

outside air to the system and dampers are included to adjust the desired air quantities.

The heating coil of the unit may be connected to a steam or hot water boiler system and is adaptable for operation with a one-pipe, two-pipe or vacuum system. The cooling coil may be connected to a source of refrigeration, or in some cases city water is circulated through the coil when 58 F or lower temperature water is available. The amount of moisture released is adjustable depending upon the degree of humidification desired. The complete unit may be adapted to various automatic control arrangements to satisfy the comfort demands of the occupants.

CONDENSATION RETURN PUMPS

Condensation return pumps are generally required when the elevation of the boiler with respect to the heating units is such that the condensate will not return by gravity, or when the boiler pressure is greater than that supplied the heating units, as in a high-pressure boiler installation supplying steam through a reducing valve to the heating units. The condensate is commonly returned by gravity to a receiver, vented to the atmosphere, from which it flows to the pump.

Condensation return pumps are assembled with tank or receiver and arranged for either continuous operation or for automatic starting and stopping by float control. Any style of water pump may be employed for this service, the power available determining whether the mode of drive shall be steam or electric. The motor-driven, automatic, centrifugal pump and receiver has found wide acceptance for low pressure heating systems.

Fig. 20 shows a typical installation using an automatic condensation return pump and vented receiver. A float control operates the pump whenever sufficient water accumulates in the receiver. Condensation return pumps are suitable for use on systems in which the returns are under atmospheric pressure. These include atmospheric systems, orifice systems with open returns, and certain types of vapor systems which operate within a few ounces of atmospheric pressure, but ordinarily do not carry any sub-atmospheric pressure. They may also be used on one-pipe and two-pipe gravity steam systems with a proper arrangement for venting the receiver. In discharging to waste, there is no object in using a condensation pump unless the discharge must be elevated.

VACUUM PUMPS

A vacuum heating pump is employed to create a vacuum on the return side of a system to remove air and water from the return piping and to pump the condensate to the boiler or to a receiving tank. Pumps of this classification may be driven by steam or electricity; they may be continuous in operation, or automatic with float or vacuum control in one or more combinations.

For rating purposes³, vacuum pumps are classified as *low vacuum* and *high vacuum*. Low vacuum pumps are those rated under operation at $5\frac{1}{2}$ -in. mercury vacuum, and high vacuum pumps are those rated at vacuums above $5\frac{1}{2}$ in.

³See A.S.H.V.E. Standard Code for Testing and Rating Return Line Low Vacuum Heating Pumps.

Return line vacuum pumps are classified in the method of their performance as follows:

- Those which perform the function of air separation under atmospheric pressure.
- Those which perform the function of air separation under a partial vacuum.

Pumps coming under the first classification will handle vacuum steam system condensation coming back by gravity at any temperature up to 205 F without either the sealing or the hurling water flashing into steam. These pumps, to operate under a combined water level and vacuum control, must be equipped with a float-control receiver between the vacuum pump and the system, but where they are intended for continuous operation, they do not require a receiver. Such pumps employ a single vacuum

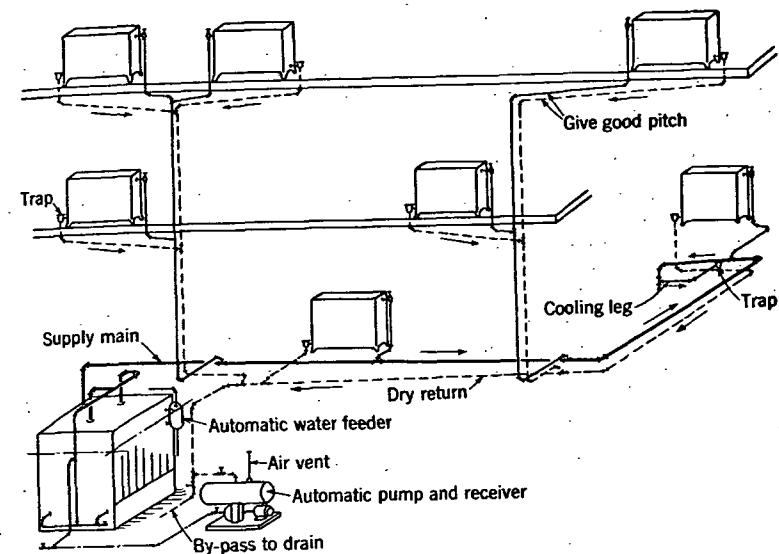


FIG. 20. TYPICAL INSTALLATION USING CONDENSATION PUMP

producer which removes the condensate and air from the system and delivers it into a separating chamber under atmospheric pressure from which the condensate is delivered to the boiler or feed water heater. They are constructed on one of the following evacuating and discharge principles:

- Hydraulic vacuum producer with one pump impeller.
- Hydraulic vacuum producer with two pump impellers.
- Water displacement vacuum producer with two pump impellers.
- Piston displacement vacuum producer with one pump piston.

The second classification of pumps will handle vacuum steam system condensation coming back by gravity at any temperature not exceeding 190 F without the flashing into steam of either the sealing or the hurling water. In order to operate under a combined water-level and vacuum control, these pumps must be equipped with a float-control receiver