



MARSHALL ENGINEERED PRODUCTS CO.

Form 1408

## VACUUM PUMP - STANDARD VRD-C5 PACKAGES

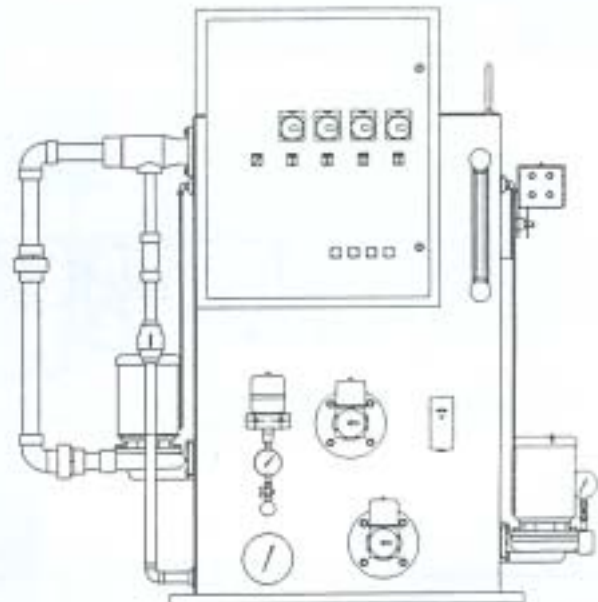
VACUUM PUMPS - Types DUPLEX VRD, MODEL C-5

### 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.

Type VRD-C-5 Unit, are designed for projects with capacities of 20,000 & 40,000 EDR with discharge pressures of 20 and 40 PSI.

Each MEPCO 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 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.



Standard VRD-C-5 Unit

### 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 MEPCO design and manufacture is of the highest efficiency, based on 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 controls are housed in a NEMA 2 quadruplex panel including: 1) Master disconnect switch, 4) Magnetic starters, 4) Circuit breakers, 2) T-O-A and 2) H-O-A lighted selector switches and 1) Multi-tap transformer 115 volt.

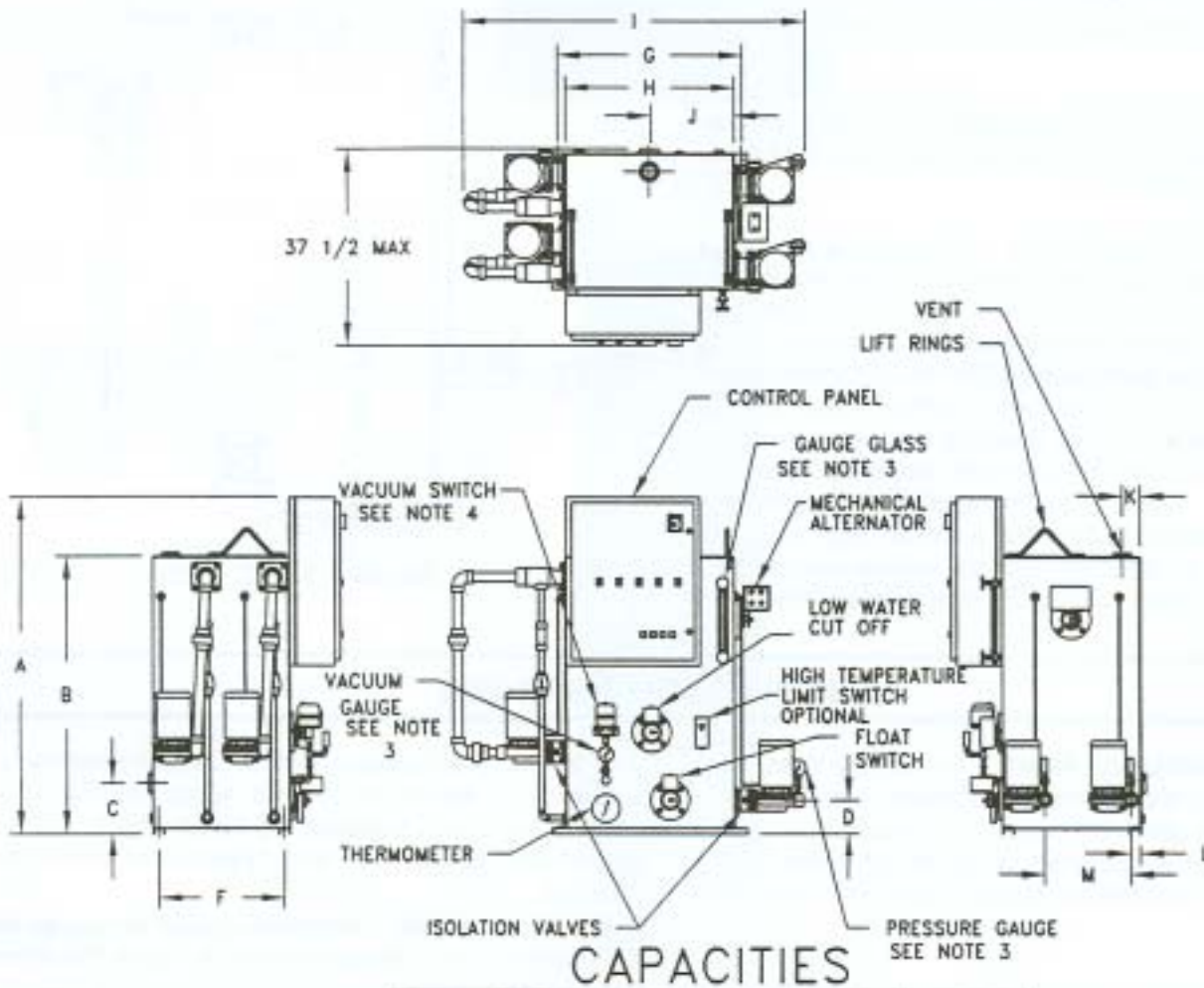
**THE ALTERNATOR** - This device causes the pumps to alternate in service yet permits one to follow the other into service if the first pump should fail to start. Also, if one pump cannot handle the condensate load, both pumps automatically operate simultaneously.

**NOTES** - 1) Motor speeds for 60 cycle AC are 3450 RPM. 2) All necessary accessories such as pressure and vacuum gauges.

*MEPCO 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	
20		2 1/2	2	1 1/4	61	49	9	6	26	22 1/4	33	30 1/4	61	15 1/4	3 1/4	1 3/4	15
40		4	2 1/2	1 1/2	63	58	8 1/2	7	27	22 3/8	49 3/8	47 3/8	87	23 3/4	2 3/4	3/8	15



## CAPACITIES

PUMP SIZE		20	40
PART NUMBER		31524	31533
SQ.FT. RADIATION (EDR)		20,000	40,000
BOILER HORSE POWER		143	286
BTU (MILLION)		4.80	9.60
SIMULTANEOUS CAPACITY	WATER GPM	30	60
	AIR CFM	8.2	22
MOTOR HP AIR		1 1/2	3
MOTOR HP WATER 20# DISCH		3/4	1 1/2
ACCUMULATOR TANK GALLONS		22.5	41
HURLING TANK GALLONS		121.5	235

- NOTES: 1) AIR AND WATER CAPACITIES ARE BASED ON 5 1/2 HG VAC @ 160 DEGREES F.  
 2) RATINGS IN ACCORDANCE WITH VACUUM HEATING PUMP CODE OF THE ASHRAE.  
 3) INDICATOR OPTIONS KIT SHIPPED LOOSE.  
 4) LEAD PUMP LEFT-RIGHT OPTION AVAILABLE. INCLUDES SECOND VACUUM SWITCH.

## Typical Specifications

**VRD-C5** = duplex vacuum pump

1. Provide duplex vacuum pump for operation with variable vacuum control system as herein specified.

2. Each vacuum pump shall be a packaged type, 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 & gases shall be removed by a vacuum pump. The units shall include two condensate pumps and 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 & 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. A low water condensate *cut-off 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 gasketed 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 metal control cabinet shall be NEMA 2. Fiberglass or other nonmetallic cabinets will not be acceptable. The panel shall incorporate the following: industrial grade motor protective *circuit breakers* (one for each motor), *magnetic starters* with overload protection, numbered terminal strip, 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. The cabinet shall provide quarter turn latches for easy entry.

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 5-1/2" 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.

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. All vacuum pump receivers shall have a guarantee for a period of 10 years. All other components of the vacuum pumps shall have a guarantee for a period of one year.

12. STANDARD DUPLEX UNIT INCLUDES -

- Positive seating suction isolation valves on both the condensate pumps and vacuum pumps.
- NEMA 2 quadraplex control panel includes; a master disconnect switch, two magnetic starters, four circuit breakers, two T-O-A lighted selector switches, two H-F-A lighted selector switches, one multi-tap transformer 115 volt, and terminal strip mounted and wired.

- Mechanical alternator, Low water Cut-off, and Float switch.
- High Temperature Limit Switch to disengage the vacuum switch if condensate reaches 160 degrees fahrenheit .

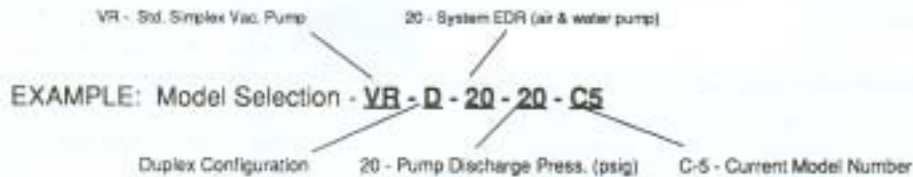
13. INDICATOR OPTIONS INCLUDE -

- Upper and lower gauge glass and cocks (shipped loose).
- Dial thermometer, Pressure gauges, and Vacuum gauge (shipped loose).
- Lead lag package optional for the air pumps.

### Model VRD/C-5 Standard Vacuum Pump

The contractor shall furnish and install as specified in the plans and in accordance with the manufacturer's instructions, duplex MEPCO type VRD/C-5 Vacuum Pump, which has a rating of \_\_\_\_\_ (20,000 or 40,000) square foot of Equivalent Direct Radiation and capable of discharging against \_\_\_\_\_ (20, 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 degrees Fahrenheit.

The pump shall be powered by \_\_\_\_\_ volts, three phase (208-230-460), \_\_\_\_\_ hertz. The unit shall be factory wired and tested.



Job Name \_\_\_\_\_ Location \_\_\_\_\_

Door Size \_\_\_\_\_ x \_\_\_\_\_



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