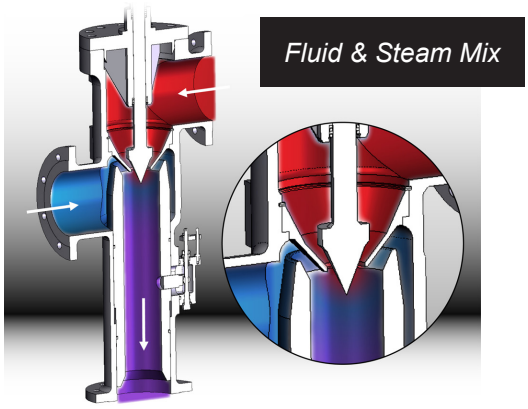
hydro THERMAL®
SINCE 1934
A HERITAGE OF STEAM INNOVATION

HYDROHEATER
FOR INDUSTRIAL APPLICATIONS

The Hydroheater is used in a wide range of industries including: ethanol & grain processing, pulp & paper, food & beverage, wastewater, mining, chemical and more. It is very effective for heating complex fluid types because of the adjustability inherent to this configuration. This workhorse has been used in many applications, with decades of solid experience, making it the outstanding leaderin direct steam injection heating.



Key Design Features

» **Internal Modulation:** Steam flow is controlled at the injection point, not by an external steam control valve. Steam velocity and mixing is consistent across the operating range and other dynamic complexities are minimized.

» **Choked Flow:** Steam to process pressure operates in the choked flow regime, resulting in excellent steam mixing, uniform heating and process stability.

» **Adjustable Flow Geometry:** Both steam & process geometry can be adjusted, providing excellent turndown ability.

» **Customized Internal Components:** Each application is engineered specifically for your process and further modification is possible.

» **Robust Design:** Heavy-duty design; cast construction

Process Benefits

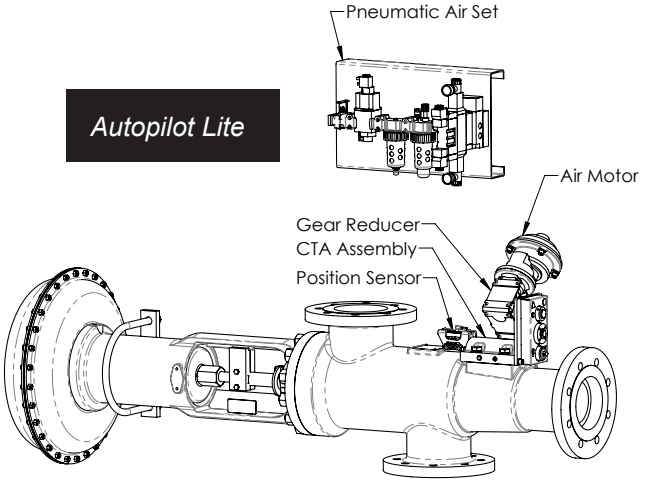
» **Non-clogging:** Internal modulation and choked flow eliminates clogging of steam supply. The Hydroheater self-cleaning design sends high velocity steam through the heater, eliminating fouling and clogging opposed to numerous applications where heat exchangers and spargers are used.

» **Near Instantaneous Heating:** Provides a highly mixed, homogenous temperature profile. Condensation occurs within the heater and is minimized in the downstream piping eliminating hammer as seen in less complex steam sparging configurations.

» **Process Stability:** Operating in the choked flow regime means that a process pressure change will not affect steam flow, and thus, temperature. This results in a stable process with less hunting and variation. In contrast, when using sparging-type steam injection systems, process pressure variations result in temperature variations and process instability.

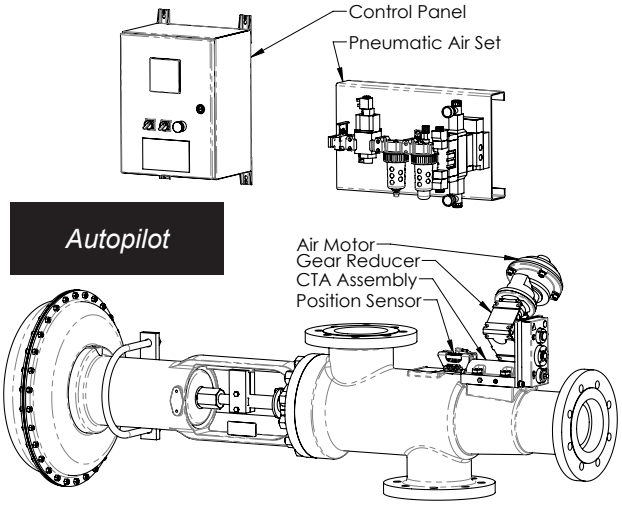
» **Process Flexibility:** With high turndown, either in steam usage or flow rate, the Hydroheater is well-suited because of the adjustable combining tube to maintain flow patterns.

Electric option available. Electric stepper motor with encoder would replace air motor, position sensor and air-set.



Adaptation for Abrasive Fluids

The Industrial Hydroheater is very robust and reliable, and can be further enhanced as needed for heating abrasive fluids. For many applications, a weld overlay and enriched material in key areas is sufficient. Some applications such as slurries with sand content require additional overlays outside the basic weld overlay. This technique has greatly increased the heater's internal component lifespan. Other fluids have required more extensive modifications. In oil sands froth heating applications, for example, a combination of a weld overlay as well as the use of hard, abrasive resistant materials is recommended. For specific requirements for your application, please contact Hydro-Thermal directly.



Autopilot

The Autopilot™ automatically adjusts the Hydroheater's product flow path as process conditions change to maintain a constant pressure drop across the unit. This results in optimized shear, mixing characteristics, and more effective starch conversion, leading to lower enzyme usage and higher yields.

To maintain a constant product pressure drop, the Autopilot automatically adjusts the position of the combining tube as needed.

The outputs to the DCS are the measured pressure drop, and the combining tube position. The alarm outputs are: analog range alarm, combining tube over travel alarm, and the no movement/reverse movement alarms. These are available locally at the control panel via indicator screens, and also provide output to a DCS as discrete signals.

To adjust the flow path, the integral gear motor rotates the drive shaft through an air motor geared to the combining tube drive shaft; this moves the combing tube linearly, thereby adjusting the combining tube to nozzle gap. As the combining tube/nozzle gap is widened, the pressure drop is lowered. As the gap is narrowed or closed, the pressure drop is increased.

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