

PUMP SECTION

Vacuum Pumps - Types VR, VRD, DV & DVD, Model C-5

APPLICATION

The Vacuum Pump is the indispensable heart of the modern heating system. By rapidly exhausting air from the system it circulates steam quickly, minimizes the warm-up period and enables the heating system to function quietly.

This vacuum pump unit applied in differential Vari-Vac® systems provides steam temperature control, varying steam temperature based on outside temperature and indoor requirements.

Types VR, VRD, DV, and DVD, Model C-5 Pumps are designed for large and small projects with capacities of 5,000 through 65,000 EDR with discharge pressures of 20, 30, and 40 PSI. Each Vent-Rite® duplex pump is equipped with its own automatic controls and so arranged to provide automatic standby service. It is not necessary for the operating engineer to switch from one condensate pump to the other manually, as the pumps alternate automatically on float control. If one float switch contact closes and for some reason that pump does not start, the other float switch contact will automatically close and the start the other pump. Also, if the condensate load becomes too great for one pump, the other pump will start automatically. Both pumps then operate simultaneously. This feature is of great value to the operating engineer.

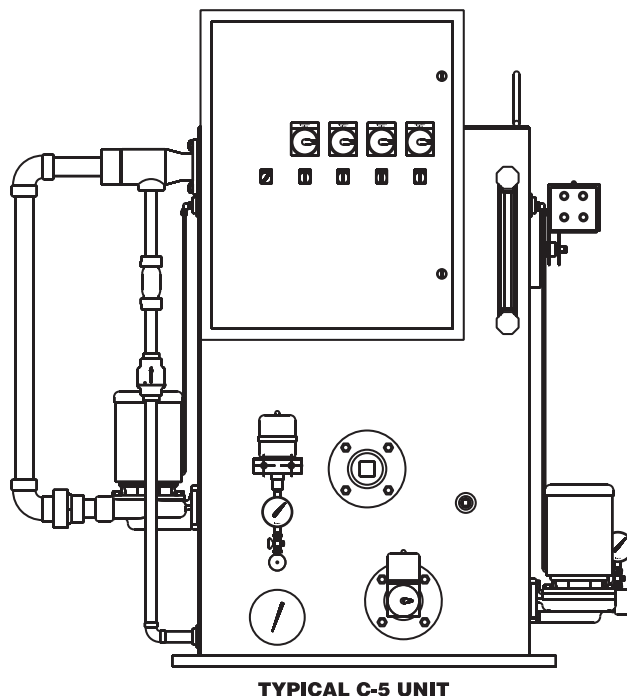
CONSTRUCTION FEATURES

THE CENTRIFUGAL PUMP. The bronze fitted Centrifugal Pump with its enclosed impeller is mounted in a straight line assembly directly connected to a heavy duty motor. It is designed to provide for hydraulic balance and to avoid steam binding under high water temperatures.

THE EXHAUSTER. A jet-type exhauster of Vent-Rite® design and manufacture is of the highest efficiency, based on over 60 years of successful design experience.

ELECTRICAL CONTROLS. Furnished as standard are a float switch and a vacuum switch located in the accumulator portion of the tank, which brings on both vacuum pumps, speeding up the recovery time on this important function. A float control switch is located in the hurling portion of the tank to energize the condensate pump.

The electrical controller is housed in a NEMA enclosure and includes a motor starter with overload circuit breaker and a three position selector switch for each pump.



This device causes the pumps on duplex units to alternate in service yet permits one to follow the other into service if the first pump should fail to start. Also, if one pump cannot handle the condensate load, both pumps automatically operate simultaneously.

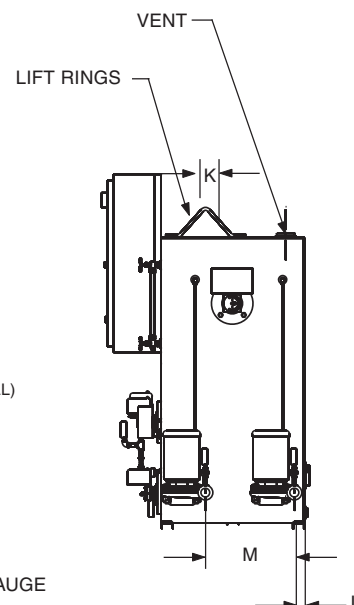
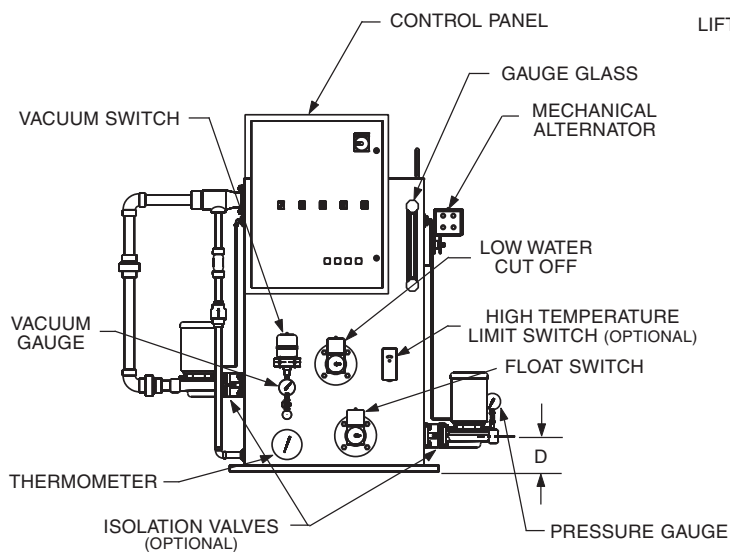
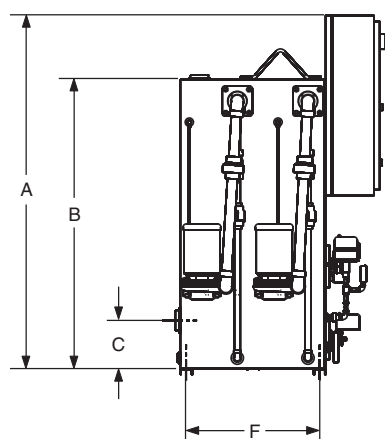
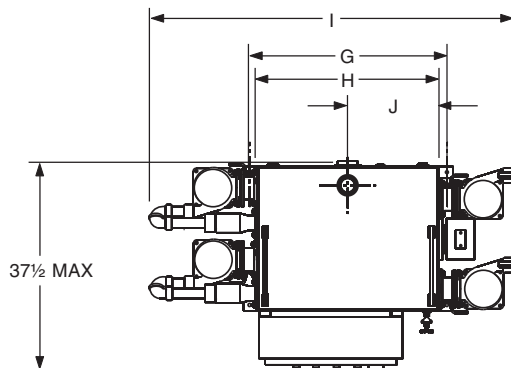
Motor speeds for 60 cycle AC are O.D.P. 3450 RPM.

Vent-Rite® reserves the right to make changes in specifications and design without notice.

DIMENSIONS AND SELECTION

PUMP TAPPINGS IN INCHES				DIMENSIONS IN INCHES												
PUMP EDR	INLET	VENT	DISCHARGE	A	B	C	D	E	F	G	H	I	J	K	L	M
5 - 30	2½	2	1¼	63	49	9	6	26	24	33	30¼	61	15¼	3¼	1¼	15
40 - 65	4	2½	1½	72	58	8½	7	27	24	49⅜	47⅜	87	23¾	2¾	3/8	15

Note: Without Isolation Valves deduct 6" from I dimension



CAPACITIES

PUMP SIZE		5	10	15	20	25	30	40	65
SQ. FT. RADIATION (EDR)		5,000	10,000	15,000	20,000	25,000	30,000	40,000	65,000
BOILER HORSE POWER		36	71	107	143	178	214	286	464
BTU (MILLION)		1.20	2.40	3.60	4.80	6.00	7.20	9.60	15.60
SIMULTANEOUS CAPACITY	WATER GPM	7.5	15	22.5	30	37.5	45	60	97.5
	AIR CFM	2.6	6.1	7.1	8.2	12.4	14.4	22	36
MOTOR HP AIR		¾	1	1	1½	2	3	3	5
MOTOR HP WATER	20# DISCH	½	½	¾	¾	1	1	1½	3
	30# DISCH	¾	¾	1	1	1½	1½	2	5
	40# DISCH	1	1	1½	1½	1½	2	3	5
ACCUMULATOR TANK GALLONS		22.5	22.5	22.5	22.5	22.5	22.5	41	41
HURLING TANK GALLONS		121.5	121.5	121.5	121.5	121.5	121.5	235	235

NOTES: 1) AIR AND WATER CAPACITIES ARE BASED ON 5½ HG VAC @ 160° F.
2) RATINGS IN ACCORDANCE WITH VACUUM HEATING PUMP CODE OF THE ASHRAE.

TYPICAL SPECIFICATIONS

VR, VRD = Simplex and Duplex Vacuum Pump

DV, DVD = Simplex and Duplex Differential Vacuum Pumps

1. Provide simplex or duplex vacuum pump or differential vacuum pumps for operation with variable vacuum control system as herein specified. Quantities shall be as indicated on drawings.
2. Each vacuum pump shall be packaged type, simplex (2) pumps, duplex (4) pumps completely assembled, pre-piped and pre-wired. Materials and parts shall be of the highest quality. The condensate shall be discharged by a condensate pump and the air and gases shall be removed by a vacuum pump. The units shall include one or two condensate pumps and one or two vacuum pumps. Each packaged unit shall include a heavy copper-bearing steel condensate receiver, with a minimum 3/16" material thickness. The manufacturer shall provide stainless steel pressure gauges, water level gauge, stainless steel vacuum gauges, stainless steel dial thermometer, and check valves which have a stainless steel valve and seat. All gauges shall be observable from a single point located in the front of the unit. The tank shall be on rails to provide air space under the tank to allow for evaporation beneath the tank. The manufacturer shall provide lifting lugs on the unit for ease of installation. Companion flanges or unions shall be provided for all connections.
3. The condensate and vacuum pumps shall be centrifugal type, bronze fitted, with 250° F mechanical seals and dynamically balanced single cast bronze impellers. Motors shall be 3450 RPM and open drip proof type. Motor horsepower at design point and design voltage shall be adequate to handle load requirements, 208, 230, 460/3/60.
4. Provide each vacuum pump with a three position selector switch to permit automatic (float and vacuum) off and hand operation. When the selector switch is in the "automatic position" for the vacuum pumps, control shall be such that an increase in water level in the accumulator or a system call for vacuum will start both pumps. Provide each condensate pump with a three position selector switch to permit automatic (float only) off and test operation. A mechanical alternator shall provide for alternate operation of the condensate pumps, and for starting the standby pump, if the lead pump cannot handle the return condensate or if the lead pump fails to function. A low water condensate switch will break power to condensate pumps, in the event condensate recedes near suction opening of the vacuum pumps. Once water is restored to an acceptable level the pumps will return to normal operating condition. All liquid level switches shall be 4 bolt gasket type devices.
5. Provide a single consolidated control panel mounted and wired on the receiver. The control panel shall be mounted in an upright fashion with provision for removal to accommodate limited clearance entrance ways. The single control cabinet shall be NEMA 1. The panel shall incorporate the following: industrial grade motor protective circuit breakers (one for each motor), magnetic starters with overload protection, numbered terminal strip, and 3 position selector switches. The control circuit shall be protected by circuit breakers. The starters must be designed so as to limit contact bounce. The overloads shall provide single phase motor protection and shall be temperature compensated up to 40° C or 104° F. All electrical components shall have a verifiable life rating. All internal electrical components as well as the assembled and prewired control cabinet shall be UL approved.
6. Vacuum pump equipment is to be assembled, piped and valved in accordance with the manufacturers certified drawings.
7. Each pump shall have not less than the capacity of EDR, equivalent direct radiation indicated on the drawings. The water pumps shall be capable of simultaneously delivering the full rating in GPM and pressure as scheduled. Each air pump shall be capable of delivering the full rated air capacity specified. With both pumps operating, indicated air and water quantities shall be doubled. Quantities of water and air specified are at a temperature of 160° F and 5½" of vacuum. Each pump shall be rated in accordance with Vacuum Heating Pump Code of ASHRAE, and when exhausting against a closed suction, shall produce a minimum of 25" of mercury vacuum with water at 125° F. The receiving tank shall have a capacity as scheduled. The air removal tank shall have a capacity as recommended by the manufacturer and approved by the Engineer.
8. Each vacuum pump unit shall be tested at the plant of the manufacturer in accordance with the ASHRAE Standard Code for Testing and Rating Return Line Low Vacuum Heating Pumps. The manufacturer shall have been in design and manufacturing of vacuum systems for a minimum of 5 years.
9. The vacuum pump units shall be installed complete with all piping and new electrical wiring and connections. Overflow piping shall be directed to the nearest floor drain.
10. In the discharge line from each condensate pump the contractor shall provide a gate valve and a suitable spring loaded check valve. Near the inlet of the receiver for each vacuum pump unit the contractor shall provide a gate valve and strainer.

11. Differential Vacuum Pumps DV and DVD will require a Mepco differential controller installed near the end of the steam main farthest from the control valve, which shall be connected to both steam and return piping of the zone in which it is located. The differential controller shall maintain a positive pressure differential between steam and return piping by governing the differential vacuum pump operation. The differential controller shall operate on maximum 24 volt.

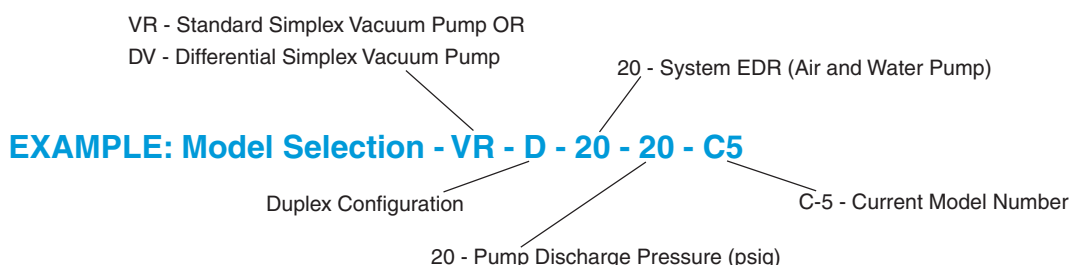
12. Available Options

- Positive seating suction isolation valves on both the condensate pumps and vacuum pumps
- NEMA 2, 3, 4, 4X, 12 Control Panel available
- 2 position selector switches
- High Temperature Limit Switch to disengage the vacuum switch if condensate reached 160° F.
- Fused disconnect switches
- 115 volt transformers
- Illuminated selector switches
- Liquid tight conduit

Model C-5 Vacuum Pump

The contractor shall furnish and install as specified in the plans and in accordance with the manufacturer's instructions _____ (quantity) duplex Vent-Rite® type _____ (VR, VRD, DV, DVD) Vacuum Pump, which has a rating of _____ 5, 10, 15, 20, 25, 30, 40, 65) square foot of Equivalent Direct Radiation and capable of discharging against _____ (20, 30, 40) PSI pressure at the pump. Each pump shall be rated in accordance with the Vacuum Heating Pump Code of the ASHRAE and when exhausting against a closed orifice, shall produce a minimum of 25" of mercury vacuum with water 125° F.

The pump shall be powered by _____ volts, _____ phase, _____ hertz.
The unit shall be factory wired and tested.



Job Name _____ Location _____



Manufacturers
Representative For:



MARSHALL ENGINEERED PRODUCTS CO.

Vent-Rite

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