Technology Review: Next Generation Electrical Water Heating Technology by MicroHeat.

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The MicroHeat Technology replaces electric heating elements with inert electrode heating (Direct Energy Transfer) combining capability for full digital control delivering improved output temperature stability while eliminating the phenomenon of scale. Using electricity to directly energise water to be heated is not new, but the MicroHeat Technology provides a unique dynamic and absolute method of control of the direct application of electrical energy to heat water

The Technology has been successfully applied to water heating appliances, and in a world first, it released the first Continuous Flow Electric Water Heater with electrode heating technology, Australian designed and manufactured, to the Australian market.

There were two main objectives underpinning MicroHeat Technology, it reduces energy and water consumption improving operational efficiency, adaptability and longevity compared to existing water heating products on the market today. Existing contemporary water heating products use heat exchange technology, which typically provides reduced operational efficiencies, suffer inevitable failure over time and deliver inconsistent temperature output. Similarly storage tank water heaters wastefully consume energy maintaining water at an elevated temperature in anticipation of use. Energy is also wasted because of long hot water reticulation needed to deliver hot water to the point of use. On-demand water heating that can be installed at the point of use eliminates these energy losses.

How it works?

Energy is applied directly to the water to be heated using inert electrodes that allow for electricity to flow through the water, heating it up, hence facilitating “Direct Energy Transfer”. There are no additional mediums required that must first heat up, and then be used to transfer heat to the water.

The Technology intelligently “optimises” the amount of energy (exact power) needed to heat the water by using CPU processing of the thermal equation every 100th of a second to calculate the energy required. For example, if the required temperature rise at the drawn flow rate only requires 2 kW then that’s what is supplied; if 8 kW is required, then that’s what’s supplied. This applies to both single and three phase CFEWH product configurations.

Unique Value Add

The MicroHeat product has a compact footprint that does not generate heat, ensures 99.9% energy transfer efficiency, and accommodates quick and easy installation at the hot water point of use. Almost zero energy (typically half a Watt) is used in standby mode when heated water is not needed. There is no heat loss from the unit as there is no storage tank, additionally heat loss due to reticulation piping can also be reduced, which results in a significant reduction in water and energy consumption. Delivering stable temperatures at very low or high flow rates enables users to access heated water using less energy and less water if compared with traditional products on the market.

There is no heating element burn out with the MicroHeat technology; which is a common failure in water heaters that use heating elements, when there is no water or insufficient water in the system. Additionally traditional electrically powered water heaters rely on ON/OFF heating element control where the heating element temperature required is much hotter than the water being heated resulting in thermal inertia with further temperature instability. To reduce the impact of failure and instability on consumers, product model and power rating design constraints are required, combined with the incorporation of flow rate and or mechanical/electrical thermostatic controls. MicroHeat Technology delivers market leading, stable warm or hot water temperatures without suffering any of the above issues. Nor is there the need for the inclusion of additional controls and restrictions

Our technology also eliminates the scaling phenomenon, where the electrodes are the same temperature as the water being heated. This serves to increase operational life which is virtually maintenance-free. Additionally with hard / poor quality water the potential for scale and the risk of impeding electrical safety becomes significant with existing heating element systems but not with MicroHeat systems.

The electrode technology also lends itself to new ways to design and manufacture water heaters. The electrodes, being at the same temperature as the water, eliminates the need for thermal shields, high temperature plastics and metal casings required in water heaters that use traditional electric heating element technologies.

MicroHeat CFEWH appliances are data communication ready. Direct communication to

and from the CFEWH can be made from Building Management Systems, Energy Management Systems as well as domestic Home Automation Systems.

Key markets & sectors

The MicroHeat CFEWH product ranges accommodate single phase and three phase applications supplied to consumer, commercial and industrial markets for delivery of heated water for human consumption, across all hot water uses. This includes residential buildings/units, shopping malls, retail outlets, schools and public buildings, office and tenant spaces, commercial builds such as restaurants and service stations, modular buildings, temporary offices and trailers, concession stands, food service locations as well as boosting existing hot water services.

MicroHeat is now in the process of expanding into regional markets such as New Zealand, Middle East, China, India, Singapore, SE Asia, North and South America.

MicroHeat is also in the process of applying its Technology to the development of Continuous Flow Boiling Water Dispenser (CFBWD) products. It is envisaged that this will be the most energy and water efficient boiling water dispenser on the market that delivers continuous flow.

There are opportunities to use the MicroHeat Technology in other applications such as:

- Existing water/glycol heating systems to provide a fast, accurate, and efficient vehicle heating solution that improves efficiency and reduces maintenance.
- To replace existing heating element technology with electrode heating technology. MicroHeat has been exploring the application of the MicroHeat electrode technology into coffee machines, static boiling water dispensers, hot water or solar storage tanks, etc. There are significant advantages in the elimination of scale, burnout, thermal inertia and optimised energy control.

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