



HYDRO-TEMP[®]

Earth Coupled Heat Pumps



Harnessing the Power of the Earth

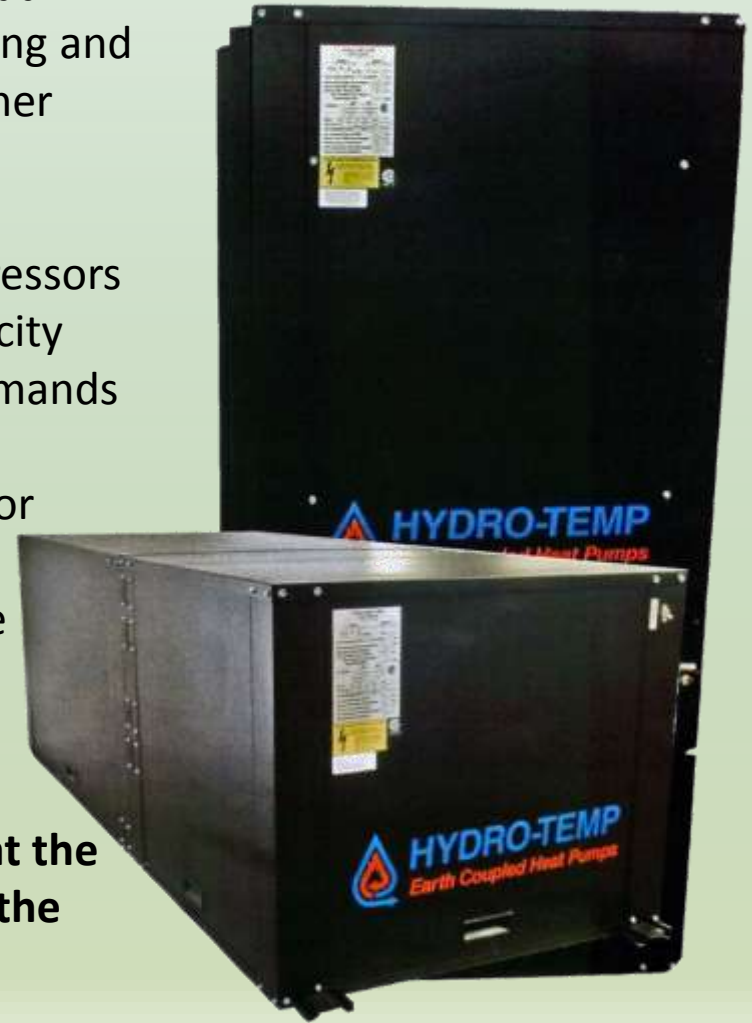


WHY HYDRO-TEMP?

Hydro-Temp geothermal/water source systems use load matching technology to provide all your heating/cooling and hot water demands at a fraction of the cost versus other leading geothermal systems.

The load matching technology uses either dual compressors or a single variable speed compressor to change capacity outputs for the ever changing heating and cooling demands of your facility. The unit will run on low speed when conditions require only a minimal amount of heating or cooling. With increased demand, the Hydro-Temp system will automatically increase speed to satisfy the demand.

Simply put, Hydro-Temp systems significantly reduce power consumption because they will only operate at the highest capacity as determined from the demand of the space being conditioned.



Not Only Heating and Cooling – Hot Water as Well!!

Hydro-Temp systems can efficiently meet your building's hot water needs by employing one of two different options available to the owner:

-Desuperheater: While heating and cooling, the desuperheater will assist your hot water tank in making hot water for free in the summer and at a very low cost in the winter. Even if a desuperheater cannot keep up with the usage, it can assist the hot water tank in efficiently heating the water.

-Priority Hot Water: The priority hot water heating option is a patented system that works like a desuperheater except that, once the heating or cooling load from the building is satisfied, the unit's microprocessor can turn on the system just to heat hot water when required. The temperature of the hot water tank is monitored by a digital aqua stat. When the room thermostat later calls for more heating or cooling, the unit will then switch back and heat or cool the building.

What Makes Hydro-Temp Even More Unique?

MICROPROCESSOR CONTROL BOARD

The Hydro-Temp microprocessor control board provides all of the control functions for Hydro-Temp systems. Besides controlling the unit in the normal operations of a dual compressor system, priority hot water control and zoning, the microprocessor board provides an easy trouble shooting interface for the service technician. The service technician has the ability to take control of the unit in heat and cooling, selecting individual stages as well as over riding time delays. The onboard LED's provide a history of any faults.

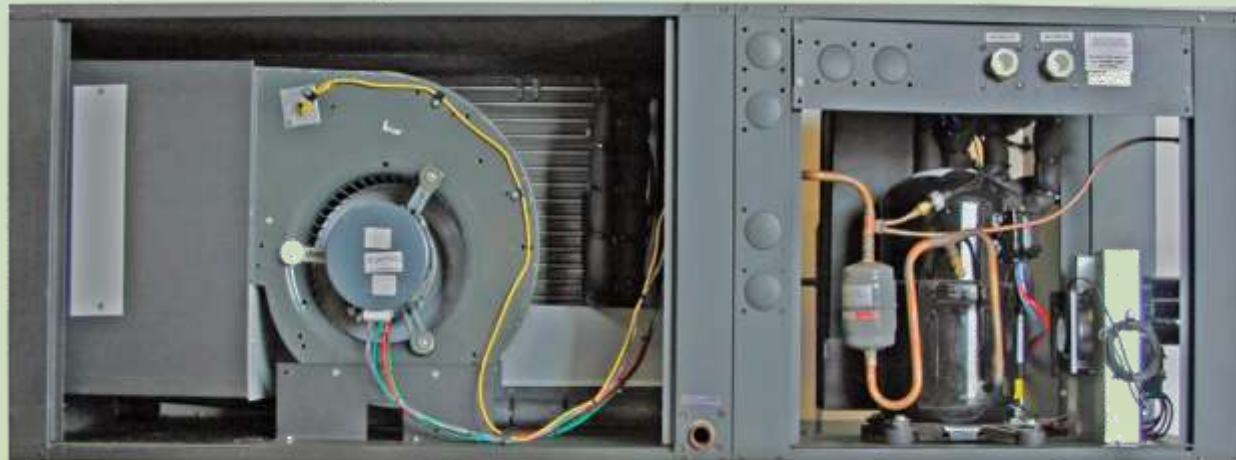
Zone Control

Zone control, or dampering of zones, is also accomplished by the microprocessor board. Each zone damper and thermostat hooks to the control board that will open and close the proper damper and turn the unit on and off. The control board allows one thermostat to call for heat while another calls for cooling. The heating zone will function first while the cooling zone shuts off until the heating zone has been satisfied.

Hydro-Temp Design Features

Custom designed for each application

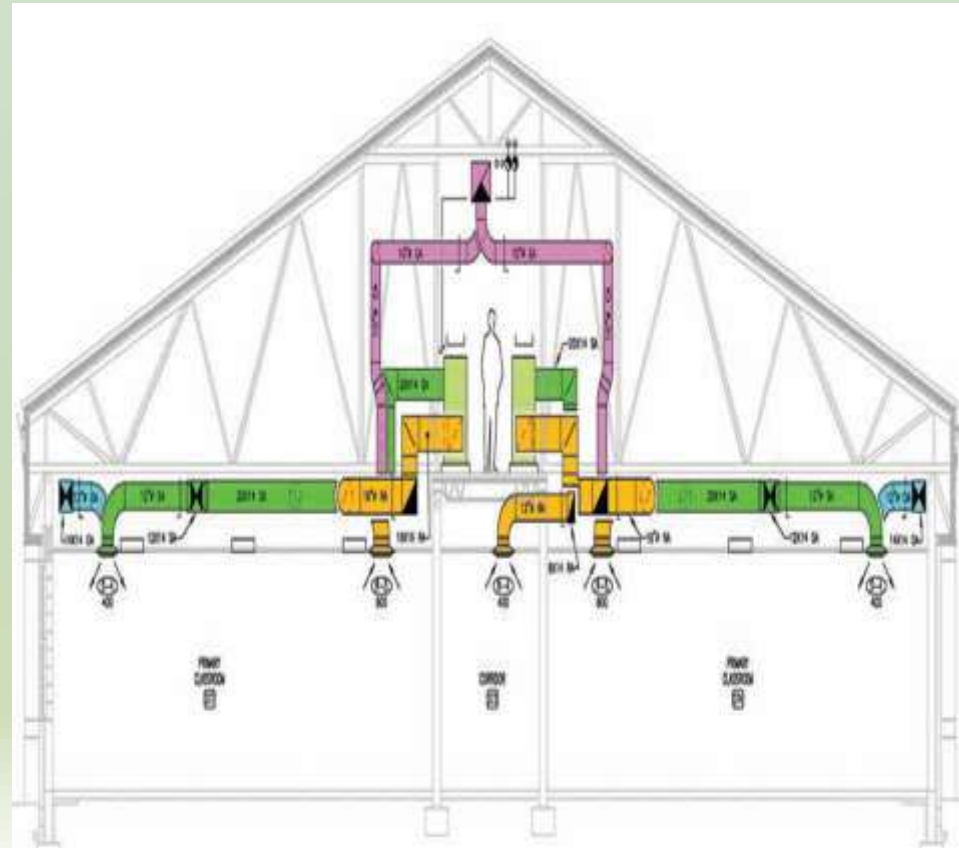
- Hydro-Temp designs and builds each unit for the specific application. Consideration is given to the operating and physical requirements for each location.
- All Hydro-Temp units are designed to operate efficiently with entering water temperatures between 25°F and 110°F.
- Hydro-Temp offers a complete range of models, sizes and voltages for all applications, horizontal or vertical, upflow or counter flow suitable for mounting in closets, overhead spaces, outside pad mounting and rooftop locations.
- Variable speed blower motor technology offers the capability to fine-tune the blower to unique local situations in ducting and/or CFM requirements



Past Projects

Plano Elementary, Bowling Green, KY

First year tests proved that the HYDRO-TEMP dual compressor heat pumps operated in the first stage 87% of the time. A 3.5 ton unit was field tested to determine the efficiency improvements. The heat pump unit consisted of a 1.5 ton and 2.0 ton compressor connected to a single 3.5 ton refrigerant circuit. Stage one efficiency is significantly higher than full load condition because the 1.5 ton compressor has 3.5 tons of Evaporator and condenser coil surface area for heat exchange. A field test measured the condenser and evaporator pressures/temperatures and found that when both compressors operate, the 1.5 ton compressor has an energy efficiency ratio rating of 11. The compressor efficiency increases to 18 when running solely in the first stage. *This results in a 64% efficiency boost when the dual compressor heat pump unit operates in stage one.*



Past Projects

Fayette High School, Fayette, MO

The electrical consumption of the HYDRO-TEMP Corner Console heating and cooling equipment, as well as the generation of hot water for the kitchen, was sub metered by Howard Electric Coop from 8/28/02 to 5/30/03. **Results proved that the 36,080 square foot school only consumed 61,400 kWh.**

Cost per kWh	Annual Heating/Cooling Cost (36,080 ft ²)
\$0.06	\$3,684.00
\$0.07	\$4,298.00
\$0.08	\$4,912.00
\$0.09	\$5,526.00
\$0.10	\$6,140.00



Past Projects

Marion Junior High, Marion, AR

The 194,082 square foot Marion Junior High was able to achieve 24 KBTU/Sq Ft by using HYDRO-TEMP heat pumps along with other energy conservation measures. **The average energy nationwide for schools is about 73 kBTUs per square foot.**

Month	Electric Consumption		Natural Gas Consumption	
	kWh	BTU	CCF	BTU
January	128800	439,465,600	163	16,805,300
February	110400	376,684,800	199	20,516,900
March	92800	316,633,600	199	20,516,900
April	84400	287,972,800	154	15,877,400
May	95200	324,822,400	208	21,444,800
June	106800	364,401,600	171	17,630,100
July	86000	293,432,000	35	3,608,500
August	128000	436,736,000	20	2,062,000
September	166000	566,392,000	150	15,465,000
October	92400	315,268,800	194	20,001,400
November	95600	326,187,200	193	19,898,300
December	110800	378,049,600	208	21,444,800
Total	1297200	4,426,046,400	1894	195,271,400

SUMMARY	
Electric KBTU	23
Gas KBTU	1
Total KBTU	24

V-STAR Multiple Capacity System

The newest addition to the Hydro-Temp line is the multiple capacity V-Star system. This system utilizes a variable speed compressor and variable speed ECM fan motor to provide the desired amount of heating and cooling. The actual capacity output of the system is based on the discharge temperature. Currently the system is available in the following capacities:

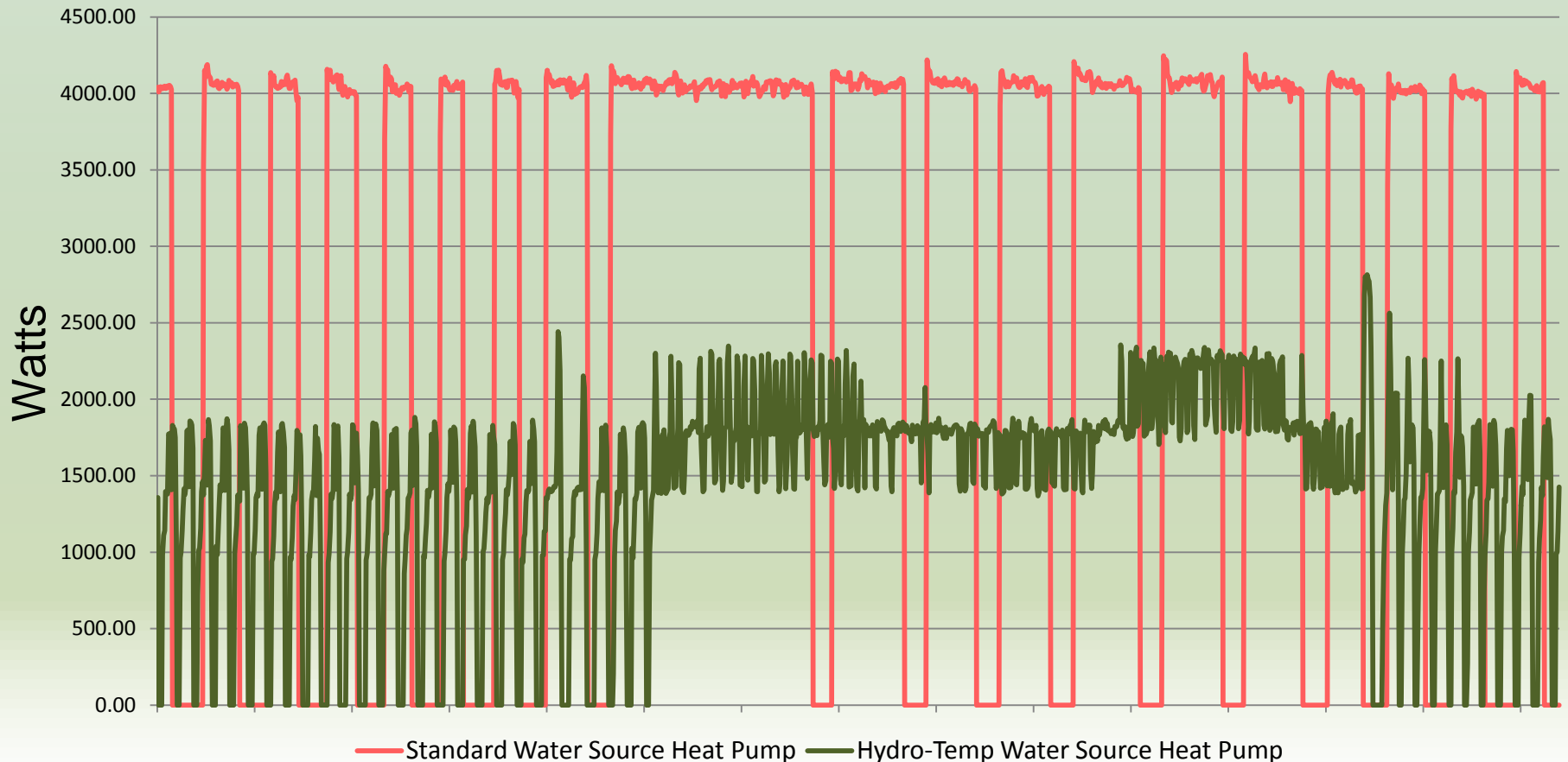
2 ton unit	6,000btu to 28,000btu
4 ton unit	13,000btu to 52,000btu
6 ton unit	24,000btu to 80,000btu



Past Projects

Commercial Office Building

The graph below shows the results from a study comparing a 4-ton Hydro-Temp V-Star system versus a leading brand 4-ton system operating in the same environmental conditions over a 24 hour period. **Energy consumption was reduced up to 46%**



Past Projects Continued

Langley Air Force Base, Hampton, VA

A recent study proved, even under unfavorable conditions, that the Hydro-Temp system achieved energy savings up to 40% while providing optimum indoor temperature and humidity versus other leading geothermal systems.

The table below shows the results of a 24 hour period from a study that was conducted over several months.

Leading National Brand 4 Ton WSHP Energy Data							
July 16, 2011							
Outside Temp Minimum	64	Outside Humidity Minimum	42%	Room Temp Minimum	72.89	Room Humidity Minimum	50.76%
Outside Temp Maximum	80	Outside Humidity Maximum	92%	Room Temp Maximum	74.09	Room Humidity Maximum	61.4%
Outside Temp Average	71	Outside Humidity Average	73%	Room Temp Average	73.4	Room Humidity Average	55.56%
Total kW per 24 Hour Period	96.7			Average kW/hr	4.03		

Past Projects Continued

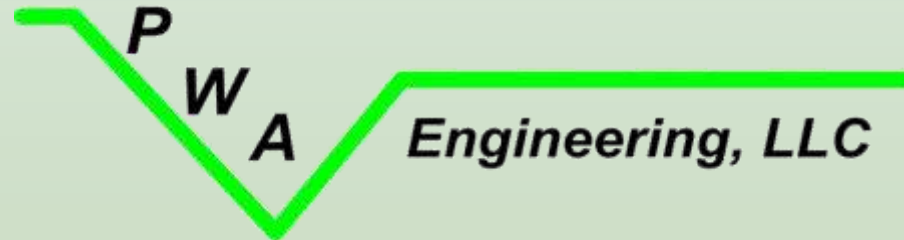
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Hydro-Temp 4 Ton WSHP Energy Data							
July 9, 2011							
Outside Temp Minimum	71	Outside Humidity Minimum	60%	Room Temp Minimum	73.58	Room Humidity Minimum	47.22%
Outside Temp Maximum	83	Outside Humidity Maximum	100%	Room Temp Maximum	74.96	Room Humidity Maximum	60.90%
Outside Temp Average	77	Outside Humidity Average	89%	Room Temp Average	74.3	Room Humidity Average	52%
Total kW per 24 Hour Period	58.4			Average kW/hr	2.44		

Please contact PWA Engineering, LLC for additional information.



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