



# *Direct Fired Solar Supplement*

**Installation**

**Start-Up**

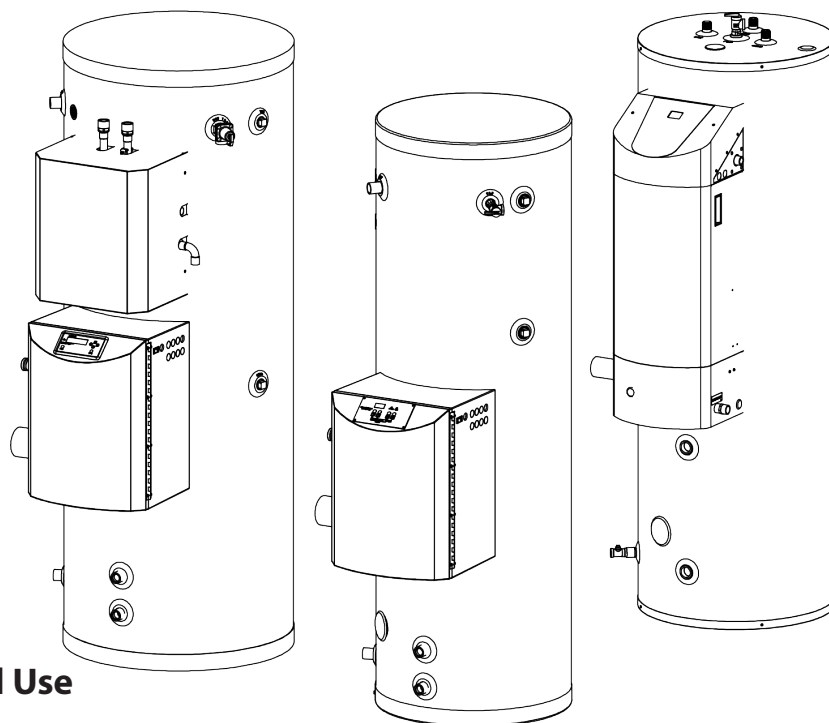
**Maintenance**

**Parts**

**Warranty**

**For Residential and Commercial Use**

**Phoenix and Versa Hydro Solar Models**



## **⚠ DANGER**

This manual must only be used by a qualified installer / service technician. Read all instructions in this manual before installing. Perform steps in the given order. Failure to do so could result in substantial property damage, severe personal injury, or death.

## **⚠ WARNING**

Improper installation, adjustment, alteration, service, or maintenance could void product warranty and cause property damage, severe personal injury, or death.

California Proposition 65 Warning: This product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

## **NOTICE**

HTP reserves the right to make product changes or updates without notice and will not be held liable for typographical errors in literature.

The surfaces of these products contacted by potable (consumable) water contain less than 0.25% lead by weight as required by the Safe Drinking Water Act, Section 1417.

**NOTE TO CONSUMER: PLEASE KEEP ALL INSTRUCTIONS FOR FUTURE REFERENCE.**

## SPECIAL ATTENTION BOXES

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important product information.

### DANGER

**DANGER** indicates an imminently hazardous situation which, if not avoided, will result in serious personal injury or death.

### WARNING

**WARNING** indicates a potentially hazardous situation which, if not avoided, could result in personal injury or death.

### CAUTION

**CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor personal injury.

### CAUTION

**CAUTION used without the safety alert symbol** indicates a potentially hazardous situation which, if not avoided, may result in property damage.

### NOTICE

**NOTICE** is used to address practices not related to personal injury.

## Foreword

This manual is intended to be used in conjunction with other literature provided with the Solar Water Heater. This includes all related control information. It is important that this manual, all other documents included with this system, and additional publications, such as *Solar Water Heating System Design and Installation Guidelines, SRCC OG-300*, be reviewed in their entirety before beginning any work.

Installation should be made in accordance with the regulations of the Authority Having Jurisdiction, local code authorities, and utility companies which pertain to this type of water heating equipment.

Authority Having Jurisdiction (AHJ) – The Authority Having Jurisdiction may be a federal, state, local government, or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department or health department, building official or electrical inspector, or others having statutory authority. In some circumstances, the property owner of his/her agent assumes the role, and at government installations, the commanding officer or departmental official may be the AHJ.

**NOTE:** HTP reserves the right to modify product technical specifications and components without prior notice.

## For the Installer

### WARNING

For your safety, please read through this manual carefully before installation to minimize the risk of fire, property damage, personal injury, or death. Ensure the solar hot water system is properly installed in accordance with this manual before use.

INSTALLATION OR SERVICE IS REQUIRED TO BE PERFORMED BY LICENSED PROFESSIONALS WHERE SOLAR, PLUMBING, AND ELECTRICAL WORK IS REQUIRED.

The installer should be guided by the instructions furnished with the tank, as well as local codes and utility company requirements. Preference should be given to codes and requirements where they differ from the furnished instructions. Always use the latest edition of codes.

Additional publications which should guide the installer include:

Local, state, provincial, and national codes, laws, regulations, and ordinances.

*Solar Water Heating System Design and Installation Guidelines, SRCC OG-300*, available from Solar Rating & Certification Corporation, 400 High Point Drive, Suite 400, Cocoa, FL 32926-6630, [www.solar-rating.org](http://www.solar-rating.org).

The latest version of the *National Electrical Code, NFPA No. 70*.

In Canada refer to *Canadian Electrical Code C 22.1*, from Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.

**NOTE:** The gas manifold and controls met safe lighting and other performance criteria when undergoing tests specified by the ANSI Z21.10.3 standard - latest edition.

### For Your Records

#### Write the Product Model and Serial Numbers:

Model # \_\_\_\_\_

Serial # \_\_\_\_\_

**These numbers are listed on the product ratings label.  
Keep this manual and information for future reference.**

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## Introduction

Your water heater has an internal heat exchanger for use with solar collectors. When there is not sufficient solar energy, the water heater utilizes a gas-fired backup system to provide hot water. (Refer to Applications in this manual for piping examples.)

Your system uses a circulation pump to circulate heat transfer fluid (HTF) throughout a closed loop system. Closed loop propylene glycol systems provide additional freeze protection for the solar components.


**NOTE:** System performance and efficiency varies with factors such as: household hot water load, ambient air temperature, collector/roof pitch, collector orientation, and seasonal intensity.

Job site conditions will require your installation contractor to supply some or all of the following:

- Plumbing connections
- Piping and insulation
- Valves between your backup water system and the solar system

**NOTE:** Failure to follow the procedures and instructions in this manual WILL VOID the warranty.

**Part 1 - General Safety Information**

 <b>WARNING</b>
<b>Installer</b> - Read all instructions in this manual before installing. Perform steps in the given order.
<b>User</b> - This manual is for use only by a qualified heating installer / service technician. Have this water heater serviced / inspected annually by a qualified service technician.
Failure to adhere to these guidelines can result in substantial property damage, severe personal injury, or death.
<b>NOTE:</b> Obey all local codes. Obtain all applicable permits before installing the water heater.
<b>NOTE:</b> Install all system components and piping in such a manner that does not reduce the performance of any fire rated assembly.
<b>DO NOT USE THIS WATER HEATER IF ANY PART HAS BEEN SUBMERGED IN WATER.</b> Immediately call a qualified service technician. The water heater <b>MUST BE</b> replaced if it has been submerged. Attempting to operate a water heater that has been submerged could create numerous harmful conditions, such as a potential gas leakage causing a fire and/or explosion, or the release of mold, bacteria, or other harmful particulates into the air. Operating a previously submerged water heater could result in property damage, severe personal injury, or death.
<b>NOTE:</b> Water heater damage due to flood or submersion is considered an Act of God, and IS NOT covered under product warranty.
<b>NOTE:</b> If the solar water heater is exposed to the following, do not operate. Immediately call a qualified service technician. 1. Fire 2. Damage 3. Submersion in Water
Failure to adhere to these guidelines can result in substantial property damage, severe personal injury, or death.
Only use this water heater as intended and described in this installation manual. Any use other than described will void warranty and may lead to fire, property damage, personal injury, or death.
<b>CAUTION</b>
Improper installation or use may result in property damage. Such damages ARE NOT covered by warranty.
<b>NOTICE</b>
<b>UNCRATING THE WATER HEATER</b> - Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

**ALL PIPING AND PLUMBING CONNECTIONS SHOULD BE MADE WITH COPPER PIPE ONLY.** No less than ¾" I.D. copper tube of the type meeting local codes must be used for piping. Pipe runs must be solidly attached with proper clamping methods. Soldered connections should be secured with 95/5 lead-free solder. Use only pipe rated for 250°F minimum on both the collector return and supply piping.

**A. When Servicing the Solar Water Heater**

To avoid electric shock, disconnect electrical supply before performing maintenance.

To avoid severe burns, allow solar collector and associated equipment to cool before servicing.

**B. Local Installation Regulations**

Installation of this solar water heater may be governed by individual local rules and regulations, which must be observed. Always use the latest edition of codes. The installation, adjustment, service, and maintenance of the solar water heater must be done by a licensed professional who is qualified and experienced in the installation, service, and maintenance of solar hot water heaters.

**C. Chemical Vapor Corrosion**

Products to Avoid	Areas Likely to Have Contaminants
Spray cans containing fluorocarbons	Dry cleaning / laundry areas and establishments
Permanent wave solutions	Swimming pools
Chlorinated waxes / cleaners	Metal fabrication plants
Chlorine-based swimming pool chemicals	Beauty shops
Calcium chloride used for thawing	Refrigeration repair shops
Sodium chloride used for water softening	Photo processing plants
Refrigerant leaks	Auto body shops
Paint or varnish removers	Plastic manufacturing plants
Hydrochloric or Muriatic acid	Furniture refinishing areas and establishments
Cements and glues	New building construction
Antistatic fabric softeners used in clothes dryers	Remodeling areas
Chlorine-type bleaches, laundry detergents, and cleaning solvents	Garages and workshops
Adhesives used to fasten building products	

**Table 1 - Products and Areas Likely to Have Contaminants**

**NOTE: DAMAGE TO THE WATER HEATER, COLLECTOR, OR RELATED COMPONENTS CAUSED BY EXPOSURE TO CORROSIVE VAPORS IS NOT COVERED BY WARRANTY.** (Refer to the limited warranty for complete terms and conditions.)

**D. Insulation Blankets**

For installation of insulation blankets, refer to *Solar Water Heating System Design and Installation Guidelines, SRCC OG-300*.

## E. Water Temperature Adjustment

An ASSE 1017 rated mixing valve to avoid severe burns or death from scalding temperatures IS REQUIRED PER SRCC OG-300.

Approximate Time / Temperature Relationships in Scalds	
120°F	More than 5 minutes
125°F	1 1/2 to 2 minutes
130°F	About 30 seconds
135°F	About 10 seconds
140°F	Less than 5 seconds
145°F	Less than 3 seconds
150°F	About 1 1/2 seconds
155°F	About 1 second

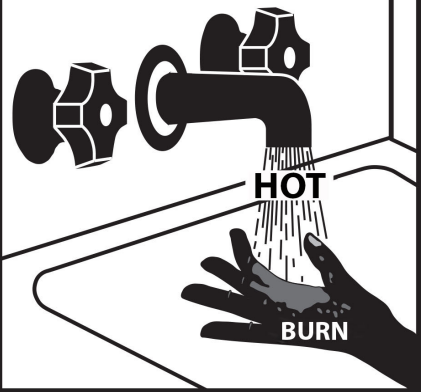
**Table 2 - Approximate Time / Temperature Relationships in Scalds**

**WARNING**

Households with small children, disabled, or elderly persons may require a 120°F or lower temperature setting to prevent severe personal injury or death due to scalding.

In addition, to prevent scalding, the high temperature of the potable water must be limited using an ASSE 1016 tempering valve. This valve is usually located between the hot water storage tank and faucets in bathrooms, kitchens, etc. Tempering valves are mandatory under most codes and usually set to a maximum of 120°F. Tempering valves must be rated for high-temperature solar use.

**! DANGER**



Water temperature over 125°F can cause severe burns instantly or death from scalds. Children, disabled and elderly are at highest risk of being scalded. See instruction manual before setting temperature at water heater. Feel water before bathing or showering. Temperature limiting valves are available, see manual.

## F. Freeze Protection

**NOTE:** Consider piping and installation when determining water heater location. Place the water heater in a location not prone to freezing.

**CAUTION**

Failure of the water heater, solar system, or components due to freeze related damage IS NOT covered by product warranty.

In order to meet health and safety regulations, solar system antifreeze fluid should be food grade polypropylene glycol, FDA rated as "generally recognized as safe" (GRAS). Using proper concentrations

of glycol, solar systems can be operated at ambient temperatures as low as -60°F. Freeze tolerance limits are based upon an assumed set of environmental conditions. Refer to the specification sheet included with the glycol for recommended concentrations. A glycol / potable water mix must not exceed 50%, unless the manufacture specifies that a different ratio is recommended for use with solar water heaters. Glycol may need to be changed periodically (every 3-5 years) to prevent it from becoming acidic; please refer to the guidelines provided by the glycol manufacturer regarding replacement.

**NOTE:** The use of glycol not recognized as GRAS is allowed in double wall heat exchanger models ONLY.

## Part 2 - Important Information

### A. Scope of this Manual

This manual pertains only to the installation and operation of the solar water heater. Details for the installation, operation, and maintenance of the complete solar water heating system, including, but not limited to: the solar collector(s), boiler, pump, system controller, valves, and other plumbing components, should be provided separately by their respective manufacturers.

**NOTE:** This manual is primarily a reference document for authorized installation individuals, as the solar water heater is not permitted to be installed by non-authorized persons.

### B. Local Standards and Authorized Persons

Installation must be completed in accordance with local standards and regulations.

Installation must also be completed by a qualified tradesperson who holds relevant industry licenses or certificates. The term "authorized person(s)" used throughout this document refers to a suitably qualified professional. Unless otherwise specified, no part of the solar water heater may be inspected, repaired, or maintained by anybody other than an authorized person.

### C. Terminology

Solar terminology differs from region to region. To avoid confusion, please note the following:

**Supply** – The plumbing line running from the outlet of the collector to the tank (or heat exchanger).

**Return** – The plumbing line running from the tank (or heat exchanger) to the inlet of the collector. This line incorporates the circulation pump.

### D. Locating the Solar Water Heater

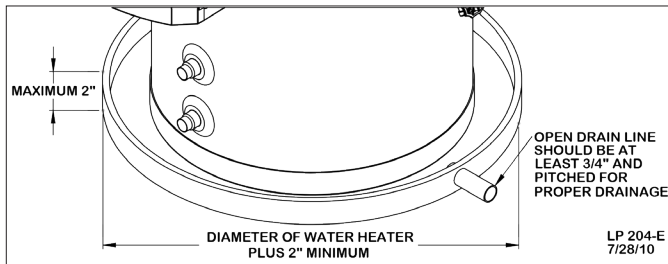
This water heater is certified for indoor use only. **DO NOT INSTALL OUTDOORS.** Outdoor installations ARE NOT covered by warranty. To minimize expense, choose a location for the water heater as centralized to the domestic piping system and near the solar collectors as possible. Also, locate the water heater and domestic water piping where it will not be exposed to freezing temperatures. All piping should be insulated to protect against freezing and minimize heat loss. Additionally, place the water heater so that the drain, controls, and inlets/outlets are easily accessible.

**NOTE:** If you do not provide the minimum clearances shown in Figures 4 - 5, it might not be possible to service the water heater without removing it from the space.

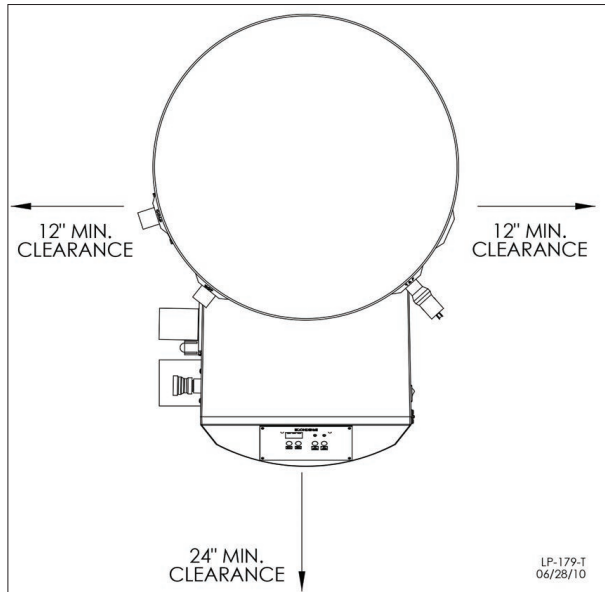
**NOTE:** A combustible door or removable panel is acceptable front clearance.

The solar water heater should also be installed in a place where T&P discharge or a leak will not result in damage to the surrounding area. Install a 2" high drain pan with a minimum of ¾" drain line to prevent water damage if leakage should occur. See Figure 3.

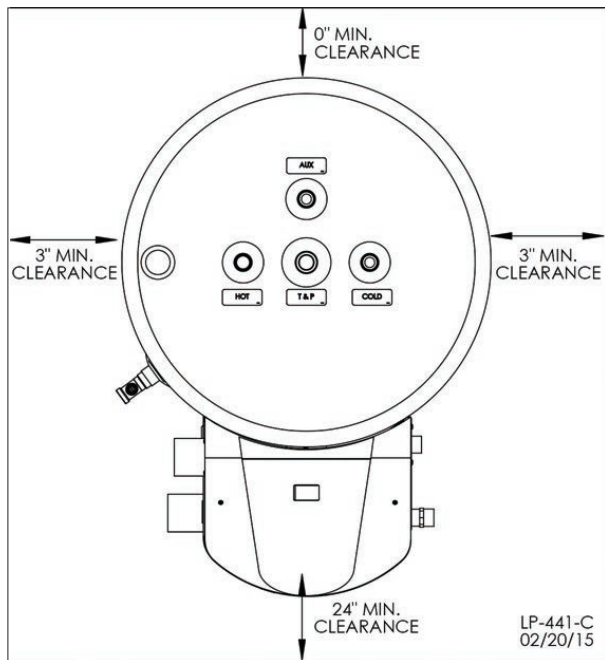




**Figure 1 - Drain Pan Dimensions Service Clearances**



**Figure 2 - 160 and 199kBTU Model Service Clearances**



**Figure 3 - 76kBTU Model Service Clearances**

## **WARNING**

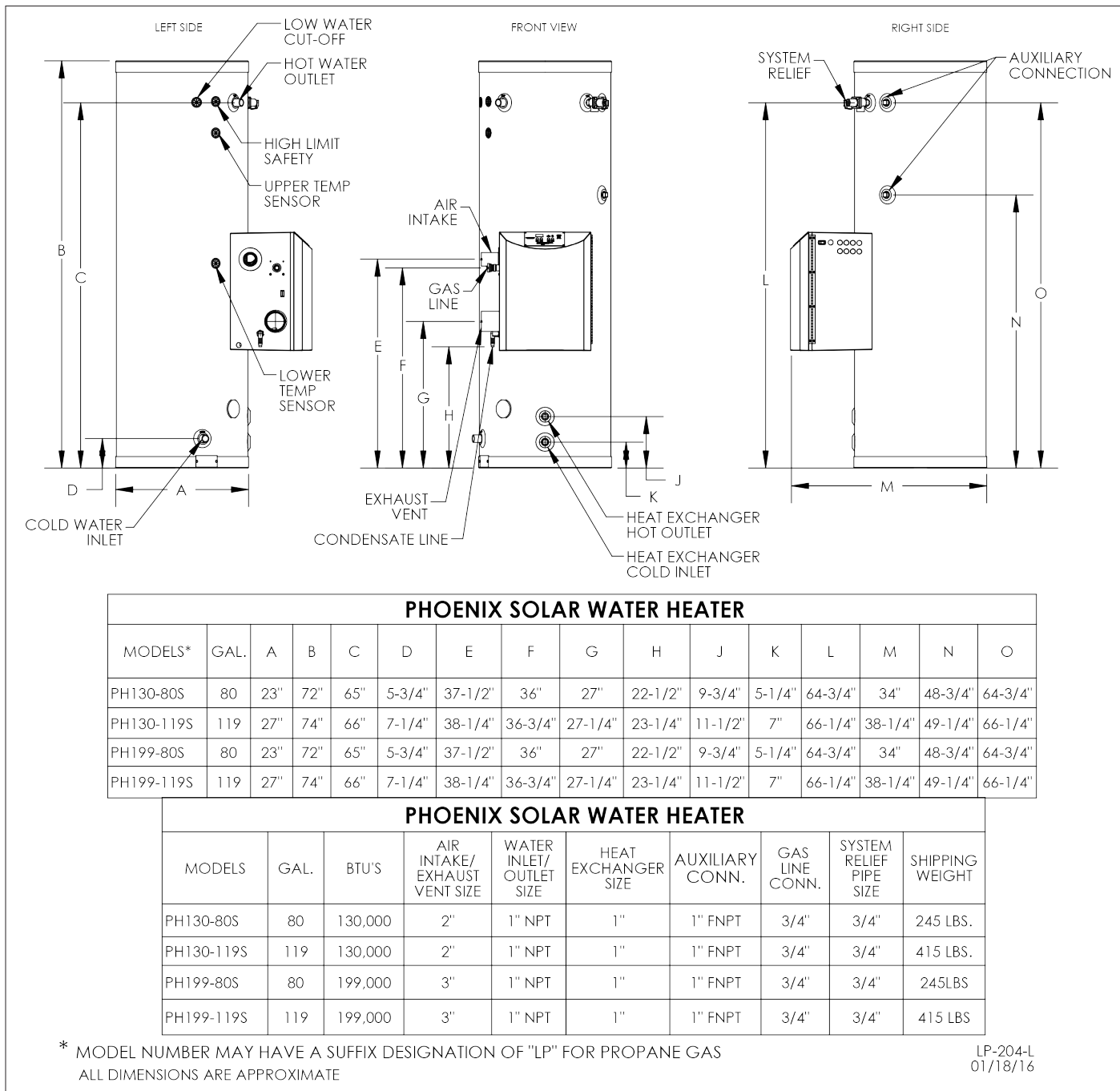
Filled hot water storage tanks are very heavy, and should be located in areas that can structurally support such weight. Failure to properly locate water storage tanks could result in property damage, personal injury, or death.

This water heater must be installed upright in the vertical position as described in this manual. DO NOT attempt to install this water heater in any other orientation. Doing so will result in improper water heater operation and property damage, and could result in serious personal injury or death.

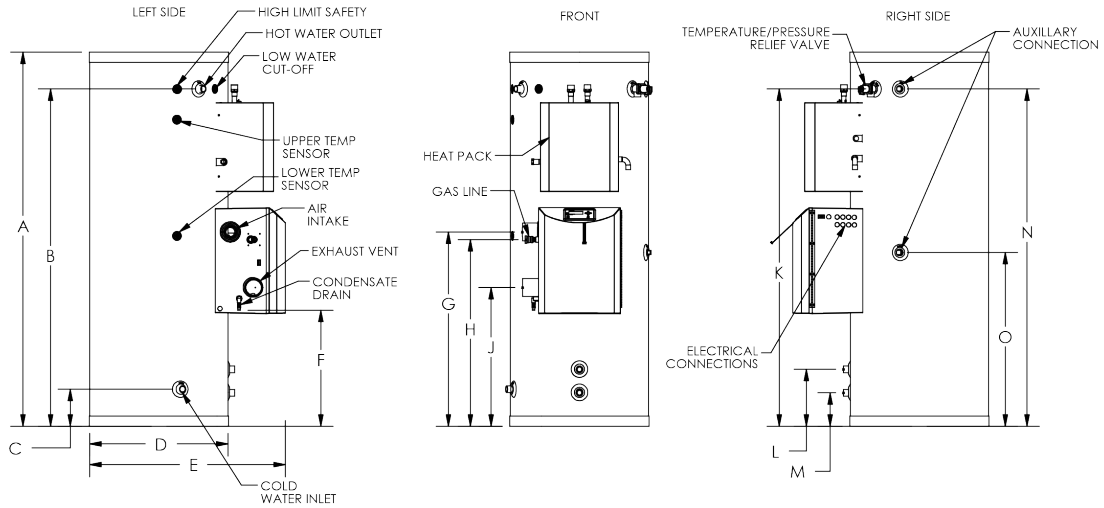
## **CAUTION**

High heat sources (sources generating heat 100°F / 37°C or greater, such as stove pipes, space heaters, etc.) may damage plastic components of the water heater as well as plastic vent pipe materials. Such damages ARE NOT covered by warranty. It is recommended to keep a minimum clearance of 8" from high heat sources. Observe heat source manufacturer instructions, as well as local, state, provincial, and national codes, laws, regulations and ordinances when installing this water heater and related components near high heat sources.

## E. Specifications and Dimensions



**Figure 4 - PH Model Dimensions and Specifications**



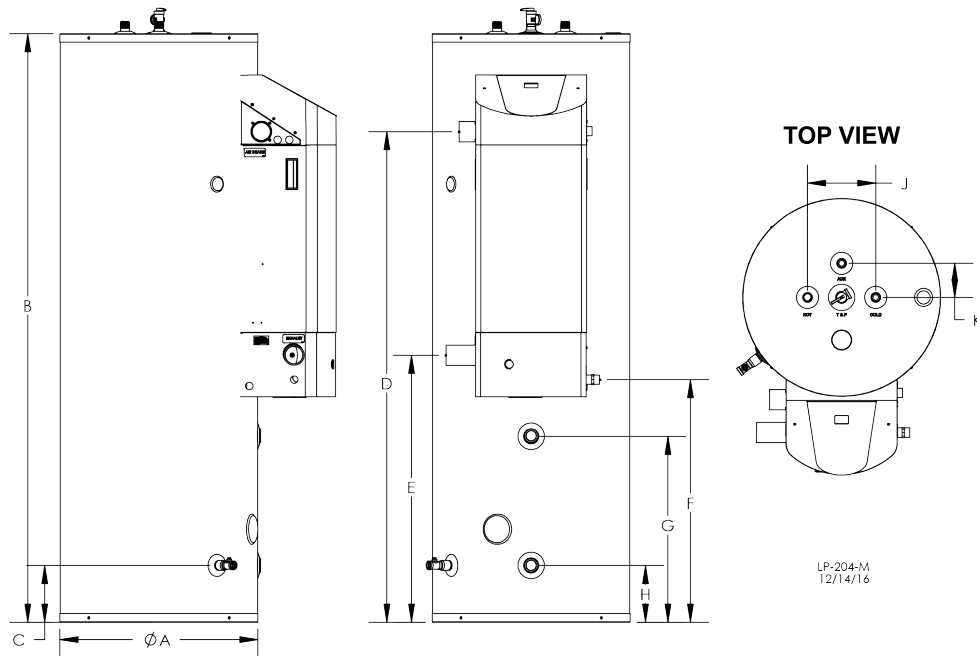
VERSA-HYDRO SOLAR WATER HEATER DIMENSIONS															
MODEL #*	GALLONS	A	B	C	D	E	F	G	H	J	K	L	M	N	O
PHE130-80S/PHE199-80S	80	72"	64-1/2"	5-3/4"	23"	34"	24"	37-1/2"	36"	27"	64-1/2"	9-3/4"	5-1/4"	64-3/4"	48-3/4"
PHE130-119S/PHE199-119S	119	74"	66"	7-1/4"	27"	37"	24"	37"	35-1/2"	26"	66"	11-1/2"	6-3/4"	66-1/4"	32"

VERSA-HYDRO SOLAR WATER HEATER SPECIFICATIONS								
MODEL #*	GALLONS	BTU'S	AIR INTAKE/EXHAUST VENT SIZE	WATER INLET/OUTLET SIZE	AUXILIARY CONN.	GAS LINE CONN.	SYSTEM RELIEF PIPE SIZE	SHIPPING WEIGHT
PHE130-80S/PHE199-80S	80	130,000	2"	1" NPT	1" FNPT	3/4"	3/4"	275
		199,000	3"					
PHE130-119S/PHE199-119S	119	130,000	2"	1" NPT	1" FNPT	3/4"	3/4"	445
		199,000	3"					

\* No suffix denotes natural gas and suffix "LP" denotes propane gas  
 \* Suffix "NHX" denotes no solar heat exchanger (119 gallon only)

LP-314-XX  
 01/18/16

**Figure 5 - PHE Model Dimensions and Specifications**



PHOENIX LD SOLAR WATER HEATER											
MODELS*	GAL.	A	B	C	D	E	F	G	H	J	K
PH76-80S	75	23"	69"	6-3/4"	57-1/4"	31-1/4"	28-1/4"	21-3/4"	6-1/2"	8"	4"

PHOENIX LD SOLAR WATER HEATER SPECIFICATIONS								
MODELS	GAL.	BTU'S	AIR INTAKE/EXHAUST VENT SIZE	WATER INLET/OUTLET SIZE	HEAT EXCHANGER SIZE	GAS LINE CONN.	SYSTEM RELIEF PIPE SIZE	SHIPPING WEIGHT
PH76-80S	75	76,000	2"	3/4" NPT	1"	3/4"	3/4"	245 LBS.

\* MODEL NUMBER MAY HAVE A SUFFIX DESIGNATION OF "LP" FOR PROPANE GAS  
 ALL DIMENSIONS ARE APPROXIMATE

**Figure 6 - PH Model, 76kBTU Dimensions and Specifications**

## Part 3 - Piping

The design and installation of the solar water heating system should be done by qualified individuals. It is important that good design and installation practices be followed to assure that your system will operate properly. Failure to follow installation guidelines for your solar water heating system could cause component failure and possible safety issues.

### A. Potable Water Piping

#### CAUTION

It is very important that you do the potable piping before you pipe into your solar system. Failure to do so may damage your water heater.

Do not introduce HTF into any fittings on the heater except those clearly marked for that purpose.

Never use dielectric unions or galvanized steel fittings on any domestic water connections or auxiliary connections. **ONLY** use copper or brass fittings. Teflon thread sealant must be used on all connections.

It is mandatory that all plumbing be done in accordance with local and state codes or warranty will be void. It is also necessary to use both thread tape and pipe dope on all mechanical connections. The potable water piping is located on the side of your solar water heater and marked Hot and Cold. It is recommended that unions or flexible copper connectors be used so heater can be easily serviced. Install a shut-off valve on the cold feed near the solar water heater to isolate the tank for future service.

Provide clear access to the water heater, pump, expansion tank, mixing valve, time clock and other key components. The components on the potable side of the system may require future service or maintenance, so it is recommended that the connections be made with brass unions. You must use copper and brass fittings in plumbing the solar storage tank and expansion tank. The use of galvanized fittings, nipples, dielectric unions, CPVC, PVC, or other plastic pipe is prohibited.

Hard copper connections to the city cold water supply line and home hot water feed lines are recommended.

The gaskets in standard water heater flex hose connectors can become brittle and compressed over time and begin leaking on the water heater. If not detected in a timely manner, a drip or leak may cause serious damage to the tank's electrical components, or, in extreme cases, cause the tank to leak from the outside in.

### B. Potable Water Chemistry Requirements

#### CAUTION

Chemical imbalance of the water supply may affect efficiency and cause severe damage to the appliance and associated equipment. Water quality must be professionally analyzed to determine whether it is necessary to treat the water. Various solutions are available to adjust water quality. Adverse water quality will affect the reliability of the system. In addition, operating temperatures above 135°F will accelerate the build-up of lime scale and possibly shorten appliance service life. Failure of an appliance due to lime scale build-up, low pH, or other chemical imbalance IS NOT covered by the warranty.

The water must be potable, free of corrosive chemicals, sand, dirt, and other contaminants. It is up to the installer to ensure the water does not contain corrosive chemicals or elements that can damage the heat exchanger. Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3). If the water contains contaminants higher than outlined by the EPA, water treatment is recommended and additional, more frequent maintenance may be required.

If you suspect that your water is contaminated in any way, discontinue use of the appliance and contact an authorized technician or licensed professional.

#### • **Water pH between 6.5 and 8.5**

- pH levels below 6.5 can cause an increase in the rate of corrosion. pH of 8.5 or higher can potentially cause lime scale build-up
- Maintain water pH between 6.5 and 8.5. Check with litmus paper or have it chemically analyzed by a local water treatment company.
- If the pH is not between 6.5 and 8.5, consult a local water treatment company for solutions.

#### • **Hardness less than 12 grains (200 mg/L) (Residential Use - water temperatures below 140°F)**

#### • **Hardness less than 7 grains (120 mg/L) (Commercial Use - water temperatures of 140°F and greater)**

- Hardness levels above the required amounts can lead to lime scale build-up throughout the system. Water below 5 grains/gallon (85 mg/L) may be over softened.
- Consult local water treatment companies for unusually hard water areas (above the required amounts) or for other treatment solutions if water is being over softened (below 5 grains/gallon [85 mg/L]).

#### • **Chloride concentration less than 100 ppm (mg/L)**

- Do not fill appliance or operate with water containing chlorides in excess of 100 ppm (mg/L).
- Using chlorinated fresh water should be acceptable as levels are typically less than 5 ppm (mg/L).
- Do not connect the appliance to directly heat swimming pool or spa water.

#### • **Total Dissolved Solids (TDS) less than 500 ppm (mg/L)**

- Total dissolved solids are minerals, salts, metals, and charged particles that are dissolved in water.
- The greater the amounts of TDS present, the higher the corrosion potential due to increased conductivity in the water.
- If using softened water to fill the appliance, it is still possible to have high TDS. This water can be corrosive. Consult local water treatment companies for other treatment solutions to reduce this effect.

**\*NOTE:** To promote appliance service life, it is strongly recommended to follow the maintenance procedures in this manual.

### C. Solar Heat Exchanger Piping

Set up the primary balance of the system components following the piping detail in Figure 9.

Run ½" type M or larger copper pipes, or flex line sets, to and from the collector following the direction of supports, penetrations, and other relative items.

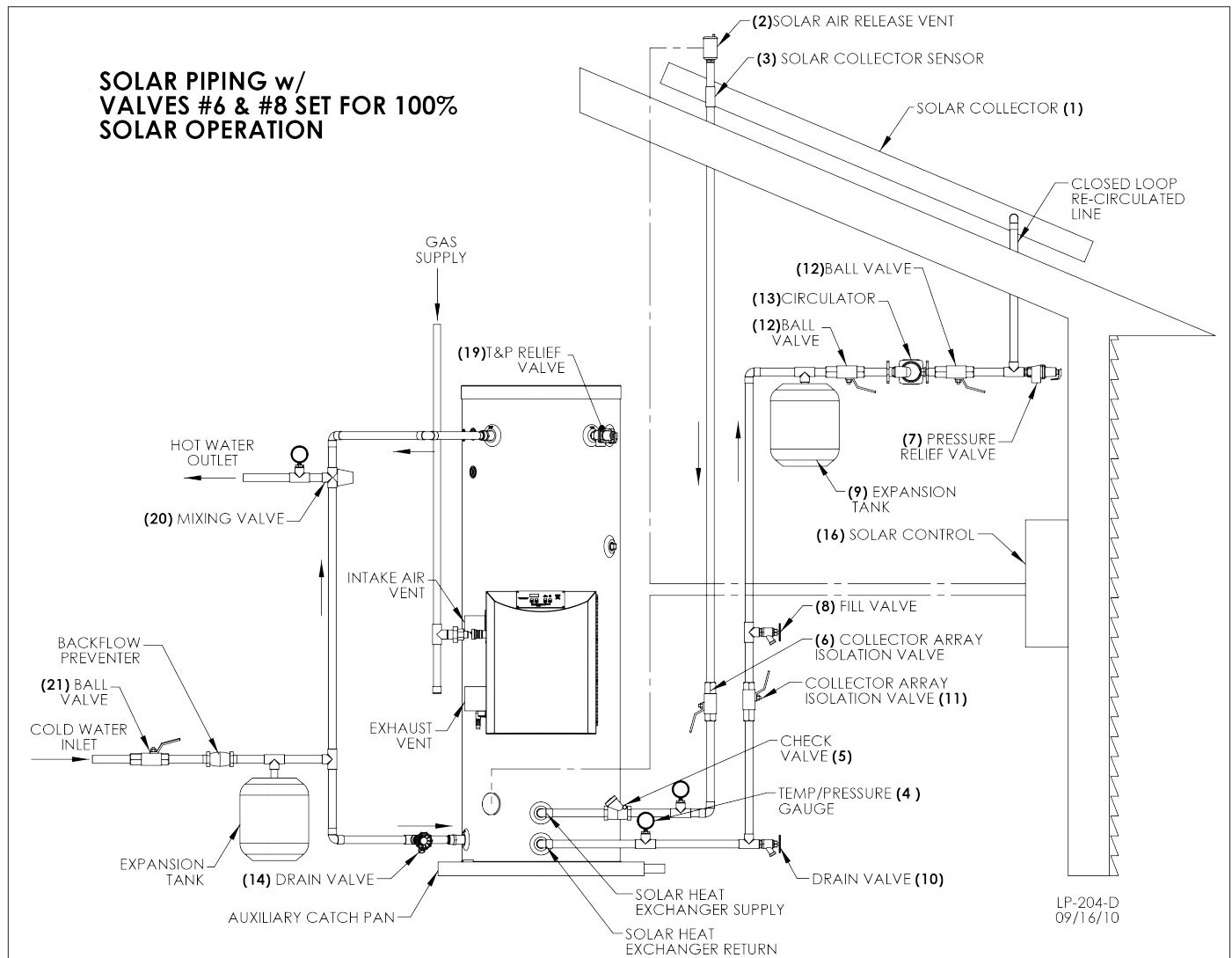
Only copper, cast iron, or brass are to be allowed in the collector piping loop due to transient operating temperatures that may reach as high as 300°F. PEX, PVC, CPVC, and other polymers are expressly prohibited in the piping network of closed loop systems.

When making a connection to the heat exchanger, use Teflon Tape and joint compound to prevent leaks. The connections to the heat exchanger are 1" NPT. Do not apply heat directly to the heat exchanger thread connection when sweating fittings.



Line pressure and temperature gauge shall be installed in the collector supply and return lines to allow for a simple diagnostic check of proper system operation. On a sunny day, the hot water return line should be approximately 5 – 12°F warmer than the water in the collector supply line. Compare the temperature readings in the two line thermometers. The ¾" cold water supply line to the storage tank must be insulated with a minimum 7/8" x ½" pipe insulation to a minimum distance of 5' behind the storage tank, or to the wall if closer than 5'.

#### D. Potable Water Piping Application



**Figure 7 - Potable Water Piping Application. Meant to demonstrate piping concept only. Installer is responsible for all equipment and detailing per local codes.**

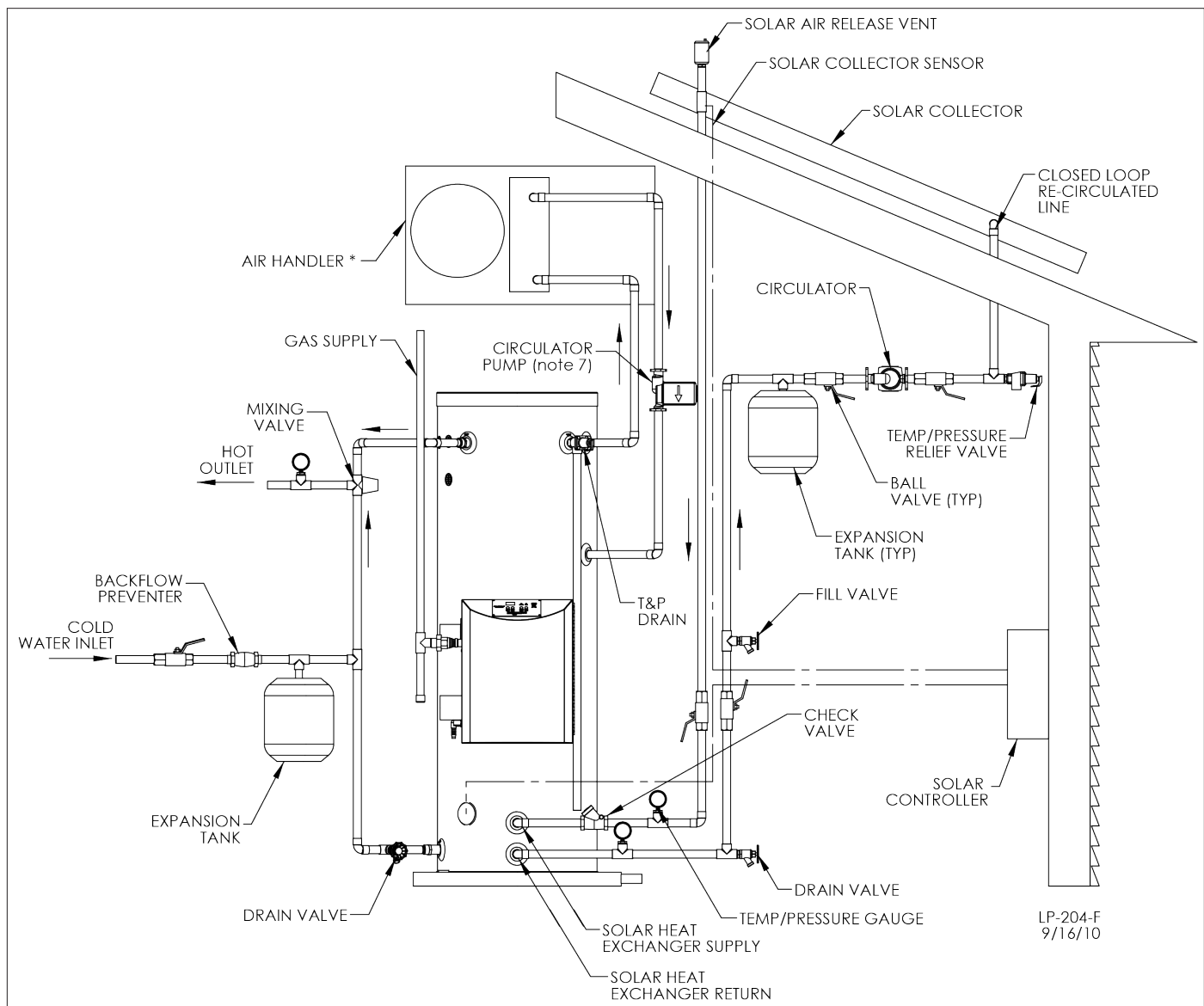
#### E. Tank Sensor Placement

Make sure the sensor is secured on the stud located in the lower section of the water heater. Secure the sensor by packing Armaflex insulation behind it. This will also help the sensor react to temperature change.

Non-toxic freeze protection fluid must be used to protect the system from freezing. Use a mixture appropriate for your climate. Do not use a higher glycol to water concentration than necessary, as this will adversely impact heat transfer efficiency. See the manufacturer's data sheet for recommended concentrations. A copy of this sheet must be left with the end user of the solar system.

The collector loop must be charged with HTF. Use potable water as a mixing agent ONLY. Regular scheduled maintenance must be established to monitor and maintain the proper pH level of HTF in the system to protect the heat exchanger and other components in the system.

## F. Applications



**Figure 8 - Solar Water Heater with Air Handler**

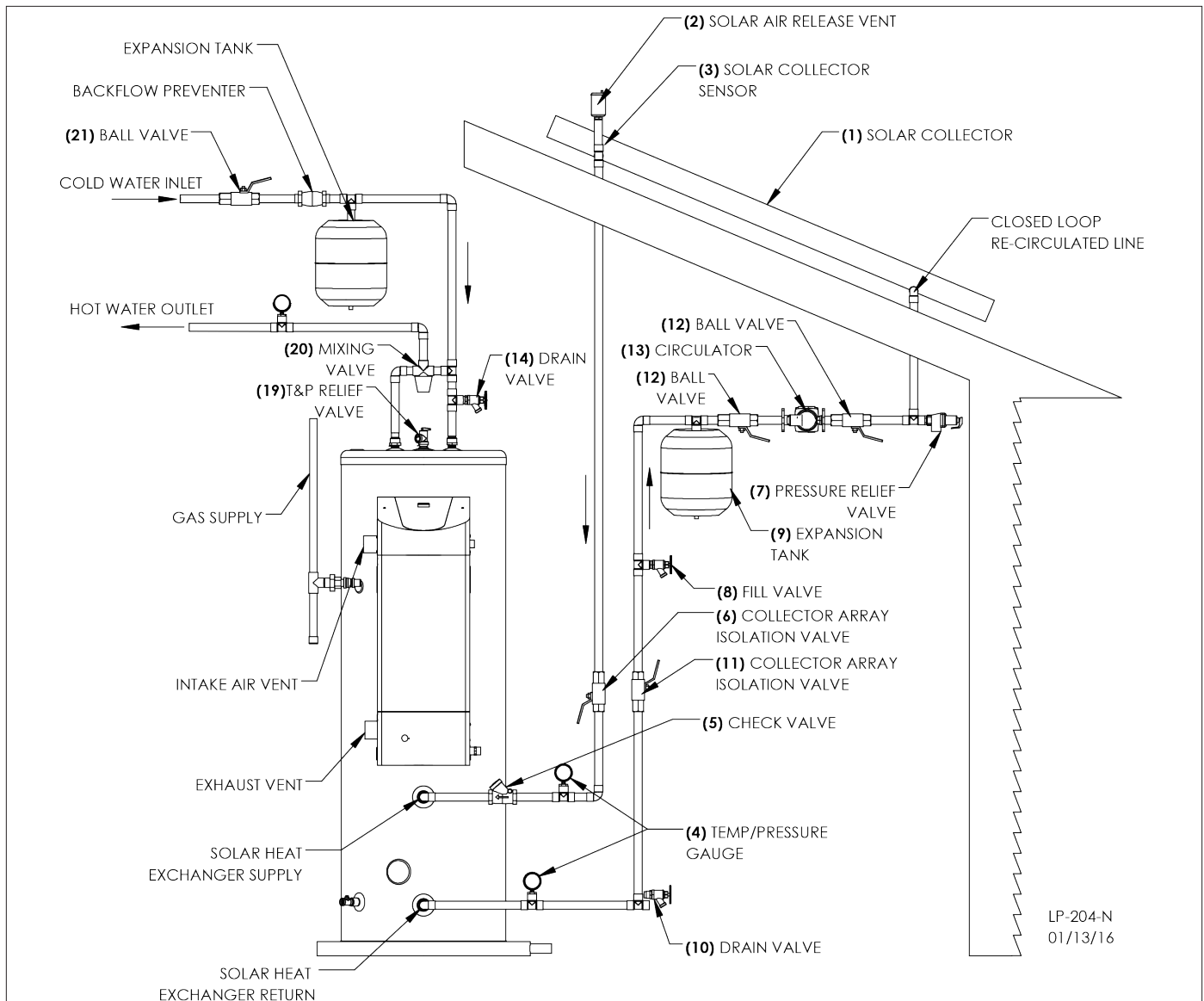
### FIGURE NOTES:

1. This drawing is meant to show system piping concept only. The installer is responsible for all equipment and detailing by local codes.
2. Antifreeze, non-potable HTF shall be used for the solar heat exchanger circuit only. Never introduce antifreeze solution to any connection other than the solar loop.
3. If there is a check valve on the cold water feed line, a thermal expansion tank suitable for potable water must be sized and installed within this piping system between the check valve and cold water inlet of the solar water heater.
4. An ASSE 1017 mixing valve is required per SRCC OG-300.
5. A minimum of 12 diameters of straight pipe must be installed upstream of all circulators.
6. Make sure tank is fully purged of air before power is turned on to the backup heat source.
7. Circulators shown in the above hydronic piping should have an integral flow check or alternately use a stock pump with an external spring type check valve. **(Due to extreme temperatures, circulators with integral flow checks are not to be used in solar systems. If circulator comes equipped with an integral flow check, remove it.)**

### NOTES FOR AIR HANDLER APPLICATION

1. Massachusetts state plumbing code requires a distance no greater than 50 feet from the water heater to the fan coil in the air handler.
2. Massachusetts state plumbing code requires an electronically times circulator pump to activate every six hours for 60 seconds. This circulator must be bronze or stainless.
3. All water piping must be insulated.
4. A vacuum relief valve must be installed per Massachusetts CMR248.

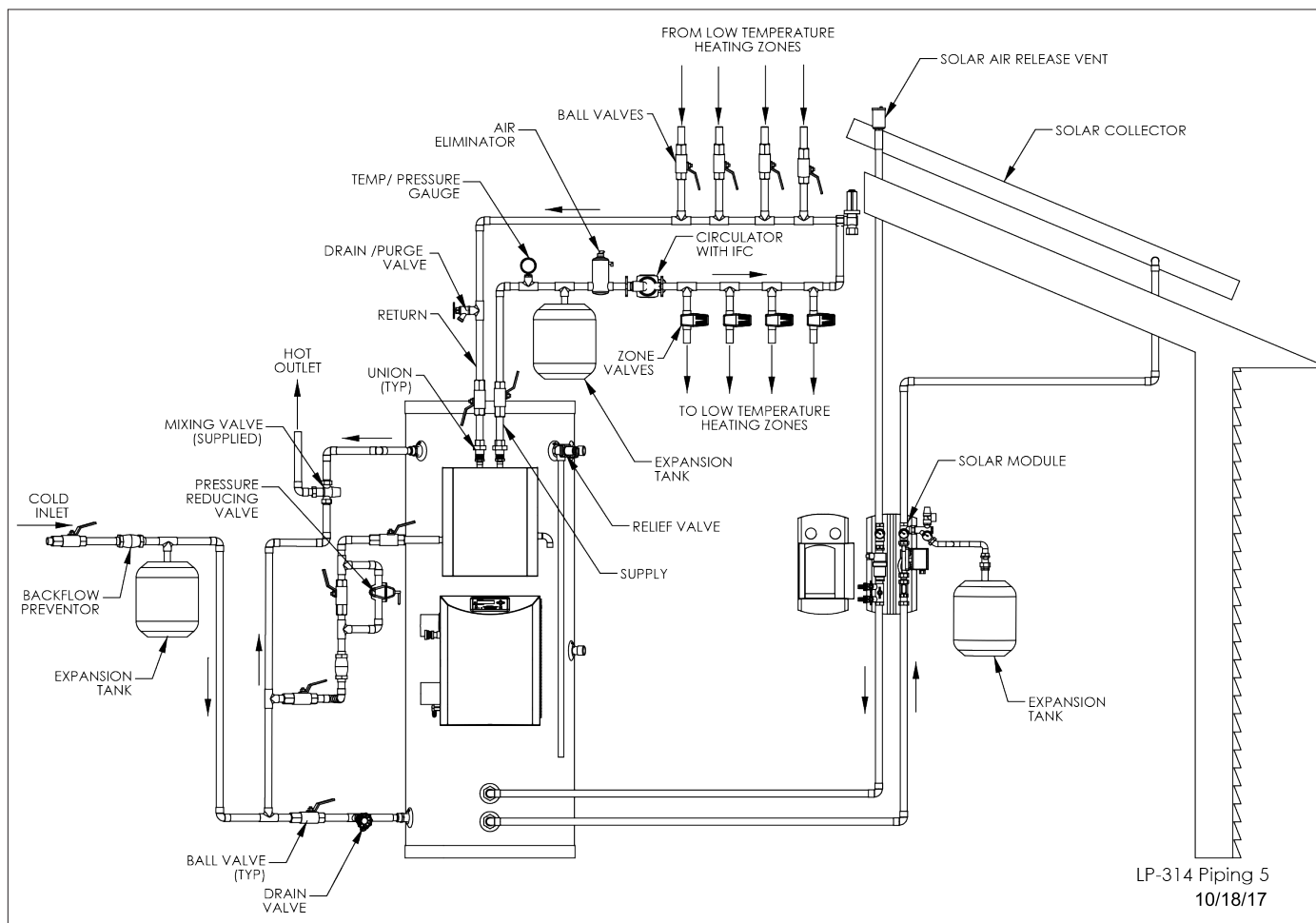
**NOTE:** This drawing is meant to show system piping concept only. The installer is responsible for all equipment and detailing required by local codes.



**Figure 9 - PH-76 Solar Model**

**FIGURE NOTES:**

1. This drawing is meant to show system piping concept only. The installer is responsible for all equipment and detailing by local codes.
2. Antifreeze, non-potable HTF shall be used for the solar heat exchanger circuit only. Never introduce antifreeze solution to any connection other than the solar loop.
3. If there is a check valve on the cold water feed line, a thermal expansion tank suitable for potable water must be sized and installed within this piping system between the check valve and cold water inlet of the solar water heater.
4. An ASSE 1017 mixing valve is required per SRCC OG-300.
5. A minimum of 12 diameters of straight pipe must be installed upstream of all circulators.
6. Make sure tank is fully purged of air before power is turned on to the backup heat source.



LP-314 Piping 5  
10/18/17

**Figure 10 - PHE Solar Model with Central Heating**

**FIGURE NOTES:**

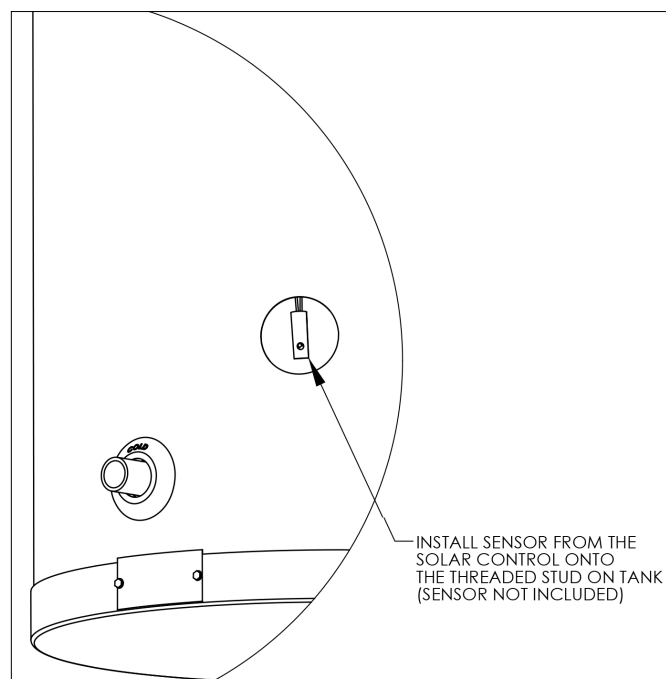
1. This drawing is meant to show system piping concept only. The installer is responsible for all equipment and detailing by local codes.
2. Antifreeze, non-potable HTF shall be used for the solar heat exchanger circuit only. Never introduce antifreeze solution to any connection other than the solar loop.
3. If there is a check valve on the cold water feed line, a thermal expansion tank suitable for potable water must be sized and installed within this piping system between the check valve and cold water inlet of the solar water heater.
4. An ASSE 1017 mixing valve is required per SRCC OG-300.
5. A minimum of 12 diameters of straight pipe must be installed upstream of all circulators.
6. Make sure tank is fully purged of air before power is turned on to the backup heat source.
7. Circulators shown in the above hydronic piping should have an integral flow check or alternately use a stock pump with an external spring type check valve. **(Due to extreme temperatures, circulators with integral flow checks are not to be used in solar systems. If circulator comes equipped with an integral flow check, remove it.)**

**G. Tank Control**

Install the solar sensor onto the threaded stud provided in the front of the water heater (sensor not included). Additional equipment may be needed in order to wire the control to the existing system. Controls also have the ability to monitor and display solar collector temperature and upper and lower tank temperatures. See Figure 13 for installation detail.

**H. Circulator Sizing**

The circulator pump must be sized for the related piping and pressure drop of the heat exchanger, and for situations specific to your solar system. Figure 14 represents the pressure drop of the solar heat exchanger. Consult the solar panel manufacturer for flow requirements to assist in pump selection.



**Figure 11 - Sensor Installation Detail**

## Part 4 - Service / Maintenance Procedures

A properly maintained solar water heating system can provide years of dependable, trouble-free service. It is suggested that a routine preventive maintenance program be established and followed by the end user with the solar contractor. Listed below is the maintenance check list that outlines the primary components of the solar system that need to be inspected annually.

1. HTF Glycol – It is very important that the quality of the glycol is maintained to avoid damage to the collector loop and related components. See the manufacturer's data sheet for further details.
2. Water quality can affect the operation of the solar heat exchanger over time. In very hard water areas, it is recommended to drain a few gallons of water from the bottom of the tank to keep the water heater free of sediment.
3. Clean and inspect the solar collector. Dirt or film may settle on the surface and affect performance. Check collector supplier for cleaning procedures.
4. Check piping and component insulation for deterioration.
5. Check solar tank sensors. Assure these sensors are secure and have not moved or loosened.
6. Inspect the T&P valve on the water heater. Lift the release handle lever. Make sure discharge is directed to an open drain.

### WARNING

Never open the pressure relief valve while the system is in operation or hot water is present. Allow to cool prior to opening. Failure to do so could result in serious personal injury or death.

7. The area near the water heater must be kept free of flammable liquids such as gasoline, paint thinners, adhesives, or other combustible materials.

### A. Shutdown Procedures

To isolate the water heater, simply shut down supply water shut off valve which isolates the water heater from the pressurized cold water supply.

The collector loop can be isolated from the solar storage tank by closing shut off valves. If the pressure in this loop drops, or you find a glycol leak, shut these valves and contact your installation contractor. Turn the circulating pump off on your solar control.

### B. Vacation Shutdown

Solar water heaters can build up very high temperatures when there is no daily draw on the system. The best way to dissipate heat in the system is set the control to run the circulator pump 24 hours a day to cool off the storage tank at night. The collector will radiate heat back to the atmosphere at night, preventing the system from stagnating at very high temperatures.

### C. Estimated Life of Components

Proper care and maintenance will determine the life expectancy of the individual components of the solar system. Refer to manufacturer's warranty information to determine coverage of individual components. To obtain warranty service, call your local service or installing contractor.

### D. Temperature and Pressure Relief Valve

A temperature and pressure relief (T&P) valve is designed for emergency safety relief and shall not be used as an operating control. A T&P valve functions by discharging water in an emergency. Therefore, it is essential that a discharge line be piped from the valve in order to carry the overflow to a safe place of disposal. The discharge line must be the same size as the valve outlet, must pitch downward from the valve, and terminate at least 6" above a drain where any discharge will be clearly visible.

### WARNING

**Following installation of the T&P Relief Valve, the valve lever MUST be operated AT LEAST ONCE A YEAR by the water heater owner to ensure that waterways are clear.** Certain naturally occurring mineral deposits may adhere to the valve, blocking waterways and rendering the valve inoperative. When the lever is operated, hot water will discharge if the waterways are clear. PRECAUTIONS MUST BE TAKEN TO AVOID PERSONAL INJURY FROM CONTACT WITH HOT WATER AND TO AVOID PROPERTY DAMAGE. BEFORE operating lever, check to see that a discharge line is connected to the valve, directing the flow of hot water from the valve to a proper place of disposal. If no water flows when the lever is operated, replacement of the valve is required. TURN THE WATER HEATER "OFF" AND CALL A PLUMBER IMMEDIATELY.

## Part 5 - Troubleshooting

Owners are advised to contact the installer whenever in-depth interaction with the solar system is required.

### A. Leaks

For leaks in the potable water system or solar storage tank, close the cold water inlet and unplug the solar controller. This will isolate the solar system until repairs can be made.

### B. Other Problems

A noisy pump could be an indication of worn bearings, obstructions, or a leak in your system. Call your installer for diagnosis of the problem, repair of the system, and/or replacement of components.

### WARNING

For your safety, DO NOT attempt repair of electrical wiring or other operating controls. Refer repairs to qualified service personnel. Failure to do so could result in serious personal injury or death.




### C. Operating Suggestions for the User

A properly designed solar hot water system provides solar energy for approximately 70 – 90% of annual hot water needs. Listed below are some suggestions that will maximize the benefits of your solar hot water system.

1. Showers - If possible, take showers during the day, or in the early evening. Use low flow showerheads to reduce water consumption.
2. Dishwashing – Run your dishwasher during the day, after showers, to ensure as much hot water as possible is available for showers.
3. Laundry – Spread clothes washing over the week instead of washing all at the same time.
4. Single Lever Faucets – When using cold water, make sure the lever is all the way over in the cold position. This prevents hot water from inadvertently flowing from the solar storage tank.

Problem	Reason	Remedy
No Hot Water	1. Improper Wiring	Rewire per Wiring Diagram
	2. No Power - Blown Fuse or Tripped Circuit Breaker a. Shorted Wiring b. Circuit Overloaded c. Improper Wiring	a. **Replace or repair b. **Provide adequate circuit or reduce load c. ** Rewire per diagram
	3. Solar System Incorrectly Installed	**Check installation
	4. Leaking Plumbing or Open Hot Water Faucet(s)	**Ensure all faucet(s) are closed. Check water meter
Not Enough Hot Water	1. Heater Undersized	Reduce rate of hot water use
	2. Wired Incorrectly	**Check wiring or replace
	3. Solar System Incorrectly Installed	**Check installation
Water Too Hot or Not Hot Enough	1. Thermostat Setting Too High or Low	Change setting as required
	2. Thermostat Out of Calibration	**Replace
	3. Solar System Incorrectly Installed	**Check installation

**Table 3 - Troubleshooting - See Water Heater Installation Manual for More Detailed Maintenance Information - \*\* USER - For your safety, DO NOT attempt repair of electrical wiring, thermostat, or operating controls. Refer repairs to qualified service personnel.**

 <b>WARNING</b>
<p>The risk of scald injury increases as you increase water temperature. Use a water tempering or mixing valve and extreme caution when using hot water to avoid scald injury. Consult codes for conformance. Failure to follow the instructions in this warning statement could result in serious personal injury or death from scalds.</p> <p>Be sure to disconnect electrical power before performing service. Failure to do so could result in electrical shock, property damage, serious personal injury, or death.</p>

<b>CAUTION</b>
<p>If draining of the water heater is necessary, open the T&amp;P valve or a hot water tap to prevent vacuum buildup in the tank and piping.</p>

Customer Installation Record Form	
The following form should be completed by the qualified installer / service technician for you to keep as a record of the installation in case of a warranty claim. After reading the important notes at the bottom of the page, please also sign this document.	
Customer's Name	
Date of Installation	
Installation Address	
Product Name / Serial Number(s)	
Comments	
Installer's Code / Name	
Installers Phone Number	
Signed by Installer	
Signed by Customer	
Installation Notes	

**IMPORTANT**

Customer: Please only sign after the qualified installer / service technician has fully reviewed the installation, safety, proper operation, and maintenance of the system. If the system has any problems please call the qualified installer / service technician. If you are unable to make contact, please call your sales representative.

Distributor / Dealer: Please insert contact details.