

# SPH Series



## Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heaters



STONESTEEL is a registered trademark of Cemline Corporation

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# Advantages of Cemline® Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heaters

Cemline® Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heater (SPH) is a perfect solution for domestic water heating systems using hydronic boilers including cast iron, copper tube, water tube, or specialty high efficiency condensing boilers. The SPH heat exchanger allows high efficiency condensing boilers to operate more efficiently since the SPH heat exchanger can return the boiler water to the hydronic boiler at lower temperatures than the traditional u-bend heat exchanger. The boiler water can be returned to the boiler as low as 90°F from the SPH water heater.

The SPH heat exchanger has a high heat transfer rate allowing for maximum heat transfer between the boiler water and the domestic water. As the heat is transferred from the boiler water to the domestic water, the boiler water can experience large temperature drops through the heat exchanger using less boiler

water without experiencing laminar flow on the boiler water side of the heat exchanger. The heat exchanger can even allow for temperature crosses between the boiler water outlet and the domestic water outlet temperature, meaning the domestic water outlet temperature can be greater than the returned boiler water temperature.

This heater can be used in many hydronic heating style applications including those systems using low temperature boiler water. The SPH heater can also be used in in condensate systems by recovering heat from the condensate to produce hot water.

Cemline Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heaters (SPH) are completely packaged and ready for use. The tank allows for storage of hot water and all components are sized, mounted and piped prior to shipment. The heaters come complete and

require only connection to services. Cemline Corporation SPH Series Water Heaters are available with Cement Lined STONESTEEL® or 316-L stainless steel vessel in sizes 60, 120, 200, 300, 500, and 680 gallon capacity. The time tested STONESTEEL® lining is a unique formulation of hydraulic cement that is durable, reliable, trouble-free lining know for hot water storage. Optionally, the 316-L stainless steel is corrosion resistant and with solid 316-L stainless steel vessel no lining is required.

The Cemline SPH comes factory standard with a 3-way electronically operated boiler water control valve. The 3-way electronically operated control valve allows for close temperature control of the water heater by modulating flow of the boiler water through the heat exchanger. The 1000:1 turn down ratio of the control valve allows for accurate control of these water heaters.

Standard SPH Package	Features
<b>A.S.M.E. CODE constructed National Board Registered Storage tank (125 PSIG WP)</b>	ASME Code stamping and registration offers the assurance of quality controlled construction.
<b>STONESTEEL® lining</b>	STONESTEEL® prevents rust or and corrosion.
<b>OR 316-L Stainless Steel Vessel</b>	Type 316-L Stainless is virtually rustproof.
<b>Brazed Plate or Plate &amp; Frame Heat Exchanger</b>	Extremely efficient. Allows close temperature approaches.
<b>3" Fiberglass insulation</b>	Prevents heat loss to cut operation costs. Meets latest ASHRAE standards.
<b>20 gauge steel jacket with hammertone enamel paint</b>	Protect insulation & provides neat finished appearance with hammertone enamel painted exterior.
<b>Standard operating controls</b>	All components necessary for safe-complete-operation. All gauges, relief valves, controls, and piping factory piped and mounted. Over-temperature safety system which will close the main control valve upon an over-temperature condition. This system utilizes an adjustable electric thermostat which monitors the temperature of the water and if over-temperature condition is detected, sends an electric signal to the valve, thereby closing the valve. This system requires a 120 volt 5 amp circuit.
<b>Optional Safety System</b>	Double safety system: This is an optional over-temperature safety system which will deactivate the main control valve, as described above and also open a solenoid valve at the top of the vessel to drain. This system requires a 120 volt 5 amp circuit.

# Standard Equipment

## Cemline Storage Plate Heat Exchanger Water Heaters

*Cemline Storage Plate Heaters are completely packaged and ready to use. All components are sized, mounted and piped prior to shipment. These heaters come complete and require only connection to services.*

### Basic SPH Package Includes:

A.S.M.E. CODE Constructed  
National Board Registered  
storage tank

STONESTEEL® lining

316-L Stainless Steel threaded  
connections

3" Fiberglass insulation

20 gauge steel jacket with  
hammered enamel paint

Structural steel base

A.S.M.E. relief valve-pressure  
and temperature

Electronic temperature gauge

Water pressure gauge

Drain valve

Brazed Plate Heat Exchanger

Integral bronze circulator

Single safety system  
with electronic limit control

2 or 3-Way Electronic Boiler Water  
Control Valve

Boiler water temperature gauge

Cem-Trol® II control module

### Optional

316-L Stainless Steel Vessel\*  
(Note: 60 gallon only available in  
316-L stainless steel)

Double Walled Plate & Frame  
Heat Exchanger

Boiler water pump

Aquastat for boiler water pump



# Digital Electronic Temperature Control Cemline Storage Plate Heat Exchanger Water Heaters

*SPH water heaters have a Cem-Trol® II electronic control and limit with LCD touch screen display.*



## Electronically Operated Control Valves

Electronically operated control valve used for boiler water applications. Electronically operated control valves use a solid state temperature sensor which is wired to the Cem-Trol® II electronic control module. The control module has an adjustable set point. The Cem-Trol® II compares the set point with the sensed temperature and sends an electric signal to a magnetic linear actuator on the control valve. The magnetic linear actuator modulates the control valve and regulates the amount of boiler water through the valve to maintain the set point of the controller. As the set point is approached the controller sends a signal to the valve actuator and modulates the valve to a closed position. In the event of high temperature or loss of building power the limit control interrupts the power to the controller which closes the valve.



## Digital Electronic Temperature Limit Control

SPH Water Heaters have a Cem-Trol® II Digital Electronic Limit Control with LCD touch screen display. The A.S.M.E. code requires that water heaters utilizing boiler water as energy source have a high limit temperature control. Our limit controller is a solid state device with LCD readout of temperature, set point and differential and easily field-programmable. Cem-Trol® II can communicate with a building automation system with Modbus via a RS-485 connection.

### Standard:

Single Safety System:

This temperature controller is a single set point limit control will act directly to close an electronic control valve on over temperature.

### Optional:

Double Safety System:

This temperature controller is a dual set point limit control. The first set point output will act directly to close an electronic control valve on over temperature.

The second adjustable set point output will open a water solenoid to drain excessively heated water from the water heater. Since there are two set points and two outputs, the water drain solenoid set point can be set at a slightly higher temperature than the valve close-off temperature.



## Advantages over electro-mechanical device:

Solid state device/no mechanical parts to wear out.

Digital readout on large LCD touch screen display.

Easily adjustable set point and differential.

Dual set points for double safety system.

Accuracy within +1°F.

*As a safety measure, all heaters are designed to shut off on loss of primary power.*

## Specifications:

Set point adjustment range: 50-180°F

Input: 115v AC

Temperature Sensor: 1000 ohm

Operating Ambient: 32° to 140°F

## Operating Humidity:

5% to 95% RH (Noncondensing)

# Recovery Capacities - Single or Double Wall Brazed Plate Heater and Double Wall Plate & Frame Heater

*The listing below is for the boiler water temperatures and temperature rises which are most widely used. Heat exchangers are available for other boiler water temperatures and different temperature rises. Consult factory for further information.*

Domestic Water Recovery				Boiler Water as Energy Source		
Hex Model #	Flow Rate gph	Inlet Temp. (°F)	Outlet Temp. (°F)	Inlet Temp. (°F)	Outlet Temp. (°F)	gpm
250	300	40	140	200	160	13
500	600	40	140	200	160	26
750	900	40	140	200	160	39
1000*	1200	40	140	200	160	52
1250*	1500	40	140	200	160	65
1300*	1800	40	140	200	160	78
1750*	2100	40	140	200	160	91
2000*	2400	40	140	200	160	104
2250*	2700	40	140	200	160	117
2500*	3000	40	140	200	160	130

Domestic Water Recovery				Boiler Water as Energy Source		
Hex Model #	Flow Rate gph	Inlet Temp. (°F)	Outlet Temp. (°F)	Inlet Temp. (°F)	Outlet Temp. (°F)	gpm
250	300	40	140	180	140	13
500	600	40	140	180	140	26
750	900	40	140	180	140	39
1000*	1200	40	140	180	140	52
1250*	1500	40	140	180	140	65
1300*	1800	40	140	180	140	78
1750*	2100	40	140	180	140	91
2000*	2400	40	140	180	140	103
2250*	2700	40	140	180	140	116
2500*	3000	40	140	180	140	129

Domestic Water Recovery				Boiler Water as Energy Source		
Hex Model #	Flow Rate gph	Inlet Temp. (°F)	Outlet Temp. (°F)	Inlet Temp. (°F)	Outlet Temp. (°F)	gpm
250	300	40	140	160	120	13
500	600	40	140	160	120	26
750	900	40	140	160	120	39
1000*	1200	40	140	160	120	51
1250*	1500	40	140	160	120	64
1300*	1800	40	140	160	120	77
1750*	2100	40	140	160	120	90
2000*	2400	40	140	160	120	103
2250*	2700	40	140	160	120	116
2500*	3000	40	140	160	120	129

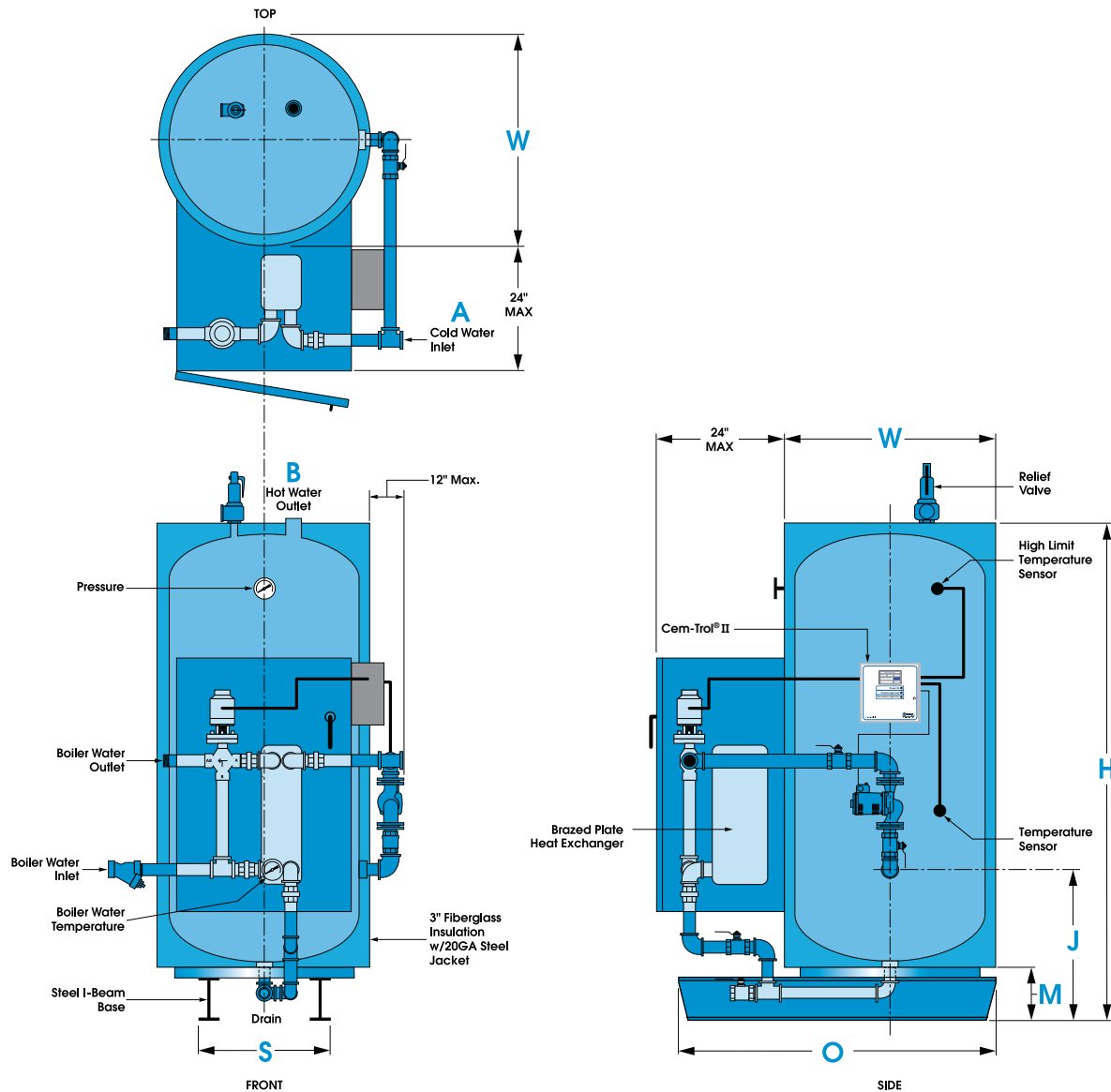
\* When using a double wall heat exchanger a plate and frame style is required for these conditions.

*SPH water heaters are not recommended for water with hardness over 140 parts per million. If water hardness exceeds 140 ppm either put a water softener in the system or use Cemline SWH series water heaters.*

# SPH Water Heaters - Dimensional Data

*Cemline SPH Series (single wall or double wall brazed plate) vertical Packaged Heaters are normally piped as shown below. Also available with 2-way control valve.*

## Brazed Plate Unit



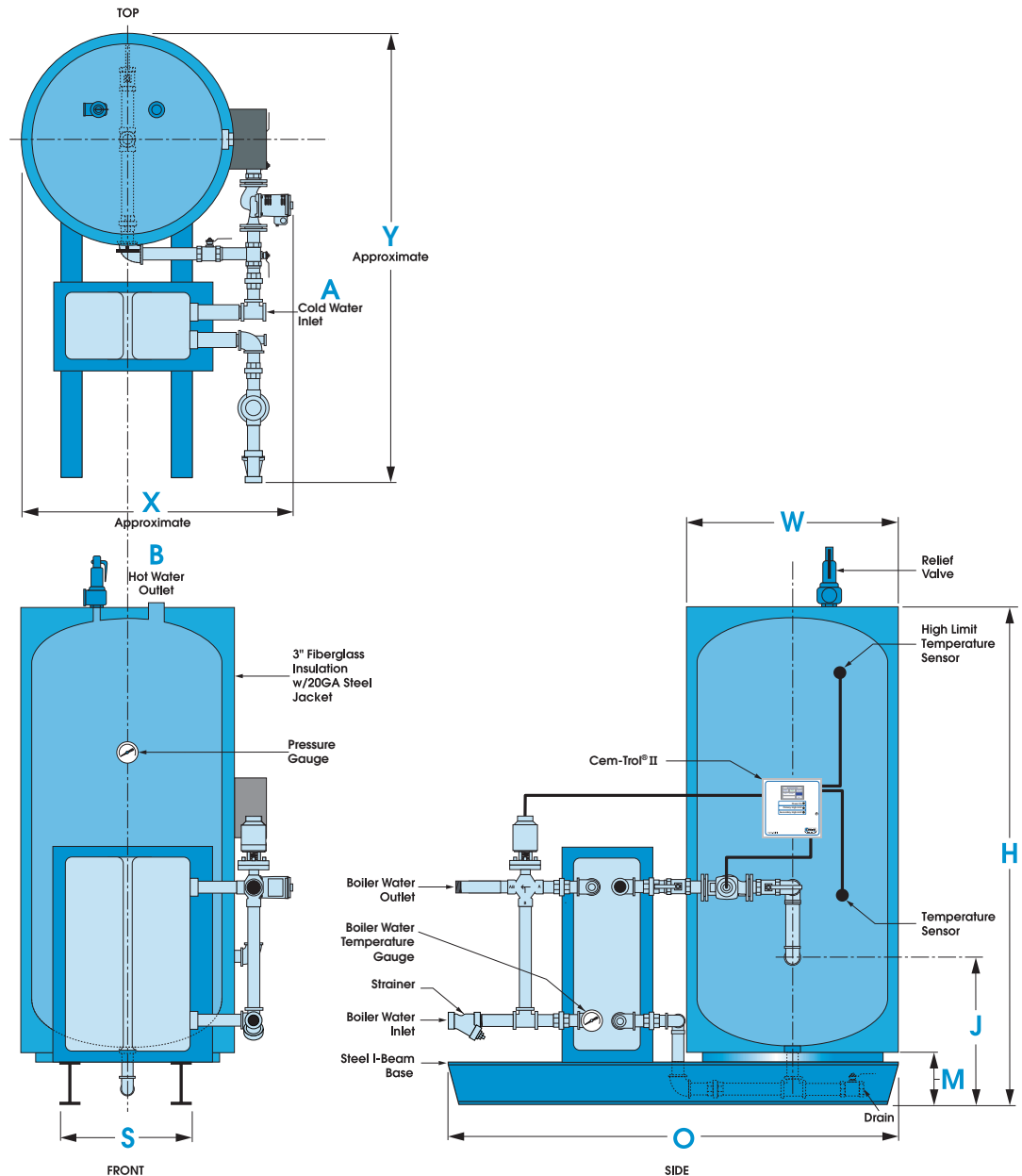
GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	M	S	A & B*	X	Y
60	V60SPH	24" x 36"	28"	49"	40"	20"	9"	18"	1 1/2"	42"	79"
120	V120SPH	24" x 63"	28"	77"	48"	24"	10"	20"	1 1/2"	42"	79"
200	V200SPH	30" x 76"	34"	90"	54"	28"	10"	24"	1 1/2"	45"	82"
300	V300SPH	36" x 80"	40"	94"	60"	28"	10"	25"	1 1/2"	51"	85"
500	V500SPH	42" x 90"	46"	104"	66"	30"	10"	32"	2"	63"	91"
680	V680SPH	48" X 96"	52"	110"	72"	30"	12"	42"	2"	69"	106"

\*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

# SPH Water Heaters - Dimensional Data

*Cemline SPH Series (single or double wall plate & frame) vertical Packaged Heaters are normally piped as shown below. Also available with 2-way control valve.*

## Plate and Frame Unit



GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	M	S	A & B*	X	Y
60	V60SPH	24" x 36"	28"	56"	78"	27"	16"	20"	1 1/2"	42"	79"
120	V120SPH	24" x 63"	28"	77"	78"	24"	10"	20"	1 1/2"	42"	79"
200	V200SPH	30" x 76"	34"	90"	82"	28"	10"	24"	1 1/2"	45"	82"
300	V300SPH	36" x 80"	40"	94"	85"	28"	10"	25"	1 1/2"	51"	85"
500	V500SPH	42" x 90"	46"	104"	90"	30"	10"	32"	2"	63"	91"
680	V680SPH	48" x 96"	52"	110"	91"	30"	12"	42"	2"	69"	106"

\*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

# Sample Specifications



*Cemline Corporation has an automated sizing program that allows the customer to size and select Cemline products available on-line at [www.cemline.com](http://www.cemline.com). Specifications and drawings can be downloaded to word processing and CAD files.*

## SPH Water Heaters

Storage heater shall be Cemline Series SPH; factory assembled and packaged. Water heater shall be constructed in accordance with A.S.M.E. Code for a working pressure of 125 psig. The packaged water heater shall be constructed with a vertical steel tank, cement lined (or 316-L stainless steel) with 316-L stainless threaded openings.

Heater shall be mounted on a steel support skid and shall have concealed lifting lugs. Heater shall be insulated with 3" Fiberglass protected by an enameled metal jacket, 20 gauge minimum thickness. Heater shall be factory assembled and piped including electronic operated 2 or 3-way temperature regulating valve. Heat exchanger shall be single wall copper brazed 316L Stainless Steel Plate Type (or double wall brazed or double wall plate and frame heat exchanger) an integrated cover and shall have an integral valved circulator to circulate domestic water through the heat exchanger into the bottom of the tank.

Heater shall be supplied with solid-state control module with LCD touch screen display and LED pilot lights to indicate on-off, primary high limit, and secondary high limit. Solid-state control module shall be provided with a field programmable digital electronic PID controller allowing the owner to set operating and temperature limits on the display screen. Solid-state control module shall have red alarm light and alarm horn with built in alarm silence relay. Solid-state control module shall be supplied with dry contact closure outputs to indicate to building automation system (BAS) the occurrence of power on, primary high temperature, and secondary high temperature. The control module shall allow the BAS to turn the heater on or off through a remote relay. The control module shall allow the BAS to remotely set the temperature of the heater using a 4-20 mA input signal. The control module shall allow the BAS to remotely monitor the operating temperature via a 4-20 mA signal. The control module shall allow the BAS to remotely monitor the operating temperature via 4-20 mA signal. Control module shall communicate with the BAS using Modbus Protocol via an RS-485 connection. Control module shall be supplied with an on-off switch and shall be mounted in a NEMA 4 panel. All solenoids and limits shall be 24 VAC.

Heater shall be furnished with a water pressure gauge and an A.S.M.E. pressure-temperature relief valve of sufficient size to relieve total BTU input of the coil.

Manufacturer shall assume responsibility for correct sizing of components to assure performance designated in design criteria.

Heater shall be Cemline Corporation Model V \_\_\_\_\_ SPH \_\_\_\_\_.  
Tank dimensions \_\_\_\_\_" diameter x \_\_\_\_\_" long.  
Storage gallon capacity \_\_\_\_\_.  
Plate exchanger to heat \_\_\_\_\_ GPH from \_\_\_\_\_ °F to \_\_\_\_\_ °F with  
\_\_\_\_\_ GPM of \_\_\_\_\_ °F inlet - \_\_\_\_\_ °F outlet Hot Water.



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