



# CSX Instantaneous Steam-to-Water Heater

High-Temperature Blend-down System

Designed for Buildings with Re-circulating Domestic Water Loops



CSX single-exchanger models range in output from 15 to 75gpm of 140°F water with 15 psi steam. Packaged dual-exchanger systems are available.

Fixed-temperature valves (tamper-proof) are available to provide 120°F, 140°F or 160°F outlet water to within  $\pm 5$  °F. Valve failure results in cold water flow.

Exchanger is passivated 316L stainless steel with corrugated, helical tubing and a counter-flow design for low floor space requirements. Water is in the shell and steam in the tubes.

High-temperature blend-down is an approach to domestic water heating where potable water is initially heated by a steam heat exchanger to 220°F to 250°F and then is blended with cold water through a mixing valve to achieve the required outlet temperature. The approach avoids modulating steam to control water temperature and instead relies on the modulation of flows of cold and hot water.

## CSX Compared to Competitive Blend-Down Water Heaters with Building Re-Circulation

### Greater Temperature Accuracy - dual control valves

CSX controls the blending of hot and cold water through two separate fixed-temperature mixing valves downstream of the heat exchanger. With a building re-circulation loop, both valves are always blending.

### Greater Safety - high-limit shutdown system

CSX is equipped with a high-temperature shutoff device on the hot water piping. Thermostats monitor the downstream side of both blending valves. A solenoid valve shuts off flow from the heat exchanger if water temperatures climb above either high-limit threshold.

### True Clean-in-Place Capability

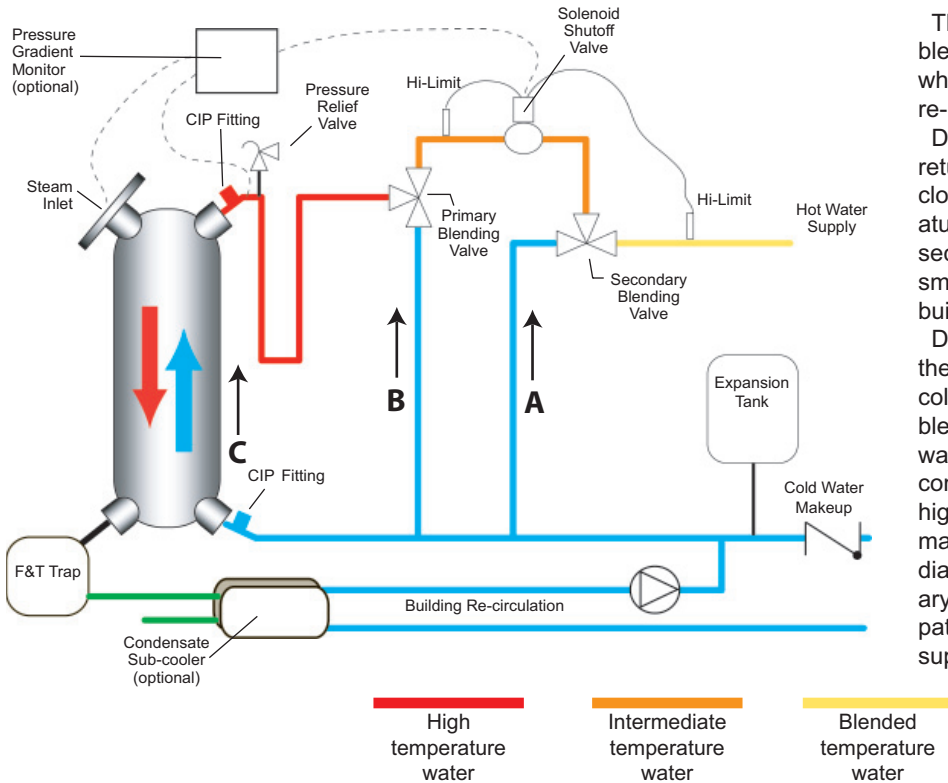
Unlike competitive designs that require the breaking of piping connections or the removal of blending valves to access the waterside of the heat exchanger, CSX provides two readily accessible CIP threaded fittings. All piping remains intact during cleaning.

### Variable "Cold" Water Temperature is No Problem

The dual CSX blending valves respond seamlessly to variable temperature and flow at the cold inlet port and produce water within 5 degrees of the system's setpoint temperature.

Competitive designs use a blending valve that responds to flow as the only variable input. Using this type of valve requires the cold water temperature at the valve inlet to remain constant. With a building recirculating loop, water at the valve's cold inlet can range from 40°F to 110°F. The valve has no internal means to adjust to this variable and can miss the outlet temperature target by a wide margin. Without additional downstream blending valves, over- or under-temperature water can enter the domestic water system.

## Operation of the CSX water heater in applications with building re-circulating potable water loops.



The temperature setting on the secondary blending valve determines the path water takes when returning to the CSX from the building re-circulation loop.

During periods of low demand when water returning to the CSX from the building loop is close to the required hot water supply temperature, water is mainly channeled through the secondary valve (path A) where it mixes with a small amount of hot water and is returned to the building.

During periods of high demand when most of the water in the return line to the CSX is makeup cold water, the cold inlet port on the secondary blending valve will narrow, forcing most of the water through paths B and C. These two paths combine at the primary blending valve where high temperature water (path C) mixes with cold makeup water (path B). The resulting intermediate temperature water, travels to the secondary blending valve, mixes with cold water from path A and re-enters the building potable water supply lines at the proper temperature.

## Key Components of the CSX

**CSX heat exchanger** - an ASME code, 316L stainless steel, shell-and-tube exchanger where potable water is heated to between 200° and 250°F depending upon supply steam pressure and hot water demand (flow rate)

**Primary blending valve** - an all-bronze, thermostatic, fixed-temperature mixing valve where over-heated water is tempered with cold water. Hot water outlet will be approximately 20°F higher than the outlet set point of the secondary blending valve

**Secondary blending valve** - an all-bronze, thermostatic, fixed-temperature mixing valve located downstream of the primary blending valve and set to supply water at the required domestic hot water temperature

**High-temperature limits** - safety devices; one located in the intermediate temperature water line and one located in the final hot water supply line. When sensing water temperature above their set points, the thermostat breaks the circuit holding the solenoid valve open.

**Solenoid shutoff valve** - shuts off water flow from the high-temperature side of the CSX water heater in the event of high-temperature downstream of the blending valves or a pressure equalization occurrence (if pressure gradient monitor is supplied)

**Pressure relief valve** - set to relieve pressures above 150 psi

**Steam inlet valve (factory piped)** - modulating, pressure-pilot steam valve is standard equipment when supply steam pressure is above 15 psi and optional when supply steam pressures are at or below 15 psi

**Pressure gradient monitor** - device that monitors steam side and water side pressures. Equalization of these pressures might indicate a heat exchanger tube wall breach and, if equalization is detected, the control breaks the circuit that keeps the solenoid shutoff valve open. (optional)

**Condensate sub-cooler** - additional heat exchanger used to pre-heat building re-circulating water with condensate and reduces condensate temperature to below 100°F. (optional)



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