

November 2021

Spence™ Condensate Commander Pump



WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire and/or chemical contamination causing property damage and personal injury or death.

Condensate Commander pump must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations and Emerson instructions.

If leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Only a qualified person shall install or service the Condensate Commander pump.

Introduction

Scope of the Manual

This manual provides instructions for installation, maintenance and parts information for the Condensate Commander pump.

Product Description

Condensate Commander Pump is a pressure operated pump primarily intended to move condensate or other fluids without the use of electricity that makes it the preferred choice for remote or hazardous



Figure 1. Condensate Commander Pump

locations. Required suction head is negligible as optimal performance is achieved at only 12 in. / 305 mm. The stainless steel snap acting mechanism in continuous compression is unaffected by turbulence and the single spring assures long service life without adjustment or maintenance. The head assembly is available to retrofit other manufacturer's tanks. Self centering supply and exhaust valves provide reliable performance and are lapped for tight shutoff.

The Condensate Commander Pump removes condensate as well as acids and other process fluids that may be incompatible with conventional pumps. It performs well with high back pressure, low pressure and vacuum systems and can be used in a sump or other submerged application.

The Condensate Commander Pump is used in different applications. This pump can be used with a vented receiver, with an inlet receiver, in a submerged application or in a skid mounted system.

Condensate Commander

Specifications

The Specifications section gives some general specifications for the Condensate Commander Pump.

<p>Available Configurations Classic Vertical: Standard capacity, vertical tank Big boy: Super capacity, horizontal tank Classic Horizontal: Standard capacity, high pressure, horizontal tank Little boy: Reduced capacity, vertical tank Skid Mounted System: Standard or custom multiplex configurations</p> <p>Maximum Operating Conditions⁽¹⁾ See Table 1</p> <p>Operating Characteristics See Table 2</p> <p>Vented Receiver Sizing See Table 3</p> <p>Percent of Flash Steam Formed See Table 4</p> <p>Inlet Receiver Sizing See Table 5</p>	<p>Materials of Construction Tank Weldment: Steel Trip Mechanism with Flange: Ductile Iron, Stainless steel and Steel Pipe Plug and Inlet and Outlet Nipple: Steel Water Level Gauge: Bronze Inlet and Outlet Check Valve: Stainless steel and Bronze Gasket: Graphite and Non-asbestos Inlet and Outlet Reducer: M. Iron</p> <p>Options Stainless Steel Tank High Temperature High Pressure</p> <p>Accessory options Glass Water Gauge Cycle Counter Check Valves Insulating Jacket</p>
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1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

Table 1. Maximum Operating Conditions

PUMP TYPE	MAXIMUM OPERATING PRESSURE		MAXIMUM OPERATING TEMPERATURE	
	psig	bar	°F	°C
Little boy	150	10.3	400	204
Big boy	150	10.3		
Classic Vertical	200	13.8		
Classic Horizontal	250	17.2		

Table 2. Operating Characteristics

PUMP TYPE	PUMP DISCHARGE PER CYCLE	MAXIMUM INSTANTANEOUS DISCHARGE RATE	STEAM CONSUMPTION	AIR CONSUMPTION	RECOMMENDED FILLING HEAD
Little boy	4.2 to 5.1 gal. / 0.016 to 0.019 m ³	60 GPM / 227 LPM	3 lbs. per 1000 lbs. of liquid pumped / 1 kg per 454 kg of liquid pumped	100 SCF per 1000 lbs. of liquid pumped / 2.68 Nm ³ per 454 kg of liquid pumped	6 in. / 152 mm
Classic Vertical	7.8 to 8.6 gal. / 0.030 to 0.032 m ³	90 GPM / 341 LPM			12 in. / 305 mm
Classic Horizontal	8.8 to 11 gal. / 0.033 to 0.291 m ³	90 GPM / 341 LPM			12 in. / 305 mm
Big boy	140 to 185 gal. / 0.530 to 0.700 m ³	195 GPM / 738 LPM			24 in. / 610 mm

Condensate Commander

Table 3. Vented Receiver Sizing Table

FLASH VAPOR		PIPE DIAMETER		VENT LINE SIZE	
lbs/hr	kg/hr	In.	mm	In.	mm
75	34	4	102	1 1/2	38
150	68	6	152	2	51
300	136	8	203	3	76
600	272	10	254	4	102
900	408	12	305	6	152
1200	544	16	406	6	152
2000	907	20	508	8	203

Table 4. Percent of Flash Steam Formed

INITIAL STEAM PRESURE		SATURATED TEMPERATURE		RECEIVER TANK PRESSURE															
				0		5		10		20		30		40		50		75	
psig	bar	°F	°C	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
10	0.69	239	115	3.0	0.21	2.0	0.14	0	0	0	0	0	0	0	0	0	0	0	0
25	1.72	267	131	5.7	0.39	4.1	0.28	3.0	0.21	1.0	0.07	0	0	0	0	0	0	0	0
50	3.45	298	148	9.0	0.62	7.4	0.51	6.2	0.43	4.3	0.30	2.6	0.18	1.0	0.07	0	0	0	0
75	5.17	320	160	11.3	0.78	10.8	0.74	8.6	0.59	6.7	0.46	5.0	0.34	3.7	0.26	2.5	0.17	0	0
100	6.90	338	170	13.3	0.92	11.7	0.81	10.6	0.73	8.7	0.60	7.0	0.48	5.7	0.39	4.6	0.32	2.2	0.15
125	8.62	353	178	14.8	1.02	13.4	0.92	12.2	0.84	10.3	0.71	8.7	0.60	7.4	0.51	3.6	0.25	3.8	0.26

Table 5. Inlet Receiver Sizing Table

LIQUID		RECEIVER PIPE SIZE									
		3		4		6		8		10	
lb/hr	kg/hr	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm
> 500	> 227	2	51	----	----	----	----	----	----	----	----
1000	454	2	51	----	----	----	----	----	----	----	----
1500	680	3	76	2	51	----	----	----	----	----	----
2000	907	3.5	89	2	51	1	25	----	----	----	----
3000	1361	----	----	3	76	2	51	----	----	----	----
4000	1814	----	----	4	102	2	51	1	25	----	----
5000	2268	----	----	6	152	3	76	2	51	----	----
6000	2722	----	----	----	----	3	76	2	51	----	----
7000	3175	----	----	----	----	3	76	2	51	----	----
8000	3629	----	----	----	----	4	102	2	51	----	----
9000	4082	----	----	----	----	4.5	114	3	76	2	51
10,000	4536	----	----	----	----	5	127	3	76	2	51
11,000	4990	----	----	----	----	5	127	3	76	2	51

Principle of Operation

The Condensate Commander pumps by displacing fluid with steam or compressed gas. The float is connected to a linkage and spring that simultaneously actuates a motive valve and an exhaust valve. During the fill cycle the motive valve closes while the exhaust valve opens, allowing condensate to fill the pump

housing. When the float, rising with the entering fluid level, reaches the top of its stroke, the mechanism releases the spring, opening the motive and closing the exhaust valves. Steam or compressed gas then flows into the pump displacing the fluid. Check valves positioned at the inlet and outlet of the pump direct the fluid in the direction of the flow, repeating the cycle.

Condensate Commander

Installation



WARNING

Personal injury or system damage may result if this equipment is installed where service conditions could exceed the limits given in the Specifications section.

Vented Receiver

Install the inlet receiver horizontally with at least 12 in. / 305 mm above the pump to efficiently drain condensate from an open system, see Figure 2.

Condensate is being pumped from a vented receiver to an overhead elevated condensate return line that may contain pressure. For safety, the pump exhaust and receiver should be vented to atmosphere if steam is used for the motive pressure.

Inlet Receiver

Install the vented receiver horizontally with at least 12 in. / 305 mm above the pump to allow sufficient condensate collection in closed system, see Figure 3.

Condensate is flowing from a pressurized system to another pressurized system with greater pressure. Both the inlet and return line may be elevated. This installation will also service a high capacity process installation using a pressurized receiver.

Note

To allow for sufficient volume of condensate and flash vapor, the receiver must be sized adequately to permit the complete separation of flash vapor from condensate.

The receiver must be sized to provide the minimum condensate capacity required to prevent equipment flooding.

The receiver may be either an ASME coded tank or a length of large diameter pipe. A safety relief valve may be required.

Submerged Pump

Condensate Commander Pumps can pump liquids from low lying areas such as manholes, steam pits or any area that may collect liquid or flood. The

non-electric feature makes it a good choice if steam or any other gas is readily available for use as the driving force, see Figure 4.

Liquid is pumped from a sump, manhole or other low-lying area where it may accumulate. For back pressure applications, multiply the total vertical lift by 0.5 plus any back pressure in the return line.

Skid Mounted System

Where the condensate load exceeds the capacity of one Condensate Commander Pump, multiple pumps may be used in tandem. Skid mounted units may be simplex (1 pump), duplex (2 pumps), triplex (3 pumps) or quadruplex (4 pumps). The units are equipped with a receiver, Condensate Commander Pump(s) and all necessary piping fully connected and ready for use, see Figure 5.

The skid mount systems are designed to provide a complete condensate collection and condensate pump unit ready to pipe. All necessary connections are in place. The filling head dimension has already been determined.

Maintenance



WARNING

To avoid personal injury, property damage or equipment damage caused by sudden release of pressure or explosion of accumulated gas, do not attempt any maintenance or disassembly without first isolating the pump from system pressure and return lines. Relieve all internal pressure from the pump prior to any maintenance.

Pumps that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Emerson should be used for repairing this pump.

Pressure operated pumps and the Condensate Commander requires a little maintenance. Generally, for these types of pumps, by eliminating rotating seals, electrical motors and impellers, last five to ten times as long as conventional electrical pumps while eliminating most of the standard maintenance.

Condensate Commander

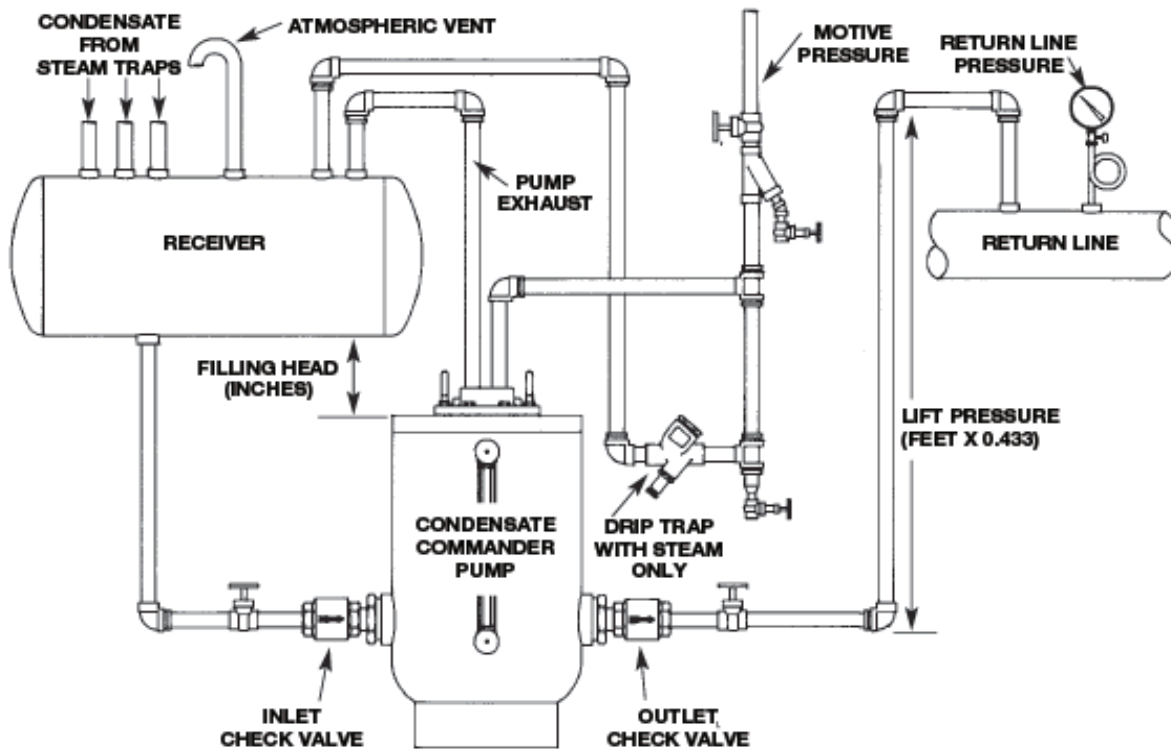


Figure 2. Typical Installation of a Condensate Commander Pump with a Vented Receiver

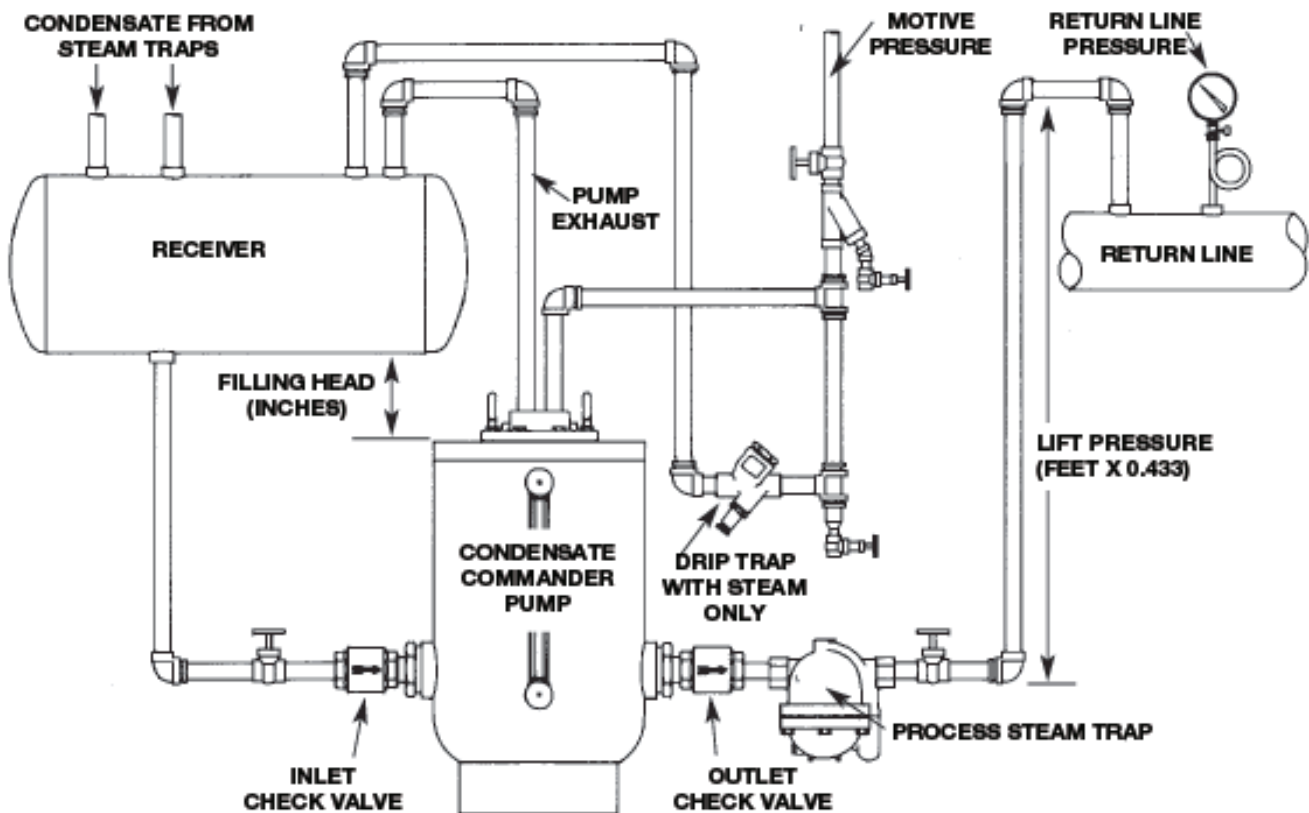


Figure 3. Typical Installation of a Condensate Commander Pump in a Closed System

Condensate Commander

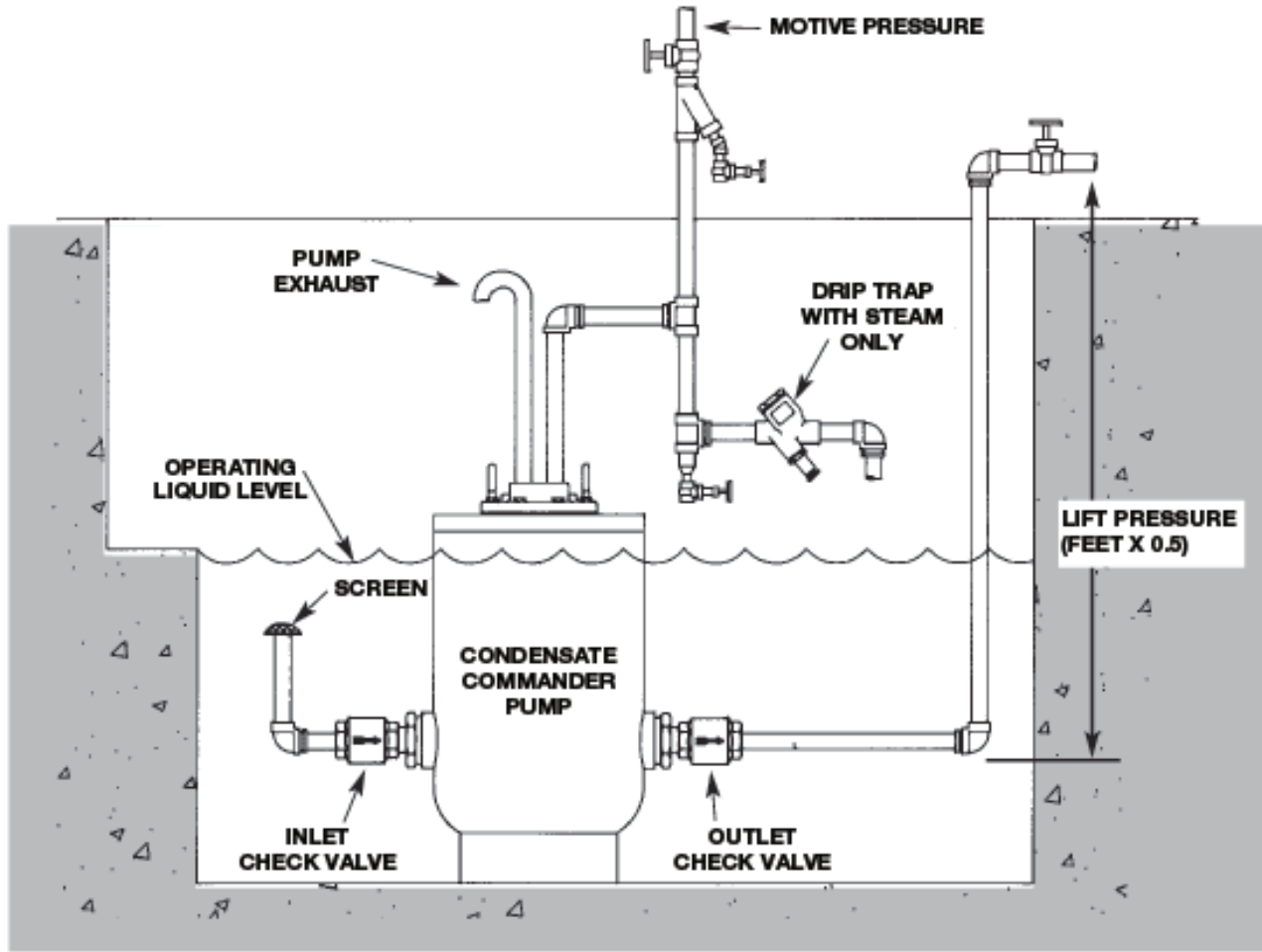


Figure 4. Typical Installation of a Condensate Commander Pump in a Submerged Application

Parts Ordering

When corresponding with your local Sales Office about Condensate Commander Pump, always reference the assembly number.

Parts List

Key	Description	Part Number	Key	Description	Part Number
	Parts Kit	See Table 6	10	Water level Gauge, Bronze	WAL0018125
1	Tank Weldment, Steel	WAL0014164	11	Inlet Reducer, M. Iron	WAL05-15043-00
2	Trip Mechanism with Flange, Ductile Iron, Steel, Stainless steel	WAL0014161	12	Inlet Nipple, Steel	WAL05-02807-00
3	Gasket, Non-asbestos	WAL0621155	13	Inlet Check Valve, Stainless steel	WAL0016294
4	Bolt, Hex head, Steel	WAL0046626	14	Outlet Reducer, M. Iron	WAL05-15043-00
5	Eye Bolt, Steel	WAL0030396	15	Outlet Nipple, Steel	WAL05-02807-00
6	Nut, Steel	WAL05-02856-00	16	Outlet Check Valve, Stainless steel	WAL0016294
7	Nameplate, Aluminum	WAL0028249		Condensate Pump Sub-assembly, Steel	WAL0014163
8	Drive Screw, Steel	WAL0028250		Cycle Counter	WAL0016296
9	1/2 NPT Pipe Plug, Steel	WAL05-03775-00		Insulating Jacket	WAL0014162

Condensate Commander

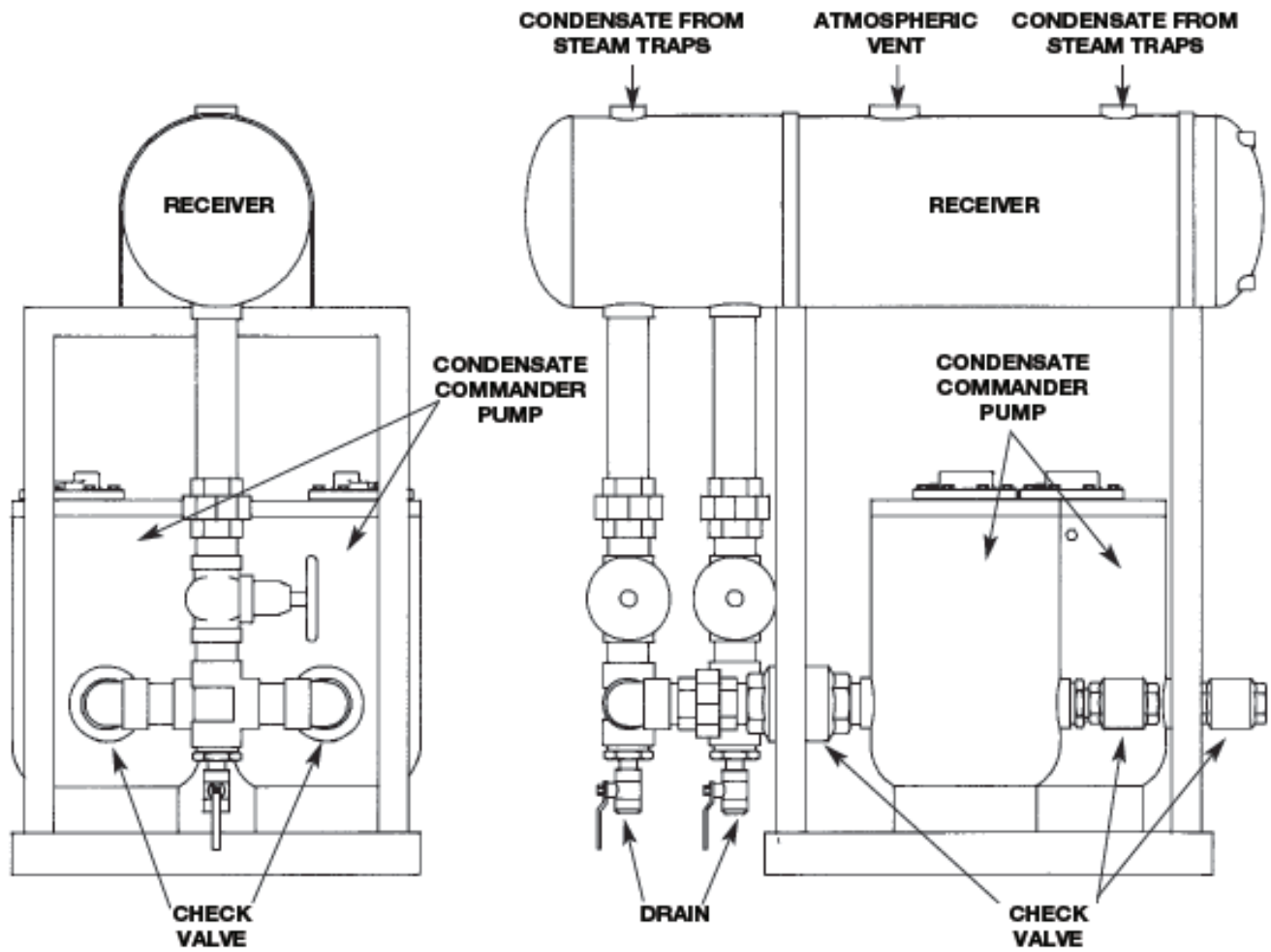


Figure 5. Typical Duplex Condensate Commander Pump Skid Mount System

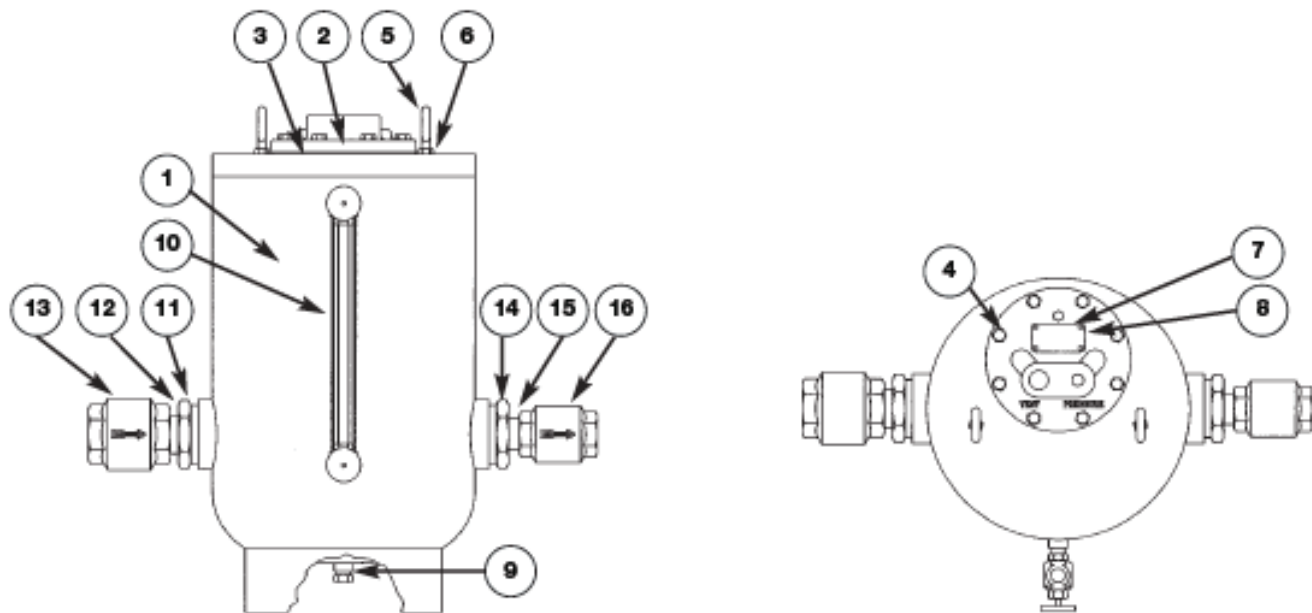


Figure 6. Condensate Commander Pump Assembly Drawing

Condensate Commander

Table 6. Condensate Commander Parts Kit

MODEL	SIZE	PART NUMBER
Repair Mechanism (Gasket Included)	Little Boy	WAL5883615
	Classic Vertical	WAL5883609
	Classic Horizontal	WAL5883616
	Big Boy	WAL5883617
Mechanical Springs	Little Boy	WAL0061293
	Classics	WAL0061294
	Big Boy (x4)	WAL0061294
Digital Cycle Counter	All	WAL0016343
Mechanism Gaskets	Classics and Little Boy	WAL05-02372-01
	Big Boy	WAL0621178
Classics Spring Kit [1 Classic Spring, 2 Spring Buttons, 2 pins, 2 cotter pins (for Classic Vertical and Classic Horizontal)]	Little Boy	WAL5883634
	Classics	WAL5883629
Pump Check Valves - Stainless Steel	NPS 1 / DN 25	WAL0016294
	NPS 1-1/2 / DN 40	WAL0016295
	NPS 2 / DN 50	WAL0016292
	NPS 3 / DN 80	WAL0016293
	NPS 4 / DN 100	WAL0016332
Gage Glass	Little Boy	WAL0018133
	Classic Vertical	WAL0018134
	Classic Horizontal	WAL0018135
	Big Boy (2 required)	WAL0018136
	Receiver Tanks	WAL0018129
Valve Kit - For Pump Mechanism (Includes 1 vent valve and 1 motive valve)	Classic Vertical	WAL5883611
	Classic Horizontal	
	Little Boy	
	Big Boy (4M and 1V)	WAL5883613
Gage Glass Seals	LB	WAL5883630
	CH, CV, BB	WAL5883631

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