

DEFINITIONS OF CONTROL UNITS AND TERMS

Controlling devices and terms commonly used in the automatic control of heating, ventilating and air conditioning systems are:

Thermostats: Thermostats are defined as temperature sensitive devices reacting to temperature changes. There are four major types of thermostats.

A *Room Thermostat* is normally installed on the wall of the room whose temperature it is to control, and in reacting to rising or falling temperatures, the thermostat causes the operation of heating or cooling equipment so that desired temperatures will be maintained.

The temperature sensitive element will usually consist of a bi-metal strip or coil, or a vapor-filled bellows as illustrated in Fig. 1.

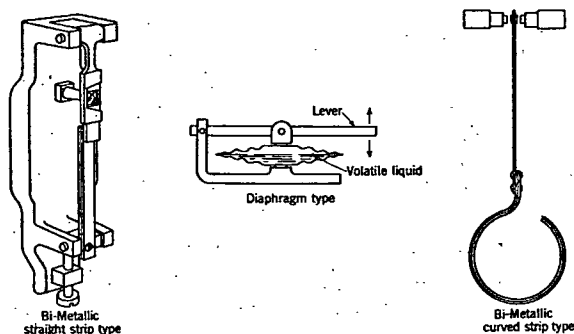


FIG. 1. TYPICAL THERMOSTATIC ELEMENTS

Immersion Thermostats are used for controlling liquid temperatures. The sensitive element will normally be encased in a protective well which is inserted in the liquid, the temperature of which is being controlled.

The temperature sensitive element will usually consist of a bi-metal coil, thermal expansion rod, or a vapor-filled system. If the latter is used the temperature sensitive bulb may be connected to the case of the instrument by either a flexible or rigid tube.

Insertion Thermostats are similar to immersion thermostats except that they are for use in controlling the temperature of a gas such as air. The sensitive element will often be encased in a protective well which prevents mechanical damage but which permits the gas to come in direct contact with the element.

Surface Thermostats include those devices which measure surface temperatures. These surface temperatures will often be an indirect measure of the temperature of a gas or fluid as in the case of a pipe within which water is flowing. The sensitive element will usually be placed in direct contact with the surface of the object whose temperature it is to measure and may consist of a bi-metal spiral or vapor-filled bellows.

Humidity Controls: Humidity controls are defined as automatic devices reacting to changes in relative humidity. Within this group, the devices which operate in controlling humidity supplying equipment are regulating devices and when operating only to prevent relative humidity from exceeding a predetermined maximum are a form of limit control.

The humidity sensitive element may consist of hair, paper, wood, skin or any other material which changes its dimensions with changes in humidity.

Controls are available provided with both temperature and humidity sensitive elements, which operate to maintain definite relations between dry-bulb temperature and relative humidity.

Pressure Controllers: Pressure controllers are defined as devices reacting to pressure and pressure changes. Examples of such devices are the pressure controls governing the operation of refrigeration equipment from either head or suction pressure, devices reacting to steam or water pressure or the pressure of air in the distribution systems.

Damper Motors: Damper motors are defined as specialized power units, the purpose of which is to position outdoor air, face, by-pass or distribution dampers, regulating the flow of air through the system. Connected by suitable linkages, these damper motors react at the command of thermostats, humidity controllers and pressure controllers to adjust the air flow to the needs of the system.

Control Valves: Control valves are defined as steam valves, water valves or air valves which may be adjusted at the command of controllers to regulate the flow of the medium passing through them to the needs of the system. Such control valves are usually constructed with an electric or pneumatic power unit connected to the valve stem so that the movement of the power unit will react to position the valve as conditions demand.

Self-contained valves are also included under this classification. Their application is principally limited to the regulation of the steam supply to individual radiators in two-pipe low pressure steam heating systems, and the temperature of hot water supply tanks.

Solenoid Valves: Solenoid valves are, as their name implies, valves actuated by the magnetic effect of an electric solenoid built within them. While normally these valves are opened when the solenoid is energized, they are sometimes built in a reverse acting manner and closed when energized. In heating, ventilating and air conditioning systems, they are normally adapted to the control of oil or gas burners as fuel valves, as water valves on humidifiers, or as refrigerant valves in refrigeration systems.

Relays: A relay is defined as a unit installed between a controller and the device under control, for purposes of amplifying the capacity of the controller or performing an auxiliary control function. For example, a thermostat, in order to preserve its sensitivity may be constructed so that it is not capable of handling the power required of a motor. A relay is, therefore, installed between the two. The thermostat actuates the relay and the relay, in turn, actuates the motor. Motor driven switching devices are also often used as relays.