

A thermostat sensing outdoor conditions is used to reset inside temperatures, raising them gradually to a point from 5 to 15 F below the highest outside temperature. This differential depends on the type of occupancy. Temperatures should be maintained so as to avoid too great a change for anyone entering or leaving. In large buildings, gradually lower temperatures at increasing distances from entrances and exits can be arranged. See Chapter 2 for general remarks about proper temperatures.

Except in the case of dehydrating systems, independent humidistatic control of dehumidification is seldom provided. Air washer systems as already described, are provided with dew-point thermostats. Cooling coils may be designed for proper proportion of sensible and latent heat removal so as to give satisfactory relative humidity when only the temperature is controlled. For a small installation, without by-pass or other reheat, a room thermostat and humidistat are sometimes arranged to provide cooling until both the temperature and humidity requirements

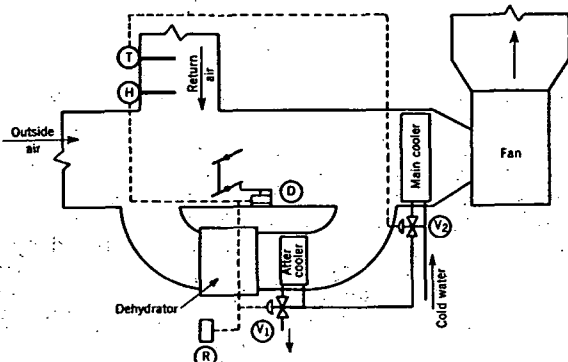


FIG. 4. CONTROL FOR A DEHYDRATING AND COOLING SYSTEM

have been satisfied, and a second thermostat is used to prevent excessive cooling by the humidistat. The cooling may be regulated by a combination of temperature and humidity that approaches *effective* temperature, by causing the relative humidity to gradually readjust the temperature control point, higher for dry air.

Control of Refrigeration. Room or duct conditions may start, stop and unload the refrigerant compressors directly, or may operate only at the evaporators. In either case other controlling instruments are used for the refrigeration, as described under the general heading, Control of Refrigeration Equipment.

Control of Direct Dehumidifiers—Dehydrators. Absorbent and adsorbent types of conditioning systems have the dehumidification controlled by room or return air humidistats. Since these processes are capable of producing relative humidities much below the desired point, only a portion of the air may be treated and a by-pass damper, controlled by the humidistat, used to vary this portion. The control of water cooling coils is similar to that previously described, except that the additional coil, used to extract

the sensible heat transformed from latent by the process, can use cooling water leaving another coil. That is, water leaves the main cooling coils at a low enough temperature to do the requisite cooling for the high temperature air. In order to have water available at both coils, the control valves at each are of the three-way type. As this allows free flow of water at all times, a normally closed valve can be installed in the water line and controlled by a thermostat varying the flow to maintain a suitable temperature. By connection to the fan motor circuit the valve can be kept closed while the system is not in use.

Some of these features are shown in Fig. 4. Humidistat *H*, on rising humidity, simultaneously starts the dehydrator and its fan through relay *R*, positions three-way valve *V*₁ to permit water to flow through the *after cooler*, and closes damper *D* to increase the resistance in the main duct so as to reduce any tendency of the dehydrated air to short-circuit. Outside air and return air dampers, commonly used, are not shown. Their operation is as described for Fig. 3, except that for the summer cycle, the outside air is fully opened before *V*₂ turns on the main cooling

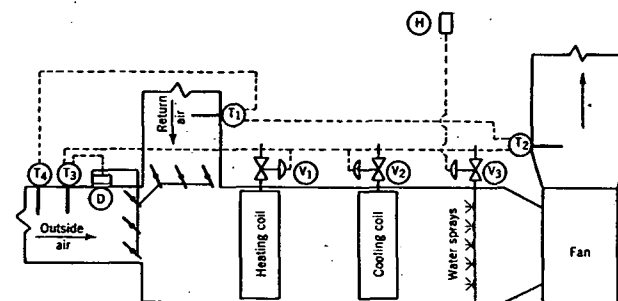


FIG. 5. CONTROL FOR AN ALL YEAR CENTRAL SYSTEM

coil, and a wet-bulb or similar thermostat in the intake cuts the outdoor air to a minimum when its wet-bulb temperature is greater than that of the return air.

All Year Systems

All year systems combine the features described for heating and cooling cycles, and have provisions for spring and fall conditions. Complete automatic control of all year systems incorporates an automatic change-over between the cooling and heating cycles. If the installation necessitates operation of a manual switch or other change-over device between the heating and cooling cycles, then the control system is semi-automatic. The full automatic change-over between cycles becomes particularly desirable in the early and late portions of the cooling and heating seasons, when heating and cooling may be required alternately.

For all year systems, a single thermostat may be used for both heating and cooling cycles, as shown in Fig. 5. In this diagram, *T*₂ regulates the amount of recirculation through damper motor *D*, the amount of steam by valve *V*₁ and the amount of chilled water by *V*₂. As the temperature rises, *V*₁ first operates completely to close off the steam; next, outdoor air