

# THERMOMASTER®

Indirect-fired Steam & Boiler Water Heaters



**High Recovery**

**ASME Constructed & Stamped**

**Factory Packaged**

**RECO**  
**USA**



## Applications

Thermomaster water heating systems provide high recovery, tight temperature control and dependability. Forced circulation provides controlled, accurate hot water for high peak loads. By combining high recovery capacities with storage, the system makes effective use of the available energy source. The design also minimizes spatial requirements normally needed by conventional storage type heaters. Units are engineered for long dependable service and use steam, boiler water or HTHW as the heating medium.

The Thermomaster is a complete packaged system with components engineered to specific application requirements. The user simply needs to hook up water and utility connections in the field. RECO USA selects the correctly sized and matched components for optimal performance.

By combining exact storage requirements for peak load demands with a forced circulation recovery section, the Thermomaster is excellent for commercial, industrial and institutional service. Integral recirculation assures a full supply of hot water on demand.

**Commercial** Thermomaster is capable of meeting all the demands of facilities with large hot water needs, including hotels, apartment buildings, military buildings, and hospitals. Thermomasters are typically found in facilities with a central energy source. This energy source is typically piped directly to the unit in the mechanical room or is transported to various sub mechanical rooms furnishing hot water to a specific building or application. Units may be piped in parallel to provide additional capacity or emergency back up.

**Institutional** Thermomaster is excellent for facilities that tend to exhibit high demand periods at intervals throughout the day, including dormitories, schools and correctional complexes. High recovery capacities with storage handle the short cycle, high demand needs of these facilities. Energy requirements are maximized so excess capacity to meet critical periods is minimized.

**Industrial** Thermomaster is widely used for shower and cafeteria needs, providing controlled hot water for manufacturing processes, and for equipment washdown in all industries.

## Capacity

The heat exchanger section consists of a sheathed tube in shell configuration with copper, copper nickel or stainless steel tubes. Thermomasters are available in single and double-wall construction, and can conform to all local code requirements. Each unit is computer selected to match project requirements and provide optimal heat transfer efficiency.

To provide and maintain peak delivery through all loads, Thermomaster has a peak demand anticipator. This allows the control valve to respond promptly to load changes and meter the optimal amount of energy flow to the heat exchanger.

## Construction

RECO USA fabricates each Thermomaster to the customer's specific needs. All materials are of the highest quality and must meet the stringent requirements of our Quality Control department. All Thermomasters are constructed and stamped in accordance with the latest edition of the ASME Sect VIII Division I Code and bear the "U" stamp. Working pressures up to 300 psig are available.

RECO USA can provide you with the right materials for your specific needs, including carbon steel, copper nickel and stainless steel. Carbon steel vessels feature a selection of linings to provide optimal corrosion resistance and long vessel life. Each lining is approved for potable water use.

Horizontal or vertical configurations allow flexibility for installation in any equipment room.

## Sizing Methods

Consult the latest ASHRAE or equivalent sizing methods to determine your actual requirements. This should include specific water usage requirements and intermittent loads. Required water temperatures, type of building and available energy source are important factors.

Hot water requirements vary in total flow rate, peak load and temperatures required. These factors must be considered when sizing.

Hot water may be used for showers, cafeterias, or wash stations and should be sized according to demand and peak load factors. Hot water that is being used for a process application must be sized to handle a continuous and potential peak load to match production requirements. Many cases warrant the installation of twin systems to provide back up in the event of service or routine maintenance. For instance, hospital installations may require dual systems to provide adequate back up.

## Lining Options

**UltraStone™** 1/2- to 5/8-inch potable water cement, compliant with NSF-61 standards.

**Pre-Krete®** Aluminous based cement lining for use of potable water and soft water applications.

## Heat Transfer Tubes

All tubes are seamless U-tube construction, typically used with a wrapped and baffled design. This sheathed design used with an integral pump allows for smaller surface area than immersion heaters. Copper tubes are standard with an option for 90/10 Copper-Nickel construction where high temperature and/or corrosive water conditions exist. Other custom materials are available to meet your unique needs and can be requested through your appointed sales representative.

**Single Wall** Copper or 90/10 Copper-Nickel.

**Double Wall with Leak Detection Port** Copper or 90/10 Copper-Nickel.

**Custom Materials** Just ask a Sales Representative.

## Control Valve Options

All RECO USA supplied control valves are full modulating type and designed with fail safe shutdown. Modulating type valves (such as solenoid valves) not only control temperature better than full open/close type valves, but they also use less energy.

**Pneumatic** Use with steam or boiler water, available in both 2-way or 3-way design.

**Electric** Use with steam or boiler water, available in both 2-way or 3-way. It can be supplied with a RS-485 communication port or analog outputs for communication with building automation systems.

**Self-Contained** 2-way steam service only. No external source of air or electricity required to operate valve.

# Sizing

## Determining Total Hot Water Demand

Review Example A along with Table 1. Then use Table 1 and the provided worksheet to calculate your total hot water demand.

**Example A — Total Hot Water Demand Calculation** Based on 60 unit apartment building with incoming 40°F water heated to 140°F, coupled with a steam line pressure of 10 psig using single wall tubes and a vertical 150 psi vessel.

Type of Fixture	Number of Fixtures	GPH / Per Fixture	Total Demand
Private Lavatories	60	2	120
Bathtubs	30	20	600
Showers	30	30	900
Kitchen Sinks	60	10	600
Laundry, Stationary Tubs	15	20	300
<b>Total</b>			<b>2520</b>

**Table 1 — Various Building Fixtures Hot Water Demand** Reprinted with permission of the America Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. from the 1999 ASHRAE Handbook.

Fixture	Apartment House	Club	Gym	Hospital	Hotel	Industrial Plant	Office Building	Private Home	School
	(GPH) Gallons of water per hour per fixture unit, calculated at a final temperature of 140°F.								
Basin, Private Lavatory	2	2	2	2	2	2	2	2	2
Basin, Public Lavatory	4	6	8	6	8	12	6	—	15
Bathtub	20	20	30	20	20	—	—	20	—
Dishwasher	15	50-150	—	50-150	50-200	20-100	—	15	20-100
Foot-Basin	3	3	12	3	3	12	—	3	3
Kitchen Sink	10	20	—	20	30	20	20	10	20
Laundry, Stationary Tub	20	28	—	28	28	—	—	20	—
Pantry Sink	5	10	—	10	10	—	10	5	10
Shower	30	150	225	75	75	225	30	30	225
Slop Sink	20	20	—	20	30	20	20	15	20
Hydrotherapeutic Shower	—	—	—	400	—	—	—	—	—
Hubbard Bath	—	—	—	600	—	—	—	—	—
Leg Bath	—	—	—	100	—	—	—	—	—
Arm Bath	—	—	—	35	—	—	—	—	—
Sitz Bath	—	—	—	30	—	—	—	—	—
Continuous-Flow Bath	—	—	—	165	—	—	—	—	—
Circular Wash Sink	—	—	—	20	20	30	20	—	30
Semicircular Wash Sink	—	—	—	10	10	15	10	—	15

### Determining Total Recovery Demand

Review Example B along with Table 2. Then use Table 2 and the provided worksheet to calculate your total recovery demand.

#### Example B — Recovery Demand Calculation

<b>TOTAL DEMAND</b>	<b>% RECOVERY</b>	<b>RECOVERY DEMAND</b>
1920	0.33	634
GPH (From Example A)	GPH (From Table 2)	GPH

Table 2 — Storage to Recovery Ratios (Typical)

Fixture	Restaurants	Hospital	Gym	School	Hotel	Factory	Office	Correctional Institution	Apartment
% Recovery (GPH)	0.47	0.40	0.48	0.48	0.48	0.40	0.58	0.48	0.33
% Storage (Gallons)	0.47	0.47	0.57	0.47	0.33	0.38	0.47	0.47	0.47

### Determining Total Storage Demand

Review Example C along with Table 2. Then use Table 2 and the provided worksheet to calculate your total storage demand.

#### Example C — Storage Demand Calculation

<b>TOTAL DEMAND</b>	<b>% STORAGE</b>	<b>STORAGE DEMAND</b>
1920	0.47	902
GPH (From Example A)	Gallons (From Table 2)	Gallons

## Model Selection Guide

Once you have determined the storage tank and recovery capacities, you are now ready to select the proper hot water heater model and its configuration. Please review Example D along with Tables 3-12. Then use the worksheet on page 6 to customize a Thermomaster water heater to meet your exact needs.

For ideal Thermomaster model number, cross reference your storage demand with Tables 3 and 4 and choose the closest tank size to match your needs. In our 60 unit apartment, we chose Model TMV150-54120 to accommodate a storage demand of 1075 gallons (Example C). **Please note if you have an unconventional vertical or horizontal space, we can custom manufacturer a tank to exactly match your tolerances.**

To determine the proper heating coil model, use the data from your total recovery needs (Example B) and cross reference Tables 5-12. In our example, the customer specified 140 °F water, 10/5 psig steam pressure, single wall, and a recovery of 634 GPH; therefore, we chose heating coil model 06024.

#### Example D — Selecting Hot Water Model

STYLE	WORKING PRESSURE	TANK SIZE	TANK LINER	COIL MODEL	TUBES	CONTROL VALVE	HEATING MEDIUM
TMV	150	54120	US	06024	S	PN	S
TMV=Vertical TMH=Horizontal	125 Psig or 150 Psig	Choose from Tables 3-4 to determine Tank Size	UltraStone™=US G8 Cement=G8	Choose from Tables 4A - 7B to determine Heating Coil Model	Single Wall=S Double Wall=D (Copper is standard)	Electric=EL Pneumatic=PN Self Contained=SC	Steam=S Water=W

# Worksheet

## STEP 1: Determining Total Hot Water Demand

Review Example A along with Table 1. Then use Table 1 to calculate your total hot water demand.

Type of Fixture	Number of Fixtures	GPH / Per Fixture	Total Demand
Basin, Private Lavatory			
Basin, Public Lavatory			
Bathtub			
Dishwasher			
Foot-Basin			
Kitchen Sink			
Laundry, Stationary Tub			
Pantry Sink			
Shower			
Slop Sink			
Hydrotherapeutic Shower			
Hubbard Bath			
Leg Bath			
Arm Bath			
Sitz Bath			
Continuous-Flow Bath			
Circular Wash Sink			
Semicircular Wash Sink			

## STEP 2: Determining Total Recovery Demand

Review Example B along with Table 2. Then use Table 2 to calculate your total recovery demand.

### Recovery Demand Calculation

$$\begin{array}{ccc}
 \text{TOTAL DEMAND} & & \% \text{ RECOVERY} & & \text{RECOVERY DEMAND} \\
 \boxed{\phantom{000}} & \times & \boxed{\phantom{000}} & = & \boxed{\phantom{000}} \\
 \text{GPH (Total from Step 1)} & & \text{GPH (From Table 2)} & & \text{GPH}
 \end{array}$$

## STEP 3: Determining Total Storage Demand

Review Example C along with Table 2. Then use Table 2 to calculate your total storage demand.

### Storage Demand Calculation

$$\begin{array}{ccc}
 \text{TOTAL DEMAND} & & \% \text{ STORAGE} & & \text{STORAGE DEMAND} \\
 \boxed{\phantom{000}} & \times & \boxed{\phantom{000}} & = & \boxed{\phantom{000}} \\
 \text{GPH (Total from Step 1)} & & \text{GPH (From Table 2)} & & \text{Gallons}
 \end{array}$$

# Suggested Specifications

**Heating Medium Steam** Furnish and install where indicated on the plans \_\_\_\_\_ completely factory packaged \_\_\_\_\_ gallon RECO USA Thermomaster water storage heaters, Model \_\_\_\_\_. The storage section and heating coil must be fabricated by the same manufacturer. The vessel shall be constructed with SA-516-70 carbon steel and stamped for \_\_\_\_\_ PSI under Section VIII of the ASME Code. Manufacturer's data report and U-1 forms shall be furnished to the owner. Each water heater shall be designed to recover \_\_\_\_\_ GPH of water from \_\_\_\_\_ to \_\_\_\_\_ degrees when supplied with \_\_\_\_\_ PSI steam to the control valve.

The heating element shall be fabricated with \_\_\_\_\_ (single or double) wall \_\_\_\_\_ (copper or 90/10 copper-nickel) tubes, non-ferrous sheath, baffles and a copper-lined tubesheet. The heater shall have its temperature control bulb located for direct sensing of stored water, cold water and building return water to insure proper temperature control with no lag periods. Each heater shall consist of the following components, assembled in a complete factory package:

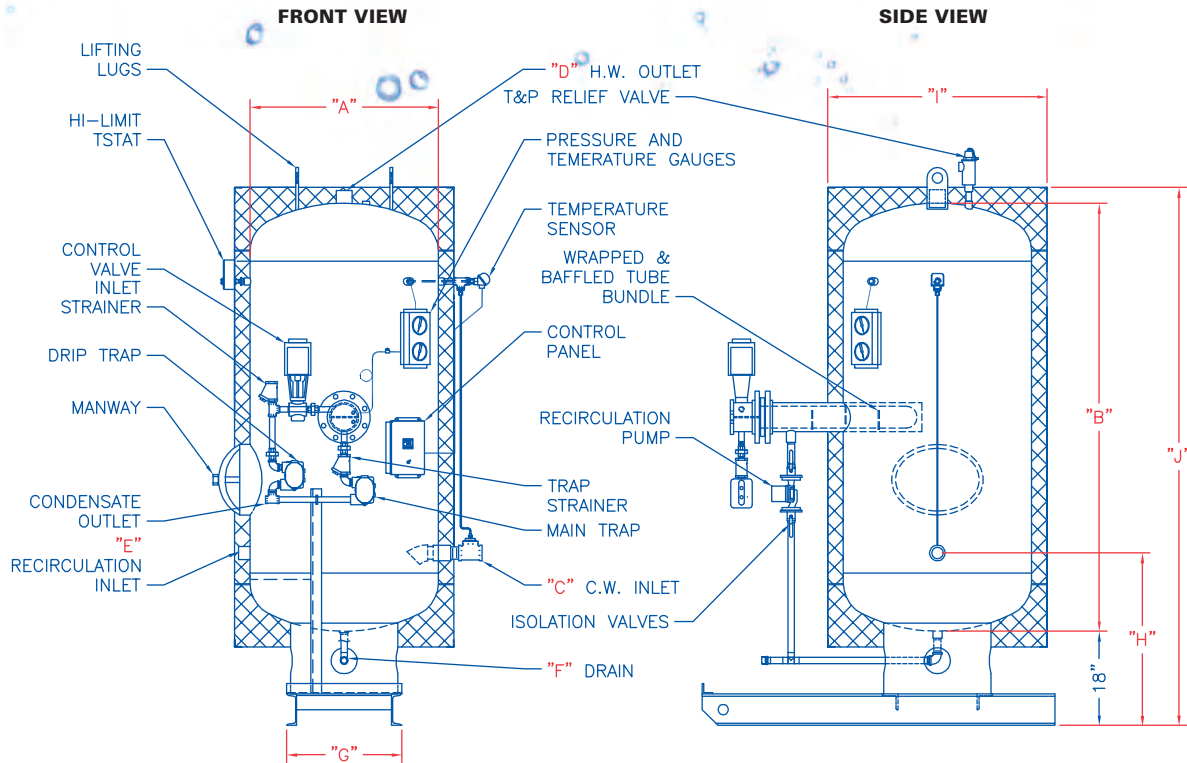
- Tank shall be \_\_\_\_\_ inch diameter by \_\_\_\_\_ inch vertical, with \_\_\_\_\_ gallons of storage.
- Vessel will be lined with \_\_\_\_\_ (Ultra-Stone™ or Pre-Krete®) for potable water.
- Stainless steel fittings and a 12 x 16 inch manhole.
- Steam control valve shall be a modulating, \_\_\_\_\_ (electric, self-contained, or pneumatic)-operated, and designed to fail closed. Solenoid control valves will not be accepted.
- Main strainer, F&T trap, drip trap, condensate strainer, and associated piping.
- All bronze integral circulating pump with copper piping and isolation valves.
- Non-ferrous deflector baffle.
- Console-mounted pressure and thermometer gauges.
- High limit single solenoid safety system.
- ASME-rated temperature and pressure relief valve.
- Insulation per ASHRAE Standard with an enamel finished metal jacket.
- Skid supports.

**Heating Medium Boiler Water** Furnish and install where indicated on the plans \_\_\_\_\_ completely factory packaged \_\_\_\_\_ gallon RECO USA Thermomaster water storage heaters, Model \_\_\_\_\_. The storage section and heating coil must be fabricated by the same manufacturer. The vessel shall be constructed with SA-516-70 carbon steel and stamped for \_\_\_\_\_ PSI under Section VIII of the ASME Code. Manufacturer's data report and U-1 forms shall be furnished to the owner. Each water heater shall be designed to recover \_\_\_\_\_ GPH of water from \_\_\_\_\_ to \_\_\_\_\_ degrees when supplied with \_\_\_\_\_ GPM of boiler water entering at \_\_\_\_\_ °F in the tubes.

The heating element shall be model \_\_\_\_\_ fabricated with \_\_\_\_\_ (single or double) wall \_\_\_\_\_ (copper or 90/10 copper-nickel) tubes, non-ferrous sheath, baffles and a copper-lined tubesheet. The heater shall have its temperature control bulb located for direct sensing of stored water, cold water and building return water to insure proper temperature control with no lag periods. Each heater shall consist of the following components, assembled in a complete factory package:

- Tank shall be \_\_\_\_\_ inch diameter by \_\_\_\_\_ inch vertical, with \_\_\_\_\_ gallons of storage.
- Vessel will be lined with \_\_\_\_\_ (Ultra-Stone™ or Pre-Krete®) for potable water.
- Stainless steel fittings and a 12 x 16 inch manhole.
- Boiler Water control valve shall be a modulating, \_\_\_\_\_ (electric or pneumatic)-operated, and \_\_\_\_\_ (2- or 3-way) designed to fail closed. Solenoid control valves will not be accepted.
- All bronze integral circulating pump with copper piping and isolation valves.
- Non-ferrous deflector baffle.
- Boiler water inlet/outlet and tank thermometer gauges.
- High limit single safety system.
- ASME-rated temperature and pressure relief valve.
- Insulation per ASHRAE Standard with an enamel finished metal jacket.
- Skid supports.

# Vertical Configuration



**Table 3 — Vertical Tank Dimensions (in inches)**

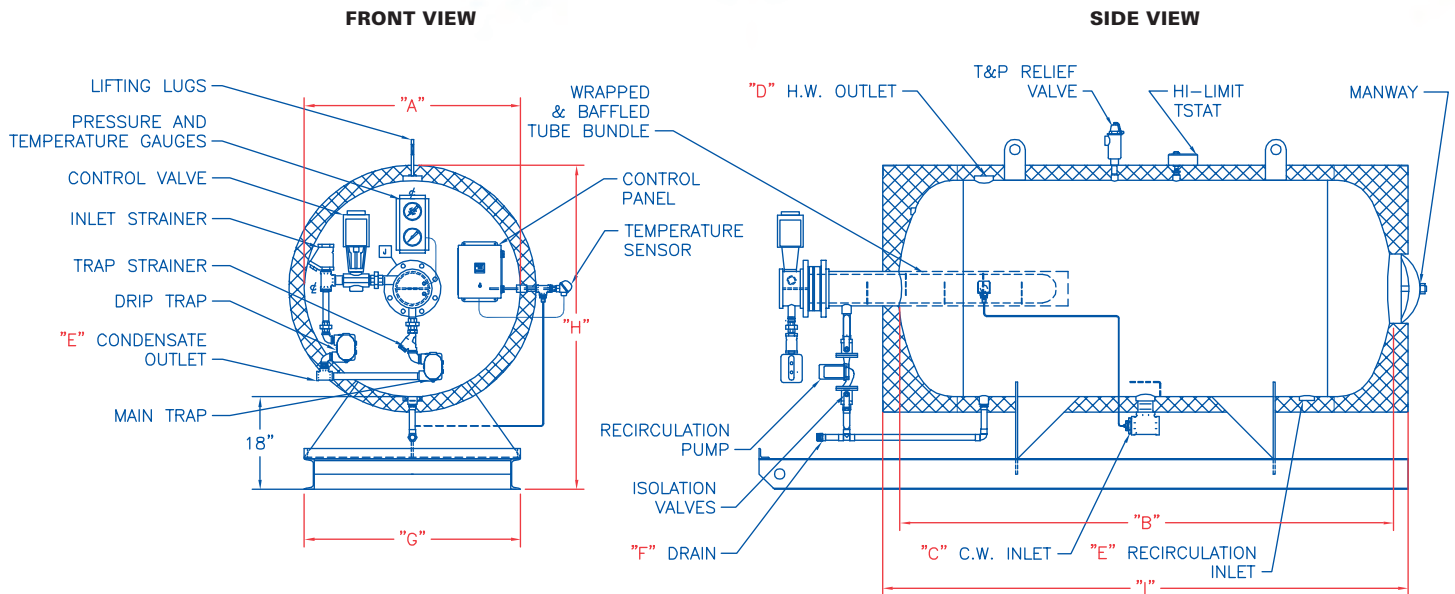
*Additional sizes are available. Please contact your Sales Representative for information.*

MODEL	TANK SIZE (GALLONS)	A	B	C/D	E	F	G	H	I	J
TMV150-30048	130	30	48	1.5	1	1	22	31.5	34	68
TMV150-30060	165	30	60	1.5	1	1	22	31.5	34	80
TMV150-30072	205	30	72	1.5	1	1	22	31.5	34	92
TMV150-30084	240	30	84	1.5	1	1	22	31.5	34	104
TMV150-36072	285	36	72	1.5	1	1.5	22	33	40	92
TMV150-36084	340	36	84	1.5	1	1.5	22	33	40	104
TMV150-36096	395	36	96	1.5	1	1.5	22	33	40	116
TMV150-42072	380	42	72	1.5	1	1.5	26	34.5	46	92
TMV150-42084	450	42	84	1.5	1	1.5	26	34.5	46	104
TMV150-42096	525	42	96	1.5	1	1.5	26	34.5	46	116
TMV150-42108	595	42	108	1.5	1	1.5	26	34.5	46	128
TMV150-48072	500	48	72	2	1.25	2	32	36	52	92
TMV150-48084	585	48	84	2	1.25	2	32	36	52	104
TMV150-48096	680	48	96	2	1.25	2	32	36	52	116
TMV150-48108	770	48	108	2	1.25	2	32	36	52	128
TMV150-48120	865	48	120	2	1.25	2	32	36	52	140
TMV150-54096	870	54	96	2	1.25	2	38	37.5	58	116
TMV150-54120	1075	54	120	2	1.25	2	38	37.5	58	140
TMV150-60096	1065	60	96	2	1.25	2	44	39	64	116
TMV150-60120	1315	60	120	2	1.25	2	44	39	64	140
TMV150-72096	1500	72	96	2.5	1.5	2.5	50	42	76	116
TMV150-72120	1875	72	120	2.5	1.5	2.5	50	42	76	140
TMV150-84120	2500	84	120	3	2	2.5	62	45	88	140

*Additional sizes are available. Consult a factory representative for more information.*



# Horizontal Configuration



**Table 4 — Horizontal Tank Dimensions (in inches)**

Additional sizes are available. Please contact your Sales Representative for information.

MODEL	TANK SIZE (GALLONS)	A	B	C/D	E	F	G	H	I
TMH150-30048	130	30	48	1.5	1	1	36	50	52
TMH150-30060	165	30	60	1.5	1	1	36	50	64
TMH150-30072	205	30	72	1.5	1	1	36	50	76
TMH150-30084	240	30	84	1.5	1	1	36	50	88
TMH150-36072	285	36	72	1.5	1	1.5	42	56	76
TMH150-36084	340	36	84	1.5	1	1.5	42	56	88
TMH150-36096	395	36	96	1.5	1	1.5	42	56	100
TMH150-42072	380	42	72	1.5	1	1.5	48	62	76
TMH150-42084	450	42	84	1.5	1	1.5	48	62	88
TMH150-42096	525	42	96	1.5	1	1.5	48	62	100
TMH150-42108	595	42	108	1.5	1	1.5	48	62	112
TMH150-48072	500	48	72	2	1.25	2	54	68	76
TMH150-48084	585	48	84	2	1.25	2	54	68	88
TMH150-48096	680	48	96	2	1.25	2	54	68	100
TMH150-48108	770	48	108	2	1.25	2	54	68	112
TMH150-48120	865	48	120	2	1.25	2	54	68	124
TMH150-54096	870	54	96	2	1.25	2	60	74	100
TMH150-54120	1075	54	120	2	1.25	2	60	74	124
TMH150-60096	1065	60	96	2	1.25	2	66	80	100
TMH150-60120	1315	60	120	2	1.25	2	66	80	124
TMH150-72096	1500	72	96	2.5	1.5	2.5	78	92	100
TMH150-72120	1875	72	120	2.5	1.5	2.5	78	92	124
TMH150-84120	2500	84	120	3	2	2.5	90	104	124

Additional sizes are available. Consult a factory representative for more information.

# Steam Selection Tables

**Table 5 — Single Wall Steam Water Heater Sizing**

40–120°F							
GPH	5/2*	10/5*	15/10*	25/15*	50/25*	75/40*	BTU/HR
250	04030	04030	04030	04030	04024	04024	166,700
400	04036	04036	04030	04030	04030	04024	266,700
600	05030	05024	04036	04036	04030	04030	400,000
900	06024	05030	05030	05024	04036	04036	600,000
1200	06024	06024	05030	05030	05030	04036	800,000
1500	06024	06024	06024	06024	05030	05024	1,000,000
1800	08024	06024	06024	06024	05030	05030	1,200,000
2400	08024	08024	08024	06024	06024	05030	1,600,000
3000	10024	08024	08024	08024	06024	06024	2,000,000
3600	10024	10024	08024	08024	08024	06024	2,400,000
4200	10024	10024	10024	08024	08024	06024	2,800,000
4800	10024	10024	10024	10024	08024	08024	3,200,000
6000	12024	12024	10024	10024	08024	08024	4,000,000
7500	14024	12024	12024	10024	10024	08024	5,000,000
9000	—	14024	12024	12024	10024	10024	6,000,000

\*Steam Pressure In Lines / Steam Pressure In Tubes

**Table 6 — Single Wall Steam Water Heater Sizing**

40–140°F							
GPH	5/2*	10/5*	15/10*	25/15*	50/25*	75/40*	BTU/HR
250	05030	04036	04036	04036	04030	04030	208,350
400	05030	05030	05030	04036	04036	04036	333,350
600	05036	05036	05030	05030	05030	04036	500,000
900	06030	06024	05036	05036	05030	05030	750,000
1200	06030	06030	06024	06024	05030	05030	1,000,000
1500	08024	08024	06030	06024	05036	05030	1,250,000
1800	08024	08024	08024	06030	06024	05036	1,500,000
2400	10024	08024	08024	08024	06030	06024	2,000,000
3000	10024	10024	08024	08024	08024	06030	2,500,000
3600	10024	10024	10024	08024	08024	08024	3,000,000
4200	12024	10024	10024	10024	08024	08024	3,500,000
4800	12024	12024	10024	10024	08024	08024	4,000,000
6000	14024	12024	12024	10024	10024	08024	5,000,000
7500	—	14024	12024	12024	10024	10024	6,250,000
9000	—	—	14024	12024	12024	10024	7,500,000

\*Steam Pressure In Lines / Steam Pressure In Tubes

**Table 7 — Double Wall Steam Water Heater Sizing**

							40–120°F
GPH	5/2*	10/5*	15/10*	25/15*	50/25*	75/40*	BTU/HR
250	05036	05036	05030	04036	04036	04030	166,700
400	06030	05036	05036	05036	04036	04036	266,700
600	06030	06030	06030	05036	05036	05030	400,000
900	06036	06030	06030	06030	06030	05036	600,000
1200	08024	06036	06030	06030	06030	06030	800,000
1500	08030	08024	06036	06036	06030	06030	1,000,000
1800	08030	08030	08024	06036	06030	06030	1,200,000
2400	10024	08030	08030	08024	06036	06030	1,600,000
3000	10024	10024	08030	08030	08024	06036	2,000,000
3600	12024	10024	10024	08030	08030	08024	2,400,000
4200	12024	12024	10024	10024	08030	08030	2,800,000
4800	12024	12024	10024	10024	10024	08030	3,200,000
6000	14024	12024	12024	12024	10024	08030	4,000,000
7500	—	—	14024	12024	10030	10024	5,000,000
9000	—	—	14024	14024	12024	10030	6,000,000

\*Steam Pressure In Lines / Steam Pressure In Tubes

**Table 8 — Double Wall Steam Water Heater Sizing**

							40–140°F
GPH	5/2*	10/5*	15/10*	25/15*	50/25*	75/40*	BTU/HR
250	06030	06030	06024	05036	05036	04036	208,350
400	06036	06030	06030	06030	05036	05036	333,350
600	06036	06036	06036	06030	06030	06030	500,000
900	08030	08030	06036	06036	06030	06030	750,000
1200	08030	08030	08030	06036	06036	06030	1,000,000
1500	08036	08030	08030	08030	06036	06036	1,250,000
1800	10030	08036	08030	08030	08030	06036	1,500,000
2400	10030	10030	08036	08030	08030	08030	2,000,000
3000	12024	10030	10030	10030	08030	08030	2,500,000
3600	12030	12024	10030	10030	08036	08030	3,000,000
4200	12030	12030	12024	10030	10030	08036	3,500,000
4800	14030	12030	12030	12024	10030	08036	4,000,000
6000	—	—	12030	12030	10030	10030	5,000,000
7500	—	—	—	14024	12030	10030	6,250,000
9000	—	—	—	—	12030	12030	7,500,000

\*Steam Pressure In Lines / Steam Pressure In Tubes

# Boiler Selection Tables

**Table 9 — Single Wall Boiler Water Heater Sizing**

40–120°F							
BOILER WATER 180–160°F				BOILER WATER 200–180°F			
GPH	PASS	BW G.P.M.	MODEL	PASS	BW G.P.M.	MODEL	BTU/HR
250	2	17	05036	2	17	05030	166,700
400	2	27	06030	2	27	05030	266,700
600	2	41	06036	2	41	06024	400,000
900	2	61	06036	2	61	06030	600,000
1200	2	82	08030	2	82	08024	800,000
1500	2	102	08030	2	102	08024	1,000,000
1800	2	123	08030	2	123	08024	1,200,000
2400	2	164	10024	2	164	10024	1,600,000
3000	2	205	10024	2	205	10024	2,000,000
3600	2	246	12024	2	246	12024	2,400,000
4200	2	287	12024	2	287	12024	2,800,000
4800	2	327	12024	2	327	12024	3,200,000
6000	2	409	14024	2	409	14024	4,000,000

**Table 10 — Single Wall Boiler Water Heater Sizing**

40–140°F							
BOILER WATER 180–160°F				BOILER WATER 200–180°F			
GPH	PASS	BW G.P.M.	MODEL	PASS	BW G.P.M.	MODEL	B.T.U. / HR.
250	2	21	06036	2	21	05036	208,350
400	2	34	06036	2	34	06036	333,350
600	2	51	08030	2	51	06030	500,000
900	2	76	08036	2	76	08024	750,000
1200	2	102	08036	2	102	08030	1,000,000
1500	2	128	10030	2	128	08030	1,250,000
1800	2	153	10030	2	153	10024	1,500,000
2400	2	204	10036	2	204	10024	2,000,000
3000	2	255	12030	2	255	10024	2,500,000
3600	2	306	12030	2	306	12024	3,000,000
4200	2	357	12030	2	357	12024	3,500,000
4800	2	409	14030	2	409	14024	4,000,000

**Table 11 — Double Wall Boiler Water Heater Sizing**

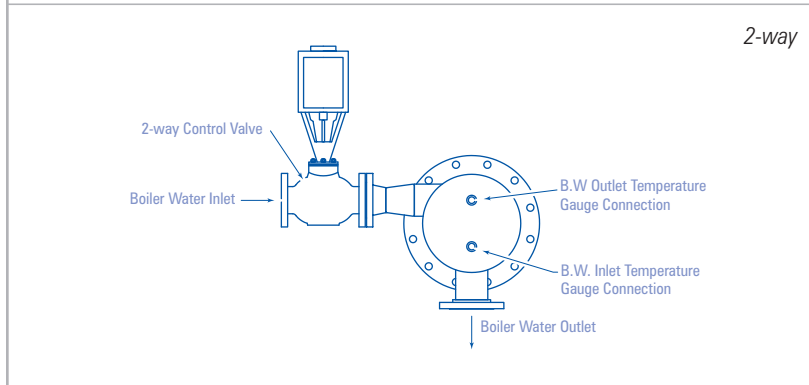
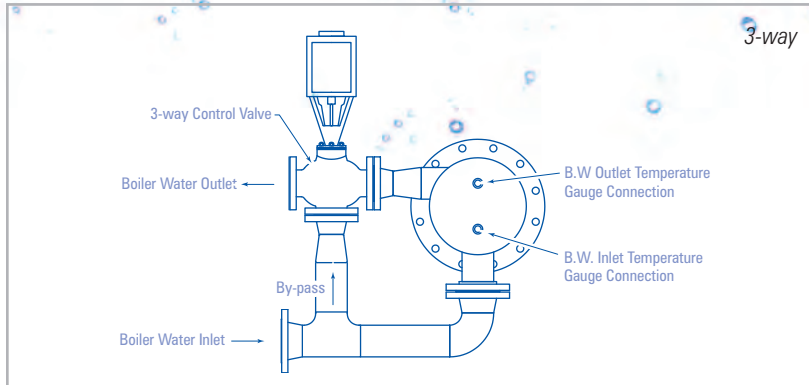
							40–120°F
BOILER WATER 180–160°F				BOILER WATER 200–180°F			
GPH	PASS	BW G.P.M.	MODEL	PASS	BW G.P.M.	MODEL	BTU/HR
250	2	17	06036	2	17	06030	166,700
400	2	27	08030	2	27	06036	266,700
600	2	41	08036	2	41	06036	400,000
900	2	61	08036	2	61	08030	600,000
1200	2	82	10030	2	82	08030	800,000
1500	2	102	10036	2	102	08036	1,000,000
1800	2	123	10036	2	123	10030	1,200,000
2400	2	164	10036	2	164	10030	1,600,000
3000	2	205	12030	2	205	12024	2,000,000
3600	2	246	12036	2	246	12030	2,400,000
4200	2	287	12036	2	287	12030	2,800,000
4800	2	327	14036	2	327	14030	3,200,000

**Table 12 — Double Wall Boiler Water Heater Sizing**

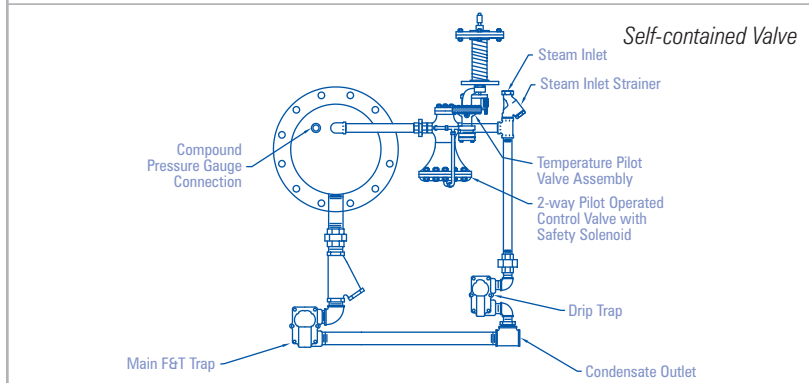
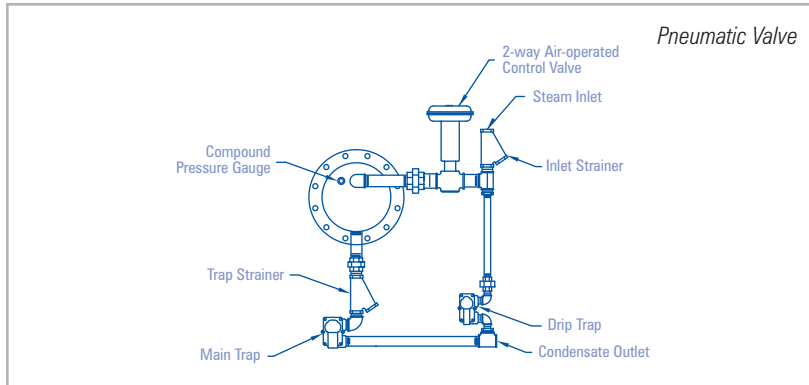
							40–140°F
BOILER WATER 180–160°F				BOILER WATER 200–180°F			
GPH	PASS	BW G.P.M.	MODEL	PASS	BW G.P.M.	MODEL	B.T.U. / HR.
250	2	21	08036	2	21	08030	208,350
400	2	34	10030	2	34	08030	333,350
600	2	51	10036	2	51	08036	500,000
900	2	76	12030	2	76	10030	750,000
1200	2	102	12036	2	102	10030	1,000,000
1500	2	128	12036	2	128	10036	1,250,000
1800	2	153	14036	2	153	10036	1,500,000
2400	2	204	14036	2	204	12030	2,000,000
3000	2	255	—	2	255	12036	2,500,000
3600	2	306	—	2	306	14030	3,000,000
4200	2	357	—	2	357	14036	3,500,000

# Control Piping Diagrams

## Typical Boiler Water Control Piping

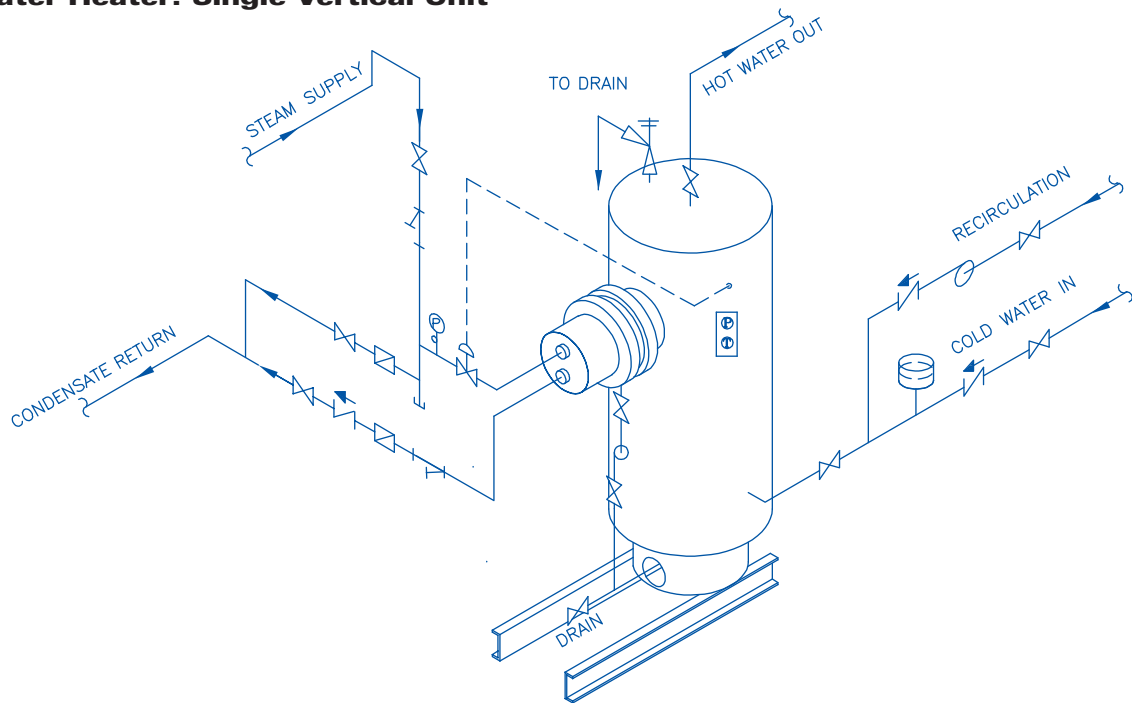


## Typical Steam Control Piping

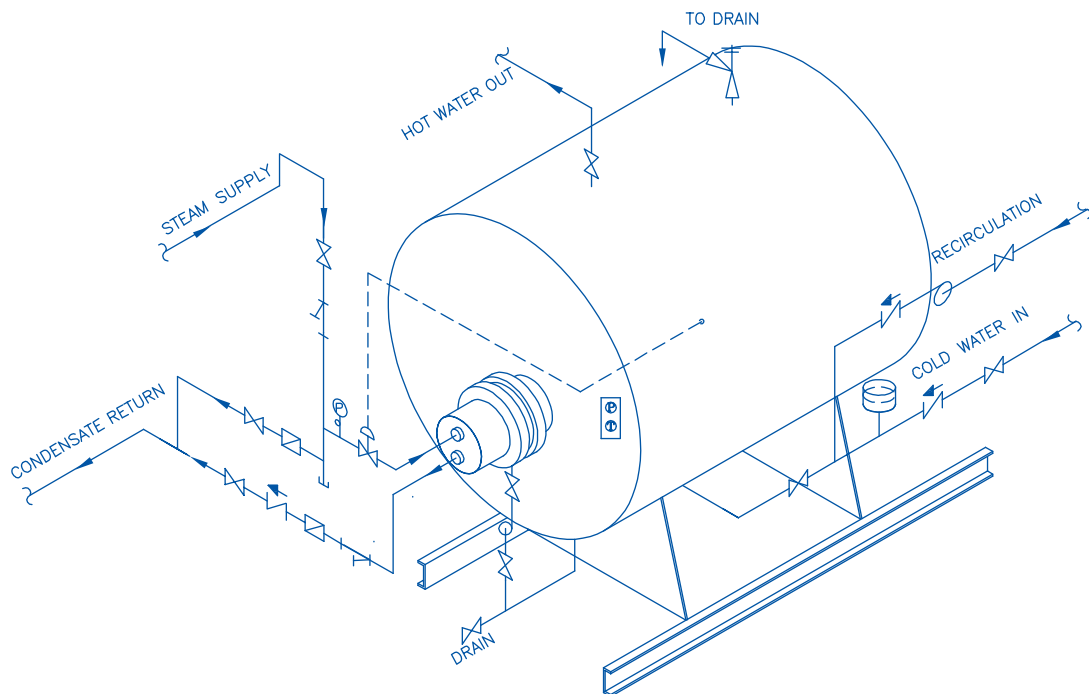


# Piping Layouts & Diagrams

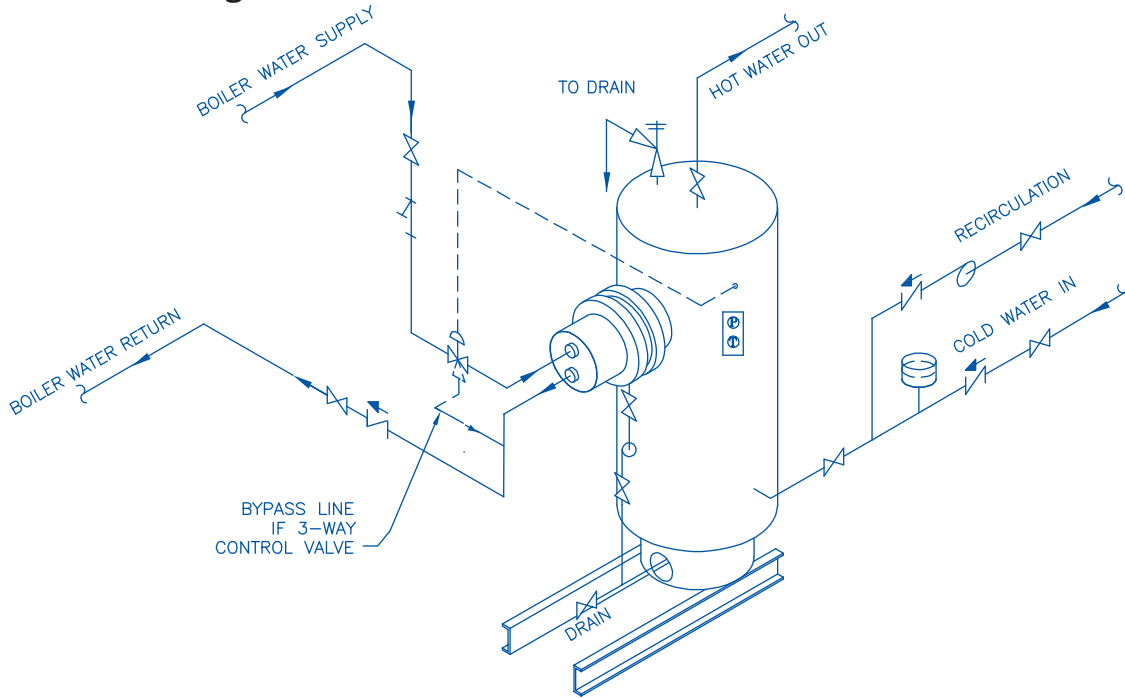
## Steam Water Heater: Single Vertical Unit



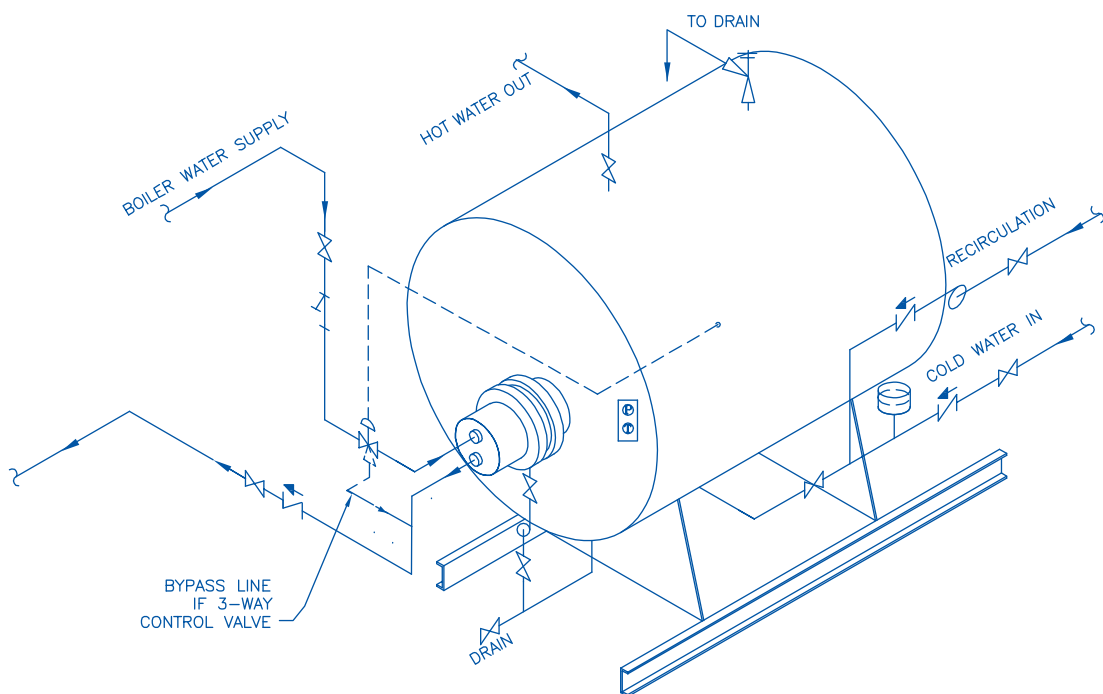
## Steam Water Heater: Single Horizontal Unit



### Boiler Water Heater: Single Vertical Unit



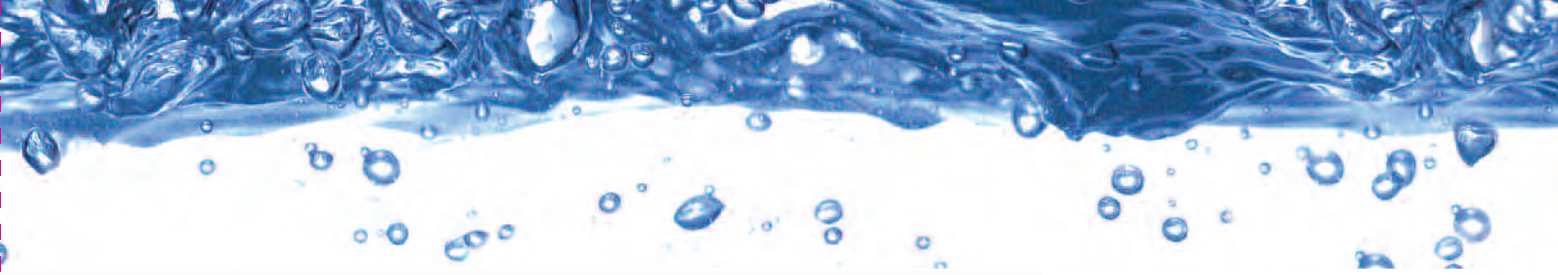
### Boiler Water Heater: Single Horizontal Unit



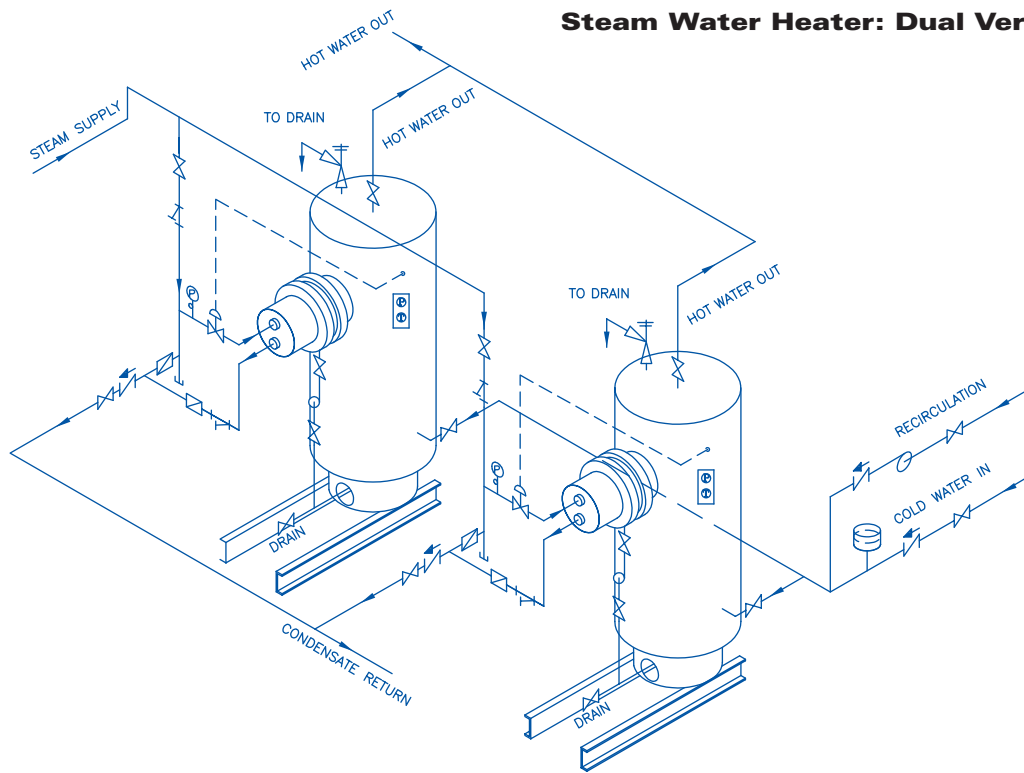
### LEGEND





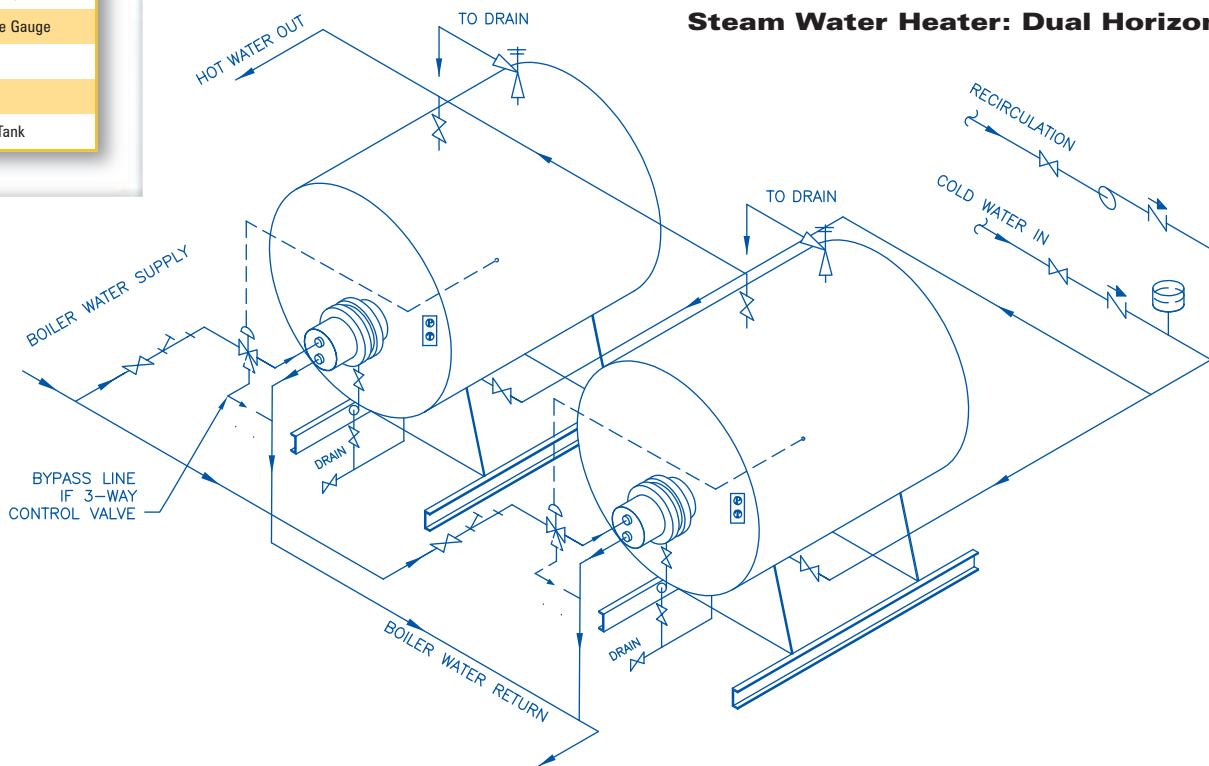


### Steam Water Heater: Dual Vertical Unit



- Strainer
- Stop Valve
- Check Valve
- Control Valve
- Relief Valve
- Thermal Element
- Pressure Gauge
- Temperature Gauge
- Steam Trap
- Circulator
- Expansion Tank

### Steam Water Heater: Dual Horizontal Unit



# Additional Products

Storage Tanks  
Storage Heaters  
Air Receivers  
Expansion Tanks  
Hydro Pneumatic Tanks

Fire Protection Tanks  
Flash tanks  
Blow Down Tanks  
Replacement Tube Bundles



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