

# INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS

## OVENTROP SOLAR WATER HEATERS

<u>MODELS</u>	<u>PRODUCT NUMBER</u>
Single Heat Exchanger Coil 80 gal.	540 00 80 SC
115 gal.	540 01 15 SC
Dual Heat Exchanger Coil 60 gal.	540 00 60
80 gal.	540 00 80
115 gal.	540 01 15
Single Coil w/Electric Heat 80 gal.	540 00 80 E
115 gal.	540 01 15 E

For service or repairs to the water heater, call your heating contractor. Your water heater has been manufactured to provide years of service. In order to insure proper service, the following information is provided to assist in enabling the installation, operation, and maintenance of this water heater. When the installation is completed, keep this manual with the water heater.

Oventrop Corporation  
PO Box 789  
29 Kripes Road  
East Granby, CT 06026



## IMPORTANT TERMS

The following terms are used in this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning product life.

### **! DANGER !**

Indicates an imminent hazardous situation, which, if not avoided, will result in death, serious injury, or substantial.

### **! WARNING !**

Indicates a potentially hazardous situation, which, if not avoided, will result in death, serious injury, or substantial.

### **! CAUTION !**

Indicates a potentially hazardous situation, which, if not avoided, may result in moderate, or minor injury or property damage.

### **NOTICE**

Indicates special instructions on installation, operation or maintenance, which are important but not related to personal injury hazards.

## IMPORTANT INFORMATION – READ CAREFULLY

NOTE: The equipment shall be installed in accordance with those installation regulations required in the area where the installation is to be made. These regulations shall be carefully followed in all cases. Authorities having jurisdiction shall be consulted before the installations are made.

All wiring on water heaters shall be in accordance with the National Electrical Code and/or local regulations.

### **! WARNING !**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, or loss of life. Read and understand the entire manual before attempting installation, start-up, operation, or service. Installation and service must be performed only by an experienced, skilled installer or service agency.

This water heater contains very hot water under high pressure. Do not unscrew any pipe fittings or attempt to disconnect any components of this water heater without positively assuring that the water is cool and has no pressure. Always wear protective clothing and equipment when installing, starting up or servicing this water heater to prevent scalding injuries. Do not rely on the pressure and temperature gauges to determine the temperature and pressure of the water heater. This water heater contains components that become very hot in operation. Do not touch any components unless they are cool.

Failure to follow all instructions in the proper order can cause personal injury or death. Read all instructions, including all those contained in component manufacturers' manuals before installing, starting up, operating, maintaining, or servicing the water heater.

### **! CAUTION !**

To reduce the risk of excessive pressures and temperatures in this water heater, install temperature and pressure protective equipment required by local codes but no less than a combination temperature relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials, as meeting the requirements for Relief Valves and Automatic Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22-latest edition. This valve must be marked with a maximum set pressure not to exceed the marked working pressure of the water heater. Install the valve into an opening provide and marked for this purpose in the water heater, and orient it or provide tubing so that any discharge from the valve will exit only within 6 inches above, or at any distance below, the structural floor, and cannot contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.

The heat transfer medium must be water or other non-toxic fluid having a toxicity rating or class of 1, as listed in clinical Toxicology of Commercial Products, latest edition.

For solar closed loop heating the pressure of the heat transfer medium must be limited to a maximum of 87 psig by an approved safety or relief valve. For boiler indirect hot water heating the pressure of the heat transfer medium must be limited to the boiler maximum operating pressure of 30 psig by an approved safety or relief valve.

### **! DANGER !**

**DO NOT** store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance. If you smell gas vapors, **DO NOT** try to operate any appliance - **DO NOT** touch any electrical switch or use any phone in the building. Immediately, call the gas supplier from a remote located phone. Follow the gas supplier's instructions or if the supplier is unavailable, contact the fire department.

## IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING THIS WATER HEATER.

### **! WARNING !**

When using electrical appliances, basic safety precautions to reduce the risk of fire, electric shock, or injury to persons should be followed, including:

1. This water heater must be grounded. Connect only to properly grounded outlet. See “GROUNDING INSTRUCTIONS” found in Section IV.
2. Install or locate this water heater only in accordance with the provided installation instructions
3. Use this water heater only for its intended use as described in this manual.
4. Do not use an extension cord set with this water heater. If no receptacle is available adjacent to the water heater, contact a qualified electrician to have one properly installed.
5. As with any appliance, close supervision is necessary when used by children.
6. Do not operate this water heater if it is not working properly, or if it has been damaged or dropped.
7. This water heater should be serviced only by qualified personnel. Contact nearest authorized service facility for examination, repair, or adjustment.

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Installer Contact Information

SAVE THESE INSTRUCTIONS

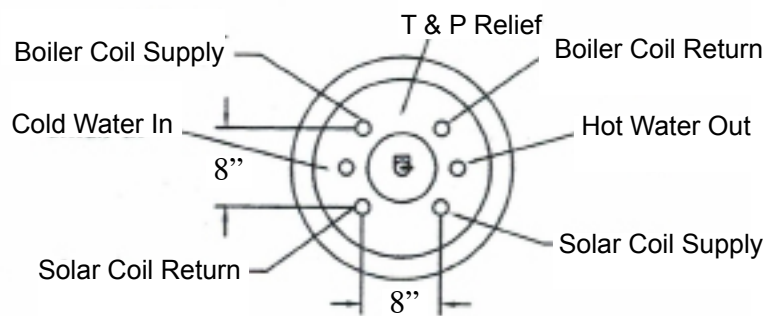
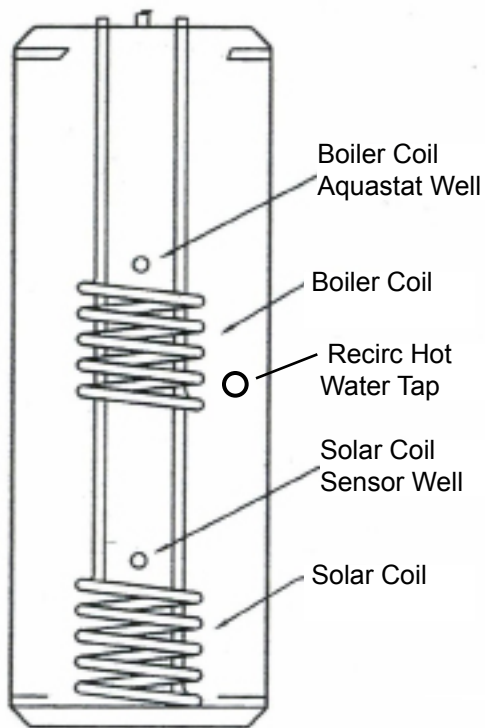
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**Section I      General Information**

**Table 1** Dimensions

Model	Storage Volume	Coil Heating Surface	Tank Height	Tank Diameter	NPT Piping Connection Domestic Water	NPT Piping Connection Boiler Water	Max Working Pressure	Approx. Shipping Weight
Product NO.	US Gal.	Sq. Ft.	Inches	Inches	In/Out [in.]	In/Out [in.]	psi	lbs
540 00 60	60	8.3	60.0	22.5	3/4	1	150	125
540 00 80	80	8.3	54.0	26.5	1	1	150	139
540 00 80 SC	80	8.3	54.0	26.5	1	1	150	139
540 00 80 E	80	8.3	54.0	26.5	1	1	150	139
540 01 15	115	8.7	72.0	26.5	1	1	150	175
540 01 15 SC	115	8.7	72.0	26.5	1	1	150	175
540 01 15 E	115	8.7	72.0	26.5	1	1	150	175



**Models SC, and E do not contain Top Coil**

## Heat Exchanger Output Ratings

**Table 2a**

Model	60 Gallon		540 00 60	
Boiler Output	1st Hour Rating		Continuous Rating	
BTU/Hr	US Gal/Hr		US Gal/Hr	
	140 F	115 F	140 F	115 F
50,000	121	146	67	92
60,000	134	165	80	111
80,000	161	201	107	147
100,000	187	238	133	184
120,000	214	275	160	221
140,000	214	312	160	258
160,000	214	312	160	258

**Table 2b**

Model	80 Gallon		540 00 80	
Boiler Output	1st Hour Rating		Continuous Rating	
BTU/hr	US Gal/Hr		US Gal/Hr	
	140 F	115 F	140 F	115 F
50,000	139	164	67	92
60,000	152	183	80	111
80,000	179	219	107	147
100,000	205	256	133	184
120,000	232	293	160	221
140,000	232	330	160	258
160,000	232	330	160	258

**Table 2c**

Model	115 Gallon		540 01 15	
Boiler Output	1st Hour Rating		Continuous Rating	
BTU/Hr	US Gal/Hr		US Gal/Hr	
	140 F	115 F	140 F	115 F
50,000	139	164	67	92
60,000	152	183	80	111
80,000	179	219	107	147
100,000	205	256	133	184
120,000	232	293	160	221
140,000	232	330	160	258
160,000	232	330	160	258
180,000	273	365	170	265

**Table 2d**

Model	540 00 60	540 00 80	540 01 15
Minimum Flow Rate	10 gpm	10 gpm	10 gpm
Pressure Drop at Minimum Flow Rate	3.9 ft/hd	3.0 ft/hd	3.0 ft/hd

Minimum Flow Rate is for Boiler Coil only.

## Section II Installation Considerations

Inspect shipment carefully for signs of damage. All equipment is carefully inspected and packed. Oventrop's responsibility ceases upon delivery of the water heater to the carrier in good condition. Any claims for damage or shortage, must be filed immediately against the carrier by the consignee. No claims for variances or shortages will be allowed by the Manufacturer, unless they are presented within sixty days after receipt of the equipment. Installation must conform to the requirements of the authority having jurisdiction. In the absence of such requirements, installation must conform to the National Plumbing Code and the National Electrical Code ANSI/NFPA No. 70, current edition.

### IMPORTANT CONSIDERATIONS BEFORE INSTALLATION

#### Solar Water Heater Sizing

Choose the solar water heater model based on the daily hot water usage for the given site. Factors that increase hot water demand dramatically include high flow shower heads, hot tubs, and the use of more than one shower at a time. Increase the tank size if these factors are present. Consult ASHRAE sizing guides and other references.

#### Heat Exchanger

The heat exchanger (coil) is made of 316 stainless steel and 1" NPT male fittings. If a confirmed leak occurs, contact the plumbing professional who installed the water heater or the manufacturer, listed on the rating plate, for additional guidance.

#### Boiler Indirect Water Heating with use of upper coil (solar back-up)

##### *Boiler sizing for indirect water heating for backup*

The water heater will provide the rated performance only if it is used with a boiler with a heating capacity of at least as much as the capacity ratings in Tables 2a, b and c. If the boiler has less capacity, the water heating output will be reduced.

##### a. Circulator Sizing.

Refer to Table 2d for the minimum flow through the water heater coil and the pressure drop at minimum flow. Calculate the pressure drop across all piping and fittings connected to the water heater zone. Be sure to include all zone valves, check valves, and shut-off valves. It is recommended that the water heater zone be piped with 1" pipe around the entire loop on typical residential sites.

##### b. System Zone Control

The water heater must be installed as a separate zone from the space heating system. The water heating zone's piping and circulator must be sized for the minimum flow rate with all the zones in use and a maximum flow with only the water heater in use. This is the reason that the best method of zone control is with circulators.

The three most common boiler indirect systems are:

I. Zone Circulators- The space heating zones use a circulator for each zone, and the water heater is controlled with an additional circulator.

II. Hybrid System- The space heating zones use zone valves for each zone, and the water heater is controlled with an additional circulator.

III. Zone Valves – The space heating zones use zone valves for each zone, and the water heater is controlled with an additional zone valve. Select a valve with a low pressure drop, and assure minimum flow with adequate pipe sizing.

##### c. Priority or Non-Priority for Hot Water

I. Option 1 – Priority. The demand for space heating is interrupted until the hot water demand is satisfied. This option provides the maximum delivery of hot water.

Priority is recommended when:

1. The boiler output is less than 100,000 Btu per hour, or
2. The boiler output required to satisfy the hot water demand is more than 50% of the boiler output needed to satisfy the space heating demand, or

3. When an interruption in space heating can be tolerated during long domestic hot water draws.

In most cases the delay in space heating will not be noticed because of the rapid recovery of the water heater. It must be recognized however that certain water heater malfunctions, such as a failed thermostat or circulator, could delay space heating indefinitely.

- II. Option 2 – Non-Priority. The boiler output is divided between space heating and water heating. Heating of domestic hot water can be reduced during simultaneous space and water heating demands. The amount of reduction depends on the boiler output, the number of space heating zones calling, and the amount of boiler water flow split between the space heating and zones and the water heater zone.

### Solar Electric Hot Water Heating

#### *Backup heating elements with adjustable thermostats*

A 4500 watt element provides backup hot water heating in the solar electric models. The element is located mid-height on the tank to provide one-half the tank capacity in electric hot water heating. The temperatures may be adjusted from approximately 110°F to approximately 160°F. The thermostats are factory set at 120°F. It is recommended that lower temperatures be used to avoid the risk of scalding. It is further recommended, in all cases, that the water temperature be set for the lowest temperature that satisfies your hot water needs. This will also provide the most energy efficient operation of the water heater and minimizes scale formation.

Setting the water heater temperature at 120°F will reduce the risk of scalds. Some states require settings to specific lower temperatures.

### **NOTICE**

Neither the solar controller nor the thermistors are provided with the solar water heater and must be purchased separately. The lower sensor well is used to measure temperature for the comparison to the solar collector temperature to determine if an appropriate temperature difference for heat transfer is available.

Mixing device – An ASSE approved temperature mixing device must be installed for solar hot water tanks. The solar heating system may transfer heat into the water heater above the temperature limits set by the thermostats. This may create the potential for scald injury. To protect against injury, you must install a ASSE approved mixing valve (a device to limit the temperature of water to protect against scald injury via mixing hot and cold water supply) in the water system. This valve will reduce point of discharge temperature in branch supply lines.

### Locating the water heater.

The water heater should be located in an area where water leakage from the tank or connections will not result in damage to areas adjacent to the water heater or to lower floors of the structure. When such a location can not be avoided, a suitable drain pan must be installed under the water heater, and the drain pan must be connected to a drain. The water heater should be installed as close to the boiler as is practical for easy access for service. The unit is designed for installation on combustible flooring and in alcoves, closets, etc.

The minimum clearances from combustible surfaces are:

<b>Table 3</b>	Service Clearance	Combustible Surfaces Clearance
Bottom	0"	0"
Left, Right, and Rear Sides	3"	1"
Front	30"	1"
Top	6"	6"



## Additional recommended components

1. Shut-off valves. Allows the isolation of the water heater from the boiler system during service.
2. Unions. Allows for easy locating or removal.
3. Thermal expansion tank. If the water heater is installed in a closed water supply system, such as a system having a back flow preventer in the cold water supply line, the installation of a thermal expansion tank is required.

## Water Quality

Improper water quality will reduce the expected life of the water heater. Hard water, sediment, high or low pH, and high levels of chlorides in the domestic water should be avoided. Sediment and hard water will eventually coat the heating coil inside the water heater and reduce the rate of hot water production and may, eventually cause a failure. High or low Ph and/or high chloride concentrations will cause corrosion and eventually failure. A filter is strongly recommended where sediment is present in the water. A water softening system is recommended for areas with hard water.

In an area where the water quality is not known, a water quality test should be performed.

### **! WARNING !**

Do not operate the Oventrop water heaters in areas where the pH is above 8.0 or below 6.0, and/or with chloride concentrations greater than 80 parts per million (ppm). Oventrop's standard warranty does not cover problems caused by improper water pH or excessive levels of chlorides.

## Section III Installation Procedure

There are 2 design strategies for solar storage and backup hot water systems. One method is a single tank providing both solar storage and backup hot water supply. The other is a two tank system, with one solar storage tank supplying a conventional water heater. Oventrop tanks are compatible with both designs. The dual coil indirect and the solar electric solar storage tanks are primarily designed to be used as a single tank system. The single coil solar storage tank is to be installed in series with a conventional water heater to provide hot water backup to the solar tank. See figures 1 and 2.

### Installation Procedure

#### A. Piping the Domestic Hot Water

1. Shut off the cold water supply at the main shutoff valve.  
Open one or more faucets to relieve the water pressure.  
Open the tank drain, leaving the faucets open. Drain the existing domestic hot water tank.
2. For 2 tank solar systems do not remove existing back up hot water heater.  
Or if single tank system is replacing water heater, remove existing water heater after fully drained.
3. Position the Oventrop water heater.
4. Connect the cold water supply piping to the Oventrop tank.  
Install piping onto cold inlet connection.

### **! WARNING !**

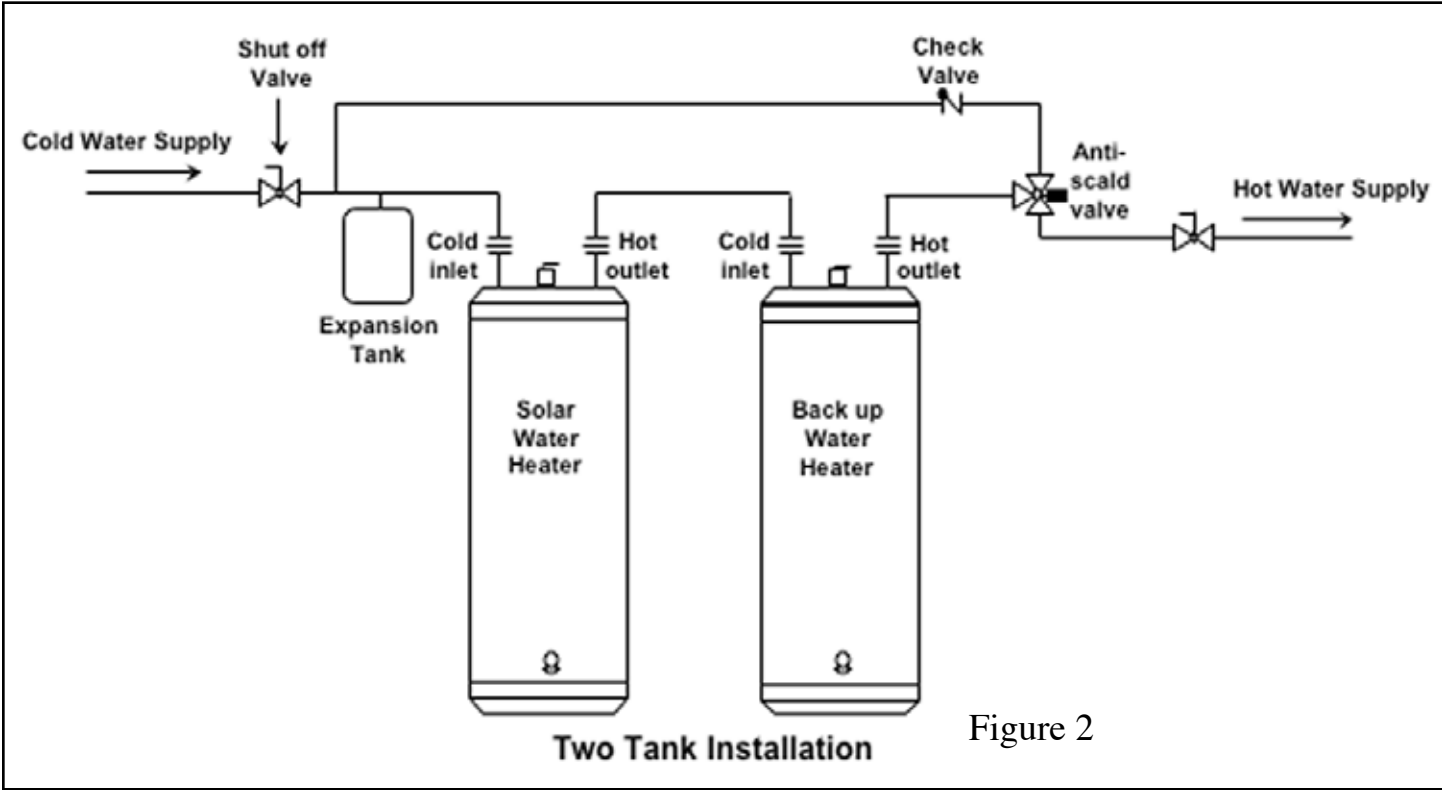
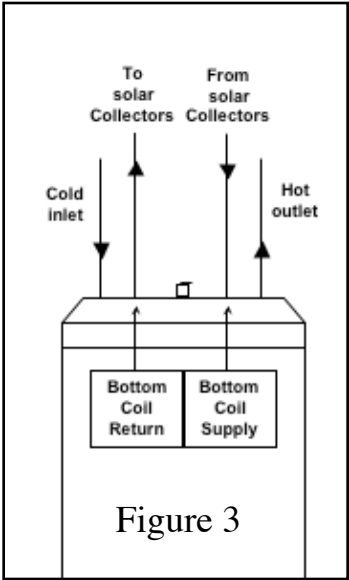
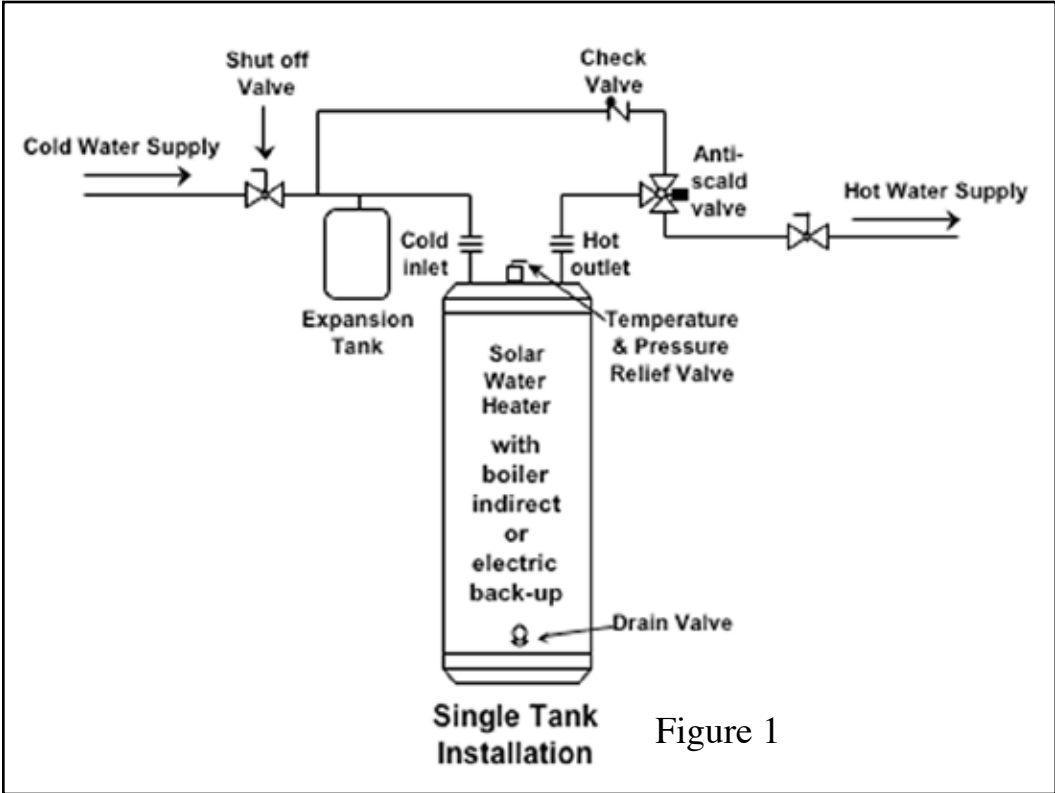
Do not apply heat to the cold water inlet fitting while making sweat connections to the heater. Sweat tubing to an adapter before fitting the adapter to the heater. It is imperative that no heat be applied to the cold water inlet fitting, because it is connected to a nonmetallic dip tube.

Connect to cold water supply fitting on the tank using a union, a heat trap, a shut-off valve, an expansion tank (where required), a back flow preventer (where required), and a filter (recommended to prevent sediment buildup).

5. Connect the hot water supply piping.

#### **For Single Tank System**

Connect hot out fitting on the Oventrop tank to the hot water supply connection using a union, and a shut-off valve.



## For 2 Tank System

Pipe the hot out from the solar tank to the cold water inlet of the backup hot water heater. Install piping from hot out from back up hot water heater to the hot water supply connection using a union, and a shut-off valve. For a 2 tank solar hot water system isolation valves may be installed to by pass either the solar storage tank or the backup hot water heater. See figures 1 and 2.

### **! WARNING !**

Both one and two tank systems must have a ASSE approved temperature mixing device installed on the hot out to the hot water supply to prevent scalding temperatures from exiting the system.

Pipe the relief valve discharge so that the discharge from the valve will exit only within 6 inches above, or at any distance below, the structural floor, and cannot contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.

6. Fill the Oventrop water heater tank.  
Open all faucets to allow air to purge from the tank and piping. Remove screens on faucets.  
Open domestic hot water shut-off valve.  
Open cold water inlet shut-off valve.  
Purge all of the air from the domestic water system. Allow water to run so the tank is completely purged of any debris. Close all faucets. Reinstall all of the screens in the faucets.  
Check the system for leaks. Repair as required.

## **B. Piping the Solar Heat Exchanger.**

1. The solar heat exchange coils are marked on top of the tank “Bottom Coil Supply” and “Bottom Coil Return”. The supply side of the coil is piped to incoming solar heated transfer fluid from the solar collectors. The return side of the coil is piped in the direction of flow to the collectors. See Figures 3.

## **C. Piping the Boiler to the Upper Coil.**

1. Determine where the boiler, the space heating, and the water heater connections should be made based on the type of piping system that is either in place, or is to be installed for a new hydronic system installation. See Figure 4, Boiler Water Piping with Zone Circulators, and Figure 5, Boiler Water Piping with Zone Valves.
2. It is recommended that 1” pipe and 1” zone valves be used on the water heater zone.

## **Zone Circulator System**

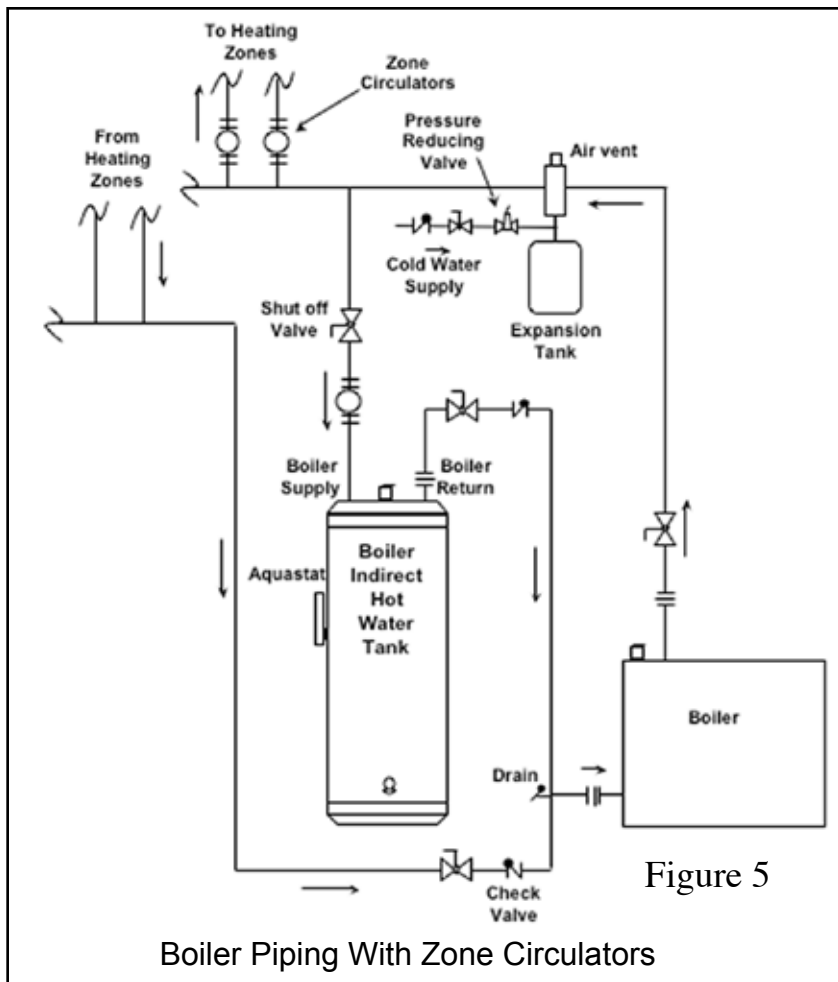
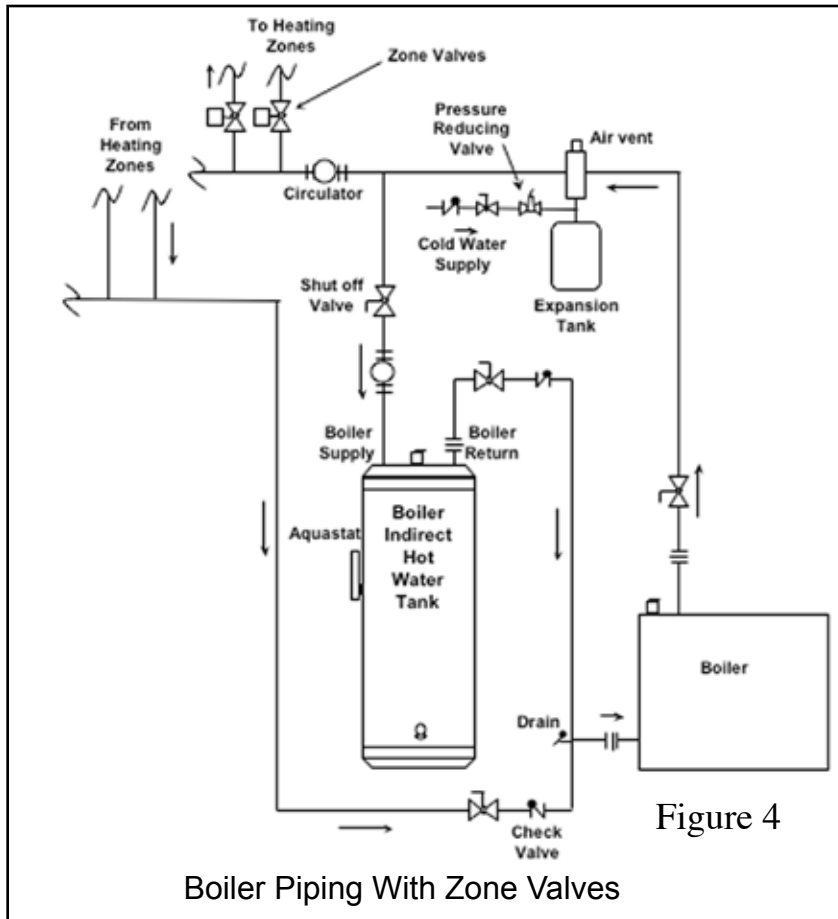
For space heating systems that use Zone Circulators, refer to Figure 3. The water heater connection labeled “BOILER SUPPLY” should be piped to the boiler supply piping after the air purger and before the space heating takeoffs. Mount the water heater circulator as close as possible to the water heater, and make sure the flow arrow points toward the water heater. The use of shut-off valves is recommended for future service convenience.

The water heater connection labeled “BOILER RETURN” should be piped to the boiler return piping as close to the boiler as possible and after any flow control or check valves in the space heating return piping. The use of a union and a shut-off valve is recommended. The use of a check valve is required to prevent back flow through the water heater during operation of the space heating system.

## **Zone Valve System**

For a space heating system that uses Zone Valves, refer to Figure 4. The water heater connection labeled “BOILER SUPPLY” should be piped to the boiler supply piping after the air purger and before the space heating circulator. Mount the water heater circulator as close as possible to the water heater, and make sure the flow arrow points toward the water heater. The use of a shut-off valve is recommended for future service convenience.

The water heater connection labeled “BOILER RETURN” should be piped to the boiler return piping as close to the boiler as possible and after any flow control or check valves in the space heating return piping. The use of a union and a shut-off valve is recommended. The use of a check valve is required to prevent back flow through the water heater during operation of the space heating system.



**Section IV      Electrical**

**! DANGER !**

Positively assure all electrical connections are unpowered before attempting installation or service of electrical components or connections of the water heater or building. Lock out all electrical boxes with padlock once power is turned off.

**! WARNING !**

When installed, the water heater must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, and /or the CSA C22.1 Electric Code, latest editions.

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Failure to properly wire electrical connections to the water heater may result in serious physical harm.

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Electrical power may be from more than one source. Make sure all power is off before attempting any electrical work.

**Wiring The Boiler For Indirect Hot Water Heating**

Refer to schematics 1 - 6 for detailed wiring of boiler controls to indirect water heating with boiler piping with zone valves or with zone circulators.

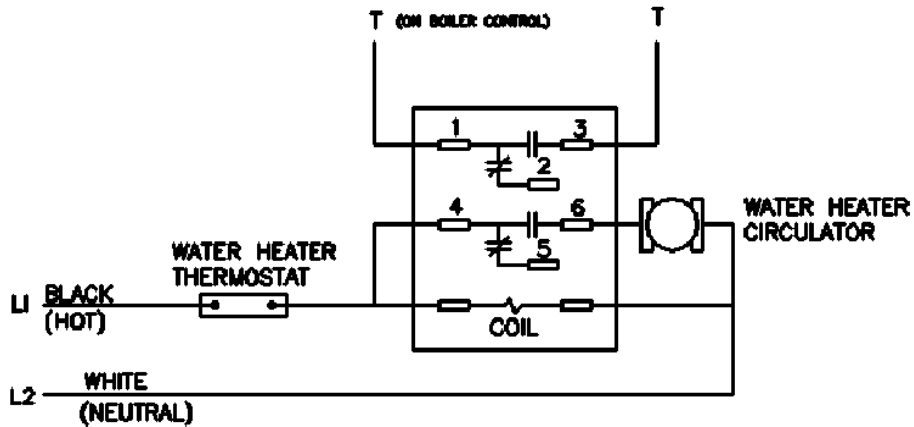
The water heater thermostat is designed to close contact below a setpoint temperature and are not included with the purchase of the tank. There is a aquastat well provided at mid-height side of the tank to provide an installation point for the water heater thermostat. The solar dual coil tank is designed to provide back-up indirect hot water heating in only the upper one-half of the tank.

Schematics 1, 2, & 3 are for separate circulators for indirect hot water heating.

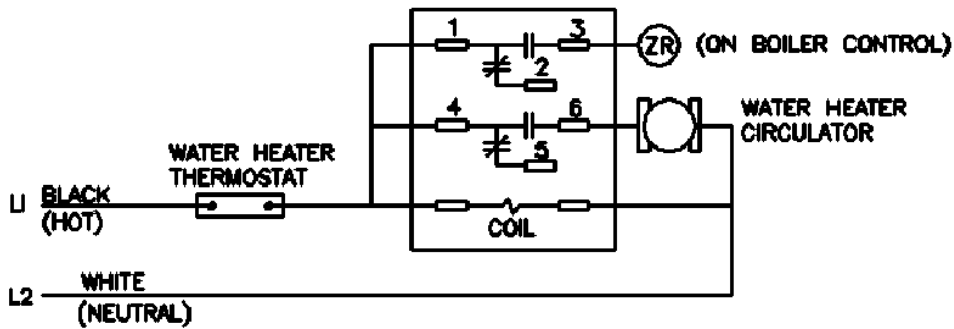
Schematics 3, 4, & 5 are for zone valve control for indirect hot water heating.

# SEPARATE CIRCULATOR WIRING

Honeywell Relay R4222D1013 with Q633A receptacle

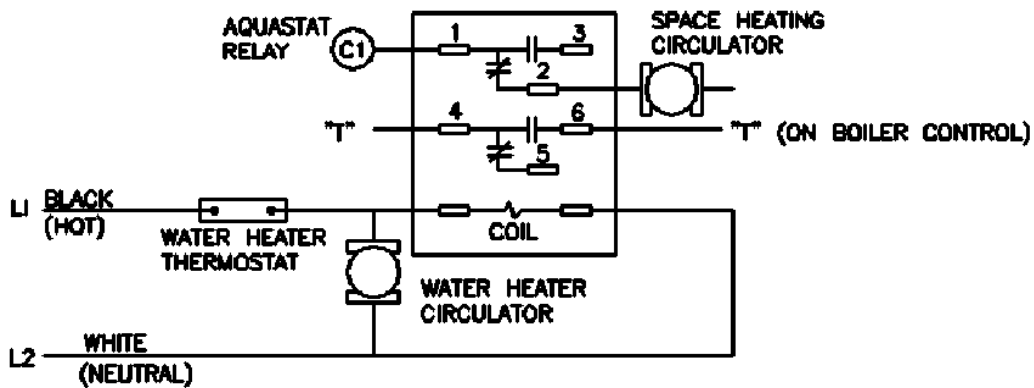


**SCHEMATIC 1**  
24 VOLT "T-T" WIRING



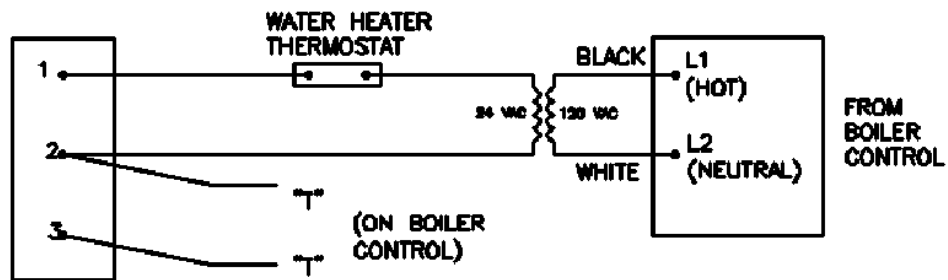
WHEN NO "ZR" TERMINAL IS AVAILABLE  
WIRE TO THE SUPPLY SIDE OF THE HI LIMIT

**SCHEMATIC 2**  
120 VOLT - ZR TERMINAL

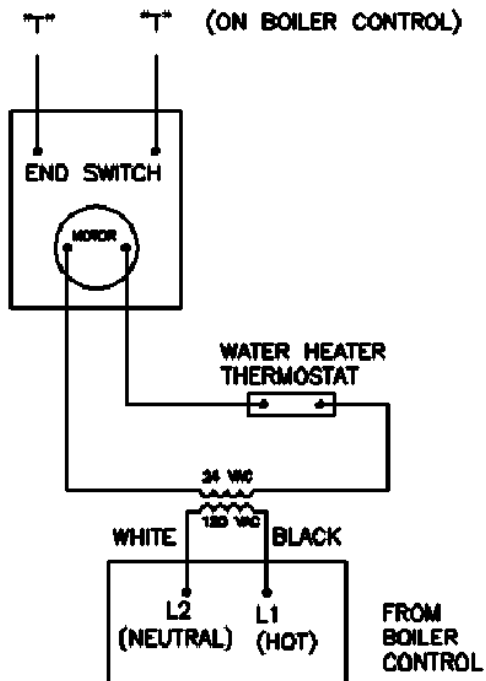


**SCHEMATIC 3**  
PRIORITY WITH CIRCULATORS

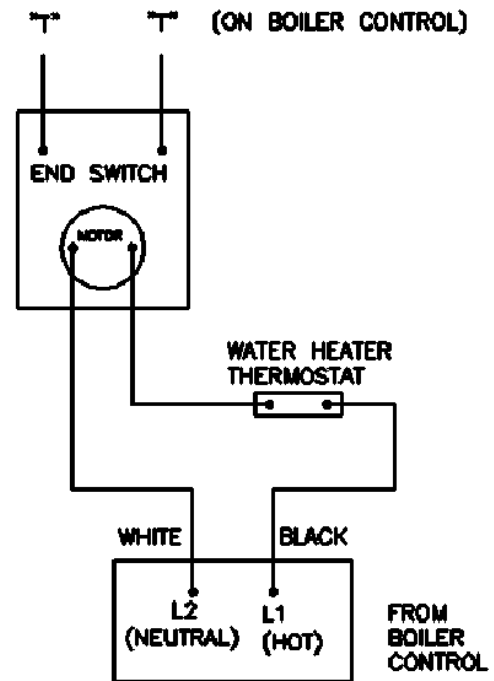
# ZONE VALVE WIRING



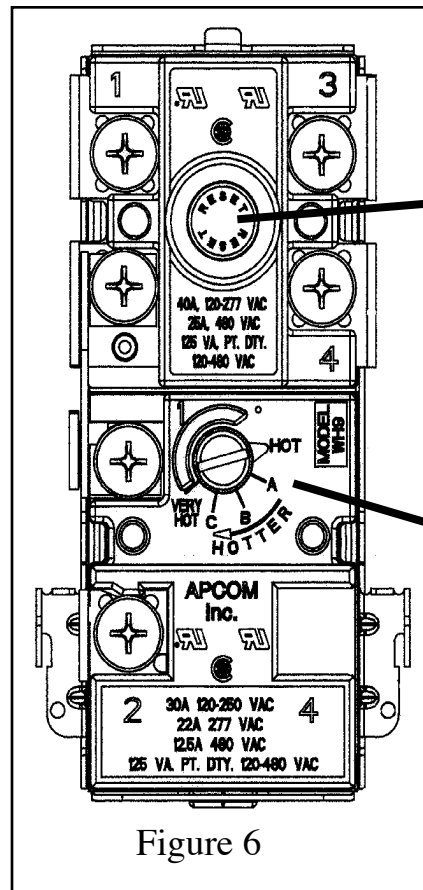
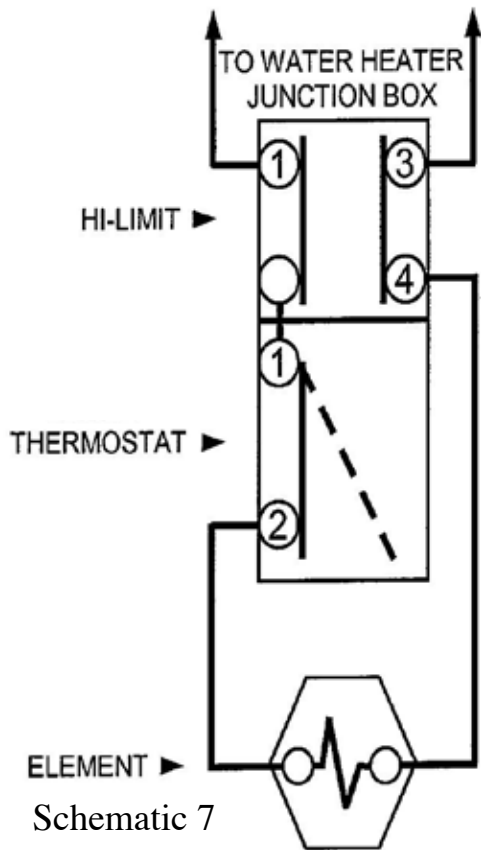
**SCHEMATIC 4**  
3-WIRE ZONE VALVE



**SCHEMATIC 5**  
4-WIRE ZONE VALVE WITH 24 VOLT MOTOR



**SCHEMATIC 6**  
4-WIRE ZONE VALVE WITH 120 VOLT MOTOR



- Reset Button
- Temperature Dial Settings
- Dot = 110°F
- Hot = 120°F
- A = 130°F
- B = 140°F
- C = 150°F
- Very Hot = 160°F

## Solar Electric Tank Electrical Connections

The solar electric hot water heater includes a 240VAC thermostat and a 4500 watt element. Refer to Schematic 7 for wiring detail.

### Connect Electric Heating Element

Before any electrical connections are made, be sure that the water heater is full of water and that the valve in the cold water supply line is open. The solar water heater is supplied with a single electric heating element backup system. The thermostat incorporates a manual reset temperature-limiting device. Please refer to the TROUBLESHOOTING GUIDE section for manual reset operation. Turn off all power related to the heating system before proceeding with the electrical connections. Any and all wiring shall be sized and installed to satisfy the voltage and amperage used. The water heater must be well grounded. A green ground screw is provided at the electrical connection point for connecting a ground wire. All wiring shall be done in accordance with all applicable local and state codes.

### Adjusting The Temperature Dial On The Thermostat

The minimum potable water temperature can be changed by adjusting the thermostat. Before any work is done on the water heater, disconnect all power to the water heater and heat source (solar collector) by opening the switch(s) at the main electrical circuit breaker or fuse box. Remove the cover and fold the insulation outward away from the control. Adjust the thermostat dial using a screwdriver until the minimum acceptable temperature is achieved. Rotate the temperature dial clockwise to increase water temperature. Rotate the thermostat dial counter-clockwise to decrease the temperature setting. See figure 6 for temperature settings. The thermostat has been factory preset to 120°F (49°C). Remember that lower temperature settings are more energy efficient. Replace the insulation making sure that the control is well covered and that the plastic terminal shield has not been displaced. Replace the access panel. The water heater is now ready for operation and the main switch can be closed.



## Section V     **Operation**

### Startup With Boiler Indirect Hot Water Heating Back-Up

After the water heater has been plumbed and wired, and the boiler water piping is purged of air, the water heater is ready to be started.

1. Follow the boiler installation instructions to place the boiler in operation.
2. Set the tank thermostat 120 degrees F and will call for heat if the water above the thermostat is lower than 120.
3. On a call for heat, the tank thermostat contacts close to start the water heater zone circulator and the boiler.
4. After the tank has reached the temperature setting, the tank thermostat opens and de-energizes the circulator and the boiler. If there is a call for space heating, the boiler will continue to run until the room thermostats are satisfied.

### Temperature Adjustment

The tank thermostat controls the maximum water temperature supplied by the boiler in the water heater. The hot water system must have a ASSE approved temperature mixing device installed on the hot out to the hot water supply to prevent scalding temperatures from exiting the system. This will prevent painful scalding with possible serious and permanent injury. The temperature at which scalding occurs varies with a person's age, and the length of time in contact with the hot water. The slower response time of infants, older, or handi-capped people increases the hazard for them.

It is recommended that the thermostat be set for the lowest possible temperature that satisfies your needs. This will also provide you with the lowest energy consumption and cost.

Adjust the water temperature at the tank thermostat and set the approved mixing valve temperature to avoid temperatures above 120F. A thermometer should be installed after the mixing valve for visual indication of temperature.

Additional temperature checks should follow the completion of the solar heating cycle, as the solar reaches the high limit setting regulated by the solar controller. Further adjustments may be required after you have reached solar high limit regulation.

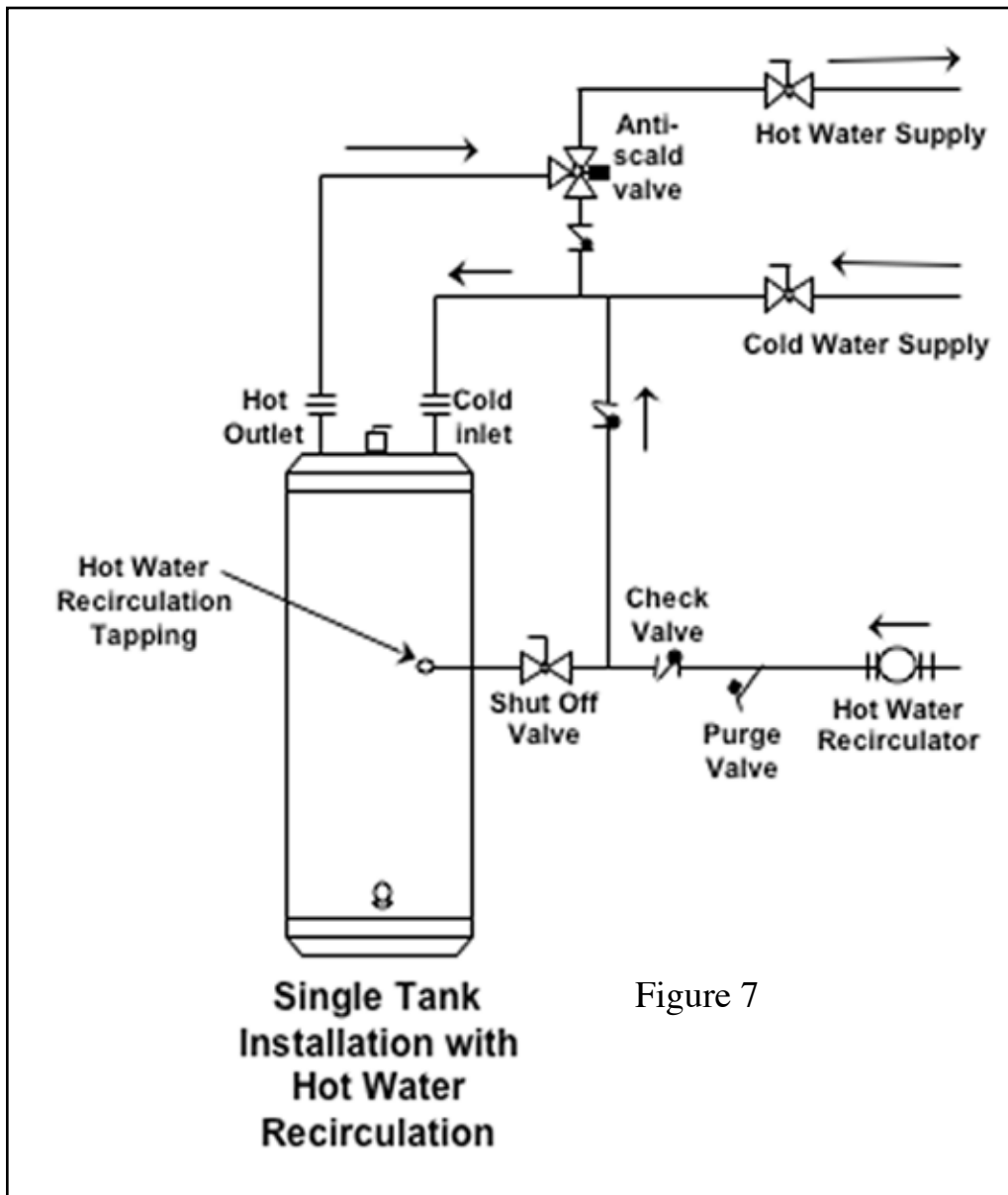


Figure 7

## Section VI Hot Water Recirculation

### Hot Water Recirculation for Solar Hot Water Storage Tanks

Hot Water recirculation is for the continuous circulation of hot water for instant hot water at the hot water faucets. With the Oventrop solar tanks tapplings are provided for the hot water recirculation return at the distance mid-height at the side of the tank. See figure 7. The location of the tapping will not allow for the mixing of back-up heated hot water (boiler indirect of electric element) into the lower solar heated section of the tank.

When an anti-scald device is installed it is critical to feed the cold supply of the mixing valve with the return of recirculated hot water. This is important to keep the hot water recirculation loop operating through the mixing valve even if the tank temperatures are above the mixing valve setting. Otherwise the mixing valve will not allow the flow of hot water through it and disable the recirculation loop of hot water.

## Section VII Maintenance

The water heater is intended to provide many years of reliable service. Components, such as thermostats and relief valves, may be subject to failures that require service. Depending on the quality of the water supply, sediment and/or scale may coat the heating coil in the tank and reduce hot water recovery rate. Failure to use the correct procedures or parts can result in unsafe operation.

The owner should arrange to have the following inspections and simple maintenance procedures done at the suggested frequencies.

1. **Boiler and Domestic Water Piping (Annual)**  
Check all piping for signs of leakage at the joints, unions and shut-off valves. Repair as required.
2. **Temperature and Pressure Relief Valve (Annual)**
3. **Sediment (Annual except where harsh water quality may require more frequent service)**  
Depending on water conditions, a varying amount of sediment may collect in the tank. Levels requiring service are indicated by a small temperature difference between the boiler supply and return lines, and a reduced recovery rate. Repeated flushing usually clears such material. As a preventive measure, water should be drawn from the drain valve until it runs clear and the installation of a water filter should be considered.
4. **Scale (Annual)**  
Hard water may cause scale buildup on the outside of the heating coil inside the tank. A water softener will prevent this problem. Symptoms are identical to sediment buildup. If repeated flushing does not resolve the problem, chemical cleaning may be required. Proceed as follows:

### Chemical Cleaning Of The Heating Coil

1. To avoid water damage, shut off the cold water supply to the water heater.
2. Make a note of the temperature control setting on the water heater, and turn off the power to the water heater.
3. Relieve the water pressure in the tank by opening a hot water faucet. This will reduce the risk of scalding.
4. Remove the relief valve from the water heater.
5. Drain the water heater until the water is at a level equal to 3" above the thermostat well. This level will cover the coil and the thermostat.
6. Using a funnel, pour one gallon of commercial ice maker cleaning solution into the tank through the relief valve opening. Follow the instructions, cautions, and warnings supplied with the cleaning solution.
7. Set the water heater thermostat to its highest setting, turn on the power to the water heater, and allow the boiler to heat the water until the tank thermostat is satisfied. The boiler may cycle on its high limit several times during this period. If the tank thermostat is not satisfied after 45 minutes of boiler operation, turn the thermostat to its lowest setting.
8. Allow the heated solution to set in the tank 30 minutes.
9. Drain the tank completely using fittings and hoses, as required, to reach a drain.
10. Fill the water heater tank with fresh, cold, water and drain it completely. Repeat filling and draining at least three (3) times to flush all of the cleaning solution from the tank.
11. Reinstall the relief valve and the drain piping.
12. Open the cold water supply and fill the tank with water. Purge the air from the tank and the piping by opening the cold and hot water faucets in the house.
13. Return the temperature control to the setting noted in Step 2.

## Section VIII Troubleshooting

Problem	Cause	Solution
No hot water at faucets.	<p>Electric back-up element is not working.</p> <p>Boiler does not operate.</p> <p>Circulator does not operate.</p> <p>Improper thermostat setting.</p> <p>Zone valve does not open.</p> <p>Electrical problem.</p> <p>Sediment and/or scale buildup.</p> <p>Clogged filter.</p>	<p>Press reset button.</p> <p>Check main cut-off switch.</p> <p>Check fuses or breakers.</p> <p>Check power supply.</p> <p>Check shaft coupling.</p> <p>Turn thermostat to a higher setting.</p> <p>Check power supply and valve.</p> <p>Check fuses and replace.</p> <p>Check circuit breaker and reset.</p> <p>Check power supply.</p> <p>If boiler, circulator, and thermostat are operating properly, and the boiler is cycling on the high limit several times before the tank thermostat is satisfied, the coil may have a coating of sediment and/or scale. See chemical cleaning instructions.</p> <p>Clean or replace filter.</p>
Insufficient or runs out of hot water at the faucet.	<p>Thermostat setting too low.</p> <p>Undersized boiler with no priority to domestic water heating.</p> <p>Peak draw of hot water is greater than the tank storage.</p> <p>Sediment and/or scale buildup.</p> <p>Faulty water heater thermostat.</p>	<p>Turn the thermostat to a higher setting.</p> <p>Rewire for priority.</p> <p>Determine peak usage and compare to tank volume.</p> <p>Clean coil.</p> <p>Replace thermostat.</p>
Water at faucet too hot.	<p>Thermostat set to high.</p> <p>Improper system plumbing.</p> <p>Improper wiring.</p>	<p>Lower thermostat setting.</p> <p>Compare plumbing to installation guide. Inspect check valves.</p> <p>Compare wiring to installation guide.</p>
Boiler cycles more than 5 times per day in summer	<p>Excessive demand.</p> <p>Faulty thermostat.</p> <p>Boiler high limit set to low.</p> <p>Sediment and or scale buildup.</p>	<p>Reduce demand or consider larger boiler and/or water heater.</p> <p>Replace thermostat.</p> <p>Increase boiler hi-limit setting.</p> <p>Clean coil.</p>

## Oventrop Corporation - Limited Warranty

Oventrop Corporation warrants to its "Customers" that all Oventrop products, used for heating and plumbing applications and sold in accordance with these warranty provisions, shall be free from defects in material and workmanship. "Customer" as used herein shall mean an end-user of Oventrop products.

Five (5) years for all solar components from the date of purchase, unless otherwise specified in writing.

Ten (10) years for evacuated tube collector from date of purchase, unless otherwise specified in writing.

Limited Lifetime for stainless steel indirect water heater fifteen (15) years from date of purchase, unless otherwise specified in writing.

In order to be eligible for a warranty claim, products sold

(1) must be installed and maintained professionally according to the relevant assembly instructions and the product manual,

(2) must only be used for purposes provided in the Oventrop Corporation's product description or assembly instructions,

(3) must be exposed only to gaseous or liquid media approved for the product by Oventrop Corporation, and

(4) shall not be combined with products of other manufacturers unless otherwise stated in the product manual.

Oventrop Corporation's sole obligation hereunder shall be, at its option, to issue credit, repair or replace any component or part thereof which is proved to be defective. The limited warranty does not cover cost for transportation or labor charges (including installation and removal) unless such charges are authorized in writing in advance by the Oventrop Corporation. Any repairs without the express written consent of Oventrop Corporation shall render this limited warranty invalid. Oventrop Corporation disclaims allowances for dismounting and consequential losses and damages.

Warranty claims must be received by Oventrop Corporation within the applicable warranty period and within thirty (30) days from when the cause for the claim occurred or was discovered. Upon receipt of prompt notice of a warranty claim, Oventrop Corporation shall have ten (10) business days in which to determine whether it acknowledges responsibility for any asserted defects in material or workmanship and the appropriate action to be taken.

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