

CRANE®

Crane Pumps & Systems

Condensate Return Systems

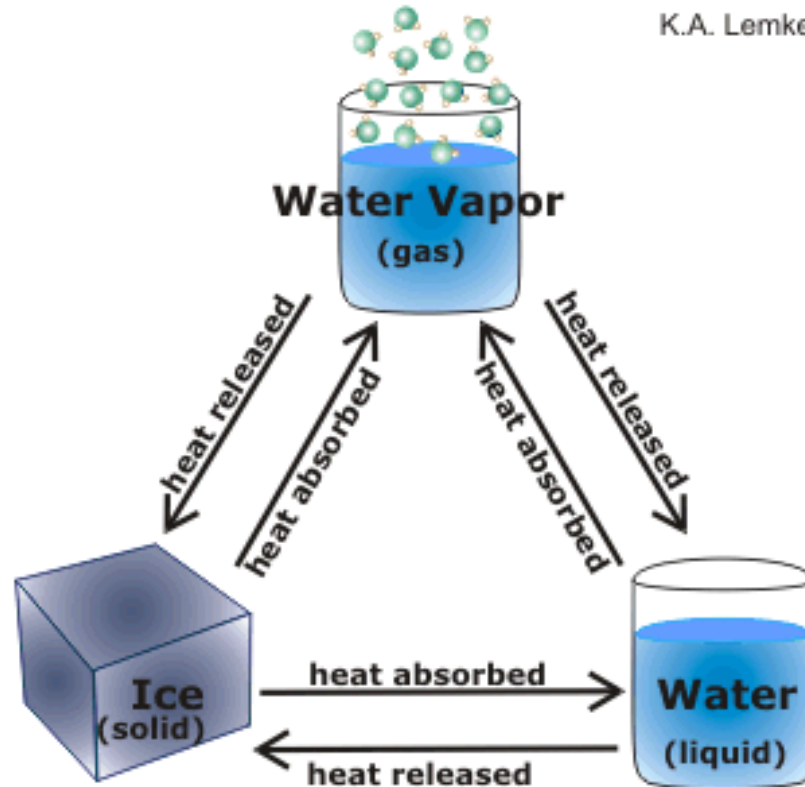
CRANE
PUMPS & SYSTEMS

Everyone. Everywhere. On Time Every Time.

- **Overview**
- Applications
- Features
- Example Selection & Pricing
- Key Takeaways



Why Use a Condensate Return Unit?

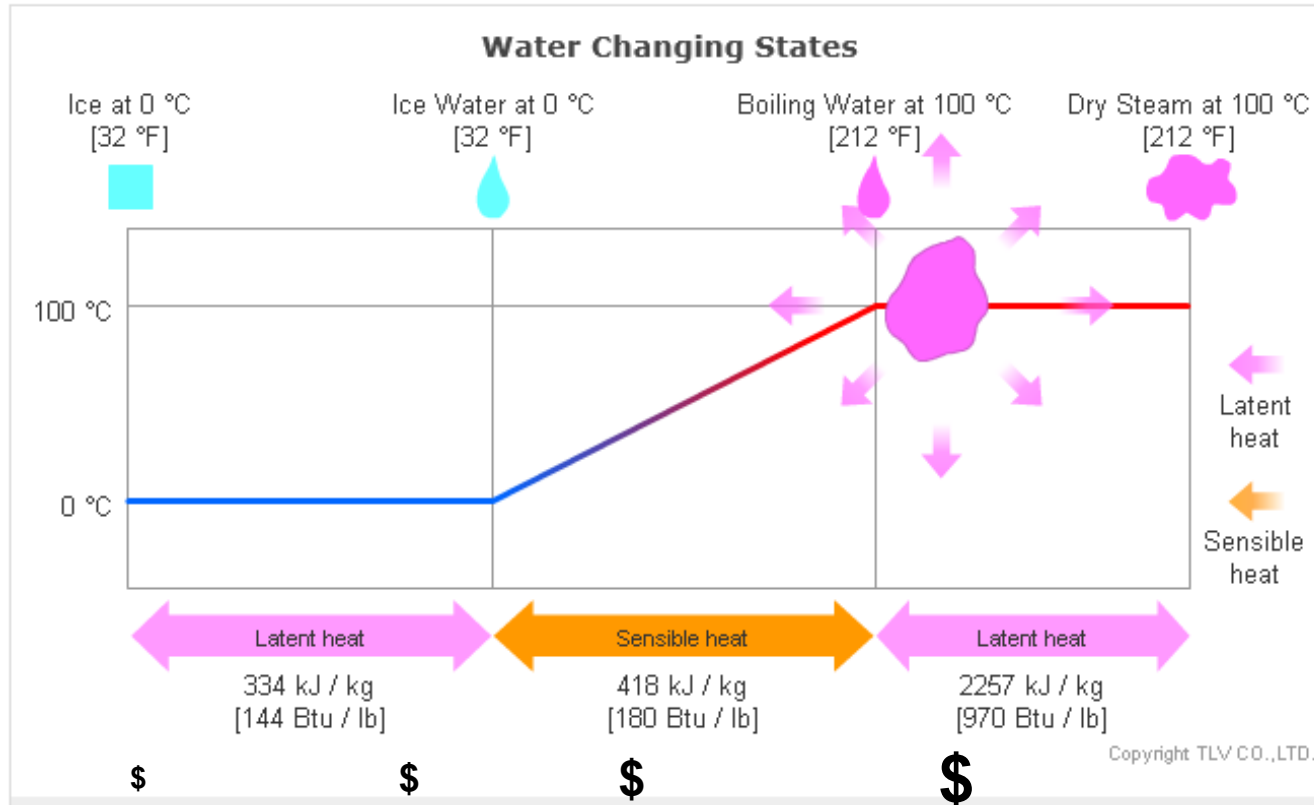


Water exists in three phases.

When it changes phases it either releases energy or requires energy to make the change.

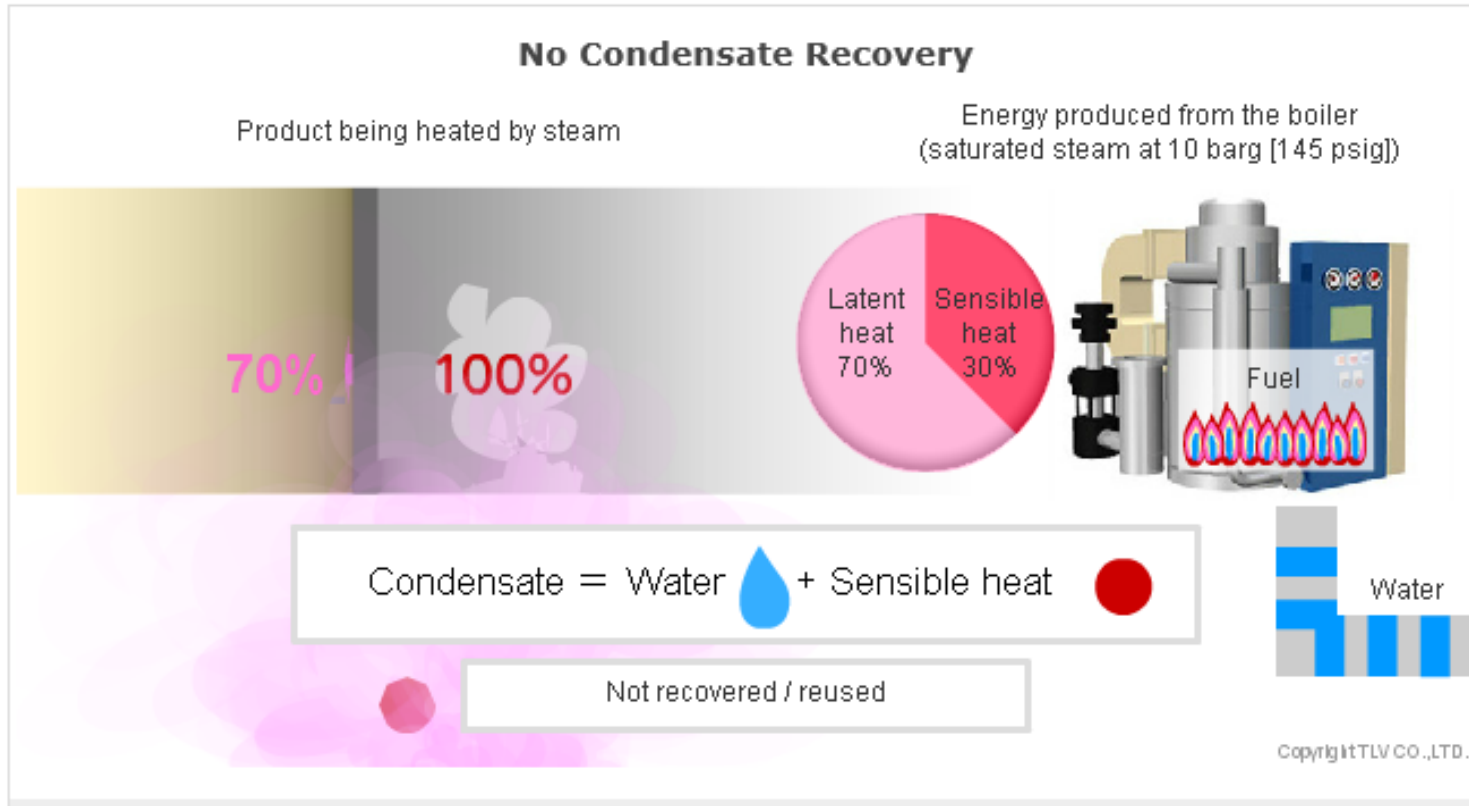
Condensate is water that has gone from a gas to a liquid.

Why Use a Condensate Return Unit?



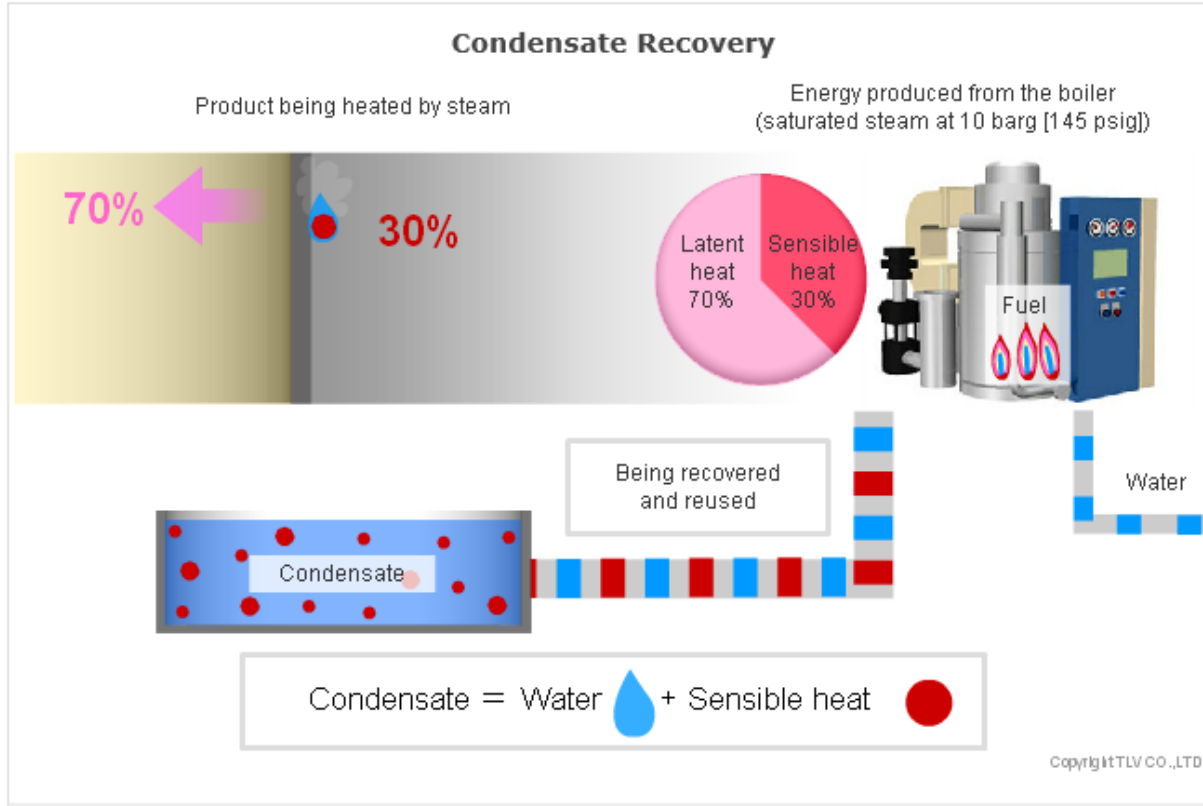
Fire in the boiler increases the sensible heat to increase the temperature. The energy provided is called sensible heat. The more heat added the greater the cost.

Why Use a Condensate Return Unit?



Without returning any of the condensate all of the energy goes down the drain at 180 – 195°F

Why Use a Condensate Return Unit?



50% Condensate 180°F

50% Raw Water 60°F

Blended at 120°F

Returning the condensate returns water, chemicals, and sensible heat back to your system. Reducing the operating cost of the steam system.

Condensate Return System - Overview

Everyone. Everywhere. On Time Every Time.

Why Use a Condensate Return Unit?

After steam has transferred its energy, it condenses into water and drains to the lowest point in the system; usually a condensate tank. The condensed water is then pumped back to the boiler for re-heating and reuse. Because the temperature of the water is very hot, it can be converted back to steam quickly and easily.



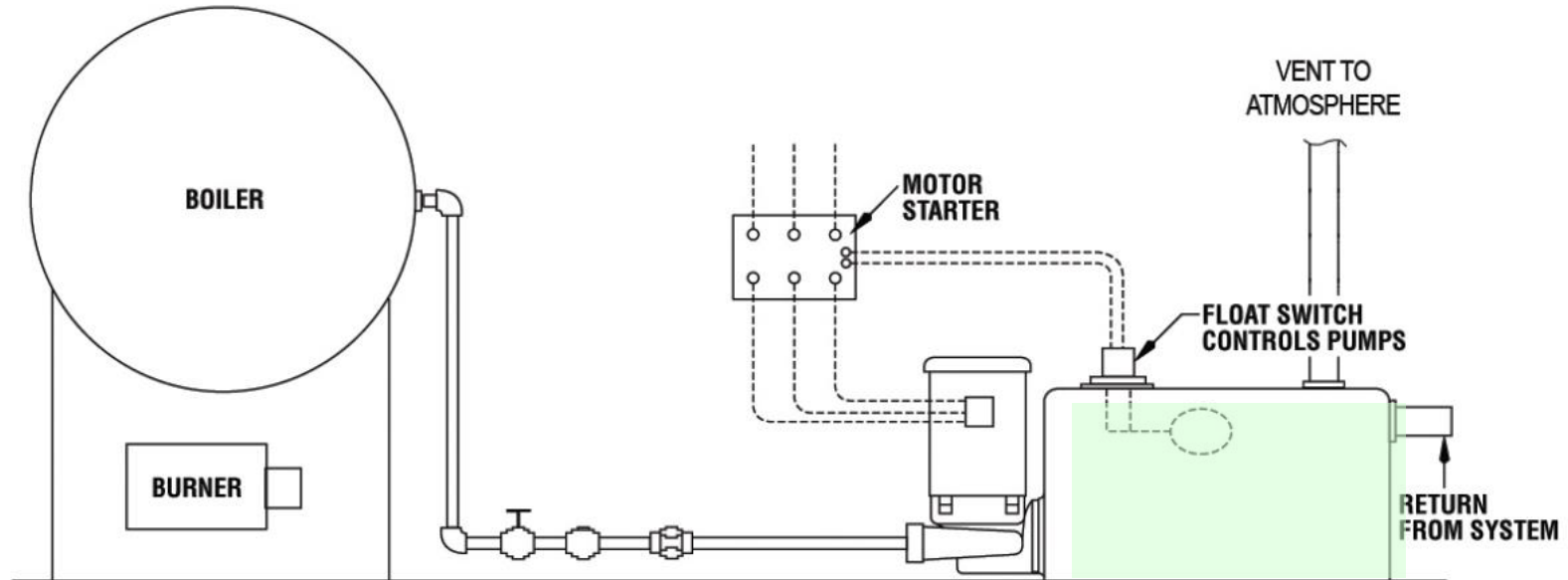
Cast Iron Duplex Unit

Condensate Return System

Everyone. Everywhere. On Time Every Time.

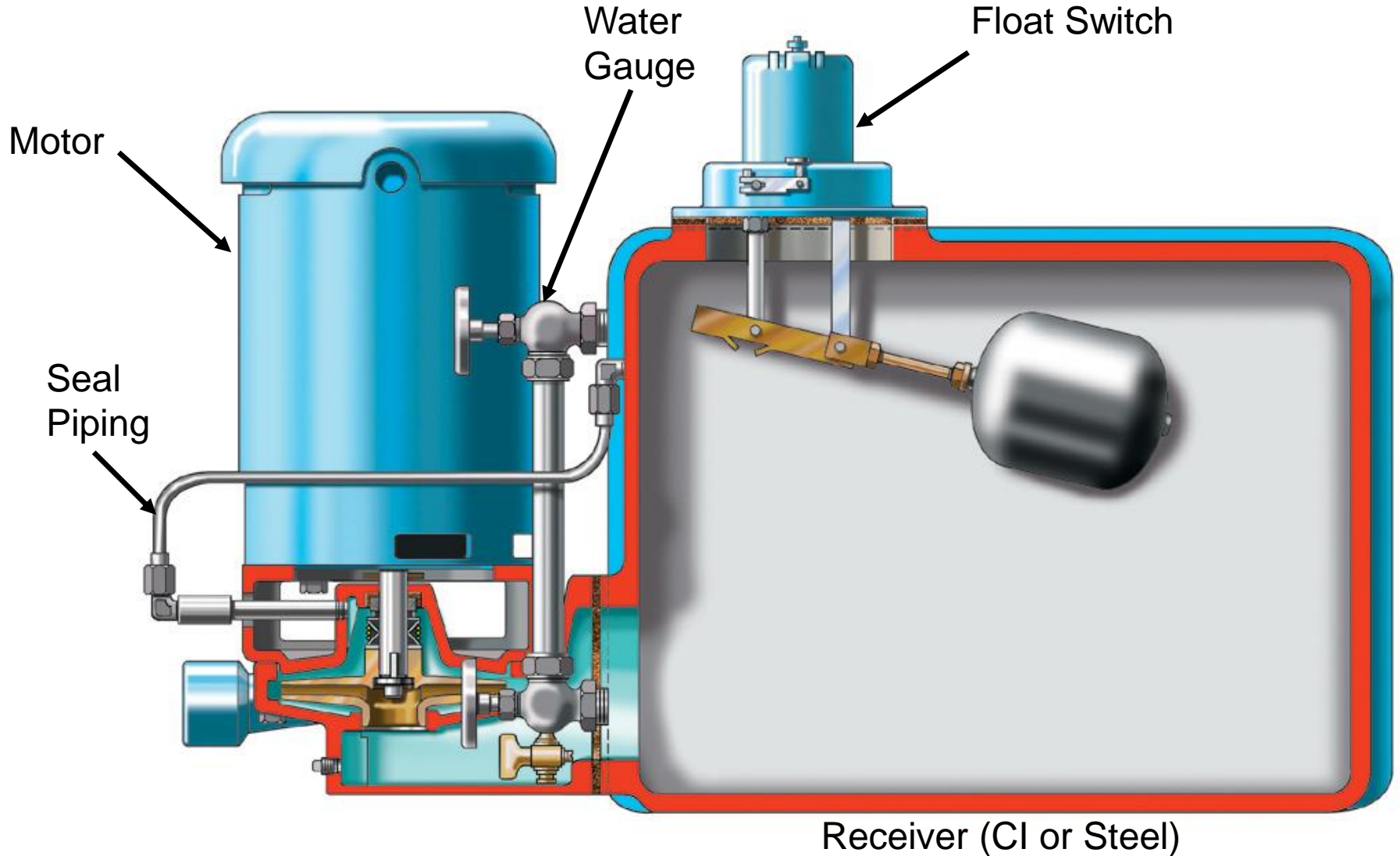
Operation

The pump is operated by a float switch located in the condensate tank. As water is returned from the system, it is pumped to the boiler or surge tank by the condensate pump. Typical systems are simplex (one pump) or duplex (two pump) units.



Condensate Return System

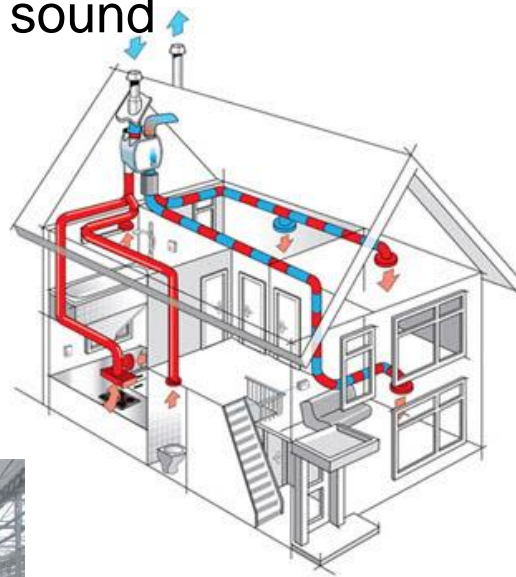
Everyone. Everywhere. On Time Every Time.



- Overview
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Everyone. Everywhere. On Time Every Time.

- Heating
- Processes Steam
- Power and Efficiency
- Environmentally sound
- Humidification
- Boiler feed



Everyone. Everywhere. On Time Every Time.

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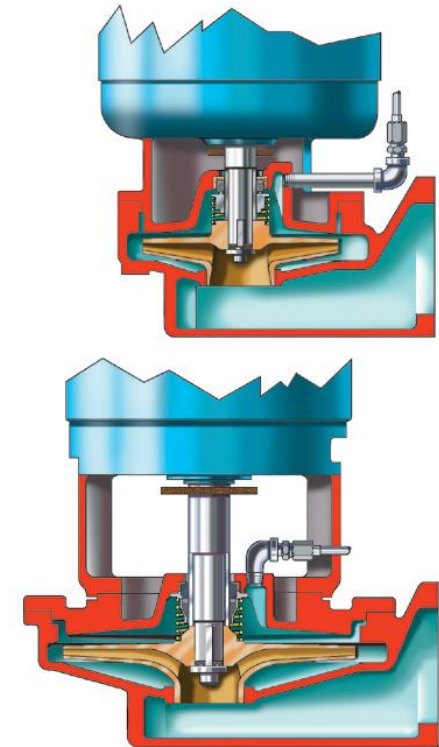


Condensate Return System - Features

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Standard Features

- **Packaged Units** - All units are shipped completely assembled for quick and easy installation.
- **Pump** – Standard cast iron case, bronze vacuum cast impeller, mechanical seal continuously flushed and vented.
- **Flexibility** - Both simplex and duplex units are available depending on system requirements. They can both be converted into boiler feed units by the addition of a solenoid operated make-up valve.



Condensate Return System - Features

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Standard Features

- **Receiver** – Non-pressurized, vented design in either heavy duty cast iron or fabricated steel with low return inlet to provide adequate drainage of radiators. Standard receiver sizes up to 67 gallons in cast iron and up to 150 gallons in fabricated steel.
- **Motors** – Drip proof with canopy available in both single and three phase. Motors are back pull-out design for ease of maintenance.
- **Mounting Arrangement** - Pumps are mounted vertically to eliminate possible motor submergence should flooding occur and to provide a low level suction inlet to the impeller so that it can be sufficiently submerged even with minimum water level in receiver.



Condensate Return System - Features

Everyone. Everywhere. On Time Every Time.

Standard Features

- **Float Switch** - Simplex Units use a float switch for start/stop operation. Duplex units utilize a mechanical alternator to alternate pump cycle or provide back up for first pump if it cannot handle the demand.
- **Repair** –Standard pump impeller and motor adapters are used for standardization and parts availability.
- **Replacement** - In addition to individual spare parts, replacement pump & motor assemblies are available in Weinman Series 120 or Burks SeriesGV6. Additionally the square suction flanges are suitable for mounting to any flat tank surface



Models ACV – AFV

Example Selection & Pricing

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Condensate Return System – Features

Burks

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Burks Condensate Systems Standard Offering

Better
Option

Burks - Series GV


- Flow to 75 GPM
- Pressure to 50 PSI
- Horsepower from 1/3 Hp to 3 Hp
- Standard receivers
 - Cast Iron - 9, 13, 20, 36



Burks GV - Duplex

Burks unit sizing

- Burks system sizing is simplified due to limited hydraulic coverage
- Using either Equivalent Direct Radiation (EDR) max or Boiler Horsepower & Pressure, units can be selected from chart found in the Burks Catalog.
- Selections on this chart are based on pump capacities of 1.5 gpm per 1000 ft² EDR

Series: GV							 www.cranepumps.com		
Cast Iron Performance and Selection									
Condensate Systems									
Max. EDR Sq. Ft.	Equiv. Boiler H.P.	Max. GPM (Liters) Req'd	Discharge Pressure PSIG (kpa)	Simplex Catalog No.	Duplex Catalog No.	Motor H.P.	Pump Discharge Size (NPT)	RECEIVER	
								Size Gals. (Liters)	Inlet Size (NPT)
6,000	40	9 (34)	10 (69)	3GV6-9	3GV6-14D	1/3	1 1/4"	9 (34) Simplex	2"
			20 (138)	5GV6-9	5GV6-14D	1/2			
			30 (207)	10GV6-9	10GV6-14D	1			
			40 (276)	20GV6-9	20GV6-14D	2			
			50 (345)	30GV6-9	30GV6-14D	3			
10,000	70	15 (57)	10 (69)	3GV6-14	3GV6-14D	1/3	1 1/4"	14 (53)	2"
			20 (138)	5GV6-14	5GV6-14D	1/2			
			30 (207)	10GV6-14	10GV6-14D	1			
			40 (276)	20GV6-14	20GV6-14D	2			
			50 (345)	30GV6-14	30GV6-14D	3			
15,000	100	22 1/2 (85.2)	10 (69)	3GV6-20	3GV6-20D	1/3	1 1/4"	20 (76)	2"
			20 (138)	7GV6-20	7GV6-20D	1/2			
			30 (207)	10GV6-20	10GV6-20D	1			
			40 (276)	20GV6-20	20GV6-20D	2			
			50 (345)	30GV6-20	30GV6-20D	3			
20,000	140	30 (114)	10 (69)	3GV6-36	3GV6-36D	1/3	1 1/4"	36 (136)	3"
			20 (138)	5GV6-36	5GV6-36D	3/4			
			30 (207)	10GV6-36	10GV6-36D	1			
			40 (276)	20GV6-36	20GV6-36D	2			
			50 (345)	30GV6-36	30GV6-36D	3			
30,000	215	45 (170)	10 (69)	3GV6-36	3GV6-36D	1/3	1 1/4"	36 (136)	3"
			20 (138)	7GV6-36	7GV6-36D	3/4			
			30 (207)	15GV6-36	15GV6-36D	1 1/2			
			40 (276)	20GV6-36	20GV6-36D	2			
			50 (345)	30GV6-36	30GV6-36D	3			
40,000	285	60 (227)	10 (69)	7GV6-36	7GV6-36D	3/4	1 1/4"	36 (136)	3"
			20 (138)	10GV6-36	10GV6-36D	1			
			30 (207)	20GV6-36	20GV6-36D	2			
			40 (276)	30GV6-36	30GV6-36D	3			
50,000	360	75 (284)	10 (69)	15GV6-36	15GV6-36D	1 1/2	1 1/4"	36 (136)	3"
			20 (138)	20GV6-36	20GV6-36D	2			
			30 (207)	30GV6-36	30GV6-36D	3			
			40 (276)	30GV6-36	30GV6-36D	3			

All selections are based on pump capacities of 1.5 gpm per 1000 sq. ft. of Equivalent Direct Radiation (EDR). Catalog Numbers shown are for units with single phase motors. For three phase, add prefix "3" to Catalog No. Example: 35GV6-9

Burks unit sizing

- Using the basic model number, the complete simplex or duplex unit with either single or two motors can be priced accordingly



Burks GV - Duplex

Systems with Cast Iron Receivers - 3500 rpm

Recvr. Size Gal.	Motor (hp)	Simplex					Duplex				
		Single Phase		Three Phase			Single Phase			Three Phase	
		Catalog No.	List Price	Weight (lb)	Catalog No.	List Price	Catalog No.	List Price	Weight (lb)	Catalog No.	List Price
9	1/3	3GV6-9	\$2,169	220	33GV6-9	\$2,264	Not Available				
	1/2	5GV6-9	\$2,203	224	35GV6-9	\$2,298					
	3/4	7GV6-9	\$2,234	227	37GV6-9	\$2,312					
	1	10GV6-9	\$2,390	229	310GV6-9	\$2,412					
	1 1/2	15GV6-9	\$2,620	239	315GV6-9	\$3,119					
	2	20GV6-9	\$2,766	244	320GV6-9	\$2,612					
	3	30GV6-9	\$2,944	247	330GV6-9	\$2,663					
14	1/3	3GV6-14	\$2,745	216	33GV6-14	\$2,827	3GV6-14D	\$4,140	259	33GV6-14D	\$4,278
	1/2	5GV6-14	\$2,775	227	35GV6-14	\$2,856	5GV6-14D	\$4,199	267	35GV6-14D	\$4,311
	3/4	7GV6-14	\$2,810	228	37GV6-14	\$2,872	7GV6-14D	\$4,264	267	37GV6-14D	\$4,366
	1	10GV6-14	\$2,960	225	310GV6-14	\$2,973	10GV6-14D	\$4,368	277	310GV6-14D	\$4,384
	1 1/2	15GV6-14	\$3,190	235	315GV6-14	\$3,119	15GV6-14D	\$4,835	297	315GV6-14D	\$4,678
	2	20GV6-14	\$3,315	240	320GV6-14	\$3,165	20GV6-14D	\$5,075	307	320GV6-14D	\$4,744
	3	30GV6-14	\$3,514	243	330GV6-14	\$3,219	30GV6-14D	\$5,471	313	330GV6-14D	\$4,862
20	1/3	3GV6-20	\$3,291	216	33GV6-20	\$3,373	3GV6-20D	\$4,686	259	33GV6-20D	\$4,824
	1/2	5GV6-20	\$3,321	227	35GV6-20	\$3,402	5GV6-20D	\$4,745	267	35GV6-20D	\$4,857
	3/4	7GV6-20	\$3,356	228	37GV6-20	\$3,418	7GV6-20D	\$4,810	267	37GV6-20D	\$4,912
	1	10GV6-20	\$3,506	225	310GV6-20	\$3,519	10GV6-20D	\$4,914	277	310GV6-20D	\$4,930
	1 1/2	15GV6-20	\$3,736	235	315GV6-20	\$3,665	15GV6-20D	\$5,381	297	315GV6-20D	\$5,224
	2	20GV6-20	\$3,861	240	320GV6-20	\$3,711	20GV6-20D	\$5,621	307	320GV6-20D	\$5,290
	3	30GV6-20	\$4,060	243	330GV6-20	\$3,765	30GV6-20D	\$6,017	313	330GV6-20D	\$5,408
36	1/3	3GV6-36	\$4,896	417	33GV6-36	\$4,967	3GV6-36D	\$6,261	460	33GV6-36D	\$6,411
	1/2	5GV6-36	\$4,927	421	35GV6-36	\$5,005	5GV6-36D	\$6,324	468	35GV6-36D	\$6,479
	3/4	7GV6-36	\$4,960	424	37GV6-36	\$5,022	7GV6-36D	\$6,389	474	37GV6-36D	\$6,495
	1	10GV6-36	\$5,110	426	310GV6-36	\$5,122	10GV6-36D	\$6,492	478	310GV6-36D	\$6,519
	1 1/2	15GV6-36	\$5,340	436	315GV6-36	\$5,270	15GV6-36D	\$6,965	498	315GV6-36D	\$6,786
	2	20GV6-36	\$5,465	441	320GV6-36	\$5,309	20GV6-36D	\$7,207	508	320GV6-36D	\$6,902
	3	30GV6-36	\$5,683	444	330GV6-36	\$5,960	30GV6-36D	\$7,605	514	330GV6-36D	\$7,000

Condensate Return System – Features

Weinman

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Weinman Condensate Systems Standard Offering

- Weinman - Series 900, 910
- Flow to 150 GPM
- Pressure to 100 PSI
- Horsepower from 1/3 to 10 Hp
- Standard receivers
 - 20 to 67 gallon cast iron &
 - 20 to 150 gallon steel
- Isolation valve – installed between pump & tank allows pump removal without draining tank

Best
Option



Condensate Return System – Features

Weinman

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Weinman Options

- Upgraded receiver tank sizes available
- Isolation valve – installed between pump & tank allows pump removal without draining tank
- Control panels - See Weinman catalog section 1910 for options, can be factory mounted & wired
- High water switch, switch enclosures, reverse float switch for boiler feed units
- Electrical Alternator versus standard mechanical
- Suction strainer – Shipped loose installed in field
- Thermometer – Shipped loose installed in field



Condensate Return System Sizing

Weinman

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Low Pressure Boilers

Sizing data for low pressure boiler condensate systems are usually expressed in Boiler Horsepower and Pressure (psi)

- **Condensate pump flow rates** are sized by boiler horsepower x .069 GPM with a safety factor of 2 to 3 times the condensate rate. The capacity shown in this table reflects approximately a 3:1 ratio
- Receiver size is typically specified by others
- Pressure can be converted to Head by use of the formula $TDH = PSI \times (2.31 \div \text{specific gravity})$
- Note to include specific gravity at system temperature and any system losses

EQUIVALENT BOILER HP	BTU/hr. (1000's)	STREAM Lb/per hr.	EDR RATING Sq. Ft.	Cond. Rate GPM	PUMP Cap. * Req'd. GPM
20	670	690	2790	1.38	3
30	1005	1035	4185	2.07	6
40	1340	1380	5580	2.76	9
50	1675	1725	6975	3.45	9
60	2010	2070	8370	4.14	12
70	2345	2415	9765	4.38	15
80	2680	2760	11160	5.52	15
100	3350	3450	13950	6.90	22.5
125	4185	4313	17438	8.62	22.5
150	5025	5175	20935	10.40	30
200	6695	6900	27915	13.80	45
250	8370	8625	34895	17.30	45
300	10045	10350	41875	20.70	60
350	11720	12075	48825	24.20	75
400	13390	13800	55830	27.60	75
450	15064	15520	63000	31.10	97.5
500	16740	17250	69790	34.50	97.5
550	18411	18975	77000	37.95	120
600	20085	20700	83750	41.40	120
650	21759	22425	91000	44.85	150
700	23432	24150	98000	48.30	150
750	25106	25875	105000	51.75	150
800	26780	27600	112000	55.20	187.5
1000	33475	34500	140000	69.00	200

(* NOTE: Boiler HP x .069 GPM of feed water required to maintain boiler water level at 100% load. Pumps should be selected to provide two to three times the condensate rate shown in the above Table. Pump capacity listed in the Table are based on an approximate 3 to 1 ratio.

Weinman pump sizing

- Using MENTOR selection program a pump can be sized from Section 120
- Repair pump units are priced from Price Book Section 120
- Cast iron receiver systems are priced from Section 900 and steel receiver units are priced from section 910

The screenshot shows the MENTOR selection program interface for pump sizing. The interface is divided into several sections:

- Navigation:** My Profile, Catalogs, Manual Selection, Design Point Search (selected), and a Return to Pump link.
- Criteria:** Primary Criteria (selected), Advanced Criteria, and Total Head Calculator.
- Rated Design Point (Change Units):**
 - Flow rate: 45 US gpm
 - Total head: 60 ft
 - Generate SRC:
 - BEP: no preference
 - Near miss: % of head
- Types & Speeds:**
 - Pump types:** 0100-End Suc CC, 0120-End Suc Vert CC (selected), 0200-End Suc FM, 0310-End Suc CC, 0320-Inline, 0500-End Suc FM, 0700-Column Sump-S.
 - Speeds:** Adjustable, 3600, 1800, 1500, 1200, 900.
- Fluid & NPSH:**
 - Water at 160°F (Change Fluid)
 - NPSHa: ft
 - Margin ratio:
- Motor:**
 - Standard: NEMA
 - Enclosure: ODP
 - Sizing criteria: Max power on design curve

At the bottom, there is a "Powered By PUMP-FLO Free 21-Day Trial" logo, a "Search" button, and a link to "Advanced Criteria".

Weinman Pricing ACV / AFV

- Simplex standard unit is (1) pump & motor, tank, float switch, & gauge glass
- Duplex standard unit is (2) pumps and motors, tank, float switch with alternator & gauge glass

WEINMAN[®]

www.cranepumps.com

**Price List: Models
20C, 30C, 45C, 67C**

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*All prices in U.S. dollars, F.O.B. Piqua, Ohio.
Prices subject to change without notice.*

Condensate Return Units, Cast Iron Receivers

3500 RPM

Simplex

Model	Motor (hp)	List Price		Weight (lb)	Model	Motor (hp)	List Price		Weight (lb)
		Three Phase	Single Phase				Three Phase	Single Phase	
20C-4ACV3P52	1/3	\$3,000	\$2,894	265	45C-4ACV5P52	1/2	\$4,757	\$4,655	560
20C-4ACV5P52	1/2	\$3,020	\$2,919	270	45C-4ACV7P52	3/4	\$4,801	\$4,706	570
20C-4ACV7P52	3/4	\$4,475	\$2,968	280	45C-4ACV10P52	1	\$4,937	\$4,713	575
20C-4AEV15P52	1 1/2	\$3,375	\$3,189	285	45C-4AEV20P52	2	\$5,231	\$4,994	630

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Several models available in both Weinman and Burks Brands

Burks – Simple Design Few options. Weinman is more configurable

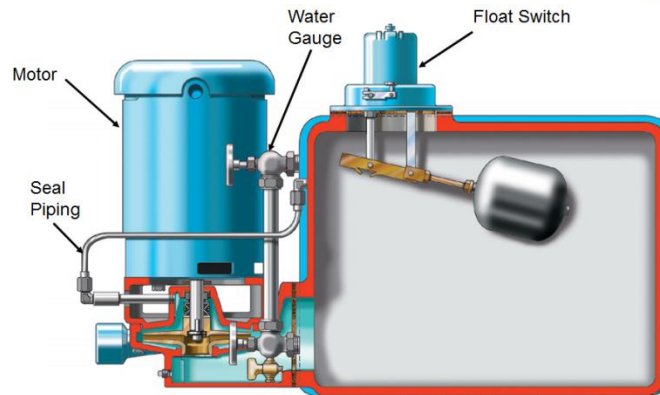
Receiver tanks can be either heavy duty cast iron or fabricated steel

They can both be converted into boiler feed units by the addition of a solenoid operated make-up valve

Simplex or Duplex arrangement



Cast Iron Duplex Unit



Receiver (CI or Steel)

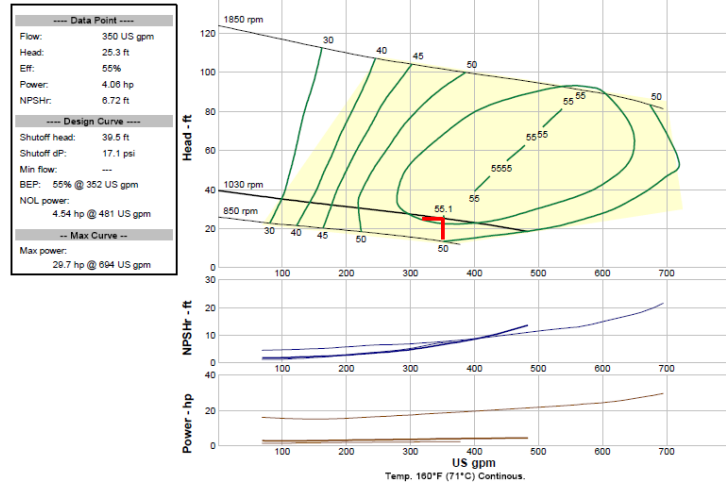


Sales and Marketing Tools

- Marketing Brochure
- Catalog Info
- Specifications
- Mentor Pump Selection

Pump:	Search Criteria:
Size: PO4LC-10D	Flow: 350 US gpm
Type: SelfPrime MotrMini-4A	Head: 25 ft
Synch speed: Adjustable	
Curve:	Fluid:
Specific Speeds:	Water
Dimensions:	SG: 1
	Temperature: 60 °F
	Viscosity: 1.105 cP
	Vapor pressure: 0.2563 psi a
	Ns: ---
	Nss: ---
	Atm pressure: 14.7 psi a
	NPSHa: ---
	Motor:
	Motor is integral to the pump except in 4A, 4B, and 5B catalog sections.

Pump Limits:	Power: ---
Temperature: ---	Eye area: ---
Pressure: 80 psi g	
Sphere size: 3 in	



Self-Priming CENTRIFUGAL pumps



Proven Performance
 Barnes® and Crown® offer a broad range of engineered self-priming centrifugal pumps for a variety of light to heavy-duty wastewater applications. Designed specifically for unscreened raw sewage or industrial waste applications, Barnes and Crown pumps are a reliable choice. These pumps are available in 1½" through 10" discharge sizes and can handle spherical solids up to 3" in diameter depending on pump model and size.

With heads to 184' and capacities to 4400 GPM at 160 °F continuous media temperature, Barnes and Crown self-priming pumps deliver efficient hydraulic coverage. The power frames are completely sealed against contaminants, and bearings are grease lubricated, thus reducing long term maintenance and operating costs of the pump.


Applications
 Barnes and Crown self-priming centrifugal pumps offer rugged reliability, quality and performance for versatile applications.

- Marine
- Municipal
- Industrial
- Corrosive Fluids

Pump Selection & Pricing

1. Obtain primary design conditions
 - Design flow rate
 - Design total head
 - Static head – both maximum (pump off) and minimum (inlet invert)
2. Select pump size & type
 - Consider efficiency for motor sizing
 - Consider solid sizes and NPSH requirements
3. Select motor size – lift stations
 - Select motor speed for maximum static head (design point)
 - Draw system curve for minimum static head
 - Hint: use **MENTOR**.
 - Determine HP at intersection of curves and select motor

Key Takeaways

- 
- Ensure NPSH calculations to identify the best pump solution and acceptable re-prime time for the installation
 - Non-clogging, solids handling capabilities for trash laden and sewage processing waste streams
 - Air leaks on the suction side will stop the pumping/re-priming process!
 - High and dry installation is beneficial for maintenance and servicing requirements
 - Repairable without disrupting system piping connections
 - Motor and pump are separate from each other