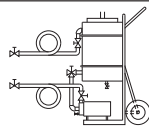
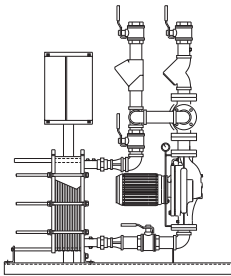

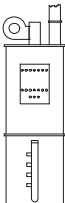
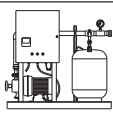


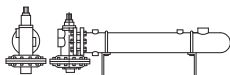
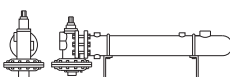
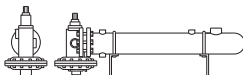
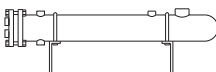
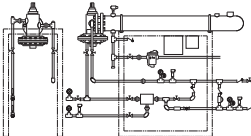


Hot Water

Water Heaters and Water Temperature Controls ID Charts

Water Heaters and Accessories										
Illustration	Type	Fluid	Connection Type	Max. Allow. Press.	TMA °F	Body Material	Model	Max. Oper. Press.	Connection Size	Located on Page
	Clean-In-Place Scale Removal System	Rite-Qwik Scale Solvent	NPT	Atmospheric	140	Teflon Coated Cast Iron (Pump) Polypropylene (Tank) PVC (Pipe & Hose)	CIP	Atmospheric	1"	For additional information, please visit our website at armstronginternational.com or contact your local Armstrong representative.
	Fio-H ₂ O™ Water to Water Instantaneous Water Heater (Single-Walled Plate and Frame Exchanger)	Boiler Water and Domestic Water	NPT	125 psi	200	Bronze (Valve)	40	125	2" Boiler 2" Domestic 1-1/4" Recirc.	
			NPT			Brass (Piping) Stainless Steel (Heat Exchanger Plates)	70	125	2-1/2" Boiler 2" Domestic 1-1/4" Recirc.	
			NPT			Cast Iron (Actuator)	100	125	3" Boiler 3" Domestic 1-1/4" Recirc.	
	Fio-H ₂ O™ Water to Water Instantaneous Water Heater (Double-Walled Plate and Frame Exchanger)	Boiler Water and Domestic Water	NPT	125 psi	200	Bronze (Valve)	40	125	2" Boiler 2" Domestic 1-1/4" Recirc.	
			NPT			Brass (Piping) Stainless Steel (Heat Exchanger Plates)	70	125	2-1/2" Boiler 2" Domestic 1-1/4" Recirc.	
			NPT			Cast Iron (Actuator)	100	125	3" Boiler 3" Domestic 1-1/4" Recirc.	
	MS-6 Noiseless Heater	Steam	NPT	100 psi	190	304 Stainless Steel	MS-6	100	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	549
Fio-Direct®										
Illustration	Type	Fluid	Conn. Type		Body Material	Model	Gas Conn.	Water Conn.		
			Gas	Water						
	Fio-Direct Direct Fired Water Heater	Natural Gas and Water	NPT	NPT	Stainless Steel	1000	1"	1"	524	
						1500	1"	1"		
						3000	1-1/2"	1-1/2"		
						5000	2"	2-1/2"		
						7000	2"	3"		
						9000	2-1/2"	3"		
						11000	3"	4"		
						15000	3"	4"		
						18000	3"	4"		
			Buttweld	ANSI 150# Flanged		25000	4"	6"		
VFD Pump Package										
Illustration	Type	Fluid	Conn. Type		Body Material	Model	Water Conn.			
			Gas	Water			Inlet	Outlet		
	VFD Pump Package	Water	ANSI 150# Flanged	NPT	Cast Iron/ Bronze Fitted	VFD-50	1-1/2"	2"	531	
				ANSI 150# Flanged		VFD-100	3"	2 1/2"		
						VFD-175	3"	3"		
						VFD-250	3"	4"		

Water Heaters and Water Temperature Controls ID Charts

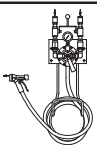
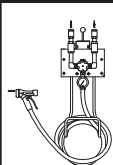
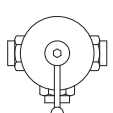
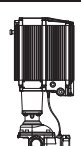
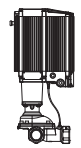
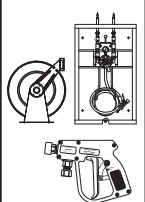
Flo-Rite-Temp™											
Illustration	Type	Fluid	Connection Type	Max. Allow. Press.	TMA °F	Body Material	Model	Max. Oper. Press.	Connection Size	Located on Page	
	Flo-Rite-Temp Steam to Water Instantaneous Water Heater (Single-Walled Heat Exchanger)	Steam and Water	NPT	150 psi (Steam)	300	Bronze (Valve)	415	125	1" Water		
			NPT					15	2" Steam		
			NPT				225 psi (Water)	665	125		1-1/2" Water
									15		2-1/2" Steam
			NPT (Water) ANSI 150 (Steam)	8120		125	2" Water				
						15	3" Steam				
						125	3" Water				
						15	4" Steam				
	Flo-Rite-Temp Steam to Water Instantaneous Water Heater (Double-Walled Heat Exchanger)	Steam and Water	NPT	150 psi (Steam)	300	Bronze (Valve)	415DW	125	1" Water		
			NPT					15	2" Steam		
			NPT				225 psi (Water)	665DW	125		1-1/2" Water
									15		2-1/2" Steam
			NPT (Water) ANSI 150 (Steam)	8120DW		125	2" Water				
						15	3" Steam				
						125	3" Water				
						15	4" Steam				
	Flo-Rite-Temp Steam to Water Instantaneous Water Heater (Single-Walled, All Stainless Steel Wetted Parts)	Steam and Water	NPT	150 psi (Steam)	300	316 Stainless Steel (Valve) Carbon Steel Shell with 316L Stainless Steel Tube Bundle (Heat Exchanger)	665 SS	125	2" Water		
								15	3" Steam		
			NPT (Water) ANSI 150 (Steam)	8120 SS			125	2" Water			
							15	4" Steam			
	Flo-Rite-Temp Shell and Tube Steam to Water Instantaneous Heat Exchanger	Steam and Water	NPT	150 psi (Steam)	375	Cast Iron (Stainless Optional) (Head) Carbon Steel Shell with Admiralty Brass Tube Bundle (Stainless Optional) (Heat Exchanger)	442ST	225	1-1/4" Water		
			NPT					150	2" Steam		
			NPT				225 psi (Water)	552ST	225		1-1/2" Water
									150		2-1/2" Steam
			NPT (Water) ANSI 150 (Steam)	662ST			225	2" Water			
							150	3" Steam			
				862ST			225	3" Water			
							150	4" Steam			
	Flo-Rite-Temp with The Brain and Complete Building Automation System Interface Solution (BASIS)	Steam and Water	NPT	150 psi (Steam)	300	Bronze (Valve) Carbon Steel Shell with Admiralty Brass Tube Bundle (Heat Exchanger)	415	125	1" Water		
								15	2" Steam		
							535	125	1-1/2" Water		
								15	2-1/2" Steam		
			NPT (Water) ANSI 150 (Steam)	665			125	2" Water			
							15	3" Steam			
							8120	125	3" Water		
								15	4" Steam		

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For additional information, please visit our website at armstronginternational.com or contact your local Armstrong representative.

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Industrial Sanitation, Safety & Process Control ID Charts

STEAMIX® Hose Stations and Mixing Units													
Illustration	Type	Connections NPT	Body Material	Model	Max. Flow Rate gpm	Max. Inlet Press. psig	Check Valves	Flow Controls	Hose Rack	Spray Nozzle	Shutdown Feature	Hose	Located on Page
	Steam & Water Mixing Unit	3/4"	Bronze/ Nickel Plated	VE/VES	9*	150		●	▲	▲	●	▲	539
				2030/2030S						●			
				2031/2031S				●			●		
				2032/2032S				●	●		●		
	Steam & Water Hose Station			2033/2033S				●	●	●	●	●	
Hot & Cold Hose Stations and Mixing Units													
	Hot & Cold Water Mixing Unit	3/4"	Chrome Plated Brass	3031/3031S	24†	150	S only	●			●		540
	Hot & Cold Water Hose Station			3032/3032S				●	●		●		
				3033/3033S				●	●	●	●	●	
				3401				●	●		●		
				3403				●	●	●	●	●	
Steam/Water Mixing Valves													
	Steam/Water Mixing Valves	1" x 1-1/4"	Chrome Plated Brass	A55	19*	100		●					
		1-1/2"		566	62*			●					
		2"		TS202	86*			●					
MegaMix™ Water Temperature Mixing Unit													
	Electronically Actuated Water Temperature Mixing Units	3/4" x 1"	Stainless Steel	E20W	36**	145					●		
		1" x 1-1/4"		E25W	56**						●		
		1-1/2" x 1-1/2"		E40W	88**						●		
		2" x 2-1/2"		E50W	213**						●		
		3" ASME B16.5 Class 150 Flg.		E80W	644**	232					●		
MegaMix™ Steam/Water Temperature Mixing Unit													
	Electronically Actuated Steam/Water Temperature Mixing Units	1" x 1-1/4"	Stainless Steel	E25S	36**	145					●		
		1-1/2" x 1-1/2"		E40S	60**						●		
		2" x 2-1/2"		E50S	119**						●		
Accessory Products													
	Washdown Equipment & Accessories	3/4"	Stainless Steel	F/SMCD Cabinet Assembly	—	—	●	●	●	●	●	●	
		1/2"	See Specification	038 Spray Nozzle	16	150				●			
		3/4" x 1/2"		035 Washdown Hose	—						●		
		3/4"	Enameled Steel/ Stainless Steel	047 Hose Reel	—								

For additional information, please visit our website at armstronginternational.com or contact your local Armstrong representative.

▲ Possible additions for VE units.

*Valve only at 100°F

**Cold Water Capacity @ 20 psi drop.

† 45 psi pressure drop to open outlet

For additional information, please visit our website at armstronginternational.com or contact your local Armstrong representative.

Steamix® - Will Not Pass Live Steam

Whisper quite operation is achieved by special steam diffuser design.

Will not pass live steam if cold water pressure falls or fails completely.

Rugged steam valve seat is made from new high-temperature-resistant polymer.

Fails safe.

Steamix will deliver only cold water if the primary operating component (diaphragm) is damaged.

Intrinsically safe.

Operating principle means steam can flow only if water is already flowing.

Reliable all stainless steel internal parts move freely every time flow takes place.

Flexibility of application allows Steamix to operate at lower steam pressures than other style dual globe valve Mixing "Y".

User friendly single-handle temperature control means no "juggling" of inlet supply globe valves is required to find temperature.

2-year warranty on mixing unit wetted components.

Lock in the temperature.

Tamper resistant locking device option allows Steamix to be preset to a desired temperature and locked. Discourages adjustments by unauthorized personnel.



Steamix® - Steam & Water Hose Stations - Standard

Steamix - Standard

The Steamix – Standard series is supplied fully assembled and pressure tested in the following configurations.

Steamix Model 2030 - is a steam/water mixing valve of brass/stainless steel construction.

Steamix Model 2031 - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with 3/4" inlet union connections with integral strainers, an outlet ball valve for flow control and an outlet dial thermometer.

Steamix Model 2032 - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with 3/4" inlet union connections with integral strainers, an outlet ball valve for flow control and an outlet dial thermometer. The unit is supplied installed on a stainless steel hose rack.

Steamix Model 2033 (shown) - is supplied as above and also includes 25 feet of "safety yellow" washdown hose, a rubber cushioned spray nozzle with, swivel adapter and a stainless steel nozzle hook.



Steamix® - Steam & Water Hose Stations - Premium

Steamix - Premium

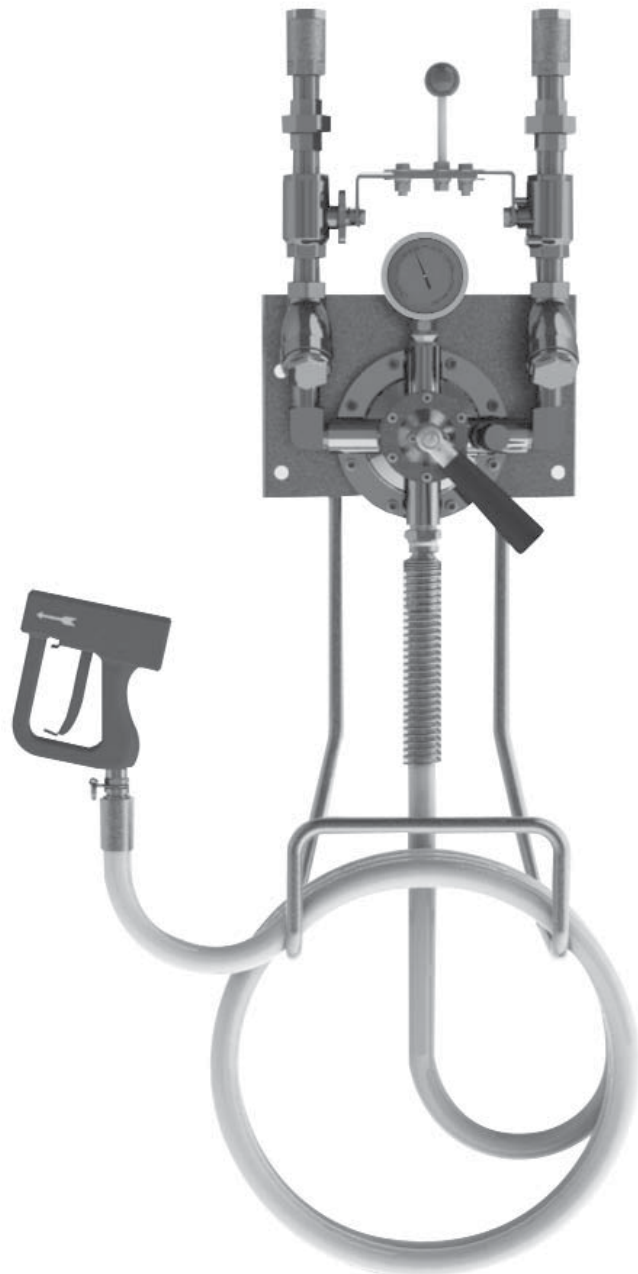
The Steamix – Premium series is supplied fully assembled and pressure tested in the following configurations.

Steamix Model 2031P - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with stainless steel dual scale top mount Thermometer and Inlet Check Valves.

Steamix Model 2032P - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Inlet Check Valves.

Steamix Model 2033P (shown) - is a steam/water mixing valve of brass/stainless steel construction. The valve is supplied as standard with integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Inlet Check Valves.

Steamix Model 2033P also includes 25 feet of "safety yellow" washdown hose rated, low-heat-transfer polymer spray nozzle with trigger guard, swivel adapter and a stainless steel nozzle hook.



Steamix® - Steam & Water Hose Stations - Stainless Steel

Steamix - Stainless Steel

The Steamix – Stainless Steel series is supplied fully assembled and pressure tested in the following configurations.

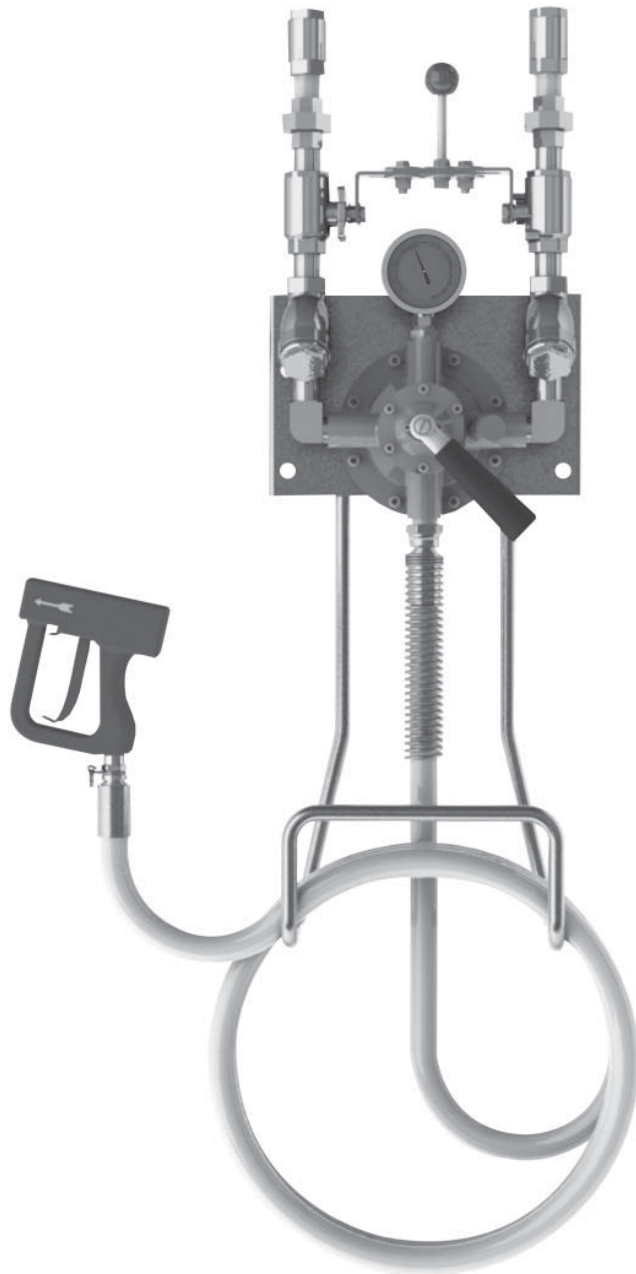
Steamix Model 2030SS - is a steam/water mixing valve of Type 304 stainless steel construction.

Steamix Model 2031SS - is a steam/water mixing valve of Type 304 stainless steel construction. The valve is supplied as standard with all stainless steel (SS) integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. Stainless Steel dual scale top mount Thermometer and Stainless Steel Inlet Check Valves.

Steamix Model 2032SS - is a steam/water mixing valve of Type 304 stainless steel construction. The valve is supplied as standard with all stainless steel (SS) integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Stainless Steel Inlet Check Valves.

Steamix Model 2033SS (shown) - is a steam/water mixing valve of Type 304 stainless steel construction. The valve is supplied as standard with all stainless steel (SS) integral inlet supply risers comprising 3/4" Y-type strainers and 3/4" ball valves cross-linked by a stainless steel bridge piece and lever for simultaneous on/off control of both inlet supplies. The unit is supplied with a stainless steel hose rack. Stainless Steel dual scale top mount Thermometer and Stainless Steel inlet Check Valves.

The STEAMIX Model 2033SS also includes 25 feet of "safety yellow" washdown hose, SS rubber cushioned spray nozzle with SS swivel adapter and a stainless steel nozzle hook.



Digital-Flo™
Instantaneous
Hot Water

- Shell & Tube
- Plate & Frame



Digital-Flo™ Instantaneous Hot Water

Armstrong blends revolutionary digital water temperature control technology with instantaneous heat exchanger design to deliver Digital-Flo™, an industry changing series of water heaters.

Digital-Flo Instantaneous Water Heaters refine hot water system temperature accuracy to a level previously deemed unattainable. By constantly monitoring the digital re-circulating valve (DRV 80) inlet hot, inlet cold and system return water temperatures, Digital-Flo previews the hot water system dynamics to increase the speed of response to changes in demand.

Capable of maintaining $\pm 2^{\circ}\text{F}/1^{\circ}\text{C}$ temperature at system draw off between 0 and 165GPM, Digital-Flo delivers a “plug and play” hot water generation packaged solution which places efficiency, energy savings and legionella risk reduction at the forefront of hot water system design, operation and maintenance.

Armstrong Digital Technology

- Powered by low voltage electronics
- Faster response times eliminate the need for pneumatic controls
- Programmable high/low temperature alert function
- Programmable hot water system safety shutdown
- Component self-diagnostics
- Performance monitoring, data logging and reporting
- Integral building management system connectivity
- Simplified system commissioning

Armstrong Heat Exchange Technology

- Constant steam pressure prevents stall - no pump trap
- Low surface temperature option for hard water applications
- Instantaneous - No Storage
- Water raised above Legionella survival temperature



Digital Steam/Water - Shell & Tube

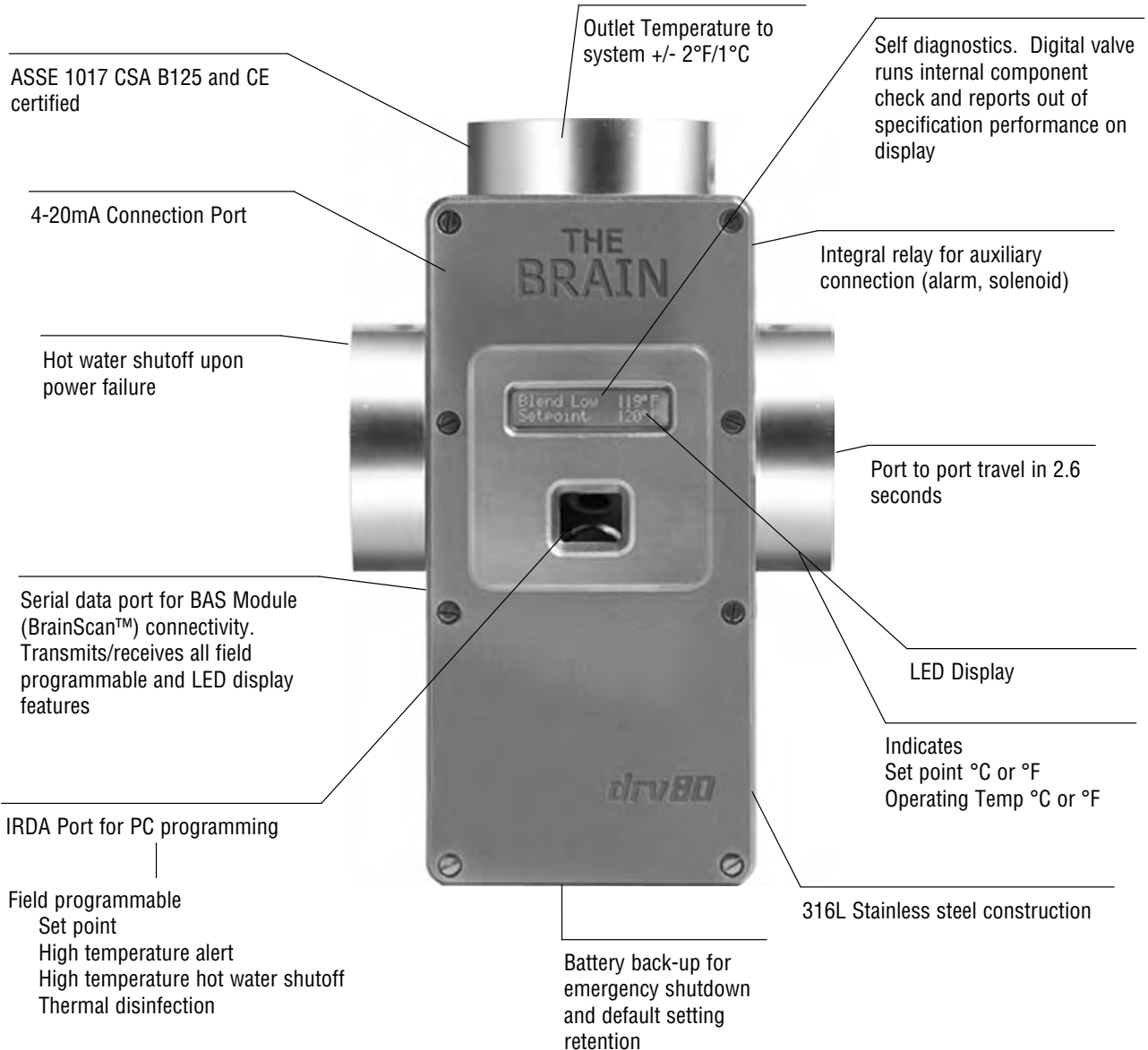


Digital Steam/Water - Plate & Frame
Digital Water/Water - Plate & Frame

All dimensions and weights are approximate. Use certified print for exact dimensions. Design and materials are subject to change without notice.

Digital-Flo™ Instantaneous Hot Water

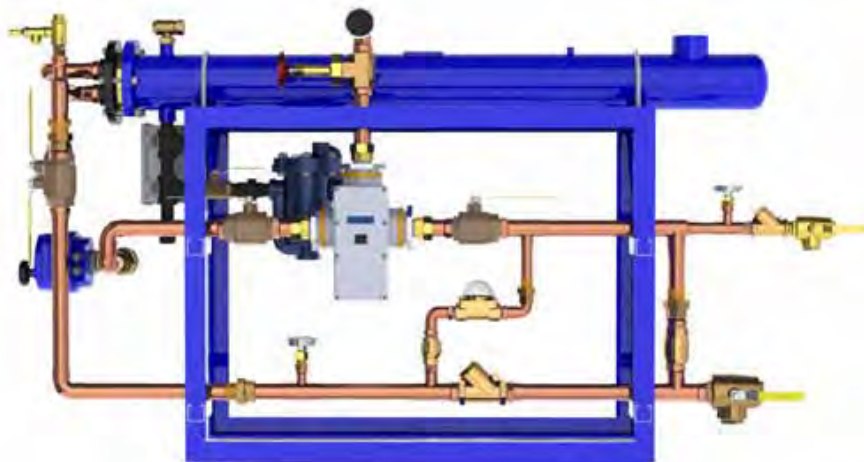
Digital Controller (DRV80)



Single integral digital control valve (DRV80) REPLACES:

- Steam Control Valve
- PID Controller
- High Temperature Limit Thermostat
- High Temperature Limit Controller
- Cold Water Injection Valve
- Internal Circulating Pump
- Compressed Air Requirement

Digital-Flo™ Shell & Tube Heat Exchanger

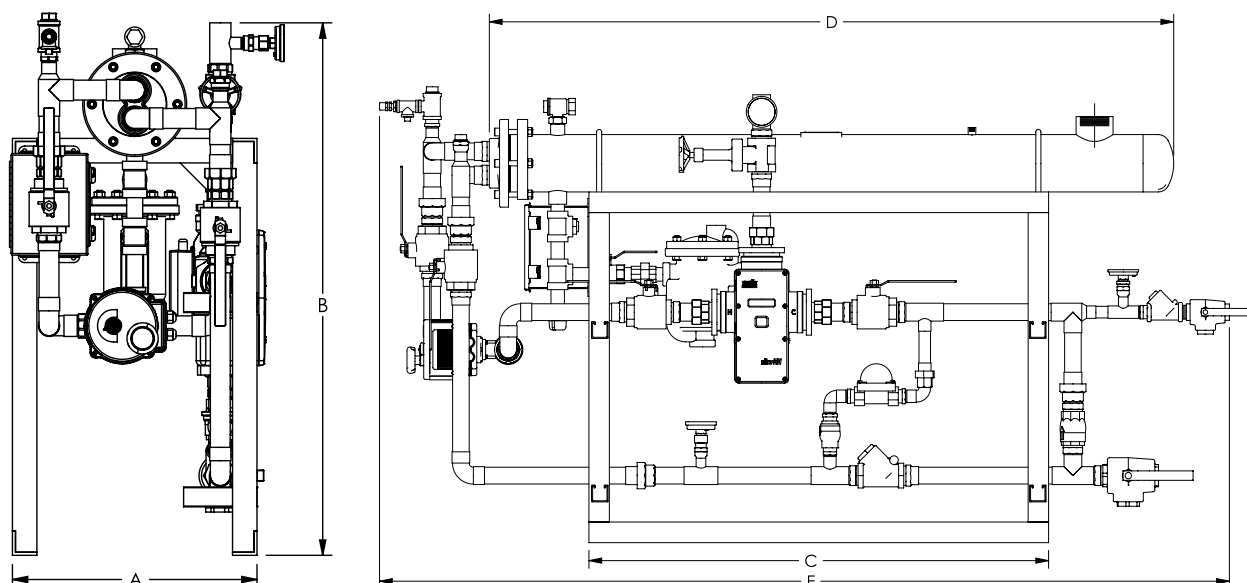


Digital Shell & Tube								
Model	Part Number	Certified Drawing	Water Side			Steam Side		
			Connections @ 7.5 ft/sec (2.3 m/s)		Flow @ 7.5 ft/sec (2.3 m/s)	Connections		Capacity @ 15 psi (1 bar)
			Hot/Cold	Recirc.	Capacity @ 100°F (55°C) Delta T	Steam Inlet	Condensate Outlet	
D535	D21983	CD2493	1.5" (40 mm)	1" (25 mm)	41.3 gpm (9.4 m3/hr)	2.5" (63.5 mm)	1" (25 mm)	2,185 lb/hr (991 kg/hr)
D535 P	D21981	CD2499	2" (50 mm)	1" (25 mm)	73.4 gpm (16.7 m3/hr)	2.5" (63.5 mm)	1" (25 mm)	3,883 lb/hr (1,761 kg/hr)
D665	D21979	CD2494	2" (50 mm)	2" (50 mm)	73.4 gpm (16.7 m3/hr)	3" (80 mm)	1.25" (32 mm)	3,883 lb/hr (1,761 kg/hr)
D665 P	D21722	CD2500	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	3" (80 mm)	1.25" (32 mm)	8,741 lb/hr (3,965 kg/hr)
D8120	D21977	CD2495	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	4" (102 mm)	2" (50 mm)	8,741 lb/hr (3,965 kg/hr)
D8120 P	D21640	CD2501	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	4" (102 mm)	2" (50 mm)	8,741 lb/hr (3,965 kg/hr)

Digital Shell & Tube Double Wall								
Model	Part Number	Certified Drawing	Water Side			Steam Side		
			Connections @ 7.5 ft/sec (2.3 m/s)		Flow @ 7.5 ft/sec (2.3 m/s)	Connections		Capacity @ 15 psi (1 bar)
			Hot/Cold	Recirc.	Capacity @ 100°F (55°C) Delta T	Steam Inlet	Condensate Outlet	
D535 DW	D21984	CD2496	1.5" (40 mm)	1" (25 mm)	41.3 gpm (9.4 m3/hr)	2.5" (63.5 mm)	1" (25 mm)	2,185 lb/hr (991 kg/hr)
D535 DW-P	D21982	CD2502	2" (50 mm)	1" (25 mm)	73.4 gpm (16.7 m3/hr)	2.5" (63.5 mm)	1" (25 mm)	3,883 lb/hr (1,761 kg/hr)
D665 DW	D21980	CD2497	2" (50 mm)	2" (50 mm)	73.4 gpm (16.7 m3/hr)	3" (80 mm)	1.25" (32 mm)	3,883 lb/hr (1,761 kg/hr)
D665 DW-P	D22000	CD2503	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	3" (80 mm)	1.25" (32 mm)	8,741 lb/hr (3,965 kg/hr)
D8120 DW	D21978	CD2498	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	4" (102 mm)	2" (50 mm)	8,741 lb/hr (3,965 kg/hr)
D8120 DW-P	D21975	CD2504	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	4" (102 mm)	2" (50 mm)	8,741 lb/hr (3,965 kg/hr)

Maximum Allowable Steam Pressure = 15.0 psi (1 bar), Maximum Allowable Water Pressure = 150 psi (10 bar), Maximum Allowable Setpoint = 158°F (70°C)

Digital-Flo™ Shell & Tube Heat Exchanger



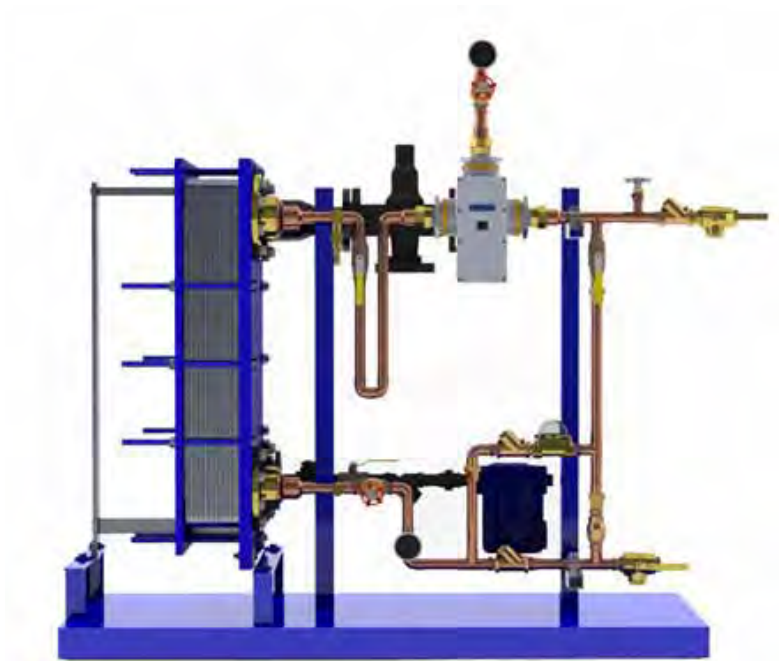
Dimensions and Weight

Model	Dimensions in (mm)					Weight
	A	B	C	D	E	
D535	20.0 (508)	43.4 (1103)	45.0 (1143)	67.0 (1702)	81.2 (2062)	804
D535 DW	20.0 (508)	43.4 (1103)	45.0 (1143)	76.7 (1947)	87.4 (2220)	1080
D535 P	20.0 (508)	76.1 (1933)	45.0 (1143)	67.0 (1702)	84.6 (2149)	1234
D535 DW-P	20.0 (508)	76.1 (1933)	45.0 (1143)	76.7 (1947)	84.8 (2154)	1317
D665	30.0 (762)	45.4 (1154)	57.0 (1448)	80.0 (2032)	100.7 (2558)	1094
D665 DW	30.0 (762)	45.4 (1154)	57.0 (1448)	88.7 (2252)	101.5 (2578)	1373
D665 P	30.0 (762)	73.3 (1863)	57.0 (1448)	80.0 (2032)	100.3 (2547)	1835
D665 DW-P	30.0 (762)	73.3 (1863)	57.0 (1448)	88.7 (2252)	100.2 (2545)	1892
D8120	34.0 (864)	46.8 (1189)	57.0 (1448)	83.5 (2121)	112.8 (2865)	1507
D8120 DW	34.0 (864)	46.8 (1189)	57.0 (1448)	77.8 (1976)	113.7 (2888)	1550
D8120 P	34.0 (864)	75.9 (1929)	57.0 (1448)	83.5 (2121)	104.5 (2654)	3011
D8120 DW-P	34.0 (864)	75.9 (1929)	57.0 (1448)	77.8 (1976)	98.8 (2509)	3050

Standard Components

- Thermometers
- DRV80 Digital Recirculating Valve
- Steam Trap
- Automatic Hot Water Safety Shut Off Valve
- Sight Flow Indicator
- Check Valves
- Inlet Strainer(s)
- Isolation Valves
- Air Vent

Digital-Flo™ Plate & Frame Steam/Water Heat Exchanger



Digital Plate & Frame Steam to Water

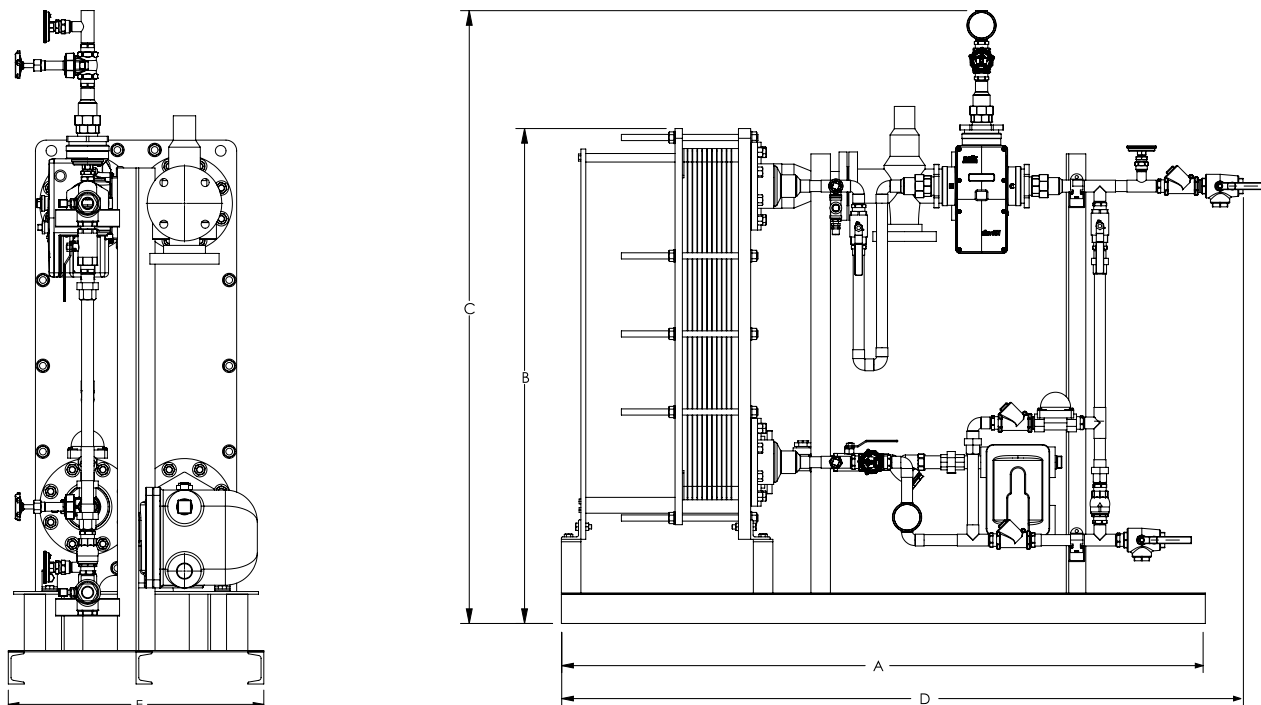
Model	Part Number	Certified Drawing	Secondary Side			Primary Side		
			Connections @ 7.5 ft/sec (2.3 m/s)		Flow @ 7.5 ft/sec (2.3 m/s)	Connections		Capacity @ 15 psi (1 bar)
			Hot/Cold	Recirc.	Capacity @ 100°F (55°C) Delta T	Steam Inlet	Condensate Outlet	
D1S	D27593	CD2508	1" (25 mm)	1" (25 mm)	18.4 gpm (4.2 m3/hr)	2.5" (63.5 mm)	1" (25 mm)	973 lb/hr (441 kg/hr)
D2S	D27594	CD2509	1.5" (40 mm)	1" (25 mm)	41.3 gpm (9.4 m3/hr)	3" (80 mm)	1.5" (40 mm)	2,185 lb/hr (991 kg/hr)
D3S	D27595	CD2510	2" (50 mm)	2" (50 mm)	73.4 gpm (16.7 m3/hr)	3" (80 mm)	1.5" (40 mm)	3,883 lb/hr (1,761 kg/hr)
D4S	D27596	CD2511	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	6" (153 mm)	2" (50 mm)	8,741 lb/hr (3,965 kg/hr)

Digital Plate & Frame Steam to Water Double Wall

Model	Part Number	Certified Drawing	Secondary Side			Primary Side		
			Connections @ 7.5 ft/sec (2.3 m/s)		Flow @ 7.5 ft/sec (2.3 m/s)	Connections		Capacity @ 15 psi (1 bar)
			Hot/Cold	Recirc.	Capacity @ 100°F (55°C) Delta T	Steam Inlet	Condensate Outlet	
D1S DW	D27603	CD2518	1" (25 mm)	1" (25 mm)	18.4 gpm (4.2 m3/hr)	2.5" (63.5 mm)	1" (25 mm)	973 lb/hr (441 kg/hr)
D2S DW	D27604	CD2519	1.5" (40 mm)	1" (25 mm)	41.3 gpm (9.4 m3/hr)	3" (80 mm)	1.5" (40 mm)	2,185 lb/hr (991 kg/hr)
D3S DW	D27605	CD2520	2" (50 mm)	2" (50 mm)	73.4 gpm (16.7 m3/hr)	3" (80 mm)	1.5" (40 mm)	3,883 lb/hr (1,761 kg/hr)
D4S DW	D27606	CD2521	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	6" (153 mm)	2" (50 mm)	8,741 lb/hr (3,965 kg/hr)

Maximum Allowable Steam Pressure = 15.0 psi (1 bar), Maximum Allowable Water Pressure = 150 psi (10 bar), Maximum Allowable Setpoint = 158°F (70°C)

Digital-Flo™ Plate & Frame Steam/Water Heat Exchanger



Dimensions and Weight

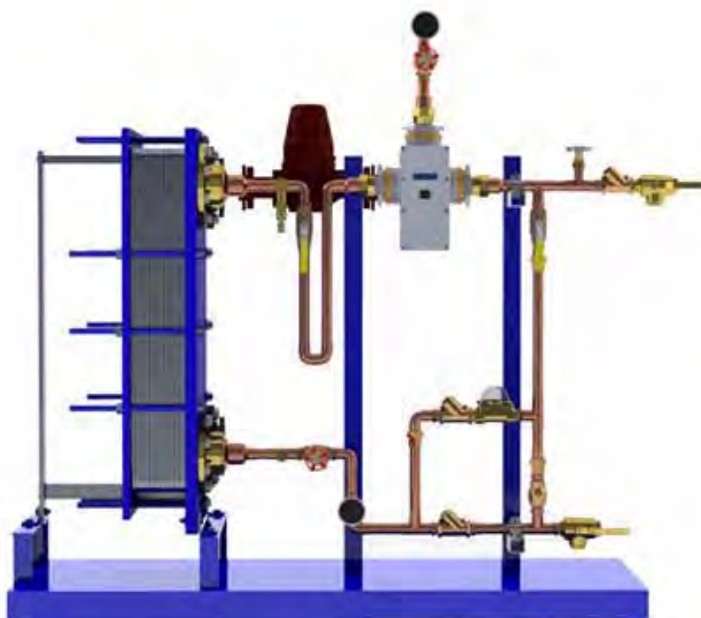
Model	Dimensions in (mm)					Weight
	A	B	C	D	E	
D1S*	66.0 (1676)	50.7 (1288)	62.8 (1595)	62.8 (1595)	24.0 (610)	Consult Factory
D2S*	66.0 (1676)	50.7 (1288)	62.8 (1595)	69.0 (1752)	24.0 (610)	Consult Factory
D3S*	66.0 (1676)	50.7 (1288)	62.8 (1595)	77.0 (1956)	24.0 (610)	Consult Factory
D4S*	78.0 (1981)	50.7 (1288)	63.5 (1613)	87.0 (2210)	24.0 (610)	Consult Factory

*Consult factory for Double Wall (DW) dimensional changes.

Standard Components

- Thermometers
- DRV80 Digital Recirculating Valve
- Steam Trap
- Automatic Steam Safety Shut Off Valve
- Sight Flow Indicator
- Check Valves
- Inlet Strainer(s)
- Isolation Valvves

Digital-Flo™ Plate & Frame Water/Water Heat Exchanger

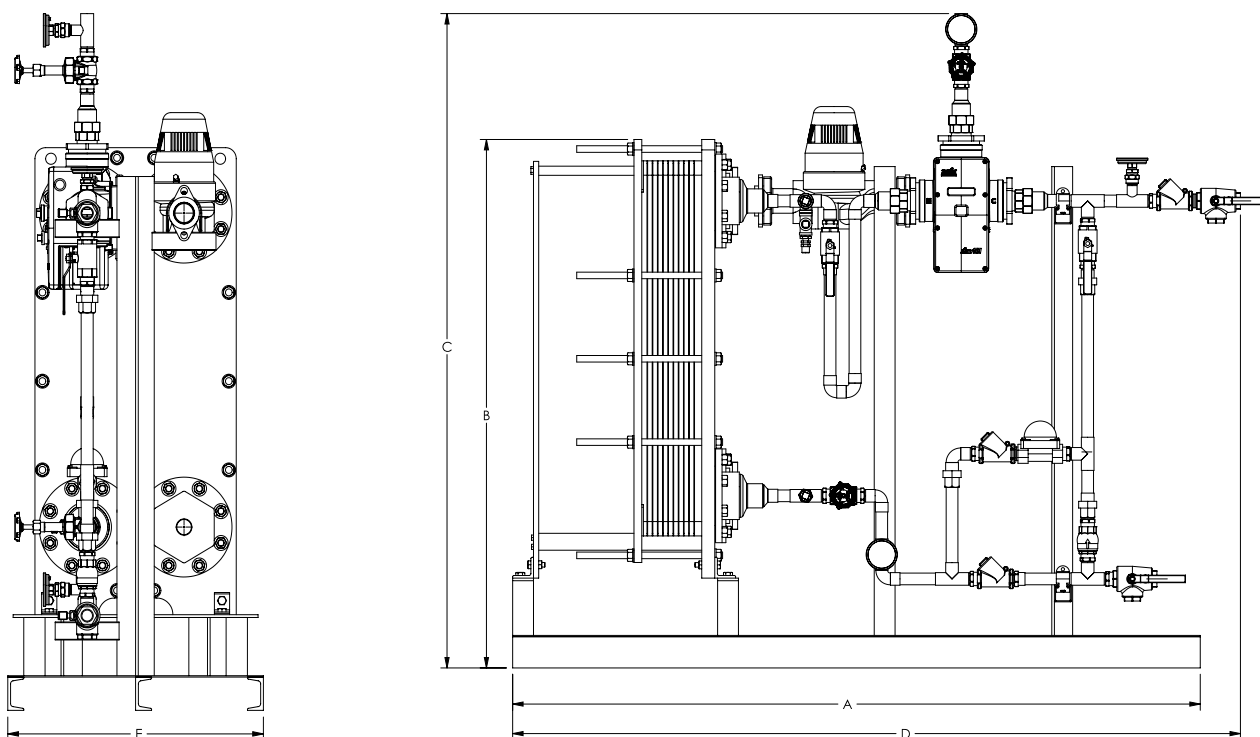


Digital Plate & Frame Water to Water								
Model	Part Number	Certified Drawing	Secondary Side			Primary Side		
			Connections @ 7.5 ft/sec (2.3 m/s)		Flow @ 7.5 ft/sec (2.3 m/s)	Connections		Capacity @ 50°F (27.8°C) Delta T
			Hot/Cold	Recirc.	Capacity @ 100°F (55°C) Delta T	Boiler Inlet	Boiler Outlet	
D1W	D27598	CD2513	1" (25 mm)	1" (25 mm)	18.4 gpm (4.2 m3/hr)	1.5" (40 mm)	1.5" (40 mm)	36.8 gpm (8.4 m3/hr)
D2W	D27599	CD2514	1.5" (40 mm)	1" (25 mm)	41.3 gpm (9.4 m3/hr)	2" (50 mm)	2" (50 mm)	82.6 gpm (18.7 m3/hr)
D3W	D27600	CD2515	2" (50 mm)	2" (50 mm)	73.4 gpm (16.7 m3/hr)	3" (80 mm)	3" (80 mm)	146.8 gpm (33.3 m3/hr)
D4W	D27601	CD2516	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	3" (80 mm)	3" (80 mm)	330.4 gpm (75.0 m3/hr)

Digital Plate & Frame Water to Water Double Wall								
Model	Part Number	Certified Drawing	Secondary Side			Primary Side		
			Connections @ 7.5 ft/sec (2.3 m/s)		Flow @ 7.5 ft/sec (2.3 m/s)	Connections		Capacity @ 50°F (27.8°C) Delta T
			Hot/Cold	Recirc.	Capacity @ 100°F (55°C) Delta T	Boiler Inlet	Boiler Outlet	
D1W DW	D27608	CD2523	1" (25 mm)	1" (25 mm)	18.4 gpm (4.2 m3/hr)	1.5" (40 mm)	1.5" (40 mm)	36.8 gpm (8.4 m3/hr)
D2W DW	D27609	CD2524	1.5" (40 mm)	1" (25 mm)	41.3 gpm (9.4 m3/hr)	2" (50 mm)	2" (50 mm)	82.6 gpm (18.7 m3/hr)
D3W DW	D27610	CD2525	2" (50 mm)	2" (50 mm)	73.4 gpm (16.7 m3/hr)	3" (80 mm)	3" (80 mm)	146.8 gpm (33.3 m3/hr)
D4W DW	D27611	CD2526	3" (80 mm)	2" (50 mm)	165.2 gpm (37.5 m3/hr)	3" (80 mm)	3" (80 mm)	330.4 gpm (75.0 m3/hr)

Maximum Allowable Boiler Water Temperature = 250°F (121°C), Maximum Allowable Water Pressure = 150 psi (10 bar), Maximum Allowable Setpoint = 158°F (70°C)

Digital-Flo™ Plate & Frame Water/Water Heat Exchanger



Dimensions and Weight

Model	Dimensions in (mm)					Weight
	A	B	C	D	E	
D1W*	66.0 (1676)	50.7 (1288)	62.8 (1595)	62.8 (1595)	24.0 (610)	Consult Factory
D2W*	66.0 (1676)	50.7 (1288)	62.8 (1595)	69.0 (1752)	24.0 (610)	Consult Factory
D3W*	66.0 (1676)	50.7 (1288)	64.3 (1633)	77.0 (1956)	24.0 (610)	Consult Factory
D4W*	78.0 (1981)	50.7 (1288)	67.4 (1711)	87.0 (2210)	24.0 (610)	Consult Factory

*Consult factory for Double Wall (DW) dimensional changes.

Standard Components

- Thermometers
- DRV80 Digital Recirculating Valve
- Primary Side Pump
- Sight Flow Indicator
- Check Valves
- Inlet Strainer(s)
- Isolation Valves

Digital-Flo™ Shell & Tube Steam/Water Packaged Solutions

Using quality Armstrong components, Armstrong Digital-Flo™ Heat exchangers can be packaged to meet your specific requirements. Armstrong can configure a solution for virtually any application. Best of all, Armstrong Digital-Flo Water Heating Packaged Solutions are supplied fully assembled, pressure tested and performance guaranteed.

Hot water system assessments, full turn-key installation, system optimization and financing options are also available. Contact your Armstrong representative for more information.

Shell & Tube Packaged Solutions Performance Matched Options

Pre-piped Pressure Reducing Station

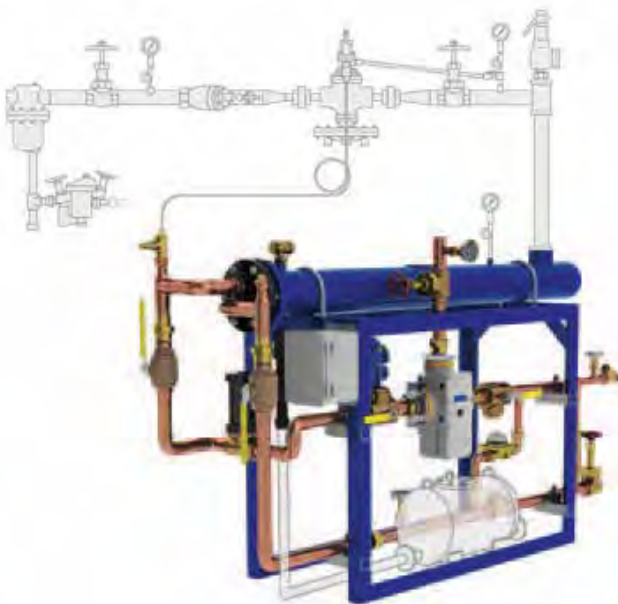
BrainScan™ - Web-Enabled and BAS Compatible - Hot Water System Monitoring

Double Wall Tube Bundle

ASTM B 111 Brass (Standard) or 316L Stainless Steel Tube Bundle



Constant Steam Pressure



Modulating Steam Pressure

Shell & Tube Packaged Solutions Performance Matched Options

Low Surface Temperature - Modulated Steam Pressure

Pre-piped Steam Modulation Assembly

Carbon Steel (Standard) or 316L Stainless Steel Shell

Copper/Brass (Standard) or 316 Stainless Steel Pipe, Valve and Fittings

Mechanical or Electric Condensate Pumps

Digital-Flo™ Plate & Frame Steam/Water Packaged Solutions

Plate & Frame Packaged Solutions Performance Matched Options

Gasketed (Standard) or Braised
Plate and Frame Module

Pre-piped Pressure Reducing
Station

BrainScan™ - Web-Enabled and
BAS Compatible - Hot Water
System Monitoring



Constant Steam Pressure



Modulating Steam Pressure

Plate & Frame Packaged Solutions Performance Matched Options

Low Surface Temperature -
Modulated Steam Pressure

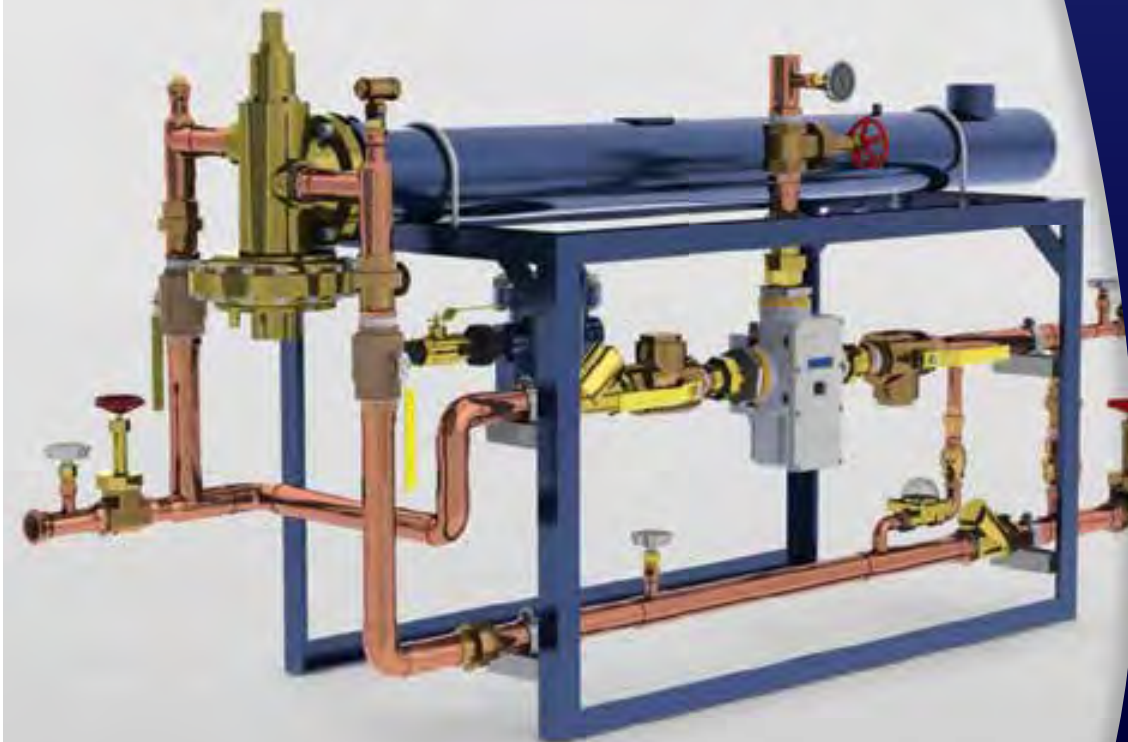
Double Wall Plate and Frame
Module

Copper/Brass (Standard) or 316
Stainless Steel Pipe, Valve and
Fittings

Mechanical or Electric
Condensate Pumps

Water Heating & Water Temperature Control

- Feed Forward
- Digital



Flo-Rite-Temp® Instantaneous Steam/Water Heater

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 for the following reasons:

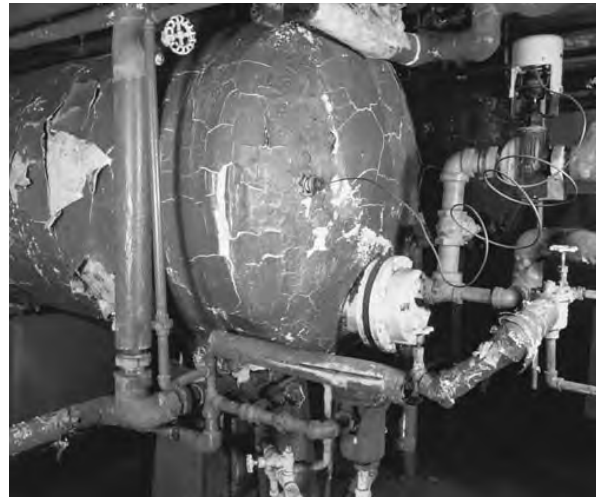
- They consume a large amount of valuable mechanical-room real estate.
- Identified as amplification and colonization points for Legionella bacteria.
- Significant leak potential over time.
- Tank repair is difficult, and tank replacement often requires mechanical room/building structural modifications.
- They consume energy to heat and maintain what is effectively a reserve hot water supply.
- Separate steam control valves, requires ongoing maintenance.
- Thermostatic element/sensors have 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 for the following reasons:

- 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.



High-maintenance feedback systems with large storage tank may leak, corrode or rupture a thermostatic control.



Feedback instantaneous systems may suffer from lag time, tube bundle corrosion and problems with thermostatic element deterioration.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

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 for the following reasons:

- 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.

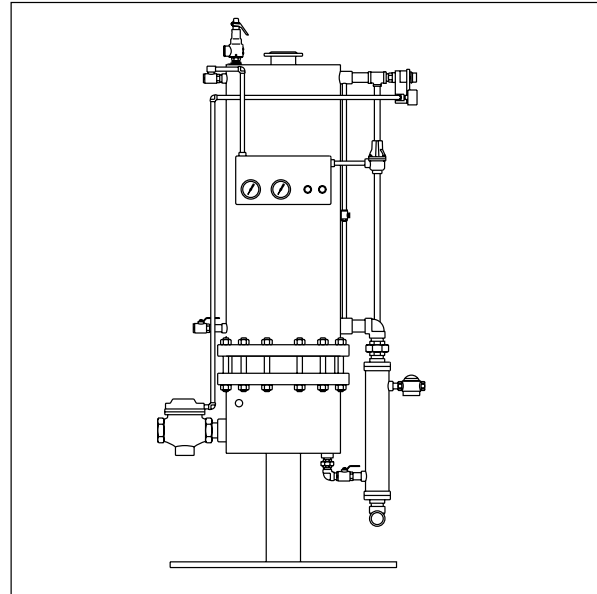
Flo-Rite-Temp® Instantaneous Steam/Water Heaters (feed-forward)

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.

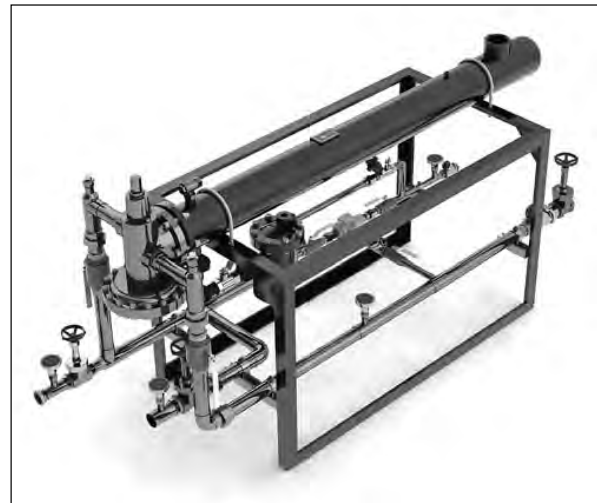
By eliminating the temperature sensing feedback element and relying upon the actual hot water system demand requirement within the system or application, feed-forward systems respond rapidly and are extremely accurate.

Flo-Rite-Temp® Feed-Forward Instantaneous Steam/Water Heater is a more attractive option for the following reasons:

- The constant, non-modulating steam pressure within the shell eliminates cycling wear and tear.
- The system demand or flow feed-forward activation eliminates the requirement for either a steam control valve or supplementary thermostatic control device.
- Flo-Rite-Temp® delivers a consistent outlet temperature (+/-4°F of set-point) with no thermal lag and resulting temperature swing.
- Flo-Rite-Temp® is extremely safe because the mixing unit will position to cold water flow upon failure of the primary operating component.



Semi-instantaneous water heaters are subject to poor recovery time at peak demand, inadequate low-flow temperature control and shorter service life.



Flo-Rite-Temp® instantaneous steam/water heaters can easily do the work of a storage tank unit many times its size—at lower installed cost and with minimum maintenance. Even the largest capacity Flo-Rite-Temp® requires only 13.5 ft² (4.1 m²) of floor space.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

The Flo-Rite-Temp® instantaneous Steam/Water heater has a unique feed forward design which features a differential pressure diaphragm actuated mixing unit integral to a shell and tube heat exchanger.

The Flo-Rite-Temp® mixing unit manages the water flow through the heat exchanger based upon downstream hot water demand and eliminates the requirement for a modulating steam control valve.

Operating on constant low pressure (2-15PSI) steam, the Flo-Rite-Temp® mixing unit supplies water to the heat exchanger where it is overheated and then returned to the mixing unit for proportional re-mixing with cold water to a pre-set outlet temperature.

Speed of response

The differential pressure diaphragm within the mixing unit rapidly responds to a change in system demand and significantly reduces the lag times typically associated with feed back/modulating steam control valve systems.

Failure Safe

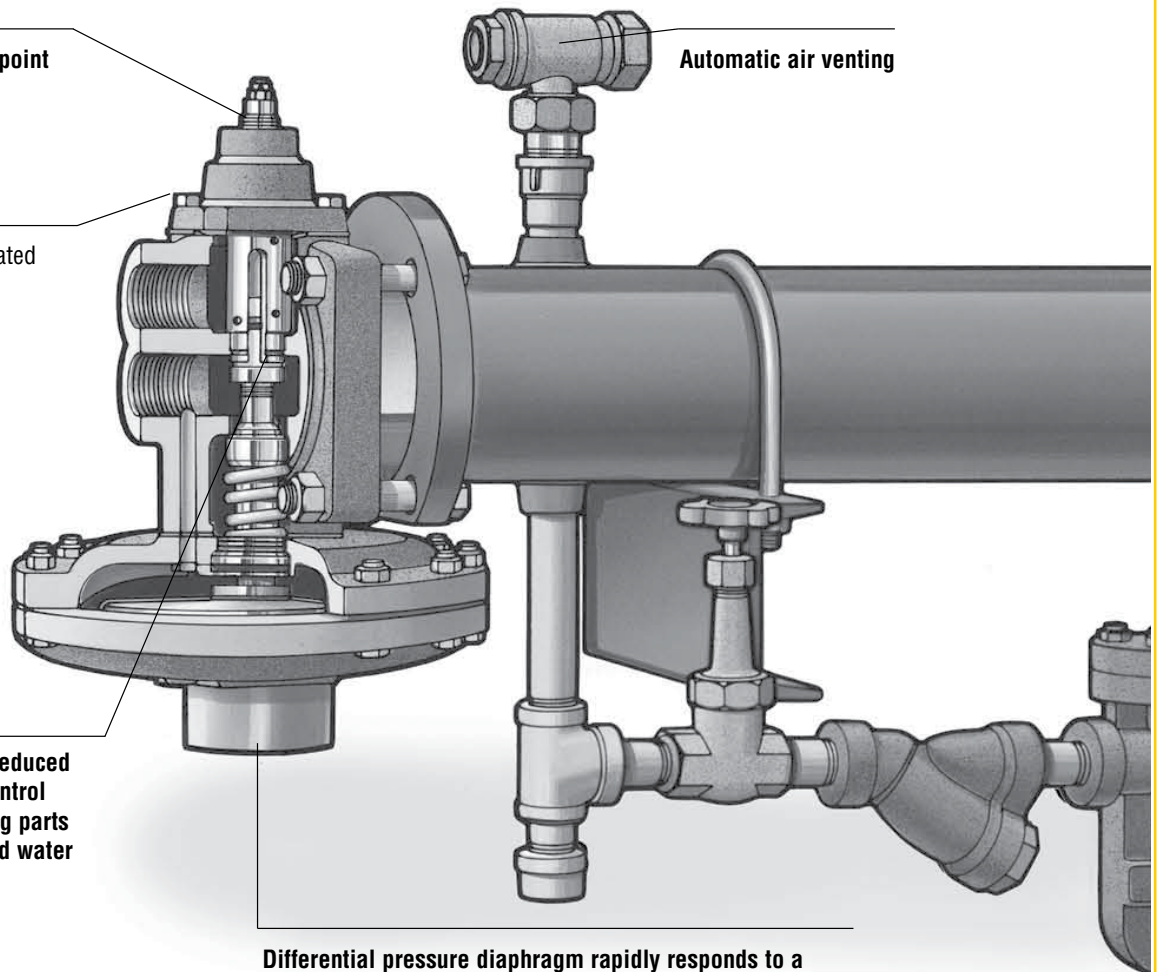
The Flo-Rite-Temp® mixing units diaphragm actuated design can be described as "failure safe" because in the event of a diaphragm failure the mixing unit will fail with a cold bias and will not allow hot water to exit the heat exchanger.

Outlet temperature set-point adjustment

Integral diaphragm actuated mixing unit eliminates intermediate pipework

Scaling and fouling is reduced because the internal control valves/seats and moving parts are only exposed to cold water

Automatic air venting



Differential pressure diaphragm rapidly responds to a change in system demand and significantly reduced the lag time

Temperature Control and User Safety

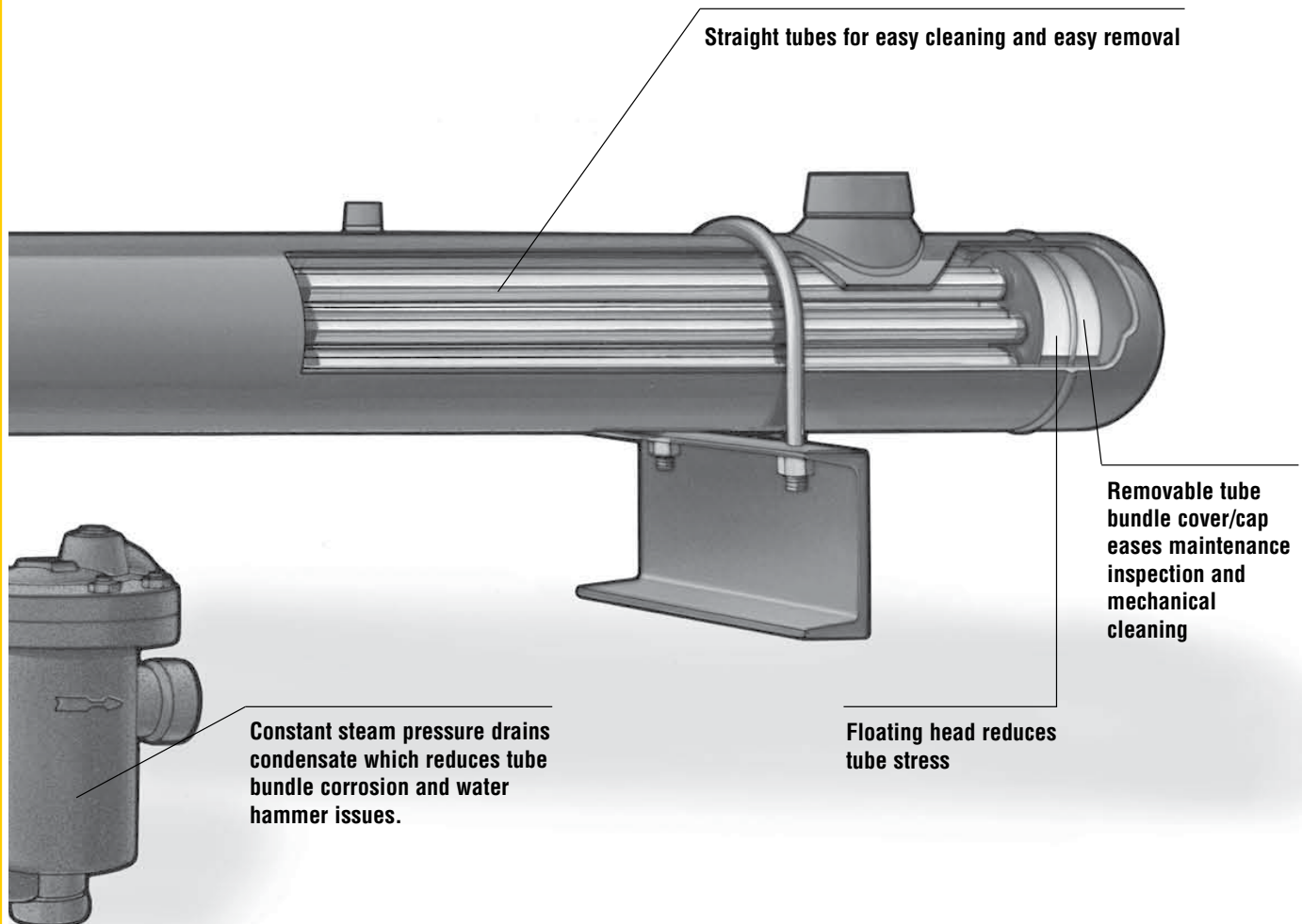
Capable of controlling outlet temperatures $\pm 4^\circ\text{F}$, this principal of operation offers the additional relevant benefit of reducing the waterborne bacterial content of the water during the overheating process. In addition, with no water storage requirement, Flo-Rite-Temp® water heaters are a sensible selection as a component of a broader system design initiative for Legionella risk reduction.

Ease of Maintenance

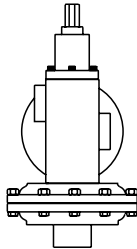
Accessible "non helical" admiralty brass straight tubes inside the carbon steel shell available mechanical cleaning and visual inspection. Non modulating constant steam pressure ensures condensate drainage and removes the potential for water hammer damage and corrosion. There is no steam control valve to maintain and typically no supplemental condensate return equipment required.

Ease of Installation

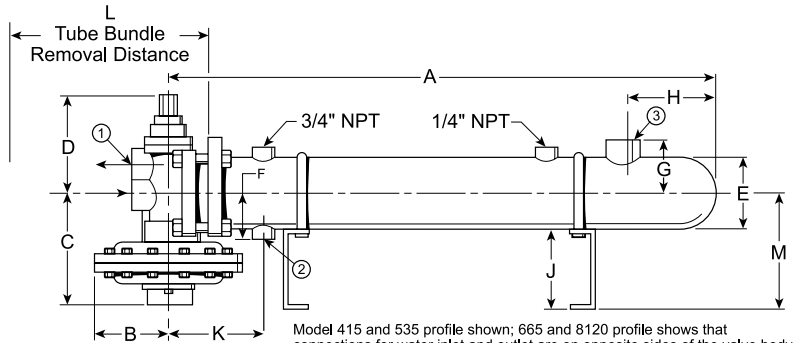
No storage tank, small footprint, access via a standard doorway and pre-piped packaged solutions reduce installation time, space and expenditure.



Flo-Rite-Temp® Instantaneous Steam/Water Heater



Model 665 and 8120 Valve



Model 415 and 535 profile shown; 665 and 8120 profile shows that connections for water inlet and outlet are on opposite sides of the valve body.

Dimensions

Model	A		B		C		D		E		F		G		H		J		K		L		M	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
415	54	1,372	4-1/2	114	7-1/2	190	7	178	4-1/2	114	3-5/16	84	3	76	7	178	6	152	6-1/4	159	50	1,270	7-1/2	190
535	67-1/2	1,715	5-1/4	133	8-5/8	219	9	229	5-9/16	141	4	102	3-11/16	94	7-7/8	200	7	178	7-1/2	191	62	1,575	9	229
665	82	2,083	5-3/4	146	10-3/8	264	10-3/8	264	6-5/8	168	4-5/8	117	4-9/16	116	9-1/4	235	8	203	8-3/4	222	74	1,880	11	280
8120	85	2,159	5-3/4	146	11-3/4	299	12	305	8-5/8	219	6	152	8-7/8	225	9-1/2	241	8	203	9-1/2	241	74	1,880	12-3/8	314

Connections and Weights

Model	Connections			Weight	
	1	2	3		
	in (mm)	in (mm)	ib (mm)	lb	kg
415	1 (25) NPT	3/4 (20) NPT	2 (50) NPT	133	60
535	1-1/2 (40) NPT	1 (25) NPT	2-1/2 (65) NPT	235	107
665	2 (50) NPT*	1-1/4 (32) NPT	3 (80) NPT	358	162
8120	3 (80) NPT*	2 (50) NPT	4 (100) 150# ANSI	585	265

*665 and 8120 connections for water inlet and outlet are on opposite sides of the valve body.

Specifications

Application	Steam Supply Pressure	Water Supply Pressure	Maximum Water Pressure Drop
Steam to Water	2 - 15 psig (0.14 - 1.0 bar)	20-150 psig (1.4 - 1.0 bar)	10 psig (0.7 bar)

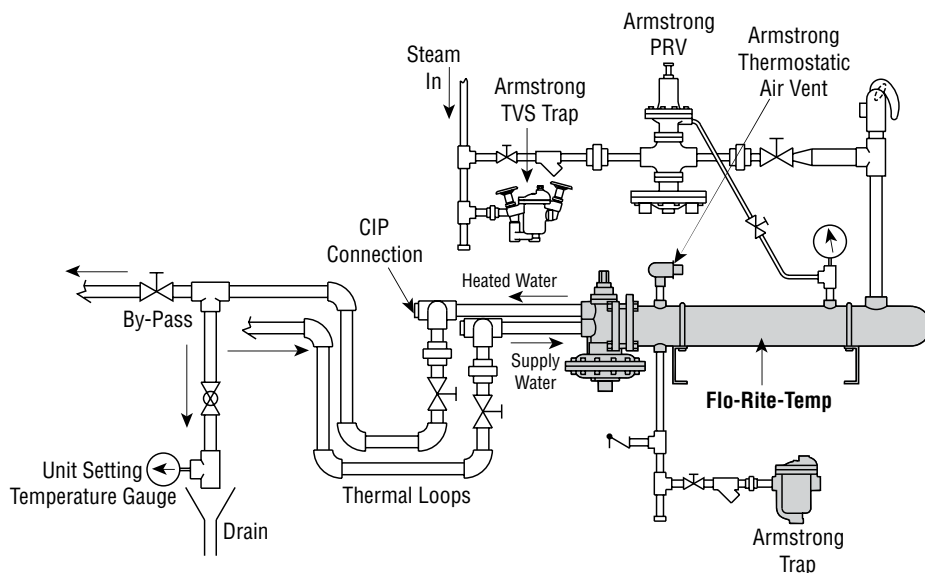
NOTE: Reusable insulation wraps available.

Materials

Body	Valve	Valve Seats	Diaphragm	Heat Exchanger Shell	Heat Exchanger Tubes	Tube Sheets	Tube Bundle End Cap
Bronze	(415) 303 Stainless Steel w/ Teflon Inserts (535/665/8120) Brass	(415/535) 303 Stainless Steel (665/8120) Brass	Viton® GF Reinforced w/Nomex® Fiber	Carbon Steel ASTM SA 106-B ASME "U" Stamped	5/8" 16 BWG Admiralty Brass	Brass	Brass

NOTE: Units are NSF-61 certified.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

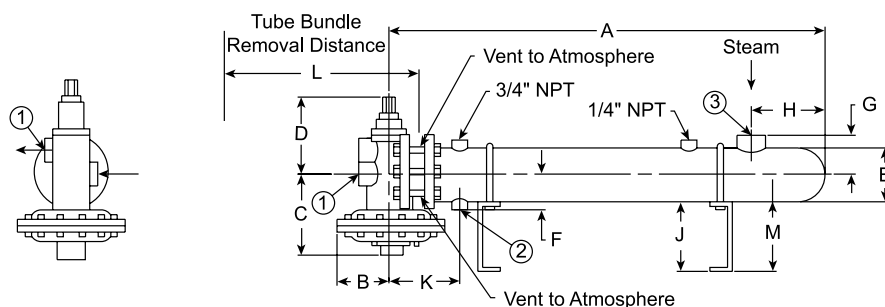


Water Heater Installation Detail

The Flo-Rite-Temp® models identified in the submittal table below are provided, as standard, with an Armstrong steam trap and thermostatic air vent (shaded). All other items indicated, are shown for water heater installation detail only. For pre-piped packaged Flo-Rite-Temp® water heater assemblies, refer to pages 14-26.

For submittal drawing refer to:		
Model 415	Single Wall	\$5640
Model 415DW	Double Wall	\$5641
Model 535	Single Wall	\$5642
Model 535 DW	Double Wall	\$5643
Model 665	Single Wall	\$5644
Model 665DW	Double Wall	\$5645
Model 665SS	Stainless Steel	\$5646
Model 8120	Single Wall	\$5647
Model 8120DW	Double Wall	\$5648
Model 8120SS	Stainless Steel	\$5649

Flo-Rite-Temp® Instantaneous Steam/Water Heater Double Wall



Model 665DW and 8120DW Valve

Model 415DW and 535DW Profile

The DW (double wall) version of the Flo-Rite-Temp® instantaneous water heater uses a double-wall tube to provide positive separation of the steam and water in the heat exchanger. The area between the walls of the tubes vents to atmosphere so you can detect tube failure without cross-contaminating either the steam or water. The Flo-Rite-Temp® DW is well suited for all hot water applications where steam is available and plumbing codes or safety requirements prevent the heating medium and the potable water supply from being cross-contaminated.

Specifications			
Application	Steam Supply Pressure	Water Supply Pressure	Maximum Water Pressure Drop
Steam to Water	2 - 15 psig (0.14 - 1.0 bar)	20 - 150 psig (1.4 - 10.3 bar)	10 psig (0.7 bar)

Connections and Weights							
Model	Connections			Tube Bundle Removal		Weight	
	1	2	3				
	in (mm)	in (mm)	in (mm)	in	mm	lb	kg
415DW	1 (25) NPT	3/4 (20) NPT	2 (50) NPT	75	1,905	199	90
535DW	1-1/2 (40) NPT	1 (25) NPT	2-1/2 (65) NPT	75	1,905	270	122
665DW	2 (50) NPT*	1-1/4 (32) NPT	3 (80) NPT	87	2,210	444	201
8120DW	3 (80) NPT*	2 (50)	4 (100) 150# ANSI	75	1,905	665	302

*665 and 8120 connections for water inlet and outlet are on opposite sides of the valve body.

Materials						
Body	Valve	Valve Seats	Diaphragm	Heat Exchanger Shell	Heat Exchanger Tubes	Tube Sheets*
Bronze	(415DW) 303 Stainless Steel w/Teflon Inserts (535DW/665DW/8120DW) Brass	(415DW/535DW) 303 Stainless Steel (665DW/8120DW) Brass	Viton® GF Reinforced w/ Nomex® GF	Carbon Steel ASTM SA 106-B ASME "U" Stamped	5/8" Copper Inner Tube 3/4" ID Grooved Copper Outer Tube	Steam Side Steel Water Side Brass

*There is an open vent to atmosphere between the tube sheets to detect tube failure.

Dimensions																								
Model	A		B		C		D		E		F		G		H		J		K		L		M	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
415DW	76-1/8	1,934	4-1/2	114	7-1/2	191	7	178	4-1/2	114	3-3/8	86	3-3/4	95	10-1/2	267	6	152	6-7/8	175	75	1,905	7-1/2	190
535DW	77-3/8	1,965	5-1/4	133	8-5/8	219	9	229	5-9/16	141	4	102	4-1/4	108	11-1/2	292	7	178	8-1/8	206	75	1,905	9	229
665DW	90-5/8	2,302	5-3/4	146	10-3/8	264	10-3/8	264	6-5/8	168	7-3/4	121	5	127	11-3/4	298	8	203	9-3/4	248	87	2,210	11	280
8120DW	79-7/8	2,029	5-3/4	146	11-3/4	198	12	305	8-5/8	219	6	152	8-3/4	222	12-5/8	321	8	203	11-5/8	295	75	1,905	12-3/8	314

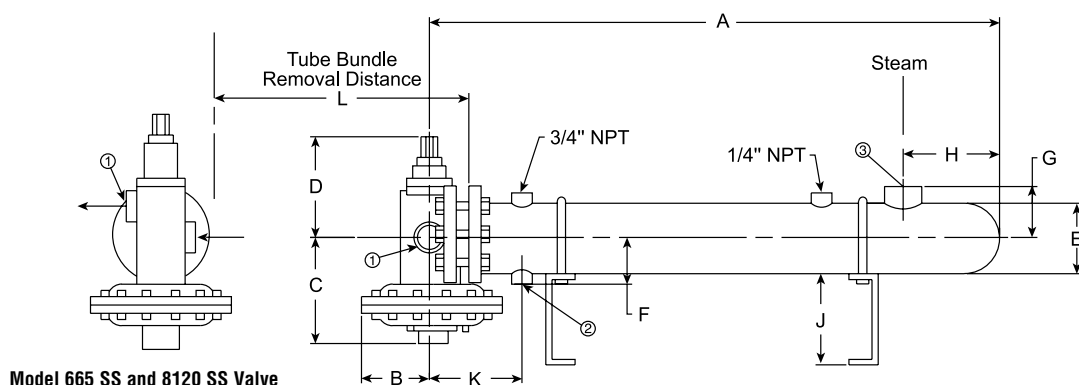
Flo-Rite-Temp® Instantaneous Steam/Water Heater Single Wall and Double Wall Sizing Chart

Water and Steam Capacities																				
Inlet Temp.	Set Temp.	Standard								Inlet Temp.	Set Temp.	Metric								Model
		Hot Water Capacities*				Steam Capacities						Hot Water Capacities*				Steam Capacities				
		Steam Pressure				Steam Pressure						Steam Pressure				Steam Pressure				
		psig				psig						bar				bar				
		2	5	10	15	2	5	10	15			0.14	0.35	0.7	1	0.14	0.35	0.7	1	
°F	°F	gpm				lbs/hr				°C	°C	m³/h				kg/h				
40	120	17	18	20	20	714	767	839	901	4	49	3.8	4.1	4.5	4.5	323	347	379	407	415
		37	40	43	43	1,543	1,657	1,814	1,946			8.4	9.1	9.8	10.2	697	749	820	880	535
		69	74	80	80	2,855	3,067	3,356	3,601			15.7	16.8	18.2	18.2	1,290	1,386	1,517	1,628	665
		142	145	145	145	5,680	6,160	6,760	7,160			32.2	32.9	32.9	32.9	2,576	2,794	3,066	3,248	8120
	130	15	16	17	18	681	734	807	868		54	3.4	3.6	3.8	4.1	308	332	365	392	415
		32	34	37	39	1,472	1,587	1,743	1,876			7.3	7.7	8.4	8.8	665	717	788	848	535
		58	63	68	73	2,723	2,936	3,226	3,472			13.2	17.3	15.4	16.6	1,230	1,327	1,458	1,569	665
		112	122	136	145	5,040	5,490	6,120	6,705			25.4	27.7	30.9	32.9	2,286	2,490	2,776	3,041	8120
	140	12	13	15	16	646	700	773	835		60	2.7	3.0	3.4	3.6	292	316	349	377	415
		27	29	32	34	1,397	1,513	1,671	1,804			6.1	6.6	7.3	7.7	631	684	755	815	535
		50	54	59	63	2,585	2,799	3,091	3,338			11.3	12.2	13.3	14.3	1,168	1,265	1,397	1,509	665
		88	97	109	120	4,400	4,850	5,450	6,000			20.0	22.0	24.7	27.2	1,996	2,200	2,472	2,722	8120
	160	9	10	11	12	572	627	702	765		71	2.0	2.3	2.5	2.7	259	283	317	346	415
		20	22	24	26	1,235	1,355	1,517	1,652			4.5	5.0	5.5	5.9	558	612	686	747	535
		37	40	45	48	2,286	2,508	2,806	3,057			8.4	9.1	10.2	10.9	1,033	1,134	1,268	1,382	665
		69	83	89	95	4,140	4,980	5,340	5,700			15.6	18.8	20.2	21.6	1,878	2,259	2,422	2,585	8120
	180	5	5	6	7	344	386	441	487		82	1.1	1.1	1.4	1.6	156	175	200	221	415
		12	13	15	16	861	966	1,104	1,219			2.7	3.0	3.4	3.6	390	438	501	553	535
		23	26	29	32	1,663	1,866	2,134	2,355			5.2	5.9	6.6	7.3	754	846	968	1,068	665
		43	47	52	59	3,010	3,290	3,640	4,130			9.7	10.7	11.8	13.4	1,363	1,492	1,651	1,873	8120
50	120	19	20	20	20	692	745	816	877	10	49	4.3	4.5	4.5	4.5	313	337	369	396	415
		41	44	45	45	1,495	1,609	1,764	1,896			9.3	10.0	10.2	10.2	676	727	797	857	535
		76	80	80	80	2,767	2,977	3,264	3,508			17.3	18.2	18.2	18.2	1,251	1,346	1,475	1,586	665
		145	145	145	145	5,740	6,090	6,580	7,035			32.2	32.2	32.2	32.2	2,603	2,762	2,985	3,191	8120
	130	16	17	19	20	660	712	785	846		54	3.6	3.8	4.3	4.5	298	322	355	382	415
		34	37	40	43	1,425	1,539	1,695	1,827			7.7	8.4	9.1	9.8	644	696	766	826	535
		64	68	75	80	2,637	2,848	3,137	3,381			14.5	15.4	17.0	18.2	1,192	1,287	1,418	1,528	665
		127	138	145	145	5,080	5,520	6,120	6,760			28.8	31.3	32.2	32.2	2,304	2,504	2,776	3,066	8120
	140	13	14	16	17	626	679	752	813		60	2.9	3.2	3.6	3.8	283	307	340	367	415
		29	31	34	37	1,352	1,467	1,624	1,756			6.6	7.0	7.7	8.4	611	663	734	794	535
		54	58	64	68	2,502	2,715	3,005	3,250			12.2	13.2	14.5	15.4	1,131	1,227	1,358	1,474	665
		99	108	121	134	4,455	4,860	5,445	6,030			22.5	24.5	27.5	30.4	2,021	2,204	2,470	2,735	8120
	160	10	11	12	13	553	608	682	744		71	2.3	2.5	2.7	3.0	250	275	308	336	415
		21	23	25	28	1,194	1,313	1,473	1,607			4.7	5.2	5.7	6.4	540	593	665	726	535
		39	42	47	51	2,210	2,429	2,725	2,974			8.9	9.5	10.7	11.6	999	1,098	1,232	1,344	665
		76	90	95	102	4,180	4,950	5,225	5,610			17.2	20.4	21.6	23.1	1,896	2,245	2,370	2,545	8120
	180	5	6	6	7	332	373	428	473		82	1.1	1.4	1.4	1.6	151	169	194	214	415
		12	14	16	17	831	934	1,071	1,185			2.7	3.2	3.6	3.9	377	424	486	537	535
		24	27	30	33	1,605	1,805	2,069	2,289			5.4	6.1	6.8	7.5	728	819	938	1,037	665
		49	55	63	72	3,185	3,575	4,095	4,680			11.1	12.5	14.3	16.3	1,445	1,622	1,857	2,123	8120
60	130	18	19	20	20	638	690	762	822	16	54	4.1	4.3	4.5	4.5	288	312	344	372	415
		38	41	45	45	1,378	1,491	1,646	1,777			8.7	9.3	10.2	10.2	623	674	744	803	535
		70	76	80	80	2,550	2,760	3,046	3,288			15.9	17.3	18.2	18.2	1,152	1,247	1,377	1,486	665
		145	145	145	145	5,110	5,465	6,090	6,510			32.2	32.2	32.2	32.2	2,318	2,524	2,762	2,953	8120
	140	15	16	17	19	605	658	729	790		60	3.4	3.6	3.8	4.3	273	297	330	357	415
		32	34	38	40	1,307	1,421	1,576	1,708			7.3	7.7	8.6	9.1	591	642	712	772	535
		58	63	69	75	2,418	2,629	2,917	3,160			13.2	14.3	15.7	17.0	1,093	1,188	1,318	1,428	665
		111	123	137	145	4,440	4,920	5,480	6,080			25.2	27.9	31.1	32.2	2,014	2,232	2,486		8120
	160	10	11	13	14	533	588	661	723		71	2.3	2.5	2.9	3.2	241	266	299	327	415
		22	24	27	30	1,152	1,270	1,428	1,561			5.0	5.5	6.1	6.8	521	574	645	706	535
		41	45	50	55	2,132	2,349	2,642	2,889			9.3	10.2	11.3	12.5	964	1,062	1,194	1,306	665
		85	99	104	115	4,250	4,950	5,200	5,750			19.3	22.5	23.6	26.1	1,928	2,245	2,359	2,608	8120
	180	5	6	7	7	320	360	414	459		82	1.1	1.4	1.6	1.6	145	163	188	208	415
		13	14	16	18	800	902	1,037	1,150			3.0	3.2	3.6	4.1	363	409	470	522	535
		25	28	32	35	1,546	1,743	2,004	2,221			5.7	6.4	7.3	7.9	701	791	909	1,007	665
		59	67	80	90	3,540	4,020	4,800	5,400			13.4	15.2	18.1	20.4	1,606	1,823	2,177	2,449	8120

*Units may be piped in parallel when desired capacities exceed that of a single unit.

NOTES: Minimum water temperature increase is 60°F (33°C). Consult factory if less than 60°F (33°C) increase is required or a set temperature below 120°F (49°C) is required.

Flo-Rite-Temp® Instantaneous Steam/Water Heater Stainless Steel



The Flo-Rite-Temp® SS is a compact, steam to water, instantaneous water heater with all wetted metal parts of type 316 stainless steel. Because of its construction materials, this heater is well-suited for heating most corrosive liquids, such as demineralized, deionized or reverse osmosis water commonly used by manufacturers of electronic equipment, pharmaceutical and food.

- Heavy duty 5/8" tubes of 16 gauge 316L stainless steel ensure long life and maintainability backed up by a 10-year tube bundle warranty against workmanship and material defects.
- Control valve is mounted integral to the heat exchanger, thus eliminating intermediate piping leaks.

Features

- Feed-forward control provides accurate temperature control on demand even when demand fluctuates abruptly.
- Feed-forward operation ensures that the heater will fail safely in the closed (cold) position to prevent overheating.
- Straight, non-U-bend tube bundle with removable end cover provides for easy tube cleaning along with the capability to visually inspect all tubes.
- Constant steam pressure on heat exchanger at all times means positive condensate evacuation, avoiding damage to the exchanger due to water hammer.

Specifications			
Application	Steam Supply Pressure	Water Supply Pressure	Maximum Water Pressure Drop
Steam to Water	2 - 15 psig (0.14 - 1.0 bar)	20 - 150 psig (1.4 - 10.3 bar)	10 psig (0.7 bar)

Materials						
Body	Valve	Valve Seats	Diaphragm	Heat Exchanger Shell	Heat Exchanger Tubes	Heat Exchanger Tube Sheets
T-316 Stainless Steel			Viton® GF Reinforced w/ Nomex® Fiber	Carbon Steel (Standard) T-316 Stainless Steel (Optional)	T-316L Stainless Steel	T-316 Stainless Steel

Dimensions and Weights																	
Model		Dimensions											Connections			Weight	
		A	B	C	D	E	F	G	H	J	K	L	1	2	3		
665 SS	in mm	82-3/4	5-3/4	10-3/8	10-3/8	6-5/8	4-3/4	5-1/2	9-1/4	8	8-3/4	74	2 NPT	1-1/4 NPT	3 NPT	lb kg	335
		2,102	146	264	264	168	121	140	235	191	222	1,880	50	32	80		152
8120 SS	in mm	90	5-3/4	10-3/8	10-3/8	8-5/8	8-1/8	8-7/8	9-1/2	8	14-1/2	74	2 NPT	2 NPT	4 150# ANSI	lb kg	670
		2,286	146	264	264	219	156	225	203	368	1,880	50	50		100		298

Flo-Rite-Temp® Instantaneous Steam/Water Heater Stainless Steel Sizing Chart

Capacities and Steam Loads																				
Inlet Temp. °F	Set Temp. °F	Standard								Inlet Temp. °C	Set Temp. °C	Metric								Model
		Hot Water Capacities*				Steam Capacities						Hot Water Capacities*				Steam Capacities				
		Steam Pressure				Steam Pressure						Steam Pressure				Steam Pressure				
		psig				psig						bar				bar				
		2	5	10	15	2	5	10	15			0.14	0.35	0.7	1	0.14	0.35	0.7	1	
		gpm				lbs/hr						m³/h				kg/h				
40	120	41	44	47	51	1,695	1,821	1,993	2,138	4	49	9.3	10	10.7	11.6	769	826	904	970	665 SS
		84	89	97	103	3,351	3,720	4,100	4,368			19.1	20.2	22	23.4	1,520	1,687	1,860	1,981	8120 SS
	130	35	37	41	43	1,617	1,743	1,915	2,061		54	7.9	8.4	9.3	9.8	733	791	869	935	665 SS
		66	72	80	86	2,974	3,239	3,611	3,956			15	16.4	18.2	19.5	1,349	1,469	1,638	1,794	8120 SS
	140	30	32	35	37	1,535	1,662	1,836	1,982		60	6.8	7.3	7.9	8.4	696	754	833	899	665 SS
		52	57	64	71	2,596	2,862	3,216	3,540			11.8	12.9	14.5	16.1	1,178	1,298	1,459	1,606	8120 SS
	160	17	18	19	21	1,011	1,110	1,242	1,353		71	3.9	4.1	4.3	4.8	459	503	563	614	665 SS
		44	48	53	57	2,726	2,990	3,346	3,646			10	10.9	12	12.9	1,237	1,356	1,518	1,654	8120 SS
	180	12	13	15	17	860	964	1,103	1,217		82	2.7	3	3.4	3.9	390	437	500	552	665 SS
		32	35	40	44	2,316	2,598	2,971	3,280			7.3	7.9	9.1	10	1,051	1,178	1,348	1,488	8120 SS
50	120	45	48	53	56	1,643	1,768	1,938	2,083	10	49	10.2	10.9	12	12.7	745	802	879	945	665 SS
		91	97	105	113	3,300	3,550	3,892	4,183			20.7	22	23.8	25.7	1,497	1,610	1,765	1,897	8120 SS
	130	38	41	44	47	1,566	1,691	1,862	2,007		54	8.6	9.3	10	10.7	710	767	845	910	665 SS
		75	81	89	95	2,997	3,257	3,740	4,031			17	18.4	20.2	21.6	1,359	1,477	1,696	1,828	8120 SS
	140	32	34	38	41	1,486	1,612	1,784	1,930		60	7.3	7.7	8.6	9.3	674	731	809	875	665 SS
		58	64	71	79	2,628	2,867	3,212	3,558			13.2	14.5	16.1	17.9	1,192	1,300	1,457	1,614	8120 SS
	160	17	19	21	23	978	1,075	1,206	1,316		71	3.9	4.3	4.8	5.2	444	488	547	597	665 SS
		46	51	56	61	2,635	2,896	3,249	3,545			10.4	11.6	12.7	13.9	1,195	1,314	1,474	1,608	8120 SS
	180	12	14	16	18	830	993	1,070	1,183		82	2.7	3.2	3.6	4.1	376	423	485	537	665 SS
		33	37	42	47	2,235	2,513	2,882	3,188			7.5	8.4	9.5	10.7	1,014	1,140	1,307	1,446	8120 SS
60	120	51	55	60	64	1,590	1,713	1,883	2,027	16	49	11.6	12.5	13.6	14.5	721	777	854	919	665 SS
		71	104	122	130	3,247	3,500	3,846	4,139			16.1	23.6	27.7	29.5	1,473	1,588	1,745	1,877	8120 SS
	130	42	45	49	53	1,514	1,639	1,808	1,952		54	9.5	10.2	11.1	12	687	743	820	885	665 SS
		86	92	100	108	3,093	3,347	3,694	3,988			19.5	20.9	22.7	24.5	1,403	1,518	1,676	1,809	8120 SS
	140	35	37	41	44	1,436	1,561	1,732	1,876		60	7.9	8.4	9.3	10	651	708	786	851	665 SS
		66	73	81	87	2,620	2,903	3,233	3,703			15	16.6	18.4	19.8	1,188	1,317	1,466	1,680	8120 SS
	160	18	20	22	24	943	1,040	1,170	1,279		71	4.1	4.5	5	5.5	428	472	531	580	665 SS
		49	54	60	65	2,543	2,801	3,151	3,445			11.1	12.3	13.6	14.8	1,154	1,271	1,429	1,563	8120 SS
	180	13	14	17	19	799	901	1,035	1,148		82	3	3.2	3.9	4.3	362	409	469	521	665 SS
		35	39	44	49	2,152	2,427	2,791	3,093			7.9	8.9	10	11.1	976	1,101	1,266	1,403	8120 SS

*Units may be piped in parallel when desired capacities exceed that of a single unit.

NOTES: Minimum water temperature increase is 60°F (33°C). Consult factory if less than 60°F (33°C) increase is required or a set temperature below 120°F (49°C) is required.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

Non-Recirculating Hot Water Systems

Pre-Piped Single Temperature

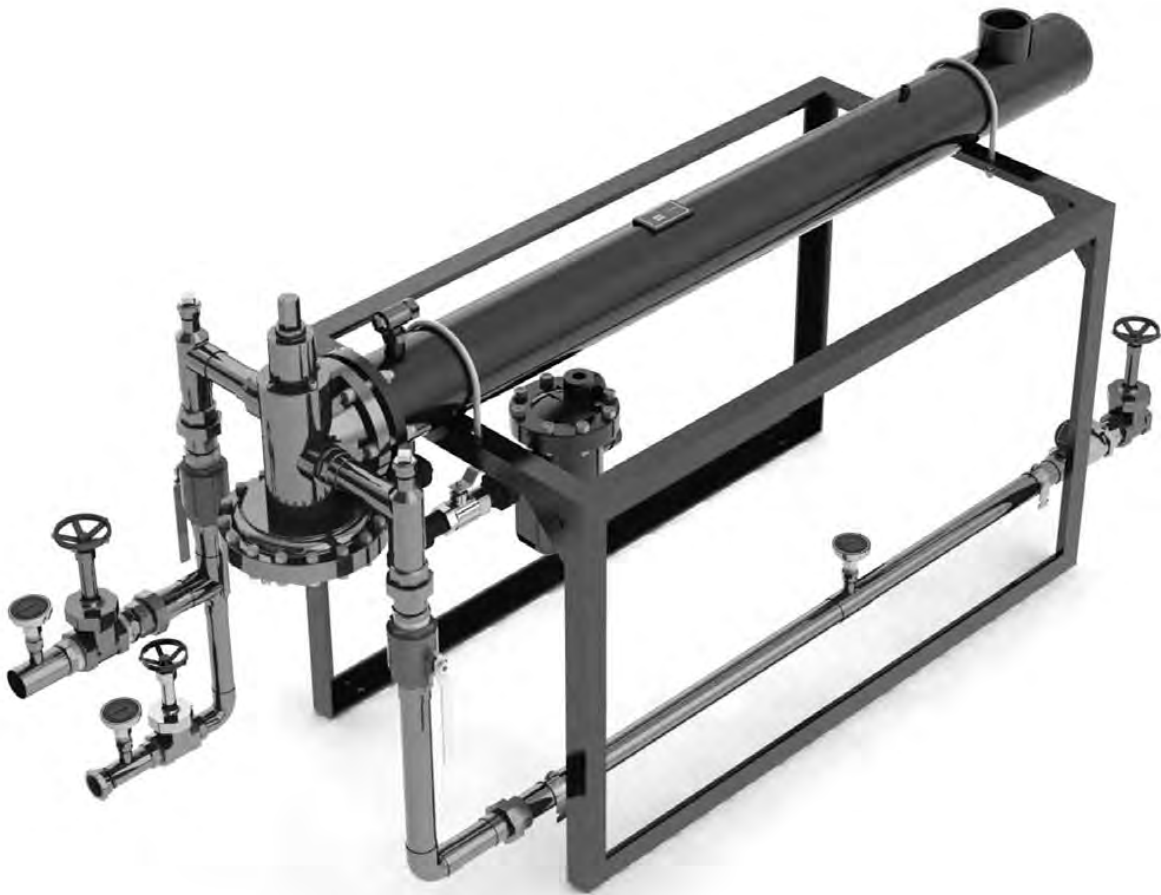
Flo-Rite-Temp® Instantaneous Steam/Water Heaters-Non Recirculating Hot Water Systems feature four single heat exchanger and four double (parallel) heat exchanger pre-piped single temperature packaged assemblies.

Parallel heat exchangers offer increased flow rates and/or system redundancy within the same footprint and allows for tube bundle and control valve servicing while the water heater remains online.

Flo-Rite-Temp® Pre-Piped Single Temperature Systems are fully assembled and include the following installation components:

- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Piped Single Temperature Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).



Flo-Rite-Temp® Instantaneous Steam/Water Heater

Non-Recirculating Hot Water Systems

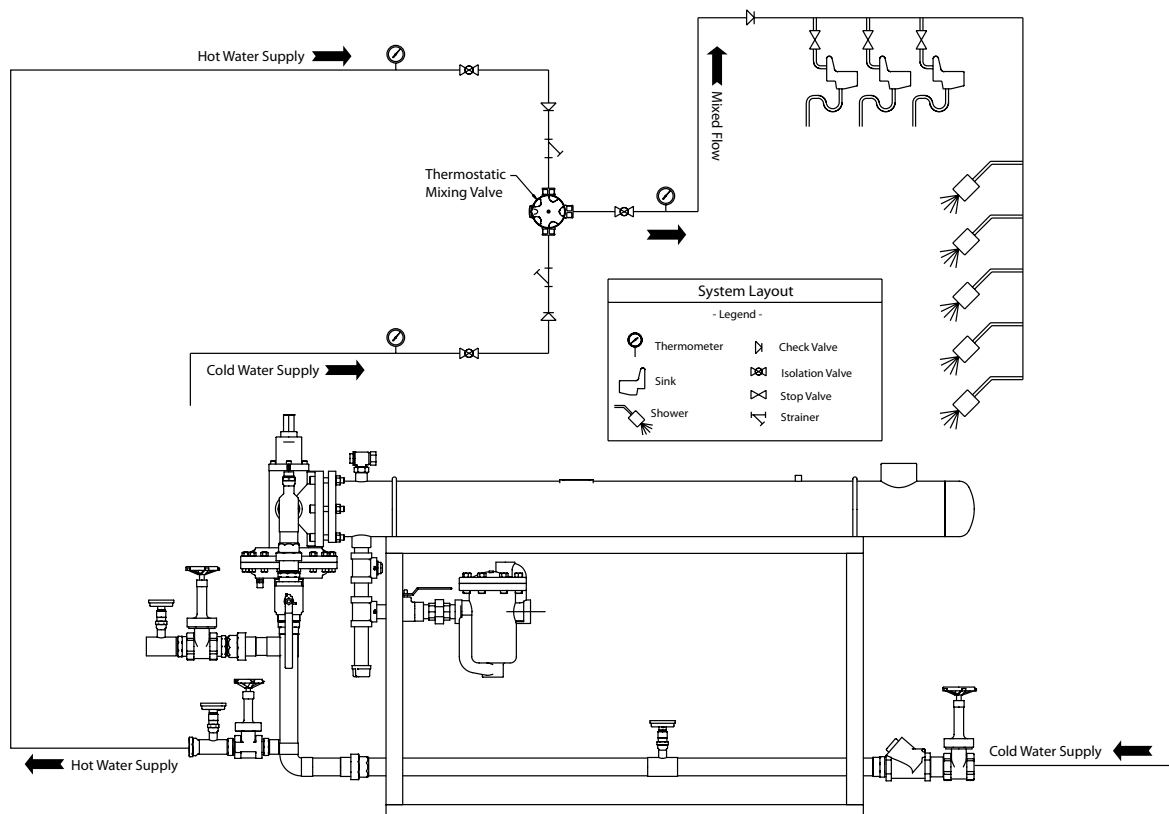
Pre-Piped Single Temperature

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on page 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.

Additionally, where appropriate, Armstrong can integrate engineering services, turn key installation and project management, system assessment and optimization along with energy conservation measure (ECM) capability through Armstrong Service Incorporated.



Flo-Rite-Temp® Instantaneous Steam/Water Heater

Non-Recirculating Hot Water Systems

Pre-Piped Single Temperature (P-P)

Flo-Rite-Temp® Instantaneous Steam/Water Heater for Non-Recirculating Hot Water Systems feature four heat exchanger options offered as pre-piped single temperature packaged assemblies.

Flo-Rite-Temp® Pre-Piped (P-P) Single Temperature Systems are fully assembled and include the following installation components:

- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Piped (P-P) Single Temperature Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway). Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on pages 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.



For submittal drawing refer to:

Model 415P-P	Single Wall	\$5453
Model 415DWP-P	Double Wall	\$5499
Model 535P-P	Single Wall	\$5454
Model 535DWP-P	Double Wall	\$5500
Model 665P-P	Single Wall	\$5455
Model 665DWP-P	Double Wall	\$5501
Model 8120P-P	Single Wall	\$5456
Model 8120DWP-P	Double Wall	\$5502

Flo-Rite-Temp™ Instantaneous Steam/Water Heater						
Model	Entering Water Temperature	Outlet Temperature				
		120	130	140	160	180
415P-P	40	20	18	16	12	7
	50	20	20	17	13	7
	60	-	20	19	14	7
535P-P	40	45	39	34	26	16
	50	45	43	37	28	17
	60	-	45	40	30	18
665P-P	40	80	73	63	48	32
	50	80	80	68	51	33
	60	-	80	75	55	35
8120P-P	40	145	145	120	95	59
	50	145	145	134	102	72
	60	-	145	145	115	90

NOTE: All flow rates in gallons per minute and using 15 PSIG steam.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

Non-Recirculating Hot Water Systems

Parallel/Redundant Pre-piped Single Temperature (PP-P)

Flo-Rite-Temp® Instantaneous Steam/Water Heater for Non-Recirculating Hot Water Systems feature four heat exchanger options offered as pre-piped parallel single temperature packaged assemblies.

Flo-Rite-Temp® Pre-Piped (P-P) Parallel (P) Single Temperature Systems are fully assembled and include the following installation components:

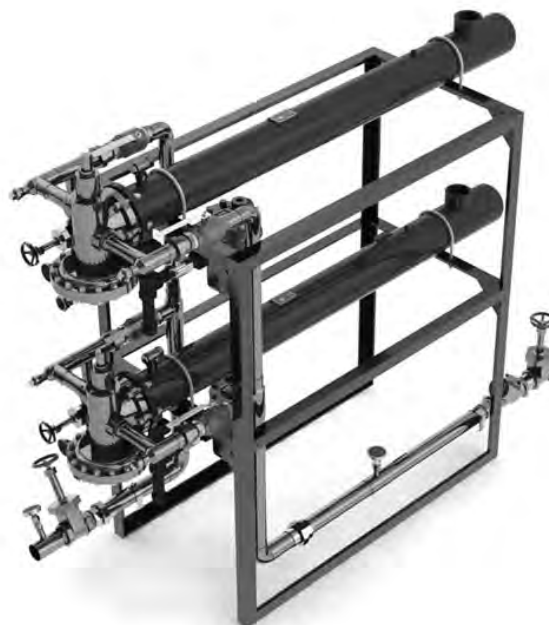
- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Piped (P-P) Parallel (P) Single Temperature Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on page 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.



For submittal drawing refer to:

Model	Configuration	Part Number
Model 415PP-P	Single Wall	S5457
Model 415DWPP-P	Double Wall	S5503
Model 535PP-P	Single Wall	S5458
Model 535DWPP-P	Double Wall	S5504
Model 665PP-P	Single Wall	S5459
Model 665DWPP-P	Double Wall	S5505
Model 8120PP-P	Single Wall	S5460
Model 8120DWPP-P	Double Wall	S5506

If unit is operated in parallel then double flow rate given for total available capacity.

Flo-Rite-Temp® Instantaneous Steam/Water Heater						
Model	Entering Water Temperature	Outlet Temperature				
		120	130	140	160	180
415PP-P	40	20	18	16	12	7
	50	20	20	17	13	7
	60	-	20	19	14	7
535PP-P	40	45	39	34	26	16
	50	45	43	37	28	17
	60	-	45	40	30	18
665PP-P	40	80	73	63	48	32
	50	80	80	68	51	33
	60	-	80	75	55	35
8120PP-P	40	145	145	120	95	59
	50	145	145	134	102	72
	60	-	145	145	115	90

NOTE: All flow rates in gallons per minute and using 15 PSIG steam.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

Pre-Piped Single Temperature

Flo-Rite-Temp® Instantaneous Steam/Water Heaters for Recirculating Hot Water Systems feature four single heat exchanger and four double (parallel) heat exchanger pre-piped single temperature packaged assemblies.

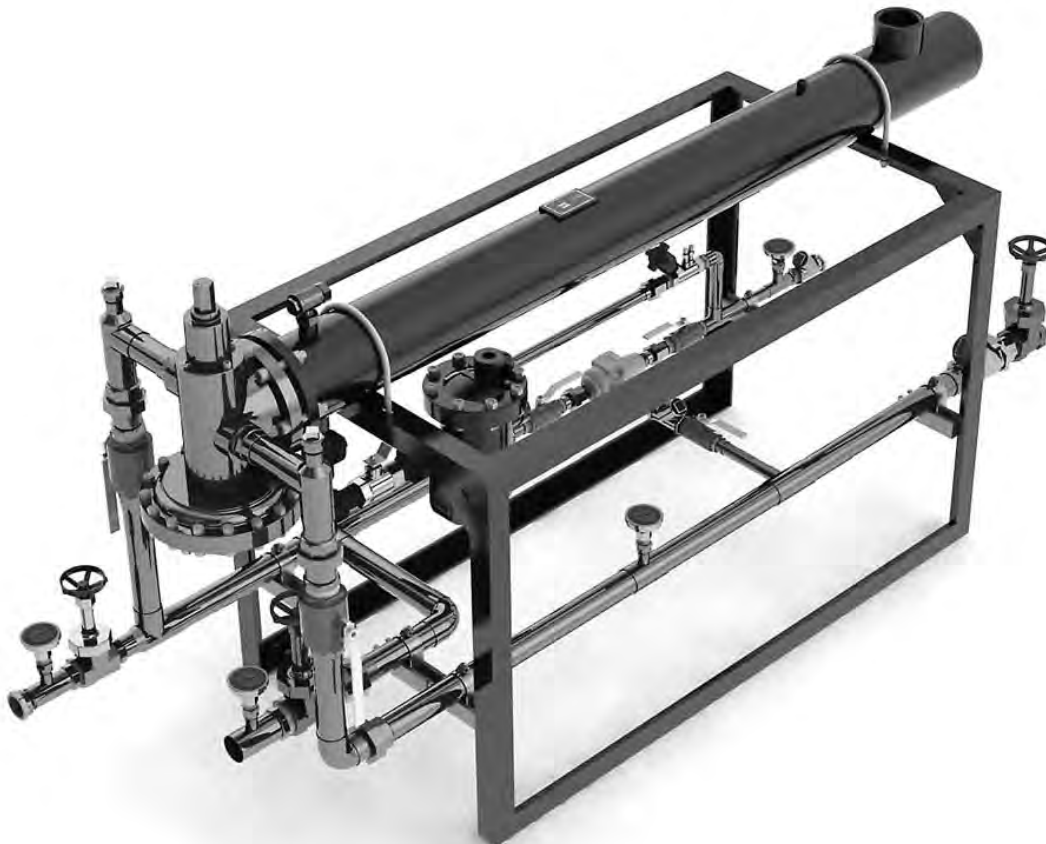
Parallel heat exchangers offer increased flow rates and/or system redundancy within the same footprint and allows for tube bundle and control valve servicing while the water heater remains online.

Flo-Rite-Temp® Pre-Piped Single Temperature Systems are fully assembled and include the following installation components:

- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves
- Thermostatic Diverting Valve*

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Piped Single Temperature Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).

Flo-Rite-Temp® Instantaneous Steam/Water Heaters Recirculating Hot Water Solutions-for single temperature systems feature an integral thermostatic diverting valve which maintains re-circulating hot water temperatures during zero system draw off "idling" periods.



Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

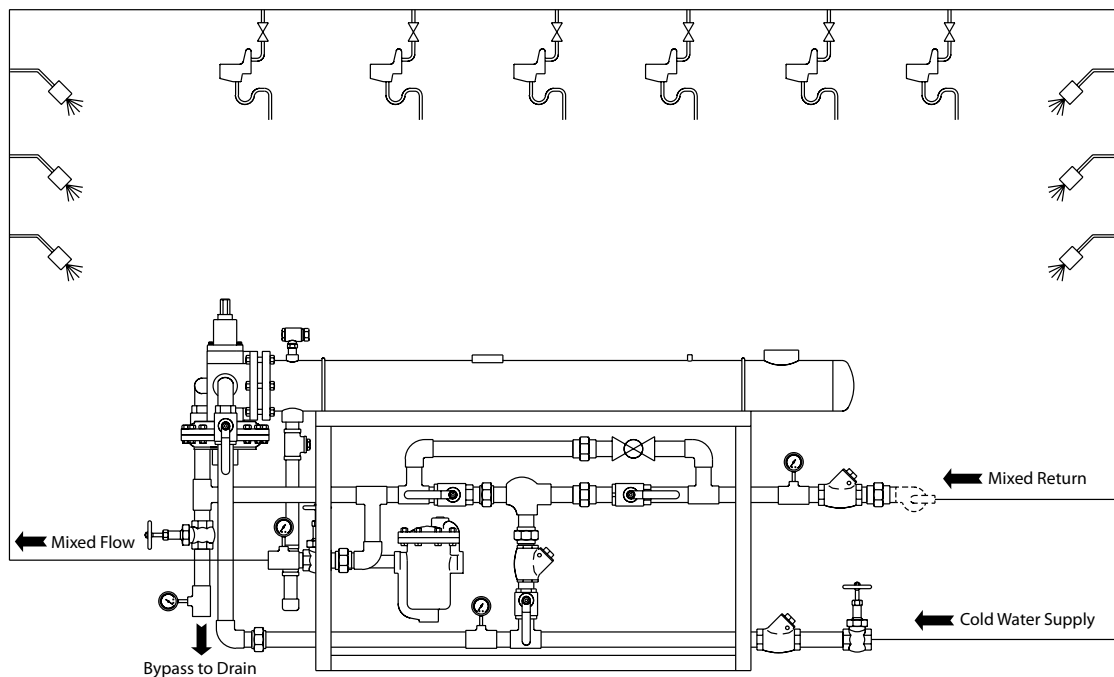
Pre-Piped Single Temperature

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on page 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.

Additionally, where appropriate, Armstrong can integrate engineering services, turn key installation and project management, system assessment and optimization along with energy conservation measure (ECM) capability through Armstrong Service Incorporated.



Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

Pre-Piped Single Temperature (P-PR)

Flo-Rite-Temp® Instantaneous Steam/Water Heater for Recirculating Hot Water Systems feature four heat exchanger options offered as pre-piped single temperature packaged assemblies.

Flo-Rite-Temp® Pre-Piped (P-P) Recirculating (R) Single Temperature Systems are fully assembled and include the following installation components:

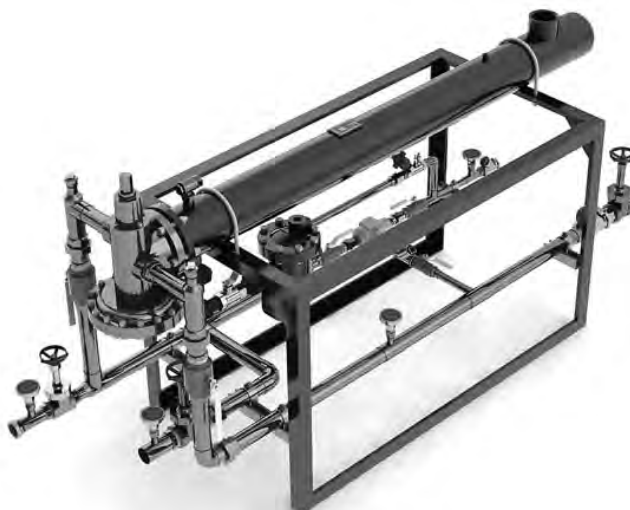
- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves
- Amot Thermostatic Diverting Valve

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Piped (P-P) Recirculating (R) Single Temperature Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on pages 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.



For submittal drawing refer to:

Model	Configuration	Price
Model 415P-PR	Single Wall	\$5468
Model 415DWP-PR	Double Wall	\$5514
Model 535P-PR	Single Wall	\$5469
Model 535DWP-PR	Double Wall	\$5515
Model 665P-PR	Single Wall	\$5470
Model 665DWP-PR	Double Wall	\$5516
Model 8120P-PR	Single Wall	\$5471
Model 8120DWP-PR	Double Wall	\$5517

Flo-Rite-Temp™ Instantaneous Steam/Water Heater						
Model	Entering Water Temperature	Outlet Temperature				
		120	130	140	160	180
415P-PR	40	20	18	16	12	7
	50	20	20	17	13	7
	60	-	20	19	14	7
535P-PR	40	45	39	34	26	16
	50	45	43	37	28	17
	60	-	45	40	30	18
665P-PR	40	80	73	63	48	32
	50	80	80	68	51	33
	60	-	80	75	55	35
8120P-PR	40	145	145	120	95	59
	50	145	145	134	102	72
	60	-	145	145	115	90

NOTE: All flow rates in gallons per minute and using 15 PSIG steam.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

Parallel/Redundant Pre-Piped Single Temperature (PP-PR)

Flo-Rite-Temp® Instantaneous Steam/Water Heater for Recirculating Hot Water Systems feature four heat exchanger options offered as pre-piped parallel single temperature packaged assemblies.

Flo-Rite-Temp® Pre-Piped (P-P) Parallel (P) Recirculating (R) Single Temperature Systems are fully assembled and include the following installation components:

- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves
- Amot Thermostatic Diverting Valve

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Parallel (P) Piped (P-P) Recirculating (R) Single Temperature Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on page 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.



For submittal drawing refer to:

Model 415PP-PR	Single Wall	S5472
Model 415DWPP-PR	Double Wall	S5518
Model 535PP-PR	Single Wall	S5473
Model 535DWPP-PR	Double Wall	S5519
Model 665PP-PR	Single Wall	S5474
Model 665DWPP-PR	Double Wall	S5520
Model 8120PP-PR	Single Wall	S5475
Model 8120DWPP-PR	Double Wall	S5521

If unit is operated in parallel then double flow rate given for total available capacity.

Flo-Rite-Temp™ Instantaneous Steam/Water Heater						
Model	Entering Water Temperature	Outlet Temperature				
		120	130	140	160	180
415PP-PR	40	20	18	16	12	7
	50	20	20	17	13	7
	60	-	20	19	14	7
535PP-PR	40	45	39	34	26	16
	50	45	43	37	28	17
	60	-	45	40	30	18
665PP-PR	40	80	73	63	48	32
	50	80	80	68	51	33
	60	-	80	75	55	35
8120PP-PR	40	145	145	120	95	59
	50	145	145	134	102	72
	60	-	145	145	115	90

NOTE: All flow rates in gallons per minute and using 15 PSIG steam.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

Pre-Piped Tempered Water

Flo-Rite-Temp® Instantaneous Steam/Water Heaters-Recirculating Hot Water Systems feature four single heat exchanger and four double (parallel) heat exchanger pre-piped tempered water packaged assemblies.

Parallel heat exchangers offer increased flow rates and/or system redundancy within the same footprint and allows for tube bundle and control valve servicing while the water heater remains online.

Flo-Rite-Temp® Pre-Piped Tempered Water Systems are fully assembled and include the following installation components:

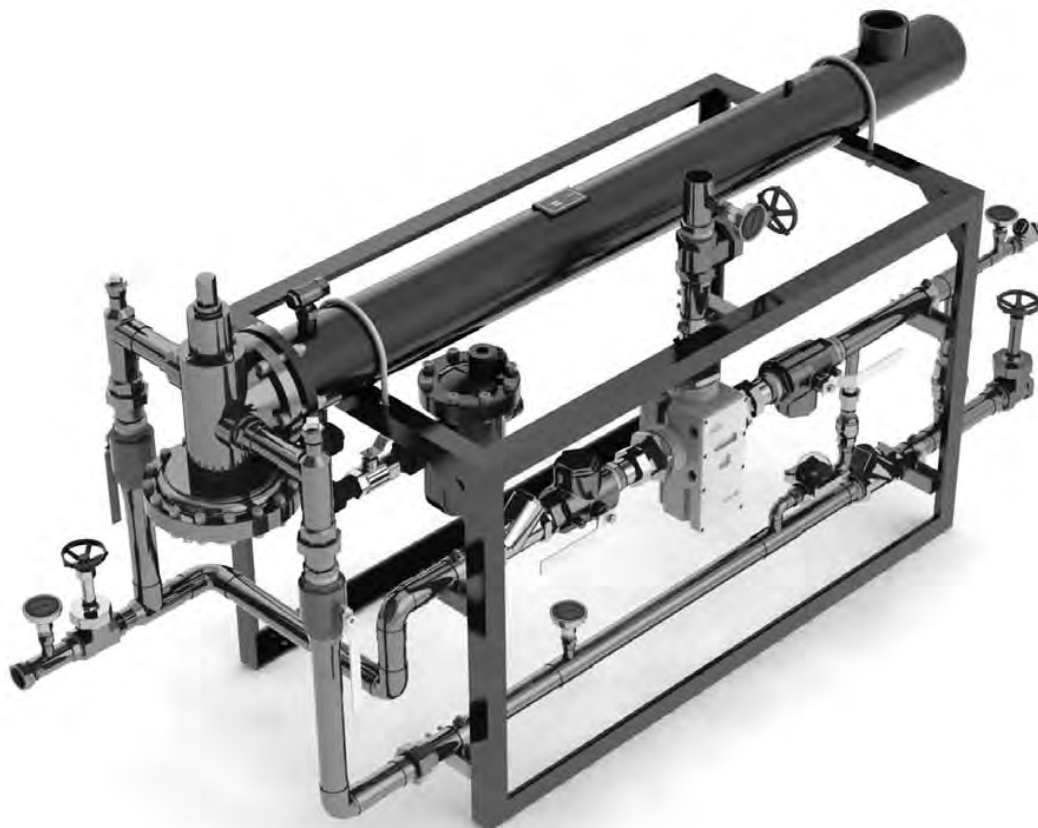
- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves
- DRV 80 "The Brain" Digital Recirculating Valve

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Piped Single Temperature Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).

Flo-Rite-Temp® Instantaneous Steam/Water Heaters-Recirculating Hot Water Solutions-for tempered water systems feature DRV 80 "The Brain".

DRV 80 delivers +/- 2F temperature control for systems which experience diverse user draw-off between 0-150GPM. DRV80 is provided as standard with an integral mixed water outlet sensor/transmitter and remote set point adjustment capability for "plug and play" communication via PC, LAN or resident Building Automation System (BAS).

More information on DRV 80 is detailed on page 27.



Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

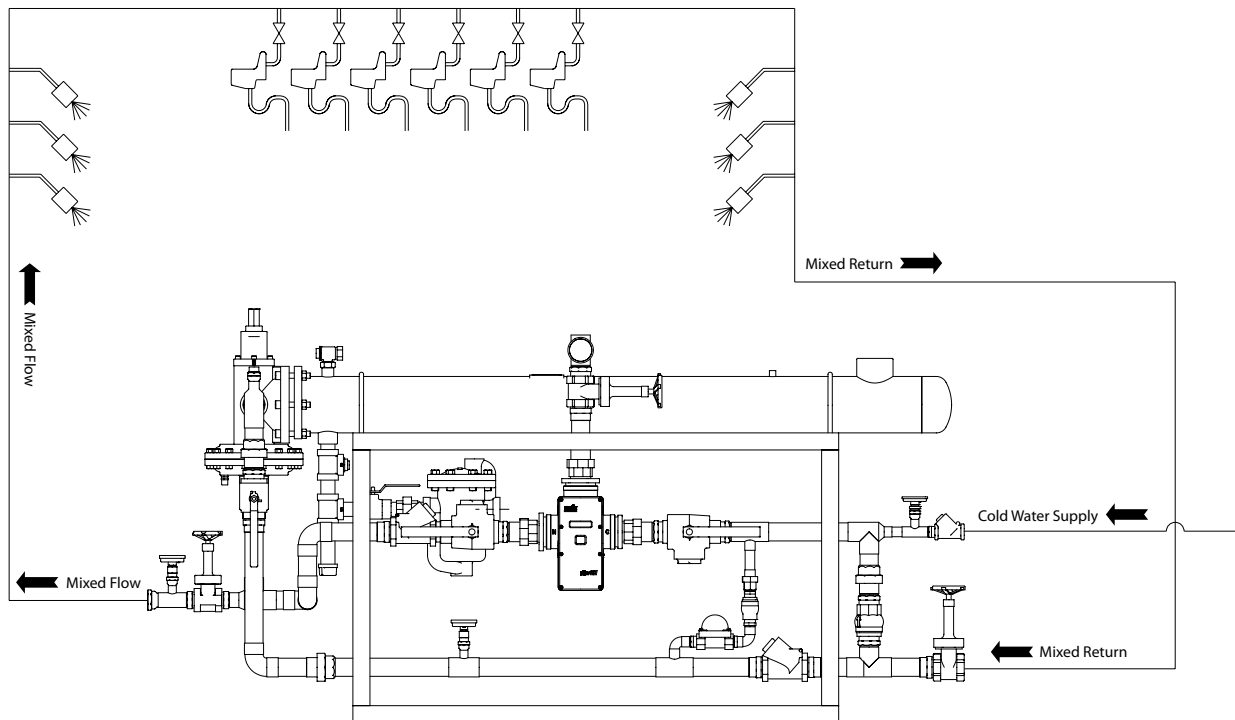
Pre-Piped Tempered Water

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on page 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.

Additionally, where appropriate, Armstrong can integrate engineering services, turn key installation and project management, system assessment and optimization along with energy conservation measure (ECM) capability through Armstrong Service Incorporated.



Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

Pre-Piped Tempered Water (P-PTW)

Flo-Rite-Temp® Instantaneous Steam/Water Heater for Recirculating Hot Water Systems feature four heat exchanger options offered as pre-piped tempered water packaged assemblies.

Flo-Rite-Temp® Pre-Piped (P-P) Tempered Water (TW) Systems are fully assembled and include the following installation components:

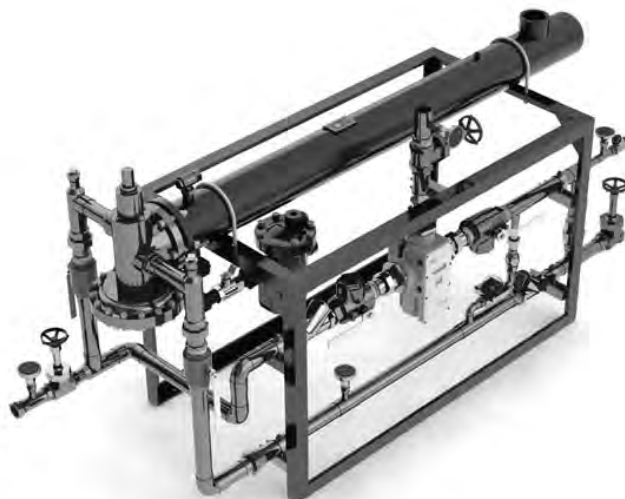
- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves
- DRV 80 Digital ReCirculating Valve
"The Brain" (DMC 1)

Ideal for both new construction and retrofit installation within an existing building infrastructure. Flo-Rite-Temp® Pre-Piped (P-P) Tempered Water (TW) Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on page 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.



For submittal drawing refer to:

Model 415P-PTW-EMC1	Single Wall	\$5476
Model 415DWP-PTW-EMC1	Double Wall	\$5522
Model 535P-PTW-DMC1	Single Wall	\$5477
Model 535DWP-PTW-DMC1	Double Wall	\$5523
Model 665P-PTW-DMC1	Single Wall	\$5478
Model 665DWP-PTW-DMC1	Double Wall	\$5524
Model 8120P-PTW-DMC1	Single Wall	\$5479
Model 8120DWP-PTW-DMC1	Double Wall	\$5525

**Note – Maximum temperature outlet set-point on digital recirculating valve is 160°F.*

Flo-Rite-Temp™ Instantaneous Steam/Water Heater						
Model	Entering Water Temperature	Outlet Temperature				
		120	130	140	160	180*
415P-PTW-EMC1	40	20	18	16	12	7
	50	20	20	17	13	7
	60	-	20	19	14	7
535P-PTW-DMC1	40	45	39	34	26	16
	50	45	43	37	28	17
	60	-	45	40	30	18
665P-PTW-DMC1	40	80	73	63	48	32
	50	80	80	68	51	33
	60	-	80	75	55	35
8120P-PTW-DMC1	40	145	145	120	95	59
	50	145	145	134	102	72
	60	-	145	145	115	90

NOTE: All flow rates in gallons per minute and using 15 PSIG steam.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

Recirculating Hot Water Systems

Parallel/Redundant Pre-Piped Tempered Water (PP-PTW)

Flo-Rite-Temp® Instantaneous Steam/Water Heater for Recirculating Hot Water Systems feature four heat exchanger options offered as pre-piped parallel tempered water packaged assemblies.

Flo-Rite-Temp® Pre-Piped (P-P) Parallel (P) Tempered Water (TW) Systems are fully assembled and include the following installation components:

- Steam Trap
- Air Vent
- Thermometers
- CIP connection port
- Flow Control/Isolation Valves
- DRV 80 Digital ReCirculating Valve "The Brain" (DMC 1)

Ideal for both new construction and retrofit installation within an existing building infrastructure Flo-Rite-Temp® Parallel (P) Pre-Piped (P-P) Tempered Water (TW) Systems are designed to fit through a standard 32" doorway (Model 8120 36" doorway).

Armstrong Flo-Rite-Temp® Instantaneous Steam/Water Heater pre-piped packages are available in standard configurations per the specification matrix on page 26.

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include condensate recovery, circulating pumps, additional mixed water temperature controls/loops and varied other components can be application engineered specifically to meet the projects requirements.

If unit is operated in parallel then double flow rate given for total available capacity.



For submittal drawing refer to:

Model 415PP-PTW-EMC1	Single Wall	\$5480
Model 415DWPP-PTW-EMC1	Double Wall	\$5526
Model 535PP-PTW-DMC1	Single Wall	\$5481
Model 535DWPP-PTW-DMC1	Double Wall	\$5527
Model 665PP-PTW-DMC1	Single Wall	\$5482
Model 665DWPP-PTW-DMC1	Double Wall	\$5528
Model 8120PP-PTW-DMC1	Single Wall	\$5483
Model 8120DWPP-PTW-DMC1	Double Wall	\$5529

Flo-Rite-Temp™ Instantaneous Steam/Water Heater						
Model	Entering Water Temperature	Outlet Temperature				
		120	130	140	160	180
415PP-PTW-EMC1	40	20	18	16	12	7
	50	20	20	17	13	7
	60	-	20	19	14	7
535PP-PTW-DMC1	40	45	39	34	26	16
	50	45	43	37	28	17
	60	-	45	40	30	18
665PP-PTW-DMC1	40	80	73	63	48	32
	50	80	80	68	51	33
	60	-	80	75	55	35
*8120PP-PTW-DMC1	40	145	145	120	95	59
	50	145	145	134	102	72
	60	-	145	145	115	90

NOTE: All flow rates in gallons per minute and using 15 PSIG steam.

*NOTE: If a 8120PP-PTW-DMC1 is selected for parallel operation, a second DRV 80 is recommended to increase the flow rate.

Flo-Rite-Temp® Instantaneous Steam/Water Heater

Specification Matrix

Flo-Rite-Temp® water heaters are available in four base models each sized with a prefix that denotes the shell size in inches (**4"**, **5"**, **6"** and **8"**) and a suffix that denotes the flow rate at a 100°F temperature rise (**15 gpm**, **35 gpm**, **65 gpm** and **120 gpm**).

Each Flo-Rite-Temp® model's heat exchanger is single wall construction as standard but is optionally available as a Double Wall (suffix **DW**).

Each Flo-Rite-Temp® model is supplied as a shell and tube style heat exchanger with integral mixing valve/head and is also available as a pre-piped "Packaged Solution" (suffix **P-P**).

Flo-Rite-Temp® Packaged Solutions are also available with a second heater (parallel, suffix **PP-P**) and third heater (triplex, suffix **Trip**) for increased flow capacity, redundant installation or both.

Flo-Rite-Temp® Packaged Solutions are supplied for either point of use "dead-leg" applications or can be factory piped for a recirculating hot water system in either a standard configuration with a thermostatic diverting valve (suffix **R**) or as a Tempered Water system (suffix **TW**).

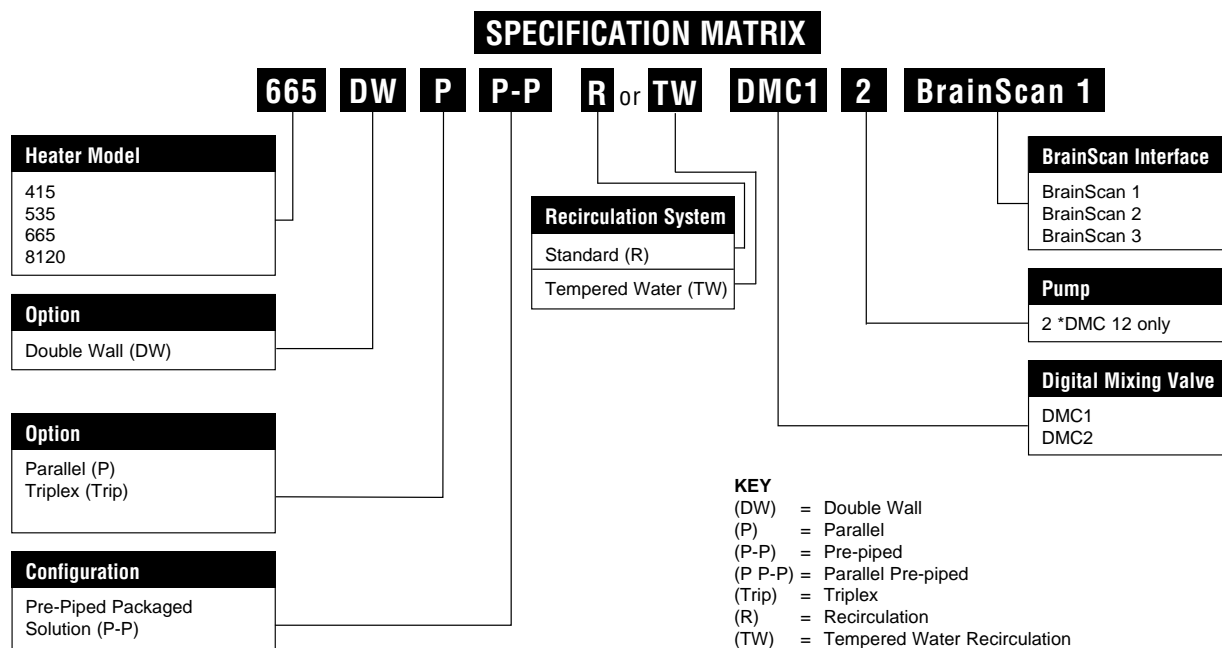
Flo-Rite-Temp® Packaged Solutions designated as Tempered Water Systems (**TW**) include an on board Digital Mixing Center (suffix **DMC**) which features DRV 80 "The Big Brain®"

Higher flow Flo-Rite-Temp® Packaged Solutions and Systems designed with built-in redundancy can include two **DRV 80**. The model code (**DMC**) always includes a trailing suffix which identifies the number of Digital Mixing Valves (**DMC 1**, **DMC 2**, etc.) The Digital Mixing Center can be assembled with a recirculation pump with a "2" in the model number following the **DMC**/(**DMC 12 only**).

Flo-Rite-Temp® Packaged Solutions fitted as DMC include a 4-20mA connection as standard on the DRV80. The 4-20mA connection provides the capability to access and transmit the water temperature output from the valves integral Mixed Outlet Water Sensor and allows Remote Set Point adjustment capability for "plug and play" system communication via PC, LAN or resident Building Automation System.

BrainScan® a Digital Hot Water Management System Console can be added by adding the suffix BrainScan with a hyphen. Flo-Rite-Temp® packaged systems fitted as DMC can connect BrainScan® directly to the serial port on the DRV 80.

When Integrated accordingly BrainScan® provides 3 levels of system interrogation options (see page 28) and is configured for most building automation systems which use BacNet™, LonWorks™ and ModBus protocols. BrainScan® also avails LAN and Web Browser connectivity options.



Flo-Rite-Temp® Instantaneous Steam/Water Heater

Digital Water Temperature Control

Flo-Rite-Temp® Pre-Piped (P-P) Single, Parallel (P) Recirculating (R) Single and Multiple Temperature Systems are available with a DRV 80 Digital Recirculating Valve. The DRV 80 "The Brain" is supplied pre-piped as an integral component to the Water Heater assembly in the form of a Digital Mixing Center (DMC).

Model DMC 1 features a single DRV 80 pre-piped and pressure tested complete with isolation valves, strainers, mixed return flow indicator, check valves, thermometers and an optionally selected system circulating pump for systems which experience diverse user draw-off from 0 to 150 GPM.

Remote Control, System Monitoring, System Interrogation and Data Logging

Model DMC 1 is provided as standard with an integral Mixed Outlet Water sensor and Remote Set Point Adjustment capability for "plug and play" system communication via PC, LAN or resident Building Automation System.

Model DMC1 offers an integral relay point for connection to a selected accessory component such as a pump on/off switch, to activate/deactivate a solenoid or to enable an audible alarm etc.

Model DMC1 is supplied as standard with integral Hot Water & Cold Water/System Return Water sensors and a serial connection data port which enables communication to third party system hardware via an accessory component called BrainScan®.

BrainScan®

BrainScan® is an optionally selected Digital Hot Water Management System from Armstrong complete with custom configured software. BrainScan® connects to the integral serial connection data port on DRV 80 and enables a direct onward connection to Building Automation Systems which utilize BacNet™, Lonworks™ and ModBus protocols, a communication capability with other Building Automation Systems which connect via an RS485 port and an Ethernet port for Web access.

Operational Specifications

The enhanced accuracy possible with DRV80 digital technology, combined with its data input/output communication capability equals:

- Accurate control of blended water drawn from the system at a point of use typically within +/-2°F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods
- Operational water pressure of 10 -150 psig
- Minimum valve inlet to outlet temperature differential requirement (system recirculation temperature loss) of 2°F



- Automatic shutoff of hot water flow upon cold water inlet supply failure
- Automatic shutoff of hot water flow in the event of a power failure
- Maintain a consistent system "idling" temperature and control Temperature Creep without the use of a manual throttling device or balance valve.
- System shall not require a temperature activated pump shut-off device (aquastat).
- Programmable set point range of 100-160°F (37-71°C) plus full hot/full cold
- Ability to thermally disinfect at recommended temperatures
- Programmable 1st level hi/lo temp alarm display
- Programmable temperature error level for safety shutdown

Technical Specifications

- 100-240 V Power supply (12 V DC output)
- 2 x 4-20 mA current loop interfaces:
Input: Setpoint Selection
Output: Measured Blend Temperature
- Relay output: Contacts
Error Relay: Activated in alarm or error mode
- Serial Connection Data Port
- Stainless Steel Construction

DMC 1

Supplied as a pre-plumbed, pressure-tested and mounted to an enameled steel frame comprising:

- 1 ea: DRV 80 Digital Recirculation System Controller
- 3" inlet/outlet piping with flanged connections
- System isolation valves,
- Inlet strainers
- Mixed return flow indicator
- Check valves
- Thermometers

DMC 12

As above with system circulating pump.

Hot Water System Monitoring

BrainScan™

BrainScan™ is a Digital Hot Water Management System optionally supplied with DRV80 Digital Recirculating Valves and DRV80 based Digital Mixing Centers.

BrainScan™ is factory configured to engage with either a Local Area Network (LAN), a third party Building Automation System (BAS) or an Internet Service Provider (ISP) to enable the DRV80's integral monitoring features.

Standard BrainScan™ configurations include hardware and software options which include on screen system graphics which are compatible with most standard Building Automation System open protocols.

All of the standard alarm conditions and error messages available through the DRV80 are also available through BrainScan™. BrainScan™ is available in three (3) different configuration packages as described below:

BrainScan™ 1

Includes remote hot water supply, cold/recirculation water supply and blended water outlet temperature readings. Also gives the ability to remotely change blended water outlet temperature setpoint. Included with all BrainScan™ options is the valve/system graphic.

BrainScan™ 2

Provided as BrainScan™ 1 with hot water supply, cold water supply and blended water outlet pressure transmitters.

BrainScan™ 3

Provided as BrainScan™ 2 with blended water outlet and recirculation return flow meters. These can be used to calculate water usage.



Technical Specifications

- BrainScan™ utilizes the SoM-5282 System Module as the processing engine and uClinux as the operating system
- BrainScan™ accommodates a socket for a protocol translator module that is capable of communicating with BacNet™, LonWorks™ and ModBus
- Standard ethernet port available to bring system on to the internet via a secured HTTP network server
- System displays "real time" values as well as stored data to be downloaded by the facility into their preferred program
- Data storage and exporting is done via XML formatted files, written every 15 minutes

Hot Water System Monitoring

BrainScan™



BrainScan™ is a Digital Hot Water Management System optionally supplied with DRV80 Digital Recirculating Valves and DRV80 based Digital Mixing Centers.

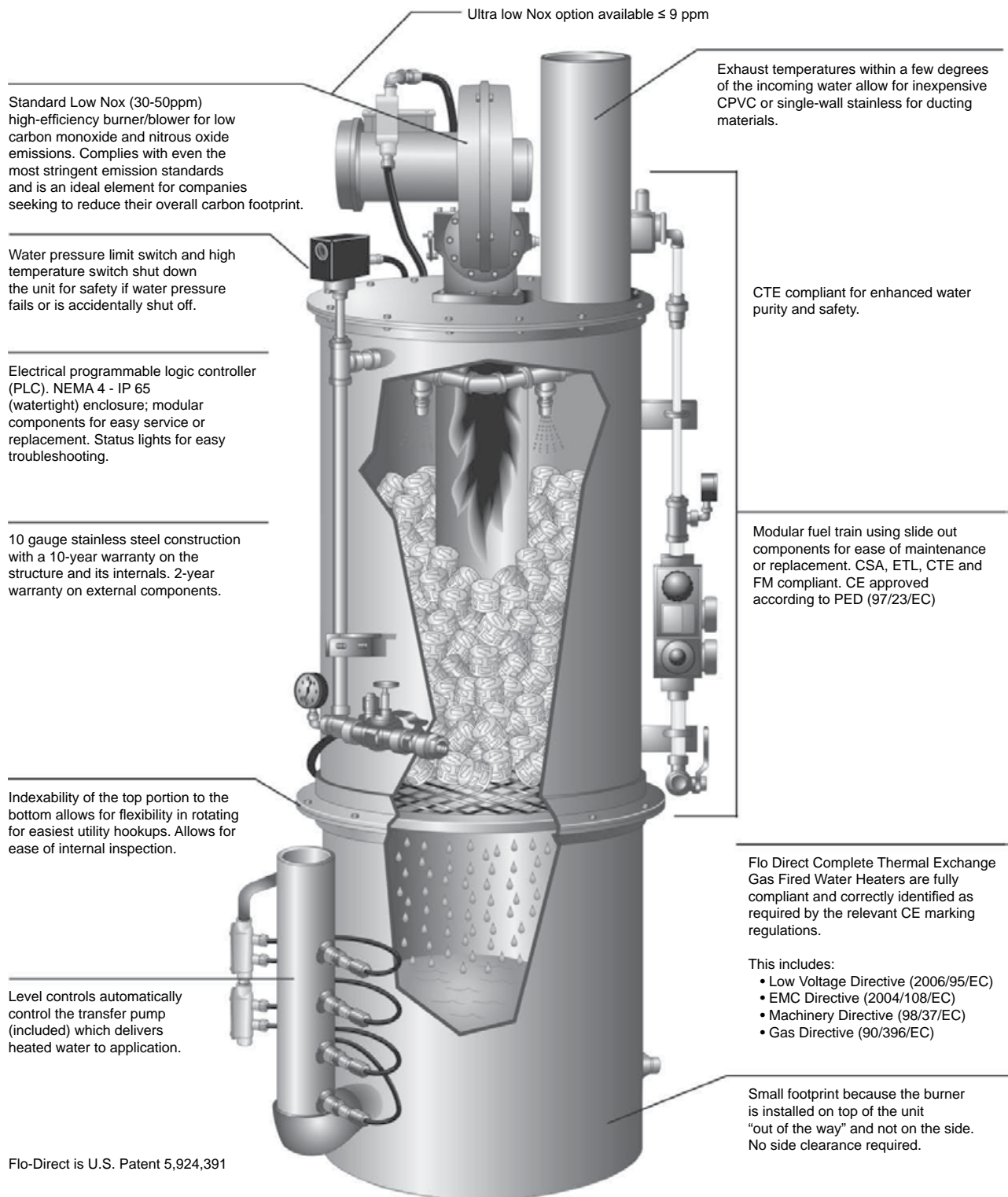
BrainScan™ is factory configured to engage with:

- Building Automation System (BacNet™, LonWorks™, ModBus)
- Local Area Network
- Web Browser



Flo-Direct®

Complete Thermal Exchange Gas Fired Water Heater



Flo-Direct® Complete Thermal Exchange Gas Fired Water Heater

Armstrong Flo-Direct CTE gas fired water heaters offer a complete range of high efficiency, compact, all stainless steel water heaters which are remarkably dependable, simple in design and operation, and suitable for a wide variety of hot water applications.

The Flo-Direct CTE gas fired water heaters often deliver fuel savings as high as 30-60% when compared to steam/water heating systems. Standard operating capacities are between 1 million and 16 million BTU per hour.

With a small footprint, 99.7% or greater high heat value (110% low heat value) heat transfer efficiencies*, remarkable dependability, ease of maintenance, and the ability to operate well with poor water quality, Armstrong Flo-Direct CTE gas fired water heaters are the product of choice for companies seeking to achieve Energy Conservation Measure (ECM) and Reduced Carbon Footprint objectives.

Primary Markets include:

Food Process Industries

- Washdown
- Batch Production
- Vessel Filling
- Tank Cleaning
- Bottle Warming

Concrete Plants

- Pre-Heated Water for batch production

Space Heating

- Greenhouses
Re-Circulated HW for general space heating
- Light Manufacturing/Warehouses
Re-Circulated HW for general space heating

General Industry

- Boiler Make-Up Water

Customized Hot Water System Solutions are our specialty. Multiple orientations, configurations and options are available.

Hot Water System Solutions which include transfer pumps, storage tanks variable frequency drive (VFD) pump skid-packaged solutions, hose stations, circulating pumps, downstream digital water temperature controls/loops with BAS/DDC interface along with a multitude of performance matched components can be application engineered specifically to meet the projects requirements.

Additionally, where appropriate, Armstrong can integrate engineering services, turn key installation, project management, system assessment and optimization along with energy conservation measure (ECM) capability through Armstrong Service Incorporated.

Flo-Direct Complete Thermal Exchange Gas-Fired Water Heaters deliver unrivaled Performance and Efficiency.

Incoming water is introduced into the top of the water heater through a series of calibrated dispersion nozzles. Cold water travels down through a bed of multifaceted stainless steel packing rings (Pall Rings) which break the water into smaller and smaller droplets.

A burner is mounted on top of the unit, firing downward through a centrally located flame tube. The flame tube is cooled by incoming cold water, and all of the fuel gasses are consumed within this flame tube. The design allows all combustion to take place within a dry and cool environment, and produces very low levels of nitrous oxide (NO) and carbon monoxide (CO).

Heat from the flame enters the lower chamber from the bottom of the flame tube, and travels slowly upward through the packing rings. Efficient heat transfer occurs as the descending water comes in contact with the rising hot gasses as both pass through the bed of packing rings in opposite directions.

This "rain" of hot water then falls into the lower chamber and is pumped out to a storage tank. Water temperatures up to 185°F are available within two minutes after the unit starts.

Outlet water temperature is set with a valve controlling the incoming water flow. More incoming water results in cooler outlet water temperatures, and less incoming water produces hotter outlet water temperatures.

The products of combustion are vented out of the top of the unit, and this exhaust is typically within a few degrees of incoming water temperature.

Features

- CTE Compliant
- Meets multiple global water quality standards
- No internal moving parts
- Low-temperature exhaust
- 99.7% or greater high heat value efficiency
- Water treatment not required
- Stainless steel construction
- Takes up minimal floor space
- Ten year warranty on structure/two years on all other components

Engineered Solutions

Armstrong can provide integrated engineering, turnkey installation and project management services. Additionally, Armstrong can perform system assessments and optimizations and identify Energy Conservation Measures (ECMs).

Flo-Direct®

Complete Thermal Exchange Gas Fired Water Heater

CTE Technology

Developed from direct contact water heating science which was first introduced more than two decades ago, Complete Thermal Exchange (CTE) technology has revolutionized high efficiency water heating methods. Today CTE enjoys a proven record and has rapidly become the new standard in high efficiency water heating and energy savings.

While traditional direct contact water heating can offer significant energy savings when compared to a conventional steam boiler system, the Armstrong Flo-Direct CTE gas fired water heater offers an unparalleled, 99.7% high heat value (110% approx. low heat value) efficiency rating* throughout each phase of its operation cycle.

The sustained operational efficiency of Flo-Direct CTE gas fired water heaters creates the most energy efficient method of hot water production currently available.

No Scale Build-Up

The Flo-Direct CTE gas fired water heater's unique design prevents scale build-up because there are no "hot spots" internally or externally, and because calcium is prevented from completely falling out of suspension during operation. As a result, the mineral content of the influent water and the effluent water will be equal.

Armstrong Flo-Direct CTE gas fired water heaters achieve CTE Standards

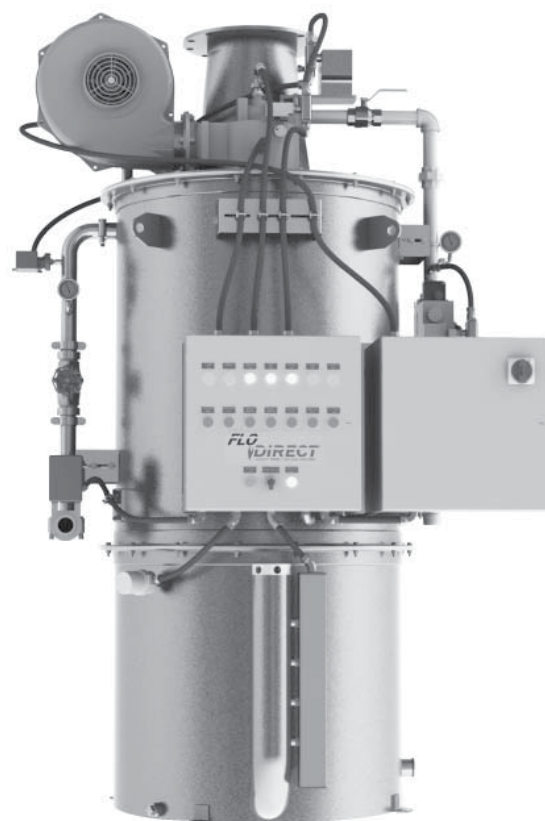
The Flo-Direct CTE direct contact water heaters, meet five standards not available with the older designs and traditional methods of direct contact water heater technology:

1. CTE units maintain a minimum of 99.7% high heat value (110% approx. low heat value) efficiency in all modes of operation, not just under optimal conditions.
2. CTE units have multiple thermal passes. Water and the combustion gasses (or heat from the combustion) repeatedly come in contact. This ensures that the maximum amount of heat or energy from combustion is transferred to the water.
3. CTE units have a dry combustion chamber. This is vital to maintaining complete combustion at all times during operation.
4. CTE units maintain complete combustion at all times.
5. CTE units must have an integral water quality integrity system. Operational procedures must be in place to ensure that effluent water quality is equal to the influent water quality.

Complete Combustion = Complete Water Quality

While many traditional-method direct contact water heaters spray water directly on the flame – sometimes called "flame quenching" – Flo-Direct, using CTE technology, avoids this process altogether. According to the Industrial Heating Equipment Association's "Combustion Technology Manual," flame quenching promotes incomplete combustion, and produces alcohols, aldehyde, formic acid, higher order acids, carbon monoxide, as well as carbon dioxide and water vapor. With CTE technology, Flo-Direct maintains 99.7% high heat value* (110% approx. low heat value) combustion efficiency, while maintaining water quality at all times.

*See page 530 for high heat value (HHV) and low heat value (LHV) explanation.



Global Water Quality Standards

Flo-Direct Complete Thermal Exchange (CTE) Gas Fired Water Heating Technology significantly limits the effluent water chemical additives typically attributed to other process water heating systems.

Our unique CTE water heating process deaerates the water significantly. Independent third party testing has verified CTE technology can actually remove some chemical constituents from the influent water.

NSF test results show that the effluent water from a Flo-Direct CTE Gas Fired Water Heater meets US, European Union and PRC bottled drinking water standards* and has been tested and documented as fully compliant with:

- USFDA - The United States Food and Drug Administration, Code of Federal Regulations Bottled Water Standard: Chapter I, Title 21, Part 165, Subpart B, Section 165.110.
- EU-TRW - The European Union Directives(s) - Treated Waters: 98/83/EC.

* Peoples Republic of China Standards for Drinking Water: GB5749-2006

*Statement presumes influent water also meets listed standards.

Flo-Direct®

Complete Thermal Exchange Gas Fired Water Heater

Specifications	
Gas Supply Pressure	2 - 6 psig / .14 - .41 bar
Dynamic Water Supply Pressure	Constant water pressure (+/-5 psi variation maximum) within a minimum of 30 psig/2 bar and a maximum of 100 psig/6.8 bar range is required for optimum performance.
Maximum Inlet Water Temperature	120°F (49°C)
Minimum Inlet Water Temperature	32°F (0°C)
Maximum Effective Outlet Temperature	185°F (85°C)

Standard Sizing Formulas

$$\frac{\text{gpm} \times \Delta T}{2} = \text{AFD Model}$$

$$\frac{(\text{AFD Model}) \times 2}{\Delta T} = \text{gpm}$$

$$(\text{AFD Model}) \times 2 = \Delta T \text{ gpm}$$

Use the Flo-Direct sizing tool at armstronginternational.com/flo-direct

Standard Formula Key

gpm = Gallons per Minute

ΔT = Temperature rise (°F)

AFD = Armstrong Flo-Direct
(e.g., 1000, 5000)

Metric Sizing Formulas

$$\frac{\text{lpm} \times \Delta T}{4.2} = \text{AFD Model}$$

$$\frac{(\text{AFD Model}) \times 4.2}{\Delta T} = \text{lpm}$$

$$(\text{AFD Model}) \times 4.2 = \Delta T \text{ lpm}$$

Use the Flo-Direct sizing tool at armstronginternational.eu/flo-direct

Metric Formula Key

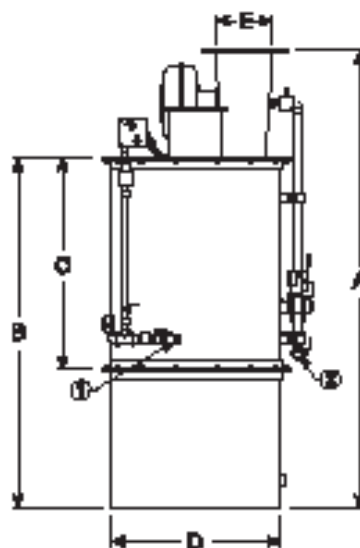
lpm = Liters per Minute

ΔT = Temperature rise (°C)

AFD = Armstrong Flo-Direct
(e.g., 1000, 5000)

Materials	
Upper and Lower Canister	Type 304 Stainless Steel #10 Glass Finish
Inlet Gas Train Piping	Malleable Iron with Standard Yellow Finish
Inlet Water Train Piping	Copper with Brass/Bronze Fittings
Spray Ring	Type 304/316 Stainless Steel
Canister Gaskets	Warco White
Flame Tube	Type 304 Stainless Steel
Pall Rings	Type 304 Stainless Steel

Optional/Custom materials of construction available upon request.



For fully detailed certified drawing, refer to CDY #1088.

Flo-Direct Dimensions and Weights

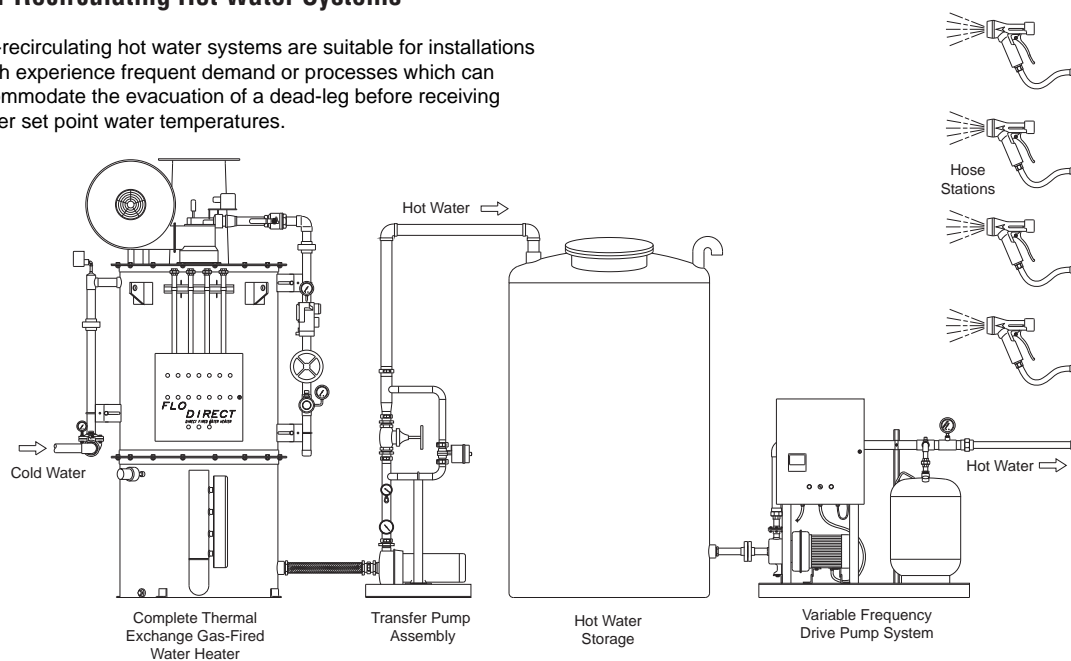
No Direct Dimensions and Weights																		
Model	Connections*				Dimensions										Weight*		btu/hr	kW
	1		2		A		B		C		D		E					
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg		
1000	1	25	1	25	95	2413	71	1803	39	991	24	610	8	203	825	375	1,000,000	292
1500	1	25	1	25	97	2464	73	1854	41	1041	26	660	8	203	850	386	1,500,000	439
2000	1-1/2	40	1-1/2	40	100	2540	76	1930	44	1118	30	762	10-3/4	273	1500	680	2,000,000	585
3000	2	50	1-1/2	40	100	2540	76	1930	44	1118	36	914	12	305	1600	725	3,000,000	878
4000	2	50	2	50	104	2642	80	2032	48	1214	40	1016	14	356	2000	907	4,000,000	1171
5000	2-1/2	65	2	50	127	3226	97	2464	65	1651	44	1118	16	406	2500	1136	5,000,000	1464
6000	3	80	2	50	132	3353	100	2540	70	1778	47	1194	18	457	2900	1316	6,000,000	1757
7000	3	80	2	50	139	3531	107	2718	77	1956	50	1270	18	457	3200	1455	7,000,000	2050
8000	3	80	2	50	139	3531	107	2718	77	1956	50	1270	18	457	3200	1455	8,000,000	2342
9000	3	80	2	50	169	4293	139	3531	107	2718	60	1524	20	508	5000	2273	9,000,000	2635
10000	3	80	2	50	181	4597	151	3835	119	3023	61	1549	20	508	5200	2405	10,000,000	2928
11000	4	100	3	80	181	4597	151	3835	119	3023	61	1549	22	559	5500	2495	11,000,000	3221
12000	4	100	3	80	181	4597	151	3835	119	3023	61	1549	22	559	5500	2495	12,000,000	3514
13000	4	100	3	80	192	4877	161	4089	129	3277	70	1778	24	610	7000	3175	13,000,000	3807
14000	4	100	3	80	192	4877	161	4089	129	3277	70	1778	24	610	7000	3175	14,000,000	4099
15000	4	100	3	80	192	4877	161	4089	129	3277	70	1778	24	610	7000	3175	15,000,000	4392
16000	4	100	3	80	216	5486	185	4699	153	3886	70	1778	24	610	7500	3402	16,000,000	4685

Hot Water Systems

Flo-Direct Complete Thermal Exchange Gas Fired Water Heaters deliver a wide variety of hot water solutions.

Non-Recirculating Hot Water Systems

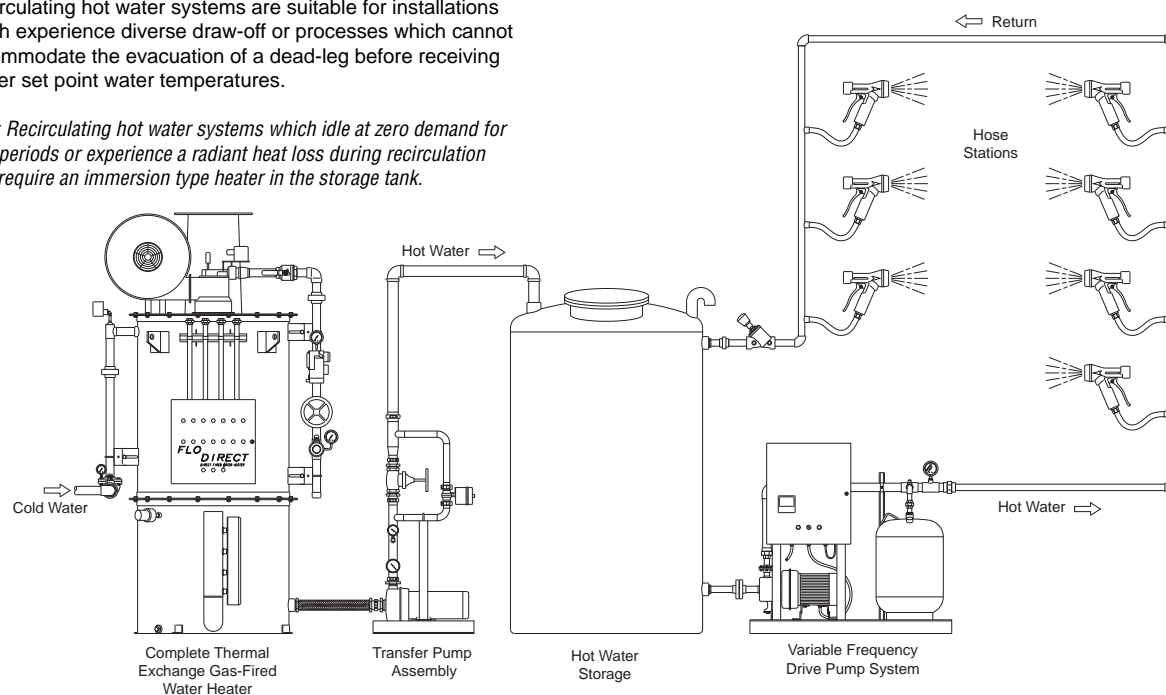
Non-recirculating hot water systems are suitable for installations which experience frequent demand or processes which can accommodate the evacuation of a dead-leg before receiving heater set point water temperatures.



Recirculating Hot Water Systems

Recirculating hot water systems are suitable for installations which experience diverse draw-off or processes which cannot accommodate the evacuation of a dead-leg before receiving heater set point water temperatures.

Note: Recirculating hot water systems which idle at zero demand for long periods or experience a radiant heat loss during recirculation may require an immersion type heater in the storage tank.

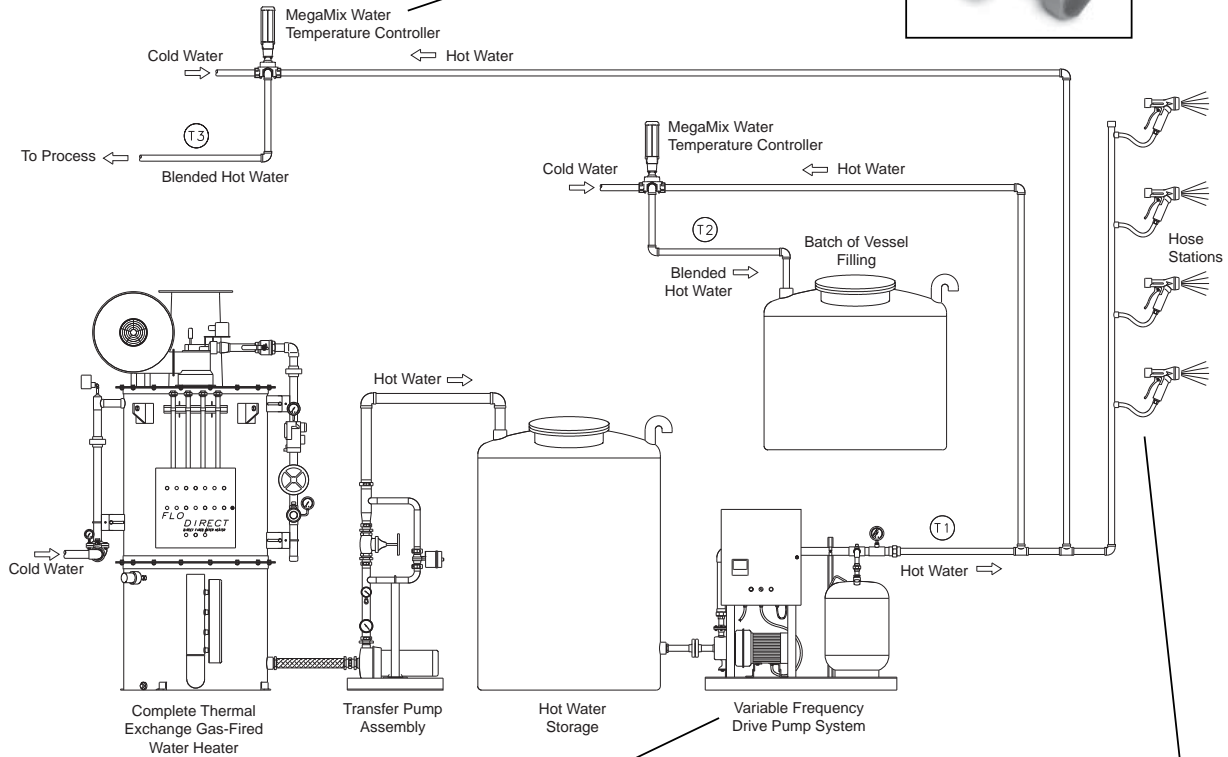


Hot Water Systems

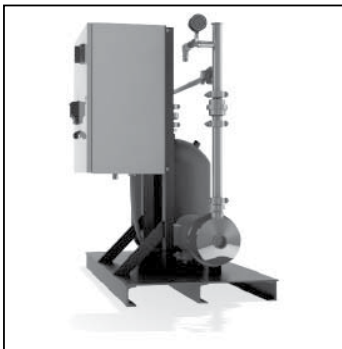
Multiple Temperature Hot Water Systems

Multiple temperature hot water systems can be designed as either recirculating, non-recirculating or a combination of both. To achieve multiple temperatures for the same hot water system, Armstrong recommends one or more MegaMix™ electronic water temperature controllers along with Armstrong thermostatic hot and cold water hose stations.

MegaMix™ Water Temperature Controller

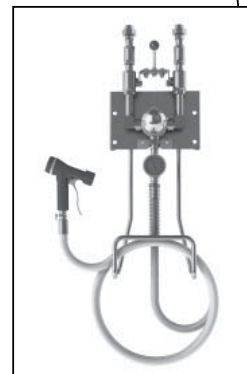


Armstrong Variable Frequency Drive Pump Assemblies

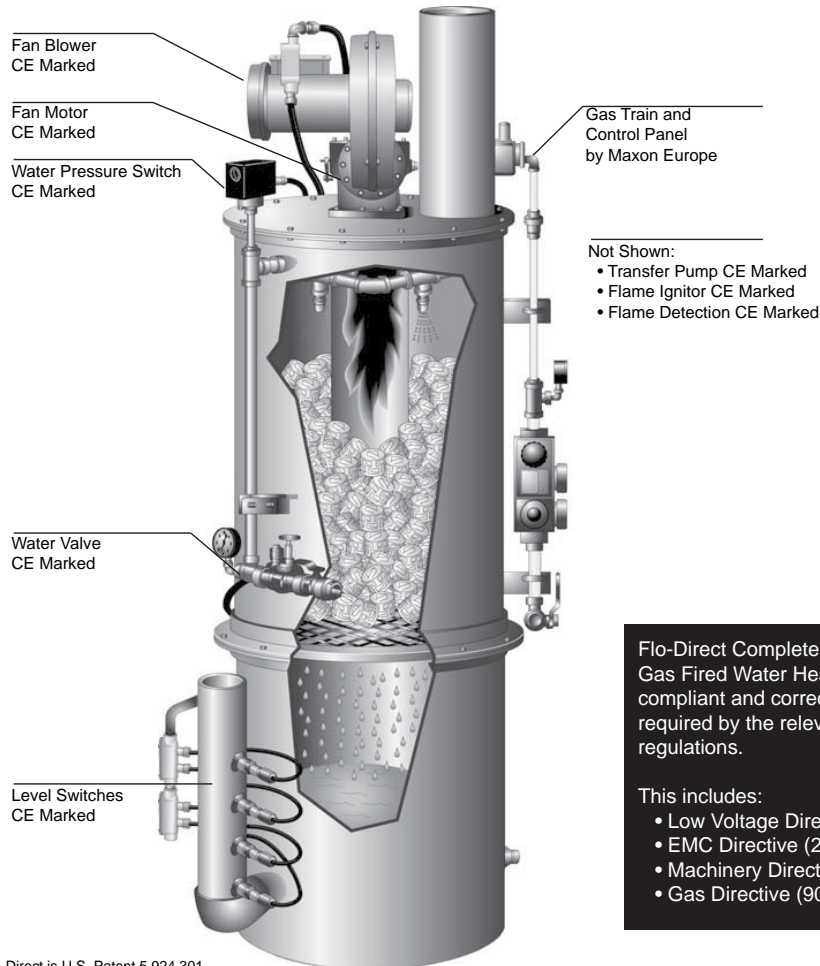


It is strongly recommended that the hot water storage temperatures are maintained at 140°F (60°C) or higher in accordance with US OSHA and CDC and corresponding global legionella guidelines. If water temperatures below 140°F (60°C) are required, Armstrong offers a variety of supplemental thermostatic, electronic and digital water temperature controllers.

Armstrong Hot/Cold Water Hose Station



Conformité Européenne (CE)



Flo-Direct is U.S. Patent 5,924,301

High Heat Value vs. Low Heat Value

High Heat Value = Total Energy Content of Fuel

Low Heat Value = Total Heat of Hot Water
or Steam Generated by the boiler

High Heat Value (HHV) is the method for evaluating boiler efficiency typically used in the USA. The efficiency is calculated by comparing the total heat content (enthalpy) of the hot water or steam generated by a boiler with the total potential energy of the input fuel.

As a result efficiency measured using HHV will not exceed 100%.

Low Heat Value (LHV) is the method for evaluating boiler efficiency typically used in Europe. A LHV calculation includes recoverable heat.

Combustion exhaust contains hot water vapor which is created by both the evaporation of the water contained in the input fuel and the chemical reaction in the combustion process. Newer technologies such as "condensing" type water heaters and boilers can capture the "latent" heat.

As a result efficiency measured using LHV can, in some cases, exceed 100%.

When developing unit and system efficiency comparisons it is important to first determine whether the stated heat transfer efficiency is measured in HHV or LHV.

Plate Heat Exchanger Packages

Armstrong can provide a full range of either brazed plate or gasketed plate type heat exchangers for all hot water generation applications. These can be supplied either as stand alone units or assembled in our own fabrication workshop as skid mounted packages inclusive of all valves and control equipment. Please **CONTACT US** for further technical assistance.

Gasketed Plate Heat Exchangers are made up of a series of assembled corrugated plates. Between the plates there are two channels with a cold and warm medium (EG: water, steam etc).

These pass on each side of the plates and in opposite direction to each other. Our product portfolio includes various types of plate heat exchangers and freshwater distillers such as:

- Gasketed
- Semi-welded and fully welded
- Brazed
- Free Flow
- Plate and Shell
- Shell and Tube
- Fresh Water Distillers (FWD)







Therm-Omega-Tech
ISO 9001 CERTIFIED

MODEL HAT

IN-LINE TEMPERATURE CONTROL

FREEZE PROBLEMS?
CALL THE GURU 1-877-FRZ-VALVE

DESIGN FEATURES

- ◆ Stainless steel body, fittings, spring and plug
- ◆ Corrosion resistant - Long service life
- ◆ Most narrow temperature band available
- ◆ Compact, low mass - Fast response
- ◆ Ram-type plug for reliable tight shutoff
- ◆ Downstream actuator for greater sensitivity
- ◆ Sensitive to temperature only
- ◆ Unaffected by pressure variations
- ◆ Easy installation with pipe wrench



ADVANTAGES

These valves save space and are easy and inexpensive to install. The unique ram-type plug & seat provide reliable, tight shut off longer than any other design available. **HAT** valves are covered with our standard 36 month prorated warranty & service policy to further reduce maintenance cost. Since **HAT** valves discharge condensate well below steam temperature, live steam losses are eliminated. For heating of temperature sensitive instruments or process fluids, the reduced temperature available for tracing simplifies operations and eliminates overheating problems. For other heat transfer fluids, **HAT** valves maintain a constant discharge temperature, thus providing benefits of accurate process temperature control and improved efficiency.

OPERATION

The **HAT** valve responds only to temperature. After condensate forms and cools to near the setpoint, the **HAT** valve modulates the flow to maintain a constant condensate discharge temperature. **HAT** valves are wide open at start-up for rapid venting and initial heat-up. **HAT** valves are self-draining after shutdown, to eliminate freeze damage.

APPLICATIONS

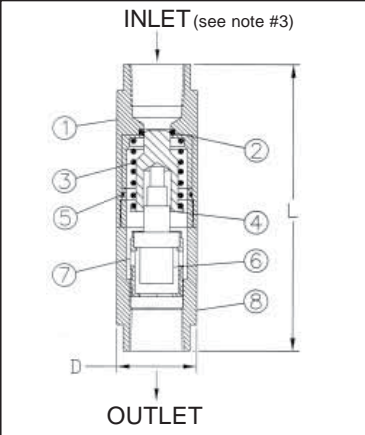
Therm-Omega-Tech **HAT** (Heat Actuated Trap) valves are commonly used as sub-cooling steam traps. **HAT** valves are ideal for replacing conventional steam traps on winterization tracing, instrument tracing, condensate return system freeze protection, tracing for processes under 150°F (65°C), and other applications requiring in-line flow control based on temperature. **HAT** valves are also suitable for controlling discharge temperature in fluid tracing systems.

HAT (REV: 07/11/2007)

MODEL HAT

FIELD SERVICEABLE IN-LINE TEMPERATURE CONTROL VALVE

PARTS AND MATERIALS

	ITEM	DESCRIPTION	MATERIAL
	1	BODY - INLET HALF	300 SERIES STAINLESS
	2	SEAT SEAL	PTFE
	3	OPERATING SPRING	300 SERIES STAINLESS
	4	RAM- TYPE PLUG	300 SERIES STAINLESS
	5	BODY SEAL	EPDM / VITON
	6	THERMAL ACTUATOR	BRASS or SS
	7	ACTUATOR CARRIER	BRASS or SS
	8	BODY - OUTLET HALF	300 SERIES STAINLESS

SPECIFICATIONS

Size (NPTF)	D		L		WEIGHT		Port Size	Cv	Maximum Pressure	Maximum Temperature
	in	mm	in	mm	Lb	Kg				
1/2"	1.25	32	4.5	114	0.9	0.41	C	1.3	200 PSIG (13.8 BAR)	300°F (149°C)
3/4"	1.5	38	5.5	140	1.4	0.64	D	2		

TO ORDER SPECIFY: (see note 1 for standard temperatures)

Part Number		Description
EPDM Seals	Viton Seals	
134 - 302100 - XXX	134 - 302200 - XXX	1/2" HAT C-Port
134 - 312100 - XXX	134 - 312200 - XXX	1/2" HAT C-Port, all SS
135 - 502100 - XXX	135 - 502200 - XXX	3/4" HAT D-Port
135 - 512100 - XXX	135 - 512200 - XXX	3/4" HAT D-Port, all SS

NOTES:

1. Standard open temperatures "XXX" available: 040F, 050F, 055F, 060F, 065F, 075F, 085F, 090F, 095F, 100F, 105F, 110F, 125F, 130F, 140F, 150F, 155F, 160F, 170F, 180F, 190F and 200F.

Note: Closing temperature is typically 10F above opening temperature

2. Seal Material compatability:

- a. EPDM - air (to 300F), water, steam, ketones and synthetic hydraulic oils.
- b. Viton - air (to 450F), fuel, oil, gas, petroleum-based hydraulic oils.

3. Flow direction is reversed in valves that close over 200°F

4. A #20 mesh strainer is recommended for use with all port sizes

Therm-Omega-Tech, Inc. reserves the right to change the design and specifications without notice