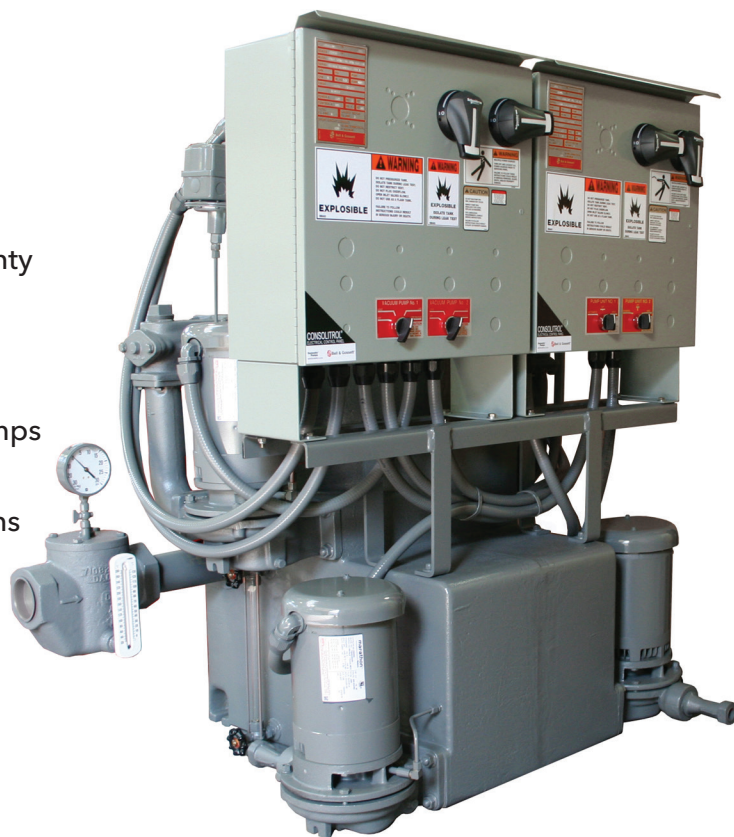
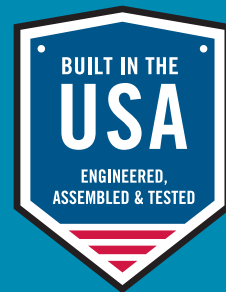


- Vertical Design for Minimum Floor Space
- Cast Iron Receiver with 20 year corrosion warranty
- Quiet Design Vacuum Pumps with low water requirements
- NEMA 2-UL Listed Control Panels
- Vertical Mounted, Bronze Fitted Centrifugal Pumps
- Low Maintenance
- Simplex, Semi-Duplex and Duplex configurations
- Individually operated vacuum and condensate pumps
- Unequaled system efficiency



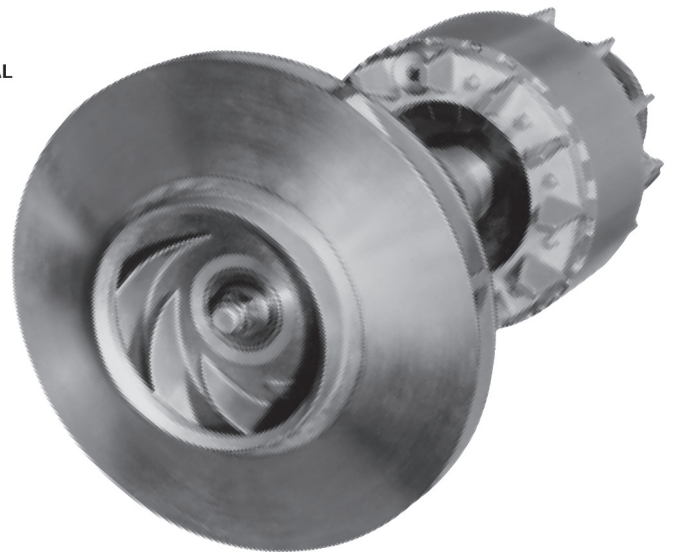
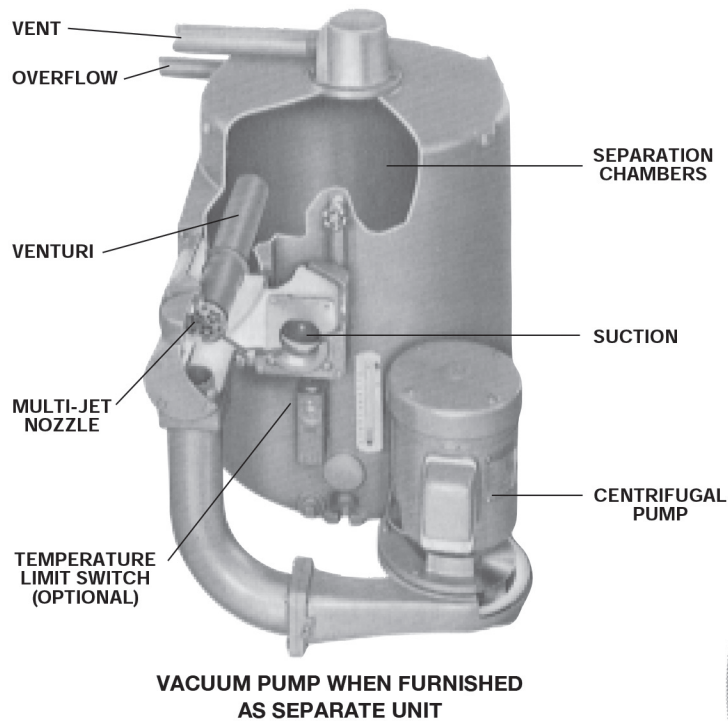
Domestic® Pump VCD™ Vacuum Heating Units



S-330H

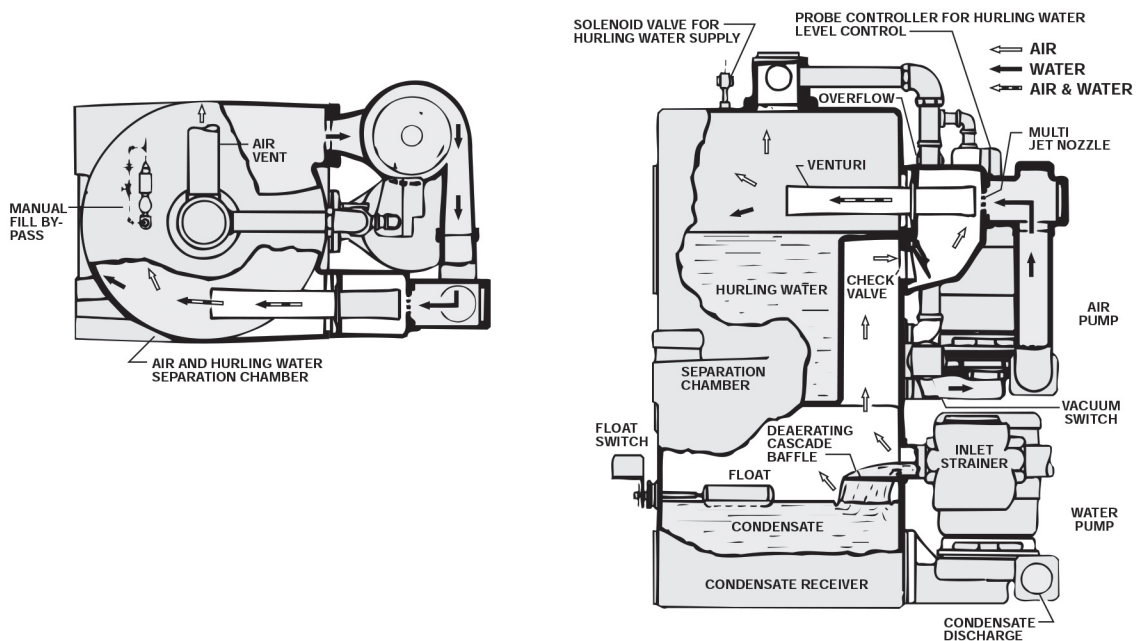
 **Bell & Gossett**
a xylem brand

Series VCD Vacuum Producer



Simplicity

Vacuum pumps feature only one moving part, the centrifugal pump impeller directly secured to the motor shaft ... no close clearances as required in competitive pumps ... no wear adjustment.



Series VCD Features

- **Original Efficiency Sustained**

Vacuum producer parts consist of multi-jet nozzle and venturi which are stationary ... retain efficiency with age.

- **Vertical Construction and Pump Design**

Protects motors from surface water and dirt ... saves floor space.

- **Built-in Quietness**

Vibration free, inherently quiet operation ... no special foundations, vibration eliminators or silencers required.

- **Rugged Construction, Low Maintenance**

Designed and built for many years of dependable service. No special tools required for maintenance ... all parts easily accessible.

- **Durable Receiver**

VCD features an all cast iron receiver that gives reliable service even when exposed to aggressive condensate.

- **Air Suction Lines**

VCD includes cast iron suction lines. Designed and built for years of dependable service. No rubber hoses to crack or split.

- **Manual Sequence Control**

Lead-lag manual alternation furnished as standard equipment for both air and water pumps on duplex and for water pumps on semi-duplex units. (Automatic alternator optional)

- **Water Pumps**

Genuine centrifugal single stage design, bronze fitted with stainless steel shafts, 250°F (121°C) Carbon/Ceramic mechanical seals and renewable wearing rings are all standard. Pump passages specifically designed for handling hot condensate.

- **Low Inlet Height**

Low inlet height reduces installation costs ... often makes pit construction unnecessary.

- **Generous Float Capacity in Condensate Receiver**

Prevents excessive cycling of water pumps.

- **Makeup Probe Control**

Easy maintenance probe allowing for visual indication of low level.

Series VCD Operation

AIR EVACUATING CYCLE

The heart of the VCD vacuum pump is the dependable multi-jet vacuum producer. It is a simple, effective device designed to give years of trouble free service.

The independent air evacuation cycle begins when the vacuum switch, responding to system requirements, starts the centrifugal pump. This pump circulates "hurling water" from the separation chamber through the multi-jet nozzle, venturi and returns it to the separation chamber. The water, forced at high velocity across the gap between nozzle and venturi, entrains air and gases in multiple jet streams creating a smooth, steady vacuum. The mixture is discharged through the venturi into the separation chamber. This causes the water in the separation chamber to force the water to the periphery of the chamber while the lighter air flows to the center and is discharged. Besides effectively separating the air and gases from the water, the centrifugal motion increases the pressure at the centrifugal pump suction, promoting high efficiency. The cycle ends when a vacuum corresponding to the high level vacuum switch setting (usually 8" Hg) has been reached.

AUTOMATIC "HURLING WATER" CONTROL

Replacement of the "hurling water" evaporated from the separation chamber is controlled by a solenoid valve, connected to a water supply (or discharge of water pumps as an alternate) and actuated by a probe controller. The temperature of the "hurling water" stabilizes approximately at the condensate temperature because the small amount of heat generated by the pump is readily dissipated. Refer to the Temperature Limit Switch section when applications encounter

unusually high temperature condensate (above 190°F [87.8°C]).

CONDENSATE RETURN CYCLE

The water pumps are controlled by float switches on water level change in the separate condensate receiver. The operating cycle begins when a float switch starts the water pump on condensate rise. The condensate is pumped to the boiler feed unit until the factory adjusted lower float level has been reached. Entrained air is liberated when condensate flows in a thin sheet over the deaerating baffle into a vacuum.

TEMPERATURE LIMIT SWITCHES

The purpose of developing a vacuum in a steam heating system is to remove air and facilitate steam flow in a cold system. Use of a vacuum in a system with hot return temperatures (above 190°F [87.8°C]) can cause condensate evaporation and potential damage to the vacuum pumps. For example, at the usual vacuum pump cut-out point of 8" Hg, condensate will evaporate at 197°F (91.7°C). Returns at this temperature would cause the vacuum pumps to operate continuously.

To protect from this scenario, Temperature Limit Switches are available to cut-out vacuum pump operation when condensate temperatures exceeds a preset (usually 180°F [82.2°C]) temperature.

Alternatively, Temperature Limit Switches are available to add cooling water the hurling chamber dependent on the water temperature in the chamber. This set-up is utilized where it is necessary to maintain system vacuum regardless of condensate return temperature.

Series VCD Benefits

Units are comprised of individually selected and controlled condensate and vacuum pumps. The unique design features condensate pumps flange mounted on a condensate receiver and vacuum pumps operating from an independent air and water separation chamber. A wide selection of condensate and vacuum pumps are interchangeable on a group of cast iron or steel receivers and separation chambers, providing unusual flexibility in specifying an assembly best suited to any application.

The heart of the VCD Vacuum unit is the simple yet very effective multi-jet, vacuum producer. This sound, proven design, relying on a centrifugal pump impeller as the only moving part, assures efficient performance even after years of operation.

The result is a vacuum unit offering the consulting engineer, the installing contractor and the owner unequaled choice of selection, performance, economy of operation and dependability.

MAXIMUM FLEXIBILITY IN MEETING SYSTEM REQUIREMENTS

A wide selection of multi-jet vacuum pumps and condensate pumps is available for mounting on a group of cast iron and steel, low inlet condensate receivers and separation chambers to meet particular system requirements.

REDUCED POWER COSTS

In most applications, demand on the vacuum pumps does not coincide with demand on the condensate pumps. Since these pumps are separate and independently controlled, they can be selected so that the smallest and least number of motors will operate to maintain the desired condition. Oversizing can and should be avoided.

ASHRAE* TESTING AND RATING

For many years, the ASHRAE standard for testing and rating return line low vacuum heating pumps has been at 51/2" Hg vacuum and 160°F condensate temperature. DOMESTIC follows this established procedure, assuring vacuum pumps whose rating and actual system performance are synonymous.

EXPANDABLE FOR ADDITIONAL RADIATION

Condensate receivers and separation chambers are designed for full duplex equipment. Simplex or semi-duplex units can, therefore, be readily converted to semi-duplex or duplex pumps. The versatile design makes it frequently possible to expand existing radiation without changing the basic pump installation. Larger condensate and vacuum components may be interchangeable with original elements.

VCD BONUS DEAERATION

Entrained air and other gases are removed when condensate flows in a thin cascade over a deaerating baffle into the condensate receiver under vacuum. Reduced pressure plus greater surface exposure reduces the oxygen content by as much as 50% (depending on the condensate temperature), lengthening the life of system and boiler. And, the air is kept out because the vacuum pump "hurling (sealing) water" never mixes with the condensate as in competitive pumps.

PACKAGE UNIT

There are no "hidden" costs when you specify and buy Domestic Pump Series VCD Vacuum Units. All components and accessories are assembled with controls mounted and wired. Factory assembly, combined with rigid testing procedures, results in a completely integrated unit which not only assures simple, trouble-free installation, but minimizes the often encountered hazards of divided responsibility.

AUTOMATIC CONTROL SYSTEM

Domestic Consolitol® Control Panels provide consolidated control especially designed for efficient automatic pump operation. Control devices operate only those pumping elements needed to maintain the desired system conditions. Standard panels are NEMA 2 - U.L. Listed.

MAXIMUM RELIABILITY

Failure on the vacuum pump motor will have no effect on the operation of the separate condensate pump. Thus, the most important duty of the unit - to return condensate to the boiler - will continue. This function can be further assured by adding a second or standby condensate pump (semi-duplex unit).

EXCEPTIONALLY FAST SYSTEM WARM-UP

The multi-jet vacuum pumps characteristically remove air far in excess of their rated capacity at start of heating cycle.

CAST IRON RECEIVERS

The VCD receivers are warranted for 20 years from the date of shipment against failure due to corrosion. In the event of receiver failure due to corrosion, the receiver will be replaced free of charge with transportation charges prepaid to any location within the continental U.S.A. Labor charges for replacement are not allowed. Nor shall any liability for any indirect or consequential damages be assumed. All implied warranties of merchantability and fitness for a particular purpose are hereby disclaimed.

FACTORY TESTING

All VCD units are completely factory tested. Test reports are available upon request.

*American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

Series VCD quick selection table for usual system conditons - based on EDR

SYSTEM CAPACITY SQ. FT. EDR	PUMP PERFORMANCE			AIR PUMP HORSEPOWER		WATER PUMP – HP							INLET SIZE INCHES	MAX. DISCH. SIZE INCHES
	RE- CEIVER NO.	RATING AT				AT PRESSURE INDICATED FROM 10" Hg								
		5 1/2" Hg		PUMP CAPACITY SAME AS SHOWN IN COL. 4										
		AT 160°F		RPM		15 PSI	20 PSI	25 PSI	30 PSI	35 PSI	40 PSI	45 PSI		
		CFM	GPM*	3500	1750	3500	3500	3500	3500	3500	3500	3500		
6,000	25	5.8	6		3/4	1/3	1/2	1/2	3/4	1	1	1 1/2	2 1/2	1 1/2
9,000	25	8	9	1		1/3	1/2	3/4	3/4	1	1	1 1/2	2 1/2	1 1/2
12,000	25	8	12	1		1/3	1/2	3/4	1	1	1 1/2	1 1/2	2 1/2	1 1/2
15,000	25	12	15	1 1/2		1/3	1/2	3/4	1	1	1 1/2	1 1/2	2 1/2	1 1/2
22,000	25	12	22	1 1/2		1/2	3/4	3/4	1	1 1/2	1 1/2	2	2 1/2	1 1/2
22,000	25	17	22	2		1/2	3/4	3/4	1	1 1/2	1 1/2	2	2 1/2	1 1/2
30,000	50	17	30	2		3/4	3/4	1	1 1/2	1 1/2	2	2	2 1/2	1 1/2
37,000	50	18	37	2		3/4	1	1 1/2	1 1/2	2	2	3	3	1 1/2
45,000	50	18	45	2		1	1	1 1/2	2	2	3	3	3	1 1/2
60,000	50	26	60	3		1 1/2	1 1/2	2	2	3	3	3	3	2
75,000	100	29	75		3	1 1/2	2	2	3	3	5	5	4	2
90,000	100	52	90		5	2	2	3	5	5	5	5	4	2
112,000	100	52	112		5	2	3	3	5	5	5	5	4	3
150,000	150	52	150		5	3	5	5	5	7 1/2	7 1/2	7 1/2	4/6	3
150,000	150	74	150		7 1/2	3	5	5	5	7 1/2	7 1/2	7 1/2	4/6	3

* Water pump capacities are per pump and based on semi-duplex or duplex applications. For single units, increase the capacity by one third, making the selections from Table 2.

Table No. 1 - Single unit air removal rates and selection of receiver numbers as governed by air and water capacities

CFM AT			AIR PUMP MOTOR HP AT		NO. OF RECEIVER CORRESPONDING TO GPM EACH WATER PUMP									
5 1/2" Hg 160°F ²	15" Hg 70°F	20" Hg 70°F	3500 RPM	1750 RPM	UP TO 12	13-23	24-30	31-45	46-60	61-100	101-120	121-150	150+	
5.8	4.4	3.8	3/4		25 VCD			Available						CONSULT REP FOR VCL SERIES UNIT
8	6	5.2	1											
12	9	8	1 1/2											
17	14	12	2											
18	15.5	12	2			50 VCD					Normal Applications			
26	20	18	3											
29.4	22	22		3										
18	15.5	12	2							100 VCD	150 VCD			
26	20	18	3											
29	22	22		3										
52	44	40		5										
74	62	58		7 1/2										
FOR LARGER SIZES, REFER TO DOMESTIC REPRESENTATIVE														
USUAL DISCHARGE LINE SIZE FOR SHORT RUN ¹					3/4	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2 1/2		
WATER PUMP DISC. SIZE NORMALLY FURNISHED					1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3		
INLET STRAINER SIZE					SEE DIMENSION DRAWINGS, PAGE 8									

¹If equivalent length of run is over 100', discharge line should be 1 or 2 sizes larger than suggested.

²This is the rating point specified by ASHRAE. It is more indicative of the way in which a pump would actually perform on a system than the more convenient testing conditions of 10" Hg and 70°F, which is its approximate thermodynamic equivalent in dry air.

Table No. 2 - Water pump capacities - Gallons per minute from 10"-20" Hg vacuum at various discharge pressures

3500 RPM – MAXIMUM GPM FOR LISTED MOTOR HORSEPOWER – 3500 RPM												
MOTOR HP	10 PSI		15 PSI		20 PSI		25 PSI		30 PSI		35 PSI	
	20"	10"	20"	10"	20"	10"	20"	10"	20"	10"	20"	10"
1/3	15	15										1/3
1/2	22	22	15	15	6	6						1/2
3/4	37	37	30	30	22	22	9	9				3/4
1	45	45	45	45	30	30	22	15	15	9	9	1
1 1/2	75	75	60	60	45	45	37	37	30	30	22	1 1/2
2	112	112	90	90	75	75	60	60	45	45	37	2
3	150	150	112	112	112	112	75	75	75	75	60	3
5			150	150	150	150	150	112	112	112	112	5
7 1/2								150	150	150	150	7 1/2
10												10
1750 RPM – MAXIMUM GPM FOR LISTED MOTOR HORSEPOWER – 1750 RPM												
	10 PSI		15 PSI		20 PSI		25 PSI		30 PSI		35 PSI	
	20"	10"	20"	10"	20"	10"	20"	10"	20"	10"	20"	10"
1/2	9	9										1/2
3/4	22	22	12	12								3/4
1	45	45	30	30								1
1 1/2	60	60	60	60	37	37	9	9				1 1/2
2	90	90	90	90	60	60	45	45				2
3	150	150	112	112	112	112	90	90	45	45		3
5			260	260	150	150	150	150	112	112	75	5
7 1/2					260	260	260	260	260	260	180	7 1/2

CAPACITIES LARGER THAN CATALOGED AVAILABLE – CONSULT FACTORY

Series VCD – Unit Selection

SIZING VACUUM HEATING PUMPS

Series VCD units offer freedom in system design and provide unique inherent advantages in pump design and function.

CONDENSATE PUMP REQUIREMENTS

It is desirable to size condensate pumps as small as practical in order to provide more constant transfer of water, thereby increasing the life of the pump and reducing power cost. At design condition, the condensing rate corresponding to 1000 EDR is 0.5 gpm. At start up, the maximum flow rate may be greater than 0.5 gpm but is less than 150% of the 0.5 gpm rate or a maximum of less than 0.75 gpm. Water pumps thus should have 0.75 to 1 gpm capacity for each 1,000 sq. ft. EDR served. The smaller rate is suggested for duplex pumps having automatic stand-by controls.

Summary of Condensate Pump Requirements

Single pump	1 gpm/1000 EDR
Duplex and semi-duplex pumps	.75 gpm/1000 EDR

STANDARD AND SPECIAL VACUUM PUMP REQUIREMENTS

Pumps for tight vacuum systems should have a capacity of 0.3 to 0.5 cfm of air removal for each 1,000 EDR served. The larger air capacity is suggested for systems up to 10,000 EDR. The pump should be selected from ratings based on 5-1/2" Hg at 160°F (71.1°C) which is representative of actual system conditions. These air removal rates are based on the vacuum range of 0" to 10" Hg, with the vacuum pumps usually operating between 3" and 8" Hg. Should a higher operating range (above 10" Hg) be required, the air removal rates should be increased accordingly, i.e., 1.5 cfm/1000 EDR for operation up to 15" Hg or 2 cfm/1000 EDR for operation up to 20" Hg. Refer to suggested guide below.

Special conditions may occasionally require larger air removal rates. For example, excessive air in-leakage in an existing system may be impractical to correct. The rate of air in-leakage is difficult to predict; however, air removal rates of approximately 1 cfm/1000 EDR have been adequate for most systems when operating in the standard range of 3" to 8" Hg.

Reciprocating steam driven vacuum pumps operate uncontrolled and, as a result, their actual air capacities are difficult to determine; they have also been used for unusual lift conditions requiring an operating vacuum higher than the standard operating range of 3" to 8" Hg. When replacing steam pumps, we suggest an air removal rate of 1 cfm/1000 EDR or greater as governed by the required operating range.

Summary Guide for Air Removal Requirements

	Vac. Range In Hg	cfm/1000 EDR
Tight systems thru 10,000 EDR	0-10*	.5
Tight systems in excess of 10,000 EDR	0-10*	.3
All systems, some air in-leakage	0-10*	1.0
All systems	10-15	1.5
All systems	15-20	2

*Air pumps are usually adjusted to operate between 3" and 8" Hg.

SELECTION TABLE INSTRUCTIONS

Reasonably tight system requirements can be met with capacities listed in the Quick Selection Table shown on page 5. Units selected from this table are based on .3 to .5 cfm/1000 EDR and have proven highly satisfactory in practice, when operated in the range of 3" to 8" Hg vacuum. Special conditions may require larger air capacities than shown in the Quick Selection Table. Refer to Suggested Guide for Air Removal Requirements on this page and follow these 5 easy steps in selecting the desired components from Tables 1 and 2, page 5.

1. Determine condensate and vacuum capacities.
(See Recommendations on page 5)
2. Select nearest higher air capacity, vacuum pump HP and rpm from Table 1. Read number of receiver at intersection of cfm and gpm columns.
3. Determine condensate pump discharge and strainer sizes from last 2 lines of Table 1.
4. Select condensate pump HP and rpm at applicable discharge pressure from Table 2.
5. Select the desired arrangement, single, semi-duplex or duplex. For lowest initial cost and maximum reliability the semi-duplex unit is recommended because it offers automatic stand-by protection and double capacity to return condensate to the boiler.
6. Select material of vacuum unit. VCD refers to cast iron.

Model No. 50 VCD Cast Iron 2 Single
Receiver No. 3 Semi-duplex
4 Duplex

For example, 50 VCD 4 identifies a full duplex VCD pump with No. 50 cast iron condensate receiver and separation chamber. Specify cfm, gpm, discharge pressure, vacuum range, motor HP and rpm, accessories, controls and power supply. See guide specification for details of standard and special equipment.

VACUUM OPERATING RANGE

Unless otherwise specified the vacuum switches are adjusted to operate the air pumps between a low of 3" Hg and a high of 8" Hg for an average vacuum of 5-1/2" Hg. The second vacuum switch of a duplex unit is set to start the stand-by air pump at 2" Hg and cut out a 8" Hg vacuum.

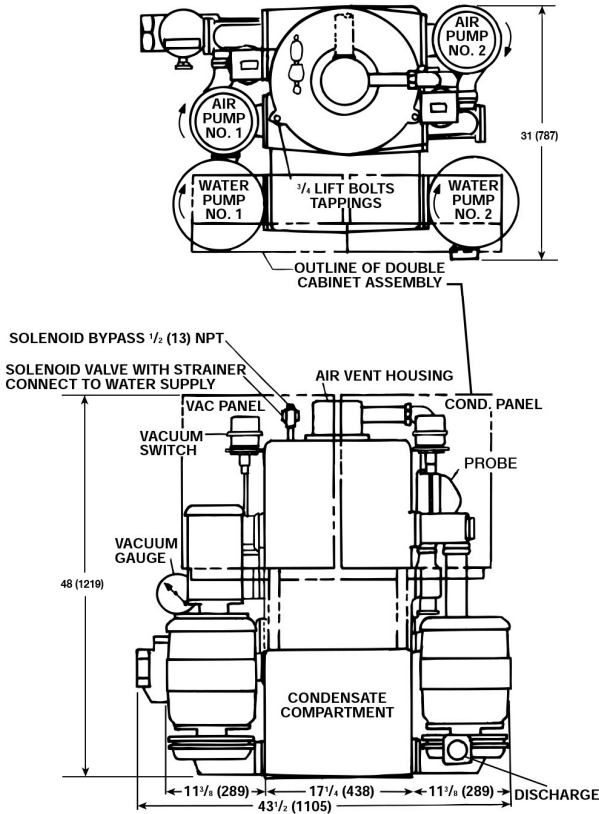
TESTING AND RATING

For many years, the ASHRAE standard for testing and rating return line vacuum heating pumps has been 5-1/2" Hg (average between 3" and 8" Hg) at 160°F (71.1°C) and test procedures have been established on this basis. Series VCD units are rated on this basis.

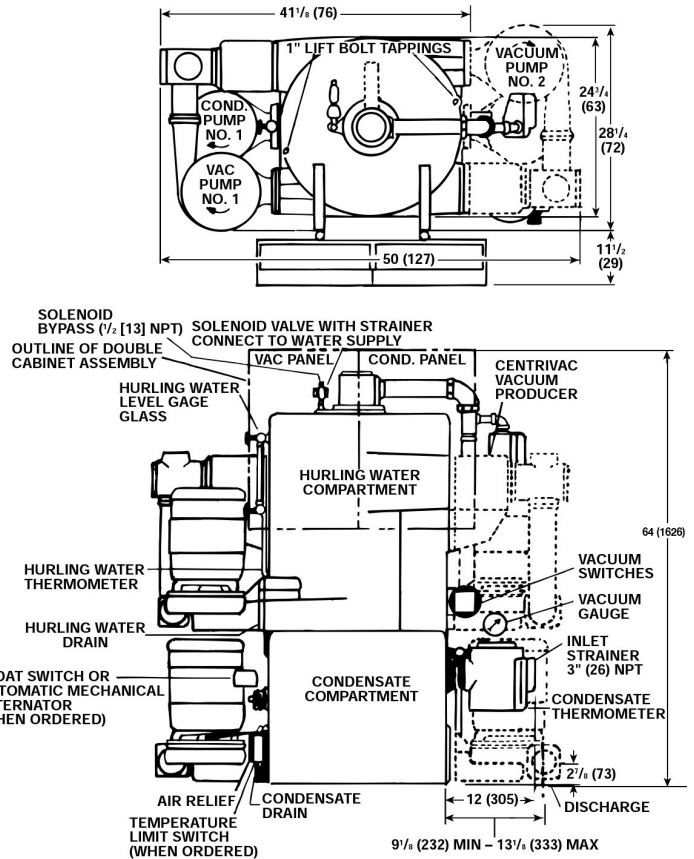
Roughing-in dimensions

Not to be used for Construction
CERTIFIED DIMENSIONS ON REQUEST

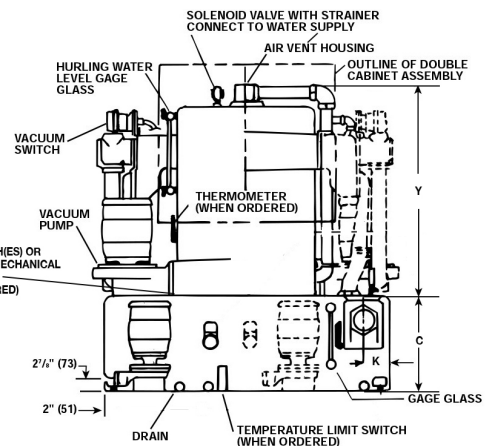
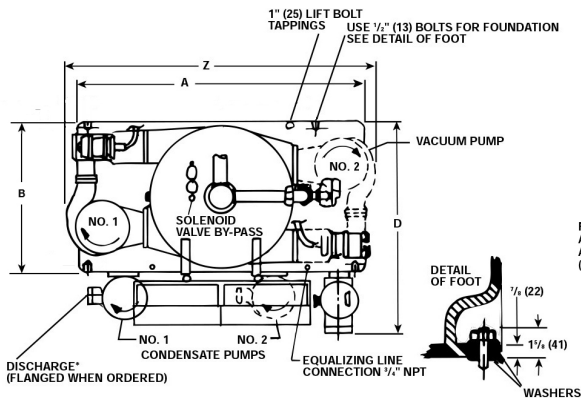
25 VCD
2 1/2" (64) Inlet
13" (330) from Floor
3DVC07



50 VCD
3" (76) Inlet
15" (381) from Floor
3DVC08



100 VCD & 150 VCD
4" (102) or 6" (152) Inlet
15" (381) from Floor



DIMENSIONS IN INCHES (MM).

REFER TO CATALOG PAGES FOR SUGGESTED SPECIFICATIONS AND DESCRIPTION OF STANDARD AND OPTIONAL EQUIPMENT.

100 & 150 VCD
DIMENSIONS OF AIR PUMP

HP	AIRVENT	OVERFLOW	Y	Z
1-3	2 (51)	1 1/2 (38)	36 1/4 (921)	28 (711)
5	2 1/2 (64)	2 (51)	46 1/4 (1175)	30 (762)
7 1/2	2 1/2 (64)	2 (51)	46 1/4 (1175)	32 (813)

DIMENSIONS OF
WATER PUMP & RECEIVER

REC. NO.	INLET	A	B	C	D
100	4 (102)	49 (1245)	29 (237)	18 1/2 (470)	43 (1092)
150	4" (102)	60 (1524)	32 (813)	20 1/4 (514)	49 (1245)
150	6" (152)	60 (1524)	32 (813)	20 1/4 (514)	53 (1364)

*Use for 4" (102) inlet for water capacities up to 120 gpm;
6" (152) inlet for 121 gpm and up.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services, and agricultural settings. With its October 2016 acquisition of Sensus, Xylem added smart metering, network technologies and advanced data analytics for water, gas and electric utilities to its portfolio of solutions. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xyleminc.com

We value your feedback. Please take our 3 question survey at **bellgossett.com/survey** to let us know how we are doing.



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