

How a ground source heat pump works...

The ground source heat pump is a device that can extract low grade heat from below the ground surface, and convert this to high grade (useable heat). Just a few feet below the ground surface the temperature remains constant throughout the year, this allows for a good steady source of low grade heat, whatever the weather...

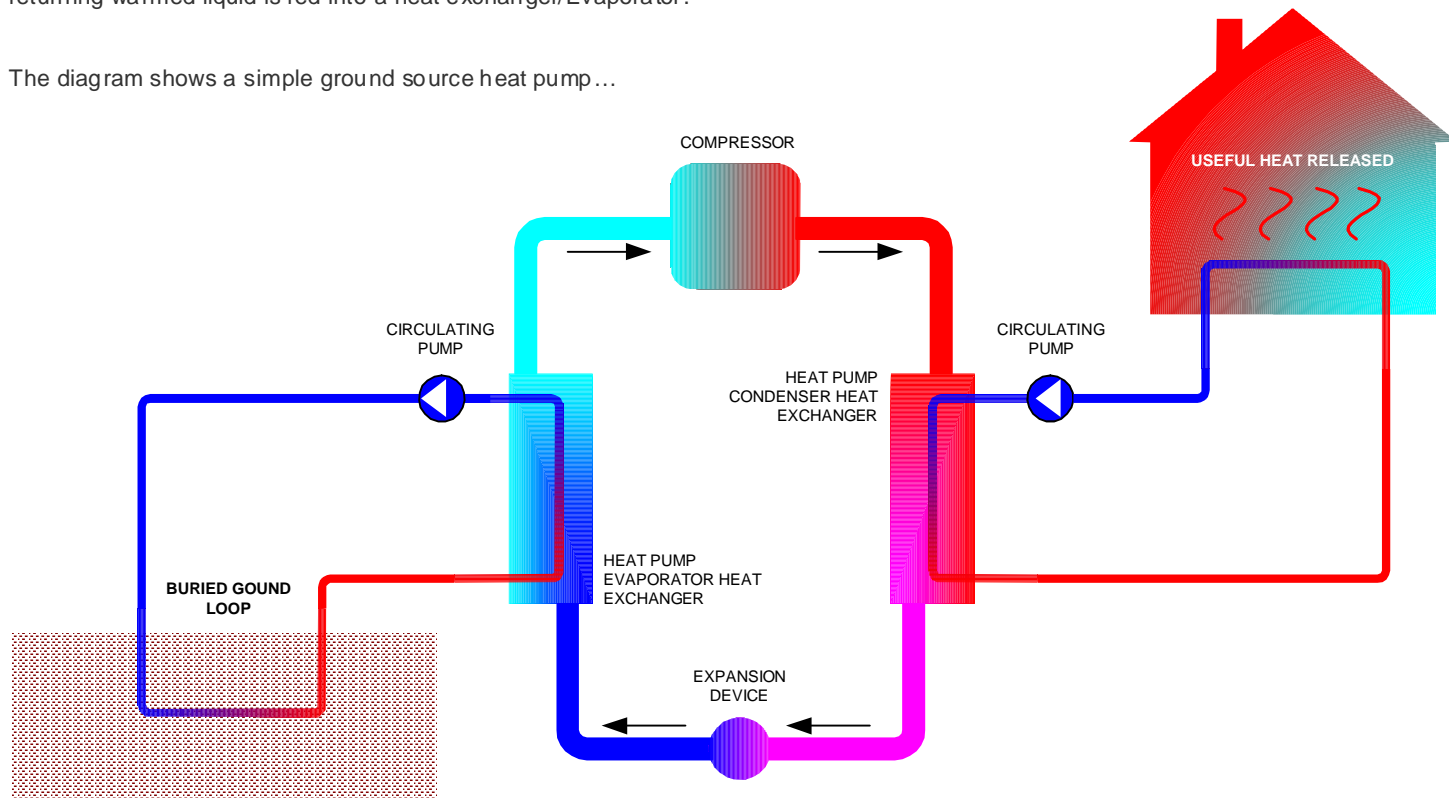
Overview

Heat pumps move stored solar energy from the ground into the home to provide a total solution for Domestic Hot Water (DHW) and all heating needs. Because heat pumps simply move energy, rather than creating it by burning fossil fuels, they are very efficient. For every 1KWhr of electricity consumed by the heat pump it can produce 4KW of heat. This gives an efficiency of 400% sometimes stated as a Co-efficient Of Performance (COP) of 4:1.

How is the heat collected?

Heat collection is achieved by installing a series of pipes in the ground. They are buried a metre deep and contain a water glycol mix at a low temperature. The surrounding soil is at a higher temperature, typically 10-13oC and gently warms the glycol mix as it is pumped around the ground loop. A temperature increase of the ground loop fluid of just 3 or 4 degrees is all the heat pump requires. The returning warmed liquid is fed into a heat exchanger/Evaporator.

The diagram shows a simple ground source heat pump...



The Evaporator / Heat exchanger

The purpose of the Evaporator is to take the collected heat out of the ground loop liquid and return it cooled to the pipe for the next cycle. It does this by using a refrigerant that boils at approximately -10 Celsius, the act of boiling turns the refrigerant into a vapour which is then moved into the Compressor.

The Compressor

The Compressor does exactly what its name suggests; the vapour is compressed in volume and as its volume reduces its temperature increases. Temperatures of between 75 and 125 Degrees Celsius are achievable and the gas is then fed through a heat exchanger.

Condenser / Heat exchanger

Feeding the hot gas through a condenser allows the refrigerant to turn back into a liquid. As it condenses it cools and releases its heat through a heat exchanger into the DHW and central heating system.

The Expansion Device

To complete the closed circuit of the heat pump the only thing which needs to be done is reduce the pressure of the condensed liquid and this is done via an Expansion Valve.