



**hydro**   
**THERMAL** <sup>®</sup>

# EXPERTS IN STEAM HEATING

Hydro-Thermal® is a global manufacturing company that designs and manufactures three way steam heating valves called Hydroheaters®†. As a total solution provider, our professional engineering team facilitates our ability to provide customers innovative applications.

## Meeting Fluid Heating Needs Worldwide

### STEAM PURITY

#### PLANT

HEAVY METALS & MINING  
INDUSTRIAL LAUNDRY  
STARCH CONVERSION  
PETROCHEMICALS  
PULP & PAPER  
WASTEWATER

#### CULINARY & FILTERED

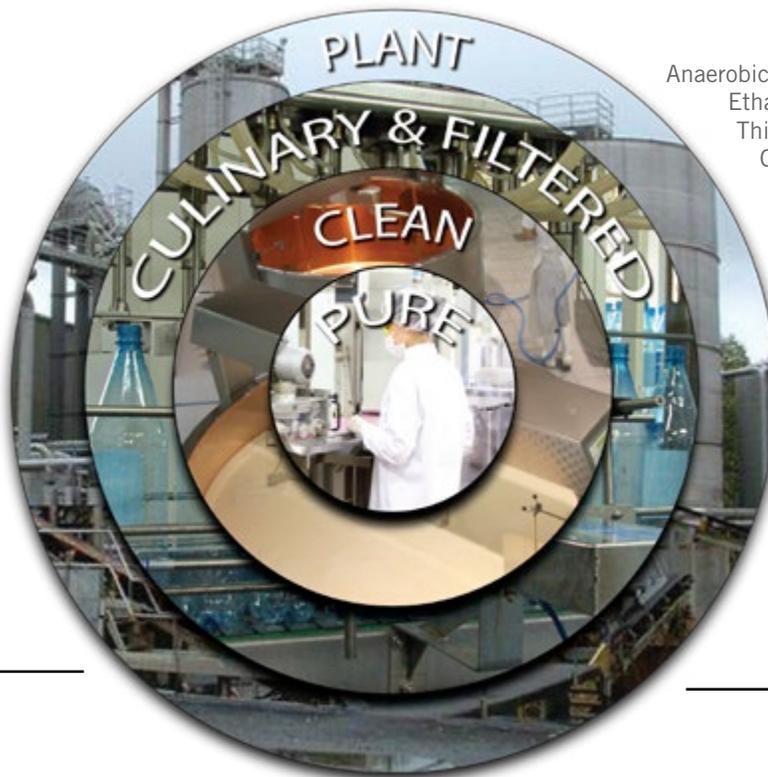
PETFOOD  
MEAT & POULTRY  
FOOD & BEVERAGE

#### CLEAN

CHEMICAL  
COSMETICS  
PERSONAL CARE  
FOOD & BEVERAGE

#### PURE

BIOTECHNOLOGY  
PHARMACEUTICALS



### APPLICATIONS

Anaerobic digestion/sludge/settling pond  
Ethanol/biofuels/Cellulosic ethanol  
Thickening/sweetening/confection  
Oil extraction/pickling/emulsion  
Pulp stock/bleaching/coating  
Whitewater/liquor heating  
Dry-end/wet-end/starch  
Water heating/dilution

Washdown/hose stations  
CIP/bottling/equipment  
Blanching/vegetables  
Can topping/dilution  
Food/slurry cooking  
Extrusion/rendering

CIP/bottling/canning  
Food cooking/defrosting  
PVOH/rubber/chemicals  
Washdown/hose stations  
Tunnel pasteurizing/retort  
Blanching/vegetables/other

Biokill & sterilization  
Reactors/tanks/kettles  
Jacketed kettles/blenders

## Proud Heritage

Our internal culture of quality improvement, sustainability, and social responsibility has led us to be recognized as an award winning company.

#### 2014 E-Export Award

Awarded to Hydro-Thermal for significant contributions to increasing U.S. exports

#### 2014 Innovation Quotient (I.Q.) Award

Awarded to Hydro-Thermal for development of an innovative product (Smart Cooking System™)

#### 2014 Top 10 Business Award

Awarded to Hydro-Thermal as one of the top ten companies in Southeastern Wisconsin

#### 2012 Wisconsin Family Business of the Year Grand Award

Awarded to Hydro-Thermal for accomplishments & contributions as a family business making an impact in Wisconsin

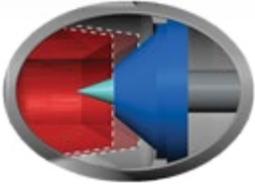
#### 2011 Governor's Export Achievement Award

Awarded to Hydro-Thermal for innovative techniques & approaches resulting in capturing worldwide markets

#### 2010 Wisconsin Manufacturer of the Year

Awarded to Hydro-Thermal by the Wisconsin Manufacturers & Commerce Association

# What is Direct Contact Steam Injection?



Direct Steam Injection heats fluids or viscous slurries wherever the fluid can be mixed with steam and often replace heat exchangers or sparging systems. Injecting steam directly into the process fluid transfers 100% of the steam's latent and sensible heat energy.

## Benefits of Hydroheaters

### » Precise Temperature Control

The Hydroheater heats to an exact temperature and maintains it precisely.

### » Product Quality

Product quality is often influenced by accurate temperature and instantaneous, thorough mixing.

### » Quiet Operation

Hydroheaters operate smoothly to ensure condensation happens immediately, which is the key to quiet operation. Other heaters which do not modulate steam, result in surging or uncontrolled operation, excessive vibration, fluid damage, and downstream interruption.

### » Energy Efficiency

Direct steam injection uses all of the energy within steam, both latent and sensible, to heat the fluid. Comparably, a heat exchanger system frequently does not return condensate to the source. Heat and energy are lost in return systems.

### » Space Savings

Hydroheater® systems are typically designed for one third of the installation footprint of heat exchanger systems. The systems are efficiently designed for optimal operation.

### » Low Maintenance

The Hydroheater's self-cleaning agitation results in minimal unscheduled repairs. On average, a Hydroheater performs well for years and requires only routine maintenance.



# Hydro-Thermal Products and Capabilities

Hydro-Thermal Direct Steam Injection heaters are custom designed for specific operating conditions and carry a 100% performance warranty.



## INDUSTRIAL HYDROHEATER®

The workhorse of industrial fluid heating heats a wide range of liquids from water to heavy viscous slurries.

**Volume Capability: 1 GPM - 6,700 GPM**  
**[0.2 up to 1,522 m<sup>3</sup>/hr]**

Uses: Pulp and paper applications, biofuels, ethanol conversion, large volume water, anaerobic digestion, cooking, and more.

## SANITARY HYDROHEATER®

A patented 3A certified heater manufactured of the finest stainless steel(s) utilizing the technology of an industrial hydroheater.

**Volume Capability: 1 GPM - 180 GPM**  
**[0.2 up to 41 m<sup>3</sup>/hr]**

Uses: Food and beverage cooking, sanitary water, pet food, and pharmaceutical fluids.

## INDUSTRIAL SOLARIS



## INDUSTRIAL SOLARIS®

An optimized straight-through heater designed to handle heavy slurries and a wide range of fluids.

**Volume Capability: 5 GPM - 25,000 GPM**  
**[1 up to 5,678 m<sup>3</sup>/hr]**

Uses: Medium consistency pulp stock, bleaching, anaerobic digestion and other fibrous slurries.

## INFUZE COOKER



## INFUZE COOKER™ ONLY WITH SILVERLINE

A sanitary straight-through design to heat and cook slurries, and other high solids products that need a sanitary device. It is capable of producing low shear product to maintain product integrity. SilverLine materials available upon request.

**Volume Capability: 5 GPM - 800 GPM**  
**[1 up to 182 m<sup>3</sup>/hr]**

Uses: Tomato paste, sauces, soup stock, salsa, meat, cheese production, vegetable blanching

## EZ HEATER® ONLY WATER HEATING

When heating water only, this affordable industrial heater takes the place of more expensive heating methods. It uses less parts and critical surfaces necessary for complicated fluid properties.

Volume Capability: 2 GPM - 1350 GPM  
[0.5 up to 306 m<sup>3</sup>/hr]

Uses: Large volume water demand, tank filling, washdown, clean-in-place (CIP), can topping, clean-up: anywhere hot water is needed.

## COMPLETE SOLUTIONS

We provide customized systems featuring our new Smart Controller™ containing everything needed to cook, mix, measure, and control your product. Pump, cook, mix, measure and control.

### EZ Skids™

For hot water only - utilizing our unique EZ Heater®, this skid is completely plumbed and assembled in the most effective configuration.

### ATTEC® Systems

Completely customized steam heating solutions, designed, built and installed to individual specifications. Let our expert engineering team support your process engineers when designing a system for your needs.



EZ HEATER



EZ SKID SYSTEM



Solaris

Sanitary Hydroheater

ATTEC SYSTEMS  
CUSTOMIZED AND INTERCHANGEABLE

## SOLUTIONS CENTER

Hydro-Thermal's fully equipped lab is available for rent to test direct steam injection with your application. For a complete list of equipment, visit our website, [www.hydro-thermal.com](http://www.hydro-thermal.com).



# How the Hydroheater® Works

Our Hydroheater is an exclusively designed and patented direct steam injection heater that looks like any 3-way valve but instead is a unique industrial heating device. The internal parts precisely mix metered amounts of steam directly with a liquid or slurry, providing instantaneous transfer of heat from steam to the liquid. Steam immediately condenses, eliminating hammer and vibration, plus causes a turbulent mixing action that self-cleans the unit.

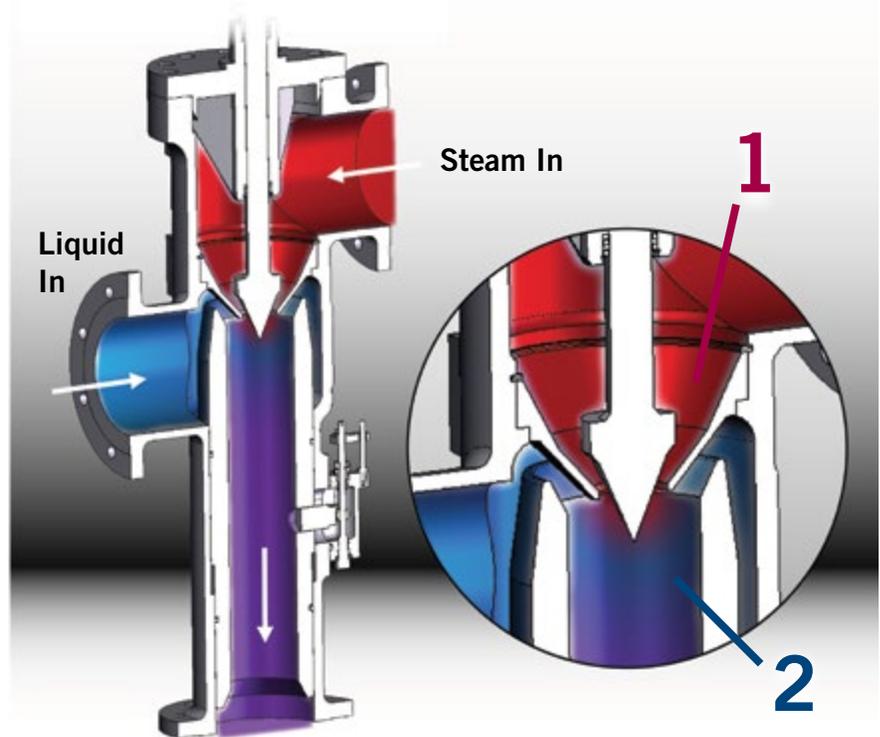
Two distinct, yet interrelated, properties for effective and uniform heating of liquids or slurries are used. These methods maximize control of the process for accurate temperature control, smooth operation and the flexibility to optimize performance under varying conditions.

## 1. INTERNAL MODULATION

Assure precise steam control and produce predictable results based on the position of the stem plug. A variable-area steam nozzle meters steam flow at the point where steam and liquid first contact and mix. This technique eliminates the need for an external steam control valve. Only the cross sectional area of the steam nozzle moves which provides process stability through a much wider variation of your process conditions.

## 2. CHOKED FLOW

The process of accelerating a vapor to maximum velocity by creating a pressure differential through an engineered nozzle. Establishing choked flow precisely controls the heating of the liquid by metering the steam mass flow. When operating under choked flow, the steam velocity will be constant which prevents liquid pressure fluctuations from affecting the discharge temperature. The result is extremely precise temperature control with instantaneous steam mixing and condensation.



# Field Support and Services

One benefit of the Hydroheater is low maintenance. However, it should be regularly inspected as a preventative measure. Backed by our exclusive 100% Performance Warranty (see back page), we assure it will perform as designed.

Maintenance plans include:

- » **Engineering Services** Our team includes engineers with the Certified Steam System Specialist designation through the US Department of Energy (DOE), P.E., PhD, and other specialty training designations.
- » **Training** We teach your staff how to maintain, operate and troubleshoot the Hydroheater.
- » **On-site Technicians** We will send knowledgeable technicians to you to maintain your heater or system.
- » **Refurbishment Services** We can provide complete rebuild services for your Hydroheater.
- » **24-hour Help Desk** Call our help desk or email us for engineering advice concerning your direct steam injection hydroheater.



## *Moving Forward*

Hydro-Thermal has an active R&D and new product development team working on fresh and inventive technology. We are developing groundbreaking understanding of condensation phenomenon and CFD modeling through a cooperative agreement with a well respected university. This work has led to several patents that improve mixing and process stability, as well as addressing practical issues such as reducing sound levels and improving product life. We're applying this technology in diverse areas such as cellulosic ethanol, wastewater treatment, soup and sauce cooking and very large flow water heating.

We are proud of our heritage and look forward to the future. Watch Hydro-Thermal for frequent technology announcements at [www.hydro-thermal.com](http://www.hydro-thermal.com).



Hydro-Thermal is ISO 9001 certified, with PED, CRN and CE certifications. We are focused on lean manufacturing and employ a talented team of engineers that fit the application to a custom situation and determine where direct steam injection is a SMART investment for your process.

†Hydroheater, Solaris, Jetcooker, EZ Heater and K5 Autopilot are trademarks registered in the US Patent and Trademark Office and registered internationally.

## 100% Performance Warranty

If, at any time and for any reason, a Hydroheater should fail to perform as designed,\* and Hydro-Thermal is given adequate opportunity to provide a remedy, Hydro-Thermal will, after receipt of the unsatisfactory unit, reimburse 100 percent of the original purchase price.

\*Proper replacement of wear parts required



## Hydro-Thermal Corporation

Hydro-Thermal Corp. is a global manufacturing company that designs and manufactures three-way steam heating valves called Hydroheaters. Our patented heating system completely mixes steam and process liquids while delivering precise and consistent temperature, instantaneous heating and no scaling or fouling of the product. Our full line of heaters and cookers support the production of pulp and paper, ethanol, soup and sauces, chemicals and pet food.

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**THERMAL**®

400 Pilot Court, Waukesha, WI 53188 USA  
P(262)548-8900 | T(800)952-0121 | F(262)548-8908  
www.hydro-thermal.com | info@hydro-thermal.com

