

Figure 4 - Water Heater Dimensions - NOTE: All Dimensions Are Approximate

Performance Specifications for Phoenix Plus Models													
BTU/Hr	Efficiency	Temperature Rise in Degrees Fahrenheit (F) and Celsius (C)											
		(°F)	40	50	60	70	80	90	100	110	120	130	140
		(°C)	22	28	33	39	44	50	56	61	67	72	78
199,000	95%	GPH	579	463	386	331	289	257	232	211	193	178	165
		LPH	2192	1753	1461	1253	1094	973	878	799	731	673	625
260,000		GPH	756	605	504	432	378	336	303	275	252	233	216
		LPH	2862	2290	1908	1653	1431	1272	1147	1041	954	882	818
320,000		GPH	931	745	621	532	465	414	372	339	310	286	266
		LPH	3524	2820	2351	2014	1760	1567	1408	1283	1174	1083	1007
399,000		GPH	1161	929	774	663	580	516	464	422	387	357	332
		LPH	4395	3517	2930	2510	2196	1953	1756	1597	1465	1351	1257

Table 3 - 95% Thermal Efficiency Used for Calculations
Performance Equations

$$\text{GPM} = \frac{\text{Rated Input} \times .95}{\text{Temp Rise } (^\circ\text{F}) \times 500}$$

$$\text{GPH} = \text{GPM} \times 60$$

Part 4 - Piping

WARNING

Failure to follow the instructions in this section **WILL VOID** the warranty and may result in property damage, severe personal injury, or death.

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.

DO NOT pipe this water heater with black iron, galvanized steel, steel, or lead pipe. Doing so will result in premature product failure and property damage, and **WILL VOID** the warranty.

A. Heater Plumbing

CAUTION

Use two wrenches when tightening water piping at heater. Use one wrench to prevent the heater return or supply line from turning. Failure to prevent piping connections from turning could cause damage to heater components.

The heater control module uses temperature sensors to provide both high limit protection and modulating temperature control. The control module also provides low water protection by sensing the water level in the tank. Some codes / jurisdictions may require additional external controls. Pump motors should not be supported by any type of stand due to possible misalignment of pump and motor. Failure to follow this instruction may result in property damage or personal injury.

The domestic water connections must be installed in accordance to all local and national plumbing codes, or any applicable standard which prevails. The inlet (cold) and outlet (hot) ports are 1 1/2" on all models.

The water heaters are shipped with a brass drain valve located on the inside of the cabinet. The water heater is also equipped with a 1" auxiliary port that can be used as a recirculation line. The auxiliary port is located between the upper and lower combustion systems. When used, the recirculation line will increase overall heater efficiency.

If there is a backflow preventer or any type of a no return valve in the system, install an additional tee on the cold feed line to connect to a potable hot water expansion tank.

In the hot outlet, install a suitable adapter to match the copper tubing of the plumbing system. A thermal trap or heat trap loop may be installed here to provide additional energy savings and prevent the thermal siphoning of domestic hot water.

B. Auxiliary Connection

The auxiliary connection is provided to improve efficiency via recirculation. This connection must be installed in accordance with all local and national codes or any applicable standard that prevails. Auxiliary connection is 1" on all models. Never use dielectric unions or galvanized steel fittings. Use only copper or brass fittings. Sealant must be used on all connections.

WARNING

Never connect auxiliary connections to any system that uses glycol or other solutions formulated for hydronic systems. These auxiliary connections are to be used only in a potable water system. Failure to follow this warning could result in serious injury or death.

C. Backflow Preventer

Use a backflow preventer specifically designed for water heater installations. This valve should be installed on the cold water fill supply line per local codes.

D. Potable Expansion Tank

A potable hot water expansion tank is required to offset heated water expansion. In most city plumbing systems, the water meter has a no return or back flow device built into the system to prevent back flowing of water into city mains. Some local codes require back flow preventers on all incoming water supplies. The hot water expansion tank must be listed for potable water use. The expansion tank should be located on the cold inlet piping close to the water heater.

Expansion Tank and Make-Up Water

1. Ensure that the expansion tank is sized to correctly handle heater and system water volume and temperature.

CAUTION

Undersized expansion tanks cause system water to be lost from the relief valve, causing make-up water to be added. Eventual heater failure can result due to excessive make-up water addition. **SUCH FAILURE IS NOT COVERED BY WARRANTY.**

The expansion tank must be suitable for hot potable water systems.

2. The expansion tank must be located as shown in Applications, this manual, or following recognized design methods. See expansion tank manufacturer's instructions for details.

E. Temperature and Pressure Relief Valve

WARNING

Overheated water and high pressures can cause water tank explosion. A properly sized temperature and pressure relief valve must be installed in the opening provided on the water heater. Failure to install a properly sized temperature and pressure relief valve could result in explosion and property damage, serious injury, or death.

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.

WARNING

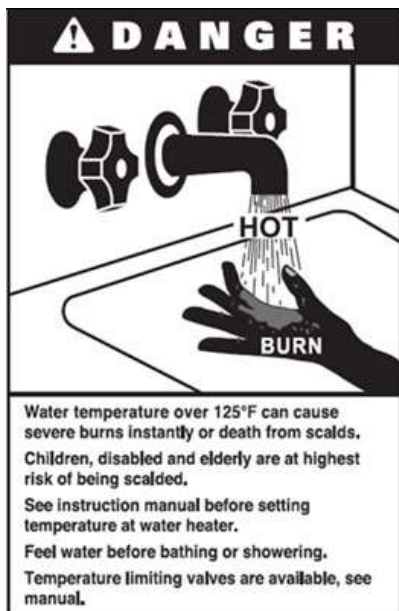
Do not thread a cap or plug into the relief valve or relief valve line under any circumstances! Explosion and property damage, serious injury, or death may result.

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.

F. Scalding

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.

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.

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 4 - Approximate Time / Temperature Relationships in Scalds

G. Filling the Heater

WARNING

The water heater must be full of water and the system fully purged **BEFORE** powering the water heater. When filling the water heater, open a hot water tap to release air in the tank and piping. All air has been purged from the system when water runs freely from the faucets.

Applying power to the water heater when it is not full of water will damage the heat exchanger, and could result in property damage, serious personal injury, or death. Such damages **ARE NOT** covered by water heater warranty.

- Make certain the 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.
- Allow sufficient time for the heater to completely fill with water.

H. Applications

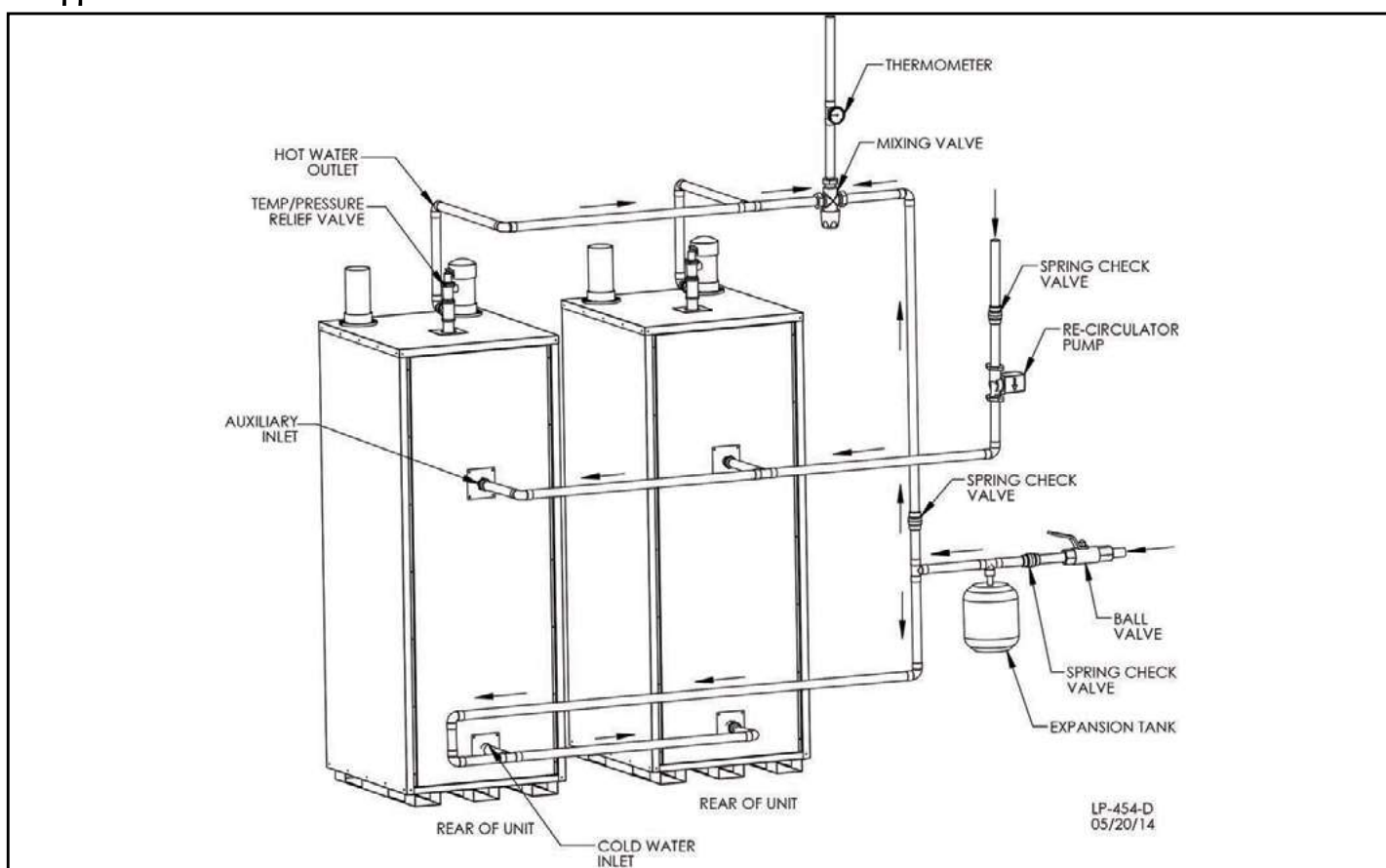


Figure 5 - Reverse Manifold Piping

NOTES:

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.
7. Always shut off power to the water heater or isolate the heater from the system if ANY plumbing work is to be done. Running the water heater without water will result in dry-firing.

WARNING

The piping will not support the weight of the water heater circulator pump. Refer to the pump manufacturer's installation instructions to properly support the circulator pump. Failure to comply with these instructions could result in substantial property damage, severe personal injury, or death.

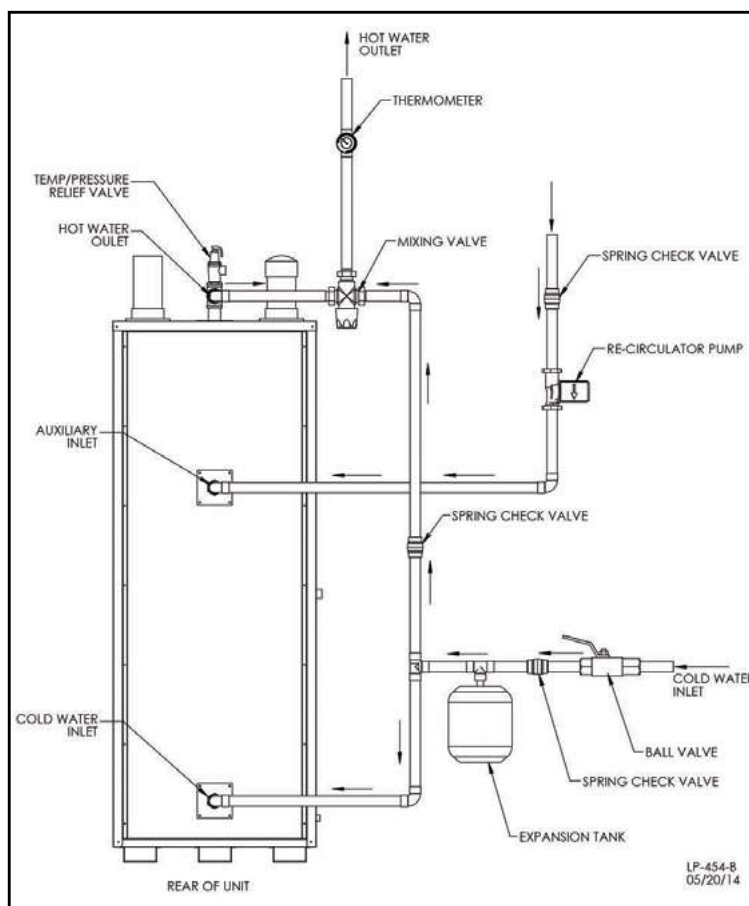


Figure 6 - Piping with Recirculation Line and Thermostatic Mixing Valve