

NOW YOU CAN USE THE EARTH'S NATURAL ABILITY TO STORE AND CONSERVE ENERGY... WITH FHP MANUFACTURING'S FOUR CONVENIENT WAYS OF USING GEOTHERMAL ENERGY FOR HEATING & COOLING.

How Geothermal Systems Work:

FHP Manufacturing offers a complete line of Geothermal Heat Pumps as well as design assistance for Geothermal Applications. Please browse our site and contact us when your ready to begin your Geothermal Project.

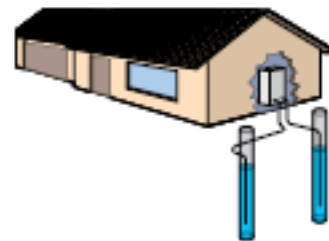
FHP Geothermal Systems provide heating, cooling, and dehumidification and can provide virtually free hot water when supplied with our optional heat recovery system. FHP Geothermal Systems work by removing heat from your home and rejecting it into the earth or in the reverse cycle mode absorbing the heat from the earth and supplying it back to the space.

Heating Mode: In the heating mode, heat is extracted from the fluid in the earth loop or well water by the FHP heat pump and distributed to your home through the air ducts. The air from your home is heated by the FHP unit with the energy absorbed from the earth and the compressor heat of the heat pump. The fluid is constantly re-circulated through the heat pump so it can continue to absorb the needed heat from the earth.

Cooling Mode: The cooling mode works similarly to the heating mode except the process is reversed. The heat pump absorbs the heat from your home and rejects it into the fluid that transfers it back into the earth.

Ground Water Energy Systems

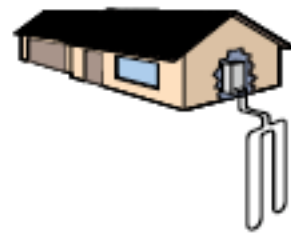
Ground Water Energy Systems (Open Loop) have been utilizing the earth's natural heat source/heat sink ability for over 40 years. Ground Water Energy Systems draw water from an aquifer via a supply well, pass through the Geothermal heat pump's heat exchanger where heat is either absorbed or rejected, then returned to the aquifer via a return well. Ground water temperatures remain very constant (usually within a degree) though out the year despite wide variations in outside air temperature, therefore your FHP



Unit will maintain its super high efficiency no matter how hot or cold it is outside. Ground Water Energy Systems are ideally suited for homes that have existing water wells available.

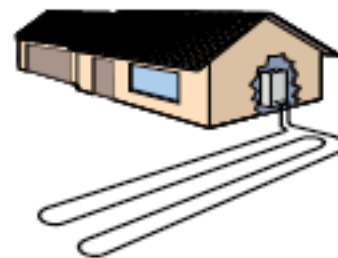
Vertical Energy Systems

Vertical Energy Systems (Closed Loop) utilize the natural thermal properties of the earth in a similar manner to the Ground Water Energy Systems. However instead of pumping water out of a well then back into the ground, you simply circulate water or an antifreeze solution through a closed loop network of plastic pipe that is inserted into vertical wells. These vertical wells are drilled to a depth of 100 to 300 feet per ton of air conditioning. The Vertical Energy System is ideally suited for applications when available land area is limited. Similar to the Ground Water Energy System, the FHP Manufacturing Vertical Energy System avoids wide temperature swings of the outside air to deliver constant high efficiency and comfort no matter where you live.



Horizontal Energy System

Horizontal Energy Systems (Closed Loop) also utilize the Earth's plentiful and renewable thermal characteristics. Like the Vertical Energy systems, Horizontal Energy Systems circulate water or an antifreeze solution through a closed loop network of sealed and pressurized plastic pipe that is buried in the ground. Instead of inserting the plastic pipe into vertical wells the pipe is laid into horizontal trenches that are trenched at a typical depth of 4 to 6 feet and to a length of 75 to 400 feet per ton of air conditioning. Recent innovations in horizontal pipe configurations has made this system particularly attractive in first cost as well as operating efficiency. Typically a little more land area is required to install a Horizontal Energy System. The same energy saving characteristics are enjoyed with the FHP



Manufacturing Horizontal Energy System as with the Ground and Vertical Energy Systems.

Pond/Lake Energy Systems

Pond or Lake Energy Systems (Closed Loop) may be the most economical system to install and has many advantages for producing energy savings. This system utilizes a nearby body of water such as a lake or a pond. As with the Vertical and Horizontal Energy Systems it is a closed loop of sealed and pressurized plastic pipe and water or an antifreeze fluid solution. Instead of inserting the pipe into a vertical well or laying the pipe in a horizontal trench the pipe is submerged into a body of water (pond or lake) where it can utilize the consistent temperature and outstanding heat transfer characteristics of the water. No wells and very little trenching are required cutting installation costs. Once again the FHP Manufacturing Pond or Lake Energy System is not subject to the cruel outside air temperatures that all air-to-air heat pumps are subject to year after year.



ARE UNCONTROLLABLE HUMIDITY PROBLEMS COSTING YOU A BUNDLE?

Why put up with humidity problems when you can have true climate control with the installation of an FHP water source heat pump with the Hot Gas Reheat option (Humidimiser option).

When your FHP unit contains this Underwriters Laboratory (UL) approved optional feature...your normal air conditioning cycle converts, as required, to an air drying operation. Your FHP unit with the humidimiser option will provide cooling, heating, and dehumidification by setting our combination thermostat/humidistat control.**

This option is available on our EM, EC, EV/ES, GT/GS and MB series. This option is ideal for any application where a high level of dehumidification is required. Typical applications are:

- Indoor Pool Areas*
- Outside/Make-Up Air Applications**
- Computer Rooms

Hotel rooms during non-occupancy

* Note: Special coil and/or cabinet coating may be necessary ** Note: Cooling always takes priority over dehumidification.

Basic Sequence of Operation: The reheat function is utilized to maintain a specified humidity level within the conditioned space. When in the reheat mode the return air from the space is cooled, dehumidified and reheated. By reheating the air along a constant sensible heat line the relative humidity of the leaving air is reduced. The leaving air dry bulb temperature is usually 2 to 5 degrees F. cooler than the return air temperature. This will vary model by model. This cycle will continue until the humidistat is satisfied. The amount of moisture removal capacity of a specific heat pump is determined by the unit latent capacity rating. A heat pumps latent capacity can be determined by reviewing the heat pump specification data sheets. Depending upon your entering water and air conditions a total and sensible capacity can be extrapolated from the data sheets. Subtracting sensible capacity from total capacity yields latent capacity. Dividing the latent capacity by 1069 (BTU/LB of water vapor at 80° DB and 67° WB moist air enthalpy) yields the amount of moisture removal in pounds per hour.