

# How Does Air Conditioning Work?

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When an air conditioner gives out, usually in the middle of a sweltering summer, we are quickly reminded how much we depend on air conditioning systems to keep us comfortable. Those of us who are not heating or cooling professionals do not always understand how air conditioning works, so let's delve into that process in this guide.

## Air conditioning explained

In short, air conditioners (<https://www.hvac.com/air-conditioners/>) make your home cooler. Using three key parts — a compressor, condenser, and evaporator — air conditioners draw heat energy from the house and move it outdoors. Then, they replace the air inside your home with cooler air. More specifically, here's how an air conditioner's cooling process works:

- Warm air from inside the home is circulated across an evaporator, where the refrigerant absorbs heat from the air. At this point, the refrigerant transforms from cold liquid to hot vapor, allowing the warm air to become cooler.
- The refrigerant vapor moves to the compressor, within the home's outdoor unit. The compressor compresses the refrigerant vapor, increasing pressure and temperature.
- The refrigerant then moves to the condenser, where it is condensed back to a liquid, allowing the heat to release, exiting the unit through the fins.
- Cooled, liquid refrigerant then cycles back into the home, where the expansion device regulates its flow back into the evaporator to repeat the cooling process.



## Air conditioners remove heat

Air conditioners do not cool hot air. Rather, they remove heat to create cooler air temperatures. Although it may feel as though the air blowing out your floor, ceiling, or wall vents has been through a freezer, in fact, the heat has simply been removed. Here's how an air conditioner works to remove heat:

- Air conditioning removes heat from a location by drawing air with excess heat in through a vent. Here, an evaporator coil absorbs heat from the air. When it meets the air, the liquid refrigerant inside the heat-absorbing evaporator coil changes into a gas and continues to the compressor.
- The compressor then tightly squeezes this gas form between two solid objects, which raises the pressure and temperature of the refrigerant (now a superheated gas), and readies it for the condenser.
- The refrigerant next travels outside the home, where it is introduced to the outside air. The outside air absorbs the heat from the superheated gas, lowering the temperature and causing the refrigerant to shift from a vapor state to a liquid so it can return to the indoors and keep the home cool.

## Heat pumps

Heat pumps (<https://www.hvac.com/heat-pumps/>) function similarly to air conditioners, but they transfer air from outside to inside the home. They do not generate heat but transfer it. For this reason, heat pumps can also be used to cool a home. Similar to a traditional air conditioner or refrigerator, heat pumps use electricity to move heat from a cooler area to a warmer one.

## Air conditioning FAQs

### How does a central air conditioning system work?

Simply put, a central air conditioning system moves heat from one place to another. Cool air is created indoors through the absence of this heat. More technically, central air conditioning systems circulate refrigerant through ducts in the home that connect to the evaporator coils, condenser, and compressor. When moved outside, the heated outdoor air absorbs the heat from the heated refrigerant, and the refrigerant that returns to the inside of the home is cool.

### How does ductless air conditioning work?

Ductless air conditioning (<https://www.energy.gov/energysaver/ductless-mini-split-air-conditioners>) essentially works the same as central air conditioning, minus the ducts. In a central air conditioner, ducts carry air to a building's central location and then use additional ducts to distribute the air, which, in turn, cools the building. With ductless air conditioning, the indoor unit is in the room it needs to cool (<https://www.cooltoday.com/blog/how-do-ductless-mini-split-air-conditioners-work>). Each individual indoor unit within a ductless air conditioning system is responsible for doing the job an indoor central location does in a central air conditioning system. Additionally, the lack of ducts in a ductless system makes it so there are no air leaks or pressure imbalances for users to worry about.

**How does a humidistat work with air conditioning?**

Also called a humidistat control, a humidistat (<https://www.lennox.com/buyers-guide/guide-to-hvac/glossary/humidistat>) is a thermometer for humidity. It prevents the heating and cooling system from running if the temperature is high but the humidity is low, which can save money on utility bills. What's more, if, at some point, the humidity reaches a level where mold or other problems may be present, the humidistat will signal the air conditioning to run until the home is back to a preferred humidity level.

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