



# Alternative Energy Solutions

Controls for Heat Pump & Solar Thermal Systems





# Alternative Energy with Maximum Efficiency

Fuel & electricity prices are on the rise. There's never been a better time to explore alternative sources of energy for heating homes & generating hot water

Energy can be harvested from the sun, earth, air or water making it an attractive solution for heating or cooling systems. To ensure comfort, alternative energy systems are commonly designed with a backup heat source.

A truly green system makes use of the higher efficiency sources first, saving the backup for times of higher energy demands or when alternative energy solutions lose their efficiency advantage.

With tekmar Controls, the entire system can be coordinated to seamlessly work together, improving system efficiency, reliability & energy savings to get the best performance out of alternative energy sources.

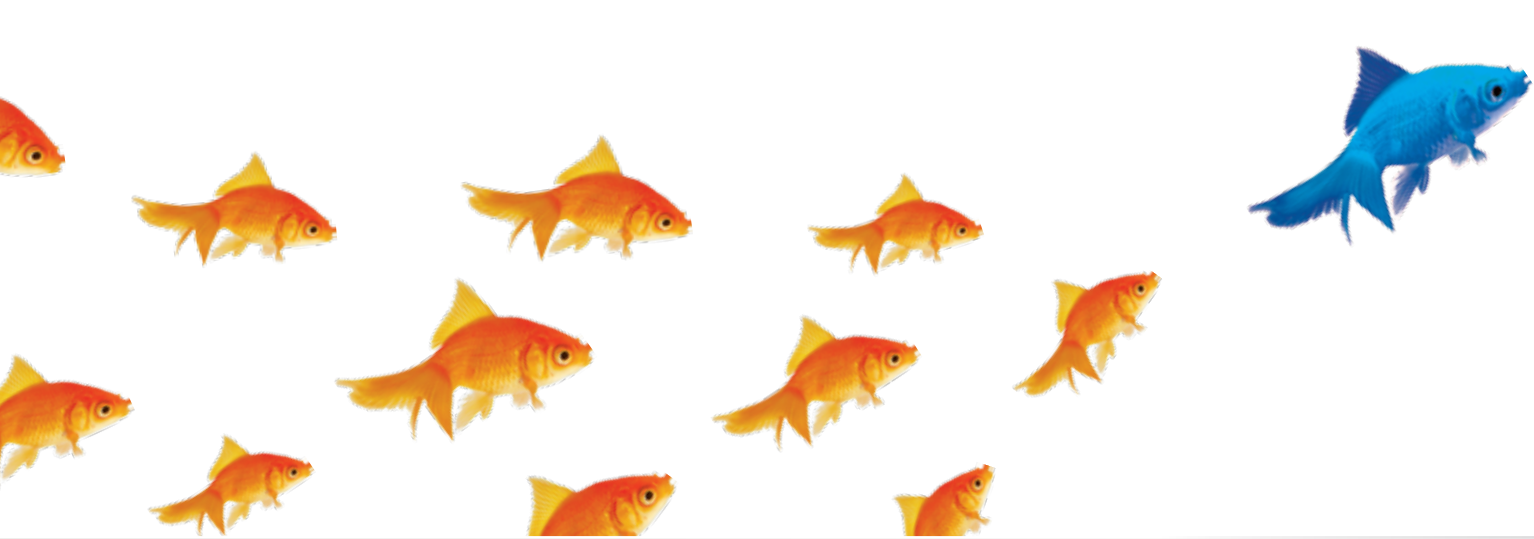
## The Perfect Match for Radiant Heating

With an energy output of up to 4 times the energy input, it's easy to understand why heat pumps are an increasingly popular alternative energy source. To make the most out of this free energy, air-to-water & water-to-water heat pumps need to operate at low temperatures. These temperatures are perfect for radiant heating systems.

- *tekmar controls with Outdoor Temperature Reset & Indoor Temperature Feedback are designed to provide comfort using the lowest possible water temperatures.*
- *Energy is saved by obtaining the maximum output from alternative energy sources before operating a backup heat source.*







## Leading the Way in Heat Pump Control

---

Why choose tekmar for heat pump system control? It's simple. The **tn2 House Control 406** improves comfort, efficiency & reliability in systems with a heat pump as a primary heat source. Energy saving features include:

### Outdoor Temperature Reset

In order to provide comfortable indoor temperatures, the supply of heat to a building must be equal to the buildings heat loss. The greatest factor affecting how much heat a building requires is the outdoor temperature. Even in a well insulated building, heat loss increases as the outdoor temperature falls. Controls with Outdoor Temperature Reset save energy by adjusting the supply water temperatures to compensate for changes in the outdoor temperature. As the outdoor temperature rises, heating supply temperatures are lowered to match what the building actually requires.

### Indoor Temperature Feedback

Indoor Temperature Feedback is made possible through communication with tekmarNet® Thermostats. When solar or occupant caused heat gains are affecting a zone, the 406 can lower supply water temperatures below the target calculated by Outdoor Temperature Reset, saving additional energy.

### Intelligent Switchover Between Heating & Cooling

During the shoulder seasons it is common to have some zones calling for heat while others require cooling. Communication with tekmarNet® thermostats enables the 406 to determine when the heat pump should switch between heating & cooling modes. The 406 also reduces energy waste when switching from heating to cooling mode through the lower tank temperatures calculated by Outdoor Temperature Reset.

### Backup Boiler Operation

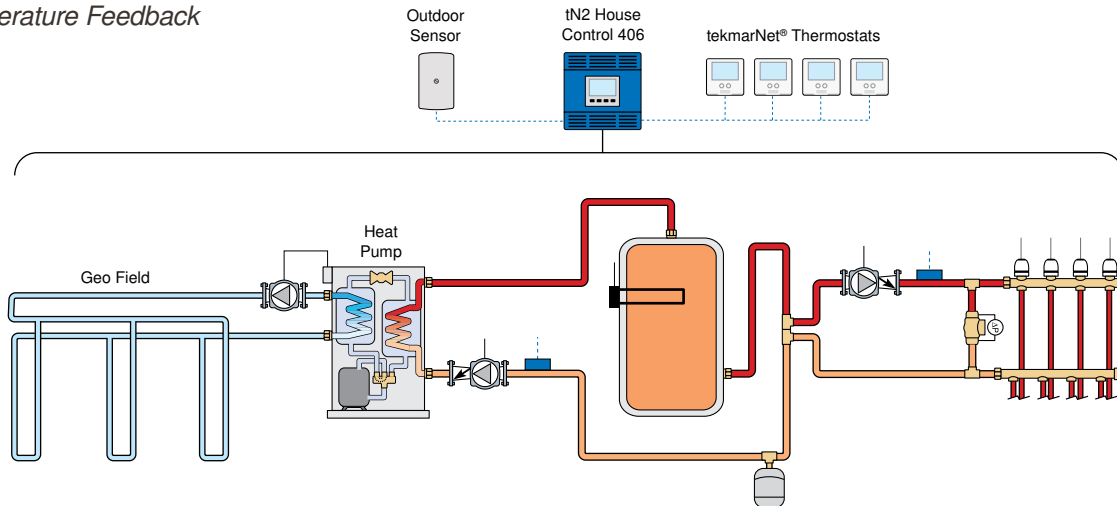
The House Control 406 can operate a backup heat source when conditions are not optimal for the heat pump or when the temperature required is higher than the efficient operating range. With a 406, systems can be designed with additional loads such as domestic hot water & high temperature zones. The storage tank is controlled to deliver floor warming or cooling to the radiant zones.

# Heat Pump Applications

## Radiant Floor & Auxiliary Backup

The control operates a two-stage water-to-water heat pump to provide heating to four radiant floor zones with auxiliary backup electric element in the storage tank.

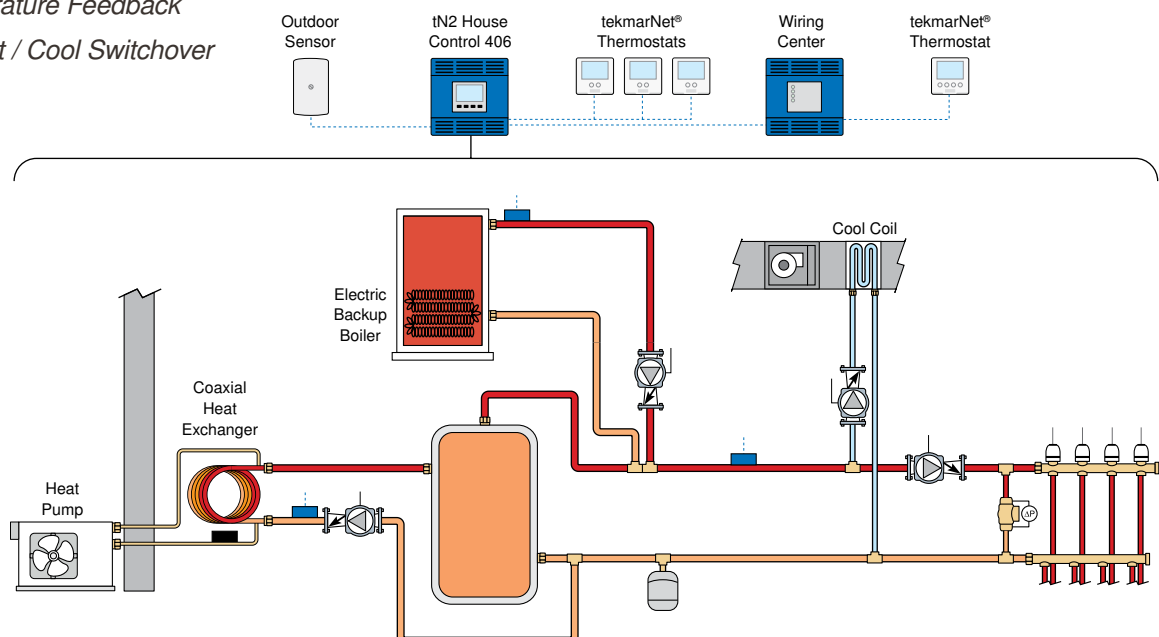
- *Outdoor Temperature Reset*
- *Indoor Temperature Feedback*



## Fan Coil Cooling & Radiant Floor Heating with Electric Boiler Backup

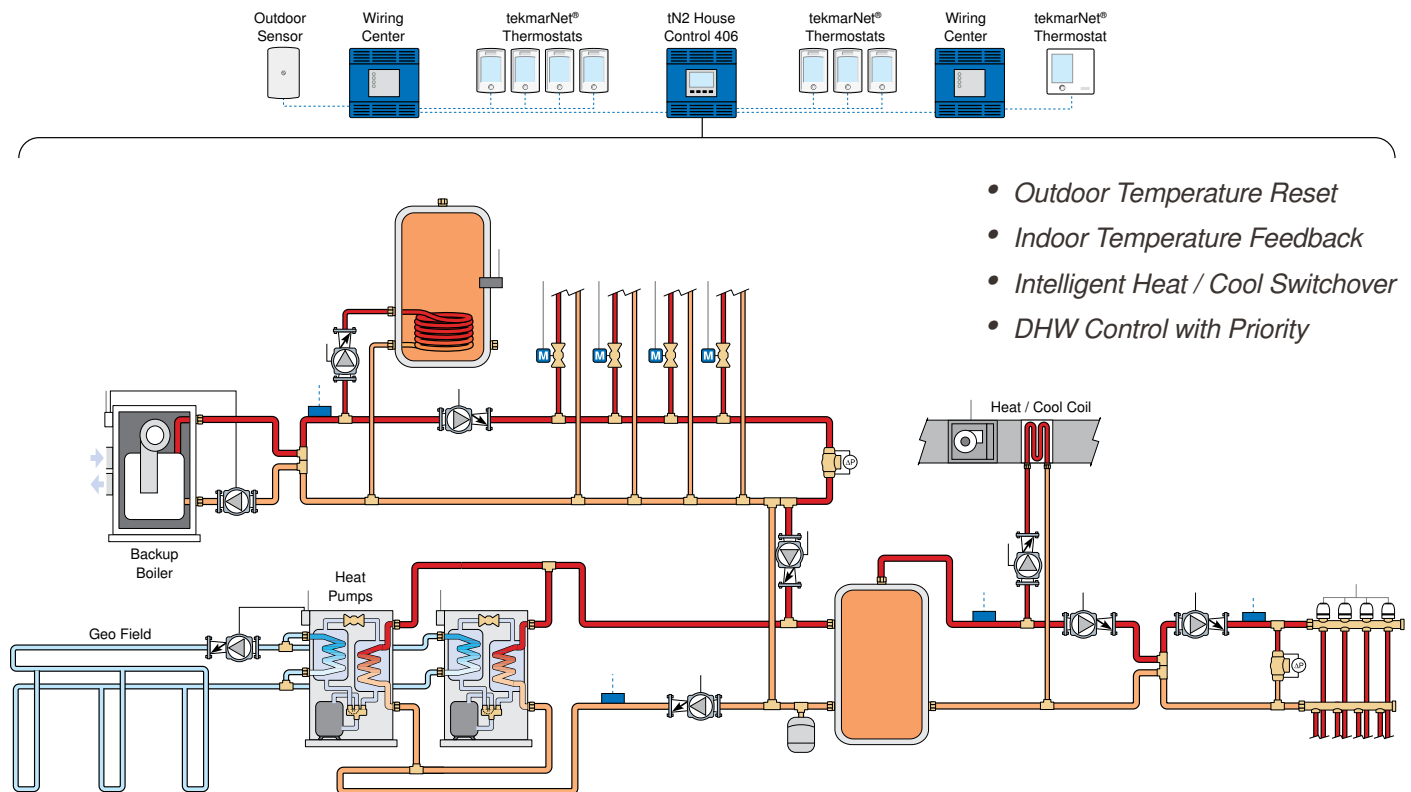
The control operates a two-stage air-to-water heat pump to provide heating to four radiant floor heating zones & cooling to a chilled water fan coil. An electric boiler provides backup heat.

- *Outdoor Temperature Reset*
- *Indoor Temperature Feedback*
- *Intelligent Heat / Cool Switchover*



## Fan Coil & Radiant Floor Heating & Cooling with Boiler Backup & DHW

The control operates two water-to-water heat pumps to provide heating or cooling to the fan coils & radiant floor zones. A boiler provides heat to the domestic hot water tank & baseboard zones, as well as backup to the fan coil & radiant floor zones.



## Perfect For Radiant Floor Cooling



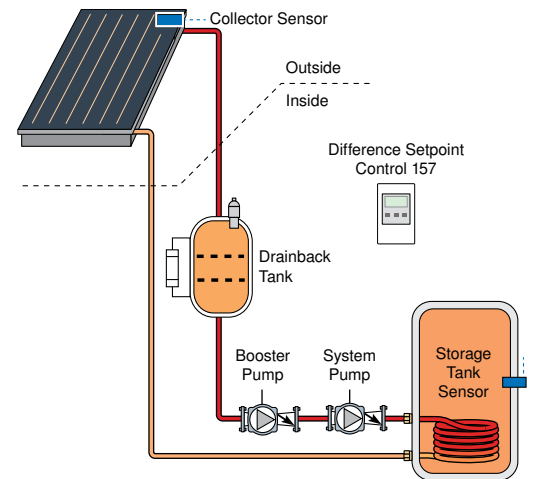
The tekmarNet® Thermostat 557 is a communicating touchscreen thermostat with a built-in humidity sensor. When operating radiant floor cooling, humidity sensing is used to help prevent condensation on floor surfaces.

- Touchscreen Technology
- Radiant Floor Heating & Cooling
- Relative Humidity Control
- tekmarNet® Communication
- Programmable Schedules

# Solar Thermal Applications

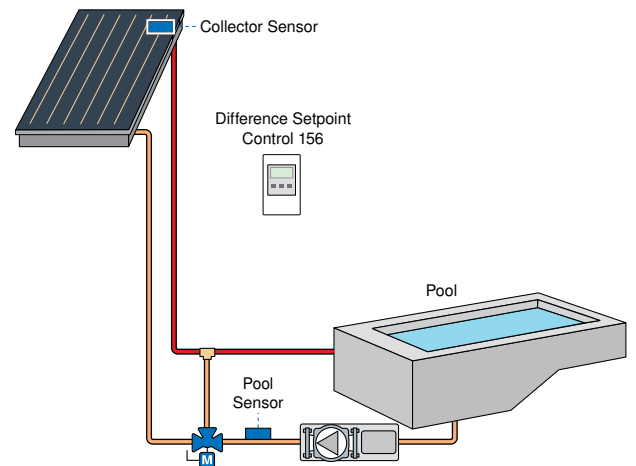
## Solar Storage Tank with Drainback

The control measures the temperature difference between the solar panel & storage tank. As the temperature difference increases, the pump speed is increased. As the temperature difference decreases, the pump speed is reduced to provide additional time for heat transfer. This allows for continued heat transfer & lower electrical consumption during off peak times. During freezing conditions, fluid is left in the drainback tank. Once the temperature recovers, a booster pump can be used to prime the system.



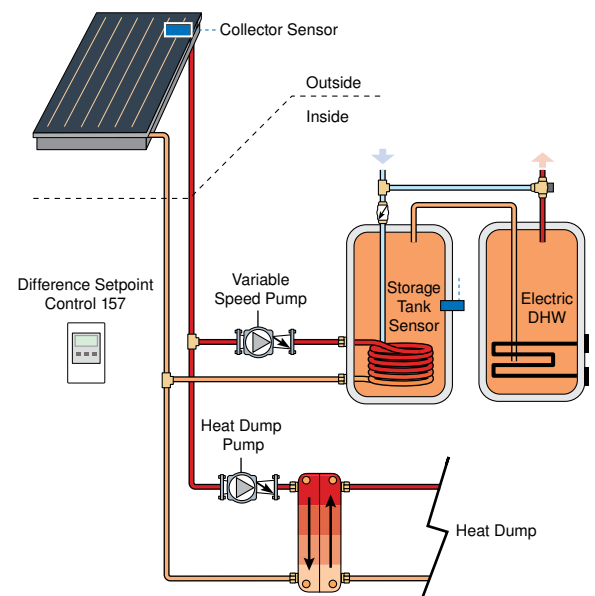
## Solar Pool Heating

The control measures the temperature difference between the solar panel & the pool. When there is a large temperature difference, the control powers the three way diverting valve to redirect water from the pool to the solar panel to be heated. When the temperature differential between the solar panel & the pool becomes too low, the 3-way diverting valve is de-energized and pool water again circulates between the pool intake to the outlets. If the pool reaches the maximum temperature limit, the 3-way diverting valve is de-energized.



## Solar DHW Pre-Heat & Heat Dump

Systems with a high solar capacity require an alternate place to transfer heat if the storage tank starts to overheat. If the control detects overheating, the pump to the heat exchanger is turned on while the pump to the storage tank is turned off. If domestic hot water requires more heat than the solar panel can provide, an electric element in the second tank operates to boost the temperature. Anti-freeze glycol provides freeze protection in the exposed piping.





## Compare tekmar Alternative Energy Controls



155

156

157

406

### System Requirements

#### *Heat Pump Applications*

Air or water source heat pump control

-

-

-

•

#### *Solar Thermal Applications*

Obtain maximum energy transfer from solar panels

•

•

•

-

#### *Variable Speed Pump Operation for Solar*

Obtain energy during times of low sunlight

-

-

•

-

#### *Backup Heat Operation*

Maintain temperatures during peak demands or less optimal conditions

-

-

•

•

#### *Solar Drainback Operation*

Drain fluid from collector into drainback tank to prevent freezing

•

-

•

-

#### *Solar Draindown Operation*

Drain water out of the collector to prevent freezing

•

-

-

-

#### *Heat Dump Operation*

Redirect heat from collectors to a secondary load to prevent overheating

-

-

•

-

### Features & Benefits

155

156

157

406

#### *tekmarNet® Communication*

Expand features & accessibility, improve comfort & efficiency

-

-

-

•

#### *Complete HVAC System Control*

Temperature control for space heating, cooling & DHW

-

-

-

•

#### *Outdoor Temperature Reset with Indoor Temperature Feedback*

Provide comfort using lower water temperatures to save energy

-

-

-

•

#### *Energy Calculation*

Information - calculate your return on investment

•

•

•

-

# Better Design, Better Control, Better Systems.

At tekmar Control Systems, we believe the indoor comfort of a building depends on the performance of its heating, ventilating & air conditioning (HVAC) system. That's why tekmar offers affordable control solutions designed to get the best in comfort, efficiency & system performance.

Our focus on innovation to add greater value to our products & services allows us to pioneer technologies & anticipate the needs of tomorrow. We stand by our products & offer in-depth technical support & training to ensure our customers are completely satisfied.

## World Class Technical Support

Our Local Representatives are knowledgeable experts in both HVAC controls & their operating mechanical systems. They offer assistance in system design, product selection & installation support. We're here when you need us most. To contact a Representative in your area, visit [tekmarControls.com](http://tekmarControls.com)

## Dependable Warranty

We strive to provide the highest quality products to our customers. In keeping with that goal, all of our products are 100% quality tested, & backed by the most dependable 3-year limited warranty in the industry.



## We Offer the Complete Solution

- *A wide range of products to match the needs of today's systems*
- *Manufactured in a state-of-the-art Canadian facility*
- *A network of experienced & knowledgeable representatives*
- *Training & technical tools available to support your success*
- *Dedicated people focused on innovation & customer service*

For more information regarding tekmar products, visit [tekmarControls.com](http://tekmarControls.com)