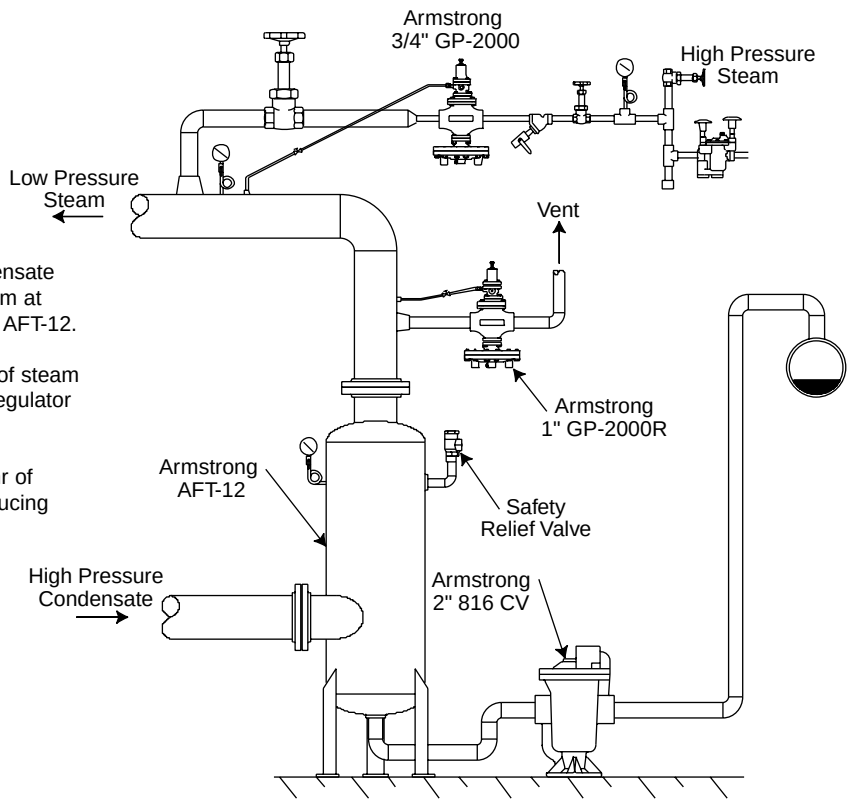
A. Condensate Load to Flash Tank **6,000** lb/hr
B. Pressure of Incoming Condensate **100** psig
C. Flash Tank Pressure **20** psig
D. Flash Percentage **9.5%**
E. Flash Amount = A x (D/100) = **570** lb/hr
F. Low Pressure Steam Required **2,500** lb/hr
G. High Pressure Steam **200** psig
H. Back Pressure **5** psig

Flash tank will accommodate (A) **6,000** lb/hr of condensate at (B) **100** psig, resulting in (E) **570** lb/hr of flash steam at (C) **20** psig. The flash tank shall be Armstrong Model AFT-12.

The back pressure regulator shall pass (E) **570** lb/hr of steam from (C) **20** psig to atmosphere. The back pressure regulator shall be Armstrong Model **1" GP-2000R**.

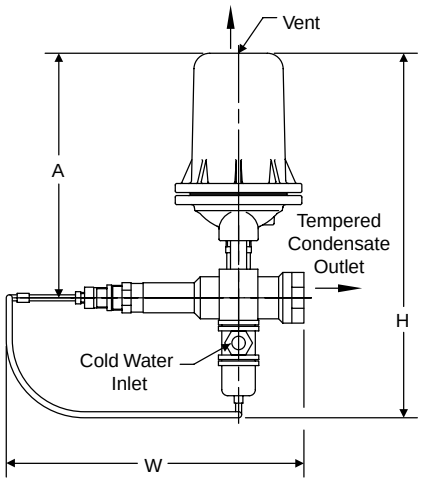
The pressure reducing valve shall pass (F) **2,500** lb/hr of steam from (G) **200** psig to (C) **20** psig. Pressure reducing valve shall be **3/4" GP-2000**.

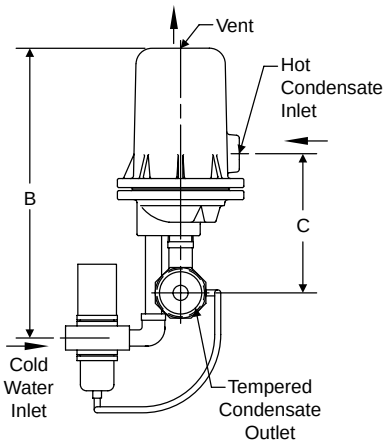
The steam trap shall be an inverted bucket type with large vent and internal check valve. The steam trap will be sized using a 3:1 safety factor. The steam trap shall pass 3 x (A - E) **16,290** lb/hr at a (C - H) **15** psi differential. The steam trap shall be an Armstrong Model **2" 816 CV**.



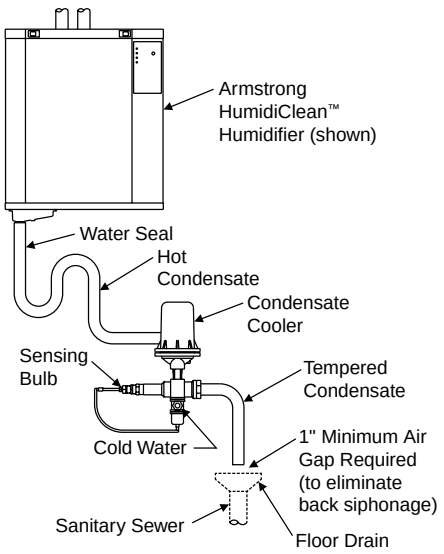
CC-5 and CC-12 Condensate Coolers

Drain Tempering Device





Typical Installation



NOTE: Can also be used with heat exchangers or any application that requires the hot water or condensate temperature to be tempered.

NOTE: The condensate receiver should **not** be used as a flash tank. Condensate should be flashed prior to entering the condensate cooler.

Description

Armstrong's Condensate Cooler is a device that mixes hot condensate or hot water with a cold water supply to reduce the temperature to acceptable discharge drain temperatures as required by city and state codes. It is a pre-assembled package that is suitable for any plumbing system. When hot condensate or hot water is drained into the condensate cooler body, the tempering valve opens and allows cold water to enter the chamber and mix with hotter liquid, cooling it to a preset temperature level of 135°F (57°C) or to a desired field set temperature.

Capacities (Total of condensate and cooling water combined)

CC-5	5 gpm (19 lpm) with 180°F (82°C) condensate
CC-12	12 gpm (45 lpm) with 180°F (82°C) condensate

To determine condensate load, use the following formula:

(B - C)/(H - C) x Total Capacity

Where: B = Blended Water Temperature
C = Cold Water Temperature
H = Condensate Temperature

Tempered Condensate Range

Factory preset 135°F (57°C)
Field adjustable range 115 to 180°F (46 to 82°C)
Maximum cold water pressure 150 psig (10 bar)

Materials

Body:	ASTM A48 cast iron
Pipe and Fittings:	
Condensate	Copper
Cold Water	Malleable iron
Body (Controller):	Brass
Sensing Bulb:	Bronze

For a fully detailed certified drawing, refer to:
CC-5 CDY #1000 **CC-12 CDY #1073**

Physical Data				
Model No.	**CC-5**		**CC-12**	
Pipe Connections	in	mm	in	mm
Vent	3/4	20	1-1/2	38
Hot Condensate Inlet	3/4	20	1-1/2	38
Tempered Condensate Outlet	1-1/4	32	1-1/2	38
Cold Water Inlet	3/8	10	3/4	20
"H"	15-1/8	384	27	686
"W"	12-3/8	314	13-7/8	352
"A"	10-3/16	258	20-1/2	521
"B"	12-1/16	306	24-1/2	622
"C"	5-13/16	147	12-1/4	147
Weight lb (kg)	14 (6)		74 (34)	

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

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Stainless Steel Sump Ejector

Armstrong Fluid Handling offers a stainless steel sump ejector for use in draining unwanted water from steam pits, steam tunnels or enclosed spaces. The stainless steel sump ejector uses a snap-acting Inconel X-750 spring-assisted mechanism, which engages a steam motive valve, turning the pump on or off as the float rises and falls. The all stainless steel design will ensure long life in the rather harsh environment of a steam pit.

The stainless steel sump ejector is designed to eliminate maintenance headaches and safety issues surrounding steam pits, tunnels and enclosed spaces.

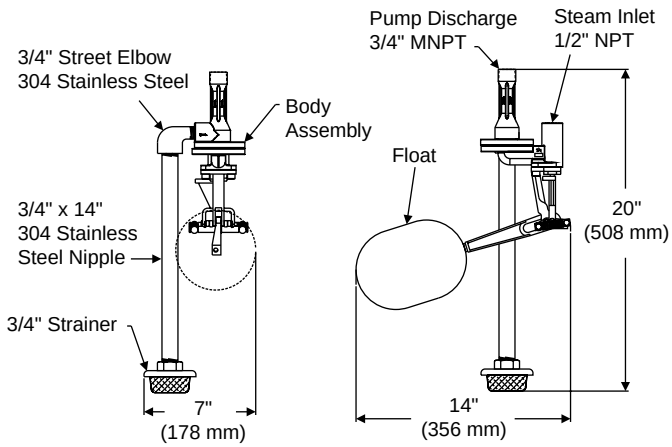
Features

- All stainless steel construction and design guard against corrosion
- True steam-on, steam-off operation
- Heavy duty Inconel X-750 springs provide a long, trouble-free service life
- The small, compact and unique cast stainless steel design is unlike anything on the market today

For a fully detailed certified drawing, refer to CDF #1052.

Stainless Steel Sump Ejector Materials

Name of Part	Material
Mechanism	ASTM A351 CF8M
Springs	Inconel X-750
Spring Ends	304 stainless steel
Clevis Pins	304 stainless steel
Body	ASTM A351 CF8M
Nozzle	308 stainless steel
Seal Retainer	303 stainless steel
Motive Ball	440-C stainless steel
Motive Valve	316 stainless steel
Rod Seal	PTFE
Seal Spring	Hastelloy C-276
Rod Wiper	Nitrile
O-Ring	EPDM
Bolts	18-8 stainless steel
Strainer Body	Glass filled nylon
Strainer Mesh	Stainless steel
Fittings	304 stainless steel
Pipe	304 stainless steel



Stainless Steel Sump Ejector Capacities in gallons per minute (gpm)

Discharge Head (ft)	Water Temperature 60°F						Water Temperature 100°F						Water Temperature 140°F				
	Motive Steam Pressure (psig)						Motive Steam Pressure (psig)						Motive Steam Pressure (psig)				
	40	60	80	100	120	150	40	60	80	100	120	150	60	80	100	120	150
0	6.0	9.3	11.6	12.2	12.8	12.9	6.0	9.0	9.2	8.6	8.0	8.0	5.5	5.3	5.4	5.5	5.5
5	4.0	7.3	9.9	11.1	11.9	12.4	3.0	7.1	8.2	8.1	7.8	7.8	4.5	4.3	5.3	5.4	5.4
10	2.0	5.2	8.3	10.0	11.0	11.9	—	5.2	7.2	7.7	7.6	7.6	3.5	3.3	5.2	5.2	5.2
15	—	3.2	6.6	8.9	10.1	11.5	—	3.3	6.2	7.2	7.3	7.4	—	2.3	5.1	5.1	5.1
20	—	—	5.0	7.8	9.2	11.0	—	—	5.2	6.7	7.1	7.3	—	1.3	5.0	4.9	4.9
25	—	—	—	6.7	8.3	10.5	—	—	—	6.2	6.8	7.1	—	—	4.9	4.8	4.8
30	—	—	—	5.6	7.4	10.0	—	—	—	5.7	6.6	6.9	—	—	4.8	4.6	4.6
35	—	—	—	—	6.5	9.5	—	—	—	—	6.4	6.7	—	—	—	4.5	4.5
40	—	—	—	—	5.6	9.1	—	—	—	—	6.1	6.6	—	—	—	4.3	4.3
45	—	—	—	—	—	8.6	—	—	—	—	—	6.4	—	—	—	—	4.2
50	—	—	—	—	—	8.1	—	—	—	—	—	6.2	—	—	—	—	4.0

NOTE: Maximum operating pressure is 175 psig (12 bar). No increase in capacity with motive pressure over 150 psig (10 bar).
Consult factory for 1-1/2" Stainless Steel Sump Ejector.

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.