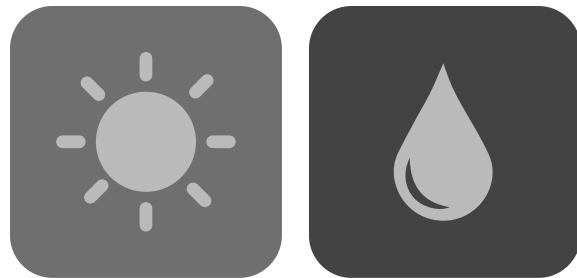


Installation Instructions and Use & Care Guide

Solar Photovoltaic Water Heater



SUNEARTH

SunEarth Incorporated Fontana, California www.sunearthinc.com

DO NOT RETURN THIS UNIT TO THE STORE



Read this manual and the labels on the water heater before you install, operate, or service it. If you have difficulty following the directions, or aren't sure you can safely and properly do any of this work yourself:

- Call our Technical Assistance Hotline at **800-978-6327**. We can help you with installation, operations, troubleshooting, or maintenance. Before you call, write down the model and serial number from the water heater's data plate.

Incorrect installation, operation, or service can damage the water heater, your house and other property, and present risks including fire, scalding, electric shock, and explosion, causing serious injury or death.



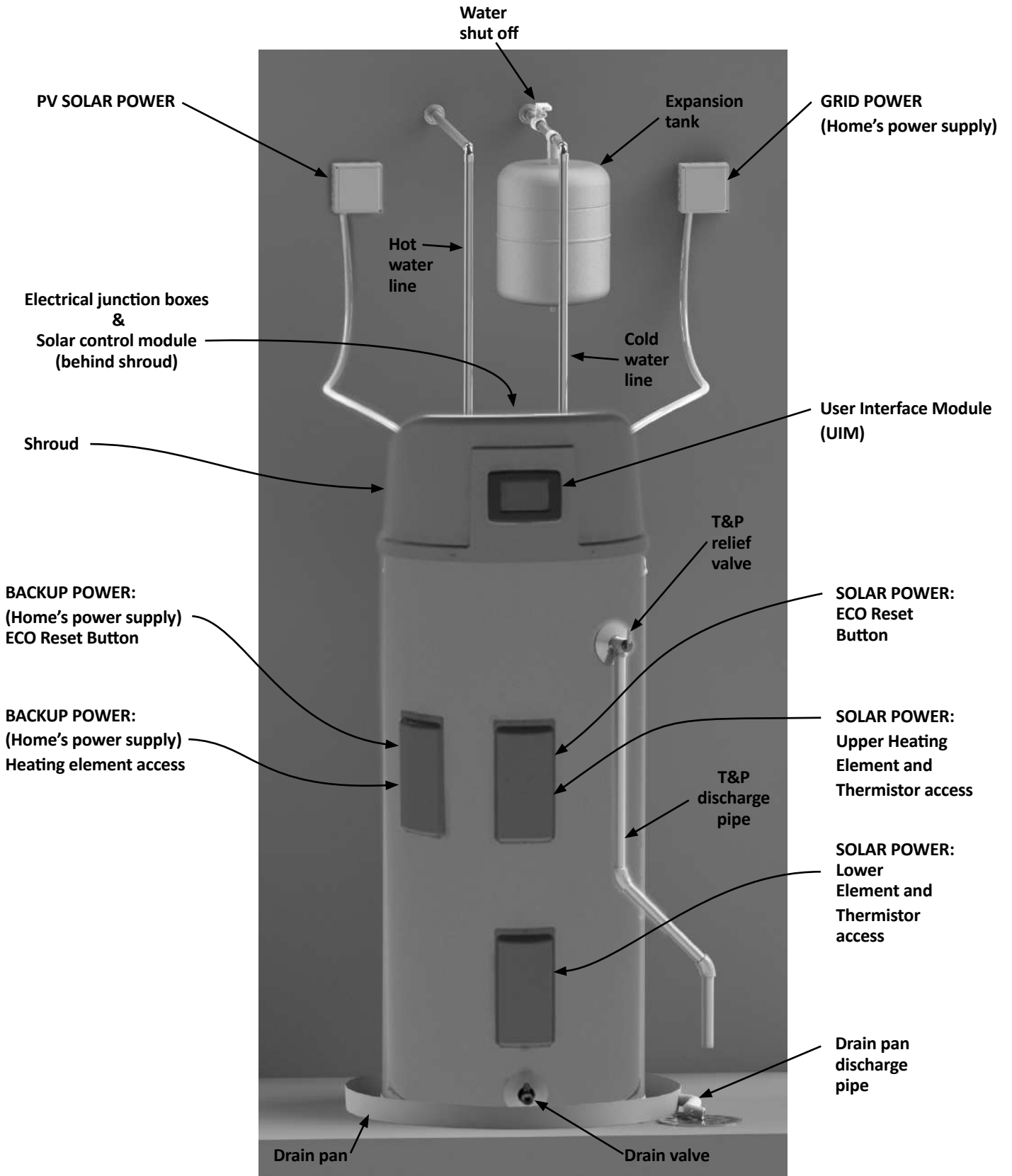
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Keep this manual in the pocket on heater for future reference whenever maintenance, adjustment or service is required.


Retain your original receipt as proof of purchase.

COMPLETED INSTALLATION (TYPICAL)



IMPORTANT SAFETY INFORMATION

Read and follow all safety messages and instructions in this manual.

	<p>This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible property damage, serious injury or death. Do not remove any permanent instructions, labels, or the data plate from either the outside of the water heater or on the inside of the access panels. Keep this manual near the water heater.</p>
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Important information to keep

Fill out this section and keep this manual in the pocket of the water heater for reference.




Date Purchased:

Model number:

Serial number:

Maintenance performed:*	Date:

*Drain and flush tank and remove and inspect anode rod after first six months of operation and at least annually thereafter. Operate the Temperature and Pressure Relief Valve (T&P) annually and inspect T&P valve every 2-4 years (see the label on the T&P valve for maintenance schedule). See the Maintenance section for more information about maintaining this water heater.

 DANGER	<p>DANGER indicates hazardous situation that, if not avoided, will result in death or serious injury.</p>
 WARNING	<p>WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.</p>
 CAUTION	<p>CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.</p>
NOTICE	<p>NOTICE indicates practices not related to physical injury.</p>

IMPORTANT SAFETY INFORMATION

To reduce the risk of property damage, serious injury or death, read and follow the precautions below, all labels on the water heater, and the safety messages and instructions throughout this manual.

RISKS DURING INSTALLATION AND MAINTENANCE



Electric Shock Risk

Contact with the electrical parts in the junction box and behind the access doors can result in severe injury or death from electrical shock:

- Disconnect power by opening the circuit breaker or removing the fuses before installing or servicing. **Electrical power must be off for both the solar and backup power systems.**
- Use a non-contact circuit tester to confirm that power is off before working on or near any electrical parts.
- Replace the junction box cover and access doors after servicing.

Lifting Risk

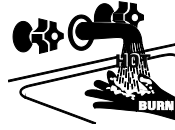


▲ WARNING! The water heater is heavy. Follow these precautions to

reduce the risk of property damage, injuries from lifting or impact injuries from dropping the water heater.

- Use at least two people to lift the water heater.
- Be sure you both have a good grip before lifting.
- Use an appliance dolly or hand truck to move the water heater.

RISKS DURING OPERATION



Scalding Risk

This water heater can make water hot enough to cause severe burns instantly, resulting in severe injury or death.

- Feel water before bathing or showering.
- To reduce the risk of scalding, install Thermostatic Mixing Valves (temperature limiting valves) at each point-of-use. These valves automatically mix hot and cold water to limit the temperature at the tap. Mixing valves are available from your local plumbing supplier. Follow manufacturer's instructions for installation and adjustment of the valves.
- The temperature setpoint on this water heater has been factory set to approximately 120°F to reduce the risk of scalding. Higher temperatures increase the risk of scalding, but even at 120°F, hot water can scald. If you choose a higher temperature, Thermostatic Mixing Valves located at each point-of-use are particularly important to help avoid scalding.

Temperature	Time to Produce a Serious Burn
120°F (49°C)	More than 5 minutes
125°F (52°C)	1½ to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (66°C)	About 1½ seconds
155°F (68°C)	About 1 second

For information about changing the factory temperature setpoint, refer to “Adjust the Temperature” (Step 11 on page 15).

Even if you set the temperature setpoint to a low setting, higher temperatures may occur in certain circumstances:

- In some cases, repeated small draws of water can cause the hot and cold water in the tank to “stack” in layers. If this happens, the water can be as much as thirty degrees hotter than the temperature setting. This temperature variation is the result of your usage pattern and is not a malfunction.
- Water temperature will be hotter if someone adjusted the temperature setpoint to a higher setting.
- Problems with the thermistors or other malfunctions may result in higher than expected water temperatures.
- If the water heater is in a hot environment, the water in the tank can become as hot as the surrounding air, regardless of the temperature setpoint.
- If the water supplied to the water heater is pre-heated (for example, by a pumped solar system) the temperature in the tank may be higher than the water heater's temperature setpoint.

To reduce the risk of unusually hot water reaching the fixtures in the house, install Thermostatic Mixing Valves at each point-of-use.

If anyone in your home is at particular risk of scalding (for example, the elderly, children, or people with disabilities) or if there is a local code or state law requiring a certain water temperature at the hot water tap, then these precautions are particularly important.

IMPORTANT SAFETY INFORMATION

According to a national standard American Society of Sanitary Engineering (ASSE 1070) and most local plumbing codes, the water heater's temperature control should not be used as the sole means to regulate water temperature and avoid scalds.

Properly adjusted Thermostatic Mixing Valves installed at each point-of-use allow you to set the tank temperature to a higher setting without increasing risk of scalds. A higher temperature setting allows the tank to provide much more hot water and can help provide proper water temperatures for appliances such as dishwashers and washing machines. Higher tank temperatures (140°F) also kill bacteria that cause a condition known as "smelly water" and can reduce the levels of bacteria that cause water-borne diseases.

Water Contamination Risk

Do not use chemicals that could contaminate the potable water supply. Do not use piping that has been treated with chromates, boiler seal, or other chemicals.



Fire Risk

To reduce the risk of a fire that could destroy your home and seriously

injure or kill people:

- Do not store things that can burn easily such as paper or clothes next to the water heater.
- Be sure the junction box cover and the access door covers are in place. These covers keep debris from entering and potentially being ignited, and help keep any internal fires from spreading.
- Keep the water heater from becoming wet. Immediately shut the water heater off and have it inspected by

a qualified person if you find that the wiring, thermistors, or surrounding insulation have been exposed to water in any way (e.g., leaks from plumbing, leaks from the water heater itself can damage property and could cause a fire risk). If the water heater has been subjected to flood conditions or the thermistors have been submerged in water, the entire water heater must be replaced.

- Make electrical connections properly, according to the instructions on page 14. Use 10 gauge solid copper wire. Use a UL listed or CSA approved strain relief. Connect ground wire to green ground screw.



Explosion Risk

High temperatures and pressures in the water heater tank can cause an

explosion resulting in property damage, serious injury or death. A new Temperature and Pressure (T&P) Relief Valve is included with your water heater to reduce risk of explosion by discharging hot water. Additional temperature and pressure protective equipment may be required by local codes.

A nationally recognized testing laboratory maintains periodic inspection of the valve production process and certifies that it meets the requirements for Relief Valves for Hot Water Supply Systems, ANSI Z21.22. The T&P Relief Valve's relief pressure must not exceed the working pressure rating of the water heater as stated on the rating plate.

Maintain the T&P Relief Valve properly. Follow the maintenance instructions provided by the manufacturer of the

T&P Relief Valve (label attached to T&P Relief Valve) and the procedure that starts on page 24.

An explosion could occur if the T&P Relief Valve or discharge pipe is blocked. Do not cap or plug the T&P Relief Valve or discharge pipe.

Fire and Explosion Risk if Hot Water is Not Used for Two Weeks or More

⚠ CAUTION! Hydrogen gas builds up in a hot water system when it is not used for a long period (two weeks or more). Hydrogen gas is extremely flammable. If the hot water system has not been used for two weeks or more, open a hot water faucet for several minutes at the kitchen sink before using any electrical appliances connected to the hot water system. Do not smoke or have an open flame or other ignition source near the faucet while it is open.

GETTING STARTED

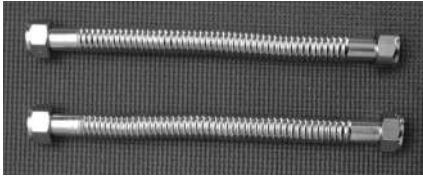


Figure 1 - Flexible connectors use compression fittings and do not require soldering.



Figure 2 - Use a non-contact circuit tester to insure that the power is off before you work on a circuit.



Figure 3 - Install a Pressure Reducing Valve set to 50 to 60 PSI.

1 Review all of the instructions before you begin work.

Improper installation can damage the water heater, your home and other property, and can present risks of serious injury or death.

2 Check with your local and state authorities for any local or state codes that apply to your area. In the absence of local and state codes, follow National Fire Protection Association (NFPA-70) and the current editions of the National Electric Code (NEC) and the International Plumbing Code (IPC). The instructions in this manual comply with national codes, but the installer is responsible for complying with local codes.

Massachusetts code requires this water heater to be installed in accordance with Massachusetts 248-CMR 2.00 and 248-CMR 5.00: State Plumbing Code. Other local and state authorities may have similar requirements or other codes applicable to the installation of this water heater.

3 Before you start, be sure you have, and know how to use, the following tools and supplies:

- Plumbing tools and supplies appropriate for the type of water pipes in your home
- Threaded connectors (Figure 1) for the cold and hot water pipes
- For homes plumbed with plastic pipe, use threaded connectors suitable for the specific type of plastic pipe used: CPVC and PEX (cross-linked polyethylene). Do not use PVC pipe.
 - For homes with copper pipes, you may purchase connector

kits with compression fittings that don't require soldering (Figure 1). Compression fittings are easier to install than soldering copper pipes.

- Thread sealant tape or pipe joint compound approved for potable water
- Tools to make the electrical connections (for example, screwdrivers, wire strippers)
- Non-Contact circuit tester to check for power (Figure 2)
- Water Pressure Gauge (Figure 4)

Recommended Accessories:

- Suitable drain pan (Figure 6 on page 8)
- Automatic leak detection and shut-off device
- Pressure Reducing Valve (Figure 3 on page 6)
- Thermal Expansion Tank (Figure 5 on page 7)
- Point-of-use Thermostatic Mixing Valves (Figure 7 on page 8)

INSTALLATION

Follow these steps for proper installation:

Step 1:

✓ Verify that your home is equipped and up-to-date for proper operation

Installing a new water heater is the perfect time to examine your home's plumbing system and make sure the system is up to current code standards. There have likely been plumbing code changes since the old water heater was installed. We recommend installing the following accessories and any other needed changes to bring your home up to the latest code requirements.

Use the checklist below and inspect your home. Install any devices you need to comply with codes and assure that your new water heater performs at its best. Check with your local plumbing official for more information.

✓ Water pressure

We recommend checking your home's water pressure with a pressure gauge (Figure 4.) Most codes allow a maximum incoming water pressure of 80 psi. We recommend a working pressure no higher than 50-60 psi.

HOW: Purchase an inexpensive water pressure gauge available at your local plumbing supplier. Connect the Water Pressure Gauge to an outside faucet and measure the maximum water pressure experienced throughout the day (highest water pressures often occur at night).

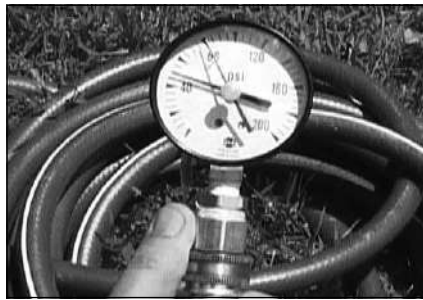


Figure 4 - Use a Water Pressure Gauge to make sure your home's water pressure is not too high.

To limit your home's water pressure: Locate your home's Pressure Reducing Valve (PRV) on the main incoming (cold) water supply line and adjust the water pressure control to between 50 and 60 psi. If your home does not have a Pressure Reducing Valve, install a PRV on the home's main water supply line and set it to between 50 and 60 psi. Pressure Reducing Valves are available at your local plumbing supplier.

BACKGROUND: Over the years, many utilities have increased water supply pressures so they can serve more homes. In some homes today, pressures exceed 100 psi. High water pressures can damage water heaters, causing premature leaks. If you have replaced toilet valves, had a water heater leak, or had to repair appliances connected to the plumbing system, pay particular attention to your home's water pressure. When purchasing a PRV, make sure the PRV has a built-in bypass.

✓ Water pressure increase caused by thermal expansion

Verify that you have a properly sized Thermal Expansion Tank (Figure 5). We recommend installing an expansion tank if your home does not have one. Codes require a properly pressurized, properly sized Thermal Expansion Tank in almost all homes. (See photo on inside front cover.)



Figure 5 - A Thermal Expansion Tank helps protect the home's plumbing system from pressure spikes.

HOW: Connect the Thermal Expansion Tank (available at your local plumbing supplier) to the cold water supply line near the water heater. The expansion tank contains a bladder and an air charge. To work properly, the Thermal Expansion Tank must be sized according to the water heater's tank capacity and pressurized to match the home's incoming water pressure. Refer to the installation instructions provided with the Thermal Expansion Tank for installation details.

INSTALLATION

BACKGROUND: Water expands when heated, and the increased volume of water must have a place to go, or thermal expansion will cause large increases in water pressure (despite the use of a Pressure Reducing Valve on the home's main water supply line). The Safe Drinking Water Act of 1974 requires the use of backflow preventers and check valves to restrict water from your home reentering the public water system. Backflow preventers are often installed in water meters and may not be readily visible. As a result, most all plumbing systems today are now "closed," and almost all homes now need a Thermal Expansion Tank.

A Thermal Expansion Tank is a practical and inexpensive way to help avoid damage to the water heater, washing machine, dishwasher, ice maker and even toilet valves. If your toilet occasionally runs for no apparent reason (usually briefly at night), that may be due to thermal expansion increasing the water pressure temporarily.

Water pipe and tank leaks

Leaks from plumbing pipes or from the water heater itself can damage property and could cause a fire risk.

- Install an automatic leak detection and shutoff device (available at your local plumbing supplier). These devices can detect water leaks and can shut off the water heater's water supply if a leak occurs.



Figure 6 - A suitable drain pan piped to an adequate drain can help protect flooring from leaks and drips.

- Install a suitable drain pan (available at your local plumbing supplier) under the water heater (Figure 6) to catch condensation or leaks in the piping connections or tank. Most codes require, and we recommend, installing the water heater in a drain pan that is piped to an adequate drain. The drain pan must be at least two inches wider than the diameter of the water heater. Install the drain pan so the water level would be limited to a maximum depth of 1-3/4".



Water temperature regulation



Figure 7 - Thermostatic Mixing Valves installed at each point-of-use can help prevent scalds.

Install Thermostatic Mixing Valves (Figure 7) to regulate the temperature of the water supplied to each point-of-use (for example, kitchen sink, bathroom sink, bath, shower). Con-

sult the valve manufacturer's instructions or a qualified person.

▲ WARNING! Even if the water heater temperature control is set to a relatively low temperature, hot water can scald. Install Thermostatic Mixing Valves at each point-of-use to reduce the risk of scalding (page 4).

BACKGROUND: A Thermostatic Mixing Valve, installed at each point-of-use, mixes hot water from the water heater with cold water to more precisely regulate the temperature of hot water supplied to fixtures. If you aren't sure if your plumbing system is equipped with properly installed and adjusted Thermostatic Mixing Valves at each point where hot water is used, contact a qualified person for more information.

INSTALLATION

Step 2:

Verify that the location is appropriate

Before installing your water heater, ensure that:

- 1 The water heater will be:
 - Installed indoors close to the center of the plumbing system.
- In a suitable drain pan piped to an adequate floor drain or external to the building (Figure 6 on page 8).
- In an area that will not freeze
- In an area that is suitable for installing the water heater vertically
- 2 The location has adequate space (clearances) for periodic servicing.
- 3 The floor can support the weight of a full water heater.
- 4 Your area is not prone to earthquakes. If it is, use special straps as required by local building codes.

NOTICE: The state of California requires bracing, anchoring, or strapping the water heater to avoid its moving during an earthquake. Contact local utilities for code requirements in your area, visit <http://www.dsa.dgs.ca.gov>, or call 1-916-445-8100 and request instructions. Other locations may have similar requirements. Check with your local and state authorities.

- 5 The location is not prone to physical damage by vehicles, flooding, or other risks.

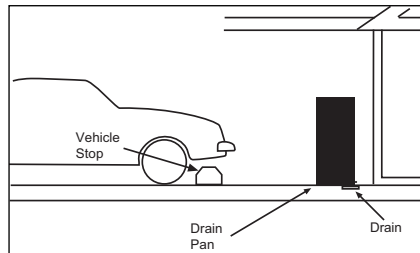


Figure 8 - In a garage, install a vehicle stop to avoid water heater damage.

- 6 Avoid locations such as attics, upper floors, or where a leak might damage the structure or furnishings. Due to the normal corrosive action of water, the tank will eventually leak. To minimize property damage from leaks, inspect and maintain your water heater in accordance with this manual's instructions. Install a suitable drain pan under the water heater piped to an adequate drain. Inspect the drain pan, pipes, and surrounding area regularly and fix any leaks found. Drain pans are available at your local plumbing supplier. Leaks are frequently in the plumbing system itself and not the water heater.

Step 3:

Removing the old water heater

- 1 Read each installation step and decide if you have the necessary skills to install the water heater. Only proceed if you can safely perform the work. If you are not comfortable, have a qualified person perform the installation.

- 2 Locate the water heater's circuit breaker and turn it OFF (or remove the circuit's fuses).
- 3 On the old water heater, remove the electrical junction box access panel. Using a non-contact circuit tester, check the wiring to make certain the power is OFF.

⚠ WARNING! Working on an energized circuit can result in severe injury or death from electrical shock.

- 4 Disconnect the electrical wires.
- 5 Open a hot water faucet and let the hot water run until it is cool (This may take 10 minutes or longer).



Figure 9 - Let the hot water run until it is cool.

⚠ WARNING! Be sure the water runs cool before draining the tank to reduce the risk of scalding.

- 6 Connect a garden hose to the drain valve and place the other end of the hose in a drain, outside, or a bucket. (Note that sediment in the bottom of the tank may clog the valve and prevent it from draining. If you can't get the tank to drain, contact a qualified person.)

INSTALLATION

7 Turn the cold water supply valve OFF.

8 Open the drain valve on the water heater.



Figure 10 - Draining the old water heater.

9 Also open a hot water faucet to help the water in the tank drain faster.

10 When the tank is empty, disconnect the Temperature & Pressure (T&P) Relief Valve discharge pipe. You may be able to reuse the discharge pipe, but do not reuse the old T&P Relief Valve. A new T&P Relief Valve comes installed on your water heater (or on some models, is in the carton with the water heater).



Figure 11 - Removing the T&P Relief Valve discharge pipe.

11 Disconnect the water pipes. Many water pipes are connected by a threaded union which can be disconnected with wrenches. If you must cut the water pipes, cut the pipes close to the water heater's inlet and outlet connections, leaving the water pipes as long as possible. If necessary, you can make them shorter later when you install the new water heater.

12 Remove the old water heater.

▲ WARNING! Use two or more people to remove or install water heater. Failure to do so can result in back or other injury.

Step 4:

Installing the new water heater

1 Completely read all instructions before beginning. If you are not sure if you can complete the installation, **DO NOT RETURN THIS UNIT TO THE STORE.** Seek assistance from any of the following sources:

- Schedule an appointment with a qualified person to install your water heater.
- Call our Technical Assistance Hotline at **800-978-6327**.

2 Install a suitable drain pan that is piped to an adequate drain.

3 Set the water heater in place taking care not to damage the drain pan.

NOTICE: Most codes require setting the water heater in a suitable drain pan piped to an adequate drain. The drain pan helps avoid property damage which may occur from condensation or leaks in the piping connections or tank. The drain pan must be at least two inches wider than the diameter of the water heater. Install the drain pan so the water level is limited to a maximum depth of 1-3/4".

4 Verify that the water heater is properly set in place. Check that:

- The T&P Relief Valve will not be in contact with any electrical parts.
- There is adequate space to install the T&P Relief Valve discharge pipe and that it can be piped to a separate drain (and not into the drain pan).
- There is adequate access and space around the water heater for future maintenance.

INSTALLATION

DO NOT CONNECT ELECTRICAL WIRING UNTIL YOU ARE INSTRUCTED TO DO SO.

NOTICE: Connecting electrical power to the tank before it is completely full of water will cause the upper heating element to burn out. Water must run FULL STREAM from a hot water tap for a full three minutes.

Step 5:

Connect the Temperature and Pressure (T&P) Relief Valve/Pipe

Most T&P Relief Valves are pre-installed at the factory. In some cases, they are shipped in the carton and must be installed in the opening marked and provided for this purpose and according to local codes.

⚠ WARNING! To avoid serious injury or death from explosion, install a T&P Relief Valve according to the following instructions:

1 If your water heater does not have a factory installed T&P Relief Valve, install the new T&P Relief Valve that came with your water heater. Do not reuse an old T&P Relief Valve. Install a T&P Relief Valve discharge pipe according to local codes and the following guidelines:

- The discharge pipe should be at least 3/4" inside diameter and sloped for proper drainage. Install it to allow complete drainage of both the T&P Relief Valve and the discharge pipe.
- The discharge pipe must withstand 250°F (121°C) without distortion. Use

only copper or CPVC pipe. Do not use any other type of pipe, such as PVC, iron, flexible plastic pipe, or any type of hose.



Figure 12 - The T&P Relief Valve discharge pipe must be installed properly and piped to an adequate drain.

- Terminate the discharge pipe a maximum of six inches above a floor drain or outside the building. Do not drain the discharge pipe into the drain pan; instead pipe it separately to an adequate drain. In cold climates, terminate the discharge pipe inside the building to an adequate drain. Outside drains could freeze and obstruct the drain line. Protect the drain from freezing.

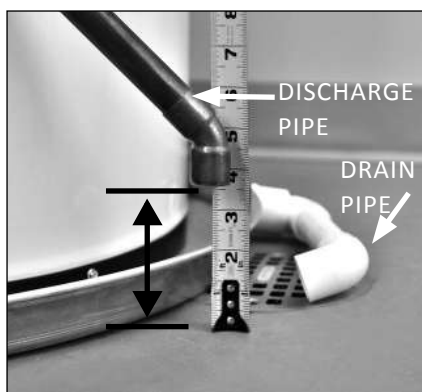


Figure 13 - The end of the T&P Relief Valve discharge pipe must stop no more than six inches above a floor drain or terminate outside the building.

- Do not place any valve or other restriction between the tank and T&P

Relief Valve. Do not cap, block, plug, or insert any valve between the T&P Relief Valve and the end of the discharge pipe. Do not insert or install any reducer in the discharge pipe.

INSTALLATION

Step 6:

Install shutoff and tempering valves

1 If one is not already installed, install a manual shutoff valve in the cold water line that supplies the water heater. Install the shutoff valve near the water heater so that it is readily accessible. Only use valves that are compatible with potable water. Use only full-flow ball or gate valves. Other types of valves may cause excessive restriction to the water flow.

2 Install a Thermostatic Mixing Valve at each point-of-use (for example, kitchen sink, bathroom sink, bath, shower). Consult the valve manufacturer's instructions or a qualified person.



Figure 14 - Install Thermostatic Mixing Valves at each point where hot water will be used.

⚠ WARNING! Even if the water heater's temperature control is set to a relatively low temperature, hot water can scald. Install Thermostatic Mixing Valves at each point-of-use to reduce the risk of scalding. (page 4.)

3 For water heaters that are fed by a solar water heating

system (or any other pre-heating system), always install a Thermostatic Mixing Valve or other temperature limiting device in the inlet water supply line to limit water supply inlet temperature to 120°F. Solar water heating systems can supply water with temperatures exceeding 170°F and may result in water heater malfunction.

⚠ WARNING! Hot water provided by solar heating systems can cause severe burns instantly, resulting in severe injury or death (page 4).

Step 7:

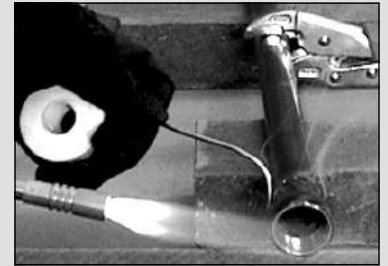
1 Connect the water supply

Determine the type of water pipes in your home. Most homes use copper water pipes, but some use CPVC or cross-linked polyethylene (PEX). Use fittings appropriate for the type of pipe in your home. Do not use iron or PVC pipe – they are not suitable for potable water.

2 Connect the cold water supply using 3/4 inch National Pipe Thread "NPT" to the cold water inlet nipple. For ease of removing the water heater for service or replacement, connect the water pipes with a coupling called a union. We recommend using a dielectric-type union (available at your local plumbing supplier). Dielectric unions can help prevent corrosion caused by tiny electric currents common in copper water pipes and can help extend the life of the water heater.

IF YOU HAVE COPPER PIPES:

If your home has copper water pipes, you can solder the water pipe connections or use compression fittings which don't require soldering. Compression fittings are easier to install than soldering pipe. Check with local plumbing officials to determine what types of pipe materials are suitable for your location. Do not use lead-based solder.



NOTICE: Do not solder pipes while they are attached to the water heater. The water heater's inlet and outlet connections contain non-metallic parts which could be damaged. The proper way to connect the water heater to copper water pipes is as follows:

- Solder a short length of pipe (about a foot or so) to a threaded adapter using only 95/5 tin-antimony or equivalent solder. Attach the threaded adapters to the water heater's connections (using thread sealant tape or pipe joint compound). Connect the home's water pipes by soldering, keeping the connections at the water heater cool with wet rags.

INSTALLATION

NOTICE: Most water heater models contain energy saving heat traps in the inlet and outlet connections. Do not remove the heat traps.

3 Connect the hot water supply using 3/4 inch NPT to the hot water outlet. Follow the same connection guidelines as for the cold water supply.

4 Install insulation (or heat tape) on the water pipes especially if the indoor installation area is subject to freezing temperatures. Insulating the hot water pipes can increase energy efficiency.

5 Double check to make sure the hot and cold water pipes are connected to the correct hot and cold water fittings on the water heater.

6 If needed, install (or adjust) the home's Pressure Reducing Valve to 50-60 psi and install a Thermal Expansion Tank.



Figure 15 - A Pressure Reducing Valve is required if your home's water pressure is above 80 psi.



Figure 16 - The Thermal Expansion Tank should be pressurized with air, to match the home's incoming water pressure.

Step 8:

Verify connections and completely fill tank

To remove air from the tank and allow the tank to fill completely with water, follow these steps:

1 Remove the aerator at the nearest hot water faucet. This allows any debris in the tank or plumbing system to be washed out.

2 Turn the cold water supply back on.

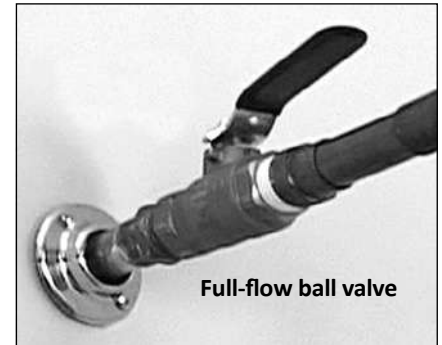


Figure 17 - Fully open the cold water supply valve.

3 Open a hot water faucet and allow the water to run until it flows with a full stream.

4 Let the water run full stream for three full minutes.

5 Close the hot water faucet and replace the aerator.

6 Check inlet and outlet connections and water pipes for leaks. Dry all pipes so that any drips or leaks will be apparent. Repair any leaks. Almost all leaks occur at connections and are not a tank leak.

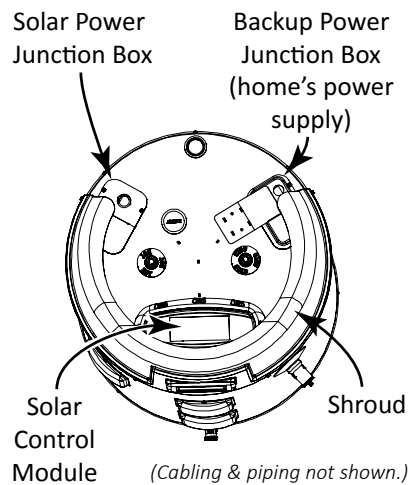
INSTALLATION



NOTICE: The tank must be completely empty of air and full of water before connecting electrical power to avoid “Dry Firing.” Dry Firing may result in the upper element burning out. This is a common installation mistake. After you make the water connections, but before you connect the electrical power, open a hot water faucet and let the water run full until all the air is removed. Let the “hot” water run full for three minutes or longer before connecting any electrical wires. A Dry Fired upper heating element is an installation error and is not covered under warranty.

If Dry Firing occurs, replace the upper heating element according to the instructions on page 23.

Figure 18 - Top view of water heater.



Step 9:

Make electrical connections

▲ WARNING! Working on an energized circuit can result in severe injury or death from electrical shock.

NOTICE: Do not turn electrical power on unless you are sure all of the air is out of the tank and the tank is completely full of water. If power is applied before the tank is completely full of water, the upper element can burn out (Dry Fire).

1 Be sure the electrical power that will go to the water heater is turned OFF at the circuit breaker panel (or remove the circuit’s fuses). **Electrical power must be off for both the solar and backup power systems.**

2 Using a non-contact circuit tester, check the wiring to make certain the power is OFF.

3 Check the water heater’s data plate and ensure that the home’s voltage, wiring size (ampacity) and circuit breaker rating and type are correct for this water heater. Refer to the wiring diagram located on the water heater for the correct electrical connections. Ensure that wire sizes, type, and connections comply with all applicable local codes. In the absence of local codes, follow NFPA-70 and the current edition of the National Electric Code (NEC).

4 Remove the covers from **both** electrical junction boxes on the top of the water heater. See “Solar Power Junction Box” and “Backup Power Junction Box” in Figure 18.

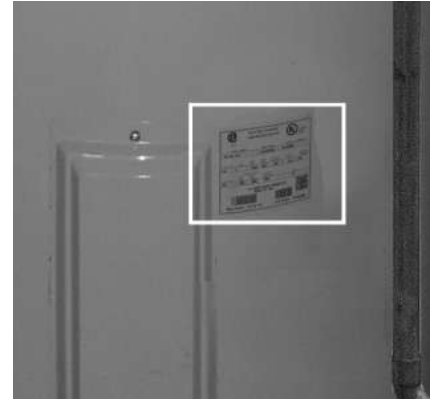


Figure 19 - The water heater’s electrical requirements can be determined from the data plate.

5 Install the wiring as follows:

- A. Install the solar power wiring at the solar power junction box (Figure 18).
- B. Install the home’s power supply at the backup power junction box (Figure 18).

In each case,

- connect the ground wire to the green ground screw.
- connect the two power wires to the water heater’s two power wires.

Use suitable twist-on wire connectors or other approved means to make the power connections.

Install all wiring in approved conduits (if required by local codes). Use UL listed or CSA approved strain reliefs to secure the electrical wiring to the water heater.



Figure 20 - Connecting the electrical wires. (Shroud not shown.)

INSTALLATION

- 6** Replace both junction box covers and secure with the screws provided.

▲ WARNING! Be sure both covers are secured to reduce the risk of fire and electric shock.

Step 10:

Set the Date and Time

Follow these steps to set the current date and time:

1. If the prompt does not display automatically, press **MENU** on the user interface, then scroll down.
2. Press **Clock**.
3. Press **Date**.
4. Press **+** or **-** to select the month, day, and year. Press **>** or **<** to move between each field.
5. Press **ACCEPT**, then press **BACK**.
6. Press **Time**. (If you default to the home screen, press **MENU**, **Clock**, then **Time**.)
7. Press **+** or **-** to select the hour, minutes, and AM/PM. Press **>** or **<** to move between each field.
8. Press **ACCEPT**, then press **BACK** to exit.

Step 11:

Adjust the Temperature

With the installation steps completed, you may adjust the water heater's temperature setting, if desired.

Set the temperature control to the desired temperature. The temperature control on this water heater has been factory set to approximately 120°F (48.9°C) to reduce the risk of scald injury. You may wish to set a higher

temperature to provide hot water for automatic dishwashers or laundry machines, to provide more hot water capacity, and to reduce bacterial growth. Higher tank temperatures (140° F) kill bacteria that cause a condition known as "smelly water" and can reduce the levels of bacteria that cause water-borne diseases.



Figure 21 - Adjust Thermostat Mixing Valves at each point-of-use 120°F or lower.

▲ WARNING! Higher temperatures increase the risk of scalding, but even at 120°F, hot water can scald (page 4).

How to adjust the water temperature set points:

The water temperature set points can be adjusted from 80°F (26.7°C) to 150°F (65.6°C). The temperature settings for the solar and backup systems are set separately.

To adjust the set temperature,

1. Press **MENU** on the user interface.
2. Press **Temperatures**.
3. Press one of these options:
 - **Solar Setpoint**
 - **Backup Setpoint**

NOTICE: *Top Temperature* and *Bottom Temperature* are display items only and cannot be adjusted. They display the water temperature at the top and bottom of the tank.

4. Press **+** or **-** to adjust the temperature.
5. Press **ACCEPT**.
6. Press **BACK** to exit.

Step 12:

Operation

The water heater is now ready for normal operation. To keep your water heater working safely and efficiently and extend its life, perform maintenance according to the schedule on page 22.

Vacation

To save energy, lower the set temperature if you plan to be gone for an extended time. See "Vacation" mode on page 20 for details.

▲ CAUTION! Hydrogen Gas Notice Hydrogen gas builds up in a hot water system when it is not used for a long period (two weeks or more). Hydrogen gas is extremely flammable. If the hot water system has not been used for two weeks or more, open a hot water faucet for several minutes at the kitchen sink before using any electrical appliances connected to the hot water system. Do not smoke or have an open flame or other ignition source near the faucet while it is open.

Need Assistance?

Call our Technical Assistance Hotline at **1-800-978-6327**.

We can help you with installation, operation, troubleshooting, or maintenance.

Before you call, write down the model and serial number from the water heater's data plate.

TROUBLESHOOTING

Error Codes

⚠ WARNING!

Electric Shock Hazard

Disconnect power before servicing. Do not remove the plastic guard from over wiring. Do not touch electrical wiring. Failure to do so can result in death or electrical shock.

DISPLAY SHOWS	INDICATES	SOLUTION
Backup Element Failure	The backup element has failed.	Replace the backup element.
Communication Failure	There was a communication error between the user interface module (UIM) and the solar control module.	Check the communication cable which runs from the solar control module to the UIM. Next, check the solar control module and UIM themselves. Replace as necessary.
Crystal Fault	The solar control module on top of the water heater has failed.	Replace the solar control module.
Dry Fire Detection	Dry fire detection fault (low water level in water heater's tank)	<ol style="list-style-type: none"> 1.) Turn off power to water heater. 2.) Open all hot water taps in the home and run water until it flows uninterrupted from all open hot water taps. 3.) Turn power to the water heater back on.
ECO Fault	Software has determined that the water temperature in the tank is too high.	The cause for overheating must be determined. Call Technical Assistance at 1-800-978-6327.
EEPROM Fault	The solar control module on top of the water heater has failed.	Replace the solar control module.
Inverter Fault	The water heater has not detected voltage from the solar system's inverter for a period of time.	Check the solar system's inverter. Replace if necessary.
Lower Sensor Failure	The lower temperature sensor has failed.	Call the technical assistance hotline at 1-800-978-6327.
Lower Solar Element Fail	The lower solar element has failed.	Replace the lower solar element. During failure, the water heater will continue to heat with the upper solar and backup elements. However, you must first turn the water heater's power off, then back on.
Upper Sensor Failure	The upper temperature sensor has failed.	Call Technical Assistance at 1-800-978-6327.
Upper Solar Element Fail	The upper solar element has failed.	Replace the upper solar element. During failure, the water heater will continue to heat with the lower solar and backup elements. However, you must first turn the water heater's power off, then back on.

TROUBLESHOOTING

⚠ WARNING! Working near an energized circuit can result in severe injury or death from electrical shock.

⚠ WARNING! When you are finished, be sure all covers are secured to reduce the risk of fire and electric shock.

No Hot Water

The most likely reasons for an electric water heater to produce NO hot water are:

- No electric power—a common problem with new installations
- Tripped Energy Cut Off (red button at upper element)
- The water heater's inlet and outlet connections are reversed (usually only in new installations)
- Broken upper thermistor (or wiring)
- A leak in the hot water side of the plumbing system that exceeds the water heater's heating capacity and makes it appear that the water heater is producing little to no hot water
- In most electric water heaters, a burned out upper element (dry fired). However, your Solar PV water heater is equipped with automatic dry fire protection.

Follow these steps to diagnose and correct common electrical problems:

1 Check the power supply to the water heater. No hot water is often caused by a problem with the home's electrical wiring or circuit breakers. You'll need a non-contact circuit tester. Follow these guidelines:

- Disconnect the power supply from the solar photovoltaic (PV) system.
- Locate the water heater's electric circuit breaker and turn it off (or remove the circuit's fuses).

NOTICE: There are two junction boxes. (See Figure 18 on page 14.) Perform these steps on each one. The solar PV system must be powered by sunlight in order to test the solar portion of the system.

- Locate the electrical junction boxes on top of the water heater and remove their covers (solar and backup). See Figure 18 on page 14.
- Identify the two power wires for each one. The power wires are blue/yellow for solar and black/red for backup power. The green or copper wire is the ground wire.



Figure 22 - Use a non-contact circuit tester to check for electrical power.

Follow these steps at both junction boxes:

- Turn the power back on (or install the fuses) and check the power on both incoming power wires using a non-contact circuit tester. **NOTICE: The solar PV system must be active and powered by sunlight.**
- Turn the power off and replace the cover on the electrical junction box.

If the water heater is not getting power, contact a qualified person to have your home's wiring or circuit breakers checked.

2 Check/Reset Energy Cut Off (ECO) Button.

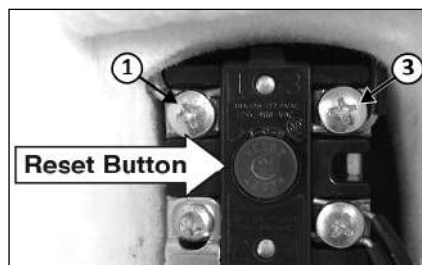


Figure 23 - Energy Cut Off (ECO) button
The Energy Cut Off (ECO) shuts off power to the water heater's elements if the temperature of the water in the tank gets too hot. If the ECO has tripped, you'll have no hot water. A tripped ECO

can usually be reset, but you should have a qualified person investigate the cause of the overheating and repair the problem. Do not turn the power back on until the cause of the overheating has been identified and repaired.

To check the Energy Cut Off (ECO)

- Turn off the power to the water heater.

⚠ WARNING! Working near an energized circuit can result in severe injury or death from electrical shock. Check power wires in the electrical junction boxes with a non-contact circuit tester to make sure power is off.

- Press the red ECO reset button (see photo above).
- The ECO was tripped if you hear a click when it is reset. In most cases, a tripped ECO indicates that the tank overheated due to a problem with one of the elements or thermistors. Have a qualified person check the upper and lower elements and thermistors and replace if necessary.
- The ECO was not tripped if you didn't hear a click. In that case, the upper thermistor should be checked by a qualified person.
- Replace the insulation and the upper access panel.
- Turn on the power to the water heater.

WARNING! Be sure all covers are secured to reduce the risk of fire and electric shock.

Insufficient Hot Water or Slow Hot Water Recovery

⚠ WARNING! Because of the increased risk from scalding, if you set the water heater's temperature setpoint higher than 120°F, Thermostatic Mixing Valves at each point-of-use are particularly important (page 4).

If the hot water is simply not warm enough, there are several possible causes:

TROUBLESHOOTING

- Faulty Thermostatic Mixing Valve in a faucet or shower control (check other faucets in the house for hot water)
- The temperature setpoint is set too low
- Water heater's capacity too small (or usage too high)
- Reversed plumbing connections or melted dip tube (usually found soon after new installation)
- Plumbing leak
- Lower heating element not working (or lower thermistor)
- Backup heating element not working
- Low supply voltage

Thermostatic Mixing Valves. If the hot water is simply not warm enough, make sure the faucet you are checking doesn't have a defective Thermostatic Mixing Valve. Many shower controls now have built-in mixing valves. If these devices fail, they can reduce the amount of hot water the shower or faucet delivers even though there is plenty of hot water in the tank. Always check the water temperature at several faucets to make sure the problem is not in a faucet or shower control.

Temperature setpoint is set too low. If the water temperature at several faucets is too cool, adjust the temperature setpoint according to the instructions in the Installation section of this manual.

Undersized water heater. If your water heater runs out of hot water too quickly, it may be too small for your needs. If the water heater is old, consider replacing it with a larger model. If the water heater is in good condition, you may be able to meet your family's hot water needs with the existing water heater by installing Thermostatic Mixing Valves at each point-of-use and then turning the temperature control to a higher temperature setting.

You can also reduce your home's hot water needs by washing clothes in cold water, installing flow restrictors on shower heads, repairing leaky faucets, and taking other conservation steps.

Reversed connections or melted dip tube. Check the hot and cold connections and make sure your home's hot

water pipe is connected to the hot water outlet on the water heater. Usually, reversed connections are found soon after the installation of a new unit. If copper pipes were soldered while they were attached to the water heater, the dip tube may have melted. The dip tube is a long plastic tube inside the tank attached to the cold water inlet. If the dip tube has melted, it can be replaced by removing the cold water inlet connection, removing the old dip tube and installing a new one.

Plumbing leak. Even a small leak in the hot water side of the home's plumbing system can make it appear that the water heater is producing little to no hot water. Locate and repair the leak.

Lower heating element not working. If the lower heating element (or, more rarely, the lower thermistor) is not working, you will have some hot water but not as much as before. Because the lower element does most of the work, the lower element usually wears out before the upper element. Replace the lower element and/or thermistor, if necessary.

Backup heating element not working. If the backup heating element is not working, you may have warm water, but it may not seem hot enough. This could happen if the backup element is not working and solar energy is too limited to heat the water quickly enough.

Temperature Too High

If the water temperature is too hot:

- Install or adjust the Thermostatic Mixing Valves for each point-of-use (see manufacturer's instructions), or
- Adjust the temperature setting on the water heater.

A nonfunctioning thermistor or a shorted heating element can cause extremely hot water. If the Temperature and Pressure Relief Valve (T&P Valve) releases large amounts of very

hot water, it is likely due to a shorted heating element, or more rarely, a nonfunctioning thermistor. Also less likely, it may be due to a thermistor not fitting snugly against the tank, or the doors may have been left off, allowing cold air to reach the thermistors. Very high water temperatures can also cause the Energy Cut Off (ECO) to trip (see **page 17**). Turn power off until this problem is fixed.

Low Water Pressure

Check both the cold and hot water at a sink to determine if the lower pressure is only on the hot water side. If both hot and cold faucets have low pressure, call your local water utility. If the low pressure is only on the hot water side, the primary causes of this are:

- Melted heat traps or dip tube. Soldering copper pipes while they are connected to the water heater can melt the heat traps inside the hot and cold water connections or the dip tube (cold water side). Melted heat traps or a melted dip tube can restrict the flow of hot water. If that's the case, replace the heat traps or dip tube.
- Partially closed supply valve. Open the water heater's supply valve fully.

TROUBLESHOOTING

Drips from T&P Relief Valve Discharge Pipe

A small amount of water dripping from the Temperature and Pressure (T&P) Relief Valve usually means the home's water pressure is too high or you need a properly sized and pressurized Thermal Expansion Tank. Refer to Step 1 in the Installation section of this manual for more information. A large amount of hot water coming from the T&P discharge pipe may be due to the tank overheating.

▲ WARNING! Do not cap or plug the T&P relief valve or discharge pipe, and do not operate the water heater without a functioning T&P Relief Valve - this could cause an explosion.

Water pressure too high. High water pressure can cause the T&P Relief Valve to drip. Install a Pressure Reducing Valve (PRV) on the main cold water supply line. Adjust the PRV to between 50 and 60 psi.

Thermal Expansion Tank. Install a Thermal Expansion Tank. If a Thermal Expansion Tank is already installed and the T&P Relief Valve discharge pipe drips, the Thermal Expansion Tank may be pressurized to the wrong pressure or the internal bladder may be defective. Refer to the instructions that came with the Thermal Expansion Tank for more information.

Debris. In rare cases, debris can stick inside the T&P Relief Valve preventing the valve from seating fully. In that case, the T&P Relief Valve discharge pipe will drip. You may be able to clear debris from the T&P Relief Valve by manually operating the valve, allowing small quantities of water to flush out the debris. See the label on the T&P Relief Valve for instructions.

If the water pressure is between 50 and 60 psi, a Thermal Expansion Tank is installed and properly pressurized, and the valve has been cleared of any debris, and it still drips, the valve may be broken—have a qualified person replace the T&P relief valve.

Water Odor

Harmless bacteria normally present in tap water can multiply in water heaters and give off a “rotten egg” smell. Although eliminating the bacteria that causes “smelly water” with a Chlorination system is the only sure treatment, in some cases, the standard anode rod that came with your water heater can be replaced with a special zinc anode rod which may help reduce or eliminate the odor. Contact a qualified person.

NOTE: To protect the tank, an anode rod must be installed in the water heater at all times or the warranty is void.

In cases where the “rotten egg” smell is pronounced, you can raise the tank temperature to 140°F in order to reduce bacteria growth in the tank.

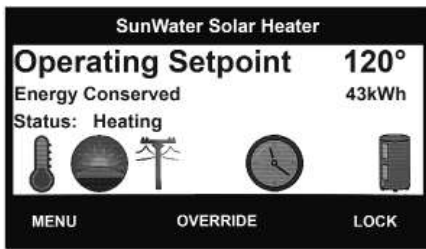
▲ WARNING! Higher temperatures increase the risk of scalding. If you set the temperature setpoint higher than 120°F, Thermostatic Mixing Valves at each point-of-use are particularly important (page 4).

USER INTERFACE






Home Screen Display

The home screen on the user interface module (UIM) shows the water heater's current status. See Figure 24 and the table that follows it.

Figure 24 - UIM home screen (example)



UIM Home Screen Descriptions. See Figure 24.	
Operating Setpoint	Displays the current temperature setting.
Energy Conserved	Displays how much energy the water heater has saved. See ““Energy Conserved” Display Options” later in this section.
Status	Displays the water heater's current status.
MENU	Press MENU to open the options list. See “Menu” for a description of each option.
OVERRIDE	Allows the user to override an energy saving schedule that is currently running.
LOCK	Allows the user to lock the system's controls. To lock or unlock, press and hold LOCK for approximately 5 seconds.

UIM Home Screen Descriptions. See Figure 24.	
	Representation of water temperature in the tank (low or high).
	Indicates the status of the solar system. If the sun's rays are moving, the solar system is heating water.
	If this icon is displayed, water is being heated by the backup system.
	If this icon is displayed, the water heater is running on a programmed energy saving schedule. (It's heating with solar energy only).
	Indicates the ratio of solar vs. electric energy usage. <ul style="list-style-type: none"> • Green = solar • No color = backup element

Menu

There are 12 options available when you touch MENU on the user interface's home screen. These options are:

- **Temperatures**
Use to set the water heater's operating temperature. See “Adjust the Temperature” on page 15.
- **Mode**
Use to change the water heater's operating mode. See “Mode” later in this section.
- **Energy Saving Schedule**
Use to set an energy saving schedule. During scheduled times, water is heated with solar power only. See “Setting an Energy Saving Schedule” on page 21.

- **Status**
Displays the status of the water heater, elements, and solar power input. *Display only.*
- **Display Settings**
Use to adjust the UIM display or change the temperature units (°F/°C). It may also be used to edit the “Energy Conserved” display options. See ““Energy Conserved” Display Options” on page 21.
- **Information**
Displays software versions. *Display only.*
- **Current Fault**
Displays the current fault if one has occurred. *Display only.*
- **Fault History**
Lists faults in order if any have occurred. *Display only.*
- **Fault Occurrence**
Lists the number of occurrences for each fault type. *Display only.*
- **Clock**
Use to set the current date and time. See “Set the Date and Time” on page 15.
- **Water Heater Settings**
Service use only. Used to set Time Base Settings and Inverter Fault Time.
- **Restore Defaults**
Use to restore factory defaults.

USER INTERFACE

Mode

This menu item allows you to choose between four operating modes:

- **Vacation**
Allows the water to heat up to the solar temperature set point. If solar energy is limited, backup power will maintain a water temperature of approximately 45°F (7.2°C). See *the hydrogen gas notice on page 15*.
- **Energy Saving**
Allows the system to run energy saving schedules (solar heating only). You must select this mode in order to run energy saving schedules.
- **Convenience**
Allows the system to heat water primarily with solar elements. The backup element works along with the upper solar element as necessary. Faster recovery than Standard mode, but less energy efficient.
- **Standard.**
Allows the system to heat water primarily with solar elements. The backup element works only when solar power is limited.

To change the operating mode,

1. Press **MENU** on the user interface.
2. Press **Mode**.
3. Press **Mode** again (top, left-hand corner).
4. Press + or – to scroll through the operating modes. Select your choice by pressing it.
5. Press **ACCEPT**, then press **BACK** to exit.

Setting an Energy Saving Schedule

During an energy saving schedule, water is heated only with solar energy.

NOTICE:

- The water heater will only run an energy saving schedule when it is set to Energy Saving mode. See “Mode.”
- The date and time must be set before you can create an energy saving schedule. See “Set the Date and Time”, page 15.
- The backup element will not operate during an energy saving schedule.

Follow these steps to set an energy saving schedule:

1. Press **MENU** on the user interface.
2. Press **Energy Saving Schedule**.
3. Select a day from the list (Monday through Sunday) by touching it.

NOTICE: Each day allows up to five schedules. These schedules are called “Durations” on the screen.

4. Select an unused “Duration” in the list by touching it.
5. Press + or – to set the start hour. Press **>** when you are finished.
6. Press + or – to set the start minutes. Press **>** when you are finished.
7. Press + or – to set AM or PM. Press **>** when you are finished.
8. Repeat to set the end time.
9. Press **ACCEPT**, then press **BACK** to exit.

“Energy Conserved” Display Options

The user interface displays the amount of energy saved through the use of solar power. (See “Energy Conserved” in Figure 24, page 20.)

To change the “Energy Conserved” option on the home screen,

1. Press **MENU** on the user interface.
2. Press **Display Settings**.
3. Press **Energy Conserved**.
4. Press + or – to scroll through each option:
 - **MLS** (miles driven)
 - **TRS** (number of trees saved)
 - **TNS** (tons of CO₂ prevented)
 - **KWH** (kilowatts saved)
5. Stop on your selection.
6. Press **ACCEPT**.
7. Press **BACK** to exit.

Your selection will now appear on the home screen.

MAINTENANCE

Routine Maintenance

Routine maintenance will help your water heater last longer and work better. If you can't perform these routine maintenance tasks yourself, contact a qualified person.

Water Heater Maintenance

After the first six months, drain and flush the water heater and inspect the anode rod. Depending on the hardness of your water, repeat this process at least annually, or more frequently if needed. From time to time, you may need to replace a heating element or a thermistor. All three maintenance tasks are described below.

Draining and Flushing the Water Heater

Tap water contains minerals that can form lime deposits on heating elements or sediment in the bottom of the tank. The amount of lime deposits or sediment depends on the hardness of your tap water. The rate at which sediment builds up depends on water quality and hardness in your area, the temperature settings, and other variables. We recommend draining and flushing the water heater after the first six months of operation to determine the amount of sediment build up. Draining sediment extends the life of the tank, heating elements, and drain valves.

- In areas with very hard water, remove and check the heating elements whenever you drain the tank. If you have heavy lime deposits on heating elements, you will need to replace them more often.
- Sediment may form large masses that can prevent the tank from draining. Have a qualified person use a de-liming agent suitable for potable water to remove the sediment buildup.
- In most cases, it is easier and

cheaper to replace lime-encrusted elements than trying to remove heavy lime deposits.

To drain and flush the tank:

- 1 Disconnect (TURN OFF) all power to the water heater (solar and backup).



Figure 25 - Circuit Breaker

- 2 Open a hot water faucet and let the hot water run until it is cool.



Figure 26 - Water Faucet

▲ WARNING! Be sure the water runs cool before draining the tank to reduce the risk of scalding.

- 3 Connect a garden hose to the drain valve and place the other end of the hose in a drain, outside, or in buckets.
- 4 Turn the cold water supply valve OFF.
- 5 Open the drain valve on the water heater.



Figure 27 - Drain Valve

- 6 Open a hot water faucet to help the water in the tank drain faster. **NOTICE: DO NOT** turn electrical power back on unless

the tank is completely full of water.

- 7 Remove and inspect the anode rod (see Repair Parts Illustration on back cover for location of the anode rod). Replace the anode rod if it is depleted. Turn power off. Run hot water until it's cool. Turn cold water supply valve off. Open a hot water faucet to depressurize tank. Locate and remove the black plastic cover marked "Anode" Use a "key hole" saw or similar tool to remove the foam insulation covering the anode rod. Once the anode rod is exposed, use a 1 1/16" socket wrench with an extension to remove it. Inspect the anode rod and replace if depleted. Apply thread sealant tape or pipe joint compound and reinstall the anode rod tightly. It is not necessary to replace the foam removed to access the anode. Turn cold water supply valve on. When hot water runs full, close hot water faucet. Check for leaks and repair if necessary. Turn power on.

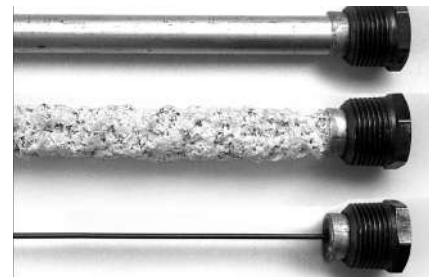


Figure 28 - Anode Rods from new (top) to partially depleted (middle) to fully depleted stage (bottom)

Anode Rod. The anode rod is a sacrificial metal rod that helps reduce corrosion and premature failure (leaks) in the tank. The anode rod is a consumable item. Inspect the anode rod after the first six months of operation when you drain and flush the tank. Replace the anode rod if it is substantially worn out or depleted. Thereafter, inspect the anode rod annually or more frequently if needed. If you use a water softener, your anode rod will deplete faster than normal. Inspect

MAINTENANCE

the anode rod more frequently, replacing the anode rod as needed. Obtain new anode rods from your local plumbing supplier or have a qualified person replace it. (Anode rods are a consumable item and are not covered under warranty).

8 If sediment was present when the tank was drained, flush the tank by opening the cold water supply valve and letting the water run until no more sediment drains from the tank. Close the drain valve when you are done.

NOTICE: Do not turn power back on until the tank is completely full of water. For complete instructions on filling the tank, follow “Verify connections and completely fill tank” on page 13.

9 Refill the tank by opening the cold water supply valve. Make sure a hot water faucet is open and the drain valve is closed. Allow the hot water to run full for at least three minutes to make sure the tank has all the air removed and is completely full of water. Failure to perform this step can cause the upper heating element to burn out. Once you are certain the tank is completely full of water, close the hot water faucet.

10 Restore power to the water heater. It may take several hours for the tank to heat up.

Replacing the Heating Element

⚠ WARNING! Working on an energized circuit can result in severe injury or death from electrical shock. Turn power off. Check wires with a non-contact circuit tester to make sure power is off. When you are finished, be sure all covers are secured to reduce the risk of fire and electric shock.

If you are not comfortable replacing a heating element yourself, have this work done by a qualified person. To replace the heating element, you'll need

the following tools and supplies:



Figure 29 - Non-Contact Circuit Tester

- Always turn power OFF and check the power wires with a non-contact circuit tester before working on the water heater.



Figure 30 - Heating Element (with gasket)

- Check your water heater's data plate for the correct wattage and voltage. Heating elements are available through your local plumbing supplier.



Figure 31 - Element Wrench

- Some regular sockets (1-1/2 inch) may work, but regular sockets are often beveled and may slip. Inexpensive element wrenches are available at your local plumbing supplier.
- Garden hose to drain the tank
- Hand dish washing soap to lubricate the gasket
- A clean cloth to clean the threaded opening
- A flat blade and a Phillips screwdriver

Steps for Replacing a Heating Element:

- 1** Turn the power OFF at the circuit breaker or remove fuses.
NOTICE: There are two junction boxes. (See Figure 18, page 14.) For safety reasons, turn off power for both the solar and backup systems.



Figure 32 - Circuit Breaker

- 2** Open **both** electrical junction boxes on top of the water heater. Using a non-contact circuit tester, check the power wires in **each** box to make certain the power is OFF. (Be sure to replace the covers when you are finished.)



Figure 33 - Non-Contact Circuit Tester

- 3** Open a hot water faucet and let the hot water run until it is cool.



Figure 34 - Water Faucet

⚠ WARNING! Be sure the water runs cool before draining the tank to reduce the risk of scalding.

- 4** Connect a garden hose to the drain valve and place the other end of the hose in a drain or

MAINTENANCE

outside (or use buckets). Turn OFF the cold water valve that supplies the water heater. Open the drain valve on the water heater. Opening a hot water faucet will help the tank drain faster.

- 5 Remove the access panel on the water heater, and then fold back the insulation and remove the plastic element cover.



Figure 35 - Access Panel

- 6 With the tank drained and power off, remove the power wires from the element you intend to replace.
- 7 Remove the bad element using an element wrench.
- 8 Make sure the new element is the correct replacement by referring to the water heater's data plate for voltage and wattage information.
- 9 Clean the threads in the tank opening with a rag. Insert the new element equipped with a rubber gasket. NOTE: Use a drop of hand dish washing liquid to lubricate the gasket to help avoid damaging the gasket as it is being tightened. Tighten with an element wrench.

NOTICE: Do not turn power back on until the tank is completely full of water. For complete instructions on filling the tank, follow Step 8 in the Installation section.

- 10 Refill the tank by opening the cold water supply valve. Make sure a hot water faucet is

open and the drain valve is closed. Allow the hot water to run full for at least three minutes to make sure the tank has all the air removed and is completely full of water. Failure to perform this step can cause the upper heating element to burn out. Once you are certain the tank is completely full of water, close the hot water faucet.



Figure 36 - Drain Valve

- 11 Check the newly installed element for leaks. If a leak is present, tighten the element until the leak stops. If you cannot stop the leak, drain the tank and remove the element. Inspect the gasket for damage. If the gasket is damaged, replace the gasket and re-install the element.
- 12 Once the element is successfully installed and there are no leaks, replace the power wires, element cover, insulation, and access panel. Make sure all wire connections are tight. Replace both electrical junction box covers.
- 13 Restore power to the water heater (solar and backup). It may take two hours for the tank to heat up.

T&P Relief Valve Maintenance

Read and follow the operating and annual maintenance instructions provided by the manufacturer of the T&P Relief Valve (yellow label attached to T&P Relief Valve). Minerals in the water can form deposits that cause the valve to stick or create blocked passages, making the T&P Relief Valve inoperative. Follow these guidelines:

- At least annually, operate the T&P Relief Valve manually to ensure the waterways are clear and the valve mechanism moves freely (above). Before operating the valve manually, check that it will discharge in a place for secure disposal. If water does not flow freely from the end of the discharge pipe, turn OFF the power to the water heater. Call a qualified person to determine the cause.

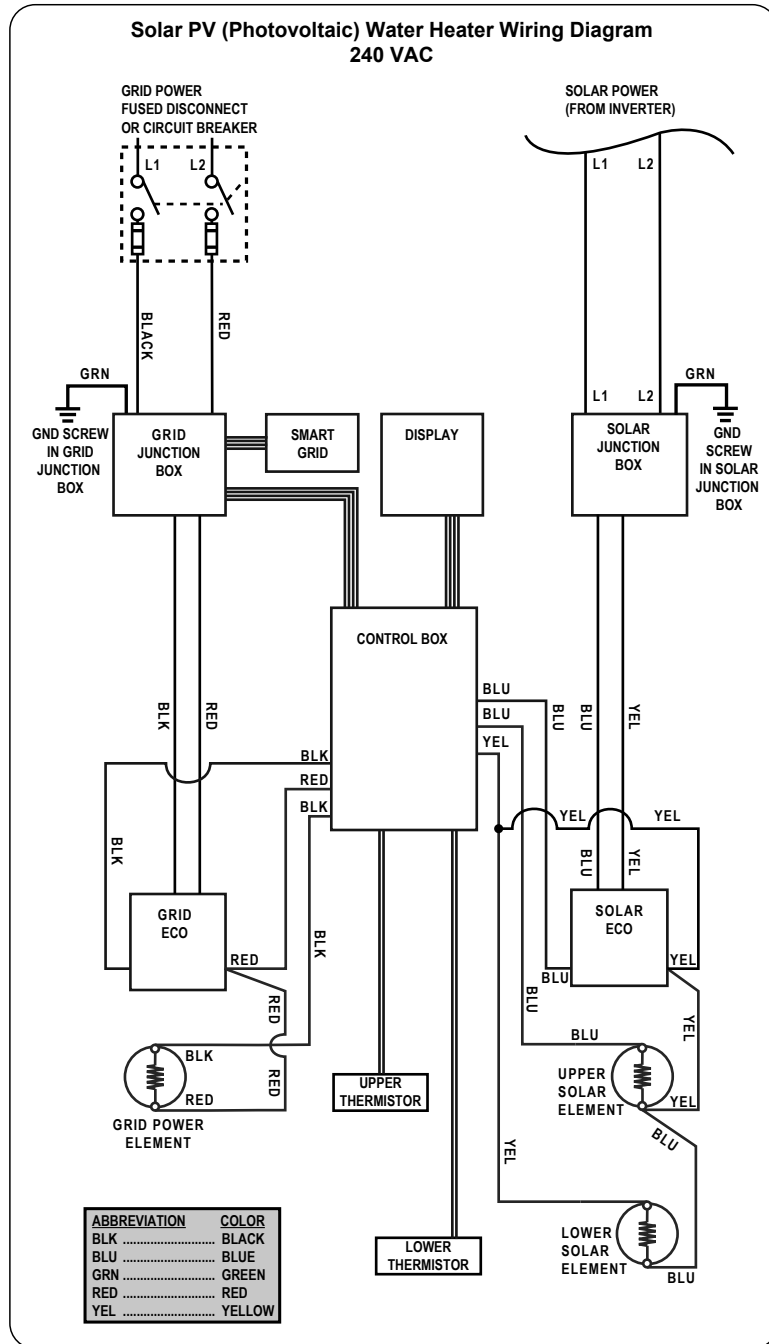
▲ WARNING! Hot water will be released. Before operating the T&P relief valve manually, check that it will discharge in a safe place. If water does not flow freely from the end of the discharge pipe, turn the power to the water heater OFF. Call a qualified person to determine the cause.



Figure 37 - T&P Relief Valve

- At least every five years, have a qualified person inspect the T&P Relief Valve and discharge pipe. Damage caused by corrosive water conditions, mineral deposits, or other problems can only be determined when a qualified person removes and inspects the valve and its components.
- Note that a dripping T&P Relief Valve is usually caused by the home's water pressure being too high or the lack of a Thermal Expansion Tank. If your T&P Relief Valve drips, see page 19.

WIRING DIAGRAM



NOTES

NOTES

REPAIR PARTS

Key No.	Part Description
1	SOLAR CONTROL MODULE
2	DISPLAY/USER INTERFACE
3	TEMPERATURE/PRESSURE RELIEF VALVE (T&P)
4	ECO (ENERGY CUT OFF)
5	BRACKET
6	ELEMENT GASKET
7a	ELEMENT (SOLAR)
7b	ELEMENT (BACKUP)
8a	TERMINAL COVER
8b	ELEMENT CAP
9	OUTER DOOR
10	DRAIN VALVE
11	ANODE
12	DIP TUBE
13	SHROUD
14	DRAIN PAN w/SIDE DRAIN

* If Applicable
 ** Not Illustrated

Repair parts may be ordered through your plumber, local distributor, your local plumbing supplier, or by calling **1-800-978-6327**. When ordering repair parts always give the following information:

1. Model and serial number.
2. Item number and part description.

