HONEYWELL PLANNING GUIDE

TEMPERATURE CONTROL

to position the dampers, valves and switches that regulate temperature balance in a temperature control system.

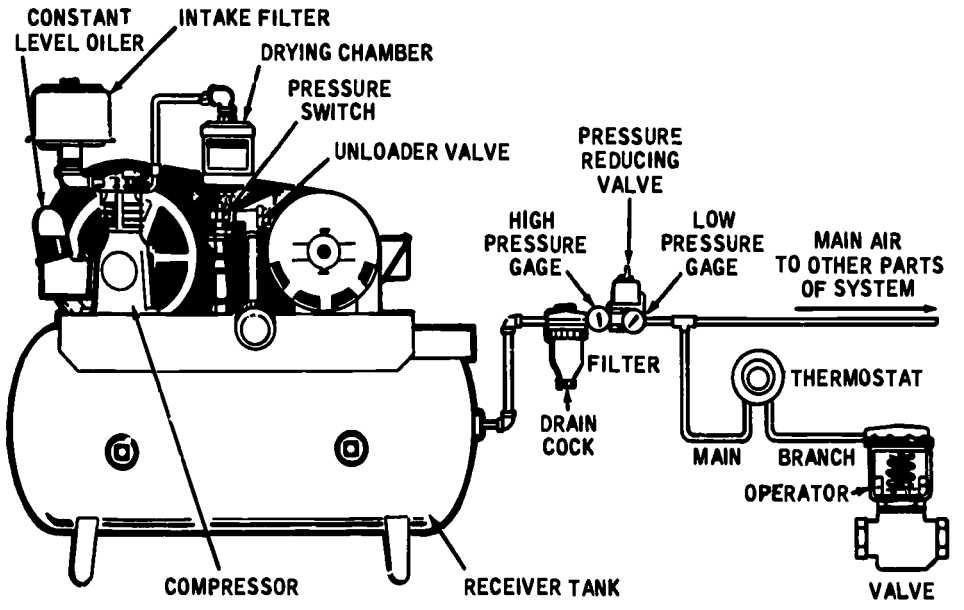
Pneumatic Control

Pneumatic control uses compressed air to supply the power for operation of the valves, dampers, relays and other devices in the system. Circuits consist of air passages, valves, orifices, and similar mechanical devices. Pneumatic control systems are presently used in most large commercial buildings.

Features of pneumatic control are:

1. A variety of control sequences and combinations can be had by using relatively simple equipment.
2. Pneumatic equipment requires little maintenance and is highly reliable.
3. Pneumatic equipment is suitable where explosion hazards exist.
4. In large installations, pneumatic equipment is usually the lowest-cost system.
5. Adjustment and indication are possible at a central location and controllers may be mounted where accessible.
6. Pneumatic equipment matches heating and cooling output to needs by true modulation of valves and motors.

Pneumatic Control System



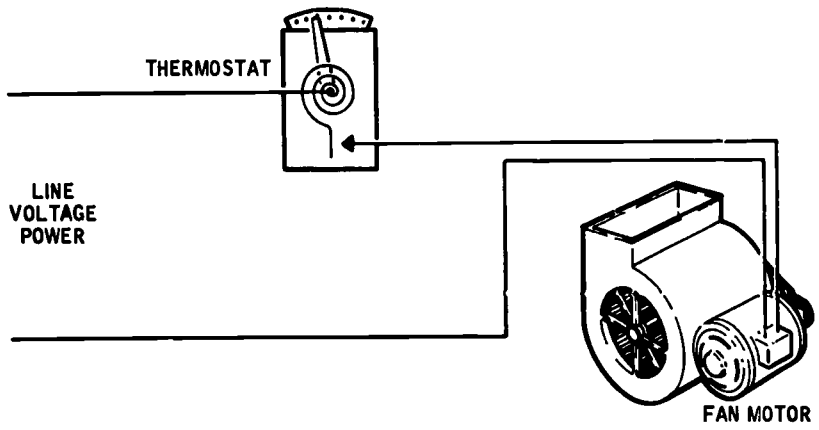
Pneumatic Control System Components

The components of a typical pneumatic control system are shown on the left below. The source of air is an electrically driven compressor. Air is supplied to a storage tank which stores air until it is needed by the control equipment. Before passing into the air main, the air is filtered and dried and the pressure is reduced to a proper value by the pressure reducing valve. Next, it flows through the air main to the controller (thermostat) and to other controllers, relays and operators of the system.

Electric Control

Since all buildings have electricity, it is natural that electric power should be used for many automatic control functions. In electric control systems, the thermostats and electric limit controls sense changing temperature and then operate electric motors controlling dampers and valves and other operations in the system.

Electric Control System



Electric Control System Components

One of several basic electric control circuits, the components of a Honeywell 40 circuit are shown above. When the controller switch is open, current is cut off from the valve, motor relay or other controlled device. When the controller switch is closed, the control device is energized.

Features of electric control are:

1. Electric wiring is usually simple and installation is well understood by virtually all electricians.
2. The impulse received from the thermostat can be applied directly to produce one or several combinations or sequences in electric output. For this reason, one actuator can be made to perform several desired functions.

3. Operations and maintenance of electric systems is simple and easily mastered by building operating personnel who have electrical backgrounds.
4. It is the most simple and direct system for controlling electric devices such as pump motors and compressor motors.

Electronic Control

The basic difference between electric and electronic control is in the sensing devices. Electric thermostats employ switches, but electronic thermostats have *no* moving parts. They sense temperature changes electronically with great accuracy and speed of response. Electronic signals operate relays which operate electric valves, damper motors or other units in the system.

Electronic control systems may be used in the control of all types of heating and air conditioning equipment in commercial buildings.

This type of system features:

1. Reliability and long life. The thermostats or sensing elements have no moving parts, nothing to wear out or maintain. They provide dependable operation. Their low mass provides speedy response to local changes. Modern electronic controllers use solid state components—the ultimate in reliability.
2. Central control. The regulator element of the controller or controlling mechanism is usually located remote from the thermostat. This means all adjustments may be made at a central location.
3. Simple, low-voltage connections between the sensing element and the electric circuitry. In many applications this means that wiring may be accomplished without using expensive conduit.
4. Flexibility. Depending on the job requirements, electronic circuits can be combined with either electric or pneumatic circuits to give efficient results, results which ordinarily cannot be achieved using only one type of control.

In addition, electronic circuitry can coordinate temperature changes from space thermostats, and/or remote temperature selectors such as the discharge-air thermostat or the outdoor-air thermostat to provide a degree of stability and convenience of adjustment otherwise unattainable.

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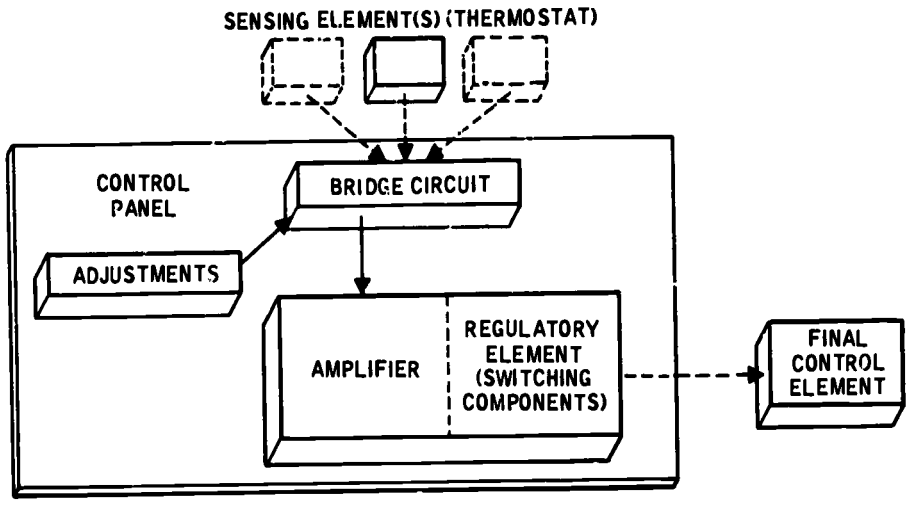
Automatic changeover from heating to cooling or automatic use of ventilation will carry out part of the cooling load. Other types of sequencing can be provided from one thermostat.

Electronic Control System



Electronic Control System Components

The components of an electronic control system are shown above. Temperature changes at the thermostat unbalances the bridge circuit. This results in a voltage increase by the amplifier to activate the controller. The activated relays will mobilize one or more final control elements to bring the temperature back to the thermostat setting.

Combination Control

Pneumatic, electric and electronic systems are often combined for certain commercial applications.

Pneumatic-electronic transducers (which translate electronic signals to pneumatic signals) make it easy to coordinate operations and take advantage of the best features of each type of control. For example, you may use the speed and sensitivity of electronics in critical areas and for remote indication.

You may use electric controls to tie in with operation and switching of electrical systems. And, you may use the smooth operation and power of pneumatic controls for positioning large dampers and valves. Any or all of these three types may be used in combination in any proportion to give your building the features you want with maximum economy.