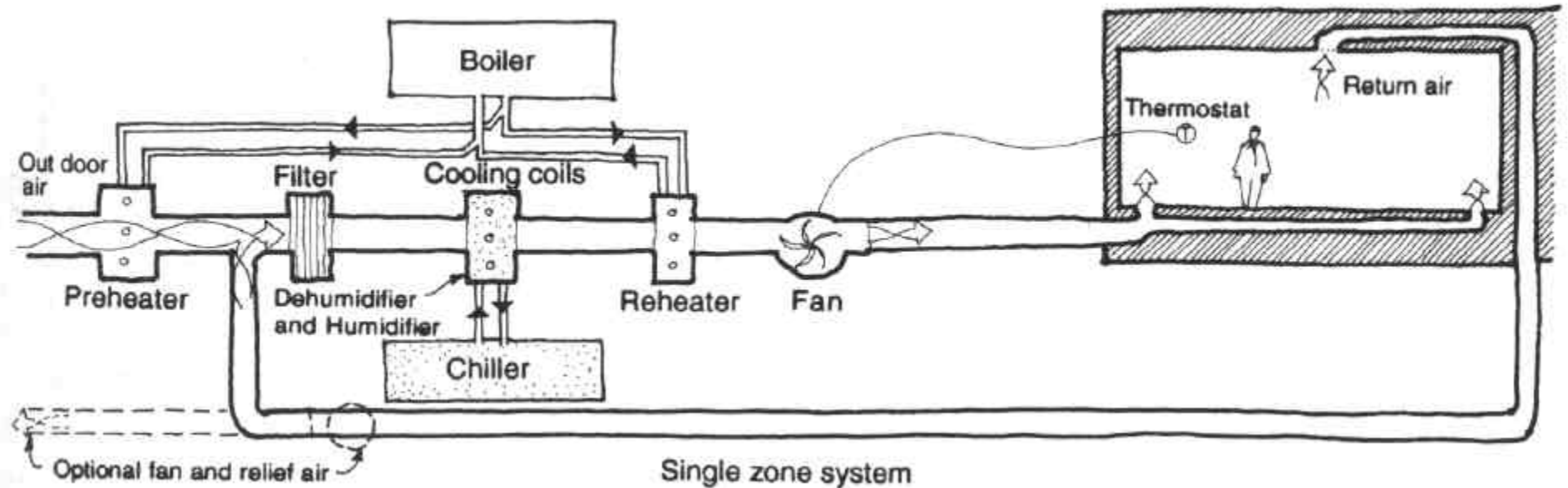
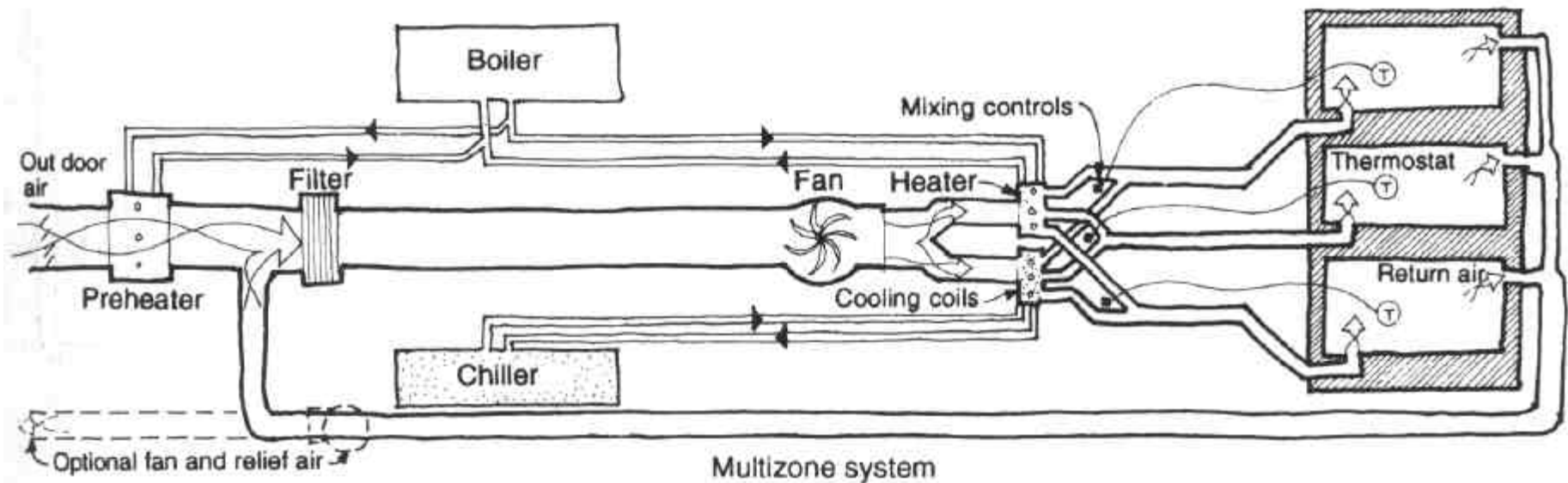


Single Zone System



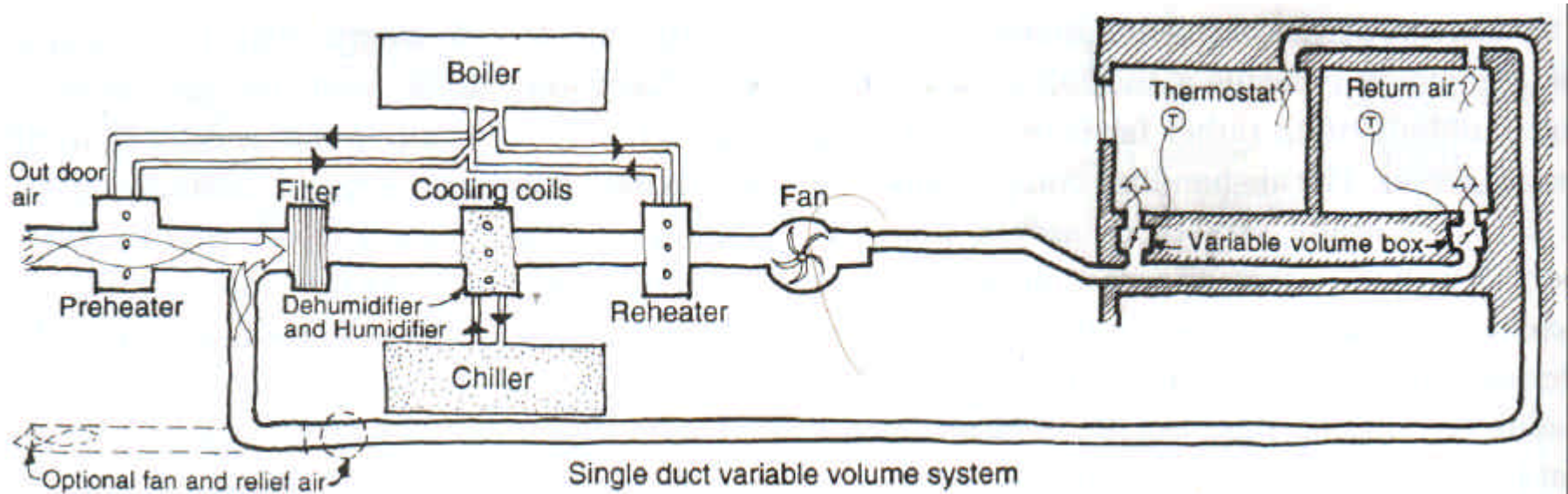
- One duct system
- Used mostly in small buildings
- Forced air system
- All spaces controlled by a single thermostat
- Single air return

Multi Zone System



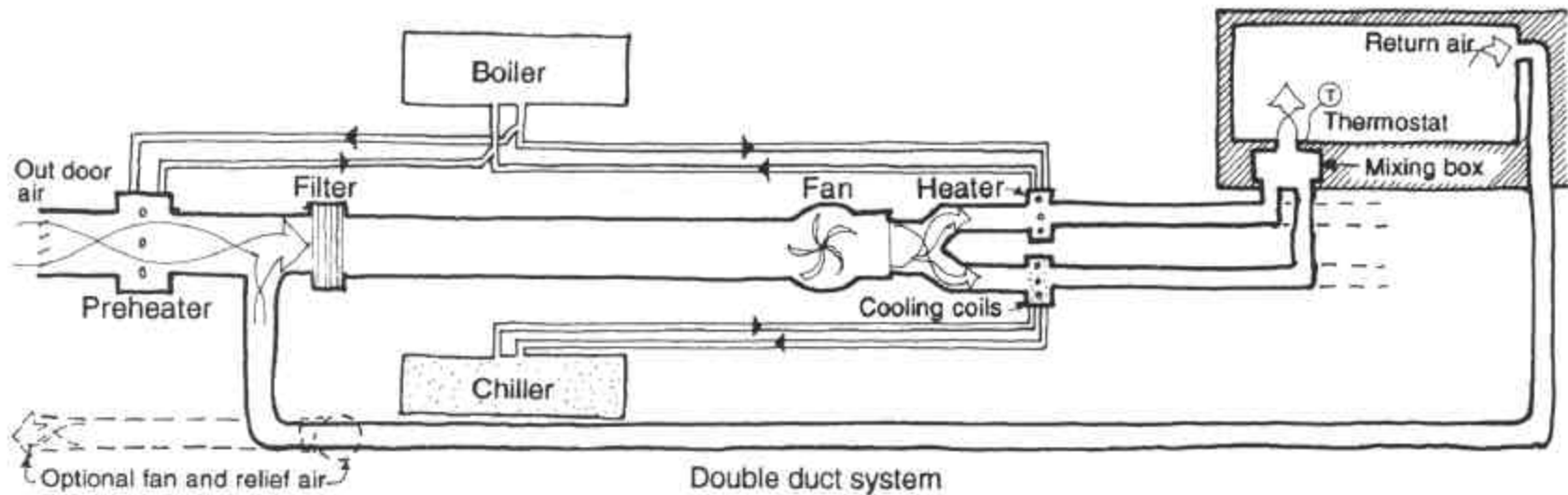
- Used in small to medium sized buildings
- Air distribution tree can grow extremely large
- Mixes warm and cold air at the central station to achieve the zone's desired air temperature and humidity
- Single return air stream
- A "bypass" system leaves the option for some of the air to be recycled saving on energy costs

Single Duct Variable Volume System



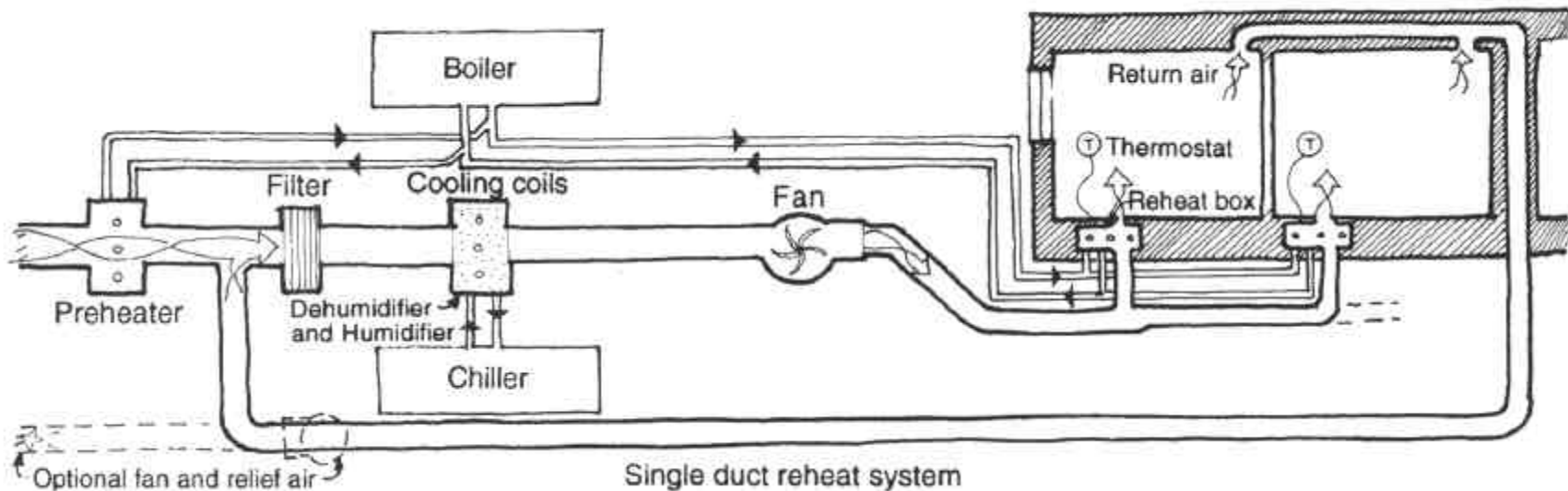
- Used mostly in large buildings
- Consumes less building volume than many other comparable systems
- Allows for variation in air volume rather than in air temperature, saving on energy costs compared to the single duct reheat system
- The system delivers just warm air or cool air. The thermostat in each zone controls how much treated air enters the space.
- Good for centrally located, hot zones, requiring cooling
- Bad for perimeter located cooler zones requiring warming

Double Duct Constant Volume System



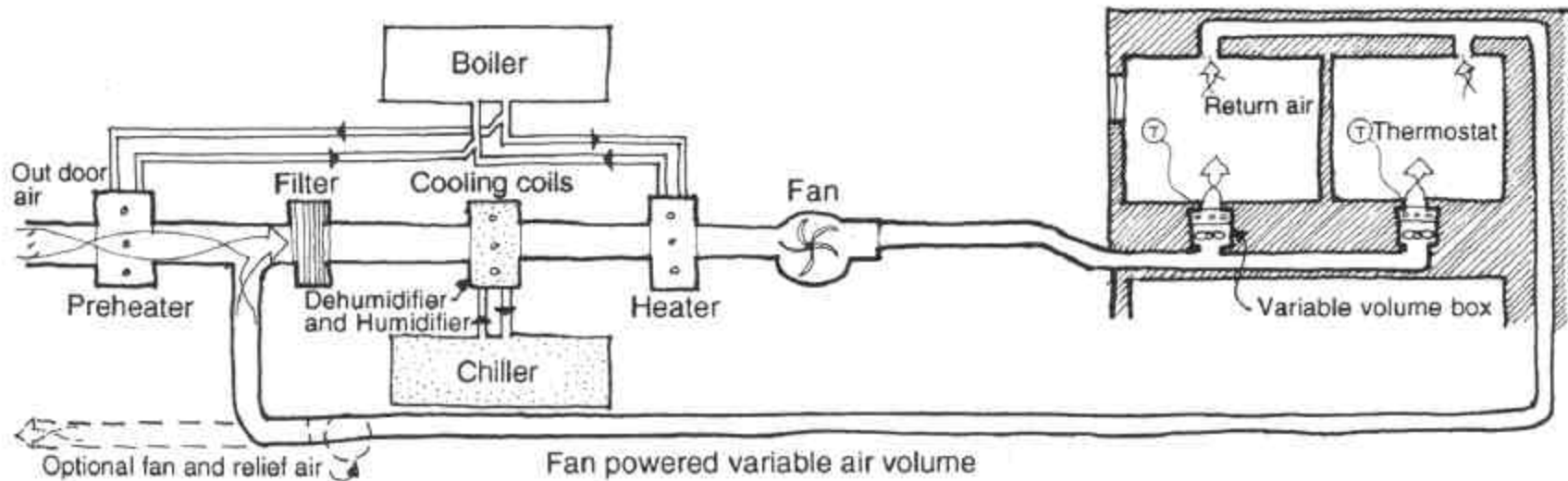
- Used mostly in larger buildings
- Requires two distribution trees
- Requires much more volume than the single duct variable air volume system
- Costs more to install than the single duct variable air volume system
- Better comfort when space is only partially filled
- Provides more fresh air
- Temperature of circulating air can be controlled
- Consumes more energy than the single duct variable air volume system
- This system has largely been replaced by the single duct variable air volume system

Single Duct Reheat System



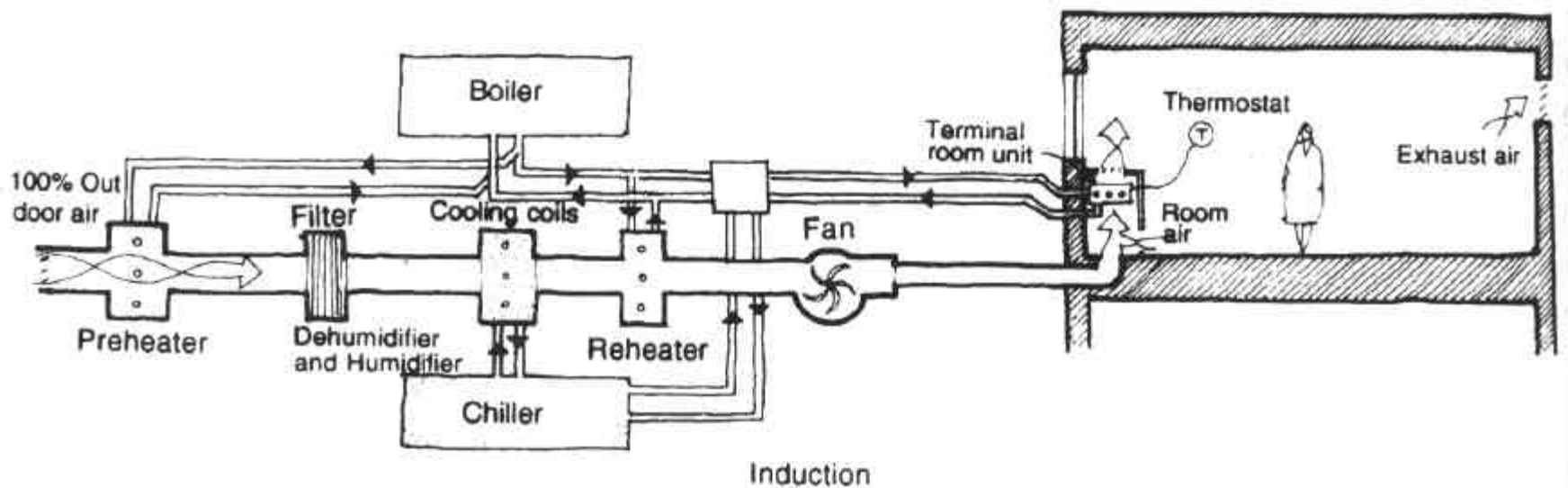
- Single duct system
- Requires less volume than most other systems
- Air is cooled to the lowest temperature required in a zone
- Small ducts split off main duct to a reheat box, which reheats the air to the temperature required by the zone.
- Reheat heat is provided by steam, hot water through tubing, or electric resistance
- This system works well in climates or building types or spaces where cooling is not required
- In most of the US, the air must be cooled and then reheated for specific spaces
- This system is known for being wasteful of energy

Fan Powered Variable Air Volume System



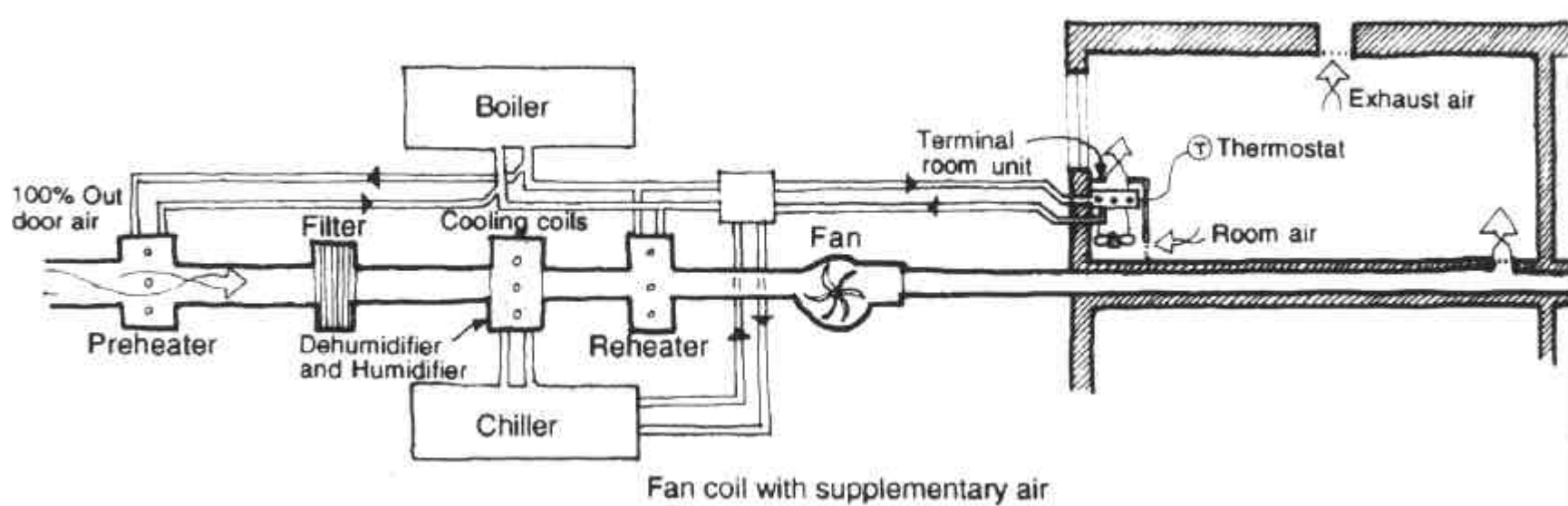
- Single duct system
- Similar to the single duct reheat system except each space has variable air volume abilities
- Variable air volume (VAV) means that each zone has its own fan to change the volume of the air entering the space
- Good for perimeter spaces requiring heating
- In heating situations, the incoming cold air is reduced to just meet the interior air quality (IAQ) requirements so less energy is being wasted on heating air that will just be exhausted.

Induction System



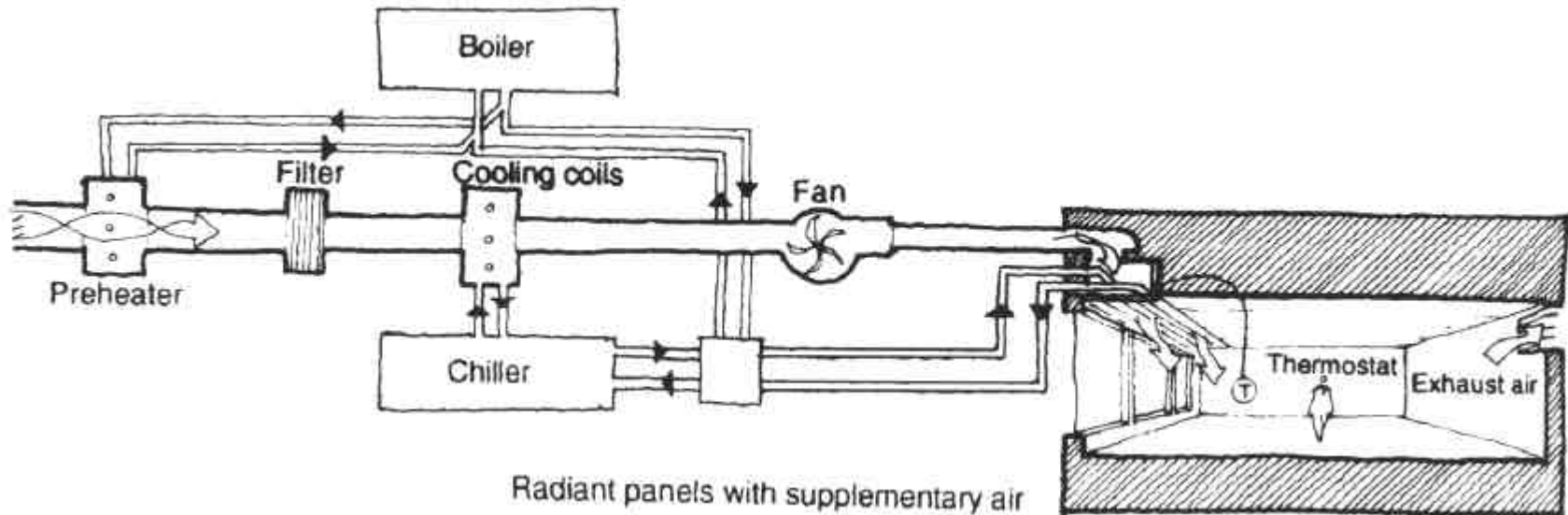
- Single duct system
- Commonly found below windows
- A constant volume of fresh air is supplied
- High speed and high pressure fresh air is delivered to the induction point
- The fresh air is mixed, or inducted, with the “bypass” or secondary air within the room
- Good air circulation throughout the room
- Limited amount of centrally treated air required for the amount of air circulation gained
- Thermostats control temperature through either changing the amount of water flowing through the finned tubes or the amount of secondary airflow.

Fan Coil With Supplementary Air System



- Single duct system
- Found commonly below windows
- Fresh air is introduced to the space at a constant volume
- The air is centrally conditioned to a moderate temperature
- The supply air is mixed with “bypass” or secondary air within the zone
- A fan moves the air mixture across the coils, which either heat or cool as required

Radiant Panels With Supplementary Air Sys.



- Single Duct System
- Uses a panel either on the ceiling or the wall
- The panel is heated or cooled by water tubes
- The large surface provides a radiant heat exchange
- The air is centrally conditioned to a moderate temperature
- Fresh air is brought at a constant rate
- The radiant heat exchange surface must be kept clear of obstructions

HVAC Systems Comparison Chart

	<i>Building Size</i>	<i>Building Type</i>	<i>Building Space</i>	<i>Adjustable Heat</i>	<i>Adjustable Air Flow</i>	<i>Number of Zones</i>	<i>Number of Ducts</i>	<i>Water or Air Sys.</i>	<i>Energy Efficient</i>
<i>Single Zone System</i>	Small	Small Gathering	Main Space	Yes	Yes	Single	Single	Air	Fair
<i>Multi Zone System</i>	Small to Medium	School or Office	Any Space	Yes	Yes	Multiple	Double	Air	Excellent
<i>Single Duct Variable Volume System</i>	Large	Large Loads	Central Hot Zones	No	Yes	Multiple	Single	Air	Good
<i>Double Duct Constant Volume System</i>	Large	Large Spaces	Partially Filled Rm.	Yes	Yes	Single	Double	Air	Poor
<i>Single Duct Reheat System</i>	Medium to Large	Non Cooling	Perimeter Spaces	Yes	No	Multiple	Single	Air (and Water)	Terrible
<i>Fan Powered Variable Air Volume System</i>	Medium To Large	Non Cooling	Perimeter Spaces	Yes	Yes	Multiple	Single	Air (and Water)	Good
<i>Induction System</i>	Any Size	Any	Below Windows	Yes	No	Multiple	Single	Water	Good*
<i>Fan Coil Supplementary Air System</i>	Any Size	Any	Below Windows	Yes	Yes	Multiple	Single	Water	Good*
<i>Radiant Panels With Supplementary Air Sys.</i>	Medium to Large	Large Surfaces	Walls or Ceiling	Yes	No	Multiple	Single	Water	Good*

** The energy efficiency of these systems depends greatly on the type of fuel used to power the boilers. For example, if electric power is used in the boiler, the energy efficiency will go down, but if natural gas is used in the boiler, the efficiency will go up.*