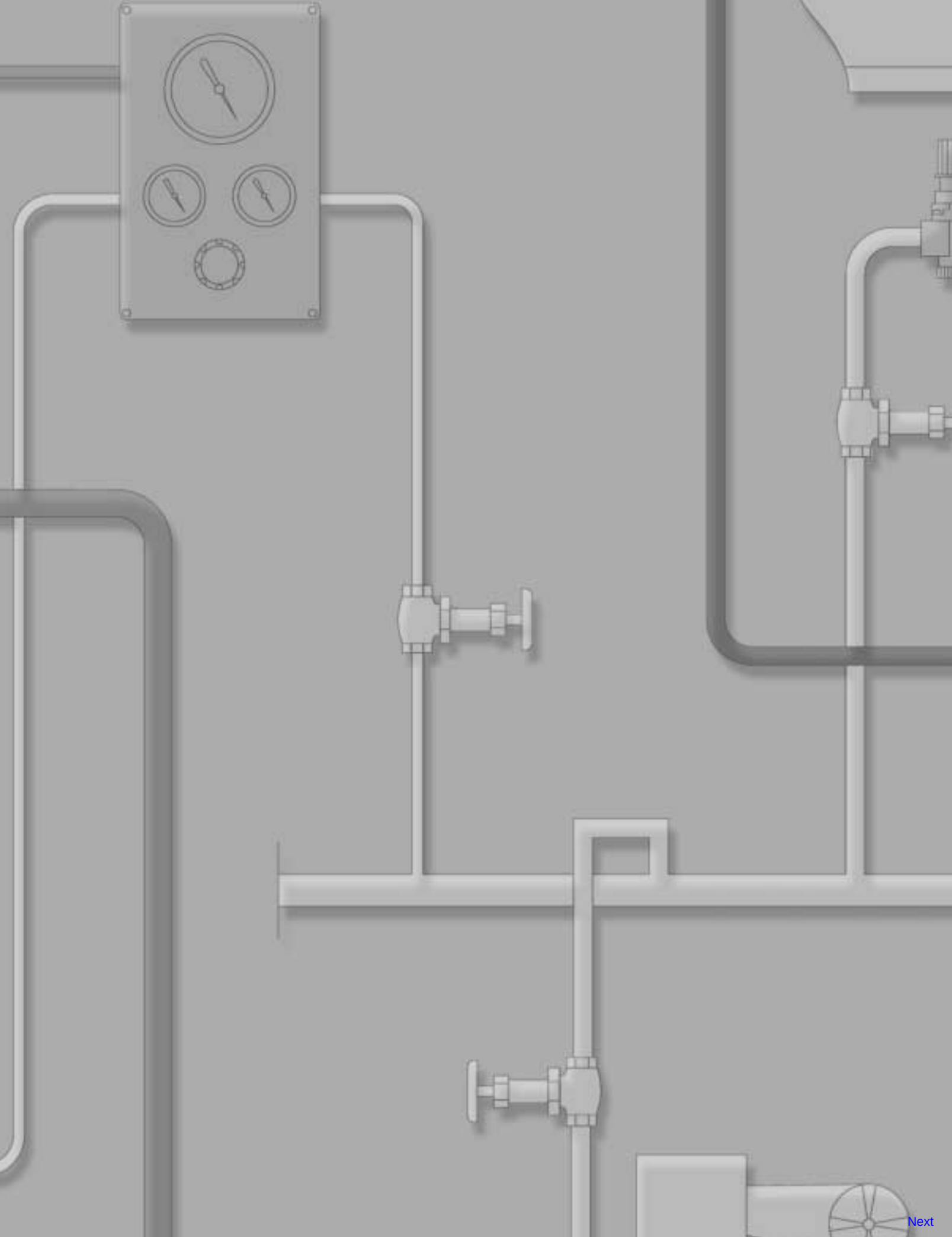
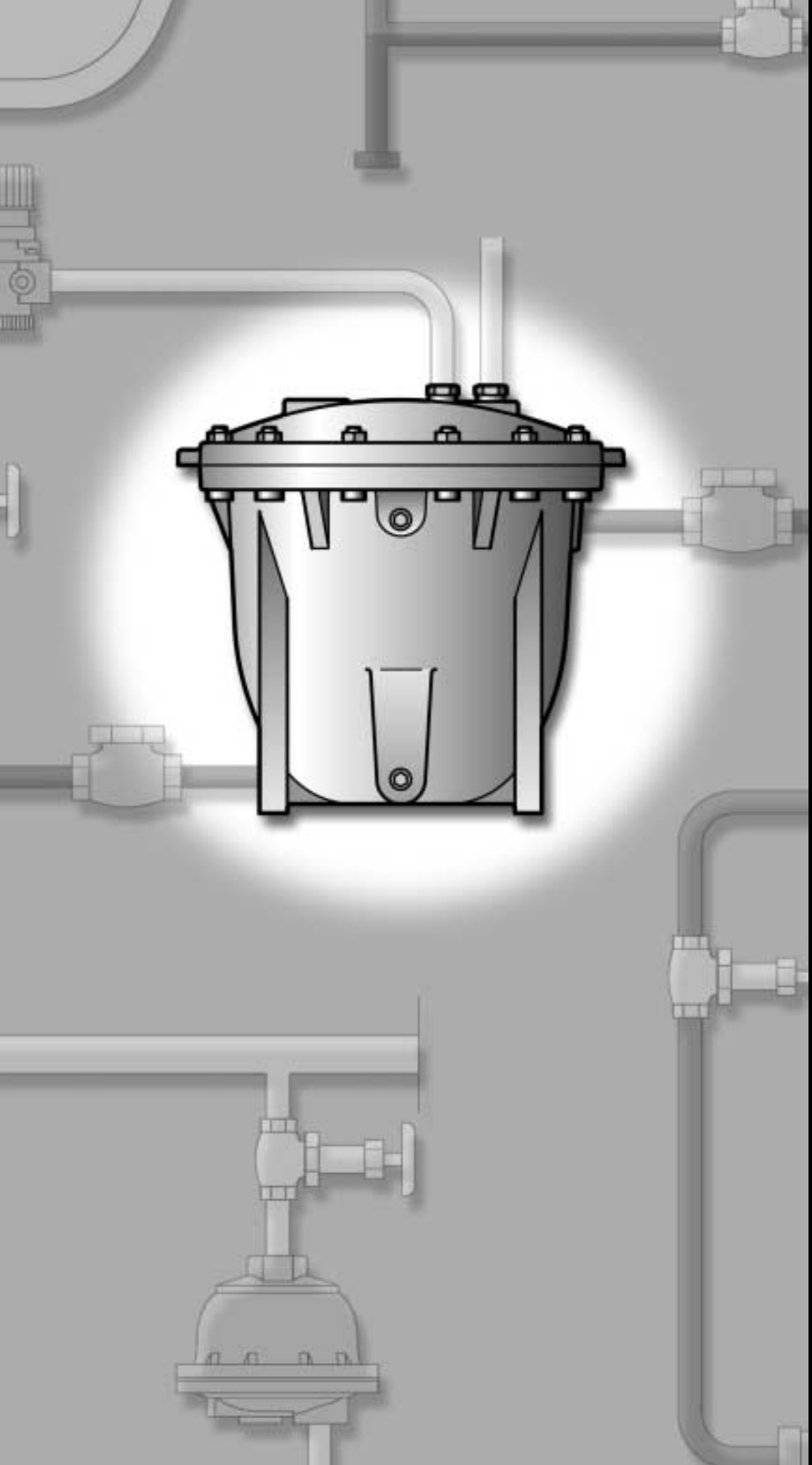


Next



# Condensate Recovery Equipment

Armstrong

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

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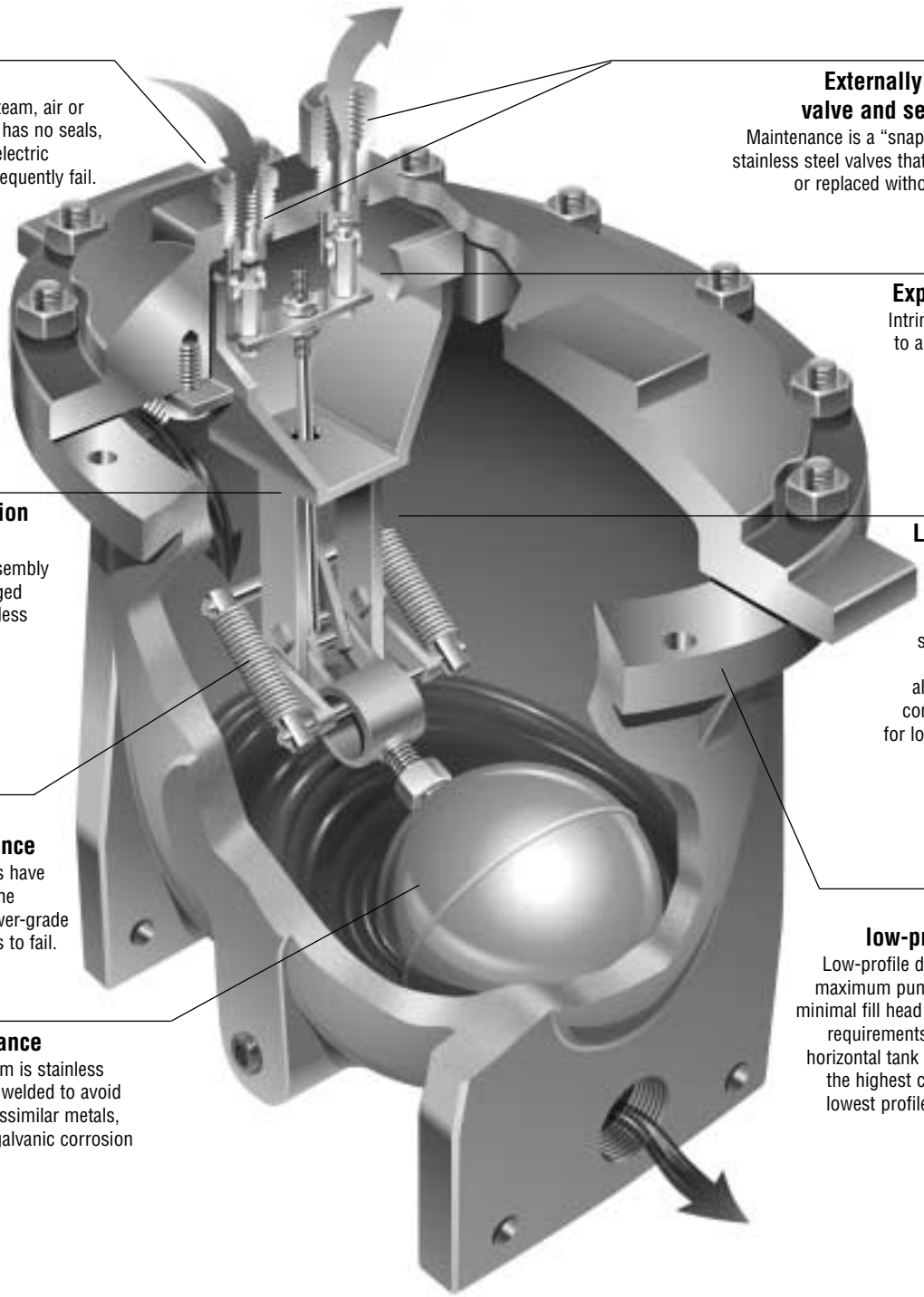
## Inside Advantages

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**

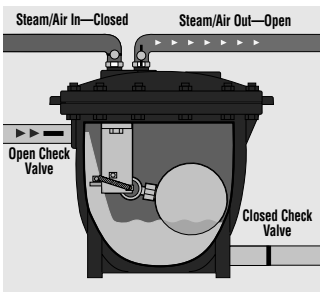
$$\frac{**(\text{cost of equipment/installation}) \$20{,}000}{(I)\ 73{,}988}$$

*Btu/lb from direct steam injection

**Estimated equipment and installation cost

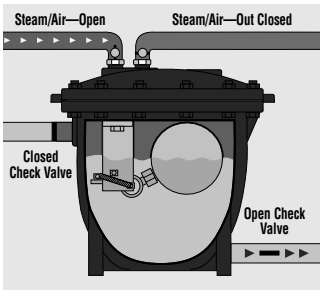
†Cost to operate in example assumes an "open" vented system. If pump trap is used in "closed loop" application, steam operation cost is negligible.

## Pumping Trap Operation



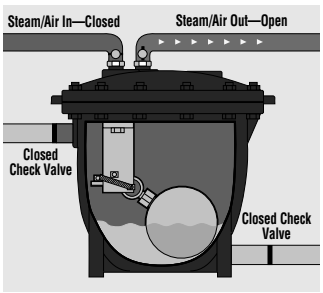

### Filling

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.



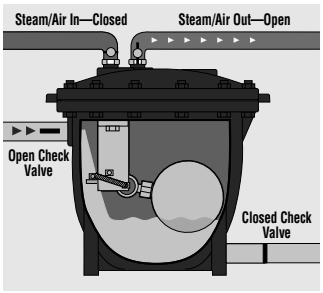

### Begin Pumping

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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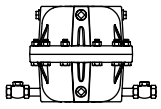
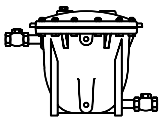
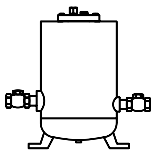
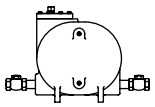
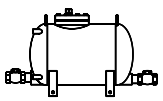
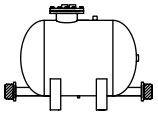
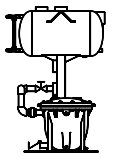
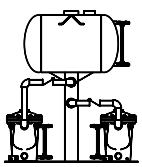
# Pumping Trap ID Charts



| 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<br>PT-206 | 125 | 2,400<br>3,700 | ●<br> | <br>● | | | 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<br>PT-406<br>PT-408<br>PT-412 | 125 | 3,600<br>5,500<br>7,400<br>12,200 | ● | <br>● | <br><br>● | <br><br><br>● | CRE-9 |
|  | **Series PT-3500** | Screwed | 150 | 450 | ASTM A48 Class 30 Cast Iron | Stainless Steel Inconel X-750 Spring | PT-3508<br>PT-3512 | 125 | 9,900<br>14,500 | | | ●<br> | <br>● | CRE-11 |
|  | **Series PT-300** | Screwed<br>*150# ANSI Flanged<br>*300# ANSI Flanged | 150 | 650<br><br>500 | *Fabricated Steel 150 psi ASME Sec. VIII Design "U" Stamped | Stainless Steel Inconel X-750 Spring | PT-308<br><br>PT-312 | 125 | 11,600<br><br>16,600 | | | ●<br><br> | <br><br>● | 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<br>*150# ANSI Flanged | 150 | 450 or 650 | Cast Iron Carbon Steel | Stainless Steel Inconel X-750 Spring | SPT-100<br>SPT-200<br>SPT-400<br>SPT-3500<br>SPT-300 | 125 | See Pages CRE-15 Thru CRE-17 | ●<br>●<br>● | <br>●<br>● | <br><br>●<br>●<br>● | <br><br>●<br>●<br>● | CRE-15 Thru CRE-17 |
|  | **Series 100, 200, 400, 3500, 300 Packages** | Screwed<br>*150# ANSI Flanged | 150 | 450 or 650 | Cast Iron Carbon Steel | Stainless Steel Inconel X-750 Spring | DPT-100<br>DPT-200<br>DPT-400<br>DPT-3500<br>DPT-300 | 125 | See Pages CRE-15 Thru CRE-17 | ●<br>●<br>● | <br>●<br>● | <br><br>●<br>●<br>● | <br><br>●<br>●<br>● | CRE-15 Thru CRE-17 |

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



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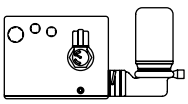
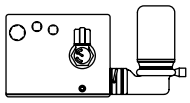
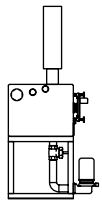
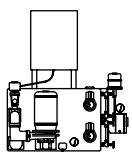
# Pumping Trap ID Charts



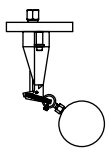
## Electric Centrifugal Condensate Pump ID Chart

| 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) | |

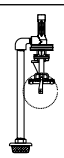
## Vacuum Condensate Pump ID Chart

| 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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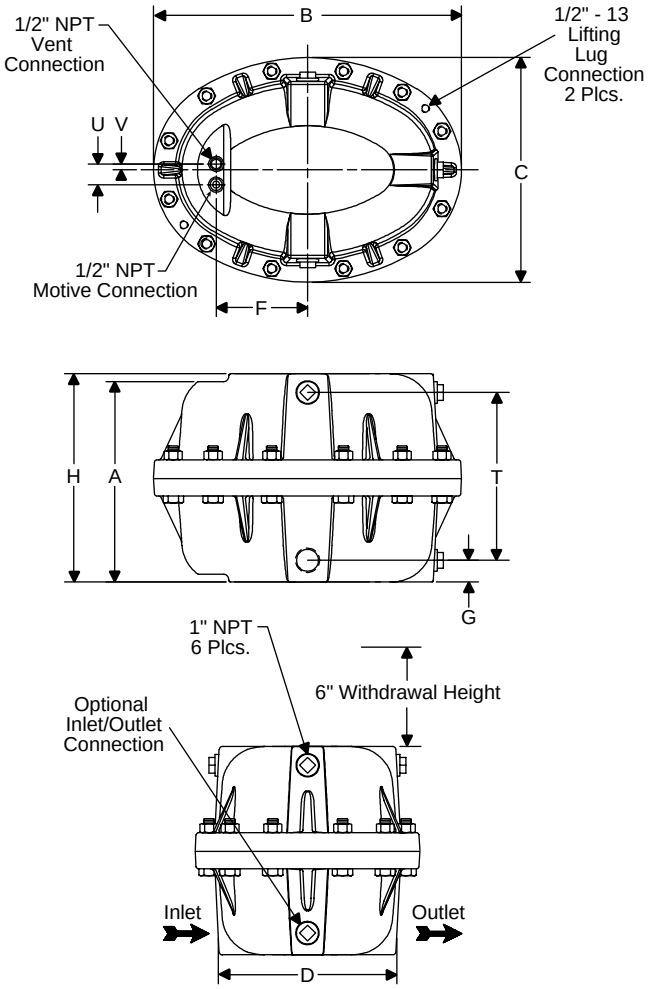
# Armstrong® PT-104 Series Mini Pump Trap






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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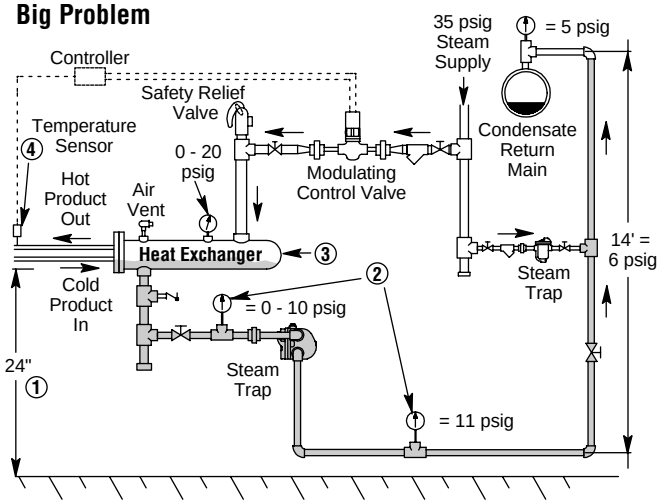
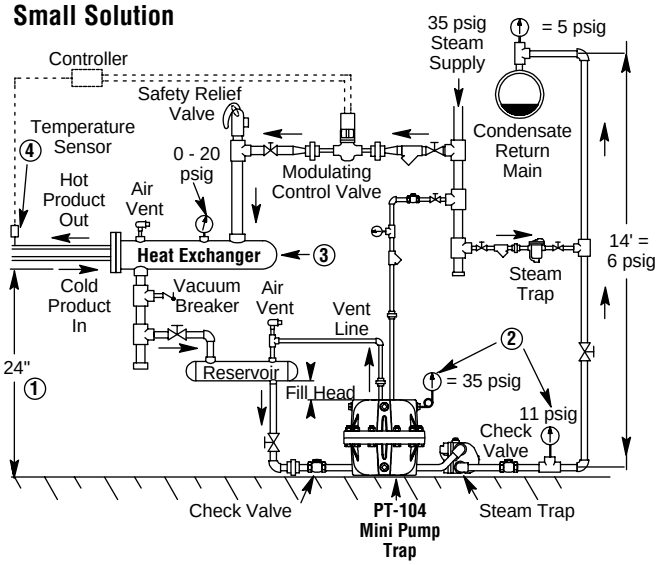
# PT-104 Series Mini Pump Trap

### 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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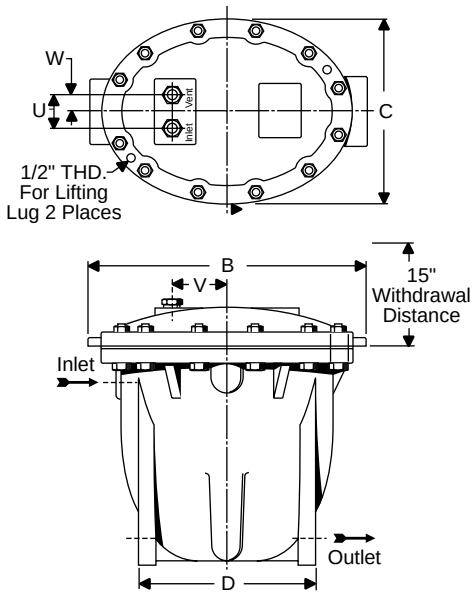
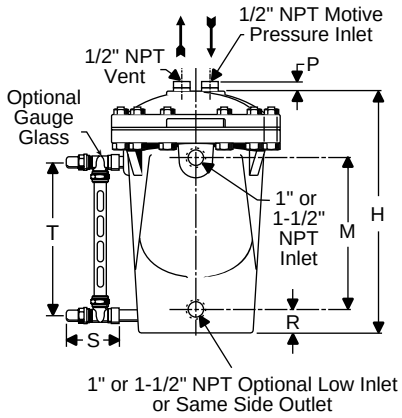
# PT-200 Series Low Profile Cast Iron Pump Trap






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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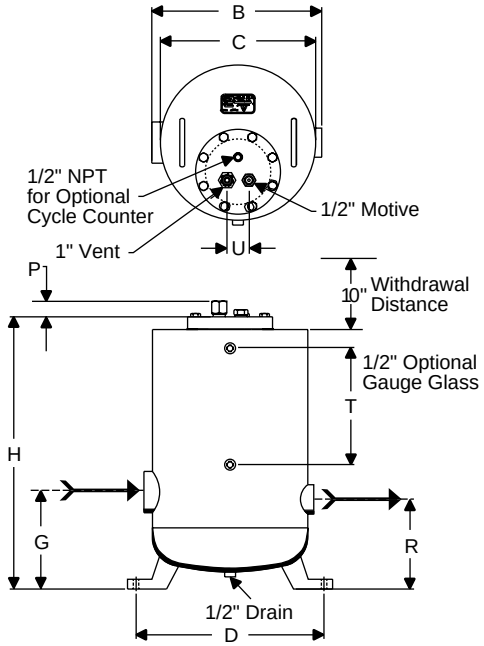
# Armstrong® PT-400 Series Vertical Steel Pump Trap






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

Armstrong®



## 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 | 60 | 4 | 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 | | | 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

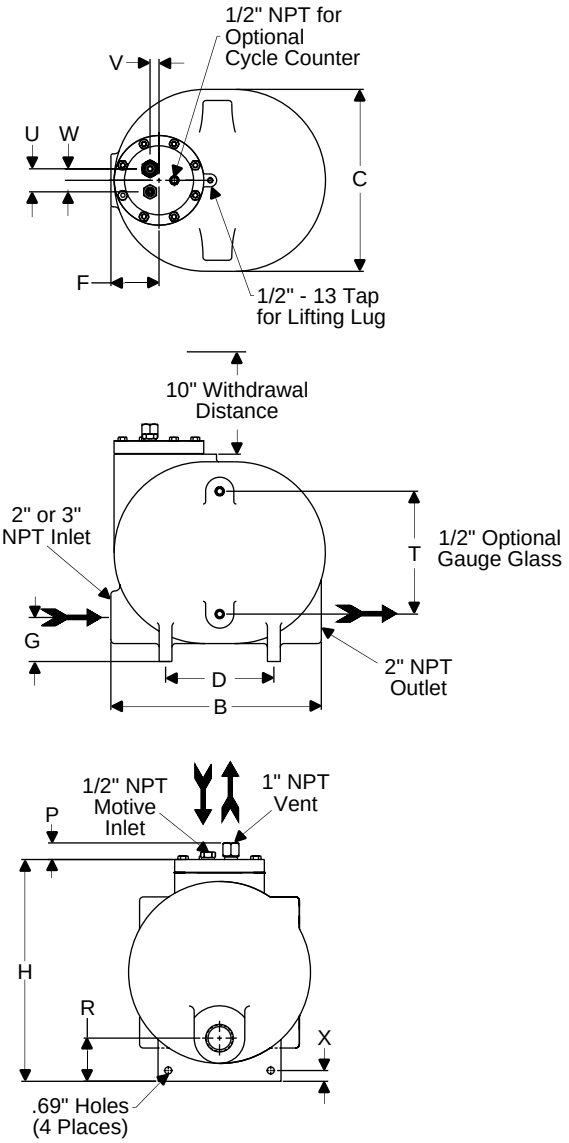
| Fill Head | | in | mm | in | mm | in | mm | in | mm | in | mm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 6 | 152 | 12 | 305 | 24 | 610 | 36 | 914 |
| Model | PT-404 | 0.7 | | 0.85 | | 1.0 | | 1.3 | | 1.4 | |
| | PT-406 | 0.7 | | 0.85 | | 1.0 | | 1.2 | | 1.35 | |
| | PT-408 |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

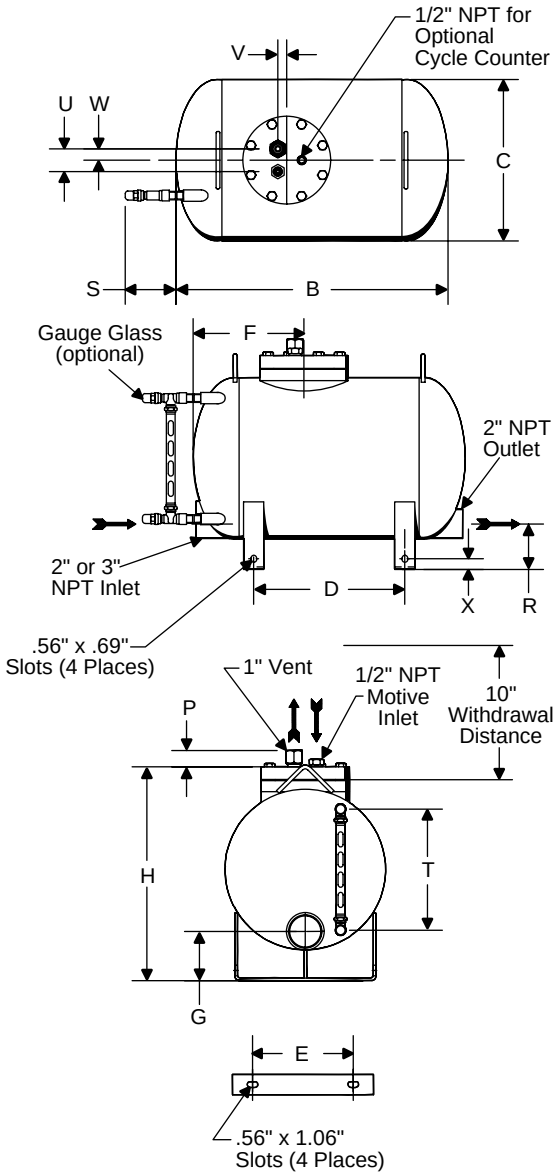
NOTE: Fill head measured from drain point to top of cap. See figures on page CRE-25. Discharge per cycle is typically 10 gallons for PT-3500 Series.

## 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.***


**Armstrong** Steam and Condensate Group, 221 Armstrong Blvd., P.O. Box 408, Three Rivers, MI 49093 – USA Phone: (269) 279-3601 Fax: (269) 279-3150
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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

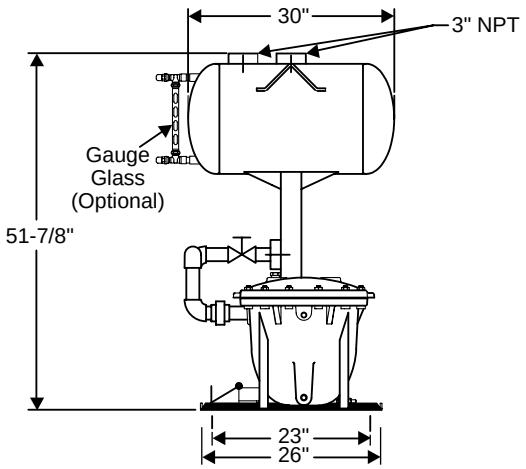
**Convert psig to kg/cm²—By dividing by 14.22** Example: 15 psi ÷ 14.22 = 1.05 kg/cm²

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

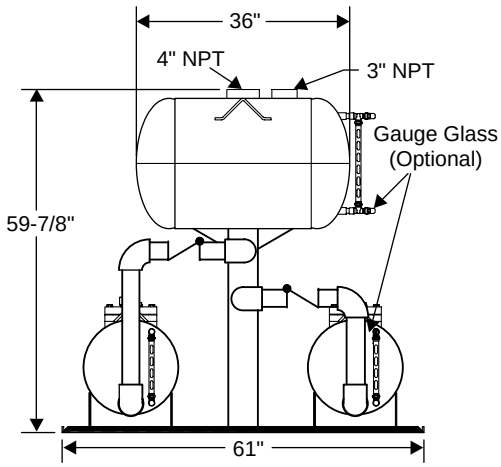


**Armstrong** Steam and Condensate Group, 221 Armstrong Blvd., P.O. Box 408, Three Rivers, MI 49093 – USA Phone: (269) 279-3601 Fax: (269) 279-3150
**www.armstrong-intl.com**

Next




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.***


**Armstrong** Steam and Condensate Group, 221 Armstrong Blvd., P.O. Box 408, Three Rivers, MI 49093 – USA Phone: (269) 279-3601 Fax: (269) 279-3150
**www.armstrong-intl.com**
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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

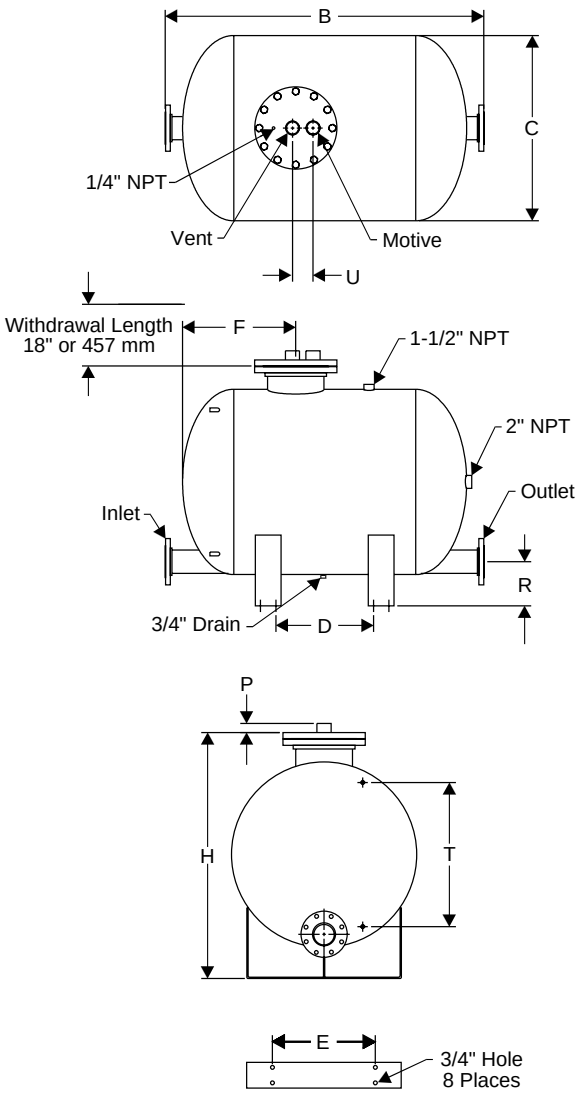
Reference Bulletin No. AFH-237.

**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




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 | |

***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-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

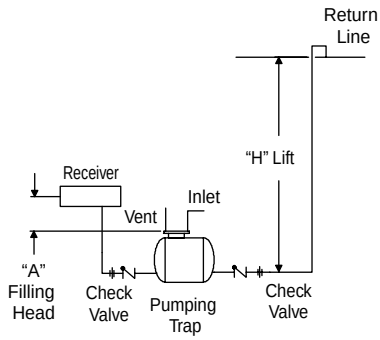
**PT-516 Pump Trap Capacities**

| 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

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# 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 |

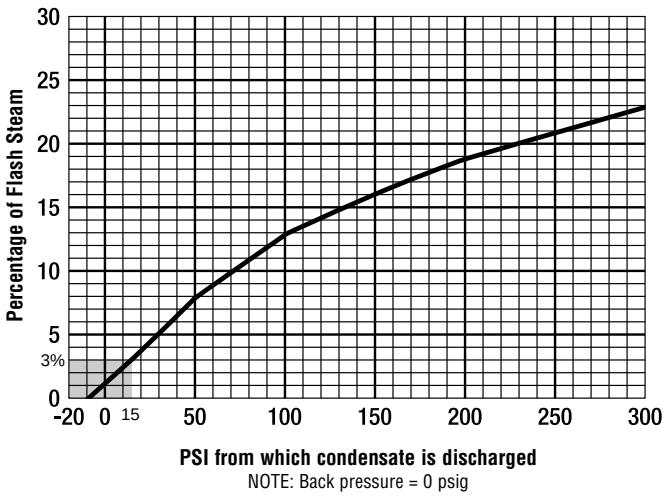
NOTE: When draining condensate from a single piece of equipment in a **closed system**, to achieve maximum energy efficiency a reservoir should be installed horizontally above and ahead of the pump trap. Sufficient reservoir volume is required above the filling head level to hold condensate during the 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

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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.

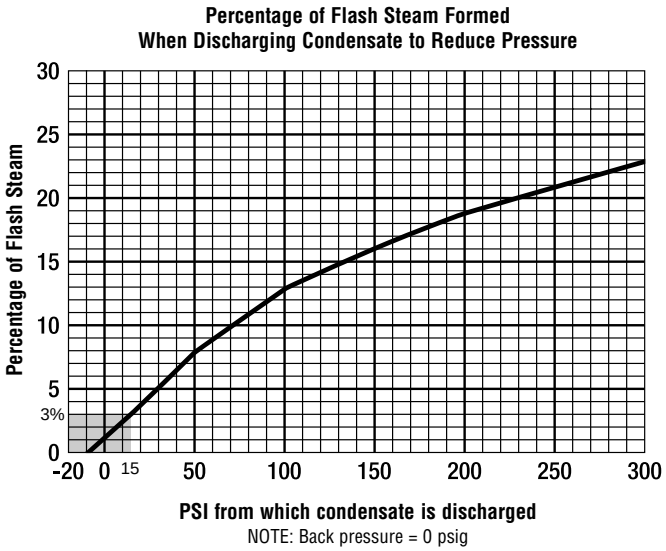
## For Closed Reservoir Piping

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**

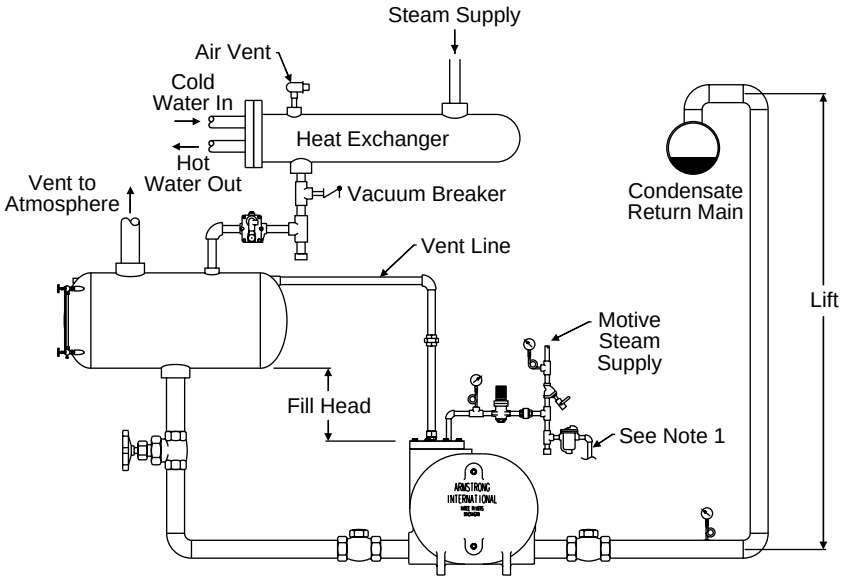
| Condensate Load lb/hr | Reservoir Pipe Diameter (in) | | | | | |
|---|---|---|---|---|---|---|
| | 8 | 10 | 12 | 16 | 20 | 24 |
| up to | Length of Pipe (feet) | | | | | |
| 10,000 | 6-1/2 | 6 | 5 | 3 | 2 | |
| 20,000 | 12 | 11-1/2 | 10 | 7 | 4 | |
| 30,000 | | 12 | 10-1/2 | 9 | 6 | 4 |
| 40,000 |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

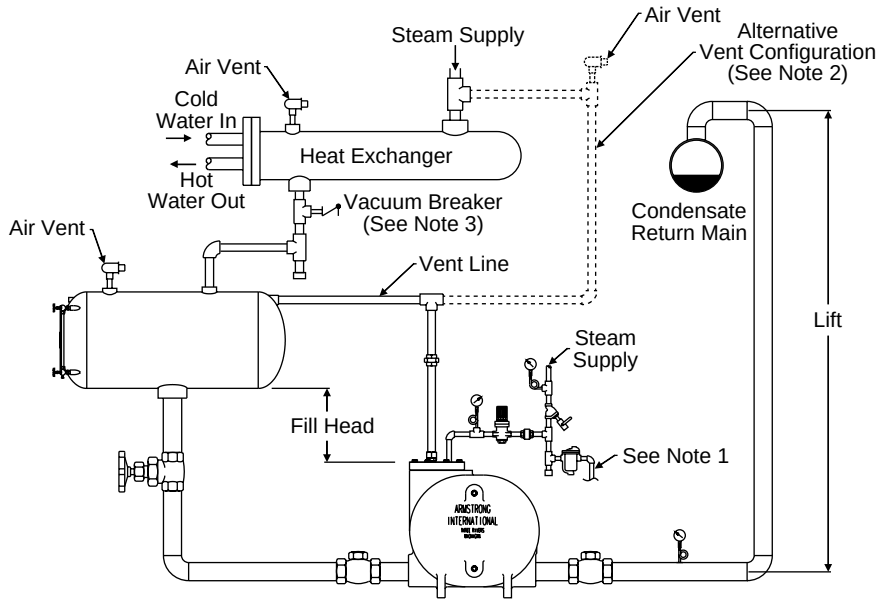



Multiple or single traps discharging to vented receiver.

## 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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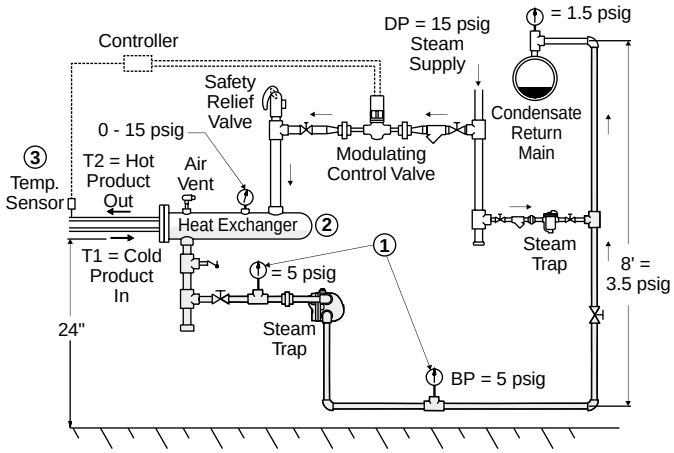
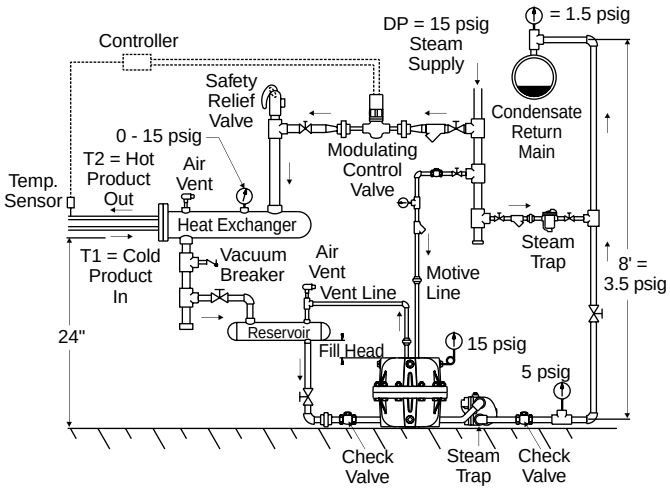
# Condensate Drainage From Modulated Steam/Temperature Controlled Equipment




## 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.

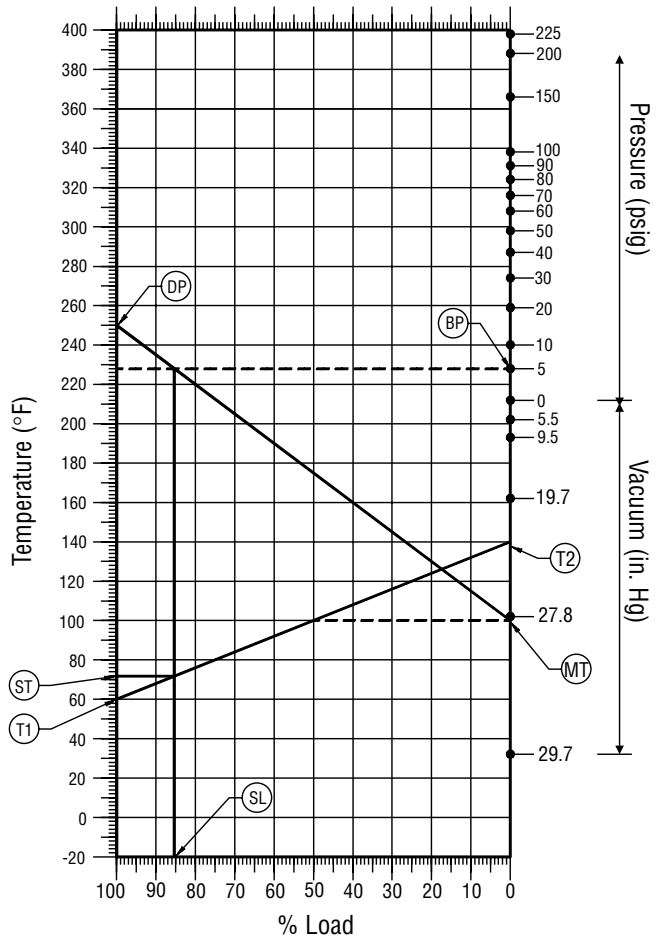
## Problems

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?**

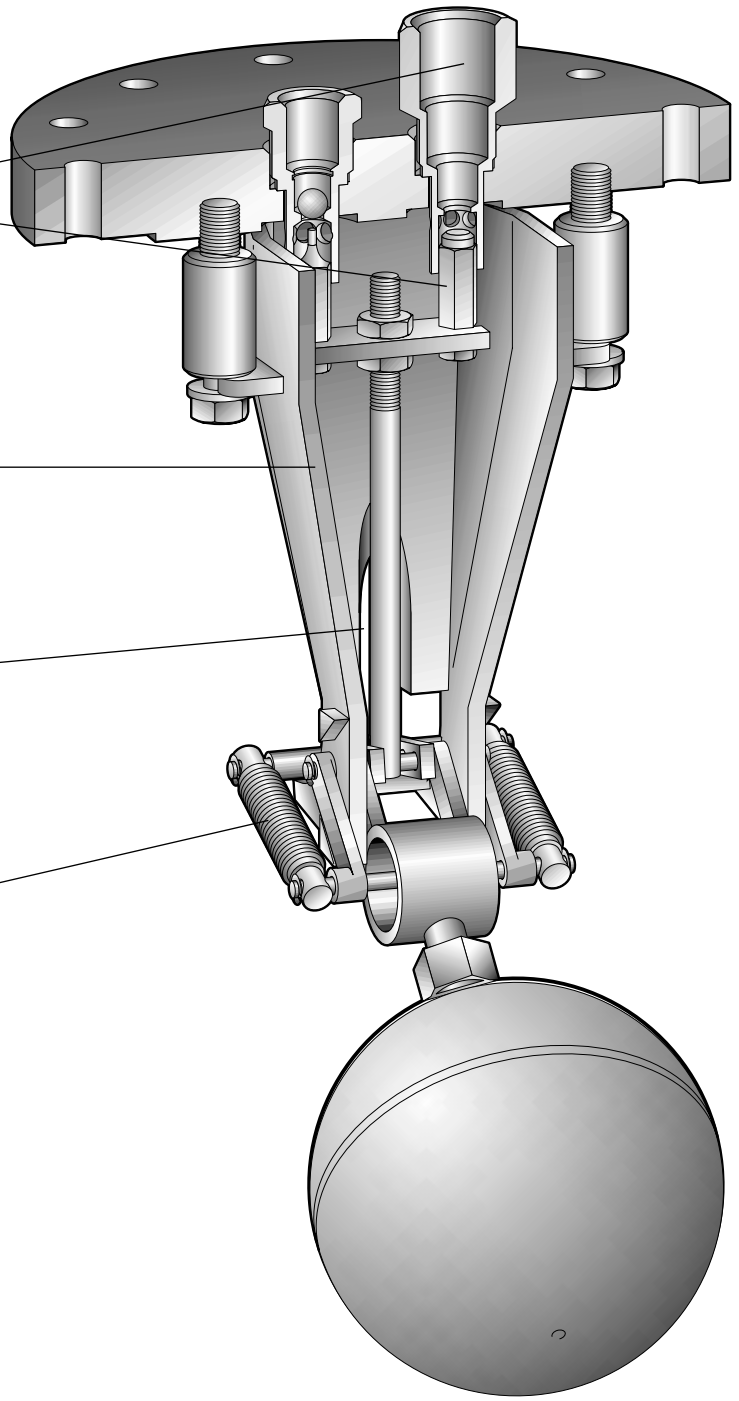


**Externally replaceable valve and seat assembly**
Maintenance is a snap with stainless steel valves that can be cleaned or replaced without cap removal.

**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.



*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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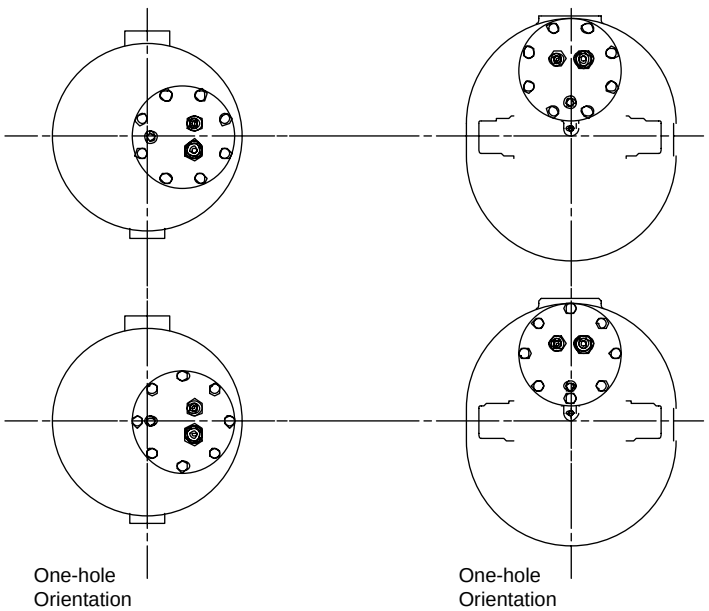
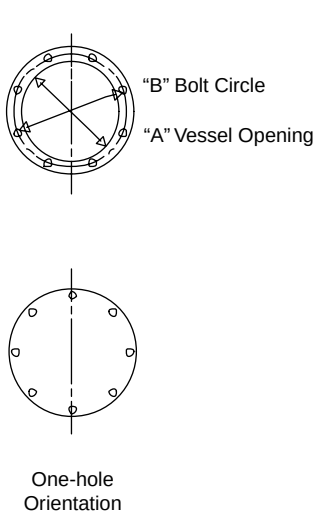
# Non-Electric Steam/Air Powered Pump Retrofit Assembly

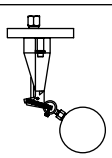


Armstrong's non-electric steam/air powered pump retrofit cap and mechanism assembly fits most competitive models. To ensure proper fit, please provide the following information:

- 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): _____

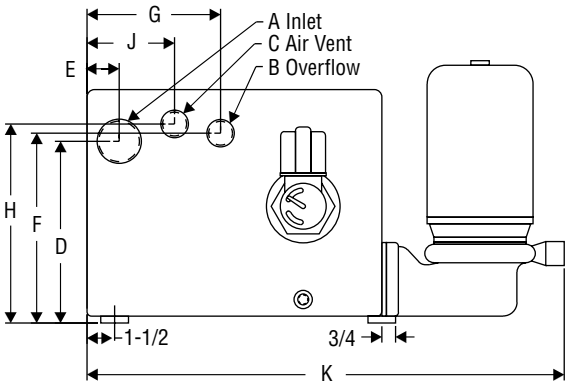


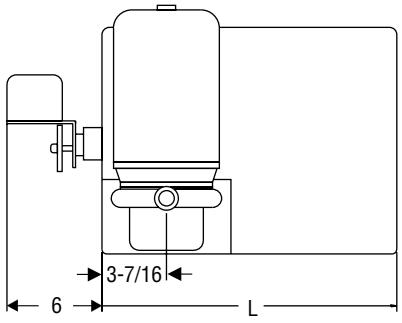




| Non-Electric Steam/Air Powered Pump Retrofit Assembly | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Illustration** | **Fits Competitors' Mechanical Pumps Listed Below** | | | | | | | |
|  | Spirax Sarco Models PPC & PPF | Watson McDaniel Models PMPC & PMP | Spence & Nicholson Condensate 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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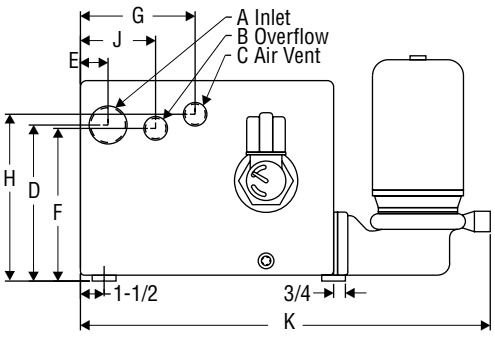
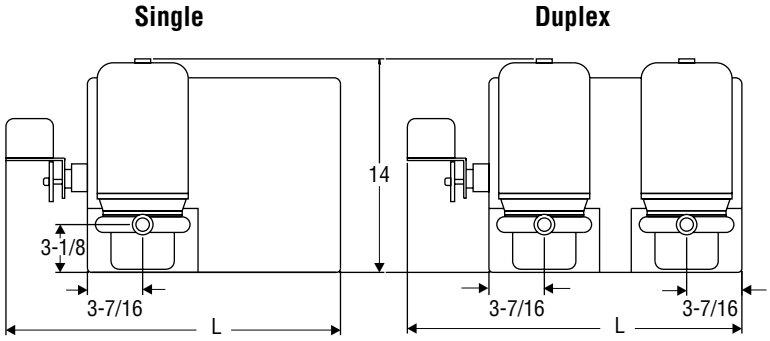
# FPC & FPS Series Electric Condensate Pumps






## 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 |

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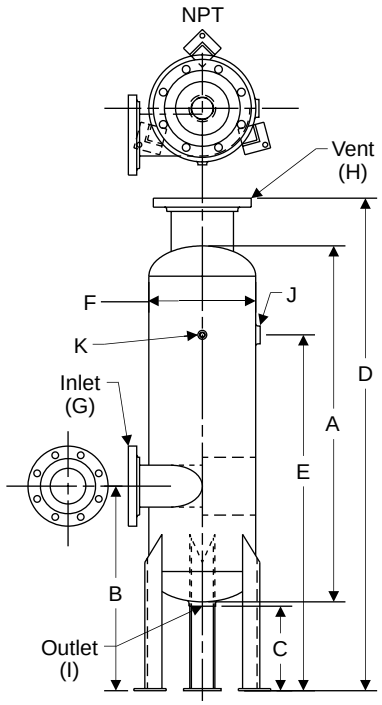


## Features

- 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?

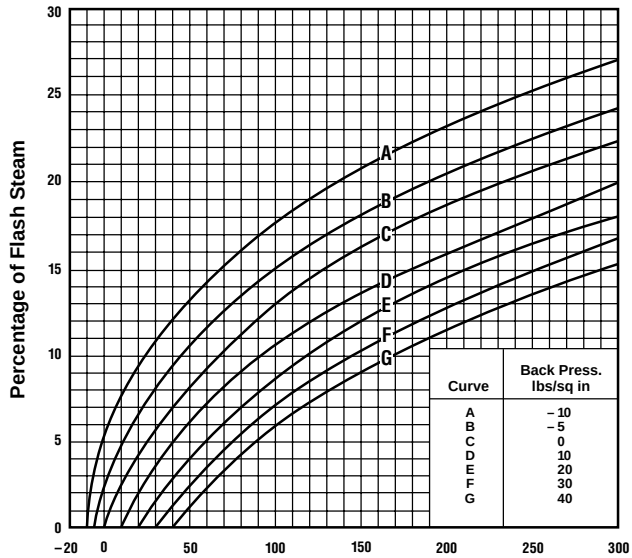
1. Follow horizontal axis right to primary discharge pressure.
2. Follow vertically up to secondary pressure curve.
3. Move left to “Percentage of flash steam.”

**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

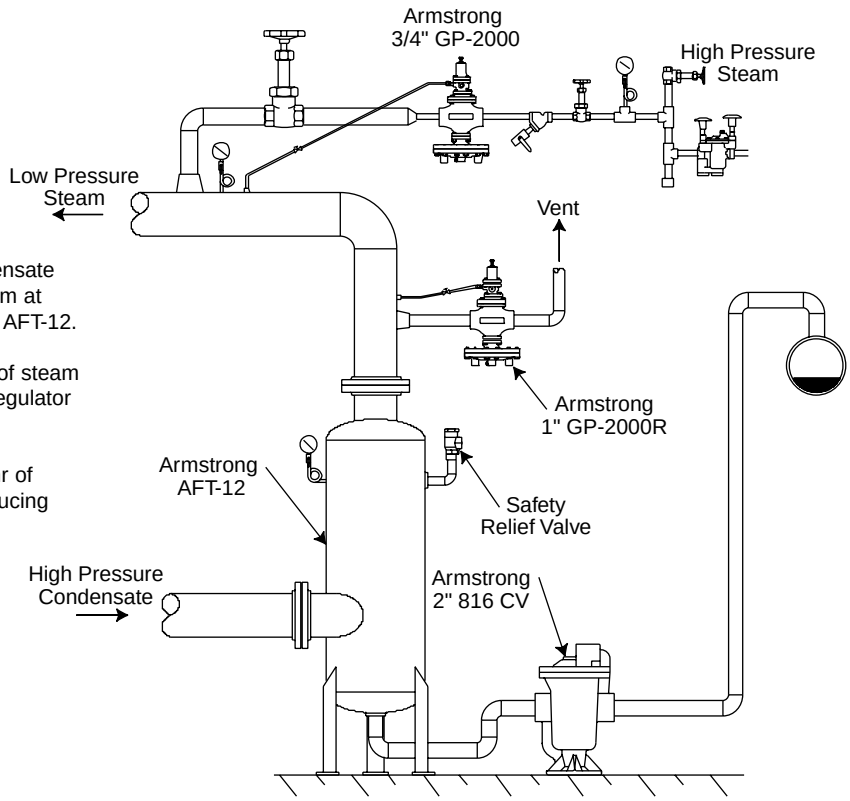
A. Condensate Load to Flash Tank **6,000** lb/hr
B. Pressure of Incoming Condensate **100** psig
C. Flash Tank Pressure **20** psig
D. Flash Percentage **9.5%**
E. Flash Amount = A x (D/100) = **570** lb/hr
F. Low Pressure Steam Required **2,500** lb/hr
G. High Pressure Steam **200** psig
H. Back Pressure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





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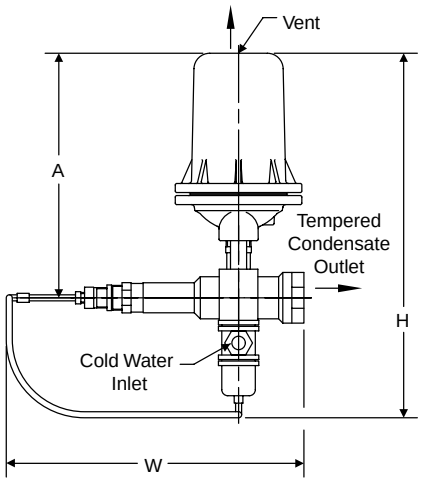
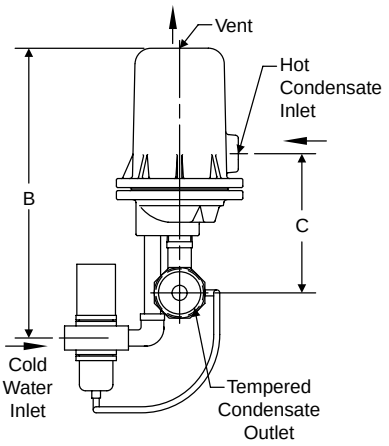
# CC-5 and CC-12 Condensate Coolers

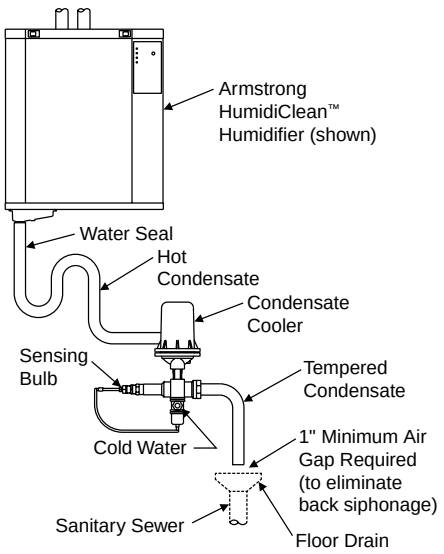
## Drain Tempering Device






### 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.



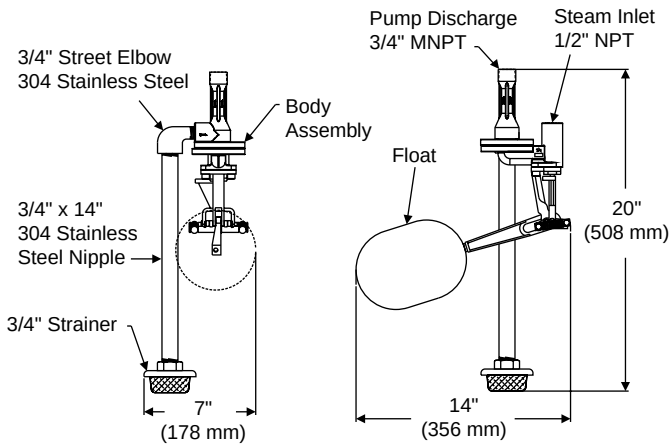
## Features

- 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.***