



Process and Installation Recommendations:

- **Steam Pressure** – Steam supply pressure should be stable. If steam supply varies greater than +/- 10% of the design pressure, a steam pressure regulating valve should be installed to stabilize steam pressure. A loss of steam pressure or spikes of steam pressure can cause unstable operation.
- **Fluid Pressure** – The liquid pressure cannot exceed the Max Backpressure listed on the PSX Heater sizing worksheet to insure stable operation.
- **Pump** - The fluid or slurry pump should operate with a steady output flow to maintain continuous flow to the PSX heater.
- The PSX steam inlet can be rotated 360° to meet incoming steam line. Specific steam inlet positioning is based on flange bolt arrangement.
- A steam trap and strainer is recommended on the incoming steam line.
- The PSX heater can be mounted in any orientation. An inverted install with the actuator pointing downward may not be wise as the actuator will become a drip point.
- The RTD and temperature switch should be placed down stream of the ProSonix heater, no more than 20 pipe diameters after discharge of PSX heater.
- A minimum of 10 pipe diameters of straight smooth pipe after heater before any instrument, elbow, or valve installation.
- Verify proper pipe supports to independently support the piping from the heater and then the heater independent from the piping.
- Placement near a pump needs to be reviewed to allow for fully developed flow or suction issues.
- Please refer to the ProSonix heater Owner's Manual for complete installation & safety details.

Steam Strainer Sizing Guidelines			
Heater Steam Inlet	Max. Opening (in.)	Heater Steam Inlet	Max. Opening (in.)
1.0"	0.020	4.0"	0.030
1.5"	0.020	6.0"	0.050
2.0"	0.020	8.0"	0.063
3.0"	0.030	10.0"	0.125



Temperature Probe - The temperature probe is a vital element in successfully controlling the PSX heater. The PSX heater will typically be among the fastest responding elements in the control system. As such, it is vital that the temperature response from the probe be as fast as possible. The following recommendations will apply to most installations:

1. Place the probe in a location where it will see well established flow
2. Place the probe no more than 20 pipe diameters from the PSX heater.
3. Use reduced Tip thermo-wells or bare sensors if the system will allow them
4. RTD's or Thermocouples may be used.
5. Temperature Transmitters, if used, should be designed to fail at high temperature output to prevent the heater from overheating the process upon failure.

Steam Traps & Blow Down

Steam will cool and condense in the pipe during normal operation. A well insulated pipe will minimize this effect. The condensed steam travels at high velocity and may cause damage to the PSX Heater or steam piping. Condensate may be removed using a device known as a steam trap. A valve may also be used to purge water from a low spot in the pipe.

1. A steam trap and drop leg with blow down valve should be installed on the steam inlet piping, upstream of the check valve.
2. Steam piping should be blown down after any extended shutdown to insure all condensate has been purged from the steam line. Install a trap in the steam supply line close to PSX Heater to remove any condensate before it can cause noise and vibration in PSX Heater.

Steam Strainer

The PSX Inline heater utilizes a Jet Diffuser for smooth operation, so a strainer should be installed on the steam line in order to insure the diffuser does not plug. In general, the steam strainer should have openings no larger than the amount shown in the above table unless allowed by ProSonix technical personnel. The total capacity of the strainer should be large enough to ensure that the minimum steam pressure to the heater meets the steam requirements for the stated steam pressure at which the PSX heater was sized.

Steam Isolation Valve

Because the PSX heater is not a positive shutoff valve, a full port tight shutoff isolation (on/off) valve should be used to provide complete shutoff of steam during extended down periods or for PSX heater maintenance. A ball or butterfly valve, sized for low pressure drop is recommended. The isolation valves should be closed to isolate the supply line from the PSX Heater when the PSX Heater is not in operation for an extended period. **Note:** *A Steam Control valve should not be used to regulate or vary steam flow to the PSX Heater. The PSX Heater is designed to operate at full design steam pressure and will control the mass flow of the steam into the fluid via the variable opening PSX Jet Diffuser.*

Check Valve

A check valve should be placed approximately 5 pipe diameters from PSX Heater steam inlet. The check valve should be sized appropriately for minimal pressure drop into the heater. During times of PSX Heater shutdown, if water pressure is maintained in PSX Heater, the water will flood the steam piping if no check valve is present. Upon opening the steam block valve when restarting the system, steam hammer may occur in the inlet piping.

Flow Monitor (Low Flow Alarming)

A Flow switch is necessary when there is intermittent flow or there is a fear of loss of flow. If a flow meter is present in the system, the flow signal can be used as a means of detecting low flow conditions and shutting down the heater and closing the steam valve. Simply program a low flow switch into the control system. If there is a pump supplying the water and there is little fear of loss of supply to the pump, a switch on the pump motor or VFD can also provide low flow protection. A flow switch is the most reliable way of protecting the system from a low flow condition. A thermal flow switch such as *Ameritrol FX* series, or an *IFM Efactor SI* series, have no moving parts and provide good protection.