

2. When low fire settings have been obtained, flip DIP switch seven (7) to its original (OFF) position. This will return the heater to normal mode.

3. Flip DIP switch six (6) to ON (high fire). Again check combustion readings with a combustion analyzer.

NOTE: DO NOT adjust the gas valve offset screw at high fire. The offset screw is only used to adjust combustion values at low fire.

4. When complete, flip DIP switch six (6) to its original (OFF) position. This will return the heater to normal mode.

5. Allow heater to operate normally. Ensure it is operating properly.

6. Reinstall the heater front cover.

7. Use a Phillips Head screwdriver to reinstall the heater top cover.

PART 8 – WATER PIPING

A. GENERAL PLUMBING CONNECTION GUIDELINES

- Pipe material must be suitable to meet local codes and industry standards.
- The pipe must be cleaned and without blemish before any connections are made.
- Do not apply a torch within 12" of the bottom connections of the water heater. Doing so could damage the water heater. Such damages ARE NOT covered by product warranty.
- The size of the hot water pipe should be $\frac{3}{4}$ " diameter.
- Isolation (shutoff valves) should be used to ease future servicing. HTP offers isolation valves (Part #7850P-090). These optional parts may be purchased separately.
- All water piping should be insulated.

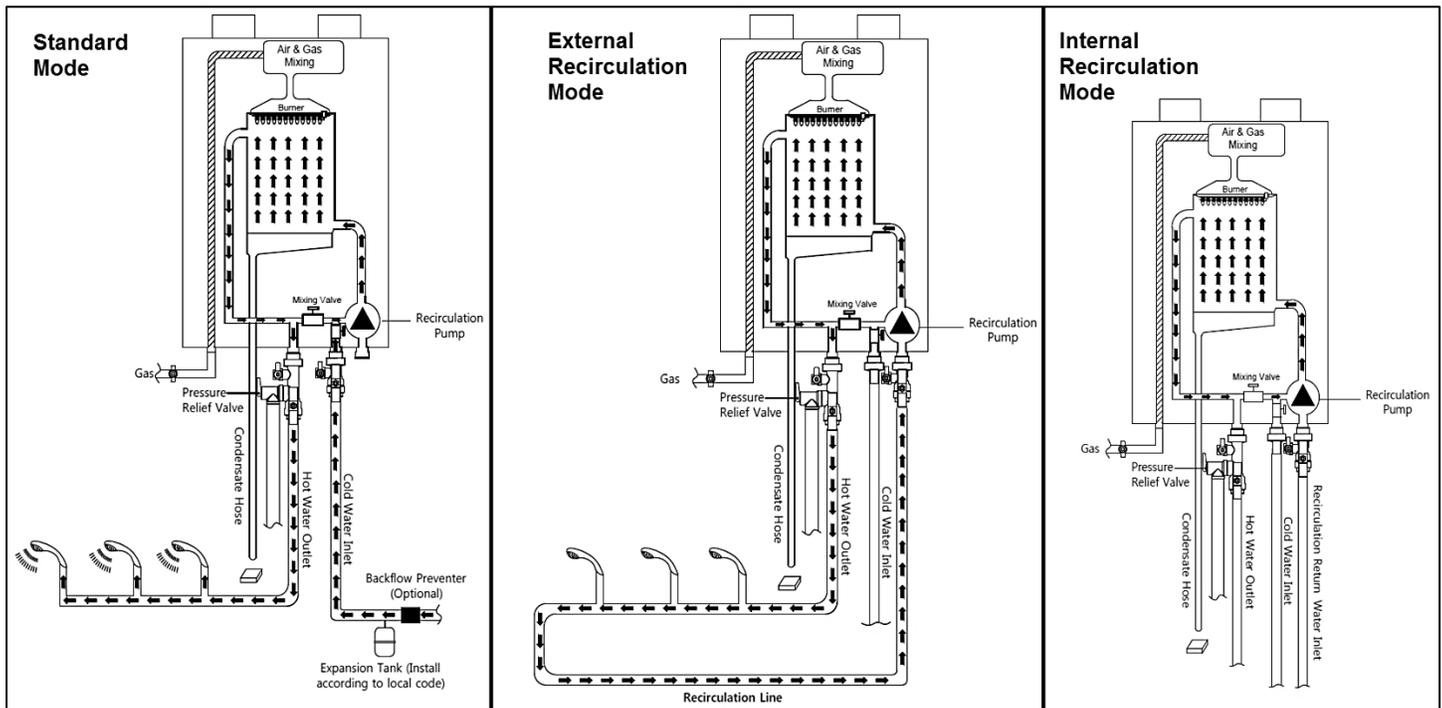


Figure 21 – Operating Modes

Standard (DHW) Mode – This is the operating mode when there is a call for hot water.

Internal Recirculation Mode – When calls for hot water are satisfied, the water heater can be programmed to recirculate water internally to more quickly and efficiently heat hot water. See Recirculation Modes, this manual, for details.

External Recirculation Mode – An external recirculation line must be installed in order to recirculate water externally. This mode keeps an external recirculation loop warm to make hot water production more efficient and also aid in freeze protection. See Recirculation Modes, this manual, for details.

B. INSTALL A BACKFLOW PREVENTER

It may be recommended to use a back flow preventer – check local codes. If a back flow preventer or a no return valve is used, a thermal expansion tank must be installed on the cold water supply between the water heater and valve.

⚠ WARNING

To control thermal expansion, a thermal expansion tank should be installed in systems with an installed backflow preventer. **DO NOT** use a closed type expansion tank. Follow expansion tank manufacturer’s specifications to properly size an expansion tank to the installation. Failure to properly accommodate thermal expansion could result in property damage, severe personal injury, or death.

C. PIPING THE WATER HEATER

CAUTION

Use at least the MINIMUM pipe size for all water heater loop piping This is to avoid the possibility of inadequate flow through the water heater. Using less than the required minimum pipe size and piping could result in system problems, property damage, and premature water heater failure. Such problems ARE NOT covered by product warranty.

Use both thread tape and pipe dope to connect to the 3/4” domestic water inlet and outlet. Tankless isolation valves between the city water supply and tank inlet are recommended for ease of service.

D. APPLICATIONS

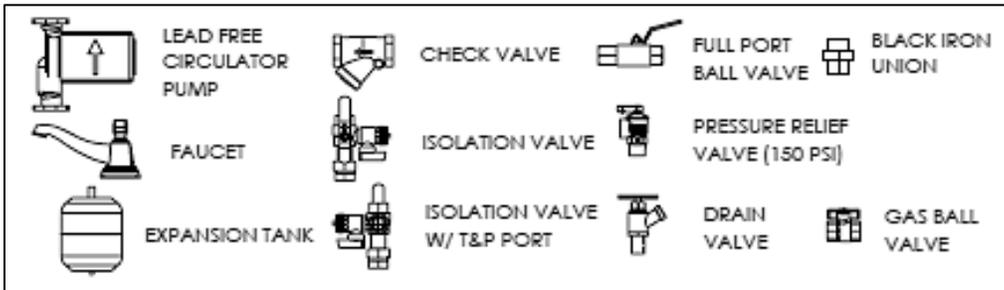


Figure 22 – Piping Symbol Legend

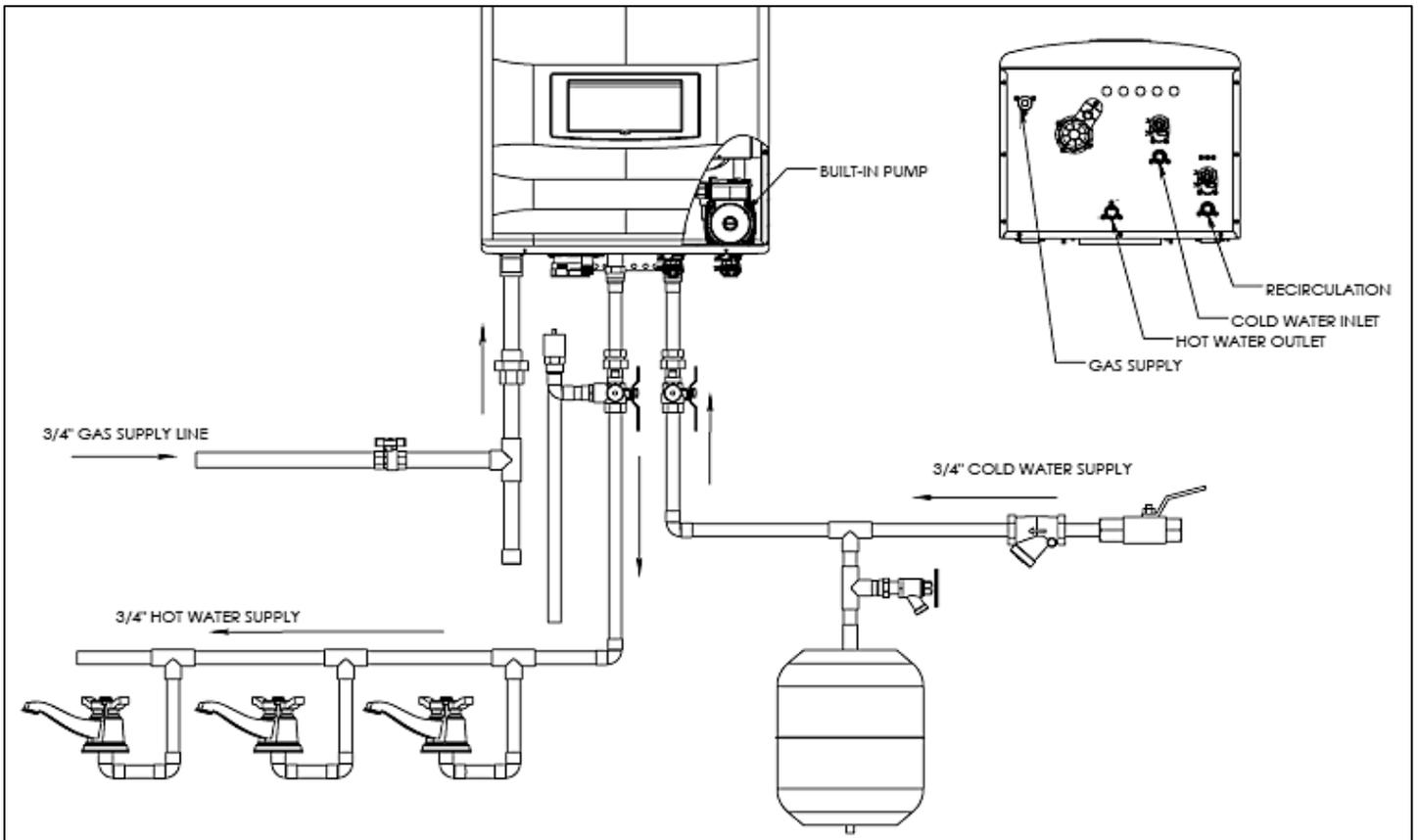


Figure 23 – DHW Piping, Single Water Heater – NOTE: There is a Built-In Flow Check in the Internal Pump Loop

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 water heater and piping 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.

NOTE: These drawings are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.

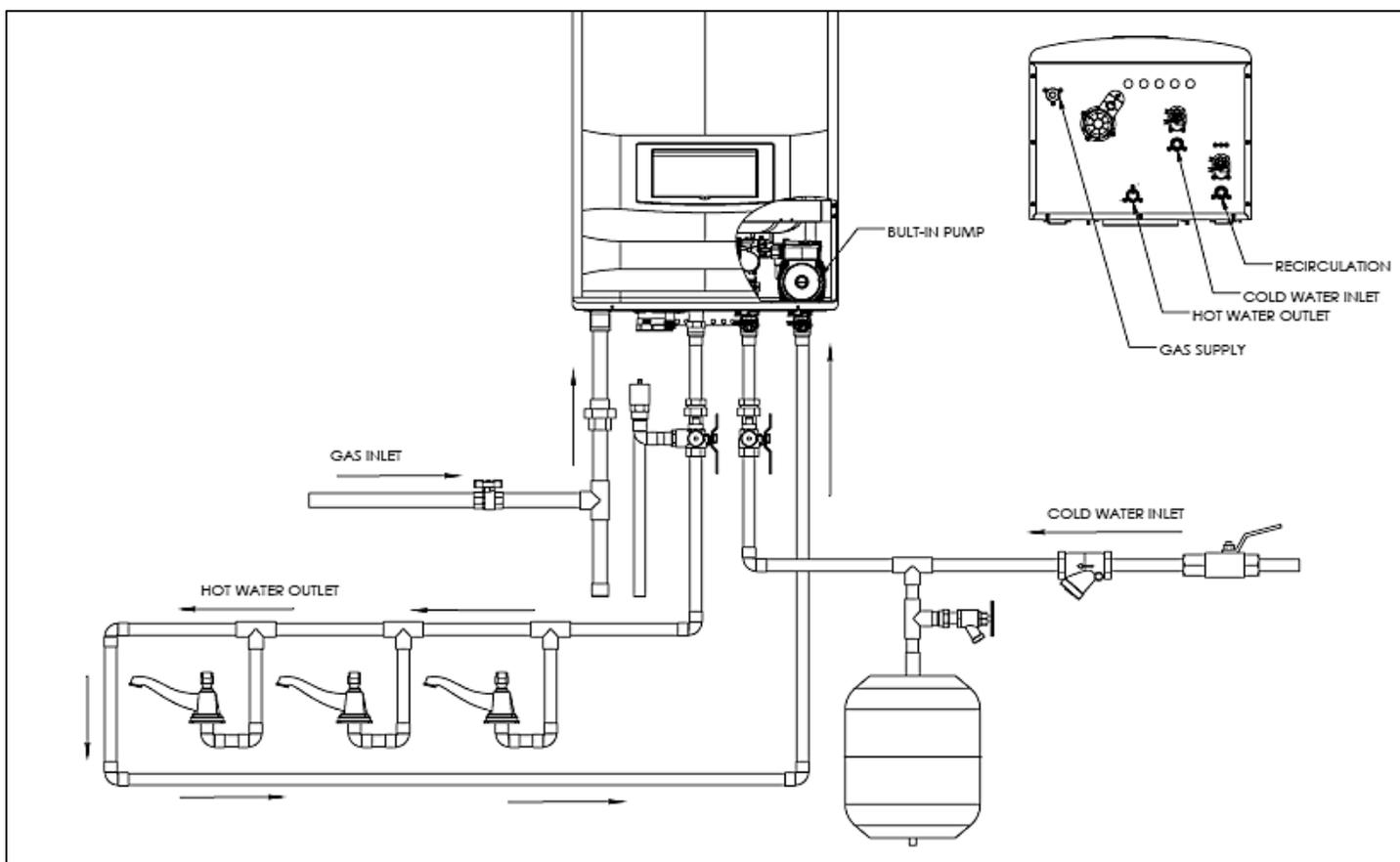


Figure 24 – Piping with Recirculation – NOTE: There is a Built-In Flow Check in the Internal Recirculation Pump Loop

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 water heater and piping 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.

NOTE: These drawings are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.

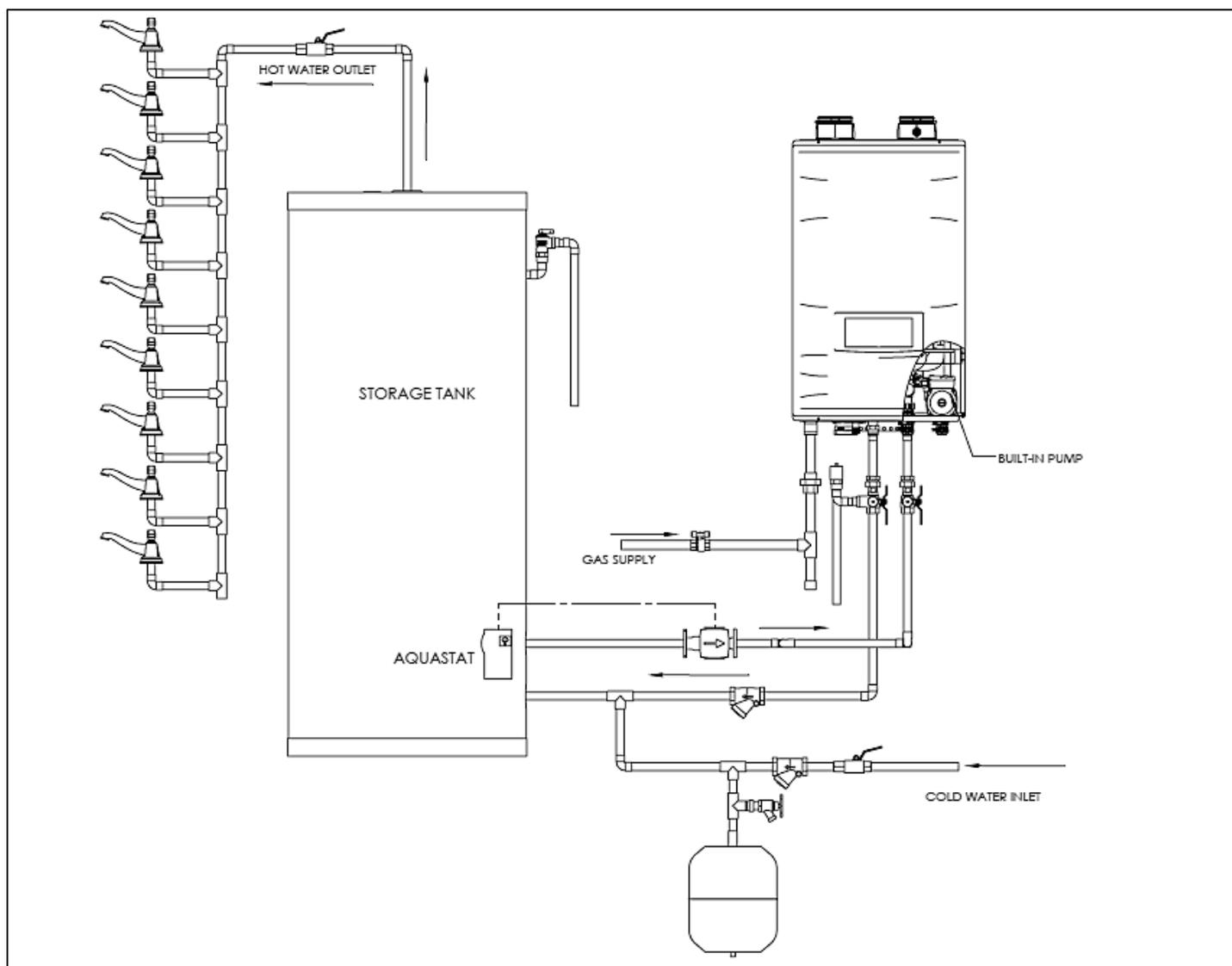


Figure 25 – Water Heater with Storage Tank – NOTE: There is a Built-In Flow Check in the Internal Pump Loop

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 water heater and piping 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.

NOTE: These drawings are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.

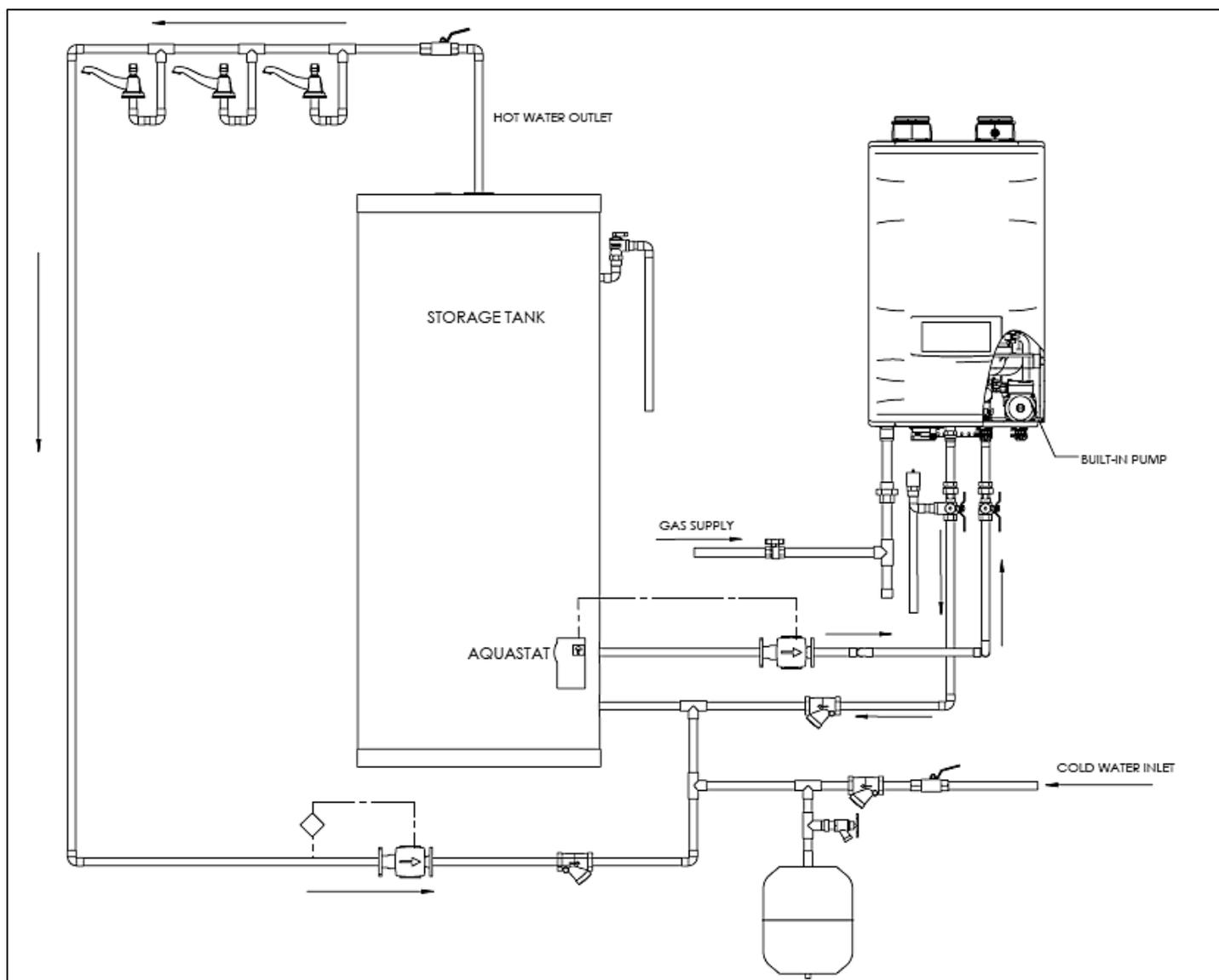


Figure 26 – Water Heater with Storage Tank and Recirculation – NOTE: There is a Built-In Flow Check in the Internal Recirculation Pump Loop

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 water heater and piping 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.

NOTE: These drawings are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.

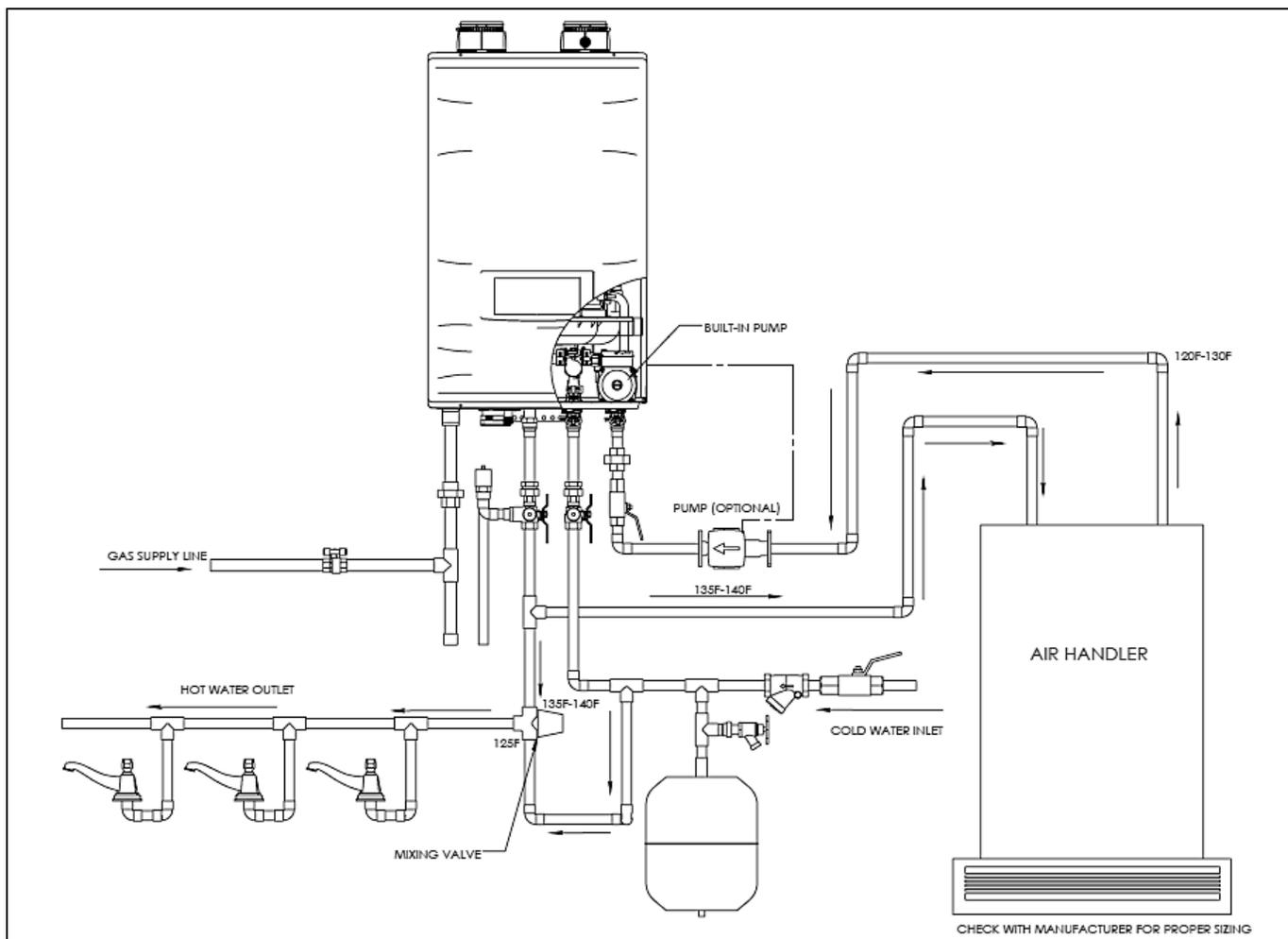


Figure 27 – Water Heater with Air Handler and Recirculation – NOTE: There is a Built-In Flow Check in the Internal Recirculation Pump Loop

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.

NOTES FOR AIR HANDLER APPLICATION:

1. WHEN USING AN AIR HANDLER, IT IS REQUIRED TO SET THE WATER HEATER INSTALLER MODE PARAMETER 19:SU to AH – AIR HANDLER MODE. THE RECIRCULATION PUMP WILL RUN ONCE EVERY 24 HOURS TO SANITIZE WATER IN THE AIR HANDLER LOOP.
 2. MASSACHUSETTS STATE PLUMBING CODE REQUIRES A DISTANCE NO GREATER THAN 50 FEET FROM THE WATER HEATER TO THE FAN COIL IN THE AIR HANDLER.
 3. MASSACHUSETTS STATE PLUMBING CODE REQUIRES AN ELECTRONICALLY TIMED CIRCULATOR PUMP TO ACTIVATE EVERY SIX HOURS FOR 60 SECONDS. THIS CIRCULATOR IS REQUIRED TO BE BRONZE OR STAINLESS.
 4. ALL WATER PIPING MUST BE INSULATED.
 5. YOU MUST INSTALL A VACUUM RELIEF VALVE PER 248 CMR.
- NOTE: THIS DRAWING IS MEANT TO DEMONSTRATE SYSTEM PIPING ONLY. THE INSTALLER IS RESPONSIBLE FOR ALL EQUIPMENT AND DETAILING REQUIRED BY LOCAL CODES.

NOTE: These drawings are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.

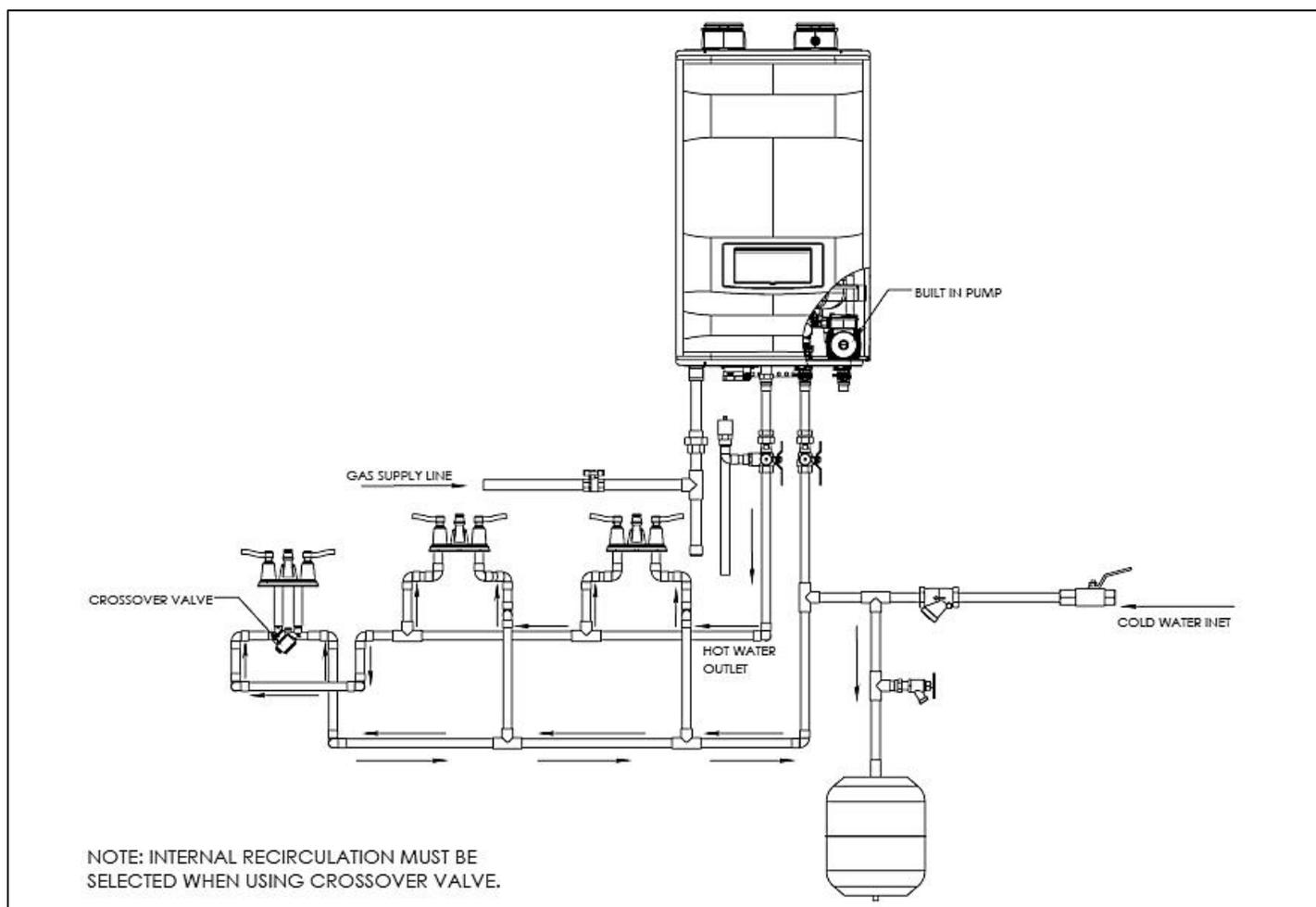


Figure 28 – Water Heater with Thermal Bypass Valve – NOTE: There is a Built-In Flow Check in the Internal Recirculation Pump Loop

Using the Optional Crossover (Thermal Bypass) Valve

In piping applications where a dedicated recirculation line is not available or too costly to install, the water heater can use a crossover (thermal bypass) valve as a method of recirculation. The water heater uses its Internal Recirculation Pump, internal bypass line, and a crossover valve installed between the hot and cold supply lines at the furthest fixture in the plumbing line from the water heater to temporarily use the cold water line to recirculate hot water through the system. A thermal bypass valve may be purchased at your local plumbing supplier.

When using an optional Crossover (Thermal Bypass) Valve, the Internal Recirculation Pump circulates hot water through the system to the thermal bypass valve, where it is directed back to the water heater through the cold water line when hot water is not in use.

NOTE: When using an optional Crossover (Thermal Bypass) Valve, it is required to set the water heater Installer Mode parameter 0:RC to InRC – Internal Recirculation Mode.

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.

E. CIRCULATOR SIZING

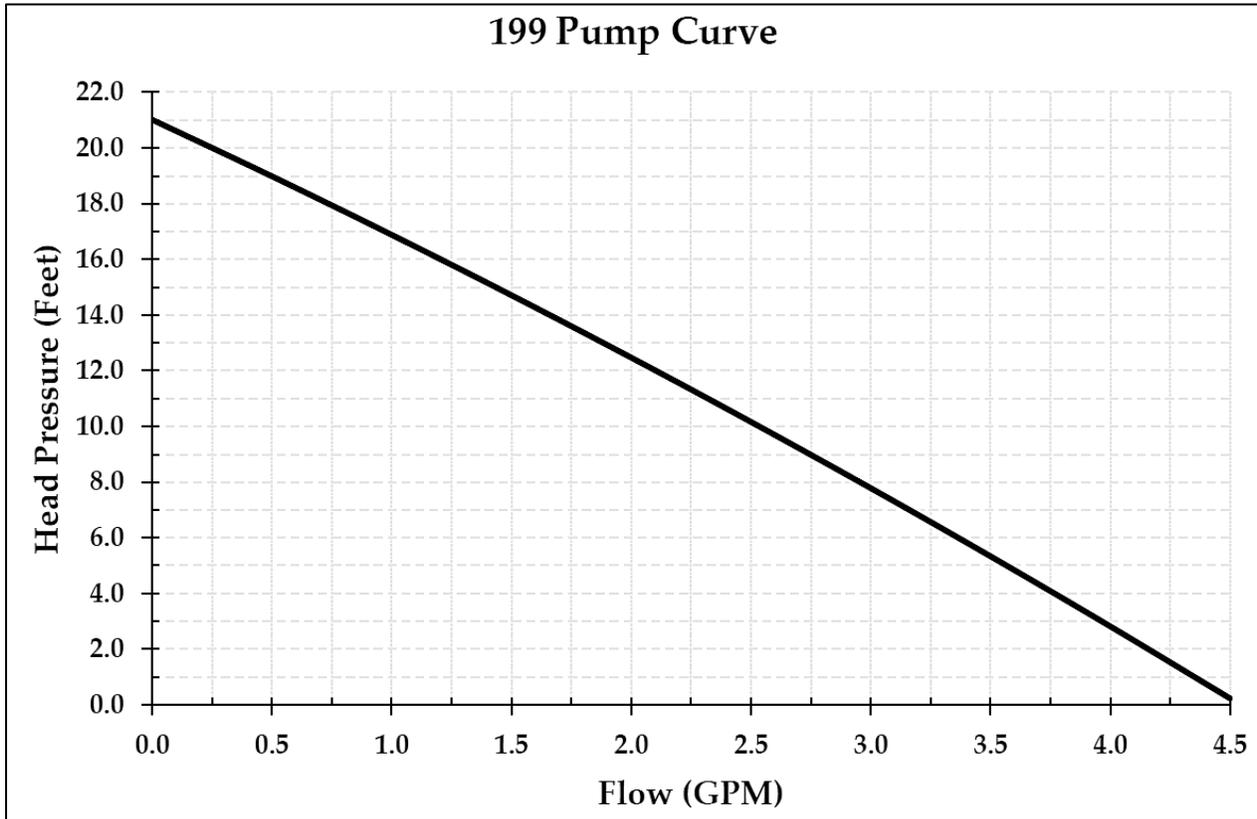


Figure 29 – This chart represents the internal recirculation pump performance curve taking into account valves and heat exchanger pressure losses.

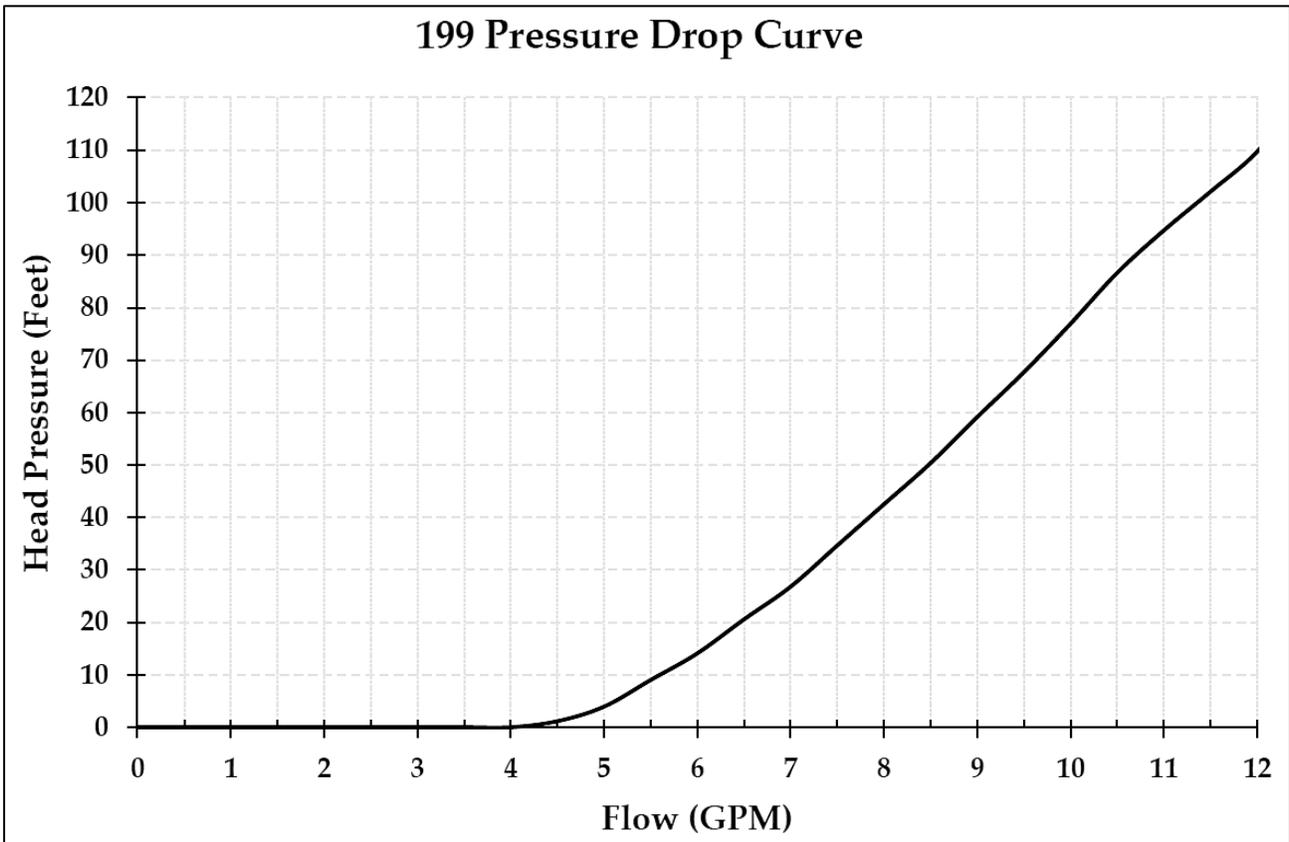


Figure 30 – This chart represents pressure drop through the heat exchanger and internal valves.

F. PRESSURE RELIEF VALVE

An external pressure relief valve must be installed on this water heater. When installing, observe the following guidelines. Failure to comply with these guidelines can result in substantial property damage, personal injury, or death.

This water heater must be provided with an approved 150 psi, ¾" ASME HV Valve that must be installed on the DHW outlet line (See Figure 31). The 150 psi Pressure Relief Valve must be installed on the DHW supply line to ensure a compliant installation and safe operation.

This water heater has a high-temperature shut-off switch built in as a standard safety feature. Therefore, a "pressure only" relief valve is required. DO NOT operate this water heater before the supplied pressure relief valve is installed with sufficient relieving capacity in accordance with the ASME rating plate on the water heater.

Pressure relief valves must be installed as close to the water heater as possible. No other valves should be placed between the pressure relief valve and the appliance. DO NOT install a relief valve with a pressure rating greater than 150 psi. This is the maximum allowable relief valve setting for this water heater.

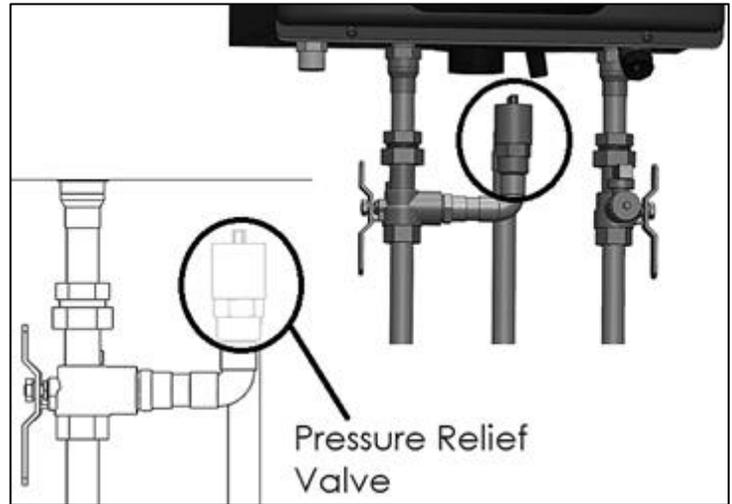


Figure 31 – Relief Valve Details

After installing the relief valve and filling and pressurizing the system, test the operation of the valve by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve. Ensure that the maximum BTU/H rating on the pressure relief valve is equal to or greater than the maximum input BTU/H rating of the combination water heater.

⚠ 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.
- 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 shutoff valve may be installed between the relief valve and water 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, replace it with a new relief valve.
- Test relief valve at least once annually to ensure the waterway is clear. If valve does not operate, turn the water heater "off" **and call a plumber immediately.**
- Take care whenever operating relief valve to avoid scalding injury or property damage.
- For water heaters installed with only a pressure relief valve, the separate storage vessel must have a temperature and pressure relief valve installed. This relief valve shall comply with *Relief Valves for Hot Water Supply Systems, ANSI Z21.22 CSA4.4.*

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.

PART 9 – CONNECT ELECTRICAL POWER / INITIAL STARTUP

⚠ WARNING

Install wiring and electrically ground water heater in accordance with the authority having jurisdiction or, in the absence of such an authority, follow the National Electrical Code, NFPA 70, and/or CSA C22.1 Electrical Code-Part 1 in Canada. Failure to follow all applicable local, state, and national regulations, mandates, and building supply codes for guidelines to install the electrical power supply could result in property damage, serious personal injury, or death.

ELECTRICAL SHOCK HAZARD – To ensure safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so could result in property damage, serious personal injury, or death.