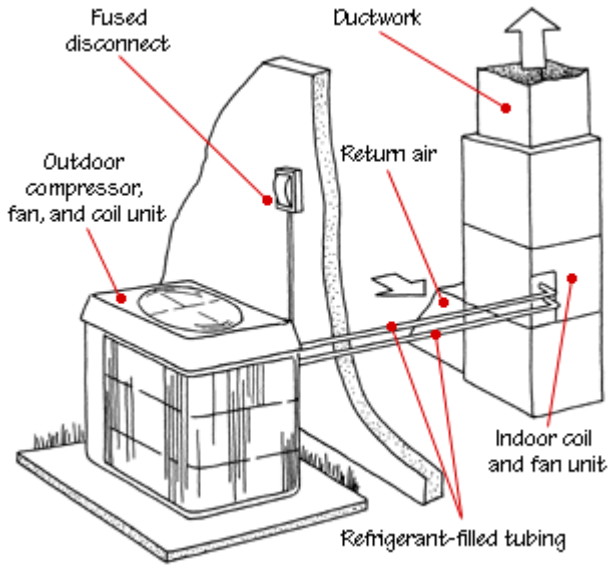
How a Heat Pump Works



Heat pumps transfer heat from one place to another--providing both heating and cooling. They work on the fundamental principle that heat exists in air even at extremely low temperatures--down to -460 degrees F. In the winter, a heat pump extracts heat from outside air and delivers it indoors. To cool a house on hot summer days, it works in reverse, extracting heat from room air and pumping it outdoors. The process is a bit technical, but here's a brief look at how they work:

Air-source heat pumps. The most common type of heat pump is an "air-source" system. "Split" air-source systems have an outdoor unit which includes a compressor, outdoor coil, fan and reversing valve. That unit is connected with refrigerant-filled tubing to an indoor component. The indoor unit contains a fan, indoor coil and a supplemental resistance heating element. "Package" systems combine both components in a single unit that's typically placed on the roof.

Depending on whether the heat pump is in a cooling or heating mode, the refrigerant moving through the system makes the indoor coils either hot or cold. A blower draws room air in through a filter and pulls it across the indoor coil. An optional electric-resistance heating element can kick on when needed to supplement heat. As the air passes by the coils, it either gathers or gives off heat-- depending on whether the coils are hot or cold. Warm or cool air travels through ductwork and registers into your rooms.

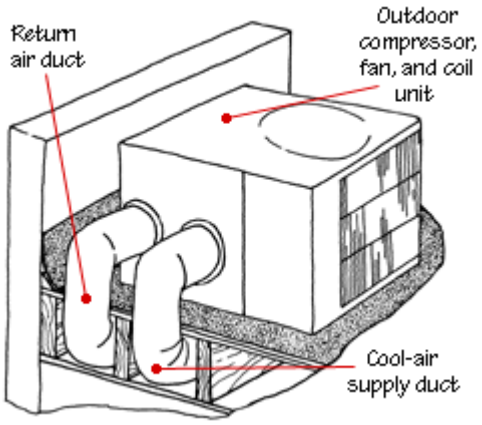
Heat pumps give off less heat at one time than a conventional gas furnace. This means they offer a mellower type of heat, stay on longer and circulate more air throughout the house. They're controlled by the same type of thermostat used for forced-air systems.

On really cold days a heat pump must work especially hard to collect heat-- that's when the supplemental heater switches on to boost warmth.

Some heat pumps can heat your water, too. The Hydrotech 2000 Heat Pump by Carrier is a system that utilizes the warm air that a heat pump gives off to help heat your water. Adding to its performance is a built-in microprocessor that varies fan speeds and output depending on need. This greatly improves a heat pump's efficiency.

New thermal storage units even store heat and cold, collecting it during non-peak hours for peak-hour use. The Phoenix THP/3 stores both heat and cool in a large insulated water tank. It also supplements hot-water heat.

Ground-source and water-source heat pumps. Not all heat pumps extract heat from the air. Ground-source and ground-water source heat pumps circulate water mixed with antifreeze through a system of buried tubing to gather heat from the earth or ground water, which is much more consistent in temperature than air. Below-ground temperatures are normally warmer than outside air in the winter and cooler than the air in summer.



The ground-source system employs a closed loop of tubing that is buried below the frost line; the water-antifreeze mixture circulates through the tubing, gathering heat from the earth. A ground-water system typically involves pumping water from one well, transferring its heat to your house, then returning the water to another well.

WaterFurnace, from WaterFurnace International can be set up either as a ground-source, closed system or an open-loop ground-water system. It uses half the electricity of ordinary heat pumps. Though the pump is about the same price as most heat pumps, the excavation and the ground loop of piping can be quite expensive-- $2000 or more