

The Prosonix logo features the word "Prosonix" in a bold, blue, sans-serif font. The letter "o" is stylized with a red-to-orange gradient and is surrounded by two concentric, overlapping loops of the same gradient color, resembling a stylized "S" or a signal wave.

Prosonix

SOLUTIONS AT THE SPEED OF SOUND



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PROSONIX PROCESS HEATING SOLUTIONS *features & benefits*



How It Works

- The PSX Inline Direct Steam Injection heater uses a unique method of steam injection, Internal Steam Modulation, which offers a precise method of steam control through a variable area, **choked flow**, steam injector
- Steam is accelerated through the steam diffuser into the steam condensing chamber, for sonic velocity injection, where it is thoroughly mixed with the liquid to achieve rapid energy transfer
- The steam diffuser controls the mass flow of steam so that it can precisely meter the amount that is required for the heating load
- Internal Modulation delivers stable and vibration free operation
- Low Liquid Pressure Drop across the heater (typically 1-2 psig) reduces pump energy demand

A Design to Fit All of Your Process or Utility Heating Needs:

- D-Series (Jet Diffuser): Designed for reliable continuous or intermittent water and slurry heating applications.
- C-Series (Coaxial Jet Cooker): Next generation Jet Cooker for improved starch cooking processes.
- J-Series (Jet Sparger): High velocity steam delivery for improved tank, vessel, and in pipe heating.
- I-Series (Inline Jet Diffuser): Designed for difficult to pump slurries, sludges, and fibrous or aggressive fluids.

Choked Flow DSI Technology Delivers Heating Performance You Can Rely on...

The PSX Direct Steam Injection (DSI) Heater operates under the choked flow principle. Choked flow is the process of physically passing the maximum amount of steam through the injector as possible. Having a choked steam discharge gives us the ability to accelerate steam flow into a high velocity jet. This high velocity steam disperses into fine droplets which rapidly condense and raise the liquid temperature in a precise manner. The fine particles impart their energy into the incoming liquid evenly, allowing for thorough mixing, rapid heating, and smooth operation.

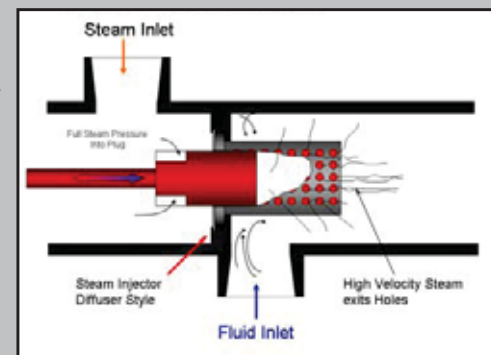
PSX Jet Diffuser D-Series Heater™

Advantages & Improvements

- Precise temperature control (+/- 1°F)
- Flow rates from 1 - 5,000 gpm
- Compact size and no floor space required
- Temp rise of up to 250 degrees F in a single pass through the heater.
- The PSX Direct Steam Injection heater uses both the latent and sensible heat of the steam providing up to 100% efficient energy use
- The PSX DSI heater is easily configured to fit existing piping to replace heat exchangers and sparging devices, rotatable steam inlet allows for simple steam piping connection
- Eliminates plugging and fouling as there are no hot surfaces to scorch slurry
- Does not require condensate return system
- Well suited for water and light slurries
- Self cleaning design reduces maintenance and provides more reliability for your process by eliminating mineral & scale build-up

Common Applications & Solutions

- Water and light slurry heating
- Intermittent heating applications
- Tank heating for rapid heat-up and trim heating
- Jacketed Vessel and Kettle heating for cascade control
- De-activation of waste and post production fluid streams
- Replacement of inefficient sparge devices
- Washdown and CIP cleaning
- Replacement of maintenance prone steam sparge devices



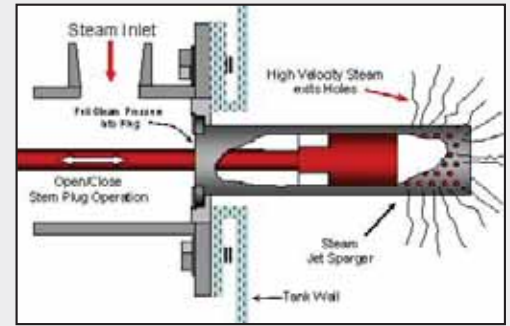
ProSonix™ J-Series Jet Sparger

Advantages & Improvements

- High velocity steam injection to improve steam mixing and rapid condensation
- Reduced process upsets (hammer & vibration) and reduced energy loss
- Integral steam flow control with double acting air cylinder
- Simple installation as steam inlet connection rotates 360 degrees with flange mount design
- Automatic (Local or Remote) or manual control
- Available in 316 SS and Carbon Steel construction
- Optional Pneumatic Actuator for modulated steam control available for more demanding applications

Common Applications & Solutions

- Suitable for water and slurry heating applications
- Tank & vessel heating
- Pipe mount for inline process fluid heating
- Vent Steam recovery & utilization
- Boiler feedwater pre-heating
- Multiple Jet Spargers (2 or more) can be installed on Tank heating for initial mass heat-up and trim temperature maintenance



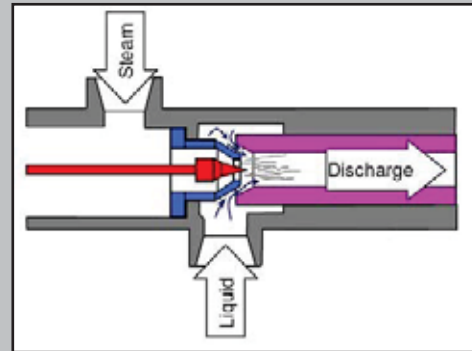
PSX OptiShear™ C-Series Jet Cooker

Advantages & Improvements

- Radial Slurry Flow assured by the precise alignment between the Condensing Tube and Steam Injector for more uniform flow
- Optimized Starch Cooking Performance leads to improve yields and a reduction in enzyme & chemical costs
- Reduced Maintenance and reduced localized wear
- Automatic Control is designed for remote operation
- No Black Box Controls or Proprietary Software - Control direct from your plant DCS/PLC
- Condensing Tube adjustment uses no plant air. Simple AC motor controls
- Ease of Installation via the Positional Steam Inlet

Common Applications & Solutions

- Wet & Dry Mill Starch Conversion Applications
- Sweetener & Alcohol production
- Ethanol production
- Paper starch processing
- Industrial starch processing



PSX Inline Diffuser I-Series Heater™

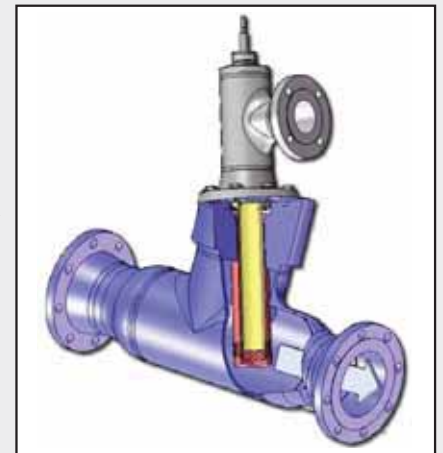
Patent Pending

Advantages & Improvements

- Flow rates from 1 - 10,000 gpm
- Compact size and no floor space required
- Temp rise of up to 250 degrees F in a single pass through the heater.
- The PSX Direct Steam Injection heater uses both the latent and sensible heat of the steam providing up to 100% efficient energy use
- The PSX DSI heater is easily configured to fit existing piping to replace heat exchangers and sparging devices
- Eliminates plugging and fouling with no problematic scale build-up.
- Does not require condensate return system
- Ability to handle high particulate, large particles and difficult to pump slurries, fibrous & thick stock slurries & sludges
- Self cleaning design reduces maintenance and provides more reliability for your process
- Precise temperature control to +/- 1 degree F

Common Applications & Solutions

- High viscosity fluids that are difficult to pump
- Fibrous slurries that require precise & uniform heating such as pulp stock heat & bleaching, and Biomass Pretreatment
- Anaerobic digestion wastewater sludge heating for Municipal & Industrial wastewater, along with Biogas production for Agricultural & Food processing
- High solids concentration slurries with large particulates
- Mineral processing & mining applications with abrasive issues
- Slurries that require minimal flow disruption



Direct Steam Injection Heater



Standard Features & Options

Energy Efficient

Utilizes both the sensible and latent heat, and along with no condensate heat loss, provides nearly 100% energy efficiency

No Steam Control Valve Required

Integral Pneumatic Actuator eliminates the need for Steam Control Valve and features "Fail Safe Close" Mode

Internally Modulated Steam Control

The Integral Pneumatic Actuator controls the Mass flow of the steam for sonic steam delivery and smooth reliable operation

Precise Temperature Control

Typical temperature control to +/- 1°F

Low Pressure Drop

The PSX Heater Diffuser design has a low pressure Drop (typically 1-2 psig) for ease of integration with your pump and process

Self Cleaning Design

Eliminates concerns over mineral scale build-up. No hot surfaces for burn or scorch sensitive materials to build upon

Water, High Viscosity or High Solids Slurries & Hard to Pump Sludges

ProSonix has multiple Steam Injector Heater designs to address all of your Process and Utility heating needs

Control Input Options

Standard control input for actuator is pneumatic. I/P's, pneumatic and electro-pneumatic positioners are available

Positional Steam Inlet

Steam Inlet can be rotated 360° to meet incoming steam pipe. 150 or 300 psig ratings available

Steam Head

316 SS & carbon steel standard (Additional Alloys available)

Jet Diffuser Design

Delivers Choked Flow steam injection for vibration free operation, precise temperature control, and smooth process integration

PSX Heater Body

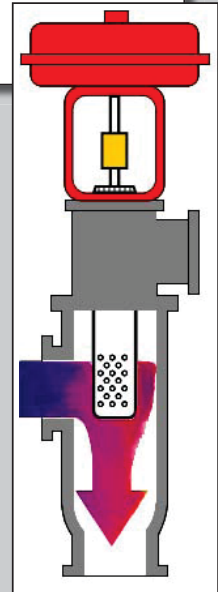
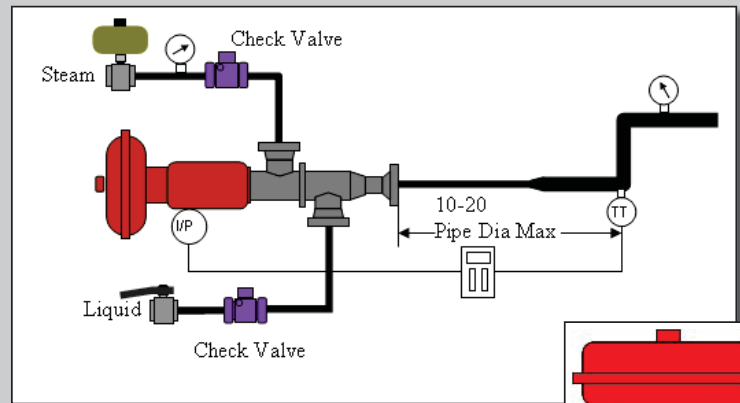
PSX Heater body is standard 316 SS or Carbon Steel (Optional Alloys and wear coatings available)

Abrasive & Corrosive Slurries

PSX Heaters available with wear coatings and special alloys for aggressive fluids.

Additional Features & Benefits:

- Designed in accordance with ASME B31.1 Power Piping codes
- Flowrates from 1 – 5,000 gpm
- Compact design allows for ease of installation and no dedicated floor space
- Note: Control input signal will vary by PSX Heater size (5-15, 3-15, or 6-30 psig)



Local PROSONIX Representative

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PERFORMANCE GUARANTEE

At ProSonix, it is our philosophy to meet and exceed our customer's needs and expectations. It is our desire to provide a solution that will perform and give what is needed, not just what is specified. To this end, ProSonix will guarantee that our proposed solution will perform as outlined in our proposal and to the conditions outlined in our heater sizing worksheet. If, after making our best effort, our equipment fails to perform as proposed, ProSonix will reimburse

100% of your purchase price for the ProSonix equipment upon receiving the returned equipment. Please contact ProSonix for additional details.

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