

Figure 3 - Installing Cold Inlet and Hot Outlet Fittings

CAUTION

The Cold Inlet and Hot Outlet Fittings MUST BE INSTALLED according to the steps in Figure 3 for the electric water heater to operate properly. Failure to install these fittings properly will result in improper water heater operation, possible substantial property damage, and increased costs. Service calls to repair the installation and properly install these fittings ARE NOT COVERED by water heater warranty. Improper installation WILL VOID the water heater warranty.

Part 3 - Piping

A. Plumbing

It is mandatory that all plumbing be done in accordance with federal, local, and state plumbing codes and practices. Failure to properly install the water heater WILL VOID the warranty. It is also necessary to use both thread tape and pipe dope on all mechanical plumbing connections.

Install unions on the hot and cold water connections to easily disconnect the water heater for servicing.

CAUTION

Dielectric unions or galvanized steel fittings must not be used in a system with this water heater. Doing so WILL VOID the warranty. Use only copper, brass, or stainless steel fittings. Teflon thread sealant must be used on all connections.

1. Install a shut-off valve on the inlet connection on the top of the heater. Connect the cold water supply line to the shut-off valve. Refer to piping Applications, this manual.

CAUTION

Do not apply heat to the Hot or Cold water heater connections. If sweat connections are used, sweat tubing to the adapter before fitting adapter to the water connections on the heater. Any heat applied to the water heater connections will permanently damage the dip tube and/or heat traps. Damages due to improper installation practices ARE NOT covered by warranty.

2. Connect the hot water line to the connection marked "HOT" on the top of the water heater.

3. Install the T&P Valve in the opening provided near the top of the heater.

4. Install the drain valve in the opening provided near the bottom of the heater.

CAUTION

Failure of electric elements due to lime scale build-up on the heating surface, low pH, or other imbalance IS NOT covered by the warranty.

B. Thermal Expansion

A check valve may be installed in the cold water inlet line as a separate backflow preventer, or may be part of a pressure reducing valve, water meter, or water softener. An **"open water system"** refers to a system without a check valve. A **"closed water system"** refers to a system with a check valve installed in the cold water inlet line.

As water is heated, it expands in volume and increases pressure within the water system. This action is referred to as **"thermal expansion"**. In an open water system, expanding water which exceeds the capacity of the system flows back into the city main where pressure is easily dissipated.

A closed water system prevents expanding water from flowing back to the city main. The resulting thermal expansion can rapidly increase pressure in the water heater and system piping. This rapid pressure increase can exceed the setting of the pressure relief valve, causing it to operate during each heating cycle, resulting in discharge from the T&P. This rapid and repeated expansion and contraction of components in the system can cause premature failure of system components, including the relief valve and possibly the water heater. Replacing the relief valve **will not** correct thermal expansion.

A potable hot water expansion tank is required to offset thermal expansion. Expansion tanks are designed with an air cushion built in that compresses as system pressure increases, thereby relieving the overpressure condition and eliminating repeated operation of the relief valve. This expansion tank should be installed in the cold water line between the water heater and check valve, and must be sized

for the entire water volume of the hot water system. See piping Applications.

Other methods of controlling thermal expansion are available.

Check with the local water utility to determine if a check valve exists in the cold water inlet line. Contact your installing contractor, water supplier, or plumbing inspector for additional information regarding thermal expansion.

C. Condensation

Condensation can form on the water heater when it is first filled with water, and may also occur with a heavy water draw and very cold inlet water temperature. This condition is not unusual and will disappear as the water becomes heated. However, if the condensation should continue, examine the piping and fittings for possible leaks.

D. Insulation Blankets

Insulation blankets for external use on electric water heaters are not necessary with this water heater. An insulation blanket is meant to reduce the standby heat loss encountered with storage tank heaters. This water heater meets or exceeds National Appliance Energy Conservation Act standards with respect to insulation and energy factor requirements, thus making an insulation blanket unnecessary.

The manufacturer's warranty does not cover any damages or defects caused by the installation, attachment, or use of any type of energy saving or other unapproved devices (other than those authorized by the manufacturer) into, onto, or in conjunction with the water heater. The use of unauthorized energy saving devices may shorten the life of the water heater and endanger life and property. The manufacturer disclaims any responsibility for any losses or injuries resulting from the use of such unauthorized devices.

WARNING

If local codes require external application of insulation blanket kits, the manufacturer's instructions included with the kit must be carefully followed.

In addition, pay careful attention to the following so as not to restrict the proper function and operation of the water heater:

- Do not cover the operating or warning labels attached to the water heater or attempt to locate them on the exterior of the insulation blanket.
- Do not apply insulation to the top of the water heater. This could interfere with the safe operation of the electrical junction box.
- Do not cover the jacket access panel(s) to the thermostat(s) and heating element(s) or T&P valve.
- Inspect the insulation blanket frequently.

Failure to follow these instructions could result in property damage, severe personal injury, or death.

E. Temperature and Pressure Relief Valve

For protection against excessive pressures and temperatures in this water heater, install temperature and pressure protective equipment as required by local codes, but not less than a combination T&P valve meeting the requirements for *Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22B / CSA 4.4-M99* by a nationally recognized testing laboratory that maintains periodic inspection of production listed equipment and materials. This valve must be marked with a maximum set pressure not to exceed the marked maximum working pressure of the water heater. Install the T&P valve into the opening provided and marked for this purpose on the water heater. The T&P valve must be plumbed down so discharge can exit at least 6" above the structural floor. The relief line cannot be in contact with any live electrical parts.

⚠ WARNING

To avoid water damage or scalding due to relief valve operation:

- Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the relief valve discharge.
- Discharge line must be as short as possible and the same size as the valve discharge connection throughout its entire length.
- Discharge line must pitch downward from the valve and terminate at least 6" above the floor drain, making discharge clearly visible.
- The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375°F or greater.
- Do not pipe discharge to any location where freezing could occur.
- No valve may be installed between the relief valve and heater or in the discharge line. Do not plug or place any obstruction in the discharge line.
- Test the operation of the relief valve after filling and pressurizing the system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, immediately replace with a new properly rated relief valve.
- Test T&P valve at least once annually to ensure the waterway is clear. If valve does not operate, turn the heater "off" and call a plumber immediately.
- Take care whenever operating relief valve to avoid scalding injury or property damage.

FAILURE TO COMPLY WITH THE ABOVE GUIDELINES COULD RESULT IN FAILURE OF RELIEF VALVE OPERATION, RESULTING IN POSSIBILITY OF SUBSTANTIAL PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.

RE-INSPECTION OF T&P RELIEF VALVES: T&P valves should be inspected AT LEAST ONCE EVERY THREE YEARS, and replaced if necessary, by a licensed plumbing contractor or qualified service technician to ensure that the product has not been affected by corrosive water conditions and to ensure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve and its components over time, rendering the valve inoperative. Such conditions can only be detected if the valve and its components are physically removed and inspected. **Do not attempt to conduct an inspection on your own.** Contact your plumbing contractor for a re-inspection to assure continued safety.

FAILURE TO RE-INSPECT THE T&P VALVE AS DIRECTED COULD RESULT IN UNSAFE TEMPERATURE AND/OR PRESSURE BUILD-UP WHICH CAN RESULT IN PROPERTY DAMAGE, SERIOUS PERSONAL INJURY, OR DEATH.

Do not thread a cap or plug into the relief valve or relief valve line under any circumstances! Explosion and property damage, serious injury, or death may result.

F. Scalding

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 6 - Approximate Time / Temperature Relationships in Scalds

⚠ WARNING

An ASSE 1017 or ASSE 1070 temperature limiting or mixing valve is recommended in installations servicing disabled or elderly persons, or children. Mixing valves do not eliminate the risk of scalding.

To avoid scalding:

- Set the water heater set point temperature as low as possible.
- Feel water before bathing or showering.
- If thermostatic valves are required, use devices specifically designed for such purpose. Install these devices in accordance with instructions provided by the manufacturer.

Failure to install a temperature limiting or mixing valve and follow these instructions could result in property damage, severe personal injury, or death due to scalds.

This water heater can deliver scalding water. Be careful whenever using hot water to avoid scalding injury. Certain appliances such as dishwashers and automatic clothes washers may require increased water temperatures. By setting the thermostat on this heater to obtain the increased water temperature required by these appliances you may create the potential for scald injury.

To protect against injury, install a mixing valve in the water system. This valve will reduce point of use discharge

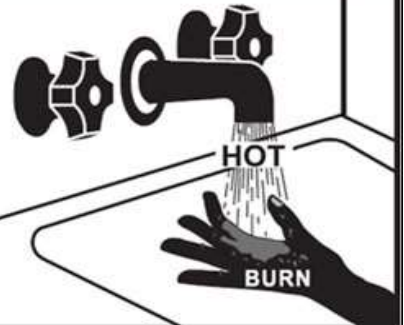
temperatures by mixing cold and hot water in branch supply lines. Such valves are available from your local plumbing supplier.

Table 4 details the relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.

G. Filling the Heater

- Make certain that the field installed drain valve is completely closed.
- Open the shut-off valve in the cold water supply line.
- Open the hot water faucets to allow air to vent from the heater and piping.

⚠ 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.

- Allow sufficient time for the heater to completely fill with water.
- Verify elements are installed correctly. Check for leaks at the water heater and throughout the system.

H. Applications

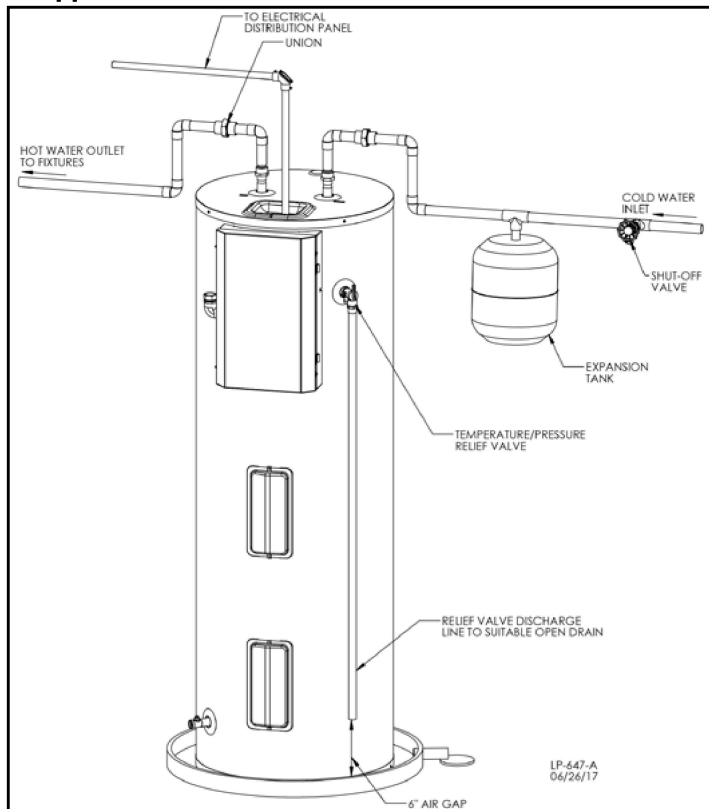


Figure 4 - Piping Detail - NOTE: Drawing is meant to demonstrate system piping concept. Heat traps are optional.

CAUTION

When filling the water heater, open a hot water tap to release air in the tank and piping. The tank must be full of water before the heater is turned on. Failure to ensure the water heater is full before turning it on could result in damage to the water heater and other property damages. Such damages ARE NOT covered by water heater warranty.

PIPING NOTES:

The following notes are applicable to all of the piping applications demonstrated on this page.

1. Minimum pipe size should match connection size. Upsize pipe accordingly if greater flow is required.
2. A thermal expansion tank suitable for potable water must be sized and installed within this piping system between the backflow preventer and the cold water inlet.
3. All circulators should have an integral flow check.
4. Drains and check valve between unit and storage tank will assist in purging air from system.
5. These drawings are meant to demonstrate system piping only. The installer is responsible for all equipment and detailing required by local codes. In Massachusetts, you must install a vacuum relief valve per 248 CMR.
6. Mixing valve application is optional, but recommended to help prevent scalding. See Part 3 for more information.

Part 4 - Wiring

CAUTION

Tank must be full of water before the power is turned on. Heating elements will be damaged if energized for even a short time while tank is dry. Failures due to "dry-firing" ARE NOT covered by warranty.

This unit is equipped with a terminal block for easy connection to field wiring and conversion. These heaters are equipped and wired for the maximum possible input allowable (see Table 3 for listing of inputs and amperage requirements). The voltage requirement and dedicated wattage load for the heater is specified on the rating label of the water heater. Consult your local power company to determine if your electrical service is adequate for the additional load of the heater.

Refer to the wiring diagrams for field connections. All wiring must conform to local code and the National Electric Code, and should be done by a qualified licensed electrician or the local electric utility. Grounding can be accomplished by using approved conduit and fittings or other approved conductive material. A grounding wire is provided on the junction bracket. This grounding wire must be used in the installation.

WARNING

Be sure to ground the water heater. The preferred way to ground is with rigid metal conduit between the main panel and the water heater junction box with approved end fittings (check codes on the use of flexible conduit). If making a separate ground, a green ground wire is provided in the water heater junction box. Replace the junction box cover and insulation after you have made the wiring connections. Failure to follow these instructions could result in property damage, severe personal injury, or death.

Alternate Wiring / Operation Configurations

The water heater ships ready for Single Phase, Simultaneous operation. Figure 9 details this configuration. This factory installed wiring and operation configuration may be converted to meet custom installation conditions. Figure 10 details these optional configurations. These optional configurations include: 3 Phase Simultaneous, 3 Phase Non-Simultaneous, and Single Phase Non-Simultaneous. Conversions MUST BE PERFORMED by a Qualified Service Technician.

STEP #1 – Wiring the Water Heater

- a. To convert the water heater from Single Phase to 3 Phase:
 1. Remove the red and grey wires from terminals L1 and L2 respectively. See Figure 5.
 2. Place the red and grey wires in terminal L3.
 3. Tighten screws to securely hold wires. Be sure not to place wire insulation under screws.

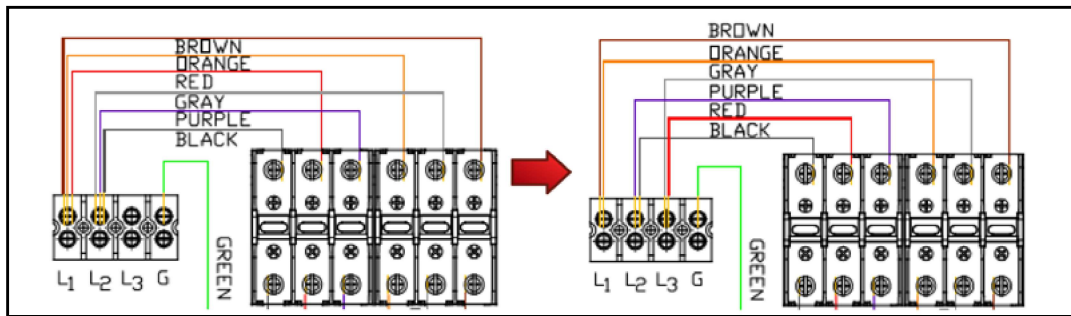


Figure 5 - Converting from Single to 3 Phase Operation

b. To convert from Simultaneous to Non-Simultaneous element operation:

1. Remove the purple wire from the bottom side of the fuse holder and place it in the terminal block slot with the adjoining purple wire.
2. Remove the orange wire from the bottom side of the fuse holder and place it in the terminal block slot with the adjoining orange wire.
3. Remove the gray wire from the bottom side of the fuse holder and place in the terminal block slot with the adjoining gray wire.
4. Remove the brown wire from the bottom side of the fuse holder and place in the terminal block slot with the adjoining brown wire.
5. Tighten screws to securely hold wires. Be sure not to place wire insulation under screws. See Figure 6.

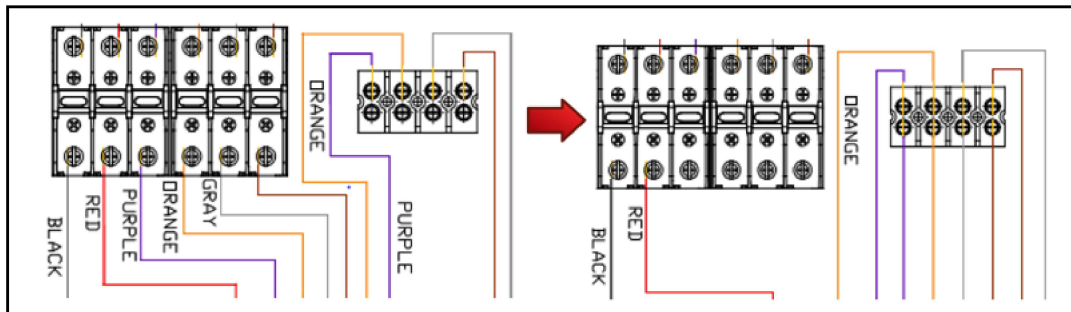


Figure 6 - Converting from Simultaneous to Non-Simultaneous Operation

See Figures 8 - 11 for optional configuration wiring details.

WARNING

Pay careful attention when making any conversions. Not properly following conversion instructions could cause a short circuit, and lead to property damage, personal injury, or death. Failures and service calls due to shorted circuits ARE NOT covered by warranty.

STEP #2 - After converting the water heater, place the labels provided in the proper locations.

- a. The Qualified Service Technician should fill in the white label with all conversion information in permanent ink. Place the completed label in an area close to the electric water heater rating label. See Figure 8.
- b. Place the clear warning label that states, **"THIS WATER HEATER HAS BEEN CONVERTED"** over the electric water heater rating label on the water heater. Ensure the original model and serial numbers remain exposed. See Figure 7.

WARNING

If the water heater has been changed from its factory installed configuration, it is required to place the included conversion labels as detailed below and to notify the factory of the conversion with the included envelope. Failure to properly document the conversion could result in property damage, severe personal injury, or death.

STEP #3 - The Qualified Service Technician is to fill out the conversion verification envelope with all conversion information. It is VERY important that the conversion verification envelope be completely filled out and sent back to the factory to register the water heater as converted and continue warranty coverage. **NOTE: FAILURE TO DO SO WILL VOID WARRANTY!**

NOTE: It is recommended to keep a copy of the filled in conversion verification form for your records.

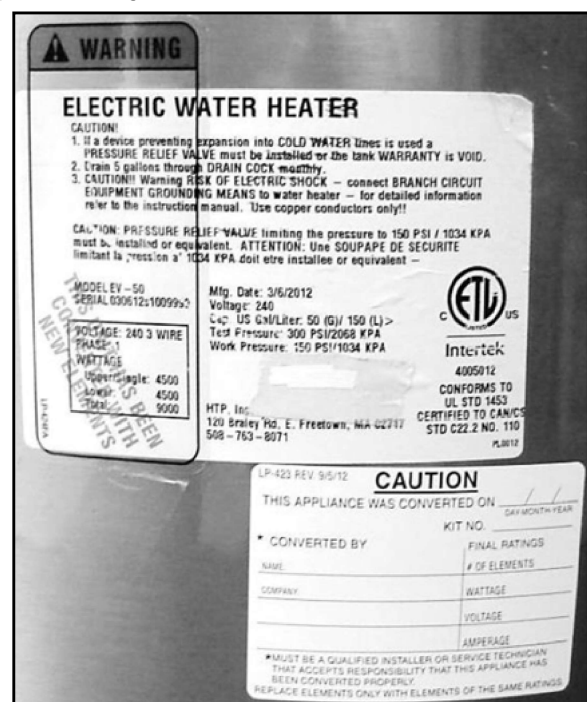


Figure 7 - Example of Conversion Label Replacement

