Steam/Water Heaters
Steam/water heaters are typically classified as instantaneous, semi-instantaneous and tank-type. Temperature control can be defined as either feed-forward or feedback.

Feedback systems are error-driven and rely upon an outlet or downstream thermostatic temperature-sensing device to detect a temperature change requirement and then modulate the steam to effect the heat exchange in an attempt to recover the heater set-point. Feedback systems are reactive, and a significant concern is their speed of response to system and application temperature control requirements.

Tank-Type Steam/Water Heaters (feedback)
Tank-type steam/water heaters typically include a temperature sensing element or coil immersed in a storage vessel with a separate, remote steam control valve. As a function of their integral and often significant storage capability, the poor response times often associated with the relationship of temperature-sensing device and steam control valve are less of an issue.

Tank-Type Steam/Water Heaters are a less attractive option because:
• They consume a large amount of valuable mechanical-room real estate.
• They have been identified as amplification and colonization points for Legionella bacteria.
• They have significant leak potential over time.
• Tank repair is difficult, and tank replacement often requires mechanical room/building structural modifications.
• They consume energy to heat and maintain what is effectively a reserve hot water supply.
• They require separate steam control valves, which require ongoing maintenance.
• They require thermostatic element/sensors which have shown a tendency to wear and eventually rupture under a heavy cycle load.
• They are slow to recover and may run out of hot water during peak load periods.

Tankless Instantaneous Steam/Water Heaters (feedback)
Tankless instantaneous steam/water heaters, often referred to as shell and tube heat exchangers, do not include hot water storage capacity. These models will rely upon either an outlet or downstream temperature-sensing element with a separate steam control valve.

Tankless Instantaneous Steam/Water Heaters are a less attractive option because:
• Lag time from message (thermostat) to action (control valve) creates thermal lag and a resulting temperature swing.
• Modulating steam supply can cause condensate evacuation issues, resulting in damage from water hammer and tube bundle corrosion.
• A cycling phenomenon during low- or no-demand periods will cause premature wear to the thermostatic element. Thermostats typically fail in an open position, making overheated, scald-temperature water available to the system.
Semi-Instantaneous Steam/Water Heaters (feedback)
Semi-instantaneous steam/water heaters typically include lower-capacity storage, with an integral steam control valve to deliver the heat exchange through an internally positioned element or coil.

Semi-Instantaneous Steam/Water Heaters are a less attractive option because:
- Poor low-flow temperature control creates an accumulation tank requirement.
- Accumulation tank creates recovery-time issues at peak demand.
- Heating element/coil in generation/accumulation tank is susceptible to failure and cross contamination.
- Accumulation tanks have been identified as amplification and colonization points for Legionella bacteria.
- Although a lower-cost option, semi-instantaneous steam/water heaters are a higher-maintenance selection.
- Semi-instantaneous steam/water heaters have a shorter service life before replacement than other choices.

Flo-Rite-Temp™ Feed-Forward Instantaneous Steam/Water Heaters
Flo-Rite-Temp feed-forward instantaneous steam/water heaters offer a simple yet time-proven alternative to traditional feedback instantaneous, semi-instantaneous and tank-type steam-heating methods.

By eliminating the temperature sensing feedback element and relying upon the actual hot water system demand requirement within the system or application, feed-forward systems respond rapidly and are extremely accurate.

Flo-Rite-Temp Feed-Forward Instantaneous Steam/Water Heater is a more attractive option because:
- The constant, non-modulating steam pressure within the shell eliminates cycling damage.
- The system demand or flow feed-forward activation eliminates the requirement for either steam control valve or thermostatic control device.
- It delivers a consistent outlet temperature (+/-4°F of set-point) with no thermal lag and resulting temperature swing.
- It is extremely safe because the mixing unit will position to cold water flow upon failure of the primary operating component.
Flo-Rite-Temp™ Water Heaters—
The Unique Feed-Forward Principle

The Armstrong feed-forward design eliminates the troublesome temperature regulator and uses a differential pressure diaphragm valve to regulate flow and control temperature. The valve teams up with a shell and tube heat exchanger to complete the system.

The idea is simple: Overheat water in the heat exchanger and then blend it (as needed) with proportional amounts of cold water to achieve the correct outlet temperature for a wide range of flows. There’s no storage tank or potential health hazard posed by standing water.

Gives you a jump on peak demand periods. The differential pressure diaphragm acts immediately upon a change of demand so there’s no lag time. You get all the hot water you need—up to the unit’s capacity—instantly. What’s more, if the diaphragm fails, a spring returns the valve to a closed position (cold), so there’s no danger of scalding by accident.

Makes maintenance a straight, easy shot. Virtually everything about the design and operation of the Flo-Rite-Temp reduces maintenance. (See below.) For starters, the tubes inside the carbon steel shell are straight for easy mechanical cleaning. And steam pressure in the heat exchanger is not modulated but constant, which ensures condensate drainage and nixes potential water hammer and corrosion.

Pushes you out front in savings. When it comes to replacing a bulky storage tank system, the choice is clear. The Flo-Rite-Temp consumes dramatically less floor space, and you don’t have to tear out walls to install it. In fact, it slips through a standard doorway. Payoff? Lower installed cost.

Easy, one-time temperature adjustment

Automatic air venting

Integral mounted control valve provides rigid construction with no intermediate piping to leak

All controlling valves and moving parts see nothing but cold water—no scaling or valve fouling

Water differential demand actuated control—instantaneous, proactive temperature control—no lag time
Another advantage: An energy-efficient Armstrong Flo-Rite-Temp instantaneous water heater won’t waste energy by constantly reheating stored water. You can even insulate the heat exchanger shell for greater savings.

**Heat it as you need it.** Match your capacity needs with one of the four models of Armstrong’s Flo-Rite-Temp instantaneous water heaters. For an application overview or technical assistance in selecting and installing, contact your Armstrong Representative today.

<table>
<thead>
<tr>
<th>How Flo-Rite-Temp Scores on Key Benefits</th>
<th>Flo-Rite-Temp</th>
<th>Storage Tank</th>
<th>Tankless Instantaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serves space</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Serves energy</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Eliminates temp. swings</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Eliminates thermal lag</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Ensures accurate control</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Designed with straight tubes for easy cleaning</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Eliminates potential health hazard of standing water</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Fails cold for safety</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Eliminates thermostatic control</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Constant steam pressure means positive condensate removal and no more corroded, ruptured bundles

Floating head reduces tube stress

Straight tubes for easy cleaning and easy removal

Removable end cover allows easy cleaning and 100% visual tube inspection