

# PNEUMATIC CONTROL SYSTEM

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Pneumatic control systems can be an effective, economical choice for commercial buildings.

They have two main advantages:

- *Reliable, economical actuators.* Pneumatic actuators, the air-powered "motors" which control valves and dampers, remain the most reliable, durable, and economical actuators available. They require essentially no maintenance except for inspection and adjustment of the mechanical linkages. It is easy to select actuators which fail in the desired position upon loss of electric power (and thus pneumatic air pressure). Pneumatic actuators, of all sizes, cost much less than corresponding electric/electronic actuators.
- *Flexible, modular control components.* The complete pneumatic control system "brains" are distributed throughout the building using numerous pneumatic building blocks such as thermostats, receiver controllers, and pneumatic relays. Virtually any control strategy can be implemented by a custom-designed pneumatic control system. Pneumatics can provide excellent control performance and can maintain setpoints accurately.

Pneumatic control systems also have two main limitations:

- *Good maintenance is required.* There is sometimes a tendency of modern building managers to overlook the need for pneumatic maintenance, or to mistakenly believe that the same person who sweeps the floors can maintain the controls. Pneumatics require two important types of maintenance. The first is to ensure that the pneumatic air supply is clean, reliable, and dry at all times. The second is to carry out a program of routine and preventative maintenance under which all control components are inspected and, if necessary, adjusted every couple of years or so. (Left unattended, pneumatic controllers and thermostats may eventually drift away from setpoint). For many commercial buildings, the best way to maintain pneumatic controls systems is to have a service contract with an outside company.
- *Building monitoring is limited.* Pneumatic controls are not well-suited for remote monitoring of space conditions and mechanical equipment status. However, at a given piece of equipment or mechanical room, pneumatic controls can provide complete and accurate information on control and equipment parameters such as temperatures and actuator positions. In most cases, this information is already available, and it requires only the addition of appropriate pneumatic indicators to display the data for the operator. The main substitute for automated remote monitoring is human monitoring. During times when the building spaces are occupied, people can report on mechanical system malfunctions or desired adjustments. For unoccupied times, basic mechanical pneumatics such as electrical service, pneumatic air pressure, critical temperatures, etc. could be monitored by a simple, low-cost, stand alone electronic system.

*Conclusion.* Pneumatic controls have been used successfully in commercial buildings for decades. Systems today are operating with control components that are 40 to 50 years old. On the other hand, there have also been cases where pneumatic systems have been pulled out and replaced because of perceived poor performance. These "failures" can usually be attributed to a lack of proper maintenance or a redefined need for improved remote monitoring.

Today, pneumatic controls are most often selected for buildings with significant existing pneumatic controls, and or equipment requiring large actuators. As long as the remote monitoring limitations are

recognized (or augmented with a separate electronic system) and a good maintenance program is carried out, pneumatic control systems can provide effective service for many years.