



Air Source Heat Pumps and how they work

RDI have been installing renewables including heat pumps for a considerable time and have many satisfied customers with demonstrable systems up here in the Highlands.

Heat pumps are a great way get your heating bills under control and can provide you with heating and hot water at an affordable cost. RDI Renewables work in partnership with Panasonic for heating & cooling systems.

Different types

There are several different types of heat pump on the market, air source, water source, and ground source (geothermal). RDI Specialises in air-to-air as it is more economical for the retro-fit market that we serve up here in the Highlands.

How they work

All heat pumps work on the basic principle of moving heat energy from a source of heat to what is called a heat sink (e.g. from outside the house to the inside to warm or cool the inside). Air source heat pumps use a refrigeration cycle (like your fridge or freezer using a compressor), even if it is -20c outside Panasonic say their heat pumps can still pull enough heat out of the air to heat a home. The benefit of this is that you only pay for the electricity to operate a compressor inside the heat pump to transfer the heat from outside but compared to a typical plug-in heater this only uses a very small amount of energy.

Panasonic
heating & cooling solutions

A typical example of a Panasonic heat pump would be the compressor using 1.85kw of electricity and delivering 8.6kw of heat to the home. In this scenario you would be getting 4.65 times more heat than you would pay for in pure electricity heating costs.



Need to know more?

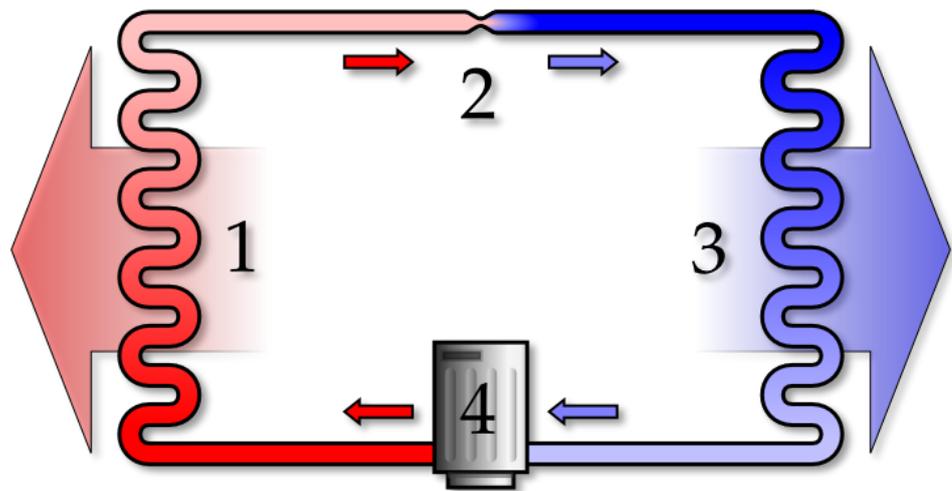
Applying both chemistry & physics, heat pumps are designed to recover external heat and restore that heat inside a building. There are two parts to a heat pump:

- a cold part (the blue coils in the diagram) called an **evaporator**;
- a hot part (the red coils in the diagram) called a **condenser**.

Circulating inside the heat pump there is a special fluid, called a **refrigerant**. There is an impressive physical law that sees liquids that convert to gas also absorb heat (called phase transition). Air conditioning uses this feature by forcing chemical compounds to go through a repeated process of evaporation and condensation in a closed system of coils. These compounds are called refrigerants.

When hot air flows over the cold system of coils, the refrigerants inside absorb this heat as it changes states from liquid to gas.

Hot air is produced by reversing the process.



There are four parts to a heat pump (and a fridge):

- 1- **The condenser** - (hottest part,) transmits the heat of the refrigerant to the hot water. It is a heat exchanger. During its passage in the condenser, the refrigerant liquefies under the effect of cold water.
- 2- **The regulator** - is a tiny pipe called a capillary. When the refrigerant passes through, its pressure is lowered, which also lowers the refrigerants temperature.
- 3- **The evaporator** - The evaporator (coldest part) captures the heat from the environment (soil, air or water). This heat is used to heat the refrigerant, which will allow it to boil for the retransformation into gas. Returned to gas, the refrigerant can again go back into the compressor.
- 4- **The compressor** - The compressor uses electricity to compress the refrigerant as a gas to increase its temperature to 90- 100 ° C . It is usually a piston type compressor.



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