



Pioneer Versa Flame Heating and Combined Appliances

Installation

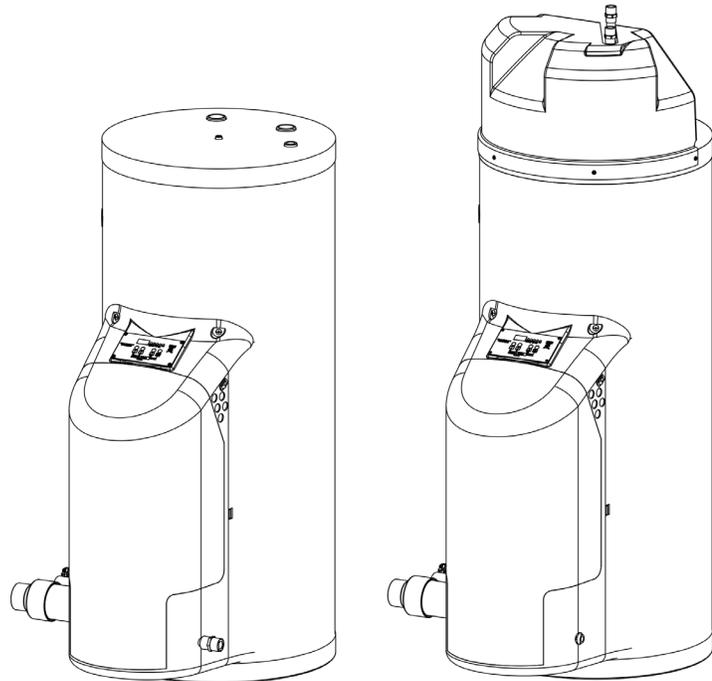
Start-Up

Maintenance

Parts

Warranty

PHR100 / 130 / 160 / 199 Models*



* "LP" Denotes Propane Gas Operation

"C" Denotes Versa Flame Combined Appliance 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.

! WARNING

IF THE INFORMATION IN THIS MANUAL IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY, OR LOSS OF LIFE. DO NOT STORE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department. Installation and service must be provided by a qualified installer, service agency, or the gas supplier.

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- C. Use only your hand to turn the gas control knob. Never use tools. If the handle will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

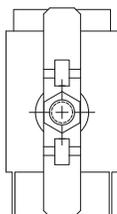
WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance
- Do not touch any electric switch; do not use any phone in your building
- Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers' instructions.
- If you cannot reach your gas supplier, call the fire department.
- Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

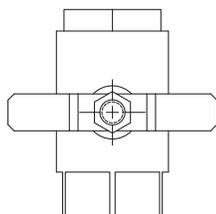
OPERATING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Remove front cover.
6. Turn gas shutoff valve to "off". Handle will be across the piping, do not force.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
8. Turn gas shutoff valve to "on". Handle will be in line with piping.
9. Install Front Cover.
10. Turn on all electric power to appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

GAS VALVE
ON



GAS VALVE
OFF



TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove Front Cover.
4. Turn gas shutoff valve to "off". Handle will be across the piping. Do not force.
5. Install Front Cover.

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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 appliance. This includes all related control information. It is important that this manual, all other documents included in this system, and additional publications including the *Code for the Installation of Heat Producing Appliances* and *National Fuel Gas Code - ANSI Z223.1* (latest versions), 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 AHJ 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 or his/her agent assumes the role, and at government installations, the commanding officer or departmental official may be the AHJ.

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

For the Installer

This appliance must be installed by qualified and licensed personnel. The installer should be guided by the instructions furnished with the appliance, and by local codes and utility company requirements. In the absence of local codes, preference should be given to the *National Fuel Gas Code - ANSI Z223.1*, latest version.

Installations Must Comply With:

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

The latest version of the *National Fuel Gas Code, ANSI Z223.1*, from American Gas Association Laboratories, 8501 East Pleasant Valley Road, Cleveland, OH 44131.

In Canada - *CGA No. B149* (latest version), from Canadian Gas Association Laboratories, 55 Scarsdale Road, Don Mills, Ontario, Canada M3B 2R3. Also, *Canadian Electrical Code, C 22.1*, from Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.

Code for the Installation of Heat Producing Appliances (latest version) from American Insurance Association, 85 John Street, New York, NY 11038.

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

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

⚠ DANGER		⚠ DANGER	
			
<p>⚠ Vapors from flammable liquids will explode and catch fire causing death or severe burns.</p> <p>Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near the water heater.</p> <p>Keep flammable products:</p> <ol style="list-style-type: none"> 1. far away from heater, 2. in approved containers, 3. tightly closed and 4. out of children's reach. 	<p>Water heater has a main burner and pilot flame. The pilot flame:</p> <ol style="list-style-type: none"> 1. which can come on at any time and 2. will ignite flammable vapors. <p>Vapors:</p> <ol style="list-style-type: none"> 1. cannot be seen, 2. are heavier than air, 3. go a long way on the floor and 4. can be carried from other rooms to the pilot flame by air currents. 	<p>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.</p> <p>See instruction manual before setting temperature at water heater.</p> <p>Feel water before bathing or showering. Temperature limiting valves are available, see manual.</p>	
<p>Installation:</p> <p>Do not install water heater where flammable products will be stored or used unless the main burner and pilot flames</p>	<p>are at least 18" above the floor. This will reduce, but not eliminate, the risk of vapors being ignited by the main burner or pilot flame.</p>	<p>Read and follow water heater warnings and instructions. If owners manual is missing, contact the retailer or manufacturer.</p>	

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Part 1 - General Safety Information

This appliance is approved for indoor installations only and is not intended for use as a pool heater. Clearance to combustible materials: 0" top, bottom, sides, and back. Appliance must have room for service: 24" front, 24" top, and 5" left side are minimum recommended service clearances. (A combustible door or removable panel is acceptable front clearance.) This appliance has been approved for closet installation and installation on combustible flooring. Do not install directly on carpeting. Install the appliance in a location where temperature and pressure relief valve discharge or a leak will not result in damage to the surrounding area. If such a location is not available, install an auxiliary catch pan. Use only Category IV vent systems.

 WARNING
<p>Installer - Read all instructions in this manual before installing. Perform steps in the given order.</p> <p>User - This manual is for use only by a qualified heating installer / service technician. Have this appliance serviced / inspected annually by a qualified service technician.</p> <p>FAILURE TO ADHERE TO THE GUIDELINES ON THIS PAGE CAN RESULT IN SUBSTANTIAL PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.</p> <p>NOTE: If the appliance is exposed to the following, do not operate. Immediately call a qualified service technician.</p> <ol style="list-style-type: none"> 1. Fire 2. Damage 3. Water <p>Failure to follow this information could result in property damage, severe personal injury, or death.</p> <p>DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN SUBMERGED IN WATER. Immediately call a qualified service technician. The appliance MUST BE replaced if it has been submerged. Attempting to operate a appliance 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 appliance could result in property damage, severe personal injury, or death.</p> <p>NOTE: Appliance damage due to flood or submersion is considered an Act of God, and IS NOT covered under product warranty.</p> <p>NOTE: Obey all local codes. Obtain all applicable permits before installing the appliance.</p> <p>NOTE: Install all system components and piping in such a manner that does not reduce the performance of any fire rated assembly.</p> <p>Altering any appliance with parts not manufactured by HTP, Inc. WILL INSTANTLY VOID the appliance warranty and could result in property damage, personal injury, or death.</p> <p>The hydronic supply and return connections of this product is for installation in closed loop systems ONLY! Use of this product in any manner other than described in this manual may result in premature product failure, substantial property damage, personal injury, or death. Damage or failure of this product (or the system in which it is installed) due to unauthorized use IS NOT COVERED BY WARRANTY.</p>

CAUTION
<p>Do not use this appliance for anything other than its intended purpose (as described in this manual). Doing so could result in property damage and WILL VOID product warranty.</p> <p>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 appliance 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 appliance and related components near high heat sources.</p>
NOTICE
<p>UNCRATING THE APPLIANCE - Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.</p>

A. Improper Combustion

 WARNING
<p>Do not obstruct the flow of combustion and ventilating air. Adequate air is necessary for safe operation. Failure to keep the exhaust vent and combustion air intake clear of ice, snow, or other debris could result in property damage, serious personal injury, or death.</p>

B. Gas

Should overheating or gas supply fail to shut off, turn off the manual gas control valve to the appliance.

C. When Servicing the Appliance

 WARNING
<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>

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

NOTE: When inquiring about service or troubleshooting, reference the model and serial numbers from the appliance rating label.

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

D. Appliance System

Thoroughly flush the system (without the appliance connected) to remove sediment. The appliance can be damaged by build-up or corrosion due to sediment. HTP recommends a suction strainer in all systems.

Do not use petroleum-based cleaning or sealing compounds in a water heating system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.

Do not use "homemade cures" or "patent medicines". Damage to the appliance, substantial property damage, and/or serious personal injury may result.

Continual fresh make-up water will reduce appliance life. Mineral build-up in the heat exchanger reduces heat transfer, overheats the stainless steel heat exchanger, and causes failure. Addition

of oxygen from make-up water can cause internal corrosion of system components. Leaks in the appliance or piping must be repaired at once.

E. Freeze Protection and Winterizing

NOTE: Consider piping and installation when determining appliance location.

CAUTION
Failure of the appliance due to freeze related damage IS NOT covered by product warranty.
 WARNING
NEVER use any toxic chemical, including automotive, standard glycol antifreeze, or ethylene glycol made for hydronic (non-potable) systems. These chemicals can attack gaskets and seals in water systems, are poisonous if consumed, and can cause personal injury or death.

To winterize the appliance, drain the entire system. Pump two gallons of non-toxic, NSF food grade, FDA rated GRAS (Generally Recognized As Safe) propylene glycol into the tank. Consult the glycol manufacturer for specific instructions on concentration percentage as well as freeze and burst protection methods. Check the concentration to assure protection is adequate to protect the bottom of the appliance from freezing.

NOTE: Damages resulting from incorrect installation or from use of products not approved by HTP, Inc. ARE NOT covered by warranty.

F. Water Temperature Adjustment

If the appliance is going to have a set temperature above 120°F, you must use an ASSE 1017 rated mixing valve to avoid severe burns or death from scalding temperatures.

 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.

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 1 - Approximate Time / Temperature Relationships in Scalds

G. High Elevation Installations

 WARNING
Natural gas at high elevation might contain less heating value than typical 1,000 BTU/cu ft and therefore can cause improper air / gas mix leading to improper combustion. For natural gas installations above 3,000 ft, call your gas provider to determine the heating value of the supplied natural gas.

Part 2 - Before You Start

Remove all sides of the shipping crate of the appliance.

A. What's in the Box

Components included with the appliance:

- Intake PVC Tee with Screens
- Exhaust PVC Coupling with Screens
- 30 PSI Temperature and Pressure Relief Valve
- Installation Manual and Warranty
- User's Information Manual
- Pressure and Temperature Gauge
- Outdoor Sensor (Part # 7250P-319)

B. How the Appliance Operates

Condensing Technology maximizes efficiency by measuring the needs of your heating system through the use of sensors and a control unit. The appliance uses data gathered by these sensors to intelligently deliver highly efficient hydronic heating.

Heat Exchanger

Exhaust gas flows through the primary section of the highly efficient combustion heat exchanger into the secondary heat exchanger section, where the coldest water on the bottom of the tank extracts the last residual amount of heat energy from the gas.

Modulating Combustion System

The combustion system modulates the output of the burner during operation to match system demand and achieve the control set point while in operation. The set point can change by internal or external signals to enhance the overall performance of the system.

Gas Valve

The gas valve senses suction from the blower, allowing gas to flow only if combustion air is flowing.

Swirl Plate System

The swirl plate on the gas valve controls air and gas flow into the burner, assuring better mixing for improved combustion.

Combination Top High Temperature Sensor

The control module adjusts appliance firing rate based on the supply temperature monitored by this sensor.

Bottom Water Temperature Sensor

The control module reduces or increases appliance input according to the return water temperature measured by this sensor.

Temperature and Pressure Gauge

Allows the user to monitor system temperature and pressure.

Control

The integrated control system monitors return and supply water temperature and regulates the unit's BTU output by controlling fan speed, delivering only the amount of heated energy required.

Burner

The metal fiber and high grade stainless steel burner uses pre-mixed air and gas to provide a wide range of firing rates.

Electrical Field Connections with Terminal Strips

The cabinet allows easy access to the clearly marked line voltage and low voltage terminal strips to facilitate wiring to the appliance.

Condensate Drain Connection

This is a condensing high efficiency appliance with a

condensate removal system. Condensate is nothing more than water vapor derived from combustion products, similar to that of an automobile when it is initially started. It is very important that the condensate line slopes away from the appliance and down to a suitable inside drain.

If the appliance condensate outlet is lower than the drain, use a condensate removal pump (Part # 554200, available from HTP). In addition, local authorities may require a condensate neutralizer to neutralize the condensate. Condensate neutralizers are made up of lime crystals, marble, or phosphate chips. Neutralizers can be installed in the field by the installer and purchased from HTP (7450P-212).

It is also very important not to expose the condensate line to freezing temperatures or any type of blockage. Plastic tubing must be the only material used for the condensate line. Steel, brass, copper, or other materials will be subject to corrosion or deterioration. A second vent may be necessary to prevent condensate line vacuum lock on a long horizontal run. Also, an increase in pipe size may be necessary to allow condensate to drain properly. Support of the condensate line may be necessary to avoid blockage of the condensate flow.

Spark Ignition

The burner flame ignites by applying high voltage to the system spark electrode. This causes a spark from electrode to ground.

Outdoor Sensor

When equipped, the outdoor sensor monitors outdoor temperature and adjusts the set point to provide greater efficiency.

(Optional) Indirect Tank Sensor – Indirect Priority

 WARNING
To control the temperature of low temperature heating circuits when using an indirect fired water appliance, a thermostatic mixing valve is required. Failure to install a thermostatic mixing valve could result in property damage, severe personal injury, or death.

The indirect sensor allows the installer to operate the appliance to satisfy two temperatures: one for central heating and the other for a domestic hot water heater. This allows the user to increase water temperature supplied to the appliance to recover faster by prioritizing flow at a higher rate than may be needed for central heating. **NOTE:** This application requires two separate circulators.

DHW Module (Versa Flame Models ONLY)

The Versa Flame combines all of the capabilities of the Pioneer with an integrated domestic hot water (DHW) module built into the appliance. Features of the module include:

Brazed Plate Heat Exchanger

When the system calls for DHW, hot heat transfer fluid is drawn from the top of the appliance through the brazed plate heat exchanger. The heat exchanger consists of a series of thin corrugated plates brazed together in counter flow channels of alternating hot and cold fluids. This counter flow system provides optimal heat transfer to the DHW system.

Circulation Pump

Draws hot heat transfer fluid from the top of the appliance through the brazed plate heat exchanger and returns the cooler heat transfer fluid to the bottom of the appliance.

Flow Switch

Senses flow into the brazed plate heat exchanger and turns on the pump when flow is greater than .5 gpm. The flow switch will shut down the pump when flow is less than .5 gpm.

Thermostatic Mixing Valve

Accurately controls the temperature of DHW by mixing cold water with the hot water leaving the heat exchanger. The installer can adjust DHW temperature by manually adjusting the valve.

C. Optional Equipment

Optional equipment available from HTP (and Part #):

- 3" Stainless Steel Vent Termination Kit (V1000)
- 4" Stainless Steel Vent Termination Kit (V2000)
- 2" PVC Concentric Vent Kit (KGAVT0501CVT)
- 3" PVC Concentric Vent Kit (KGAVT0601CVT)
- 3" Polypro Vent Kit (8400P-001)
- 3" Polypro Pipe
(33' length # 8400P-002, 49.5' length # 8400P-003)
- System Sensor (7250P-324)
- Indirect Tank Sensor (7250P-325)
- Alarm System (7350P-602) to monitor any failure
- Outdoor Sensor (7250P-319)
- PC Connection Kit (7250P-320)
- Condensate Neutralizer (7450P-212)
- UL 353 Compliant Low Water Cut-Off Interface Kit with Manual Reset (7350P-601)
- Vision 2 Temperature Mixing Control (7250P-322)

NOTE: When using an optional system sensor, pipe insulation must be wrapped around it to improve temperature measurement accuracy and increase overall system efficiency.

Part 3 - Prepare the Appliance

Remove all sides of the shipping crate to allow the appliance to be moved into its installation location.

CAUTION
COLD WEATHER HANDLING - If the appliance has been stored in a very cold location (BELOW 0°F) before installation, handle with care until the components come to room temperature. Failure to do so could result in damage to the appliance.
Carefully consider installation when determining appliance location. Please read the entire manual before attempting installation. Failure to properly take factors such as appliance venting, piping, condensate removal, and wiring into account before installation could result in wasted time, money, and possible property damage and personal injury.

A. Locating the Appliance

 WARNING
This appliance is certified for indoor use only. DO NOT INSTALL OUTDOORS. Outdoor installations ARE NOT covered by warranty. Failure to install the appliance indoors could result in property damage, severe personal injury, or death.
Incorrect ambient conditions can lead to damage to the heating system and put safe operation at risk. Ensure that the installation location adheres to the information included in this manual. Failure to do so could result in property damage, serious personal injury, or death. Failure of an appliance or components due to incorrect operating conditions IS NOT covered by product warranty.

▲ WARNING

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

1. Installation Area (Mechanical Room) Operating Conditions

- Ensure ambient temperatures are higher than 32°F / 0°C and lower than 104°F / 40°C
- Prevent the air from becoming contaminated by the products, places, and conditions listed in this manual
- Avoid continuously high levels of humidity
- Never close existing ventilation openings
- Ensure a minimum 1" clearance around hot water and exhaust vent pipes
- NOTE: To prevent condensing in the fan, it is recommended to avoid prolonged exposure to temperatures below 45°F

▲ WARNING

This appliance has a condensate disposal system that may freeze if exposed to sustained temperatures below 32°F. Precautions should be taken to protect the condensate trap and drain lines from sustained freezing conditions. Failure to take precautions could result in property damage, severe personal injury, or death.

2. Check for nearby connections to:

- System water piping
- Venting connections
- Gas supply piping
- Electrical power
- Condensate drain

3. Check area around appliance. Remove any combustible materials, gasoline, and other flammable liquids.

▲ WARNING

Failure to keep the appliance area clear and free of combustible materials, liquids, and vapors can result in substantial property damage, severe personal injury, or death.

CAUTION

The service life of the appliance's exposed metallic surfaces, such as the casing, as well as internal surfaces, such as the heat exchanger, are directly influenced by proximity to damp and salty marine environments. In such areas higher concentration levels of chlorides from sea spray coupled with relative humidity can lead to degradation of appliance components. In these environments, appliances must not be installed using direct vent systems which draw outdoor air for combustion. Such appliances must be installed using room air for combustion. Indoor air will have a much lower relative humidity, and hence potential corrosion will be minimized.

Failure of the appliance or components due to incorrect operating conditions IS NOT covered by product warranty.

▲ CAUTION

High heat sources (generating heat 100°F / 37°C or greater, such as boiler flue pipes, space heaters, etc.) may damage plastic components of the appliance 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 appliance and related components near high heat sources.

Locate the appliance where any leakage from the relief valve, related piping, tank, or connections will not result in damage to surrounding areas or lower floors of the building. The appliance should be located near a floor drain or installed in a drain pan. Leakage damages ARE NOT covered by warranty.

4. Gas control system components must be protected from dripping water during operation and service.

5. If the appliance is to replace an existing appliance, check for and correct any existing system problems, such as:

- System leaks
- Location that could cause the system and appliance to freeze and leak
- Incorrectly sized expansion tank

6. Clean and flush system when reinstalling a appliance.

NOTE: When installing in a zero clearance location, it may not be possible to read or view some product labeling. It is recommended to make note of the appliance model and serial number.

B. Leveling

▲ CAUTION

In order for the condensate to properly flow out of the collection system, the area where you locate the appliance must be level. Location must also fully support the weight of the filled appliance.

C. Clearances for Service Access

CAUTION

All appliances eventually leak. It is recommended to install a catch pan beneath the appliance. This catch pan should be sized with a maximum depth of 2", and a minimum diameter 2" greater than the diameter of the appliance. The catch pan should empty into an open drain line. This drain line should be 3/4" ID minimum, piped to an open drain. Failure to follow these instructions could result in property damage. Such damages ARE NOT covered by product warranty.

▲ WARNING

The space must be provided with combustion / ventilation air openings correctly sized for all other appliances located in the same space as the appliance. The appliance cover must be securely fastened to prevent the appliance from drawing air from the appliance room. This is particularly important if the appliance is in a room with other appliances. Failure to comply with the above warnings could result in substantial property damage, severe personal injury, or death.

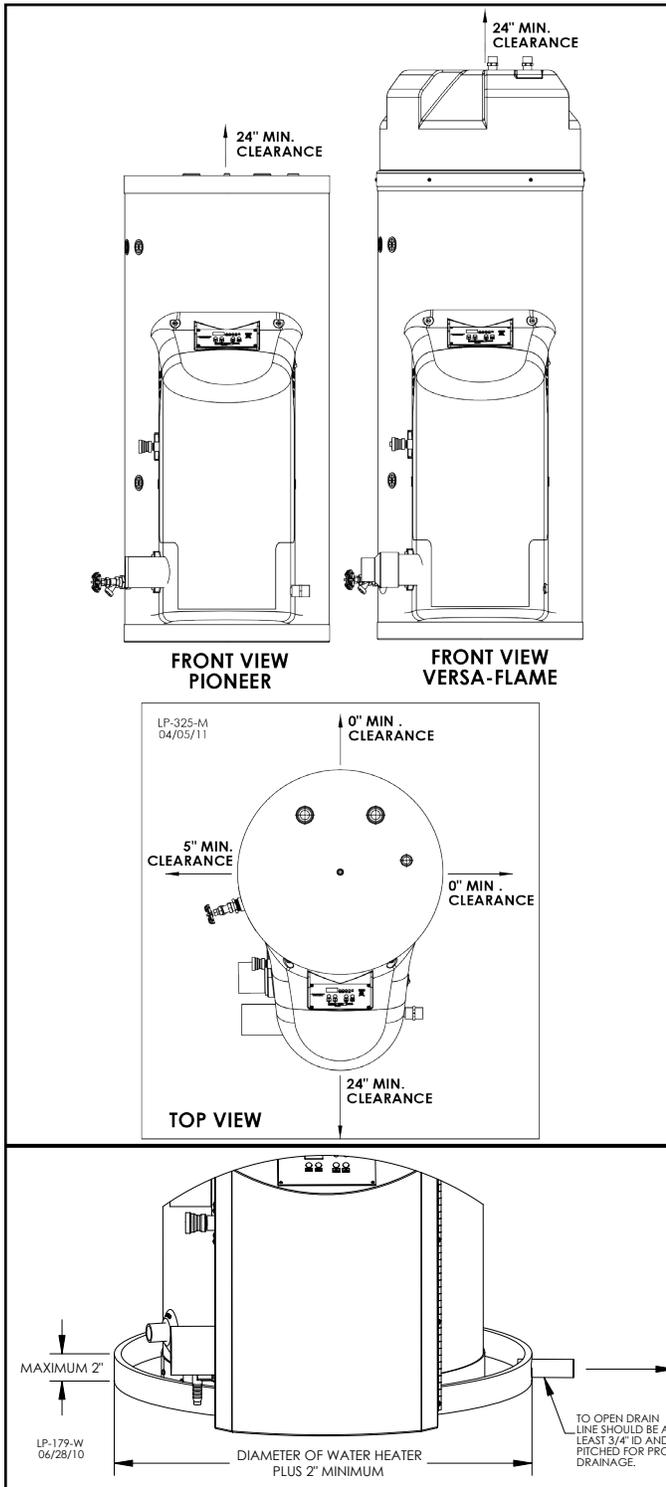


Figure 1 - Recommended Service Clearances and Catch Pan Dimensions

NOTE: If you do not provide the minimum clearances shown in Figure 1 it might not be possible to service the appliance without removing it from the space.

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

D. Residential Garage and Closet Installations

CAUTION

Check with your local Authority Having Jurisdiction for requirements when installing the appliance in a garage or closet. Please read the entire manual before attempting installation. Failure to properly take factors such as venting, piping, condensate removal, and wiring into account before installation could result in wasted time, money, and possible property damage and personal injury.

Precautions

If the appliance is located in a residential garage, per ANSI Z223.1:

- Install the appliance burner and ignition devices a minimum of 18" above the floor of the garage. This will ensure the burner and ignition devices are well off the floor.
- When raising the appliance ensure the entire bottom and fully filled weight of the appliance are fully supported.
- Locate or protect the appliance so it cannot be damaged by a moving vehicle.

WARNING

The space must be provided with correctly sized combustion/ventilation air openings for all other appliances located in the space with the appliance. For power venting installations using room air for combustion, refer to the venting section, this manual, for descriptions of confined and unconfined spaces. Do not install the appliance in an attic. Failure to comply with these warnings could result in substantial property damage, severe personal injury, or death.

E. Exhaust Vent and Intake Pipe

The appliance is rated ANSI Z21.10.3 Category IV (pressurized vent, likely to form condensate in the vent) and requires a special vent system designed for pressurized venting.

NOTE: The venting options described here (and further detailed in the Venting section, this manual) are the lone venting options approved for this appliance. Failure to vent the appliance in accordance with the provided venting instructions will void the warranty.

DANGER

Failure to vent the appliance properly will result in serious personal injury or death.

WARNING

Do not attempt to vent this appliance by any means other than those described in this manual. Doing so will void the warranty and may result in severe personal injury or death.

Vents must be properly supported. Appliance exhaust and intake connections are not designed to carry heavy weight. Vent support brackets must be within 1' of the appliance and the balance at 4' intervals. Appliance must be readily accessible for visual inspection for first 3' from the appliance. Failure to properly support vents could result in property damage, severe personal injury, or death.

The exhaust discharged by this appliance may be very hot. Avoid touching or other direct contact with the exhaust gases of the vent termination assembly. Doing so could result in severe personal injury or death.

1. Direct Vent of Exhaust and Intake

If installing a direct vent option, combustion air must be drawn from the outdoors directly into the appliance intake and exhaust must terminate outdoors. There are three basic direct vent options detailed in this manual: 1. Side Wall Venting, 2. Roof Venting, and 3. Unbalanced Venting.

Be sure to locate the appliance such that the exhaust vent and intake piping can be routed through the building and properly terminated. Different vent terminals can be used to simplify and eliminate multiple penetrations in the building structure (see Optional Equipment in Venting Section). The exhaust vent and intake piping lengths, routing, and termination methods must all comply with the methods and limits given in the Venting Section, this manual.

When installing a combustion air intake from outdoors, care must be taken to utilize uncontaminated combustion air. **To prevent combustion air contamination, see Table 2.**

2. Power Venting, Indoor Combustion Air in Confined or Unconfined Space

This appliance requires fresh, uncontaminated air for safe operation and must be installed in a mechanical room where there is adequate combustion and ventilating air. **NOTE: To prevent combustion air contamination, see Table 2.**

Combustion air from the indoor space can be used if the space has adequate area or when air is provided through a duct or louver to supply sufficient combustion air based on the appliance input. Never obstruct the supply of combustion air to the appliance. If the appliance is installed in areas where indoor air is contaminated (see Table 2) it is imperative that the appliance be installed as direct vent so that all combustion air is taken directly from the outdoors into the appliance intake connection.

Unconfined space is space with volume greater than 50 cubic feet per 1,000 BTU/hr (4.8 cubic meters per kW) of the total input rating of all fuel-burning appliances installed in that space. Rooms connected directly to this space through openings not furnished with doors are considered part of the space. See Venting Section for details.

Confined space is space with volume less than 50 cubic feet per 1,000 BTU/hr (4.8 cubic meters per kW) of the total input rating of all fuel-burning appliances installed in that space. Rooms connected directly to this space through openings not furnished with doors are considered part of the space.

When drawing combustion air from inside a conventionally constructed building to a confined space, such space should be provided with two permanent openings: one located 6" (15 cm) below the space ceiling, the other 6" (15cm) above the space floor. Each opening should have a free area of one square inch per 1,000 BTU/hr (22cm²/kW) of the total input of all appliances in the space, but not less than 100 square inches (645cm²).

If the confined space is within a building of tight construction, air for combustion must be obtained from the outdoors as outlined in the Venting section of this manual.

CAUTION

When drawing combustion air from the outside into the mechanical room, care must be taken to provide adequate freeze protection.

WARNING

Failure to provide an adequate supply of fresh combustion air can cause poisonous flue gases to enter the living space, resulting in severe personal injury or death. To prevent combustion air contamination, see Table 2.

F. Carbon Monoxide Detectors In the Commonwealth of Massachusetts and As Required by State and Local Codes:

Installation of Carbon Monoxide Detectors: At the time of installation or replacement of the vented gas fueled appliance, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas appliance is installed, unless the appliance is located in a detached, uninhabitable structure separate from the dwelling, building, or structure used in whole or in part for residential purposes. In addition, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on each additional level of the dwelling, building, or structure served by the vented gas appliance. It shall be the responsibility of the property owner to secure the service of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

a. In the event that the vented gas fueled appliance is installed in a crawl space or attic, the hard wired carbon monoxide detector with alarm and battery back-up shall be installed on the next adjacent floor level.

b. In the event that these requirements cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

WARNING

Do not attempt to vent this appliance by any means other than those described in this manual. Doing so will void the warranty and may result in severe personal injury or death.

Approved Carbon Monoxide Detectors: Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 70 and be ANSI/UL 2034 listed and IAS certified.

G. Prevent Combustion Air Contamination

Install intake air piping for the appliance as described in the Venting Section, this manual. Do not terminate exhaust in locations that can allow contamination of intake air.

WARNING

Ensure that the intake air will not contain any of the contaminants in Table 2. Contaminated air will damage the appliance, resulting in possible substantial property damage, severe personal injury, or death. For example, do not pipe intake air near a swimming pool or laundry facilities. These areas always contain contaminants.

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 2 - Products and Areas Likely to Have Contaminants

NOTE: DAMAGE TO THE APPLIANCE CAUSED BY EXPOSURE TO CORROSIVE VAPORS IS NOT COVERED BY WARRANTY. (Refer to the limited warranty for complete terms and conditions.)

H. Removing an Appliance from a Common Vent System

DANGER

Do not install the appliance into a common vent with any other appliance. This will cause flue gas spillage or appliance malfunction, resulting in possible substantial property damage, severe personal injury, or death.

WARNING

Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

- When removing an existing appliance, follow the steps below.
1. Seal any unused openings in the common venting system.
 2. Visually inspect the venting system for proper size and horizontal pitch to determine if there is blockage, leakage, corrosion, or other deficiencies that could cause an unsafe condition.
 3. If practical, close all building doors, windows, and doors between the space in which the appliance remains connected to the common venting system and other spaces in the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, at maximum speed. Do not operate a summer exhaust fan. Close all fireplace dampers.
 4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust the thermostat so the appliance will operate continuously.

5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle or smoke from a cigarette.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined, return doors, windows, exhaust fans, fireplace dampers, and any other gas burning appliances to their previous condition of use.
7. Any improper operation of the common venting system should be corrected to conform to the National Fuel Gas Code, ANSI Z223.1. When resizing any portion of the common venting system, the system should approach the minimum size as determined using the appropriate tables in Appendix G of ANSI Z223.1.

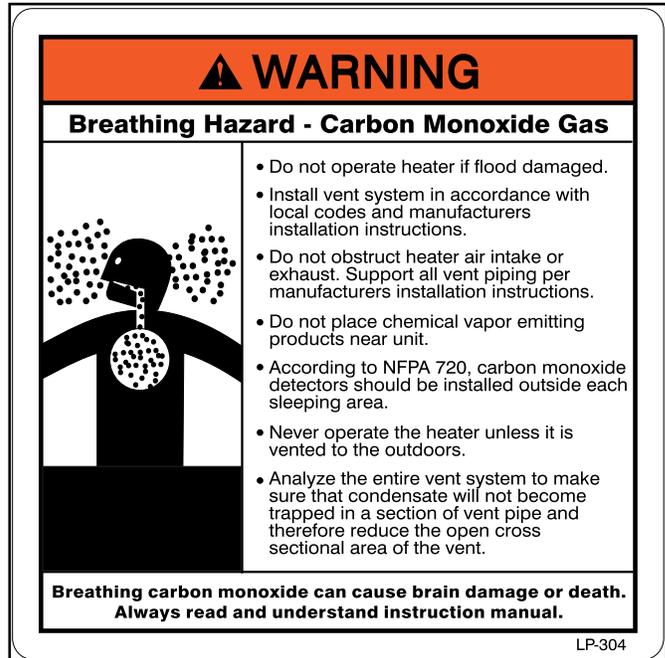


Figure 2 - CO Warning Label

I. Water Chemistry Requirements - CH and DHW

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 7 grains (120 mg/L) (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.

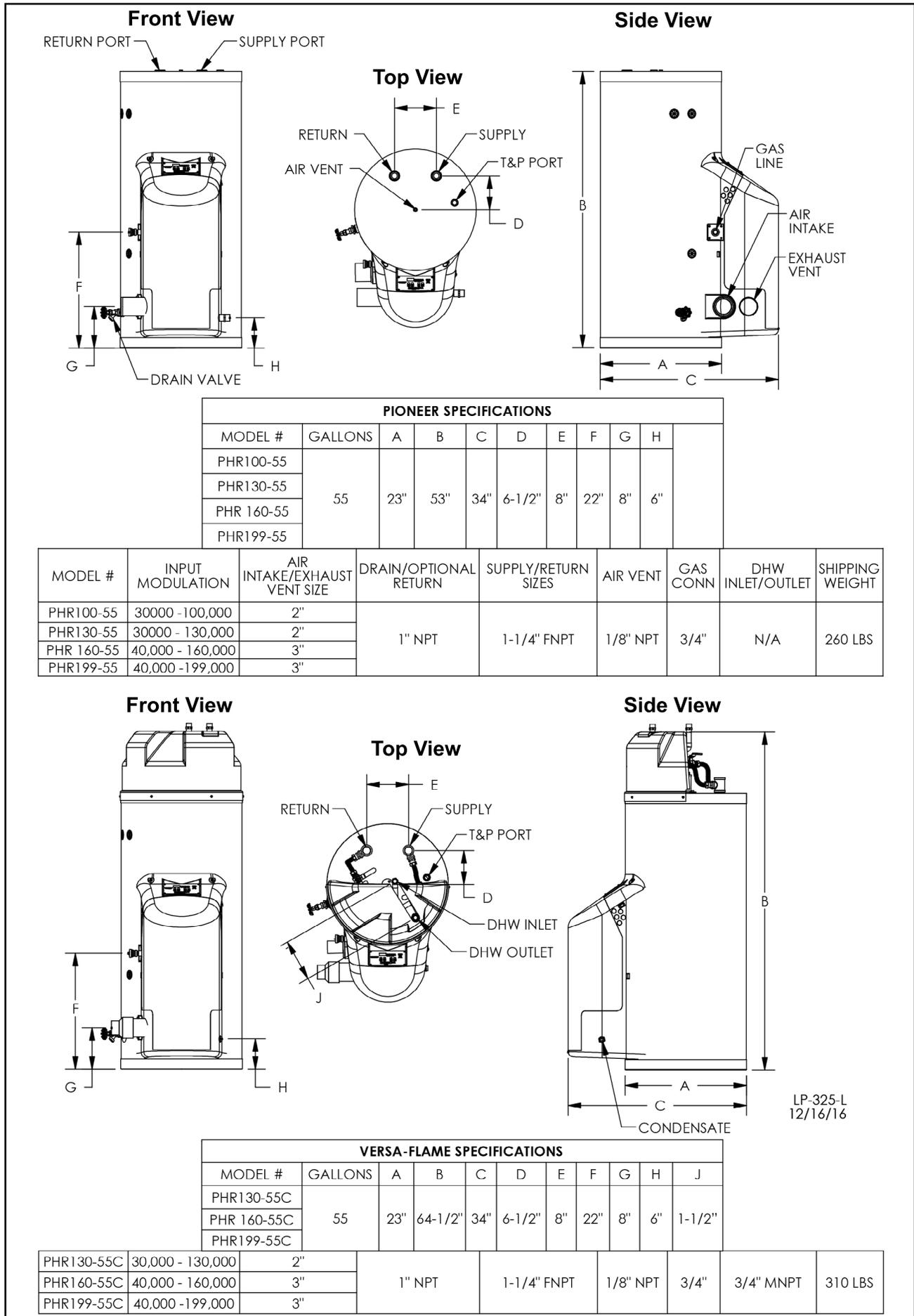


Figure 3 - Appliance Dimensions - NOTE: All Dimensions Are Approximate

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 appliance. Doing so WILL VOID the warranty. Use only copper, brass, or stainless steel fittings. Teflon thread sealant must be used on all connections.

Plumbing of this appliance should only be done by a qualified, licensed plumber in accordance with all local and national plumbing codes or any applicable prevailing standards. The appliance may be connected to an indirect storage tank to supply domestic hot water. HTP offers 30/45/60/80/119 gallon size indirect storage tanks in Stainless Steel or 50/80/119 in Glass Lined construction. These indirect storage tanks will be directly connected to the supply and return connections.

A. Hydronic Plumbing

CAUTION

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

The building piping system must meet or exceed the piping requirements in this manual.

The appliance 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 appliance. Some codes/jurisdictions may require additional external controls.

This appliance is designed to function in a closed loop 15 PSI System. A factory installed low water cut off will ensure that you have adequate water in the system. We have also included a T&P gauge which allows the user to monitor system pressure and outlet temperature from the appliance.

Install the appliance so the gas ignition system components are protected from water (dripping, spraying, etc.) allowing clearance for basic service of circulator replacement, valves and other parts. Observe minimum 1" clearance around all hot water pipes not protected by non-combustible materials. On an appliance installed above radiation level, some states and local codes require a low water cut off device at the time of installation. If the appliance supplies hot water to heating coils in air handler units, flow control valves or other devices must be installed to prevent gravity circulation of appliance water in the coils during the cooling cycle. Chilled water medium must be piped in parallel with the appliance.

Basic steps are listed below which will guide you through the installation of the appliance.

1. Connect the system return marked "Return".
2. Connect the system supply marked "Supply".
3. Install purge and balance valve or shut off valve and drain on system return to purge air out of each zone.

4. Install a back flow preventer on the cold feed make-up water line.

5. Install a pressure reducing valve on the cold feed make-up water line, (15 PSI nominal on the system return). Check temperature and pressure gauge which should read minimum pressure of 12 PSI.

6. Install a circulator as shown in piping details (this section). Make sure the circulator is properly sized for the system and friction loss.

7. Install an expansion tank on the system supply. Consult manufacturer instructions for specific information relating to expansion tank installation. Size the expansion tank for the required system volume and capacity.

8. Install supply air vent to remove air when commissioning the appliance.

9. The safety relief valve is supplied with the appliance, and must be installed on the top 3/4" NPT fitting marked "T&P". Pipe the discharge of the safety relief valve to prevent injury in the event of pressure relief. Discharge 6" above the drain. Provide piping that is the same size as the safety relief valve outlet. Never block the outlet of safety relief valve.

B. Circulator Pumps

CAUTION

DO NOT install automatic air vents on closed type expansion tank systems. Air must remain in the system and return to the tank to provide an air cushion. An automatic air vent would cause air to leave the system, resulting in improper operation of the expansion tank.

Sizing Space Heat System Piping

1. See piping details in this manual. Special attention must be paid when connecting an indirect storage tank, as temperature delivered to low temperature circuits may be higher than desired. The use of thermostatic mixing valves is required to protect these circuits.

CAUTION

To control the temperature of low temperature heating circuits when using an indirect fired water heater, a thermostatic mixing valve is required. Failure to install a thermostatic mixing valve when using an indirect fired water heater could result in damage the heating circuits. Such damage IS NOT covered by warranty.

2. Size the piping and components in the space heating system using recognized design methods.

C. Backflow Preventer

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

D. Expansion Tank

Expansion Tank and Make-Up Water

1. Ensure that the expansion tank is sized to correctly handle appliance and system water volume and temperature. The appliance volume is 55 gallons.

CAUTION

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

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.
3. Connect the expansion tank on the suction side of the circulator. Always install the system fill connection at the same point as the expansion tank connection to the system.
4. Most chilled water systems are piped using a closed type expansion tank.

WARNING

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

E. Relief Valve

Install supplied temperature and pressure relief valve. Connect discharge piping to a safe disposal location, following the guidelines on the next page. Replacement relief valves are available. See parts list.

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 appliance. Failure to install a properly sized temperature and pressure relief valve could result in explosion and property damage, serious 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.

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 appliance 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 appliance "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

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. Zoning with Zone Valves

1. Connect appliance to system as shown in the Applications diagrams. Properly size circulators for friction loss of zone valves and piping for proper operation.
2. Connect DHW (domestic hot water) piping to indirect storage water appliance as shown.

G. Zoning with Circulators

1. Connect appliance to system as shown in the Applications diagrams. Properly size each zone circulator for friction loss of each zone for proper operation.
2. Install a separate circulator for each zone.
3. Connect DHW piping to indirect storage water appliance as shown.

H. Multiple Appliances

1. All piping shown is reverse return to assure balanced flow through the connected appliances.
2. Connect DHW piping to indirect storage water appliance as shown.

I. DHW Heat Pack and Indirect Water Heater Scalding

These appliances 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 appliance to obtain the increased water temperature required by these appliances you may create the potential for scald injury.

To protect against injury, install the mixing valve included with this appliance. This valve will reduce point of use discharge temperatures by mixing cold and hot water in the branch supply lines.

Table 3 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.

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 3 - Approximate Time / Temperature Relationships in Scalds

WARNING

ASSE 1017 or ASSE 1070 temperature limiting or mixing valves do not eliminate the risk of scalding.

To avoid scalding:

- Set the appliance 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.

J. Fill and Purge Heating System

WARNING

The appliance must be full of water and the system fully purged BEFORE powering the appliance. When filling the appliance, 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 appliance 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 appliance warranty.

- Attach the hose to either balance or purge hose connector or drain valve and run hose to nearest drain.
- Close the other side of the balance and purge valve or the shut off valve after the drain.
- Open first zone balance and purge or drain valve to let water flow out the hose. If zone valves are used, open the valves one at a time manually. (NOTE: You should check valve manufacturer instruction prior to opening valves manually, so as not to damage any valves.)
- Manually operate fill valve regulator. When water runs out of the hose, while it's connected to the balance and purge valve or drain you will see a steady stream of water (without bubbles). Close balance and purge valve or drain to stop the water from flowing. Disconnect the hose and connect it to next zone to be purged.

- Repeat this procedure for additional zones (one at a time).

CAUTION

For installation that incorporates standing iron radiation and systems with manual vents at high points, follow above section and, starting with the nearest manual air vent, open until water flows out. Then close vent. Repeat procedure, working your way toward furthest air vent.

NOTE: It may be necessary to install a basket strainer in an older system where larger amounts of sediment may be present. Annual cleaning of strainer may be necessary.

Upon completion, make sure that the fill valve is in automatic position and each zone balance and purge or shut off is in an open position and zone valves are set for automatic operation.

WARNING

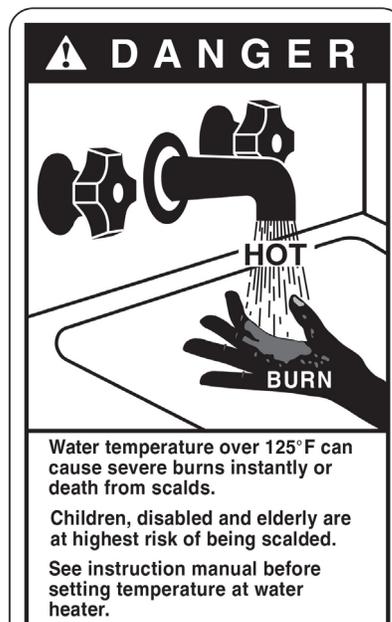
Use only inhibited propylene glycol solutions which are FDA RATED AS GRAS and specifically formulated for hydronic systems. Ethylene glycol is toxic and can attack gaskets and seals used in hydronic systems. Failure to follow the instructions in this section WILL VOID the warranty and may result in property damage, severe personal injury, or death.

Glycol in hydronic applications includes inhibitors that prevent it from attacking metallic system components. Make certain that system fluid is checked for the correct glycol concentration and inhibitor level.

The glycol solution should be tested at least once a year, or as recommended by the glycol manufacturer.

Anti-freeze solutions expand more than water. For example: A 50% by volume glycol solution expands 4.8%

in volume during a temperature increase from 32 to 180°F, while water expands 3% over the same temperature rise. Allowances must be made for expansion in system design. A 30% mixture of glycol results in a BTU output loss of 15% with a 5% increase in head against the system circulator. A 50% glycol mixture results in a BTU output loss of 30% with a 50% increase in head against the system circulator.



CAUTION

It is highly recommended that you carefully follow glycol manufacturer recommended concentrations, expansion requirements, and maintenance recommendations (pH additive break down, inhibitor reduction, etc.) You must carefully figure the additional friction loss in the system as well as the reduction in heat transfer coefficients.

K. Central Heating Applications (All Models)

NOTES:

1. This drawing is meant to show system piping concept only. Installer is responsible for all equipment & detailing required by local codes.
2. The minimum pipe size for connecting a SuperStor Ultra Indirect Water Appliance is 1-inch.
3. The minimum pipe size for connecting the appliance is 1.25-inch
4. Circulators are shown with isolation flanges and integral check valves. The alternative is standard flanges with full port ball valves and a separate flow check valve. Purge valves can be used with the circulator flanges as an alternative.
5. The anti-scald mixing valve is recommended if the DHW temperature is set above the factory setting of 119°F.
6. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
7. Winterization: When winterizing, put a drain valve on both the supply and return between the union and the shut-off connection.

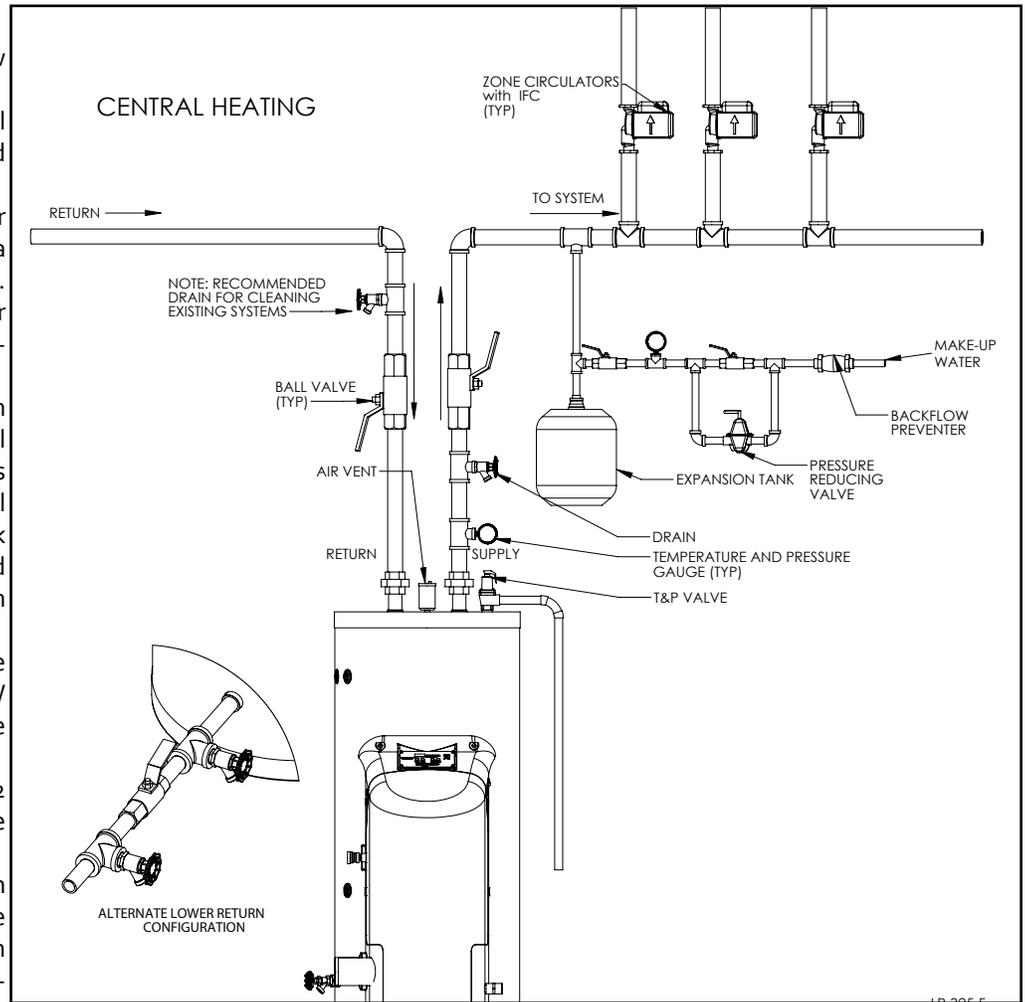


Figure 4 - Central Heating

8. If a backflow preventer or no return valve is installed, a thermal expansion tank is required on the cold water inlet between the water heating appliance and the backflow preventer.

***THIS INSTALLATION IS SUITABLE FOR PIONEER HEATING APPLIANCES ONLY.**

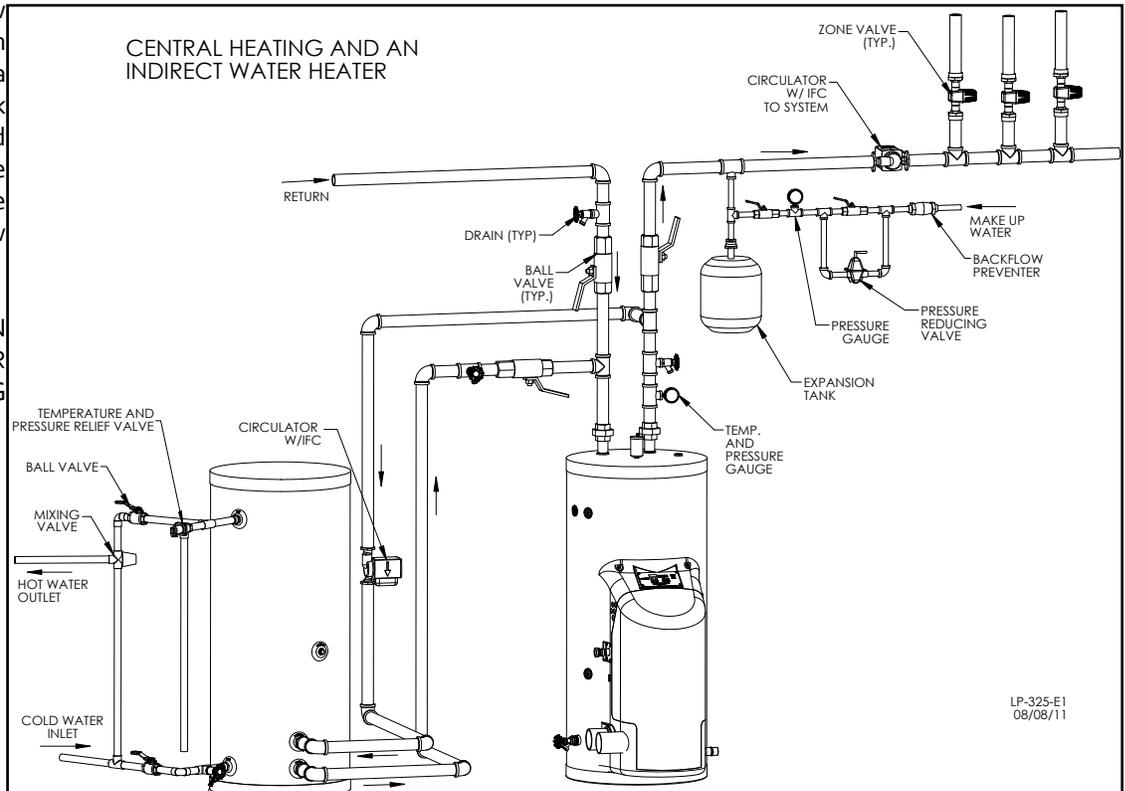


Figure 5 - Appliance with Indirect Water Heater*

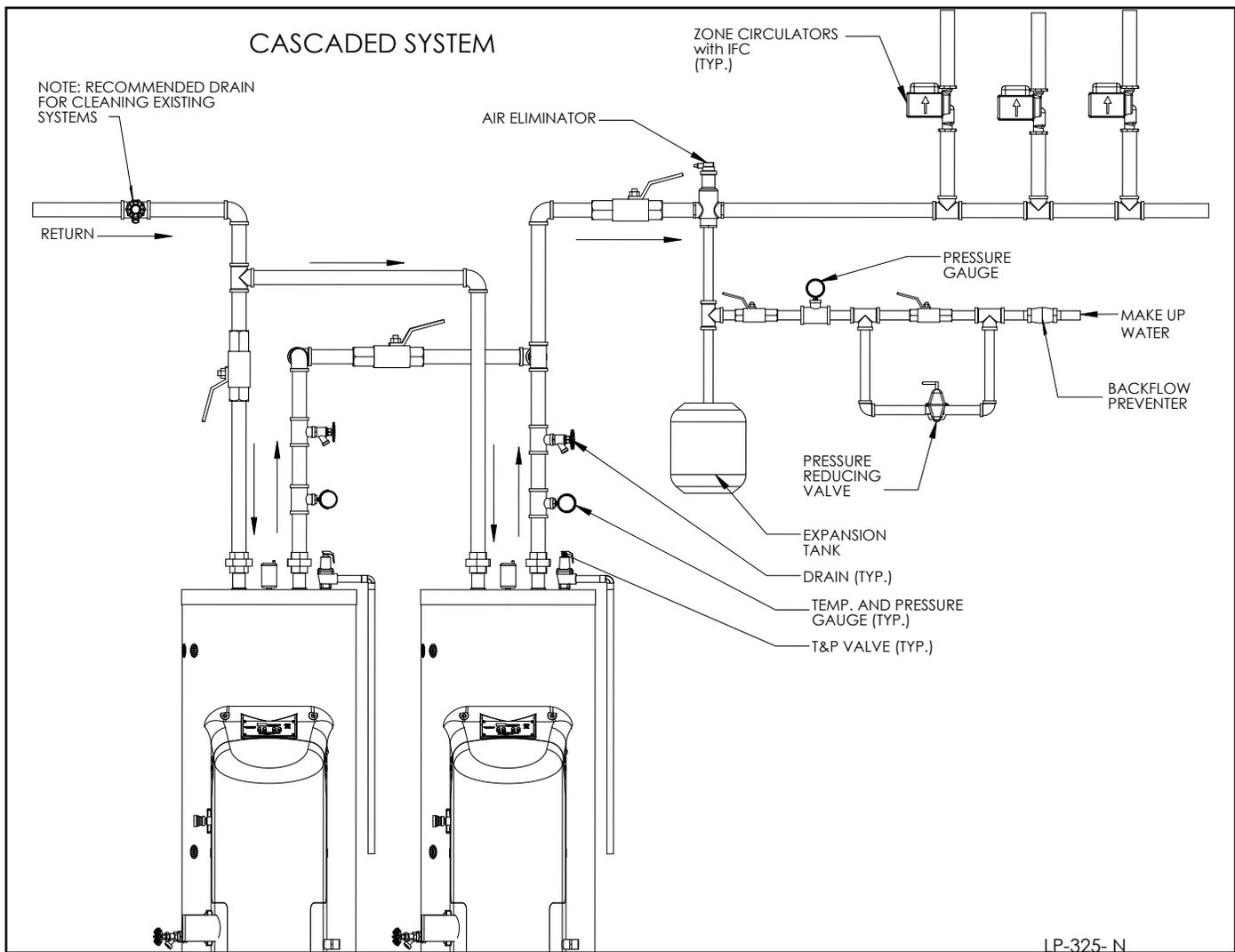


Figure 6 - Cascaded System

NOTES:

1. This drawing is meant to show system piping concept only. Installer is responsible for all equipment & detailing required by local codes.
2. The minimum pipe size for connecting a SuperStor Ultra Indirect Water Appliance is 1-inch.
3. The minimum pipe size for connecting the appliance is 1.25-inch
4. Circulators are shown with isolation flanges and integral check valves. The alternative is standard flanges with full port ball valves and a separate flow check valve. Purge valves can be used with the circulator flanges as an alternative.
5. The anti-scald mixing valve is recommended if the DHW temperature is set above the factory setting of 119°F.
6. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
7. Winterization: When winterizing, put a drain valve on both the supply and return between the union and the shut-off connection.
8. If a backflow preventer or no return valve is installed, a thermal expansion tank is required on the cold water inlet between the water heating appliance and the backflow preventer.

L. Piping into the DHW Pack (Versa Flame Models)

CAUTION

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

Domestic water connections must be installed in accordance with all local and national plumbing codes or any applicable prevailing standards. The domestic inlet and outlet ports on the brazed plate heat exchanger are 3/4" NPT connections. We recommend the installation of shut-off valves and unions on both the inlet and outlet ports to isolate the appliance for future service. It is important that the connections on the inlet

and outlet are brass or copper. Never use dielectric unions or galvanized steel fittings. Teflon thread sealant must be used to seal all appliance connections.

An approved ASSE 1017 mixing valve is provided with every appliance and must be installed on the domestic outlet to ensure that hot water temperature does not vary more than +/- 5°F to protect the user from scalding temperatures. This valve reduces the point of discharge temperature by mixing the hot and cold water from the discharge outlet or mixed outlet port. This device alone will not protect the user from scalding temperature. To properly install and set up the mixing valve, follow the pre-installation steps in this manual and the enclosed instructions included with the mixing valve.

M. Mixing Valve Installation (Versa Flame Models)

WARNING

This appliance can deliver scalding temperature water at any faucet in the system. Be careful whenever using hot water to avoid scalding injury. By setting the thermostat on this appliance to obtain increased water temperature, you may create a higher potential for scald injury. To protect against injury, you should install the ASSE approved thermostatic mixing valve (a device to limit the temperature of water to protect against scald injury by mixing hot and cold water supply) shipped with appliance in the system. This valve will reduce point of discharge temperature in branch supply lines. Install this valve according to the directions in the mixing device packaging. **DO NOT OPERATE THIS APPLIANCE WITHOUT AN ASSE APPROVED THERMOSTATIC MIXING DEVICE.** If this appliance was shipped without an ASSE approved thermostatic mixing valve, contact the manufacturer. Failure to install the mixing valve could result in substantial property damage, severe personal injury, or death.

1. All installations must be carried out by licensed professionals.
2. The installer must ensure compatibility of all installations. Example: Temperature of hot water – marked “H”, cold water inlet – marked “C”, and mixed outlet – marked with directional arrow.
3. The mixing valve may be installed in any position.
4. Local codes shall take priority over any inconsistency in these instructions.
5. During startup, you must ensure that the valve is set to the desired temperature (the mixing valve preset is 120°F). If the valve temperature needs to be adjusted, please refer to the mixing valve instructions and/or the following settings.

CAUTION

The mixing valve is certified to ASSE 1017. It is not to be used to provide anti-scald service resulting from system pressure fluctuations, and should not be used where more sophisticated compensating temperature controls are required.

Mixing Valve Specifications	
Min. – Max. Hot Water Inlet Temperature	120-180°F (49 - 82°C)
Min. – Max. Cold Water Inlet Temperature	39 - 80°F (4 - 27°C)
Max. Working Pressure	200 PSI
Min. Flow Rate	1 GPM
Outlet Water Temperature Range	85–130°F (29–54°C)
Min. Temperature Differential (Between Hot Supply and Outlet)	27°F (15°C)
Factory Set Locking Ring	120°F Max. ¹
Allowable Supply Pressure Variation	+/- 20% ²
Accuracy of Outlet Temperature	+/- 3°F (3.4°C)
Performance –	
CV	1.8
Max Flow – 1”	14 gpm

Notes:

¹Maximum permissible temperature in accordance with ASSE 1070. The limit locking ring may be adjusted for applications not requiring ASSE 1070 valves.

²Maximum allowable variation in either supply pressure in order to control the outlet temperature to within +/- 3°F. **Warning: Pressure variations outside of this range may cause changes in the outlet temperature.**

NOTE: At low flow operation, the outlet temperature may vary slightly more.

Differential pressure at the valve inlet should be within a 2 to 1 ratio under normal flow conditions.

Inline fittings, pipe work, layout and sizing must be taken into consideration. In installations where the valve is supplied with unbalanced hot cold pressures greater than a 2 to 1 ratio, please call the HTP Technical Support Department.

Installation of the Mixing Valve

1. Flush all pipe work thoroughly (with water only) before installing the mixing valve.
2. The mixing valve comes complete with union type connections for ease of installation and service.
3. The mixing valve must be removed from the pipe work prior to soldering the end connections. It is recommended to use a spacer piece while soldering.

WARNING

Do not solder unions while attached to the valve body. Solder connections prior to connecting unions to the valve body to avoid damaging the valve and its function. Failure to follow this instruction could result in property damage, serious personal injury, or death.

Setting the Mixing Valve Outlet Temperature

1. Turn both the hot and cold water supplies on. Open an outlet, preferably a sink or basin faucet rather than a shower. To calibrate, let water run for 2 minutes and measure the outlet temperature with a thermometer. Adjust the green cap counter clockwise to increase and clockwise to decrease temperature, as shown below.

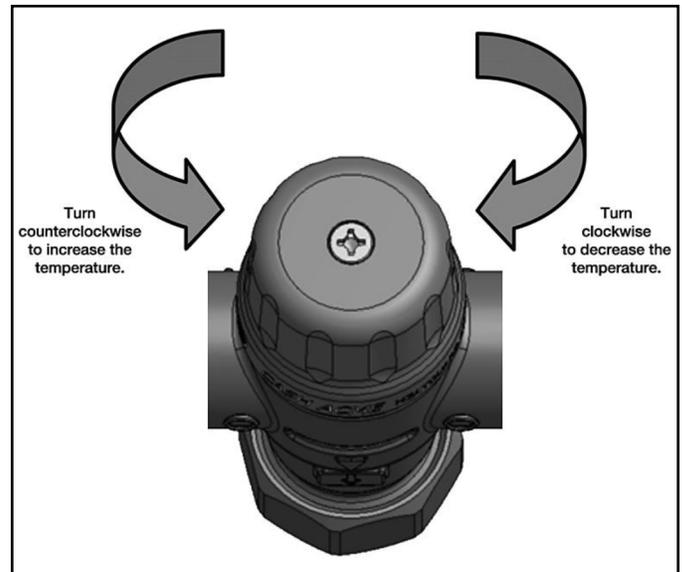


Figure 7 - Adjusting the Mixing Valve

2. Once the desired outlet temperature has been achieved, refit the green top so that it snaps onto the body of the mixing valve.

NOTE: See the instruction sheet included with the mixing valve to adjust the maximum temperature of the mixing valve

greater than 120°F.

WARNING

Hotter water increases the risk of scald injury. Scalding may occur within 5 seconds at a setting of 140°F (60°C). Water temperature over 125°F can instantly cause severe burns, or death, from scalds. Children, disabled, and elderly are at the highest risk of being scalded. See instruction manual before setting temperature at appliance. Feel water before bathing or showering!

Mixing Valve Maintenance and Service

- It is recommended to check the mixing valve annually to ensure proper system capabilities. More frequent checks are recommended in adverse water conditions.
- When checking the mixed water supply temperature, use the same faucet used in the initial installation temperature adjustment.
- There may be some variation in the water temperature from the mixing valve due to seasonal temperature variations in the cold water supply.

If the water supply is of poor quality, the internal components may jam, requiring an additional filter or strainer to be fitted to the system. Contact a plumbing professional for appropriate materials and installation.

N. Versa Flame DHW Pack Performance

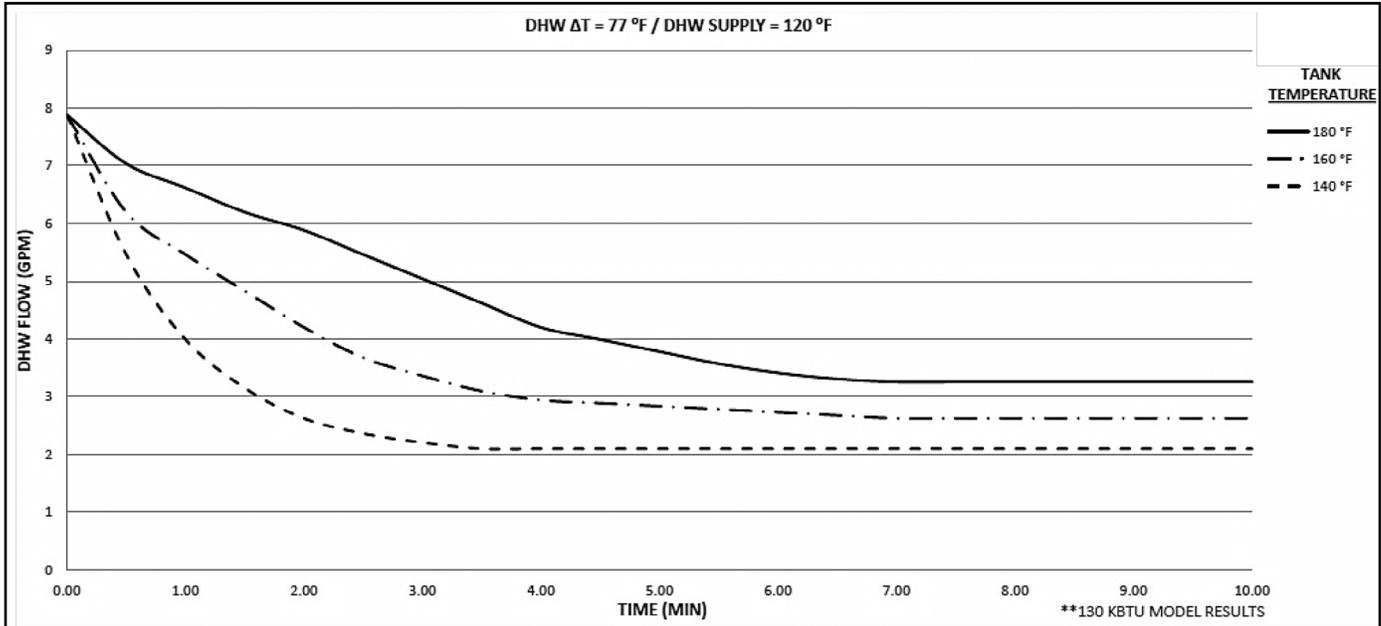


Figure 8 - Versa Flame 130kBTU DHW Pack Performance

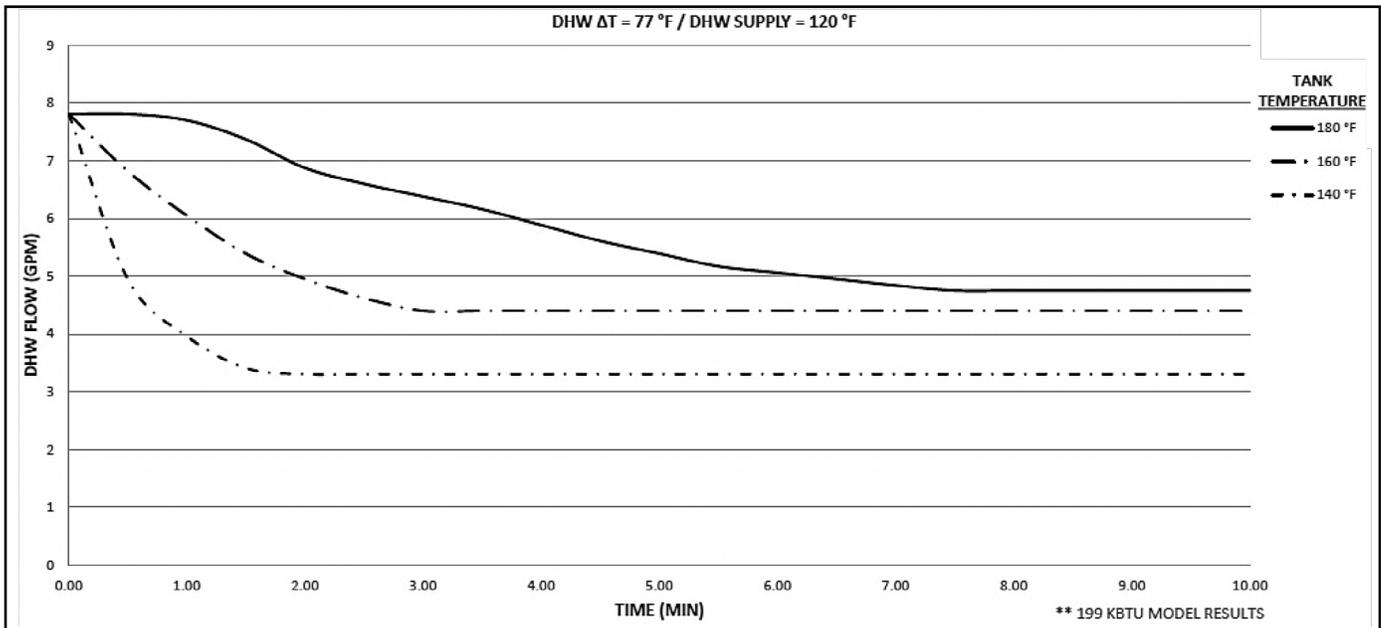


Figure 9 - Versa Flame 199kBTU DHW Pack Performance

O. Applications (Versa Flame Models)

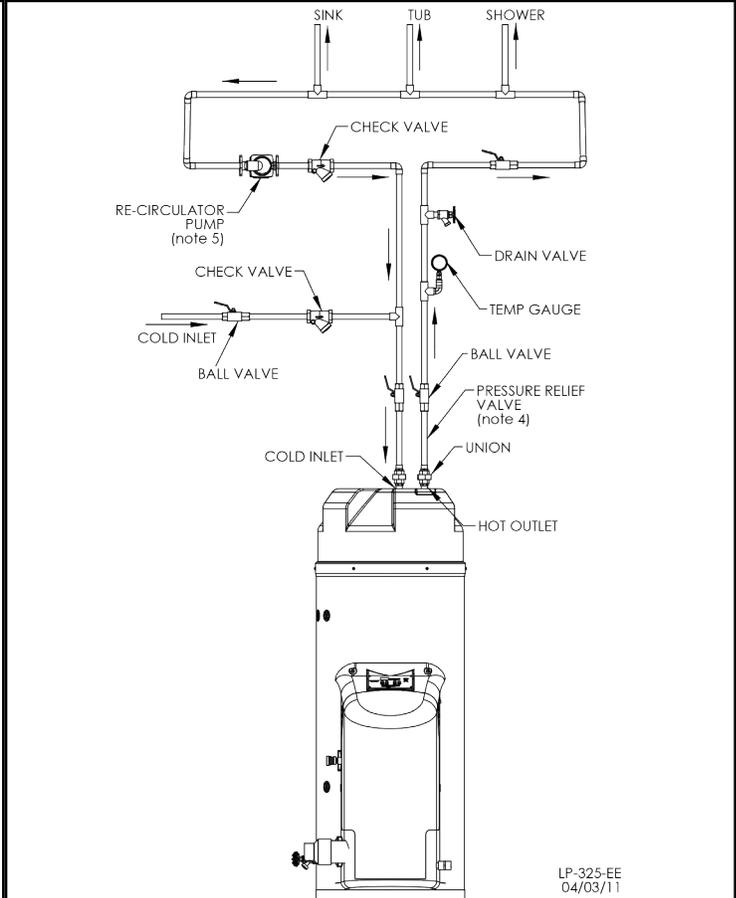
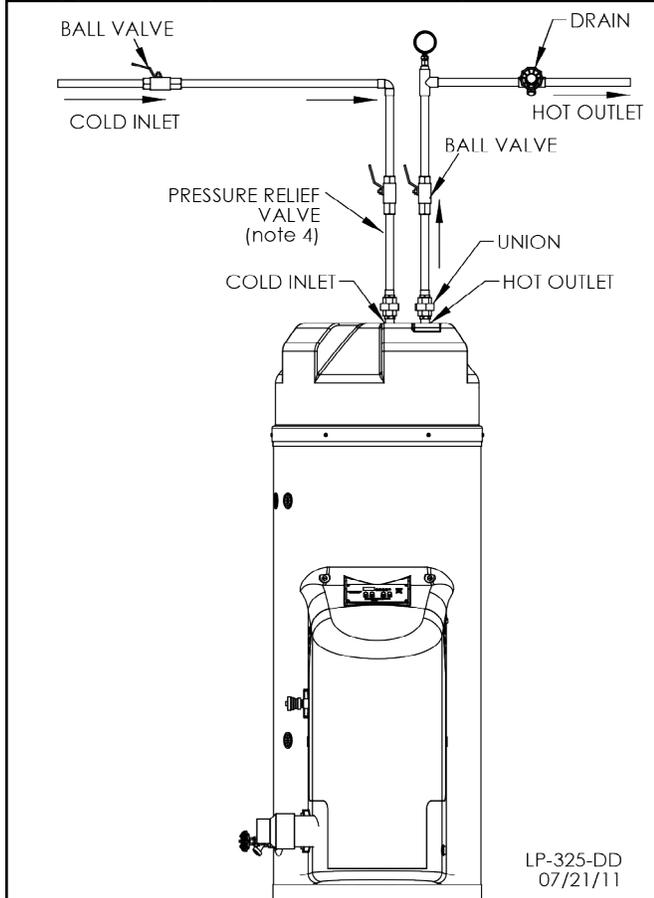


Figure 10 - Adjusting the Mixing Valve

Figure 11 - Adjusting the Mixing Valve

NOTES:

1. This drawing is meant to show system piping concept only. Installer is responsible for all equipment & detailing required by local codes.
2. A mixing valve is recommended if the DHW temperature is set above the factory setting of 119°F.
3. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
4. A pressure relief valve or T&P valve may be required. Check with local codes.
5. This drawing refers to DHW piping only. For Central Heating piping, please refer to Part 5, Section L.
6. Winterization: When winterizing, pump a small amount of food grade glycol, FDA rated as GRAS (Generally Recognized As Safe) into the brazed plate heat exchanger.
7. In Massachusetts, a vacuum relief valve must be installed on the cold water line per 24,8 CMR.
8. Recirculator pump must be sized to flow 0.6 GPM or greater to the appliance.
9. If a backflow preventer or no return valve is installed, a thermal expansion tank is required on the cold water inlet between the water heating appliance and the backflow preventer.
10. Versa-Flame DHW setting on mixing valve must be set higher (5°F minimum) than storage tank set point.

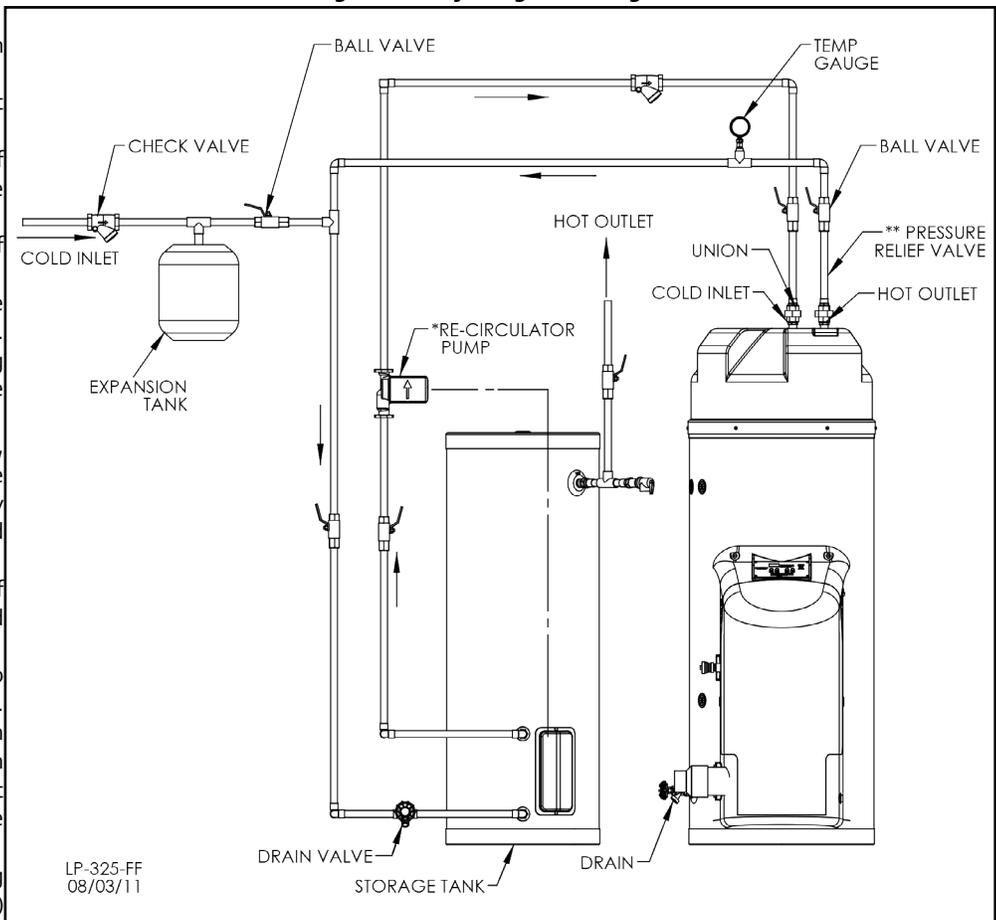


Figure 12 - Adjusting the Mixing Valve

Part 5 - Venting and Condensate Removal

DANGER

The appliance must be vented as detailed in this section. Ensure exhaust vent and intake piping complies with these instructions regarding vent system. Inspect finished exhaust vent and intake piping thoroughly to ensure all joints are well secured, airtight, and comply with all applicable code requirements, as well as the instructions provided in this manual. Failure to properly install the vent system will result in severe personal injury or death.

A. General

DANGER

This appliance is certified as a "Category IV" appliance and requires a special venting system. The vent system will operate with a positive pressure in the pipe. Exhaust gases must be piped directly outdoors using the vent materials and rules outlined in these instructions. Do not connect vent connectors serving appliances vented by natural draft into any portion of mechanical draft systems operating under positive pressure. Follow the venting instructions carefully. Failure to do so will result in substantial property damage, severe personal injury, or death.

1. 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.
2. Install the venting system in accordance with these instructions and with the National Fuel Gas Code, ANSI Z223.1/ NFPA 54, CAN/CGA B149, and / or applicable provisions of local building codes.
3. This appliance must be vented with materials, components, and systems listed and approved for Category IV appliances.

DANGER

Exhaust and intake are to be piped separately. This appliance cannot share a common exhaust or intake with multiple appliances. Failure to follow these instructions will result in substantial property damage, severe personal injury, or death.

NOTE: To avoid contamination often contained in indoor air, it is best to pipe all intake combustion air directly to the outdoors.

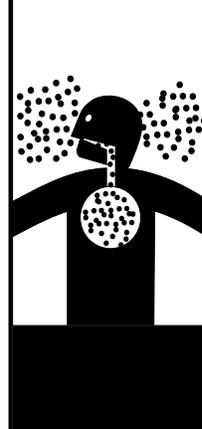
NOTE: If exhaust vent pipe system passes through an unheated space such as an alcove or attic, the space must be heated.

WARNING

Improper seating of vent pipe gaskets can cause eventual gasket failure and exhaust gas leakage. Ensure the exhaust vent pipe is properly beveled and seated before insertion into the flue adapter. Failure to do so could result in property damage, severe personal injury, or death.

WARNING

Breathing Hazard - Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

LP-304

DANGER

Due to the extreme flammability of most glues, cements, solvents, and primers used to join plastic exhaust vent and intake pipes, explosive solvent vapors must be cleared from all vent piping before start-up. Avoid using excess cement or primer, as this may pool in the vent pipes. Vent assemblies should be allowed to cure for a period of at least 8 hours before powering a connected appliance. Failure to follow these instructions will result in substantial property damage, severe personal injury, or death. It is the installers' responsibility to understand the hazards associated with explosive solvents and take the necessary precautions to avoid these risks.

WARNING

CPVC, Polypropylene, or Stainless Steel pipe material **MUST** be used for the first 3 feet of the vent run if the exhaust vent passes through an enclosed space greater than 6", such as a wall. The balance of the vent run can be installed with standard Schedule 40 PVC pipe. Failure to comply with this warning could result in property damage, severe personal injury, or death.

Exhaust vent adaptors are not designed as load-bearing devices, and must not be used to support exhaust vent piping. All vent pipes must be properly connected, supported, and the exhaust vent must be pitched a minimum of 1/4" per foot back to the appliance to allow drainage of condensate. Failure to properly support vent piping and follow the information in this statement could result in product damage, severe personal injury, or death.

B. Approved Materials for Exhaust Vent and Intake Pipe

Item	Material	Standards for Installation In:	
		United States	Canada
Exhaust Vent or Intake Pipe and Fittings	PVC Schedule 40/80	ANSI / ASTM D1785	PVC, CPVC, and PP Venting Must be ULC-S636 Certified. IPEX is an approved manufacturer in Canada.
	PVC-DWV*	ANSI / ASTM D2665	
	CPVC Schedule 40/80	ANSI / ASTM F441	
	Polypropylene	UL-1738 or ULC-S636	
	Stainless Steel AL29-4C	Certified for Category IV and Direct Vent Appliance Venting	
Pipe Cement	PVC	ANSI / ASTM D2564	IPEX System 636 Cements and Primers
	CPVC	ANSI / ASTM F493	
Pipe Primer	PVC / CPVC	ASTM F656	

DANGER

- The exhaust and intake components installed with this heater must be used for near heater piping BEFORE transitioning to the approved materials listed above. DO NOT REMOVE these installed components. Doing so WILL VOID heater warranty.
- PVC / CPVC pipe and fittings of the same diameter are considered interchangeable.
- Use of cellular core pipe PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in nonmetallic venting systems is prohibited.
- DO NOT connect PVC/CPVC to Polypropylene without an approved vent connector.
- Any transition to Polypropylene MUST be done in the vertical within five (5) feet of the appliance.
- When installing AL29-4C vent piping, install a PVC-to-stainless adapter at the heater vent connection, and at the termination when using a PVC termination kit. DO NOT mix AL29-4C piping from different manufacturers unless using adapters specifically designed for the purpose by the manufacturer.
- Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.
- A double wall vent may be used when using stainless steel vent material in a freezing climate.
- *PVC-DWV may be used for air intake applications ONLY.
- Contact the venting material manufacturer if there is any question about the applicability of the proposed venting material.

Failure to follow these directions will result in substantial property damage, severe personal injury, or death.

Table 4 - Approved Materials for Exhaust Vent and Intake Pipe

 WARNING
DO NOT mix components from different venting systems. The vent system could fail, causing leakage of flue products into the living space. Use only the approved pipe and fitting materials, and primer and cement specifically designed for the material used, as listed in the above table. Failure to do so could result in property damage, serious injury, or death.
CAUTION
High heat sources (generating heat 100°F / 37°C or greater, such as boiler flue pipes, space heaters, etc.) may damage plastic components of the appliance 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 appliance and related components near high heat sources.

NOTE: The use of double-wall vent or insulated material for the combustion air intake pipe is recommended in cold climates to prevent the condensation of airborne moisture in the incoming combustion air.

 DANGER
You must not use "B" vent in an exhaust application. "B" vent is for intake applications ONLY. Using "B" vent in an exhaust application will result in serious injury or death.

C. Additional Requirements for Installation in Canada

- Installations must be made with a vent pipe system certified to ULC-S636. IPEX is an approved vent manufacturer in Canada supplying vent material listed to ULC-S636. Additionally, you may use AL29-4C stainless steel venting to comply with Canadian requirements.
- The first three (3) feet of vent pipe from the appliance flue outlet must be readily accessible for visual inspection.
- The components of the certified vent system must not be interchanged with other vent systems or unlisted pipe / fittings.

D. Exhaust Vent and Intake Pipe Location

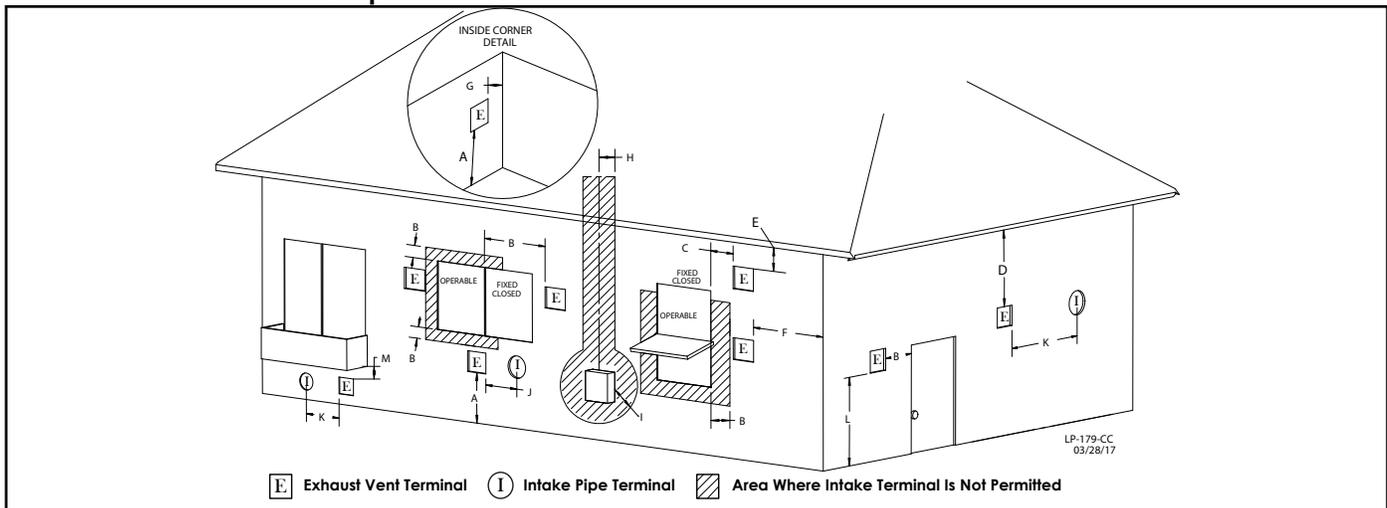


Figure 13 - Exit Terminals for Direct Vent Systems - ANSI Z223.1 / NFPA 54 for US and CAN/CSA B149.1 for Canada

DETERMINE EXHAUST VENT AND INTAKE PIPE LOCATION – NOTES:

INSTALLATIONS IN THE UNITED STATES

A. Provide a minimum of 1 foot clearance from the bottom of the exhaust vent and intake pipe above the expected snow accumulation level. Snow removal may be necessary to maintain clearance.

B. Provide a minimum of 1 foot distance from exhaust vent termination to any door, operable window, or gravity intake into any building.

C. Provide a minimum of 1 foot distance from exhaust vent termination to any permanently closed door or window.

D. Provide a minimum of 4 feet vertical clearance from the exhaust vent to all roof overhangs.

E. Locating exhaust vent termination near roof overhangs will result in the formation of icicles in freezing weather, and could result in blockage of the exhaust vent. To prevent icicles from forming, maintain 4 feet vertical clearance from the exhaust vent to all roof overhangs.

F. Provide 4 feet clearance from the outside corner of vertical walls, chimneys, etc., as well as horizontal corners created by roof overhangs.

G. Provide 6 feet clearance from the inside corner of vertical walls, chimneys, etc., as well as horizontal corners created by roof overhangs.

H. Provide 4 feet clearance from center line within a height of 15 feet above electrical meters, gas meters, gas regulators, relief equipment, exhaust fans and inlets.

I. Provide 4 feet horizontal clearance from electrical meters, gas meters, gas regulators, relief equipment, exhaust fans and inlets. In no case shall the exit terminal be above or below the aforementioned equipment unless the 4 foot horizontal distance is maintained.

J. This appliance vent system shall terminate at least 3 feet (0.9 m) above any forced air intake located within 10 ft (3 m).

NOTE: This does not apply to the combustion air intake of a direct-vent appliance.

K. When venting with a two pipe system, maximum distance between exhaust vent and intake pipe is 6 feet (1.8 m). Minimum distance between exhaust vent and intake pipe on single direct vented appliance is 10" (0.255 m) center-to-center. Minimum distance between exhaust vents and intake pipes on multiple appliances is 10" (0.255 m) center-to-center.

L. When adjacent to a public walkway, locate exit terminal at least 7 feet above grade.

In addition:

- Total length of vent piping shall not exceed the limits specified in this manual.

- The vent piping for this direct vented appliance is approved for zero clearance to combustible construction.
- The flue products coming from the exhaust vent will create a large plume when the appliance is in operation. Avoid venting in areas that will affect neighboring buildings or be considered objectionable.
- DO NOT locate exhaust vent or intake pipe in a parking area where machinery may damage the pipe.
- DO NOT locate the exhaust vent or intake pipe terminals under a porch, balcony, or veranda.
- Avoid terminating exhaust vents near shrubs, air conditioners, or other objects that will obstruct the exhaust stream.
- DO NOT vent over a public walkway. Condensate could drip or freeze and create a nuisance or hazard.
- DO NOT vent near soffit vents, crawl space vents, or other areas where condensate or vapor could create a nuisance or hazard or cause property damage.
- DO NOT vent where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valve, or other equipment.
- DO NOT vent the appliance in a chimney flue serving a separate appliance designed to burn solid fuel. The appliance may only be vented in vacant chimneys.
- **NOTE:** Due to potential moisture build-up, sidewall venting may not be the preferred venting option. Carefully consider venting installation and location to save time and cost.

INSTALLATIONS IN CANADA

NOTE: Canadian installation must comply with the CAN/CSA B149.1 code and applicable local codes and supersede the restrictions for the United States outlined in this section.

WARNING

The building owner is responsible for keeping the exhaust and intake terminations free of snow, ice, or other potential blockages, as well as scheduling routing maintenance. Failure to keep the vent piping terminations clear and properly maintain the appliance could result in property damage, severe personal injury, or death.

For each floor containing bedroom(s), a carbon monoxide detector and alarm shall be placed in the living area outside the bedrooms, as well as in the room that houses the appliance. Detectors and alarms shall comply with NFPA 720 (latest edition). Failure to comply with these requirements could result in product damage, severe personal injury, or death.

E. Exhaust Vent and Intake Pipe Sizing

1. The exhaust vent and intake pipe size is 2" for 100 and 130kBTU models and 3" for 160 and 199kBTU models.
2. The maximum total equivalent length of 2" exhaust vent and intake pipe **should not exceed 85 feet**. The maximum total equivalent length of 3" exhaust vent and intake pipe **should not exceed 200 feet**.
 - a. The equivalent length of elbows, tees, and other fittings are listed in the Friction Loss Table.

Friction Loss Equivalent in Piping and Fittings			
Fittings or Piping	Equivalent Feet		
	2"	3"	4"
90 Degree Elbow*	5'	5'	3'
45 Degree Elbow	3'	3'	1'
Coupling	0'	0'	0'
Air Inlet Tee	0'	0'	0'
Straight Pipe	1'	1'	1'
Concentric Kit	3'	3'	N/A
V500 2" Kit	1'	N/A	N/A
V1000 3" Kit	N/A	1'	1'
V2000 4" Kit	N/A	1'	1'

Table 5 - *Friction loss for long radius elbow is 1 foot less. NOTE: Consult Polypropylene venting instructions for friction loss and pressure drop equivalents.

- b. For example: If the exhaust vent has two 90° elbows and 10 feet of PVC pipe we will calculate:
 Exhaust Vent Equivalent Length = (2x5) + 10 = 20 feet.
 Further, if the intake pipe has two 90° elbows, one 45° elbow, and 10 feet of PVC pipe, the following calculation applies:
 Intake Pipe Equivalent Length = (2x5) + 3 + 10 = 23 feet.
 Finally, if a concentric kit is used we find:
 Total Equivalent Length = 20 + 23 + 3 = 46 feet.
 The total equivalent length is 46 feet, well below the maximum of 85 feet for 2" pipe.
 - c. Effort should be made to keep a minimum difference in equivalent length between the exhaust vent and intake pipe.
3. The minimum total equivalent length is 16 feet.

CAUTION
Do not exceed the maximum lengths for vent pipes. Excessive length could result in appliance shutdown and property damage. Failure to provide a minimum total vent length of 16 equivalent feet could result in property damage and improper product operation.

F. Longer Vent Runs

- The maximum total equivalent length can be extended by increasing the diameter of both the exhaust vent and intake pipes equally. However, the transitions should begin a minimum of 15 equivalent feet from the appliance.
- a. The maximum total equivalent length for increased diameter vent pipes is 125 feet for 2" transitioning to 3" pipe (this length includes the minimum 15 total equivalent feet necessary for transition).
NOTE: 3" vent pipe can be increased in diameter, but total equivalent length cannot be increased beyond 200 feet.
 - b. Transitions should always be made in vertical sections of

pipe to prevent the condensate from pooling in the vent pipe.

Standard Vent Connection and Maximum Total Equivalent Length	Reducing Coupling	Increased Vent Size and Maximum Total Equivalent Length
2" (85')	3" x 2"	3" (125')
3" (200')	4" x 3"	4" (200')

Table 6 - Vent Run Transition

- c. If transition occurs at a distance greater than 15 equivalent feet from the appliance, the maximum equivalent length will be reduced.

⚠ DANGER
Total maximum equivalent length of increased diameter exhaust vent and intake pipe must not exceed the lengths defined in this manual. 125 maximum total equivalent feet for 2" increased to 3" vent pipe; 200 maximum total equivalent feet for any increase to 3" vent pipe diameter. Failure to keep the total equivalent length below the maximum lengths determined in this manual will result in faulty appliance operation, substantial property damage, serious personal injury, or death.

Transition Point (Ft. from Appliance)	TEL of Oversized Vent Pipe (Ft.)*	Maximum TEL of all Vent Pipe (Ft.)
15	95	125
20	77 1/2	117 1/2
25	60 1/2	110 1/2
30	43	103
35	26	96
40	8 1/2	88 1/2
NONE	0	85

Table 7 - TEL = Total Equivalent Length *Oversized vent pipe diameter is 1" or greater than factory supplied connection.

G. Exhaust Vent and Intake Pipe Installation

⚠ WARNING
All joints of positive pressure vent systems must be sealed completely to prevent leakage of flue products into the living space. Failure to do so could result in property damage, serious injury, or death.

1. Use only solid PVC, CPVC, or stainless steel pipe or a Polypropylene vent system approved for use with Category IV appliances.
FOAM CORE PIPING IS NOT APPROVED FOR EXHAUST VENT APPLICATIONS. Foam core piping may be used on air inlet piping **only**.
2. Remove all burrs and debris from joints and fittings.
3. When using PVC or CPVC pipe, all joints must be properly cleaned, primed, and cemented. Use only cement and primer approved for use with the pipe material. Cement must conform to ASTM D2564 for PVC and ASTM F493 for CPVC pipe. **NOTE: DO NOT CEMENT POLYPROPYLENE PIPE.**
4. Ensure the vent is located where it will not be exposed to prevailing winds.

5. In all roof venting applications, exhaust discharge must point away from the pitch of the roof.
6. If the exhaust vent is to be terminated in a walled off area (such as a roof with a parapet wall), ensure the exhaust vent terminates a minimum of 10' from nearest wall and extends level with or above the top of the wall. This will ensure flue gas does not get trapped and possibly recirculated into the intake air pipe, which could contaminate the combustion air.
7. To prevent water leakage, install adequate roof flashing where the pipe enters the roof.
8. Do not locate vent over public walkways, driveways, or parking lots. Condensate could drip and freeze, resulting in a slip hazard or damage to vehicles and machinery.
9. Due to potential moisture build-up, sidewall venting may not be the preferred venting option. To save time and cost, carefully consider venting installation and location.
10. Horizontal lengths of exhaust vent must slope back towards the appliance not less than ¼" per foot to allow condensate to drain from the vent pipe.
11. The exhaust vent must terminate where vapors cannot make accidental contact with people or pets, or damage shrubs or plants.
12. In vacant chimney applications, install and seal a rain cap over existing chimney openings.
13. All piping must be fully supported. Use pipe hangers at a minimum of 4 foot intervals to prevent sagging of the pipe where condensate may form.
14. Do not use the appliance to support any piping.
15. A screened straight coupling is provided with the appliance for use as an outside exhaust termination.
16. A screened inlet air tee is provided with the appliance to be used as an outside intake termination.
17. Maximum Snow Level Determination: These installation instructions reference snow levels in establishing a minimum height for the installation of exhaust vent or air intake terminations. Snow levels shall be determined as follows:
 - a. The installation location may, by ordinance, designate how snow levels are calculated in that location; or
 - b. In the absence of specific ordinances, snow levels shall be calculated from the average monthly maximum depth of snow accumulation as indicated by the National Weather Service's 10 year statistics for the installation location/geographical area.

In the Commonwealth of Massachusetts and as Required by State and Local Codes:

- The vented gas fueled appliance shall not be installed so its combustion, ventilation, or dilution air is obtained from a bedroom or bathroom.
- Signage: Whenever any through-the-wall (horizontal or sidewall) vent is installed less than seven feet above the finished grade, a metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight feet above grade directly in line with the exhaust vent terminal. The sign shall read, in print no less than 0.5 inches in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".
- Marking of Exhaust Vent and Intake Pipe: Piping used for ventilation, make-up, or combustion air intake shall be labeled as follows:

- a. Throughout the entire developed length:
 - i. Labels must be placed every ten feet for exposed/visible piping; or
 - ii. Labels must be placed every three feet for concealed piping.
- b. At all changes of direction;
- c. On each side of a penetration through a partition, wall or ceiling; and
- d. The labels shall be black lettering that:
 - i. Indicates that the piping is used for ventilation, make-up, or combustion air intake, and
 - ii. The letters shall be sized equal to a minimum of the pipe diameter. However, for piping with a diameter exceeding two inches, said lettering does not need to be larger than two inches.

The following table lists optional exhaust/intake terminations available from HTP:

Description	Stock Code
2" PVC Concentric Termination Kit	KGAVT0501CVT
3" PVC Concentric Termination Kit	KGAVT0601CVT
2" Stainless Steel Termination Kit	V500
3" Stainless Steel Termination Kit	V1000
4" Stainless Steel Termination Kit	V2000
3" Polypro Vent Kit	8400P-001

Table 8 - Optional Vent Kits

H. Applications

1. Direct Vent Installation of Exhaust and Intake

If installing a direct vent option, combustion air must be drawn from the outdoors directly into the appliance intake, and exhaust must terminate outside. There are three basic direct vent options detailed in this manual: 1. Side Wall Venting, 2. Roof Venting, and 3. Unbalanced Venting.

Be sure to locate the appliance such that the exhaust vent and intake pipe can be routed through the building and properly terminated. Different vent terminals can be used to simplify and eliminate multiple penetrations in the building structure (see Optional Equipment in Venting Section). The exhaust vent and intake pipe lengths, routing and termination methods must all comply with the methods and limits given in the Venting section of this manual.

When installing a combustion air intake from outdoors, care must be taken to utilize uncontaminated combustion air. **NOTE:** To prevent combustion air contamination, see Table 2.

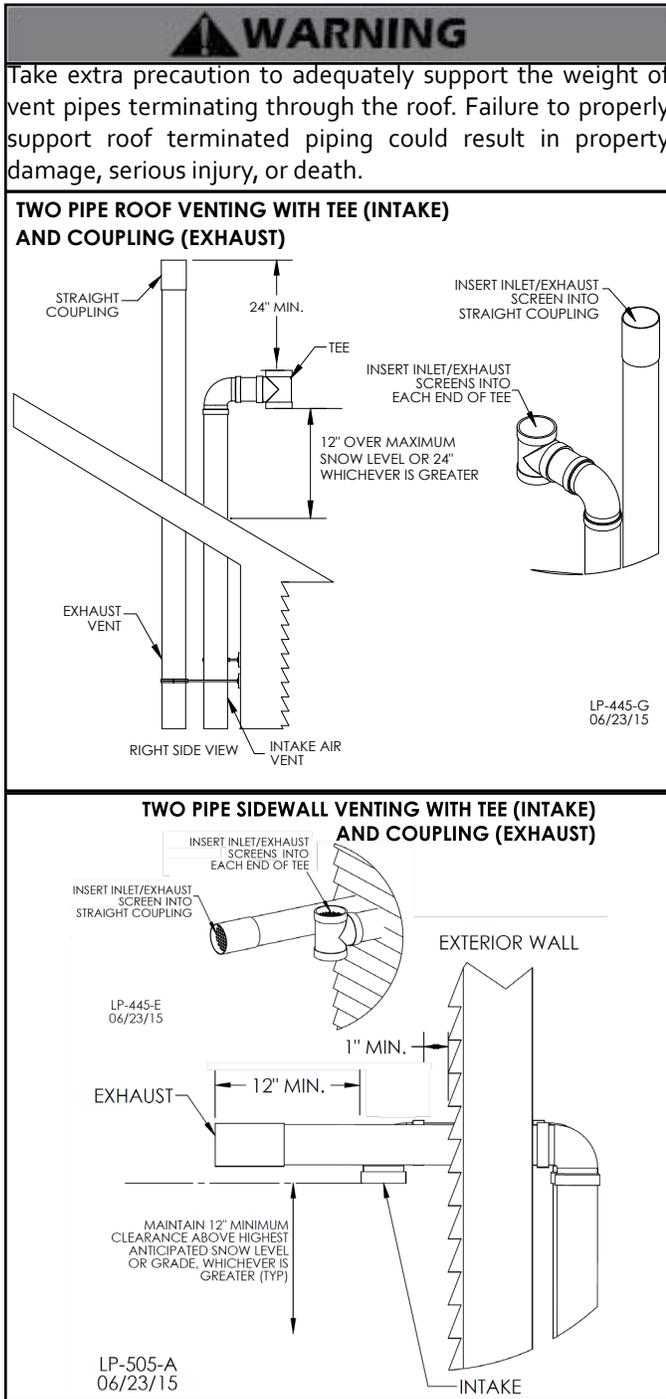


Figure 14 - Two Pipe Roof and Sidewall Venting with Included Equipment (Tee and Coupling)

NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.



All vent pipes must be glued, properly supported, and the exhaust pitched a minimum of 1/4" per foot back to the appliance to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance of 4 foot intervals on the vent pipe. Venting must be readily accessible for visual inspection from the first three feet from the appliance.

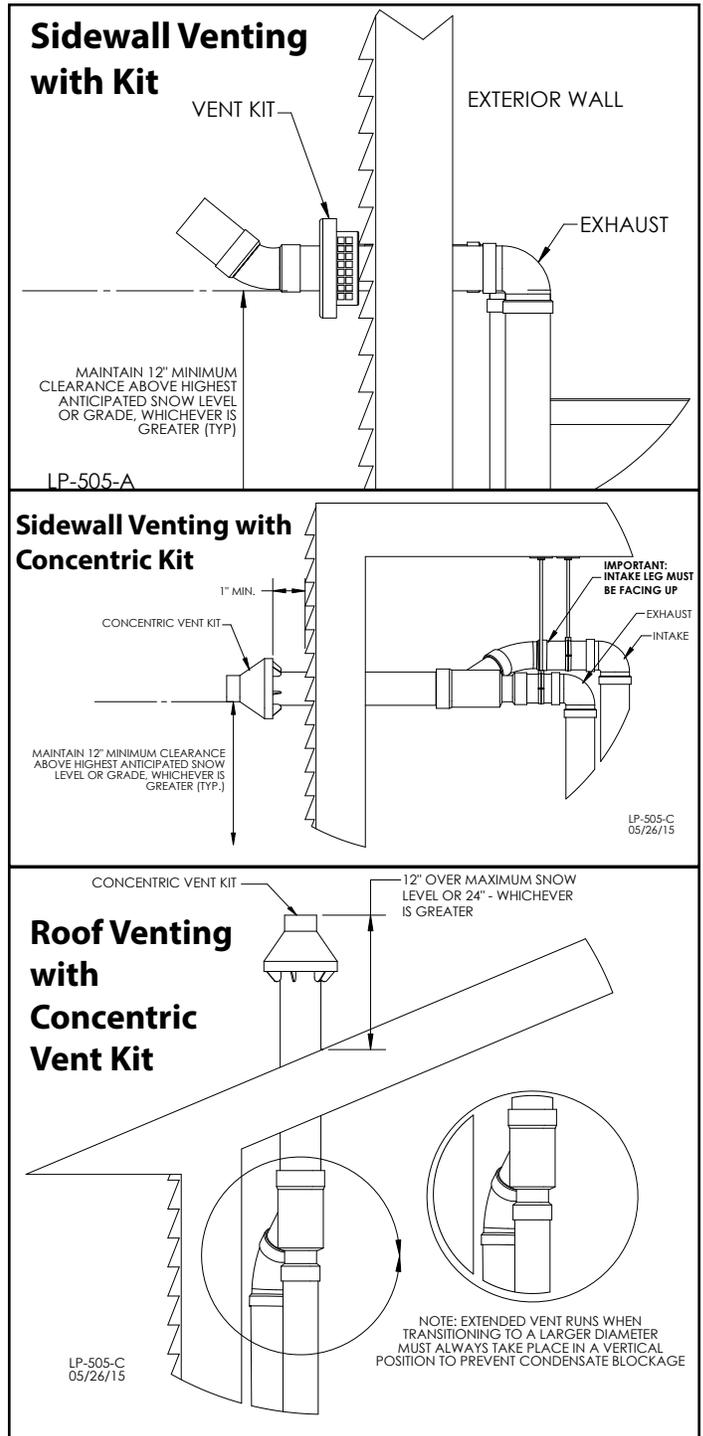


Figure 15 - Venting with Optional Kits (NOT INCLUDED WITH THE APPLIANCE)

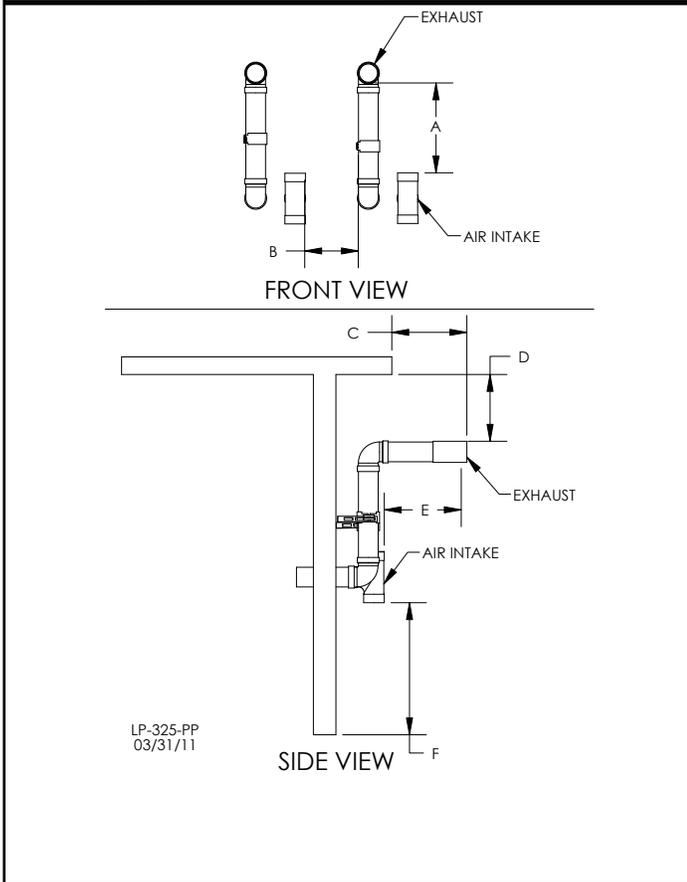
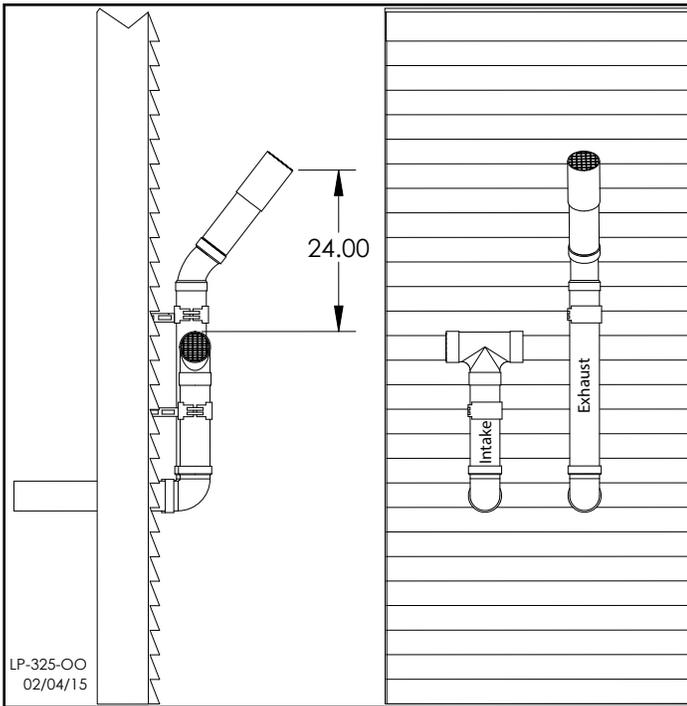


Figure 16 - Horizontal (Snorkel) Venting

NOTES:

- A. For every 1" of overhang, the exhaust vent must be located 1" vertical below overhang (overhang means top of building structure and not two adjacent walls [corner of building]).
- B. Typical installations require 12" minimum separation between bottom of exhaust outlet and top of air intake.
- C. Maintain 12" minimum clearance above highest anticipated snow level or grade (whichever is greater).
- D. Minimum 12" between vents when installing multiple vents.
- E. 12" minimum beyond air intake.

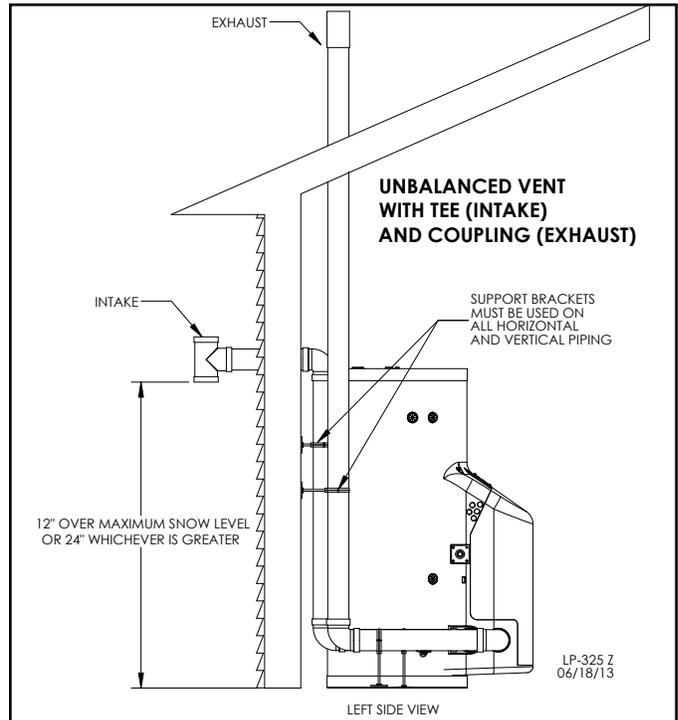


Figure 17 - Unbalanced Venting - Roof Exhaust and Sidewall Intake

NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

WARNING

All vent pipes must be glued, properly supported, and the exhaust pitched a minimum of 1/4" per foot back to the appliance to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the appliance and the balance of 4 foot intervals on the vent pipe. Venting must be readily accessible for visual inspection from the first three feet from the appliance.

2. Venting Through an Existing System

This appliance may be vented through an existing unused vent system. The inner diameter of the existing vent system is utilized for the combustion air source. Two methods have been approved for such venting: Concentric Venting Through an Existing System and Venting as a Chase.

Vent / Air Inlet Size	Minimum Existing Vent / Chase Size
2"	4"
3"	5"
4"	7"

Table 9 - Minimum Existing Vent / Chase Sizing

DANGER

Do not install the appliance into a common existing vent with any other appliance. This will cause flue gas spillage or appliance malfunction, resulting in substantial property damage, serious personal injury, or death.

CAUTION

Contractors must check state and local codes before installing through an existing vent opening. State and local codes always take precedence over manufacturer's instructions. Failure to check state and local codes before installing through an existing opening could result in property damage and add significantly to installation costs.

If an existing venting system is converted for use with this appliance, the installer must ensure that the existing venting system is clean and free from particulate contamination that could damage the appliance. Failure to do so could result in property damage and appliance failure. Such failure IS NOT covered under warranty.

Concentric Venting Through an Existing System

NOTE: The following instructions refer only to venting through an existing vent system, and not to venting with HTP's optional concentric vent kits. Refer to Concentric Vent Kit installation manual (LP-166) for further information on venting with the optional concentric vent kits.

Concentric venting through an existing system must run vertically through the roof. See Table 9 for proper minimum vent sizing. Use only the approved venting materials specified in Table 4 for piping the system. All instructions listed in this Venting section apply. See Figures 18-1 and 18-2 for venting demonstrations.

▲ DANGER

The upper and lower vent terminations as well as all joints in the venting system must be properly sealed to ensure that all combustion air is drawn properly and exhaust does not leak from the system. Failure to properly seal the venting system will result in property damage, serious personal injury, or death.

Chase Venting Through an Existing System

When venting as a chase, follow all instructions included in this Venting section, including those in the previous Concentric Venting Through an Existing System section. See Figure 18-3

for chase venting demonstration.

3. Power Venting, Indoor Combustion Air in Confined or Unconfined Space

This appliance requires fresh, uncontaminated air for safe operation and must be installed in a mechanical room where there is adequate combustion and ventilating air. **NOTE: To prevent combustion air contamination, see Table 2.**

Combustion air from the indoor space can be used if the space has adequate area or when air is provided through a duct or louver to supply sufficient combustion air based on the appliance input. **Never obstruct the supply of combustion air to the appliance.** If the appliance is installed in areas where indoor air is contaminated (see Figure 19) it is imperative that the appliance be installed as direct vent so that all combustion air is taken directly from the outdoors into the appliance intake connection.

Unconfined space is space with volume greater than 50 cubic feet per 1,000 Btu/hour (4.8 cubic meters per kW) of the total input rating of all fuel-burning appliances installed in that space. Rooms connected directly to this space, through openings not furnished with doors, are considered part of the space.

Confined space is space with volume less than 50 cubic feet per 1,000 Btu/hour (4.8 cubic meters per kW) of the total input rating of all fuel-burning appliances installed in that space. Rooms connected directly to this space, through openings not furnished with doors, are considered part of the space.

When drawing combustion air from inside a conventionally constructed building to a confined space, such space should be provided with two permanent openings: one located 6" (15 cm) below the space ceiling, the other 6" (15cm) above the space floor. Each opening should have a free area of one square inch per 1,000 Btu/hr (22cm²/kW) of the total input of all appliances in the space, but not less than 100 square inches (645cm²).

If the confined space is within a building of tight construction, air for combustion must be obtained from the outdoors as outlined in the Venting section of this manual. See Figure 20.

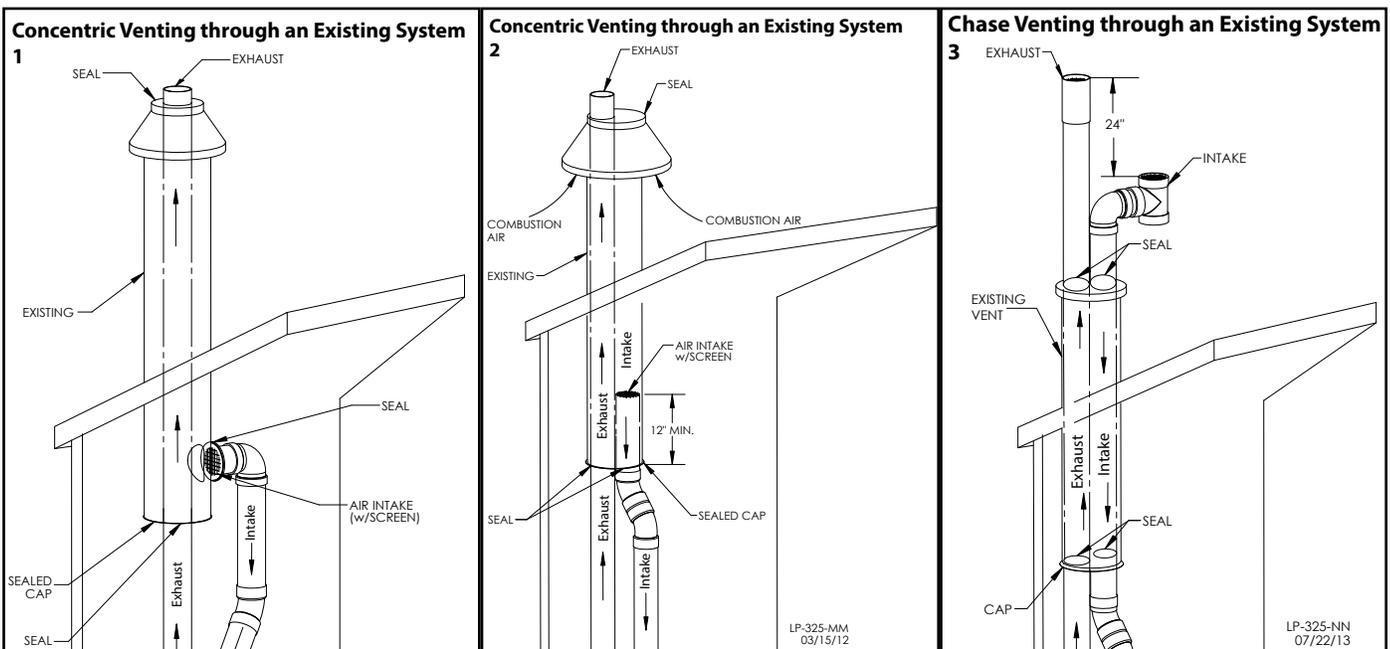


Figure 18 - 1, 2 - Concentric Venting Through an Existing System, 3, Chase Venting Through an Existing System

NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

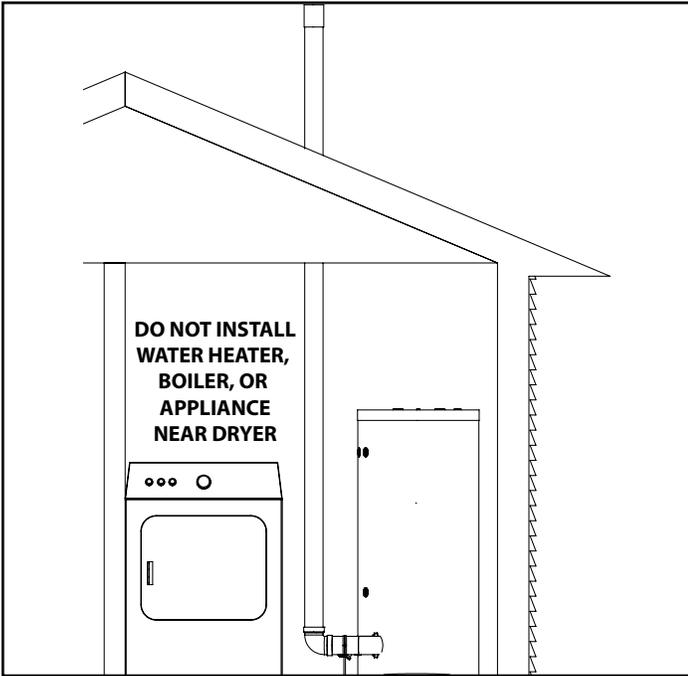
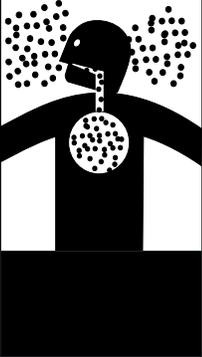


Figure 19 - Do Not Place Appliance Near Dryer

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

LP-304

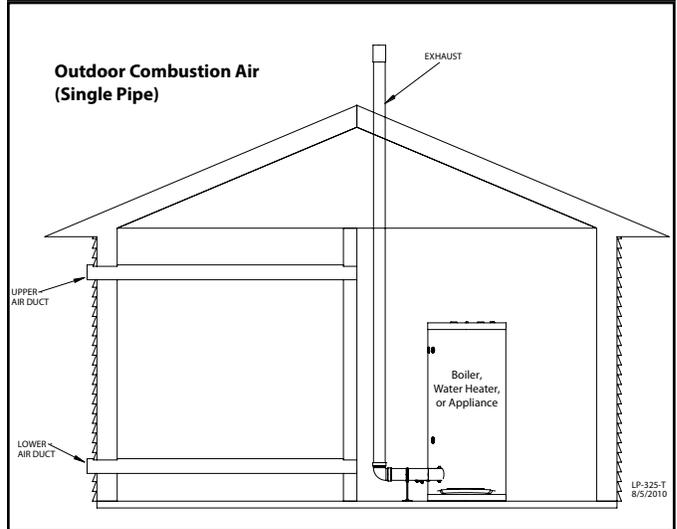
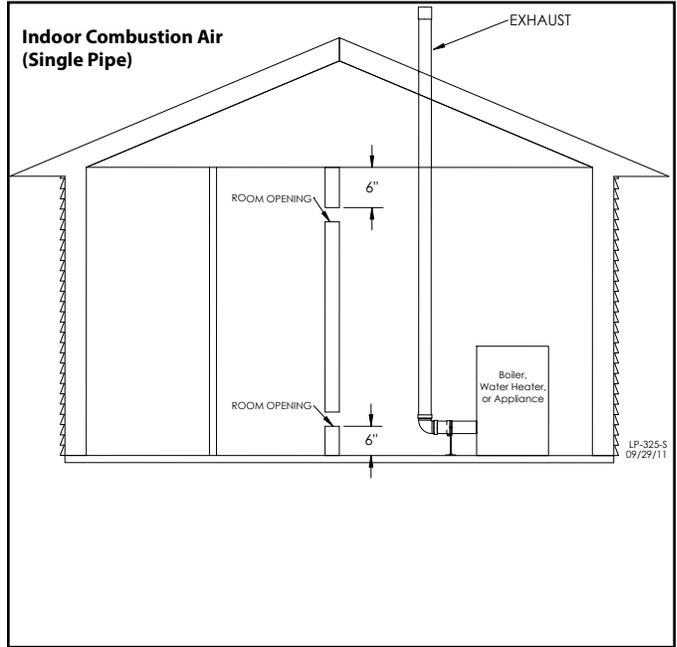


Figure 20 - Indoor and Outdoor Combustion Air - Single Pipe

I. Condensate Removal System

NOTE: Check with your local gas company to determine if combustion condensate disposal is permitted in your area. In the state of Massachusetts, condensate must be neutralized before entering a drain.

This condensing high efficiency appliance has a condensate removal system. Condensate is water vapor derived from combustion products, similar to that produced by an automobile when it is initially started. It is very important that the condensate line is sloped down away from the appliance and to a suitable drain.

If the appliance condensate outlet is lower than the drain, you must use a condensate removal pump (kit p/n 554200 available from HTP). If required by local authorities, a condensate filter of lime crystals, marble, or phosphate chips will neutralize slightly acidic condensate. This can be installed in the field and purchased from HTP (p/n 7450P-212).

installations that may encounter sustained freezing conditions, the use of heat tape is recommended to avoid freezing of the condensate line. It is also recommended to bush up the condensate line size to 1" and terminate condensate discharge as close to the unit as possible. Longer condensate runs are more prone to freezing. Damages due to frozen or blocked condensate lines ARE NOT covered by warranty.

4. Support of the condensate line may be necessary to avoid blockage of the condensate flow.

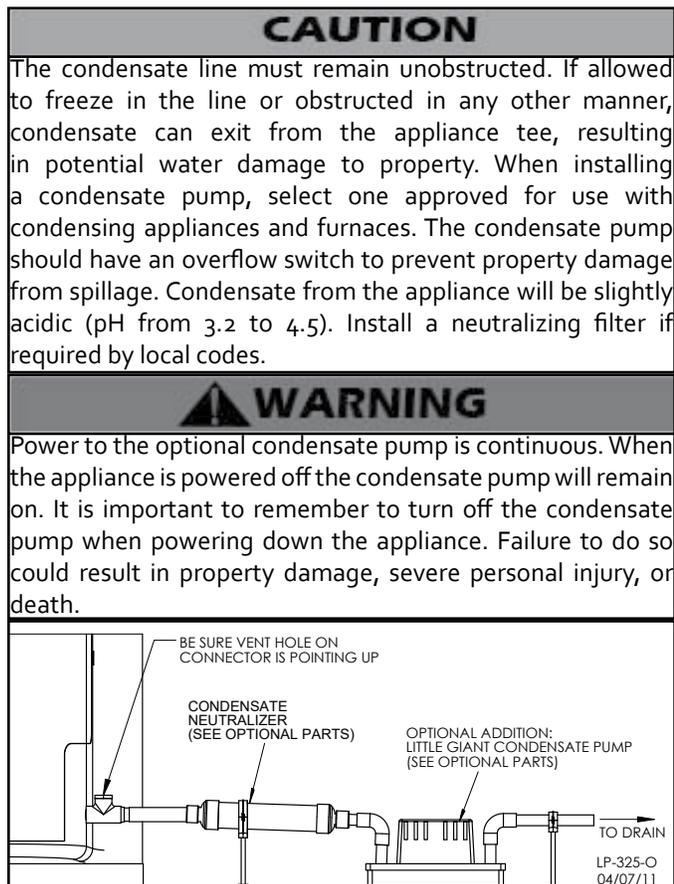


Figure 21 - Condensate Piping

NOTES:

1. Condensate line must be pitched at least $\frac{1}{4}$ " per foot to properly drain. If this cannot be done, or a very long length of condensate hose is used, increase the condensate line to a minimum of 1" ID and place a tee in the line after the condensate neutralizer to properly reduce vacuum lock in the drain line.
2. PVC or CPVC pipe should be the only material used for condensate line. Steel, brass, copper, and other metals will be subject to corrosion or deterioration.
3. A frozen condensate line could result in a blocked vent condition. It is very important to protect the condensate line from freezing temperatures or any type of blockage. In

Part 6 - Wiring

WARNING

To avoid electrical shock, turn off all power to the appliance prior to opening an electrical box within the unit. Ensure the power remains off while any wiring connections are being made. Failure to follow these instructions could result in component or product failure, serious injury, or death. Such product failure IS NOT covered by warranty.

Jumping out control circuits or components WILL VOID product warranty and can result in property damage, personal injury, or death.

NOTE: Wiring must be N.E.C. Class 1. If original wiring as supplied with appliance must be replaced, use only TEW 105 °C wire or equivalent. Appliance must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 – latest edition.

It is of extreme importance that this unit be properly grounded. It is very important that the building system ground is inspected by a qualified electrician prior to making this connection. Electrical power must only be turned on when the appliance is completely filled with cold water. Failure to follow these instructions could result in component or product failure, serious injury, or death.

An ASSE 1017 thermostatic mixing valve MUST be installed when using 0-10V or outdoor reset. Failure to do so could result in substantial property damage, serious injury, or death.

CAUTION

Label all wires prior to disconnecting them when servicing the appliance. Wiring errors can cause improper and dangerous operation. Failure to follow these instructions may result in property damage or personal injury.

A. Field Wiring

All connections made to the appliance in the field are done on the field connection board located on the top left side of the cabinet. Multiple knockout locations are available to route field wires into and out of the cabinet.

The appliance is capable of directly controlling 2 pumps when in standard mode and 3 pumps when configured as a cascade master appliance. When configured as a standard unit, each pump output can provide a maximum of 3 amps at 120 volts. If pumps require more than this amount of power, an external contactor or motor starter is needed.

If the appliance is configured as a cascade master, the appliance pump output is a dry contact output capable of switching 5 amps at 120 volts in addition to the system pump and DHW pump outputs sourcing 3 amps each.

An alarm bell or light can be connected to the alarm connection of the appliance. The alarm connection may be used to power a 120V device, and is rated 3 amps at 120 VAC.

The field connection board has separate, clearly marked terminal strips for line voltage and low voltage wiring. Special jacks are provided for trouble-free cascade system wiring using standard CAT3 or CAT5 patch cables.

B. Line Voltage Wiring for Standard Appliance

1. Connect the incoming power wiring to the line voltage terminal strip in the field connection board at terminals 120V, Neutral, Ground. A line voltage fused disconnect switch may be

required to be externally mounted and connected according to local codes that may apply.

2. Connect the central heating pump to the terminals marked 8 (HOT), 2 (NEUT), 3 (GND) in Figure 22. The connections shown are suitable for a maximum continuous pump draw of 5 amps at 120 volts. If the pump requires more current or voltage other than 120 volts, an external motor starter or contactor will be required.

3. If using DHW, connect the domestic hot water pump as shown to the terminals marked 4 (HOT), 5 (NEUT), 6 (GND). The connections shown are suitable for a maximum continuous pump draw of 3 amps at 120 volts.

4. If a pump requires more current or voltage other than 120 volts, an external motor starter or contactor will be required.

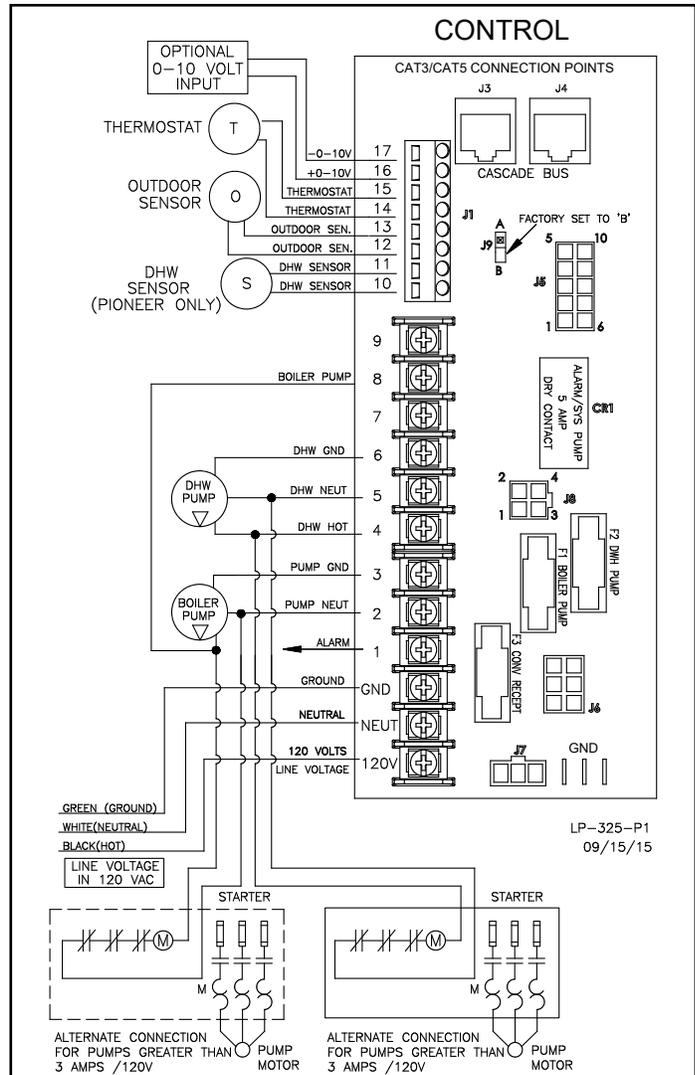


Figure 22 - Standard Appliance Customer Connection Board Detail

C. Thermostat

1. Connect the room thermostat to the terminals marked 14 and 15 on the field connection board. Any dry contact closure across these terminals will cause the appliance to run. Take caution to ensure neither of the terminals connects to the ground.
2. Mount the thermostat on an inside wall as centrally to the area being heated as possible, but away from drafts or heat producing devices such as television sets that could influence the ability of the thermostat to measure room temperature.
3. If the thermostat is equipped with an anticipator and it is

connected directly to the appliance, the anticipator should be set at .1 amps. If the thermostat is connected to other devices, the anticipator should be set to match the power requirements of those devices. See the instruction manual of connected devices for further information.

D. Outdoor Sensor (Optional)

1. If an HTP 7250P-319 outdoor sensor is not used in this installation, move on.
2. Use a minimum 22 AWG wire for runs of 100 feet or less and minimum 18 AWG wire for runs of up to 150 feet.
3. Mount the outdoor sensor on an exterior surface of the building, preferably on the north side in an area that will not be affected by direct sunlight and will be exposed to varying weather conditions.

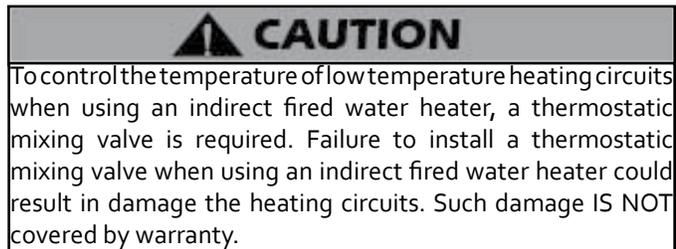
NOTE: Follow instructions provided with the sensor for detailed mounting instructions.

4. When correctly mounted, connect sensor to terminals marked 12 and 13.

E. Indirect Sensor (Optional)

1. If an indirect water heater is not used in the installation, move on.
2. The appliance will operate an indirect fired water heater with either a thermostat type aquastat or an HTP 7250P-325 tank sensor installed in the water heater. When a tank sensor is used, the appliance control will automatically detect its presence and a demand for heat from the water heater will be generated when the tank temperature falls below the user set point by more than the user selectable offset. Demand will continue until the indirect water heater temperature is above the set point.

Connect the indirect sensor or mechanical aquastat to the terminals marked 10 and 11 on the field connection board.



F. Optional 0-10 Volt Building Control Signal

1. If a 0-10 volt building management system is not used in the installation, move on.
2. A signal from a building management system may be connected to the appliance to enable remote control. This signal should be a 0-10 volt positive-going DC signal.
3. When this input is enabled using the installer menu, a building control system can be used to control either the set point temperature or the heat output of the appliance. The control interprets the 0-10 volt signal as follows; when the signal is between 0 and 1.5 volts, the appliance will be in standby mode, not firing. When the signal rises above 1.5 volts, a demand for heat is started. As the signal continues to rise towards its maximum of 10 volts, the appliance will increase either its set point temperature or firing rate depending on the setting of function 17 in the installer menu. See Part 10 for details on the setting of functions 16 and 17 for this option.
4. Connect a building management system or other auxiliary control signal to the terminals marked 16 (0-10 VOLT +) and

17 (0-10 VOLT -) in the electrical junction box caution should be used to ensure that the 16 (0-10 VOLT +) connection does not become connected to ground.

G. UL353 Low Water Cut-Off Kit (Optional)

1. If an HTP 7450P-255 UL353 Low Water Cut-Off (LWCO) Kit is not used, move on to Section I.
2. The control box of the kit should be mounted to the left side of the appliance near the low water cut-off probe, which is located near the outlet nipple of the appliance.
3. Follow the complete instructions included in the kit for proper installation.

H. Wiring of an Appliance Alarm (Optional)

An alarm bell or light can be connected to the alarm connection of the appliance. In the event of an alarm, the alarm connection may be used to power a 120V device. The alarm connections are rated 3 amps at 120 VAC. Connect to terminal 1 (HOT), 2 (NEUT), and 3 (GND).

I. Wiring for DHW Priority with Zone Valves or Circulators (Versa Flame Models Only)

For proper installation of the appliance with zone relay panels, follow the wiring instructions in Subsections 1 and 2 below. It is critical that the installation is followed for proper DHW Priority.

1. Wiring with Zone Valves

Connect the end switch to the TT connection on the appliance. The central heating pump must be connected to the appliance. Ensure that factory jumper connecting terminals 120 VOLT and 9 remains in place.

2. Wiring with Zone Circulator Pumps

Connect the end switch to the TT connection on the appliance. Remove the factory jumper from Line Voltage Pin to Pin 9. Connect the ZC/ZR to the normally open pins on the appliance relay. The appliance will close during a central heating demand, and activate the zone circulator pumps on the relay panel. If the appliance is in DHW priority mode, the relay will open, shutting off the circulator pumps. If there is still a central heating demand after the DHW priority mode is complete, the relay will close, re-activating the circulator pumps.

J. Wiring of the Cascade System Communication Bus (Pioneer Models Only)

1. Use standard CAT3 or CAT5 computer network patch cables to connect the communication bus

to each of the appliances. These cables are readily available at any office supply, computer, electronic, department or discount home supply store in varying lengths. If you possess the skills you can also construct custom length cables.

2. It is recommended to use the shortest length cable that will reach between the appliances and create a neat installation. Do not run unprotected cables across the floor where they may become wet or damaged. Avoid running communication cables parallel and close to or against high voltage (120 volt or greater) wiring. HTP recommends the maximum length of communication bus cables not exceed 200 feet.

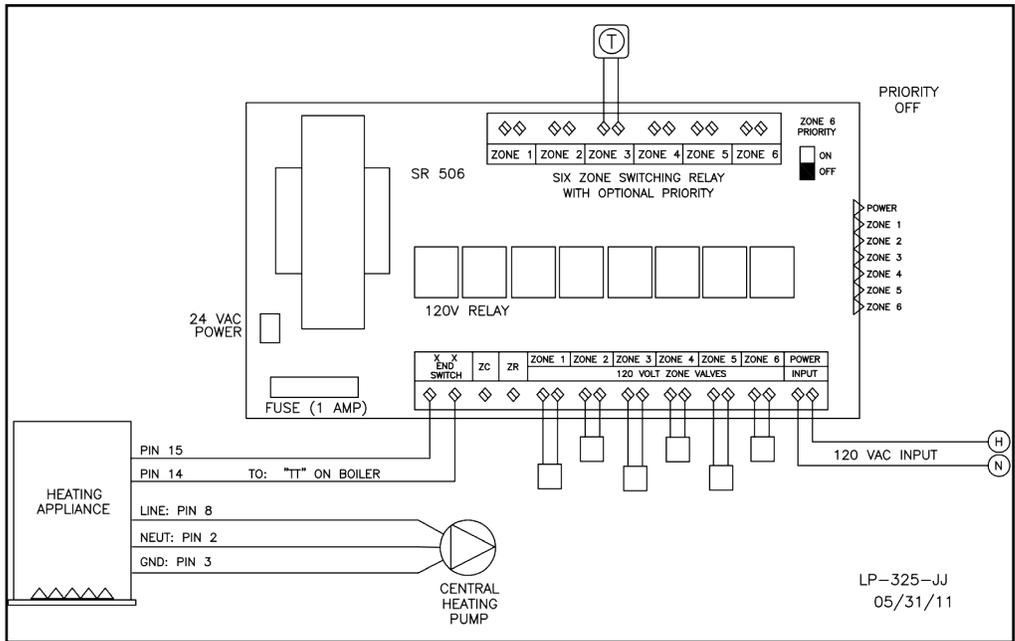


Figure 23 - Wiring with Zone Valves

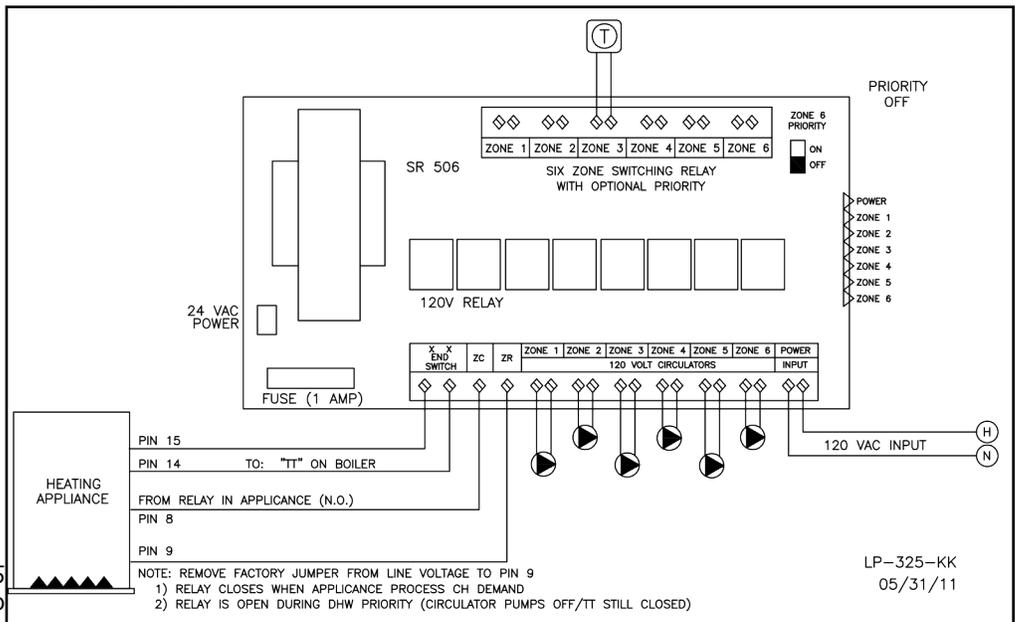


Figure 24 - Wiring with Zone Circulator Pumps

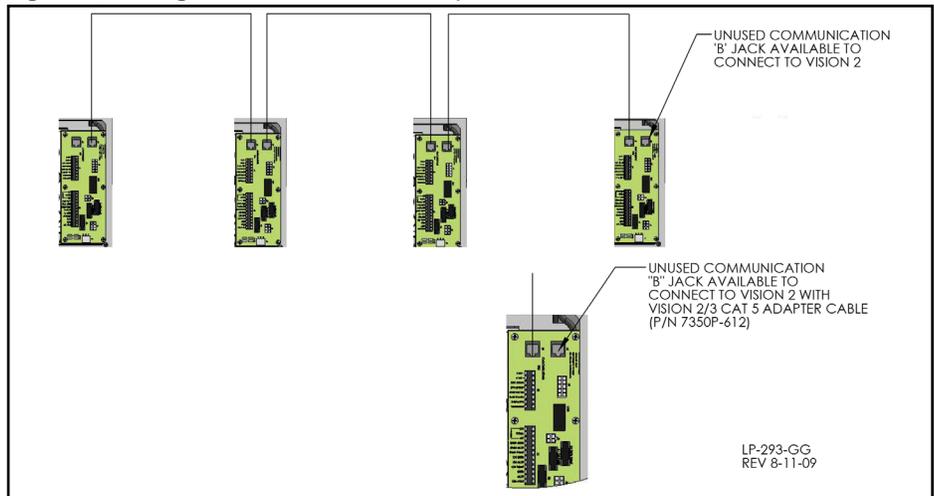


Figure 25 - Cascade Wiring

3. Route the communication cables through one of the knockouts in the cabinet.
 4. Connect the appliances in a daisy chain configuration. It is best to wire the appliances using the shortest wire runs rather than trying to wire them in the order that they are addressed.
- The communication bus jacks on the customer connection panel are interchangeable so you can use either one or both in any order to connect the cable. If you have connected the appliances to each other properly, two of the appliances will have single open connection ports.

K. Cascade Master Pump and Sensor Wiring (Pioneer Models Only)

1. Connect the system pump hot wire to the terminal marked 1.
2. Connect the system pump neutral to the terminal 2 and the pump ground wire to terminal 3.
3. Connect a jumper wire from the 120 VOLT terminal to terminal 9.
4. Connect the appliance pump to the terminals marked 8, 2, and 3.
5. Connect the system pipe sensor to the terminals marked 10 and 11.
6. Connect the outdoor sensor (if used) to the terminals marked 12 and 13.

7. Connect the signal to start the system to the terminals marked 14 and 15.

NOTE: This signal can come from a room thermostat or a dry contact closure. No power of any voltage should be fed into either of these terminals.

L. Cascade Follower Pump and Sensor Wiring (Pioneer Models Only)

1. Connect the appliance pump to the terminals labeled 8, 2, and 3.
 3. If you are using an indirect fired water tank connected directly to the follower appliance connect the pump for it to the 4, 5, and 6 terminals.
 2. An alarm bell or light can be connected to the alarm contacts of the follower appliance. In the event of an alarm, the normally open alarm contact may be used to turn a device on. The normally closed alarm contact may be used to turn a device off if the appliance goes into lockout mode. The alarm contacts are rated 3 amps at 120 VAC.
 3. To connect an alarm device, connect the power for the device to terminal 1. Connect the neutral or return of the alarm device to the neutral terminal on the customer connection board.
- NOTE:** In a cascade system the alarm output of the appliance addressed as #1 will also be active if the master appliance has a lockout condition. The alarm output of appliances addressed as 2-7 will only activate an alarm if a lockout condition occurs on that specific appliance.

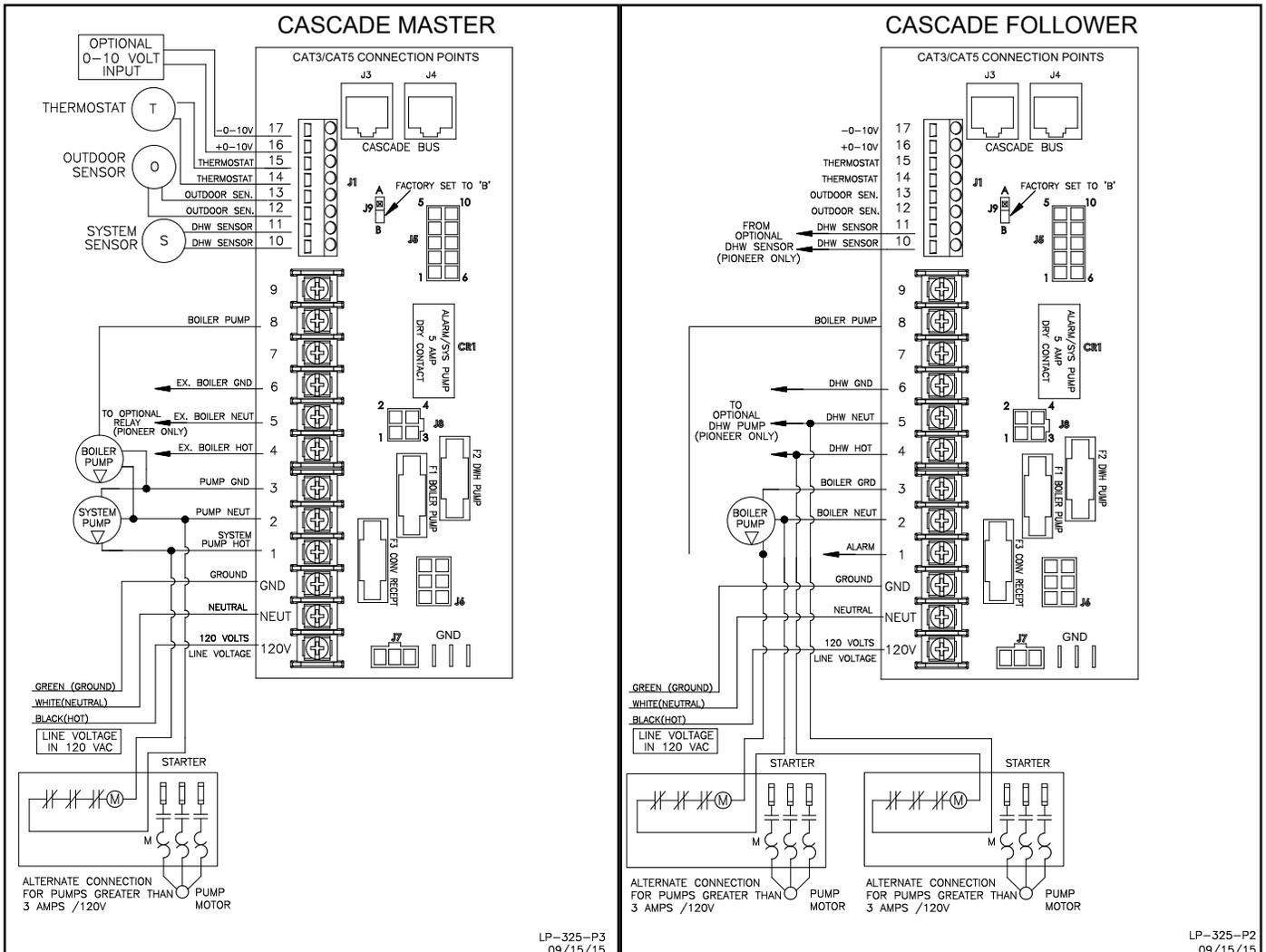
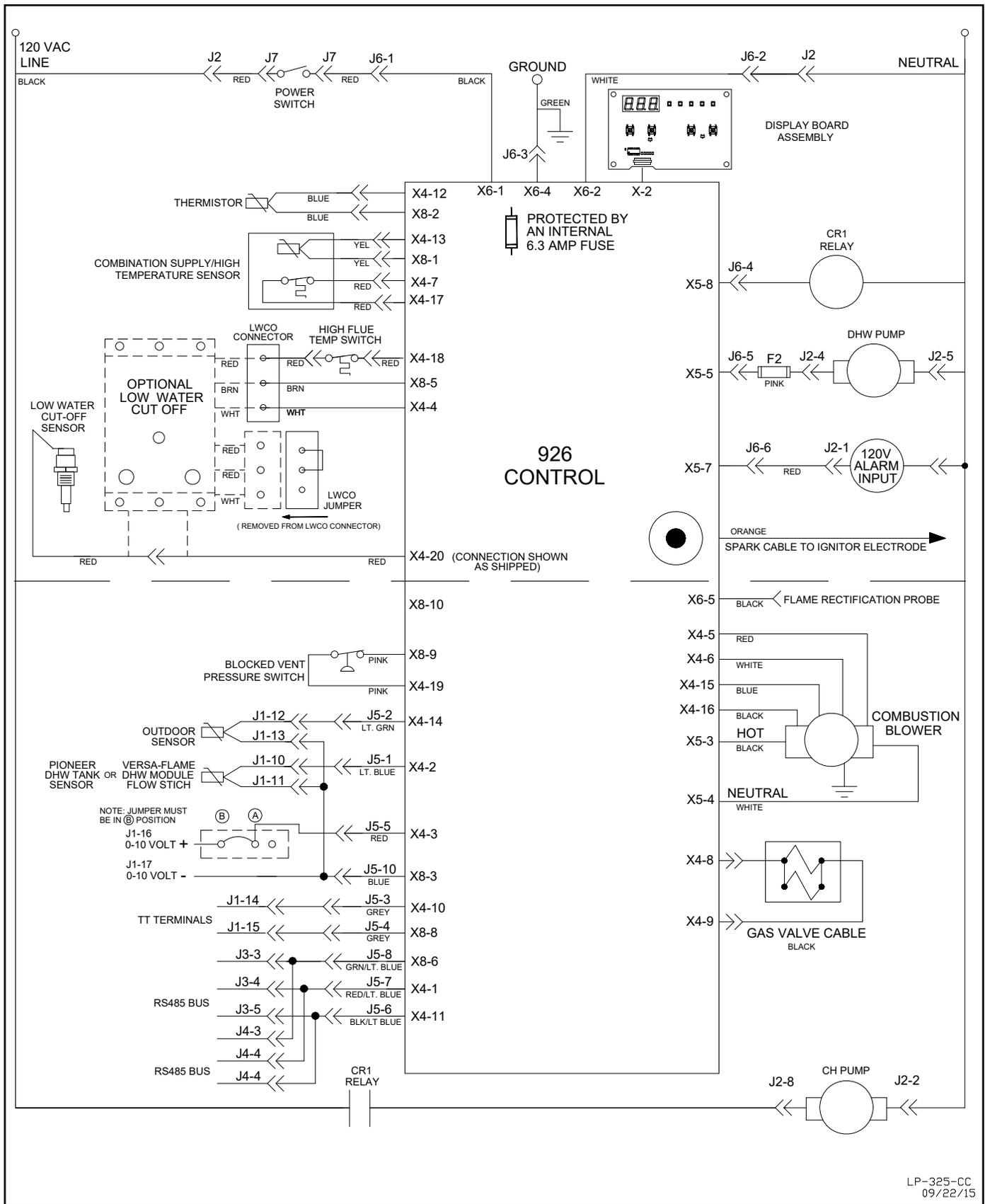


Figure 26 - Cascade Master and Cascade Follower Wiring

M. Internal Wiring Diagram



LP-325-CC
09/22/15

Figure 27 - Internal Wiring Diagram

Part 7 - Gas Connections

WARNING

Failure to follow all precautions could result in fire, explosion, severe injury, or death.

Ensure the gas on which the appliance will operate is the same type specified on the rating plate. Failure to do so could result in appliance malfunction, property damage, personal injury, or death.

The gas supply shall have a maximum inlet pressure of less than 14" water column (350 mm), ½ pound pressure (3.5 kPa), and a minimum of 3.5" water column. The entire piping system, gas meter and regulator must be sized properly to prevent pressure drop greater than 0.5" WC as stated in the National Fuel Gas Code. This information is listed on the rating plate.

It is very important that you are connected to the type of gas as noted on the rating plate: "LP" for liquefied petroleum, propane gas, or "Nat" for natural or city gas. All gas connections must be approved by the local gas supplier or utility, in addition to the governing authority, prior to turning the gas supply on.

Do not remove the adaptor in Figure 28! It is mandatory that this fitting is used for connection to a field fabricated drip leg per the National Fuel Gas Code. You must ensure that the entire gas line to the connection at the appliance is no smaller than 3/4".

Once all inspections have been performed, the piping must be leak tested. If the leak test requirement is a higher test pressure than the maximum gas inlet pressure, you must isolate the appliance from the gas line to continue leak testing. To do this, you must turn off the factory and field-installed gas cocks. This will minimize the possibility of damaging the gas valve. Failure to do so may damage the gas valve. In the event the gas valve is exposed to a pressure greater than ½ PSI, 14" water column, the gas valve must be replaced. Never use an open flame (match, lighter, etc.) to check gas connections.

WARNING

UL recognized fuel gas detectors are recommended in all enclosed propane and natural gas applications where there is a potential for an explosive mixture of fuel gas to accumulate. The installation of these detectors should be made in accordance with the detector manufacturer's recommendations, and/or local laws. Failure to install fuel gas detectors in these applications could result in fire, explosion, property damage, severe personal injury, or death.

A. Gas Piping

Run the gas supply line in accordance with all applicable codes. Locate and install manual shutoff valves in accordance with local and state requirements.

WARNING

Support gas supply piping with hangers, not by the appliance or its accessories. The appliance gas valve and blower will not support the weight of the piping. Make sure the gas piping is protected from physical damage and freezing, where required. Failure to follow these instructions could result in gas leakage, and result in fire, explosion, property damage, severe personal injury, or death.

Do not use Teflon tape on gas line pipe thread. Use a pipe compound rated for use with natural and propane gases. Apply sparingly on male pipe ends, leaving the two end threads bare. Failure to follow these instructions could result in gas leakage, and result in fire, explosion, property damage, severe personal injury, or death.

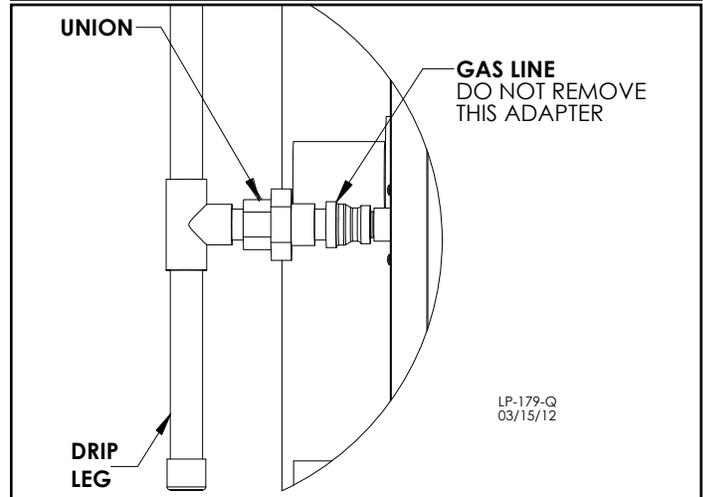


Figure 28 - Gas Connection

B. Gas Table

Refer to the table below to size the supply piping to minimize pressure drop between meter or regulator and unit.

Maximum capacity of pipe in cubic feet of gas per hour for gas pressures of .5 psi or less and a pressure drop of .3 inch water column.

It is recommended that a soapy solution be used to detect leaks. Bubbles will appear on the pipe to indicate a leak is present. The gas piping must be sized for proper flow and length of pipe to avoid excessive pressure drop. Both the gas meter and the gas regulator must be properly sized for the total gas load. If you experience a pressure drop greater than 1" WC, the meter, regulator or gas line is undersized or in need of service. You can attach a manometer to the incoming gas drip leg by removing the cap. The gas pressure must remain between 3.5" WC and 14" WC during stand-by (static) mode and while in operating (dynamic) mode at full output.

If an in-line regulator is used, it must be a minimum of 10 feet from the appliance. It is very important that the gas line is properly purged by the gas supplier or utility. Failure to properly purge the lines or improper line sizing will result in ignition failure. This problem is especially noticeable in NEW LP installations and also in empty tank situations. This can also occur when a utility company shuts off service to an area to provide maintenance to their lines. The gas valve must not be replaced with a conventional gas valve under any circumstances. As an additional safety feature, the gas valve in this appliance has a flanged connection to the swirl plate and blower.

Nominal Iron Pipe Size (in.)	Internal Dia. (in.)	Length of Pipe (Feet)														BTU's Per Hour x 1,000
		10	20	30	40	50	60	70	80	90	100	125	150	175	200	
3/4	.824	278	190	152	130	115	105	96	90	84	79	72	64	59	55	
1	1.049	520	650	285	245	215	195	180	170	160	150	130	120	110	100	
1 1/4	1.38	1050	730	590	500	440	400	370	350	320	305	275	250	225	210	
1 1/2	1.61	1600	1100	890	760	670	610	560	530	490	460	410	380	350	320	

Table 10 - Source - ANSI Z223.1

C. Gas Valve

⚠ DANGER

Do not do a gas conversion on this appliance without an officially approved conversion kit and instructions supplied by HTP. Failure to use a conversion kit when converting the appliance to fire on Natural or Propane gas will result in extremely dangerous burner operation, leading to fire, explosion, severe personal injury, or death.

⚠ WARNING

Strain on the gas valve and fittings may result in vibration, premature component failure and gas leakage, and result in fire, explosion, property damage, severe personal injury, or death.

Adjustments to the throttle screw or offset may only be made by a qualified gas technician using a calibrated combustion analyzer capable of measuring CO₂ and CO. Failure to follow this instruction could result in fire, explosion, property damage, severe personal injury, or death.

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

LP-304

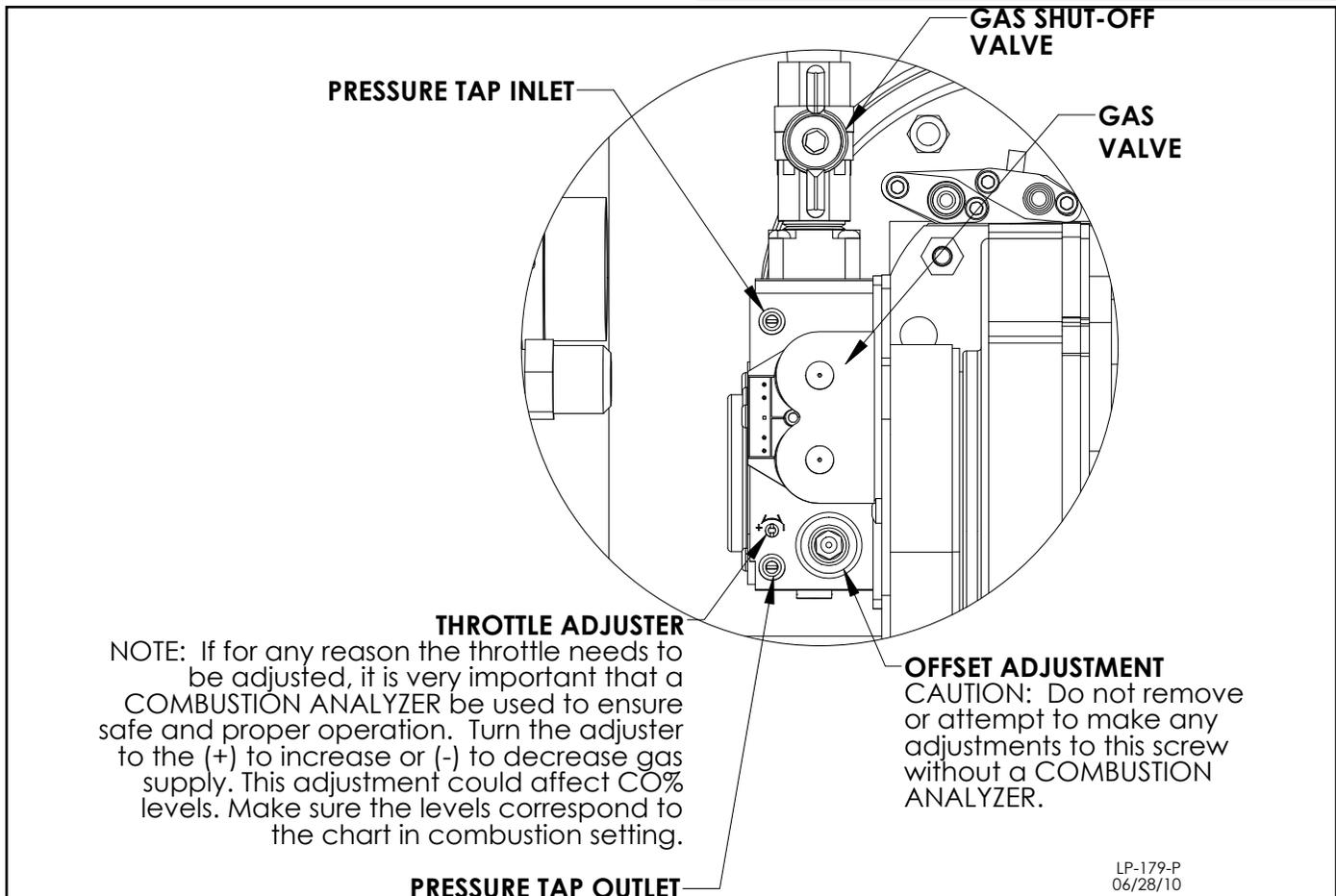


Figure 29 - Gas Valve

Part 8 - Start-Up Preparation

WARNING

Thoroughly clean and flush any system that has used glycol before installing the appliance. Provide the customer with a material safety data sheet (MSDS) on the fluid used.

A. Check / Control Water Chemistry

CAUTION

Chemical imbalance of your water can cause severe damage to your appliance and associated equipment, and may also affect efficiency. You may have to have your water quality professionally analyzed to determine whether you need to install a water softener. It is important that the water chemistry on both the domestic hot water and central heating sides are checked before installing the appliance, as water quality will affect the reliability of the system. Outlined below are those water quality parameters which need to be met in order for the system to operate efficiently for many years. Failure of a heat exchanger due to lime scale build-up on the heating surface, low pH or other imbalance IS NOT covered by the warranty.

To assure extended service life, it is recommended to test water quality prior to installation. Listed below are some guidelines.

CAUTION

Do not use petroleum-based cleaning or sealing compounds in the appliance system. Damage to elastomer seals and gaskets in the system could occur, resulting in substantial property damage.

Water pH between 6.5 and 8.5

1. Maintain appliance water pH between 6.5 and 8.5. Check with litmus paper or have it chemically analyzed by a water treatment company.
2. If the pH differs from above, consult local water treatment company for treatment needed.

Hardness less than 7 grains (120 mg/L)

Consult local water treatment companies for unusually hard water areas (above 7 grains hardness).

Chloride concentration less than 100 ppm (mg/L)

1. Using chlorinated fresh water should be acceptable since drinking water chloride levels are typically less than 5 ppm.
2. Do not connect the appliance to directly heat a swimming pool or spa water.
3. Do not fill appliance or operate with water containing chloride in excess of 100 ppm.

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

1. The greater the amounts of TDS present, the higher the corrosion potential due to increased conductivity in the water.
2. 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.

Hardness: Less than 7 grains (120 mg/L)

Chloride levels: Less than 100 ppm (mg/L)

pH levels: 6.5 - 8.5

TDS: 500 ppm / mg/L

Clean system to remove sediment*

1. You must thoroughly flush the system (without appliance connected) to remove sediment. The high-efficiency heat exchanger can be damaged by buildup or corrosion due to sediment.
2. For zoned systems, flush each zone separately through a purge valve. (If purge valves and isolation valves are not already installed, install them to properly clean the system.)
3. Flush system until water runs clean and you are sure piping is free of sediment.

***NOTE:** It is recommended you clean heat exchanger at least once a year to prevent lime scale buildup. Follow the maintenance procedure to clean the heat exchanger in the Maintenance Section of this manual.

Test/replace freeze protection fluid

1. For systems using freeze protection fluids, follow fluid manufacturer's instructions to verify inhibitor level and that other fluid characteristics are satisfactory.
2. Freeze protection fluid must be replaced periodically due to degradation of inhibitors over time. Follow all fluid manufacturer instructions.

NOTE: Appliance failure due to improper water chemistry is not covered by warranty.

B. Check for Gas Leaks

WARNING

Before starting the appliance, and during initial operation, smell near the floor and around the appliance for gas odorant or any unusual odor. Remove appliance front door and smell interior of appliance enclosure. Do not proceed with startup if there is any indication of a gas leak. Repair any leaks at once.

PROPANE ONLY – The propane supplier mixes an odorant with the propane to make its presence detectable. In some instances the odorant can fade, and the gas may no longer have an odor. Before startup (and periodically thereafter), have the propane supplier verify the correct odorant level in the gas.

C. Freeze Protection (When Used)

WARNING

NEVER use automotive or standard glycol antifreeze. Do not use ethylene glycol made for hydronic systems. Use only freeze-protection fluids certified by fluid manufacturer as suitable for use with stainless steel boilers, verified in the fluid manufacturer's literature. Thoroughly clean and flush any system that has used glycol before installing the new appliance. Provide the appliance owner with a material safety data sheet (MSDS) on the fluid used.

1. Determine the freeze protection fluid quantity using total system water content following the fluid manufacturer's instructions. Remember to include expansion tank water content.
2. Local codes may require back flow preventer or actual disconnect from city water supply.
3. When using freeze protection fluid with automatic fill, install a water meter to monitor water makeup. Freeze protection fluid may leak before the water begins to leak, causing concentration to drop, reducing the freeze protection level.

Test / Replace Freeze Protection Fluid

1. Follow fluid manufacturer instructions to verify inhibitor level and other fluid characteristics are satisfactory.
2. Freeze protection fluid must be replaced periodically due to degradation of inhibitors over time. Follow all fluid manufacturer instructions.

D. Fill and Test Water System

WARNING

Ensure the appliance is full of water before firing the burner. Failure to do so will damage the appliance. Such damage IS NOT covered by warranty, and could result in property damage, severe personal injury, or death.

1. Fill the system only after ensuring water chemistry meets the requirements listed in this manual.
2. Close the manual and automatic air vents and appliance drain valve.
3. Fill to the correct system pressure. Correct pressure will vary with each application.
 - a. Typical cold water fill pressure for a residential system is 12 psi.
 - b. Pressure will rise when appliance is turned on and system water temperature increases. Operating pressure must never exceed the relief valve pressure setting.
4. At initial fill and during appliance startup and testing, check system thoroughly for leaks. Repair all leaks before proceeding further.

WARNING

Eliminate all system leaks. Continual fresh make-up water will reduce appliance life. Minerals can build up in the heat exchanger, reducing heat transfer, overheating the heat exchanger and causing heat exchanger failure.

5. The system may have residual substances that could affect water chemistry. After the system has been filled and leak tested, verify that water pH and chloride concentrations are acceptable by sample testing.

E. Purge Air from the Hydronic System

CAUTION

It is important to purge the system of air to avoid damage to the appliance.

IMPORTANT! While commissioning the system, the air vent on top of the appliance must remain fully open to allow the appliance to properly fill. Failure to keep the air vent open could lead to improper appliance and system operation.

1. Connect a hose to the purge valve and route hose to an area where water can drain and be seen.
2. Close the appliance or system isolation valve between the purge valve and fill connection to the system.
3. Close zone isolation valves.
4. Open quick-fill valve on cold water makeup line.
5. Open purge valve.
6. One zone at a time, open the isolation valves. Allow water to run through the zone, pushing out the air. Run until no noticeable air flow is present. Close the zone isolation valves and proceed with the next zone. Follow this procedure until all zones are purged.
7. Refill to correct pressure.

F. Purge Air from DHW System (Versa Flame Models)

The power must remain off until the potable water side of the appliance is fully purged of air. To purge the DHW system, turn on the cold water feed and open a faucet at the highest point of the system. Observe filling of the brazed plate heat exchanger and inspect for any leaks in the system which may occur and need to be repaired. Shut off faucet once all evidence of air is purged from the water stream (water is flowing freely).

G. Check Thermostat Circuit(s)

1. Disconnect the two external wires connected to the appliance thermostat terminals (low voltage terminal strip).
2. Connect a voltmeter across these two incoming wires with power applied to thermostat circuits. Close each thermostat, zone valve and relay in the external circuit one at a time and check the voltmeter reading across the incoming wires.
3. There should NEVER be a voltage reading.
4. If a voltage does occur under any condition, check and correct the external wiring. (This is a common problem when using 3-wire zone valves).
5. Once the external thermostat circuit wiring is checked and corrected if necessary, reconnect the external thermostat circuit wires to appliance low voltage terminal strip.

H. Final Checks Before Starting Appliance

1. Read Startup Procedures within this manual for proper steps to start appliance. (See Startup Report to record steps for future reference).
 2. Verify appliance and system are full of water and all system components are correctly set for operation.
 3. Fill condensate trap with water.
 4. Verify electrical connections are correct and securely attached.
 5. Inspect exhaust vent and intake piping for signs of deterioration from corrosion, physical damage or sagging. Verify exhaust vent and intake piping are intact and correctly installed per Venting section and local code.

I. Condensate Removal

1. The appliance is a high efficiency condensing appliance. Therefore, the unit has a condensate drain. Condensate fluid is nothing more than water vapor, derived from combustion products, similar to that produced by an automobile when it is initially started.

Condensation is slightly acidic (typically with a pH of 3 to 5) and must be piped with the correct materials. Never pipe the condensate using steel, copper, brass or other materials that will be subject to corrosion. Plastic PVC or CPVC pipe are the only approved materials.

A condensate neutralizer, if required by local authorities, can be made up of lime crystals, marble or phosphate chips that will neutralize the condensate. This may be done by the installer or you may purchase a condensate neutralizer from HTP (7450P-212).

2. The appliance is equipped with a $\frac{3}{4}$ female socket weld fitting connection that must be piped to a local drain. It is very important that the condensate line is sloped downward away from the appliance to a suitable inside drain. If the condensate outlet on the appliance is lower than the drain, you must use a condensate removal pump, available from HTP (554200). This pump is equipped with two leads that can be connected to an alarm or another type of warning device to alert the user of a condensate overflow, which, if not corrected, could cause

property damage.

3. If a long horizontal run is used, it may be necessary to create a vent in the horizontal run to prevent a vacuum lock in the condensate line.
4. Do not expose the condensate to freezing temperatures.
5. It is very important you support the condensation line to assure proper drainage.

Part 9 - Start-Up Procedure

WARNING

FOR YOUR OWN SAFETY READ BEFORE OPERATING

1. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
2. **BEFORE OPERATING:** Smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
 - 3. WHAT TO DO IF YOU SMELL GAS**
 - Do not try to light any appliance.
 - Do not touch any electric switch, do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers' instructions.
 - If you cannot reach your gas supplier, call the fire department.
 - Turn off the gas shutoff valve (located outside the appliance) so that the handle is crosswise to the gas pipe. If the handle will not turn by hand, don't try to force or repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
4. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been damaged.
5. The appliance shall be installed so the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service (circulator replacement, condensate trap, control replacement, etc.)
Failure to follow these instructions could result in property damage, serious personal injury, or death.

If you discover any evidence of a gas leak, shut down the appliance at once. Find the leak source with a bubble test and repair immediately. Do not start the appliance again until the leak is repaired. Failure to comply could result in substantial property damage, severe personal injury, or death.

A. Operating Instructions

If you smell gas, STOP. Follow listed safety instructions. If you do not smell gas, follow the next steps.

1. Turn on all electrical power to the appliance.
2. Adjust the temperature set point of the appliance if desired. The factory default setting is 180°F. If changes are necessary, follow, "Adjusting the Setpoint", below.
3. Set the thermostat to create a demand for heat.
4. If the appliance fails to start, refer to the Troubleshooting section in the back of this manual.

B. Cascade System

1. If the appliance is used alone, skip this section.
2. Programming the Master Appliance
 - a. Make sure there is no demand for heat being supplied to

the appliance.

- b. Apply power to the appliance.
- c. Enter the Installer Menu following instructions in this manual.
- d. Verify that parameter 15 is set to 0. This makes the Master Appliance address 0.

NOTE: The Master Appliance **MUST** be addressed as 0.
- e. Set parameter 23 from 0 to 1.
- f. Exit the installer menu.

These settings designate this appliance as the Master Appliance.

3. Follower Appliances

NOTE: Read the notes below before programming follower appliances.

- The appliance addressed as 1 will share its alarm output with the Master Appliance.
- If one of the follower appliances has an indirect fired water appliance connected to it, the address of this appliance must be 2 or greater.
- It is recommended but not necessary to address appliances in the order that they are wired.
- No two appliances can have the same address.
- It is not required to use all consecutive address numbers. Example: In a 2 appliance system with an indirect tank connected to the follower, the follower address could be 2 (address 1 not used).

4. To program follower appliance(s):

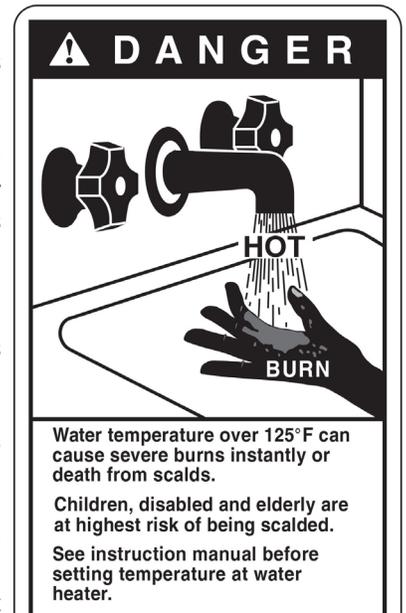
- a. Make sure there is no demand for heat being supplied to the Master Appliance.
- b. Apply power to the follower appliance you are working on.
- c. Enter the installer Menu following instructions in Part 10 of this manual.
- d. Set parameter 15 to 1 for the desired appliance address after reading the notes above.
- e. Set parameter 23 to 1 for cascade operation.
- f. Exit the installer menu.

C. Adjusting the Setpoint

Before you change the temperature from the factory setting of 180°F, make sure that none of the thermostats are calling for heat. The controller will not memorize a program setting while in a heating cycle.

To access and scroll through additional setting options, press **{S3}**.

1. Press **{S3}** once to access **|C|**, Appliance Temperature Set Point. To adjust the temperature of the appliance, simply press in the **{S3}** key for three seconds until you see a flashing (C) then an alternating value of (180). This number is the factory set point



of 180°F.

To change the temperature, push either **{S1}** or **{S2}** on the display. The **{S1}** button decreases and **{S2}** increases the set point temperature. The set point temperature can be set as low as 50°F or as high 185°F. Changes are directly stored and the display returns to normal mode after one minute.

2. Press **{S3}** a second time. The appliance will now display **|Ch|** and an alternating value of 15. This is the Appliance Differential Set Point. This function allows the installer to adjust the activation of the burner based on the differential temperature setting of the appliance. The burner will not start until the outlet water temperature reaches a temperature equal to the setting for the appliance, minus the differential.

EXAMPLE: The appliance is set to heat at 180°F and the differential is set at 15°F. The burner will not start until the outlet temperature of the system reaches 164°F (180° – 15° = 165°).

To adjust, press either **{S1}** (Decrease Value) or **{S2}** (Increase Value). Ranges 5° F to 30° F.

3. Press **{S3}** a third time and you will see the Indirect Temperature Set Point **|de|** and an alternating value of 119. **NOTE:** Only in use if using an indirect storage tank with a PIONEER (***NOT IN USE ON VERSA FLAME**). Range 95 – 180. To adjust, press either **{S1}** (Decrease Value) or **{S2}** (Increase Value).

4. Press **{S3}** a fourth time to access **|dh|**, the Indirect Differential Set Point. This function allows the installer to adjust the activation of the DHW call based on the differential temperature setting for the indirect tank with a PIONEER (***NOT IN USE ON VERSA FLAME**.) The pump will not start until the indirect water temperature reaches a temperature equal to the setting for the indirect, minus the indirect differential. Range 1 – 18. Default 7.

EXAMPLE: The indirect is set to heat at 130°F and the differential is set to 10°F. The DHW pump will not start until the outlet temperature of the system reaches 119°F (130 – 10 = 120).

Versa Flame DHW Temperature Adjustment

To adjust the DHW temperature on the Versa Flame, you will need to manually adjust the thermostatic mixing valve. See this manual for detailed instructions.

5. Press **{S3}** a fifth time to access the final adjustment in this mode – **|t|**, the Temperature Measurement in Fahrenheit to Celsius. To change value, press either **{S1}** or **{S2}** to change the measurement from F (Fahrenheit) to C (Celsius).

D. Status Menu

Installers are also able to check the current status of the appliance parameters by pressing **{S4}** for 3 seconds. Once activated, the display will show **|d1|** alternating value of the actual outlet temperature. Actual values are displayed for each function. To view the next value, simply press the **{S4}** key.

Listed below are the values which can be displayed. These values cannot be changed. To exit this menu, simply press **{S3}** to resume normal operation.

Function – Value

To toggle between values press **{S1}** to go down and **{S4}** to go up. The first function you will see is:

|d1| — Actual temperature from top sensor

|d2| — Actual temperature from bottom sensor

|d3| — PIONEER: Actual tank temperature if an indirect sensor is used.

*VERSA-FLAME: Displays the state of DHW demand – 1 if

flow switch is active (closed), 0 if flow switch is not active (open)

|d4| — Not used

|d5| — Actual temperature from the outdoor sensor **|NC|**.

|d6| — Actual fan speed multiplied by 10 (Example: If fan speed displayed is **|410|** RPM x 10 = 4100 actual fan speed)

|d7| — Actual ionization current read from flame rectification probe

|d8| — Actual status of the central heating circulator Off = **|0|**, On = **|1|**.

|d9| — Actual status of the indirect fired circulator Off = **|0|**, On = **|1|**.

*VERSA-FLAME: Status of the DHW module pump Off = **|0|**, On = **|1|**.

|d10| — Actual status of bus communication **|co|** = connected, **|nc|** = not connected

|d11| — Central heating set point

|d12| — Power on hours in thousands (display will not read until 100 hrs.)

|d13| — Total central heat hours in thousands (display will not read until 100 hrs.)

|d14| — Total indirect/dhw hours in thousands (display will not read until 100 hrs.)

|d15| — Passed ignition attempts in thousands

|d16| — This function only becomes active when appliance is set as the Master. It allows the user to monitor the System Pump connected to the Master Appliance (0 = Off, 1 = On) in a multiple appliance installation. Each appliance firing output percent is displayed.

|P0| - Master Appliance - Alternating (0-100 Percentage firing rate)

|P1| - Follower Appliance #1 – Alternating (0-100 Percentage firing rate)

|P2| - Follower Appliance #2 – Alternating (0-100 Percentage firing rate)

|P3| - Follower Appliance #3 – Alternating (0-100 Percentage firing rate)

|P4| - Follower Appliance #4 – Alternating (0-100 Percentage firing rate)

|P5| - Follower Appliance #5 – Alternating (0-100 Percentage firing rate)

|P6| - Follower Appliance #6 – Alternating (0-100 Percentage firing rate)

|P7| - Follower Appliance #7 – Alternating (0-100 Percentage firing rate)

NOTE: If you toggle beyond parameters of connected appliances, the display will go into the next function value.

E. Purge Air from System Manually Operating CH/DHW Pumps to Commission System

Disconnect wires connected to the THERMOSTAT terminals on the field connection board. Power the appliance. The display will show the appliance water temperature. Press the **{S1}** and **{S3}** keys simultaneously and hold for 1 second. The display will begin alternating between SEP and CH, and the central heating pump will come on. If you press **{S2}** again, the central heating pump will shut off, the display will begin alternating between SEP and DH, and the DHW pump will come on. If the appliance is a cascade master and you press **{S2}** again, the DHW pump will shut off, the display will begin

alternating between SEP and Sh, and the system pump will come on. You can use the {S1} and {S2} keys to toggle between running each pump in the system as required to help bleed out all trapped air. Some good indicators that air is removed include the absence of gurgling noises in the pipes and quiet pump operation. Press {S1} and {S2} together at any time to return the control to normal operation.

Part 10 - Start-Up Procedures for the Installer

The control allows the installer to set limits and program the appliance heat curve. These system limits should not be changed by the user. It is important to document the settings within this manual after programming the system parameters for future reference.

A. Program Access

To start, press and hold {S3} and {S4} simultaneously for three seconds. You will notice the display change to |000|. Then press and hold {S1} until you see |925|. (If you go past |925|, you can use {S2} to increase the number.) This is the pass code. To confirm that the pass code is correct, press and hold the {S3} key for 1 second. If the pass code is entered incorrectly, the controller program function will cancel and return to normal operation. If the code is entered correctly, the control will switch off the gas valve and purge fan while showing a solid - - - in the display. The display will show |1| alternating to |de|. This first function verifies that the control will function with the SuperStor Indirect Fired Water Heater.

B. Program System Settings

Press the {S3} key to move through each function. Press either {S1} to decrease or {S2} to increase the values. If there is no key action for 1 minute, the display returns to normal operation. Changes are effective immediately but not stored. To store changes, press the {S4} key for 3 seconds. The following table lists the functions that the installer can program.

Function	Default Value	Description
1	de	N/A
2	149°F	N/A
3	180°F	Pioneer Only: Maximum setpoint for indirect water heater (NOTE: Does not apply if used with a mechanical control) Range: 95 - 185°F
4	36°F	N/A
5	7°F	Pioneer Only: Change indirect water heater differential Range: 1 - 18°F
6	0	Changes the indirect circulator post purge time once the sensor is satisfied. (NOTE: Post purge time should be set no greater than 5 minutes.) Range: 0 - 10 Minutes
7	68°F	Warm weather shutoff Range: 41 - 122°F
8	5°F	Changes the minimum outside design temperature Range: -49 - 32°F

Function	Default Value	Description
9	180°F	Changes design supply water temperature based on minimum outside design temperature. Range: 77 - 180°F
10	68°F	Changes maximum outside design temperature for central heating Range: 32 - 95°F
11	95°F	Changes design supply water temperature based on maximum outside design temperature. Range: 32 - 185°F
12	68°F	Sets the lowest temperature on the appliance for central heating. Range: 32 - 185°F
13	0	Changes central heating circulator post purge time once thermostat is satisfied. Range: 0 - 10 minutes
14	30	Sets maximum run time for the indirect water appliance and minimum run time for central heating. Range: 0 - 60 minutes
15	0	Bus address Range: (0 = cascade master, 1 - 8 = cascade follower)
16	0	Programs a 0-10 volt directly from a Building Management System. To activate, change value to 2. WARNING: Values 1 and 3 are not to be programmed into the board. Range: 0 - 3
17	0	Controls the 0-10 volt input Range: 0 = Appliance Temperature, 1 - Appliance Power
18	1	Step Modulation - Regulates burner output in 6 steps in 1 minute intervals. Reduces short cycling. Range: 1 = On, 0 = Off
19	180°F	Pioneer: Indirect Water Heater Setpoint (flow) Range: 95 - 185°F
	150°F	Versa Flame: DHW Active Flow Tank Temperature Setpoint Range: 95 - 185°F
20	3	N/A
21	0	Displays the FOU error. If outdoor sensor is open or shorted, FOU error does not prevent the appliance from running. Range: 0 = FOU is not displayed, 1 = FOU displays if the outdoor sensor is shorted or open
22	100	Maximum appliance output percentage. Default = 100%. This parameter can be adjusted to lower maximum appliance output if necessary. Range: 50 - 100%

Function	Default Value	Description
23	0	Cascade configuration (Default 0). Leave as 0 if this is a standalone unit or if the unit is cascaded using the Vision 3 module. Change to 1 if the appliance is part of a cascaded system not using the Vision 3 module.
24	24	Power on hours for cascade priority change over. This sets how many power on hours will go by before the priority appliance will be rotated in the cascade system.
25	0	N/A, must be 0
26	---	System Pump Freeze Protection (Default --- [Disabled]) On a cascade master, this function activates the system pump if the outdoor temperature drops below the set value. Use the {S2} key to increase from the default disabled to the desired temperature. Range: (--- [disabled] - 104°F)
27	0	0 = E03 will be displayed if system sensor fails. 1 = no code will display if system sensor fails. Range: 0 = E03, 1 = no code displayed
28	0	0 = Frost protection active 1 = Frost protection disabled
29	0	0 = Normal DHW modulation. 1 = DHW will modulate on low fire rather than high fire
30	0	0 = There will be no extra appliance on the Cascade Master. 1 = Extra appliance is connected to the Cascade Master.
31	0	N/A, Do not change.
37	0	Activates control for use with HTP Modbus Board 0 = Modbus Disabled (Default) 1 = Modbus Enabled 2 = Modbus Auto (enables automatic detection of a PC or Adapter)
48	0	Tank Min. Activation. 0 = Tank Min. OFF (PIONEER DEFAULT)
	1	Activates a low limit storage tank setting. This limit is preset on all Versa Flame models at 150°F. Raising this low limit provides greater domestic hot water production. 1 – Tank Min. ON (VERSA FLAME DEFAULT)
49	150°F	Tank Min. Set Point* Sets the minimum temperature inside the storage tank in both cold and warm outdoor temperatures. Range: 32 – 180°F

Figure 30 - System Settings

* The Differential on the Tank Min. Set Point is a fixed 7°F on Versa-Flame Models. The Differential Set Point on Pioneer Models is variable based on the |dh| setting (also used for indirect differential).

Central Heating Curve Function

Central heating demand is detected when the room thermostat closes. When an outside sensor is also connected, the supply temperature will depend on the factory default central heating curve.

To set your heat curve, you will have to set the following parameters:

- 1. Minimum outside design temperature: Function 8.

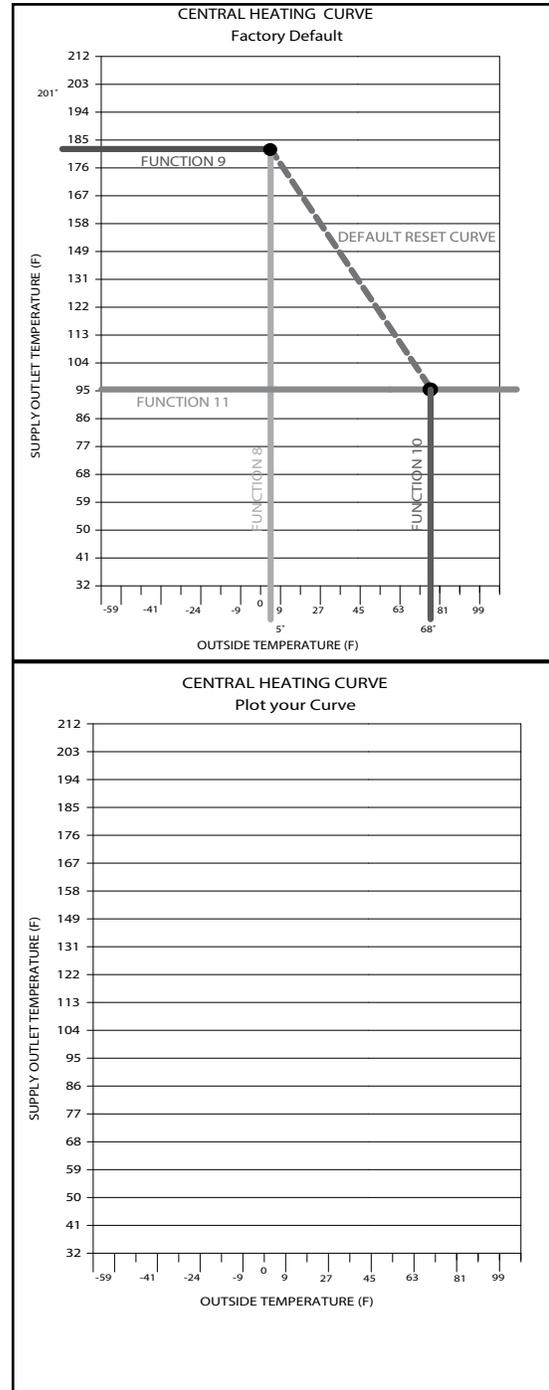


Table 11 - Heating Curve - NOTE: The user can adjust the heat curve down by lowering the central heating temperature.

- 2. Design supply water temperature at the minimum design outside temperature: Function 9.
- 3. Maximum outside design temperature: Function 10.
- 4. Design supply water temperature at the maximum outside temperature: Function 11.

NOTE: Versa Flame minimum set point Function 49 may override the supply temperature for Function 11.

NOTE: The homeowner can adjust the heat curve down by adjusting the central heating and/or DHW temperature to a lower setting.

Control Program Reference Chart		
Function	Default Setting	Programmed Setting
1	de	Do Not Change
2	149°F	Do Not Change
3	160°F	
4	36°F	Do Not Change
5	7°F	
6	0	
7	68°F	
8	5°F	
9	180°F	
10	68°F	
11	95°F	
12	68°F	
13	0	
14	30	
15	0	
16	0	
17	0	
18	1	
19	180°F or 150°F	
20	3	Do Not Change
21	0	
22	100	
23	0	
24	24	
25	0	
26	---	
27	0	
28	0	
29	0	
30	0	
31	N/A	
37	0	
48	0 or 1	
49	150°F	

Table 12 - Program Reference Chart

C. Combustion System Test Mode

This function is intended to simplify the gas valve adjustment if needed. Listed in the following tables are the recommended limits on the appliance and Combustion Settings. Automatic

modulation does not take place when the controller is in Test mode, only temperature limitation based on the Central Heating set point. The user may decrease or increase fan speed by pressing {S1} or {S2}.

Press {S2} and {S3} together for 1 second to activate Test Mode. Once activated, you will see in the display {Ser} and the actual fan speed. Measurement of combustion levels should always be taken at the highest and lowest fan speed. After 20 minutes, Test mode stops automatically. Press {S1} and {S2} together for 1 second to exit Test Mode manually.

Fan Speed	Natural Gas			Propane (LP)		
	Low	Ignition	High	Low	Ignition	High
Carbon Monoxide (CO) PPM	1 - 10	2 - 15	2 - 20	1 - 10	2 - 15	2 - 20
Carbon Dioxide (CO ₂) %	8 - 10%			8 1/2 - 10 1/2%		9 - 11%

Table 13 - Combustion Settings on All Models

Fan Speeds			
BTU	Ignition	Min	Max
100,000	3000	2000	5700
130,000			7300
160,000			7450
199,000			9100

Table 14 - Fan Speeds

Part 11 - Troubleshooting

A. Error and Fault Codes

An error or fault code may occur in the appliance. Fault codes lead to a lock out condition of the controller, which will need to be manually reset by pressing the {S4} button.

B. Appliance Error

These temporary error codes help the installer correct a problem before the appliance goes into a lock out fault condition, which will require a manual reset.

- 1. When an error condition occurs the controller will display an error code on the display module.
- 2. These error codes and several suggested corrective actions are included in the Table 15.

C. Appliance Fault

- 1. When a lockout fault condition occurs the controller will illuminate the red "fault" indication light and display a fault code (Example: |Foo|) on the display module.
- 2. Note the fault code and refer to Table 15 for an explanation of the code along with several suggestions for corrective actions.
- 3. Press {S4} to clear the fault and resume operation. Be sure to observe the operation of the unit to prevent a recurrence of the fault.

D. No Hot Water (DHW) (Versa Flame Models)

- 1. Ensure the DHW pump is not air locked. Also, ensure the pump is directing flow in the correct direction (arrow pointing towards the return port). Pressure in the tank must be a minimum of 8 psi.
- 2. Adjust the low limit setting higher.

3. Check the flow switch (if installed). Ensure it is connected and installed properly (flow arrow pointing towards the heat exchanger). Also, ensure the flow switch is properly wired to the appliance (terminals 10 and 11 on the field connection board).

▲ WARNING

When servicing or replacing components that are in direct contact with appliance water, be certain that:

- There is no pressure in the appliance. (Pull the release on the relief valve. Do not depend on the pressure gauge reading.
- The appliance water is not hot.
- The electrical power is disconnected.
- The gas is shut off.

Failure to make these checks could result in substantial property damage, serious personal injury, or death.

If overheating occurs or the gas supply fails to shut off, do not turn off electrical power to the circulating pump. This may aggravate the problem and increase the likelihood of appliance damage. Instead, shut off the gas supply to the appliance at the gas service valve. Failure to do so may result in property damage, personal injury, or death.

▲ WARNING

DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN SUBMERGED IN WATER. Immediately call a qualified service technician. The appliance **MUST BE** replaced if it has been submerged. Attempting to operate an appliance 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 appliance could result in property damage, severe personal injury, or death.

NOTE: Appliance damage due to flood or submersion is considered an Act of God, and IS NOT covered under product warranty.

▲ CAUTION

Label all wires prior to disconnecting them when servicing the appliance. Wiring errors can cause improper and dangerous operation. Failure to follow these instructions may result in property damage or personal injury.

NOTE: If system return temperatures are maintained below the dew point, condensation will form on the inside of the appliance cabinet and cause some internal sheet metal components to rust.

E. Displayed Error and Fault Codes

Error Codes		
Code	Description	Corrective Action
Fou	Outdoor sensor shorted or temperature less than -40°F	Inspect wiring from outdoor sensor for damage or shorted connections and repair as necessary. Measure resistance of outdoor sensor and compare to resistance chart. If not within range on chart, shorted, or open, replace sensor.
E19	Line voltage frequency out of range	Inspect power wiring to appliance and repair as necessary. If connected to line voltage, notify power company. If connected to an alternate power source, such as a generator or inverter, make sure line voltage frequency supplied by the device is 60 Hz.
FLU	Blocked Vent Pressure Switch open, Condensate cup Full, Condensate Cup not present	<ol style="list-style-type: none"> 1. Check the flue vent to ensure it is not blocked or damaged. 2. Check blocked vent pressure switch operation by applying a jumper. If the switch is not functioning properly, replace it.
LEO	Water Level in Tank is Low	<ol style="list-style-type: none"> 1. Be sure all air is bled from system. 2. Inspect low level switch and wiring for damage and repair if necessary.
LOU	24 Volt Low	<ol style="list-style-type: none"> 1. Check line voltage. Must be between 100 – 128 volts. 2. If available, connect a PC and, using HTP service software, check the 24v supply display in the lower left corner of the screen. The number displayed here must be greater than 128 and should be greater than 250. Use this as a troubleshooting guide as you follow the steps below. 3. Remove 10 pin Molex connector from customer connection board. If LOU clears, then the problem is with external sensor wiring. Examine external sensor wiring for shorts to ground, repairing as necessary. If LOU code is still present and the appliance is so equipped, disconnect high gas pressure switch, then low gas pressure switch, then UL 353 low water cutoff in this order, one at a time, to see if LOU code clears. Replace faulty part. Check low voltage wire harness in appliance for shorts to ground. 4. If LOU only occurs when burner tries to light, check gas valve for excessive current draw. 5. If LOU is present with the low voltage harness disconnected from the 926 control board, replace the 926 control board.

Code	Description	Corrective Action
E03	System sensor failure (Cascade Master only)	1. Check wiring to system sensor. Repair as necessary. 2. Check sensor resistance. Compare to the resistance table in this manual. Replace if not correct.
FL	Low water flow (Users with optional flow switch only)	1. Check to see if appliance circulator is functioning. Repair as necessary. 2. Be sure water is flowing in the system. Check for valves that should be open, plugged filter screens, etc. 3. Check flow switch and wiring. Repair as necessary.
The following Fault Codes will lockout operation until the control determines the situation safe for appliance operation.		
F00	High temperature switch limit exceeded 194°F	1. Try reset. If F00 repeats, create a demand for hot water. (DANGER: Take caution to prevent scald injury.) If water is above 194°F, test upper and lower temperature sensor with an ohmmeter. (Refer to resistance chart, this section.) Replace bad sensor. If water is below 194°F, test high temperature switch and wiring with ohmmeter. Switch should be closed at this point. If not, replace switch. 2. If unit reset successfully, let the appliance run and go into the status menu to check the upper and lower temperature sensor. If either display reading does not make sense, check appropriate sensor with ohmmeter. (Refer to resistance chart, this section.) Replace bad sensor. Do an OHMs reading on both sensors to check continuity.
F01	Vent temperature limit exceeded	1. Inspect all flue piping. If the flue is damaged or shows signs of overheating, repair or replace the flue parts as necessary before proceeding. 2. If the flue piping system is intact and there is no sign of the flue overheating (such as discoloration or melting), push the red reset button on the flue switch. 3. Be sure the appliance is connected to a water supply and full of water. 4. Push the {S4} button on the appliance control panel. The appliance should light. If the appliance lights, proceed to step 5. If the appliance does not light and the display again flashes F01, inspect the wiring to the flue switch, repairing or replacing as necessary. If the wiring is intact, replace the flue switch, using care to mount the new flue switch in the same position and mounting holes as the old one. If the display flashes a code other than F01, follow the troubleshooting guide for that code. 5. Observe operation for 5 minutes. Place the probe of an exhaust analyzer into the flue system within 6 feet of the appliance. The exhaust temperature should not rise above 190°F after several minutes of operation. 6. If the flue temperature is below 190°F and the appliance again goes into lockout displaying F01, replace the flue switch, using care to mount the new flue switch in the same position and mounting holes as the old one. If the display flashes a code other than F01, follow the troubleshooting guide for that code. 7. If the flue temperature increases to over 190°F, consult HTP for further assistance.
F02	Interrupted or shorted upper (supply) temperature sensor	1. Check the electrical connection to the appropriate temperature sensor. 2. If connection is okay, replace bad sensor.
F03	Interrupted or shorted lower (return) temperature sensor	
F05	Upper (supply) temperature sensor exceeds 210°F	1. If water in tank is not greater than 210°F, check wiring. Repair if faulty. 2. If wiring is okay, check appropriate sensor with ohmmeter and compare to reading in resistance chart above. If reading does not agree with water temperature, replace bad sensor.
F06	Lower (return) temperature sensor exceeds 210°F	
F09	No flame detected – Appliance will make three attempts at ignition before the control goes into this lockout condition. Will reset in 1 hour.	1. Watch the igniter through the observation window provided. 2. If there is no spark, check the spark electrode for the proper ¼" gap. 3. Remove any corrosion from the spark electrode and flame rectifier probe. 4. If there is a spark but no flame, check the gas supply to the appliance. 5. If there is a flame, check the flame sensor. 6. Check any flue blockage or condensate blocks.

Code	Description	Corrective Action
F10	Loss of flame signal – The appliance will relight 4 times before the control goes into this lockout condition. Will reset in 1 hour.	<ol style="list-style-type: none"> 1. Monitor the gas pressure to the unit while in operation. 2. Assure that the flame is stable when lit. 3. Check to see if the green light on the display module is out while the appliance is running. 4. If the green light doesn't come on or goes off during operation check the flame signal on the status menu. 5. If the signal reads less than 1 microampere, clean the flame rectifier probe. 6. If the flame rectifier probe continues to read low, replace it.
F11	False flame signal – The appliance will lock out if it senses a flame signal when there should be none present.	<ol style="list-style-type: none"> 1. Turn the gas off to the unit at the service valve. 2. If the flame signal is still present replace the igniter. 3. If the flame signal is not present after turning off the gas supply, check the gas valve electrical connection. 4. If there is no power to the gas valve, remove the valve and check for obstruction in the valve seat or replace the gas valve. 5. Turn the gas on at the service valve after corrective action is taken.
F13	Combustion fan speed incorrect – The appliance will lock out if it senses that the fan speed is less than 70% of expected rate for more than 60 seconds.	<ol style="list-style-type: none"> 1. Check the combustion air fan wiring. 2. Replace the combustion air fan. 3. Replace the control board.
pp	Parameters programmed	Press {S4} reset for at least 1 second.
F31	Program parameter error	Control must be re-programmed. If programming does not solve problem, control must be replaced.

Table 15 - Error and Fault Codes - NOTE: If you replace a part to remedy a fault, it is recommended to cycle the unit at least three or four times to ensure the fault has been resolved.

Part 12 - Maintenance

CAUTION

In unusually dirty or dusty conditions, care must be taken to keep appliance cabinet door in place at all times. Failure to do so VOIDS the warranty.

WARNING

Allowing the appliance to operate with a dirty combustion chamber will hurt operation. Failure to clean the heat exchanger as needed by the installation location could result in appliance failure, property damage, personal injury, or death. Such product failures ARE NOT covered under warranty.

The appliance requires minimal periodic maintenance under normal conditions. However, in unusually dirty or dusty conditions, periodic vacuuming of the cover to maintain visibility of the display and indicators is recommended.

Periodic maintenance should be performed once a year by a qualified service technician to assure that all the equipment is operating safely and efficiently. The owner should make necessary arrangements with a qualified heating contractor for periodic maintenance of the appliance. Installer must also inform the owner that the lack of proper care and maintenance of the appliance may result in a hazardous condition.

NOTICE

It is extremely important that whenever work is performed on the plumbing system that either:

- The appliance is powered off, or,
- The appliance is valved off and isolated from the plumbing system.

Failure to take these measures could result in a dry-firing condition.

WARNING

The appliance must be full of water and the system fully purged BEFORE powering the appliance. Performing any work in the plumbing system without either powering off the appliance or isolating the appliance through the use of shut-off valves could result in a condition referred to as "dry-firing". Dry-firing the appliance will damage the heat exchanger, and could result in property damage, serious personal injury, or death. Such damages ARE NOT covered by appliance warranty.

Part 13 - Shutdown

A. Shutdown Procedure

If the burner is not operating, disconnect the electrical supply. If the burner is operating, lower the set point value to 70°F and wait for the burner to shut off. Continue to wait for the combustion blower to stop, so all latent combustion gases are purged from the system. This should take a maximum of 40 to 90 seconds. After combustion gases are purged turn off electrical power to the appliance.

B. Vacation Procedure

If there is danger of freezing, change the set point to 70°F. DO NOT turn off electrical power. If there is no danger of freezing, follow "Shutdown Procedure".

C. Failure to Operate

Should the burner fail to light, the control will perform two more ignition trials prior to entering a lockout state. Note that each subsequent ignition trial will not occur immediately. After a failed ignition trial, the blower must run for approximately 10 seconds to purge the system. Therefore, a time period of approximately 40 to 90 seconds will expire between each ignition trial.

If the burner lights during any one of these three ignition trials, normal operation will resume. If the burner lights, but goes off in about 4 seconds, check the polarity of the wiring. See electrical connection section of this manual.

If the burner does not light after the third ignition trial, the control will enter a lockout state. This lockout state indicates that a problem exists with the appliance, the controls, or the gas supply. Under such circumstances, a qualified service technician should be contacted immediately to properly service the appliance and correct the problem.

If a technician is not available, pressing the {S4} button will remove the lockout state so additional trials for ignition can be performed. The unit will try to relight once every 6 minutes.

D. Important Notice

NOTICE	
It is extremely important that whenever work is performed on the plumbing system that either:	
<ul style="list-style-type: none"> • The appliance is powered off, or, • The appliance is valved off and isolated from the plumbing system. 	
Failure to take these measures could result in a dry-firing condition.	

Outdoor Sensor (7250P-319)		Supply Sensor (7100P-192) Return Sensor (7100P-005) Clip-On Sensor (7100P-172)	
Outside Temperature (°F)	Resistance (ohms)	High / Low Temp Sensor Temp. (°F)	Resistance (Ohms)
-22	171800	32	32550
-13	129800	41	25340
-4	98930	50	19870
5	76020	59	15700
14	58880	68	12490
23	45950	77	10000
32	36130	86	8059
41	28600	95	6535
50	22800	104	5330
59	18300	113	4372
68	14770	122	3605
77	12000	131	2989
86	9804	140	2490
95	8054	149	2084
104	6652	158	1753
113	5522	167	1481
		176	1256
		185	1070
		194	915
		202	786
		212	667

Table 16 - Sensor Temperature Resistance

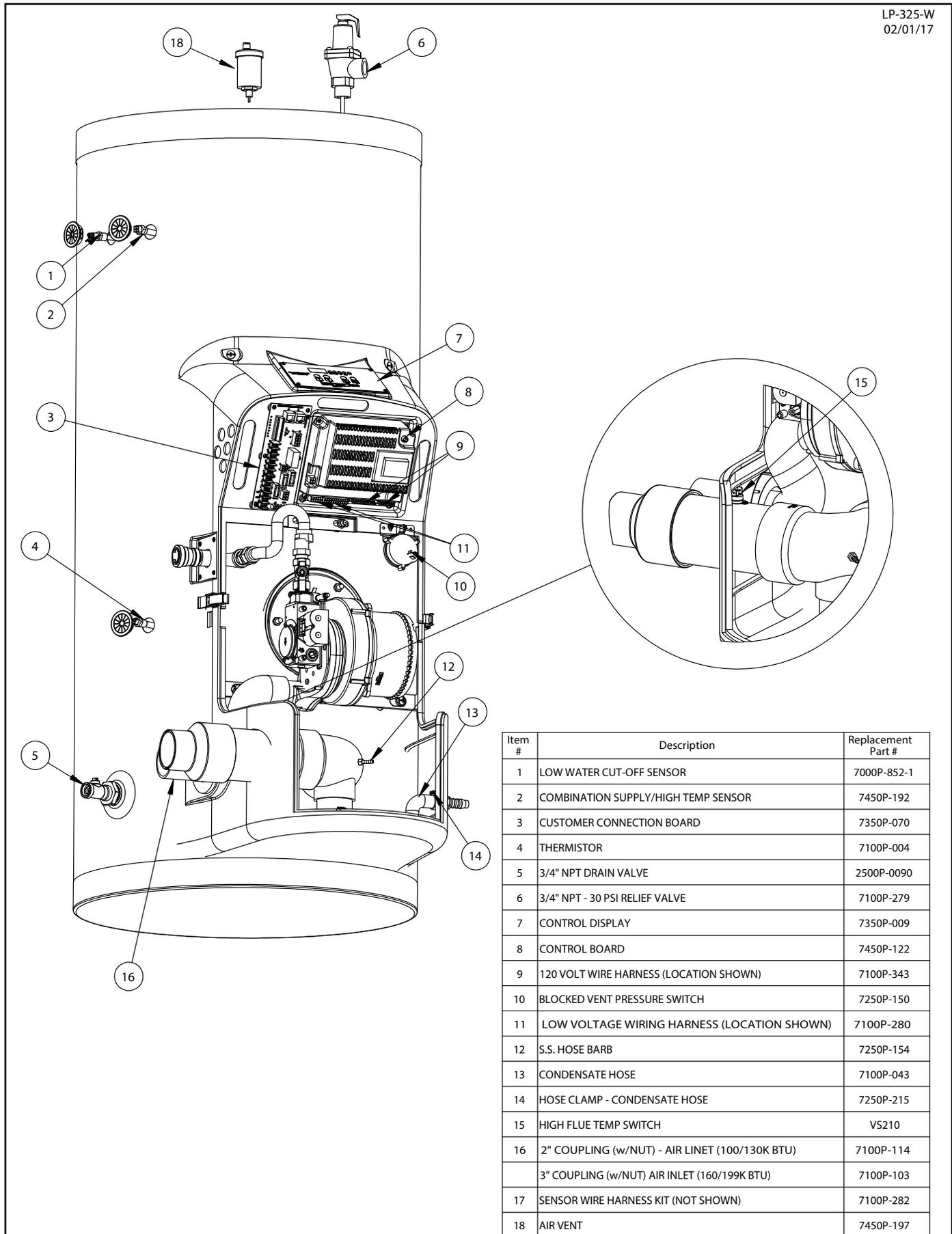
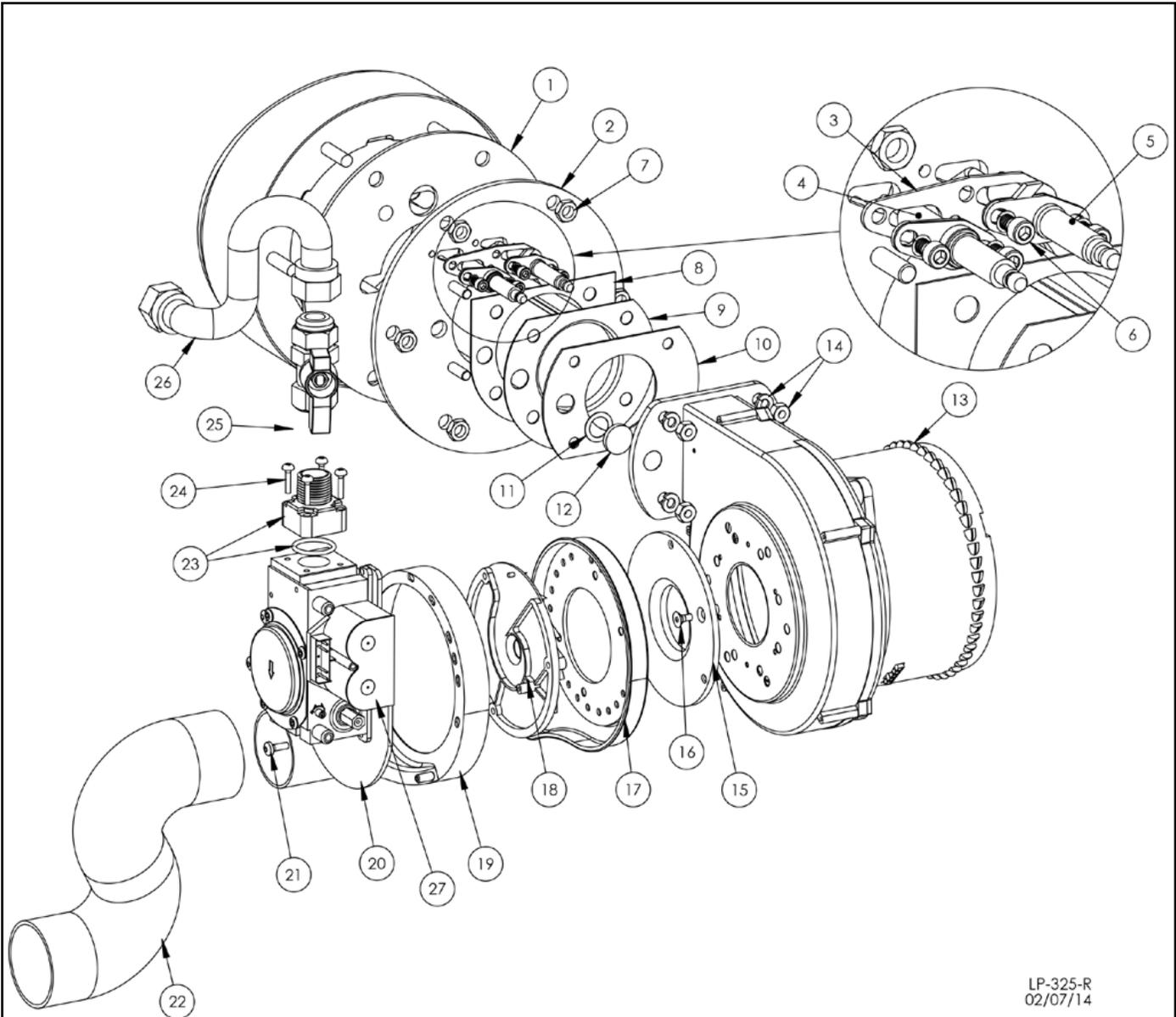


Figure 31 - Replacement Parts - All Models



LP-325-R
02/07/14

Item #	Description	Replacement Part #
1	GASKET - MOUNTING PLATE	7100P-139
2	MOUNTING PLATE	7100P-007
3	GASKET - PROBES	7100P-155
4	FLAME RECTIFICATION PROBE	7100P-082
5	IGNITOR ELECTRODE	7100P-124
6	10-32 X 3/8 SCREWS/#10 LOCK WASHERS	N/A
7	NUTS - 5/16-18	N/A
8	GASKET - BURNER MOUNTING FLANGE	7100P-152
9	BURNER - 100-130K BTU	7100P-316
	BURNER - 160-199K BTU	7100P-317
10	GASKET - BURNER OUTLET	7000P-361
11	GASKET - SIGHT GLASS	7100P-105
12	SIGHT GLASS	G2000
13	COMBUSTION BLOWER (w/GASKET, SIGHT GLASS)	7100P-015
	COMBUSTION BLOWER (w/GASKET, SIGHT GLASS) 199K BTU ONLY	7100P-350

Item #	Description	Replacement Part #
14	1/4-20 BRASS NUTS/1/4 LOCK WASHERS	7100P-268
15	ADAPTER PLATE	7250P-644
16	FLAT HEAD SCREW - ADAPTER PLATE	7100P-045
17	AIR INTAKE ADAPTER - BLOWER SIDE	7500P-185
18	SWIRL PLATE - BLACK (100/130K BTU)	7100P-042
	SWIRL PLATE - WHITE (160/199K BTU)	7500P-092
19	AIR INTAKE ADAPTER - VALVE SIDE	7500P-184
20	GAS VALVE (100/130K BTU)	7000P-862
	GAS VALVE (160/199K BTU)	7000P-863
21	SCREWS - GAS VALVE	7100P-046
22	TUBE - AIR INLET	7500P-189
23	GAS VALVE ADAPTER (w/O-RING)	7250P-454
24	SCREWS - M4 X 20MM - GAS VALVE ADAPTER	7250P-717
25	GAS SHUT-OFF VALVE	7250P-140
26	1/2" FLARE X 1/2" NPT FLEX HOSE	7100P-140
27	24VAC GAS VALVE COIL ONLY - GREY	7350P-624

Figure 32 - Replacement Parts - Combustion System - All Models

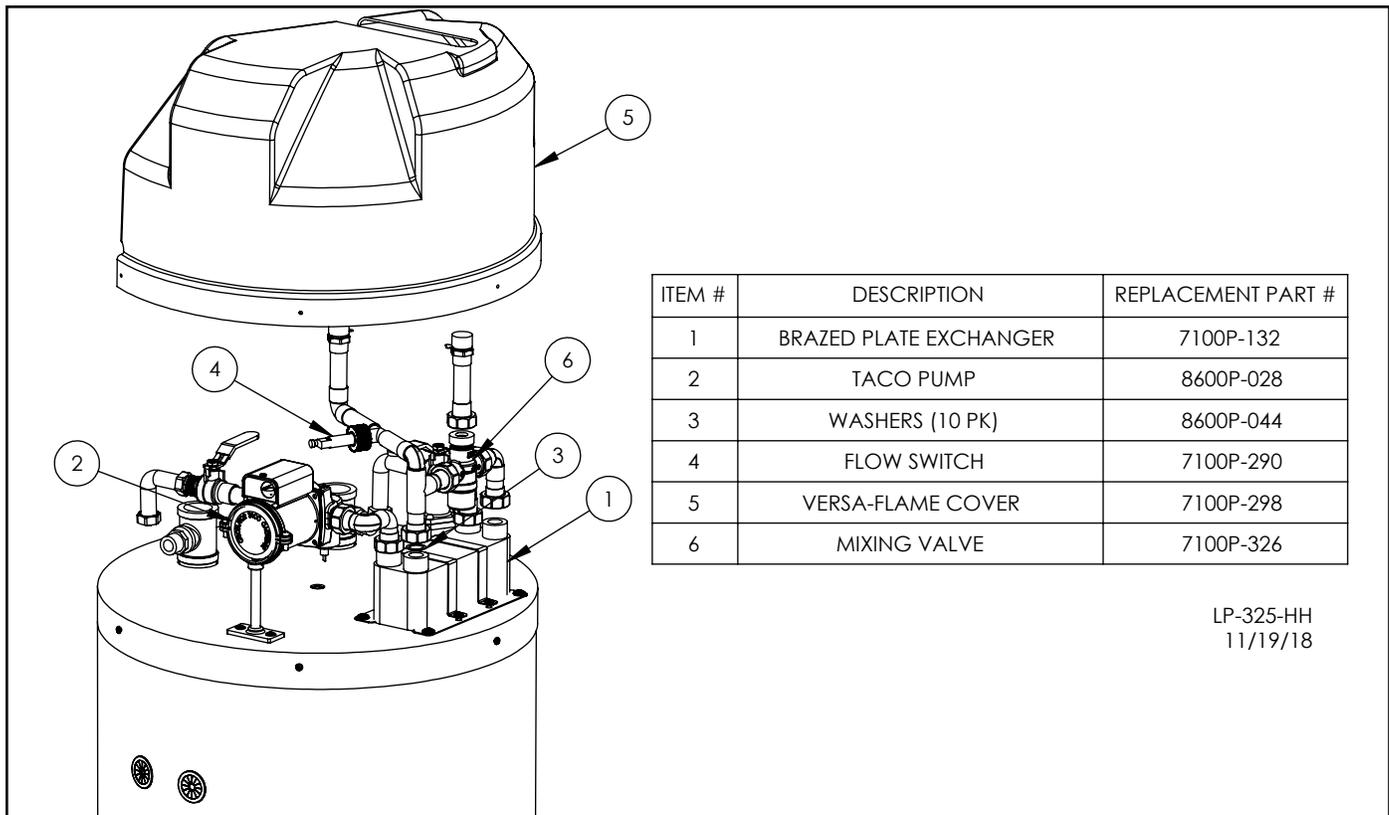


Figure 33 - DHW Module - *Versa Flame Models ONLY

Part 14 - Installation Checklist

Before Installing	Yes	No
Is there enough space to ensure proper installation?		
Does installation location allow for proper service clearances?		
Are water and gas lines properly sized and set at proper pressures for the installation?		
Is appliance location as near the exhaust vent / intake pipe terminations as possible?		
Have combustible materials been cleared from the installation location?		
Is there a drain close to the appliance?		
Water Piping	Yes	No
Does appliance loop piping meet the minimum sizing requirements listed? NOTE: Smaller piping will cause performance problems.		
Has water chemistry been checked?		
Does water chemistry meet requirements?		
If water chemistry does not meet requirements, have treatment measures been put in place?		
Has the system been cleaned and flushed?		
Install Exhaust Vent and Intake Piping	Yes	No
Has the appliance been vented with the approved materials listed in this manual or to meet local codes?		
Is air supply sufficient for proper appliance operation?		
Is total vent piping length within the maximum vent length restriction listed in this manual?		
Have venting lengths been minimized?		
Are terminations properly spaced from windows, doors, and other intake vents?		
Have all vent terminations been installed at least one foot above exterior grade and one foot above normal snow accumulation level?		
Is vent piping properly supported?		
Has vent piping been checked for leaks?		
Has the exhaust vent line been pitched back to the appliance at a rate of 1/4" per foot?		
Have the exhaust vent and intake pipes been properly installed to the appliance?		

Install Condensate Piping / Tubing and Components	Yes	No
Have all condensate components included with the appliance been installed?		
Is the condensate line piped with approved materials listed in this manual?		
Has the condensate line been routed to a laundry tub or other drain?		
Install Gas Piping	Yes	No
Is the gas supply line a minimum of 3/4" in diameter?		
Is the gas supply line length and diameter adequate to deliver the required BTUs?		
Has gas supply line pressure been measured?		
Does the gas type match the type indicated on the appliance rating plate?		
Has a union and shut-off valve been installed?		
Relief Valve	Yes	No
Is the Temperature and Pressure Relief Valve properly installed and discharge line run to open drain?		
Is the discharge line protected from freezing?		
Wiring	Yes	No
Has the power and control been wired per appliance wiring diagram, this manual?		
Is the electrical connection polarity within appliance requirements?		
Does the power supply voltage agree with the appliance rating plate?		
Is the branch circuit wire and fusing or circuit breaker of proper size?		
Are electrical connections tight and properly grounded?		
Start-Up, Adjust, and Test	Yes	No
Has the appliance been started?		
If necessary, has the appliance gas valve been adjusted?		
Has the installation been customized per installation location requirements?		
Have all customized system parameters been tested?		
Has proper appliance operation been confirmed?		
Final Installation Approvals		
Signed by Technician	Date	

Table 17 - Installation Checklist

Part 15 - Maintenance Report

CAUTION

In unusually dirty or dusty conditions, care must be taken to keep appliance cabinet door in place at all times. Failure to do so **VOIDS** the warranty.

The appliance requires minimal periodic maintenance under normal conditions. However, in unusually dirty or dusty conditions, periodic vacuuming of the cover to maintain visibility of the display and indicators is recommended.

Periodic maintenance should be performed once a year by a qualified service technician to assure that all the equipment is operating safely and efficiently. The owner should make necessary arrangements with a qualified heating contractor for periodic maintenance of the appliance. Installer must also inform the owner that the lack of proper care and maintenance of the appliance may result in a hazardous condition.

WARNING

When servicing or replacing any components of this appliance be certain that:

- The gas is off.
- All electrical power is disconnected.

In addition, when servicing or replacing components of this appliance in direct contact with appliance water:

- There is no pressure in the appliance. Pull the release on the relief valve to relieve pressure in the appliance.
- Appliance water is not hot.

Failure to follow these precautions could result in property damage, serious personal injury, or death. Such damages **ARE NOT** covered by appliance warranty.

Allowing the appliance to operate with a dirty combustion chamber will hurt operation. Failure to clean the heat exchanger as needed by the installation location could result in appliance failure, property damage, personal injury, or death. Such product failures **ARE NOT** covered under warranty.

WARNING

The appliance must be full of water and the system fully purged **BEFORE** powering the appliance. Performing any work in the plumbing system without either powering off the appliance or isolating the appliance through the use of shut-off valves could result in a condition referred to as "dry-firing". Dry-firing the appliance will damage the heat exchanger, and could result in property damage, serious personal injury, or death. Such damages **ARE NOT** covered by appliance warranty.

DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN SUBMERGED IN WATER. Immediately call a qualified service technician. The appliance **MUST BE** replaced if it has been submerged. Attempting to operate an appliance 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 appliance could result in property damage, severe personal injury, or death.

NOTE: Appliance damage due to flood or submersion is considered an Act of God, and **IS NOT** covered under product warranty.

CAUTION

The appliance has wire function labels on all internal wiring. Observe the position of each wire before removing it. Wiring errors may cause improper and dangerous operation. Verify proper operation after servicing.

Inspection Activities		Date Last Completed			
Piping		1st Year	2nd Year	3rd Year	4th Year*
Near appliance piping	Check appliance and system piping for any sign of leakage; make sure pipes are properly supported.				
Vent	Check condition of all vent pipes and joints. Ensure the vent piping terminations are free of obstructions and blockages.				
Gas	Check gas piping. Test for leaks and signs of aging. Make sure all pipes are properly supported.				
System		1st Year	2nd Year	3rd Year	4th Year*
Visual	Do a full visual inspection of all system components.				
Functional	Test all functions of the system (Heat, Safeties).				
Temperatures	Verify safe settings on appliance or anti-scald valve.				
	Verify programmed temperature settings.				
Electrical					
Connections	Check wire connections. Make sure connections are tight.				
Smoke and CO Detector	Verify devices are installed and working properly. Change batteries if necessary.				
Circuit Breakers	Check to see that the circuit breaker is clearly labeled. Exercise circuit breaker.				
Chamber / Burner		1st Year	2nd Year	3rd Year	4th Year*
Combustion Chamber	Check burner tube and combustion chamber coils. Clean according to maintenance section of manual. Vacuum combustion chamber. Replace any gaskets that show signs of damage.				
Spark Electrode	Clean. Set gap at 1/4" Clean probe with plumbers cloth to remove oxides.				
Flame Probe	Check ionization uA (see Status Menu). Record high fire and low fire. Clean probe with plumbers cloth to remove oxides.				
Condensate		1st Year	2nd Year	3rd Year	4th Year*
Neutralizer	Check condensate neutralizer. Replace if necessary.				
Condensate Pipe	Disconnect condensate pipe. Clean out dirt. Fill with water to level of outlet and reinstall. (NOTE: Verify the flow of condensate, making sure that the hose is properly connected during final inspection.)				
Gas		1st Year	2nd Year	3rd Year	4th Year*
Pressure	Measure incoming gas pressure (3.5" to 10" WC for Natural Gas, 8" to 14" WC for Propane).				
Pressure Drop	Measure drop in pressure on light off (no more than 1" WC).				
Check Gas Pipe for Leaks	Check piping for leaks. Verify that all are properly supported.				
Combustion		1st Year	2nd Year	3rd Year	4th Year*
CO / CO ₂ Levels	Check CO and CO ₂ levels in exhaust. See manual for ranges. Record at high and low fire.				
Safeties		1st Year	2nd Year	3rd Year	4th Year*
ECO (Energy Cut Out)	Check continuity on flue and water ECOs. Replace if corroded.				
Water Pressure Switch	Check operation and for signs of leakage. Replace if corroded.				
Sensors	Check wiring. Verify through ohms reading.				
Final Inspection		1st Year	2nd Year	3rd Year	4th Year*
Check List	Verify that you have completed entire check list. WARNING: FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH.				
Homeowner	Review what you have done with the homeowner.				

Table 18 - *Continue annual maintenance beyond the 4th year as required.

***Versa Flame DHW Module - ONCE ANNUALLY -** In hard water areas, shut off the DHW water supply and drain the DHW system. Then disconnect the brazed plate and pump vinegar through the heat exchanger until passageways are clean (water runs clear). This should take about an hour.

**Pioneer /Versa Flame Heating Appliance
Limited Warranty**

Twelve year warranty to assure your complete satisfaction.

HTP warrants each Heating Appliance to be free from defects in material and workmanship according to the following terms, conditions, and time periods. **UNLESS OTHERWISE NOTED THESE WARRANTIES COMMENCE ON THE DATE OF INSTALLATION.**

COVERAGE

A. During the first year after the date of installation, HTP warrants that it will repair or replace, at its option, any defective or malfunctioning component of the heating appliance that is found to have failed due to manufacturer's defect. Replacement parts will be warranted for ninety (90) days.

B. During the first through seventh year after the date of installation, HTP warrants that it will repair or replace, at its option, any defective heating appliance that is found to have failed due to manufacturer's defect.

C. During the eighth through twelfth year after the date of installation, HTP will repair or replace, at its option, any defective heating appliance found to have failed due to leaking at a cost to the purchaser equal to the following percentages of the manufacturer's list price in effect at the date of replacement:

Year of Claim	1-7	8 & 9	10 & 11	12
Percentage to be Paid by Purchaser	0 %	25 %	50 %	75 %

D. Should a defect or malfunction result in a leakage of water within the above-stated warranty periods due to defective material or workmanship, malfunction or failure to comply with the above warranty, with such defects or malfunctioning having been verified by an authorized HTP representative, HTP will replace the defective or malfunctioning heating appliance with a replacement heating appliance of the nearest comparable model available at the time of replacement. The replacement appliance will be warranted for the unexpired portion of the applicable warranty period of the original appliance. No other component of the appliance will be replaced during this period.

E. If government regulations, industry certification, or similar standards require the replacement heating appliance or part(s) to have features not found in the defective heating appliance or part(s), you will be charged the difference in price represented by those required features. If you pay the price difference for those required features and/or to upgrade the size and/or other features available on a new replacement heating appliance or part(s), you will also receive a complete new limited warranty for that replacement heating appliance or part(s).

F. In the event of a leakage of water of a replacement heating appliance due to defective material or workmanship, malfunction, or failure to comply with the above warranty, HTP reserves the right to refund to the original purchaser the published wholesale price available at the date of manufacture of the original heating appliance.

G. If at the time of a request for service the purchaser cannot provide a copy of the original sales receipt or the warranty card registration, the warranty period for the heating appliance shall then be deemed to have commenced thirty (30) days after the date of manufacture of the heating appliance and NOT the date of installation of the heating appliance.

H. This warranty extends only to heating appliances utilized in closed loop heating applications that have been properly installed based upon manufacturer's installation instructions.

I. It is expressly agreed between HTP and the original consumer

purchaser that repair, replacement, or refund are the exclusive remedies of the original consumer purchaser.

OWNER'S RESPONSIBILITIES

To avoid the exclusion list in this warranty, the owner or installer must:

1. Maintain the heating appliance in accordance with the maintenance procedure listed in the installation manual. Preventive maintenance can help avoid any unnecessary breakdown of the heating appliance and keep it running at optimum efficiency.
2. Ensure all related heating components are properly maintained and kept in good operating condition.
3. Check condensate lines to confirm that all condensate drains properly from the heating appliance.
4. Use the heating appliance in a closed system with a properly sized and installed thermal expansion tank.
5. Make provisions so if the heating appliance or any component part thereto should leak, the resulting flow of water will not cause damage to the area in which it is installed.
6. Operate the heating appliance at water pressures not exceeding the working pressure shown on the rating plate.

WARRANTY EXCLUSIONS

HTP does not warrant:

1. All labor charges incurred by any person in connection with the examination or replacement of parts claimed by the purchaser to be defective.
2. Any failed components of the heat system not manufactured by HTP as part of the heating appliance.
3. Heating appliances repaired or altered without prior written approval of HTP so as to adversely affect their reliability.
4. Any damages, defects or malfunctions resulting from improper maintenance, misuse, abuse, accident, negligence, freezing and the like.
5. Any damage or failure resulting from hard water scale buildup on the tank heat exchanger tubes or domestic brazed plate heat exchanger.
6. Any damage or failure resulting from contaminated air, including, but not limited to, sheetrock particles, plasterboard particles, dirt or dust, being introduced into the heating appliance or its components including, but not limited to, the heat exchanger.
7. Damages, malfunctions, or failures resulting from failure to install the heating appliance in accordance with applicable building codes/ordinances or good plumbing and electrical trade practices.
8. Damages, malfunctions, or failures resulting from improper installation, failure to operate the heating appliance at pressures not exceeding the working pressure shown on the rating plate, or failure to maintain and operate the heating appliance in accordance with the printed instructions that accompany the unit.
9. Failure to operate the heating appliance in a closed system with a properly sized expansion tank.
10. Failure or performance problems caused by improper sizing of the heating appliance, piping, expansion device, gas supply line, venting connection, combustion air openings, electric service voltage, wiring, or fusing.
11. Any damage or failure resulting from improper water chemistry. WATER CHEMISTRY REQUIREMENTS – Water pH between 6.5 and 8.5. Hardness less than 7 grains. Chloride concentration less than 100 ppm. Total dissolved solids less than 500 ppm.
12. Any damages, malfunctions, or failures resulting from the use of dielectric unions.
13. Components of the heating appliance that are not defective,

but must be replaced during the warranty period as a result of reasonable wear and tear.

14. Components of the heating appliance that are subject to warranties, if any, given by their manufacturers; HTP does not adopt these warranties.

15. Malfunctions resulting from, or repairs necessitated by, flood, fire, wind, or lightning, or uses of the heating appliance for purposes other than that for which it was designed.

16. Any unit purchased from an unauthorized dealer or any online retailer.

17. Damages, malfunctions, or failures caused by operating the appliance with modified, altered, or unapproved parts.

18. Units installed outside the fifty states (and the District of Columbia) of the United States of America and Canada.

PROCEDURES FOR WARRANTY SERVICE REQUESTS

Any claim for warranty assistance must be made promptly. Any claim for warranty assistance must be made promptly. Determine if the heating appliance is "in-warranty" (that is, within the applicable warranty period) by reviewing a copy of the original sales receipt. You must present a copy of the original sales receipt for a warranty service request.

If your heating appliance is "in-warranty", contact the retailer from whom the heating appliance was purchased (or the installer) for assistance. Be prepared to provide the retailer or installer with a copy of your original receipt, complete model and serial numbers, and the date of installation of your heating appliance, in addition to explanation of your problem.

Warranty coverage is subject to validation of "in-warranty" coverage by HTP claims department personnel. All alleged defective or malfunctioning parts must be returned to HTP via the local distribution channels where original purchase was made. **NOTE: Any parts or heating appliances returned to HTP for warranty analysis will become the property of HTP and will not be returned, even if credit is denied.**

If all warranty conditions are satisfied, HTP will provide replacement parts to the retailer.

If you have questions about the coverage of this warranty, please contact HTP at the following address or phone number: HTP, 272 Duchaine Blvd, New Bedford, MA, 02745, Attention: Warranty Service Department, 1(800) 323-9651.

SERVICE, LABOR AND SHIPPING COSTS

This warranty does not extend to shipping charges, delivery expenses, or administrative fees incurred by the purchaser in repairing or replacing the heating appliance. This warranty does not extend to labor costs beyond the coverage specified in this warranty document.

LIMITATIONS OF YOUR HTP WARRANTY AND REMEDIES
THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY IN CONTRACT OR TORT, WHETHER OR NOT ARISING FROM HTP'S NEGLIGENCE, ACTUAL OR IMPUTED. THE REMEDIES OF THE PURCHASER SHALL BE LIMITED TO THOSE PROVIDED HEREIN TO THE EXCLUSION OF ANY OTHER REMEDIES INCLUDING WITHOUT LIMITATION, INCIDENTAL OR CONSEQUENTIAL DAMAGES, SAID INCIDENTAL AND CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, PROPERTY DAMAGE, LOST PROFIT OR DAMAGES ALLEGED TO HAVE BEEN CAUSED BY ANY FAILURE OF HTP TO MEET ANY OBLIGATION UNDER THIS AGREEMENT INCLUDING THE OBLIGATION TO REPAIR AND

REPLACE SET FORTH ABOVE. NO AGREEMENT VARYING OR EXTENDING THE FOREGOING WARRANTIES, REMEDIES OR THIS LIMITATION WILL BE BINDING UPON HTP. UNLESS IN WRITING AND SIGNED BY A DULY AUTHORIZED OFFICER OF HTP. THE WARRANTIES STATED HEREIN ARE NOT TRANSFERABLE AND SHALL BE FOR THE BENEFIT OF THE ORIGINAL PURCHASER OF A PIONEER OR VERSA FLAME ONLY.

NO OTHER WARRANTIES

Your HTP warranty gives you specific legal rights, and you may also have other rights that vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages so this limitation or exclusion may not apply to you.

These are the only written warranties applicable to the Pioneer or Versa Flame manufactured and sold by HTP. HTP neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said heating appliances.

HTP reserves the right to change specifications or discontinue models without notice.

Customer Installation Record Form	
The following form should be completed by the installer 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 installer has fully reviewed the installation, safety, proper operation, and maintenance of the system. If the system has any problems please call the installer. If you are unable to make contact, please call your sales representative.
Distributor / Dealer: Please insert contact details.