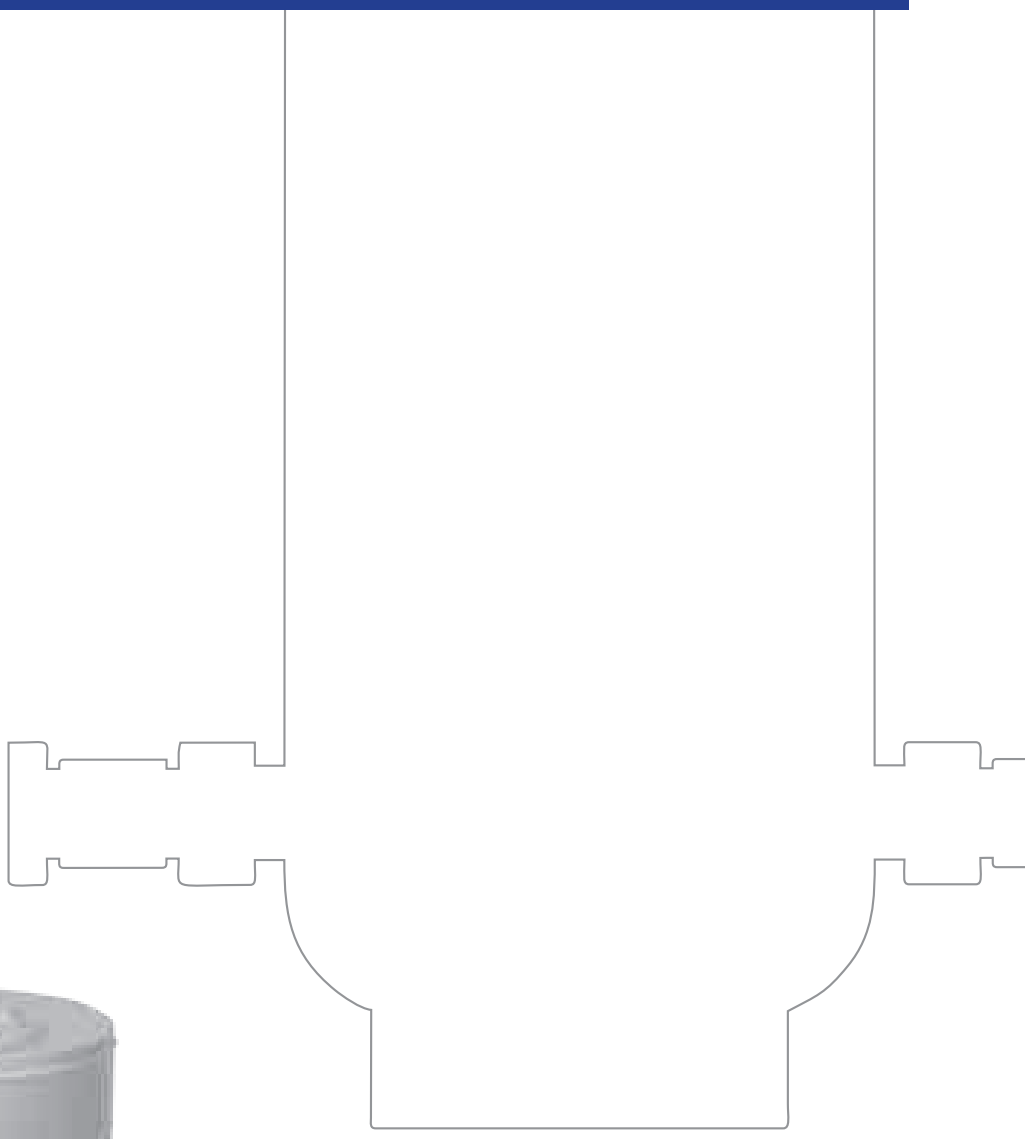
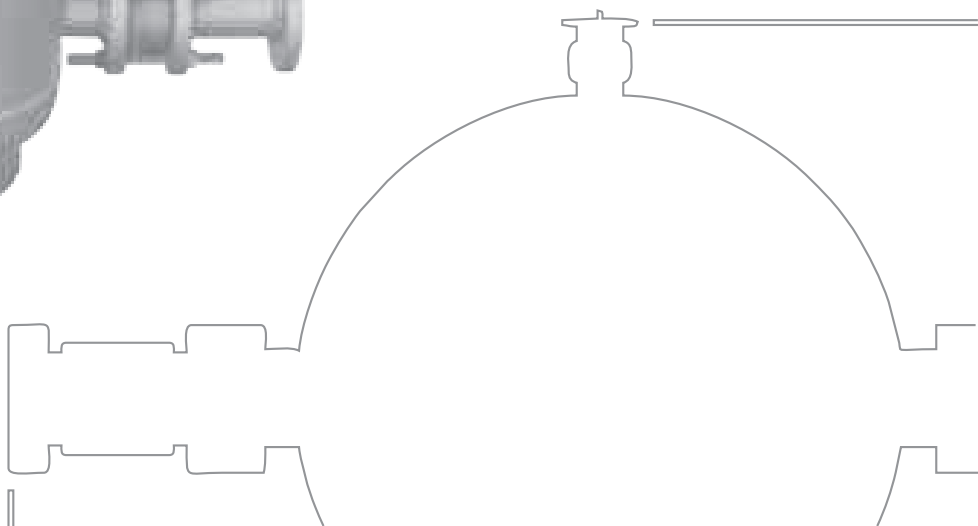
pennant®
LEAD THE WAY

PCP10
Condensate Pump





pennant®
LEAD THE WAY

PCP10
Condensate Pump

Description:

The Pennant condensate pump (PCP 10) is an excellent alternative to standard electric pumps which are not suitable for pumping hot condensate. It is a complete non-electric solution designed to lift condensate to the boiler feed-water tank, using small quantities of motive steam/air.

Features:

- Intrinsically safe for use in hazardous areas since there are no electric connections
- Works in remote areas where electric supply is not available
- Not prone to wasteful leaks as there are no rotating parts with mechanical seals
- All stainless steel internals give excellent corrosion resistance for long trouble-free service
- Exceptionally low cost of operation and maintenance

Sizes: 1”x1”, 1.1/2”x1.1/2”, 2”x2”, 3”x 2”, 4”x4”

End Connections:

- Flanged #150, #300 as per ASME B16.5
- Screwed (NPT/BSPT/BSP)

Typical Configuration:

Stand Alone Unit: A stand-alone unit consists of a pump tank, inlet-outlet check valves, & internal pumping mechanism.

Pump with Receiver Tank: In this configuration, there can be multiple pumping units, all fed from one receiver tank. The entire assembly is mounted on a common base. Depending on the number of pumping units, these are classified as:

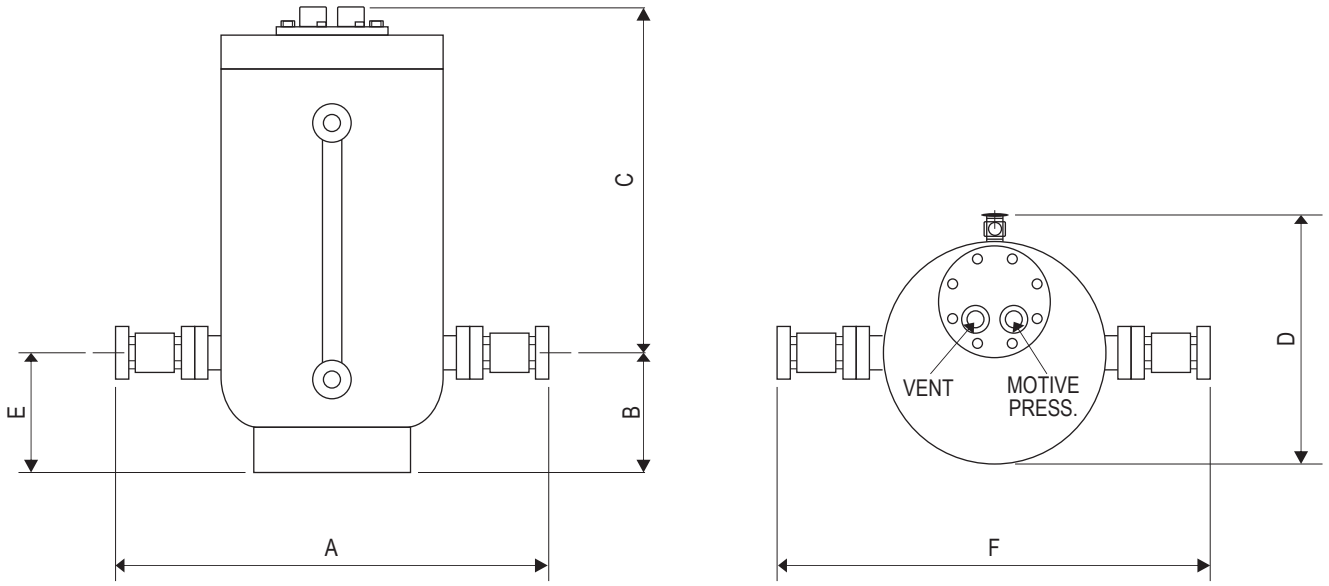
A) Simplex: One pumping unit with check valves and one receiver tank skid-mounted
B) Duplex: Two pumping units with check valves and one receiver tank skid-mounted
C) Triplex: Three pumping units with check valves and one receiver tank skid-mounted

Limiting Conditions:

PMA : Maximum allowable pressure	215 PSIG
TMA : Maximum allowable temperature	716 ^{0}F
PMO : Maximum operating pressure	150 PSIG
Cold Hydro Test Pressure	420 PSIG

pennant®
LEAD THE WAY

PCP10
Condensate Pump



VENT - 1" NPT
MOTIVE PRESSURE - ½" NPT

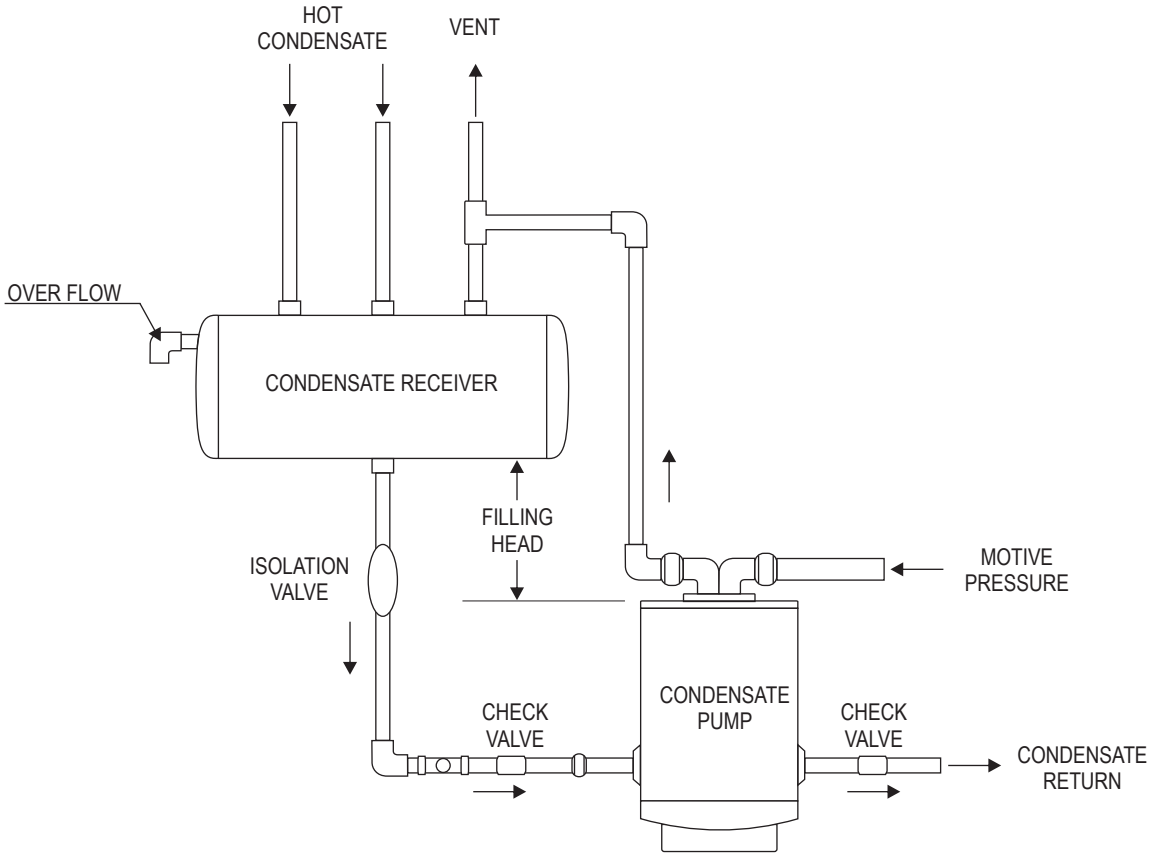
A: For threaded ends.
F: For flanged ends

Inlet x Outlet (inches)	Dimensions (inches)						Weight (lbs)	
	A	B	C	D	E	F	Threaded	Flanged
1 x 1	27	5. 1/4	16	17. 3/4	5. 1/4	34	175	193
1.1/2 x 1.1/2	28. 1/4	5. 1/4	16	17. 3/4	5. 1/4	37	179	215
2 x 2	31	9. 3/4	21. 3/4	17. 3/4	9. 3/4	40	220	280
3 x 2	33. 1/4	9. 3/4	21. 3/4	17. 3/4	11	41. 1/2	230	310
4 x 4	82	9. 3/8	38. 5/8	*	9. 3/8	82	-	1100

*Contact our representative for dimension 'D' of the 4"x4" version

pennant®
LEAD THE WAY

PCP10
Condensate Pump



Operation Principle:

Liquid to be pumped enters the pump tank via the inlet check valve – the vent valve is open and the steam/air valve closed. As the liquid level rises in the tank, the float rises. When the liquid level reaches its 'high level', the compression spring simultaneously forces the vent valve to close and the motive steam/air (pressure) valve to open. The pressure forces the liquid through the exit check valve. During the pumping cycle, the float drops as the liquid level recedes to the 'low level'. The action of the compression spring then simultaneously forces the vent valve open and the motive steam/air valve closed. Pressure in the pump tank is released through the vent, and liquid to be pumped enters through the inlet check valve repeating the cycle.

pennant®
LEAD THE WAY

PCP10
Condensate Pump

Capacity Chart for Selection:

Motive Pressure (psig)	Total Lift (psig)	Capacities (lbs/hr)				
		Pump Size - Inlet x Outlet				
		1" x 1"	1.1/2" x 1.1/2"	2" x 2"	3" x 2"	4" x 4"
150	15	2550	4650	7300	12300	43120
	40	2400	4450	6800	11200	38090
	60	2250	3850	6500	11000	34050
125	15	2550	4650	7300	12300	43000
	40	2350	4450	6800	11500	38000
	60	2250	3850	6500	11000	34000
100	15	2550	4550	7200	12100	41500
	40	2350	4150	6600	11300	36600
	60	2150	3550	6300	10700	32000
75	15	2450	4150	7290	12100	41200
	40	2350	3750	6300	10600	33500
	60	1950	3350	5400	9200	26000
50	10	2450	3900	6900	11700	41200
	25	2350	3600	6300	10600	33000
	40	1950	3150	5200	8900	24500
25	5	2250	4100	6600	11300	
	10	2050	3800	6100	10400	*
	15	1950	3200	5500	9400	

*Contact our representative for check valve specifications. Use of any other check valve may alter pump performance.

pennant®
LEAD THE WAY

PCP10
Condensate Pump

HOW TO SIZE THE CONDENSATE PUMP:

In order to size the condensate pump, the following information is required:

- Condensate load (lbs/hr)
- Required delivery head (feet)
- Line pressure in the condensate return piping (psig)
- Available filling head (feet)
- Motive pressure (steam/ air/ gas) available for pump operation (psig)

Example:

- Condensate load to be pumped: 6000 lbs/hr
- Required delivery head: 10 feet
- Pressure in the condensate return piping: 35 psig
- Motive pressure: 100 psig

Step – I

Calculate the total back pressure against which the condensate must be pumped -

Total back pressure = (required delivery head X 0.433) + pressure in the condensate return piping
= (10 x 0.433) + 35
= 39.3 psig

Step – II

Select the pump from the capacity chart where the motive pressure is 100 psig, total lift is greater than or equal to 40 psig & condensate capacity is greater than or equal to 6000 lbs/hr. The resulting selection would be a 2"x2" pump with a minimum required filling head of 1 foot. It will pump 6600 lbs/hr providing an overall capacity of 110% of required flow.

Optional Accessories:

- Cycle counter to count the number of pumping cycles.
- Insulating Jacket to reduce radiation losses from the pump body.

Savings:

Returning hot condensate to the boiler has several benefits:

- Savings in boiler feed-water - only make-up water required - return of high purity condensate saves cost of water treatment and saves water
- Fuel saving due to utilization of the energy from hot condensate
- Less condensate discharged into the sewer reduces disposal cost
- The mechanical (non-electric) operation of the PCP 10 saves the cost of power required to run an electric pump

Example of savings made:

Consider a steam system that returns 18000 lbs/hr of condensate at 180^{0}F using a PCP 10 condensate pump. Assume that this system operates 8000 hours annually with an average boiler efficiency of 80% and a make-up water temperature of 50^{0}F. The make-up water cost & sewage treatment costs for the plant is $ 0.002 per gallon ($/gal). The fuel cost is $3.00 per MMBtu ($3.00/MMBtu)

Annual saving in raw water and treatment costs:

= (Condensate Load, lbs/hr) x Annual Operating Hours x (Total Water Costs, $/lb) / (Water Density lbs/gal)

$$= \frac{18{,}000 \times 8{,}000 \times 0.002}{8.34}$$

Annual water saving = $34,532

Annual fuel saving:

Every pound of condensate not returned to the boiler must be replaced by an equal amount of fresh make-up water. Heat required to raise the temperature of cold make-up water from 50^{0}F to 180^{0}F = m x Cp x ΔT

Q annual = 18000 lb/hr x 8000 hr x 1 Btu/lb x 130 = 18,720 MMBtu
With the boiler running at an efficiency of 80%,
The actual annual heat energy required would be = 18720/0.8 = 23400 MMBtu

Considering a fuel cost of $3 per MMBtu,
The annual fuel saving will be: 23400 (MMBtu) x 3 ($/MMBtu) = $70,200

Total savings due to returned condensate: $70,200 + $34,532 = $104,732

Simple payback period considering cost of installation of a condensate recovery system is around 30 to 35 Weeks.
(Local figures/conditions may vary from the assumptions made in the example)

How to Order:

PCP 10 :: 1” x 1” :: #150

Ordering Information:

- Condensate load (lbs/hr)
- Required head for lifting condensate to the boiler feed-water tank (feet)
- Line Pressure/by Back Pressure of Condensate return piping.
- Filling head available (feet)
- Motive pressure available for pump operation (psig)
- Stand-alone unit or skid with receiver tank (Simplex, Duplex, Triplex)
- Motive fluid available – steam/air/gas

pennant®

LEAD THE WAY

Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.
In the interest of development and improvement of the product, we reserve the right to change the specifications without prior notice.

pennant
pennantcorp.com

10 Parsonage Road, Suite 312 Edison, N.J., USA **[P]** 877- 597-TRAP (8727) **[F]** 1-866-682-1244 **[E]** info@pennantcorp.com

November 2022