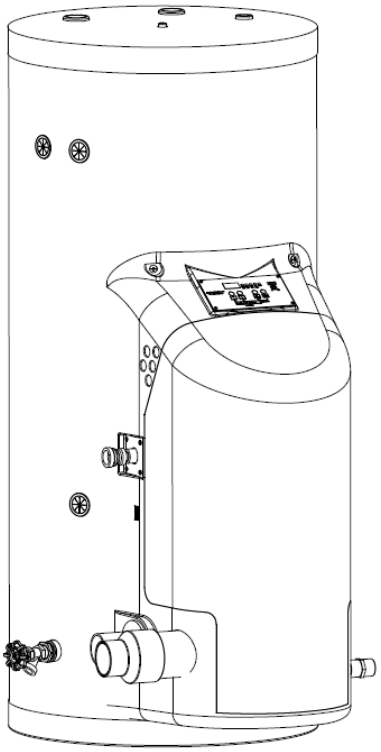
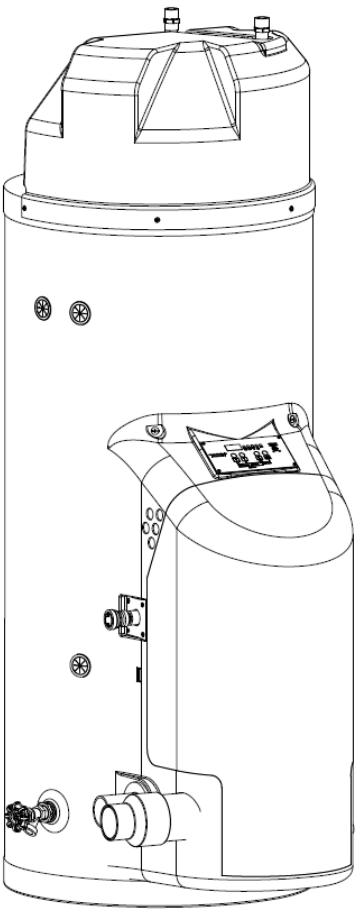
Pioneer/ Versa-Flame





INSTALLATION

START-UP

MAINTENANCE

PARTS

GAS-FIRED
c UL us
LISTED

AQMD

Pioneer Appliance Models*
PHR100-55 / 130-55 / 160-55 / 199-55

Versa-Flame Combination Appliance Models*
PHR130-55C / 160-55C / 199-55C

***A suffix of "LP" denotes propane gas**

⚠ WARNING

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

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

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

120 Braley Rd. P.O. Box 429 East Freetown, MA 02717-04 www.htproducts.com
LP- 325 REV. 11.18.11

⚠ 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.

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.**

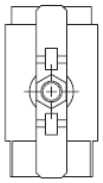
C. Use only your hand to turn the gas control knob. Never use tools. If the handle will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. 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.

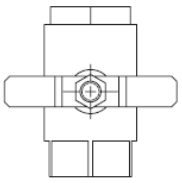
OPERATING INSTRUCTIONS

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.**

GAS VALVE ON



GAS VALVE OFF



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.**

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.**

LP-175 Rev. 4 3-11-08

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 death or serious injury.

⚠ WARNING

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

⚠ CAUTION

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

CAUTION

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

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 with this system, and additional publications including the *National Fuel Gas Code, ANSI Z223.1-2002*, be reviewed in their entirety before beginning any work.

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

FOR THE INSTALLER

⚠ WARNING

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

This appliance must be installed by qualified and licensed personnel. The installer should be guided by the instructions furnished with the appliance, and with local codes and utility company requirements. In the absence of local codes, preference should be given to the *National Fuel Gas Code*, *ANSI Z223.1-2002*.
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*.

⚠ WARNING

The hydronic supply and return connections of these products are 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, severe 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**.

TABLE OF CONTENTS

PART 1 – GENERAL SAFETY INFORMATION

A. PRECAUTIONS

This appliance is for indoor installations only. Clearance to combustible materials: 0" top, bottom, sides and back. Front must have room for service, 24" recommended. (A combustible door or removable panel is acceptable front clearance.) This appliance has been approved for closet installation. Do not install this appliance directly on carpeting. For installation on combustible flooring. Category IV vent systems only.

⚠ WARNING

INSTALLER – Read all instructions in this manual before installing. Perform steps in the order given.

USER – This manual is for use only by a qualified heating installer/service technician. Refer to user's information manual for your reference. Have this appliance serviced/inspected by a qualified service technician annually.

FAILURE TO ADHERE TO THE GUIDELINES ON THIS PAGE CAN RESULT IN SUBSTANTIAL PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.

NOTE: If the appliance is exposed to the following, do not operate until all corrective steps have been made by a qualified serviceman:

1. FIRE
2. DAMAGE
3. WATER

Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN UNDERWATER. Immediately call a qualified service technician. Replace any part of the control unit that has been under water.

⚠ WARNING

Be sure to disconnect electrical power before opening appliance cabinet. Failure to do so could result in an electrical shock that could result in serious injury or death.

B. IMPROPER COMBUSTION

CAUTION

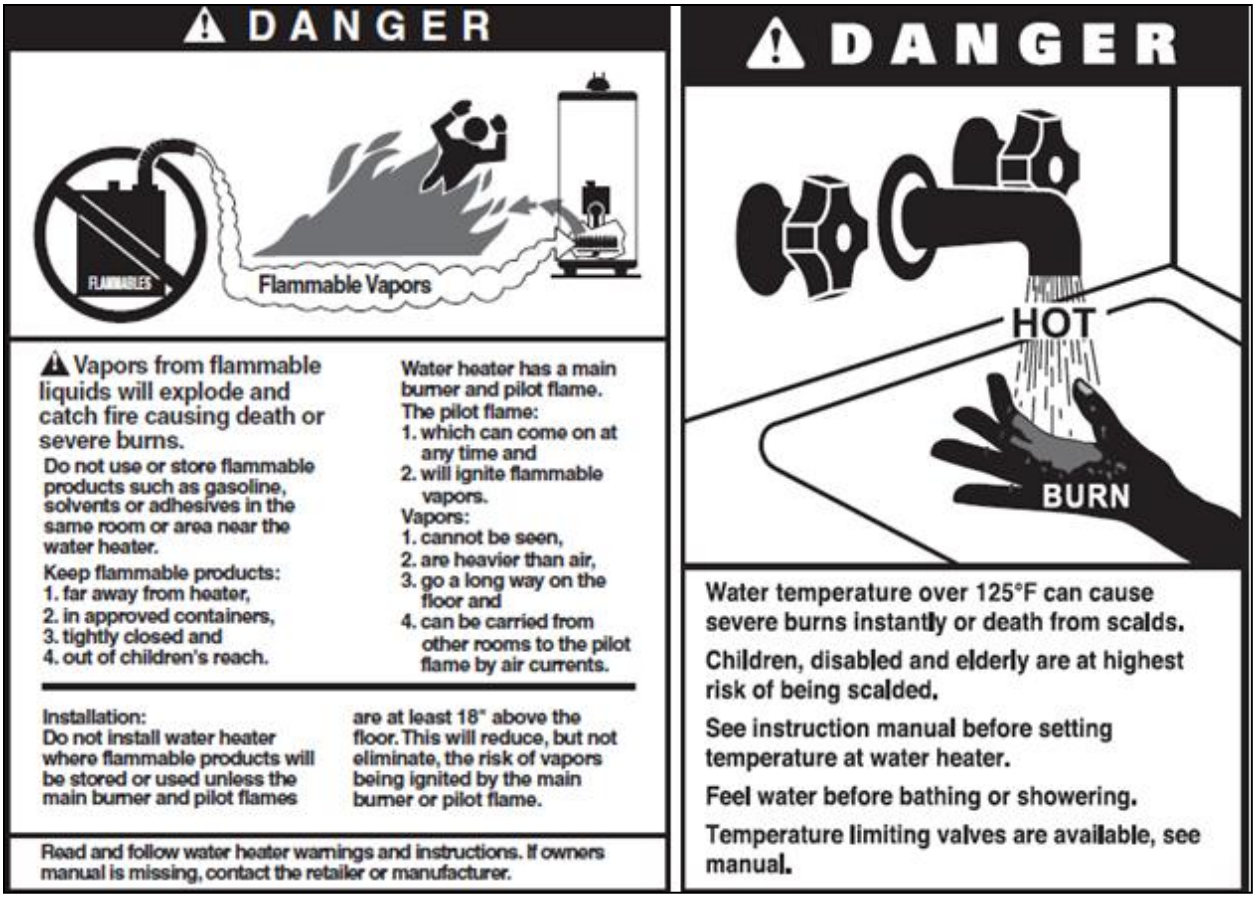
NOTE: Do not obstruct the flow of combustion and ventilating air. Adequate air must be provided for safe operation.

C. GAS

Should overheating or gas supply fail to shut off, do not turn off or disconnect electrical supply to circulator. Instead, shut off the gas supply at a location external to the appliance.

D. WHEN SERVICING THE APPLIANCE

- To avoid electric shock, disconnect electrical supply before performing maintenance.
- To avoid severe burns, allow appliance to cool.



E. WATER QUALITY

- Do not use petroleum-based cleaning or sealing compounds in an appliance system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.
- Do not use “homemade cures” or “appliance patent medicines”. Substantial property damage, damage to appliance, and/or serious personal injury may result.
- Continual fresh make-up water will reduce appliance life. Mineral buildup reduces heat transfer, overheats the heat exchanger, and causes failure. Addition of oxygen by make-up water can cause internal corrosion in system components. Leaks in the appliance or piping must be repaired at once.
- If you have an old system with cast iron radiators, thoroughly flush the system (without appliance connected) to remove sediment. Sediment can reduce the efficiency of the appliance and, in extreme cases, cause damage to the internal heat exchanger.

⚠ 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 injury or death.

F. WINTERIZING

NOTE: Consider piping and installation when determining appliance location. Do not place the appliance in an area where it will be prone to freezing.

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 of antifreeze to assure protection is adequate to protect the bottom of the appliance from freezing.

PART 2 – BEFORE YOU START

A. WHAT'S IN THE BOX

Also included with the appliance:

- Pressure and Temperature Gauge
- 30 psi Temperature and Pressure Relief Valve
- Intake PVC Tee with Screens
- Exhaust PVC Coupling with Screens
- Installation Manual
- Warranty
- 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
The highly efficient combustion heat exchanger flows exhaust gas through the primary section into the secondary heat exchanger section, where the coldest water on the bottom of the tank extracts the last residual amount of energy.

Modulating Combustion System
Modulation during central heating operation is based on the supply temperature. The set point used for the control depends upon the programmed central heating curve. The slope of the heating curve can be changed by the installer. The control monitors the system, regulating burner output during operation to match system demand, effectively increasing efficiency and providing substantial fuel savings.

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
This sensor monitors supply temperature. The control module adjusts appliance firing rate, correcting supply temperature.

Bottom Water Temperature Sensor
This sensor monitors return water temperature. The control module reduces or increases appliance input accordingly.

Temperature and Pressure Gauge
Allows the user to monitor system temperature and pressure.

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

Burner
Constructed with metal fiber and stainless steel, the burner uses pre-mixed air and gas, providing a wide range of firing rates.

Electrical Field Connections with Terminal Strips
The cabinet allows easy access to the line voltage and low voltage terminal strips, which are clearly marked to facilitate wiring to the appliance.

Condensate Drain Connection
This is a condensing high efficiency appliance, and therefore has a condensate removal system. Condensate is nothing more than water vapor derived from combustion products. The condensate is similar to that of an automobile when it is initially started.

It is very important that the condensate line slopes away from the appliance, down to a suitable drain. If the condensate outlet is lower than the drain, you must use a condensate removal pump (kit 554200, available from HTP).

A condensate filter, if required by local authorities, can be made up of lime crystals, marble or phosphate chips, and will neutralize the condensate. This can be purchased from HTP (7450P-212) and installed in the field.

It is also very important that the condensate line is not exposed to freezing temperatures or any other type of blockage. Plastic pipe must be the only material used for condensate line. Steel, brass, copper, or other materials will be subject to corrosion or deterioration.

A second vent may be necessary to prevent a condensate line vacuum lock in a long, horizontal line. Also, an increase in pipe size may be necessary to drain properly. Support of the condensation line may be needed to avoid blockage of 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
The outdoor sensor allows the installer to make the appliance even more efficient by basing temperature delivered to the central heating circuits on outdoor temperature. (See Optional Equipment, Section C).

(Optional) Indirect Tank Sensor – Indirect Priority

⚠ CAUTION
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.

The indirect sensor allows the installer to operate the appliance with two temperatures: one for central heating and the other for the SuperStor Indirect Water Appliance. This allows the user to increase water temperature supplied to the indirect to get faster recovery by prioritizing flow at a higher rate than may be needed for central heating. **NOTE:** This application requires two separate circulators. (See Optional Equipment, Section C).

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

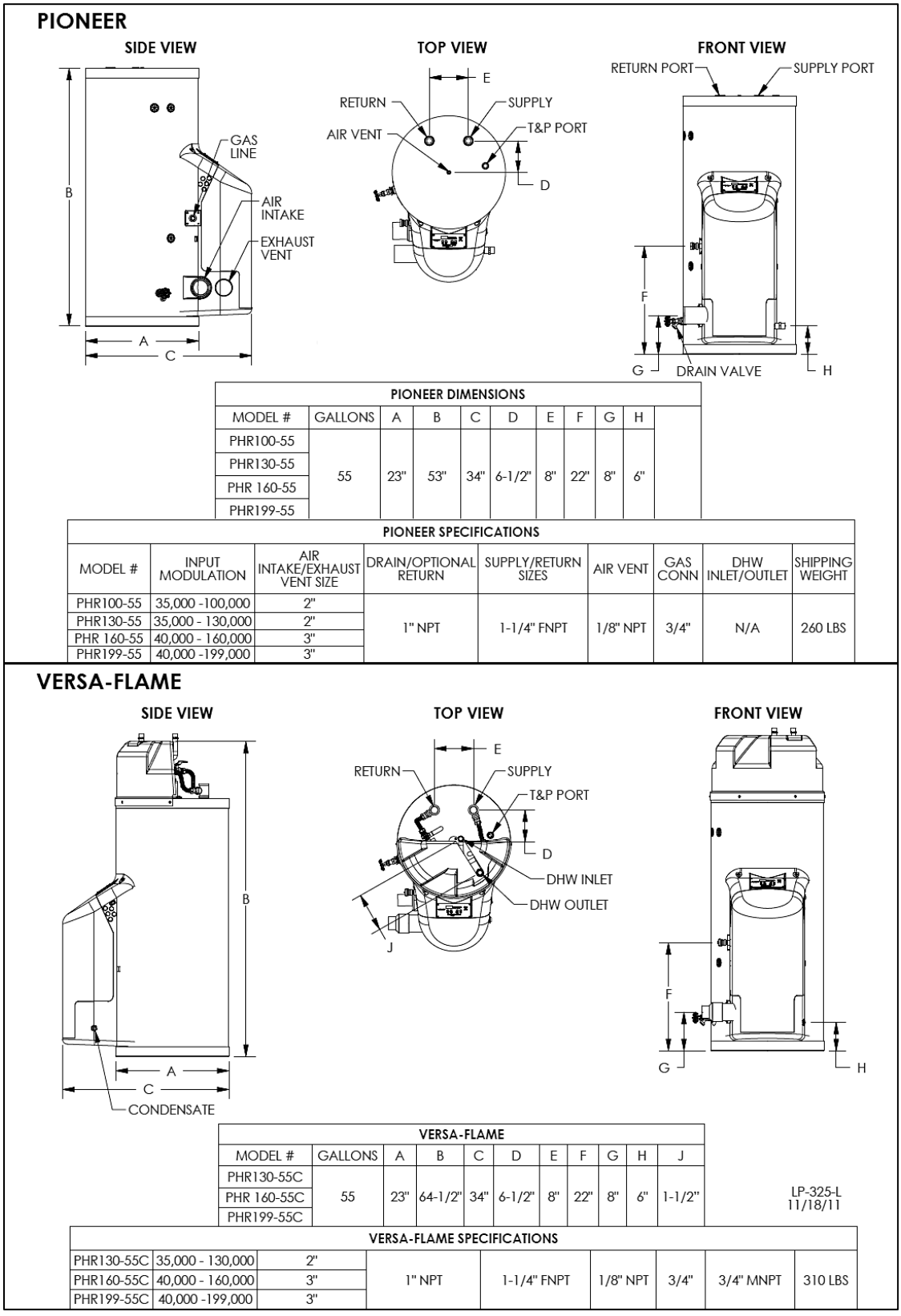
C. OPTIONAL EQUIPMENT

Below is a list of optional equipment available from HTP:

- System Sensor (Part # 7250P-324)
- Indirect Tank Sensor (Part # 7250P-325)
- 3” Stainless Steel Outside Termination Vent Kit (V1000)
- 4” Stainless Steel Outside Termination Vent Kit (V2000)
- 2” PVC Concentric Vent Kit (Part # KGAVT0501CVT)
- 3" PVC Concentric Vent Kit (Part # KGAVT0601CVT)
- 3” Polypro Vent Kit (Part **#** 8400P-001)
- 3” Polypro Pipe (33’ length Part **#** 8400P-002, 49.5’ length Part **#** 8400P-003)
- U.L. 353 Compliant Low Water Cut-Off Interface Kit with Manual Reset (Part # 7450P-225)
- Alarm System (Part # 7350P-602) (to monitor any failure)
- PC Connection Kit (Part # 7250P-320)
- Condensate Neutralizer (Part # 7450P-212)
- Vision 2 Temperature Mixing Control (Part # 7250P-322)

These additional options may be purchased through your HTP distributor.

PART 3 – DIMENSIONS AND CLEARANCES



PIONEER DIMENSIONS

MODEL #	GALLONS	A	B	C	D	E	F	G	H
PHR100-55	55	23"	53"	34"	6-1/2"	8"	22"	8"	6"
PHR130-55									
PHR 160-55									
PHR199-55									

PIONEER SPECIFICATIONS

MODEL #	INPUT MODULATION	AIR INTAKE/EXHAUST VENT SIZE	DRAIN/OPTIONAL RETURN	SUPPLY/RETURN SIZES	AIR VENT	GAS CONN	DHW INLET/OUTLET	SHIPPING WEIGHT
PHR100-55	35,000 -100,000	2"	1" NPT	1-1/4" FNPT	1/8" NPT	3/4"	N/A	260 LBS
PHR130-55	35,000 - 130,000	2"						
PHR 160-55	40,000 - 160,000	3"						
PHR199-55	40,000 -199,000	3"						

VERSA-FLAME

MODEL #	GALLONS	A	B	C	D	E	F	G	H	J
PHR130-55C	55	23"	64-1/2"	34"	6-1/2"	8"	22"	8"	6"	1-1/2"
PHR 160-55C										
PHR199-55C										

LP-325-L
11/18/11

VERSA-FLAME SPECIFICATIONS

PHR130-55C	35,000 - 130,000	2"	1" NPT	1-1/4" FNPT	1/8" NPT	3/4"	3/4" MNPT	310 LBS
PHR160-55C	40,000 - 160,000	3"						
PHR199-55C	40,000 -199,000	3"						

Figure 1 – LP-325-L

RECOMMENDED CLEARANCE ACCESS

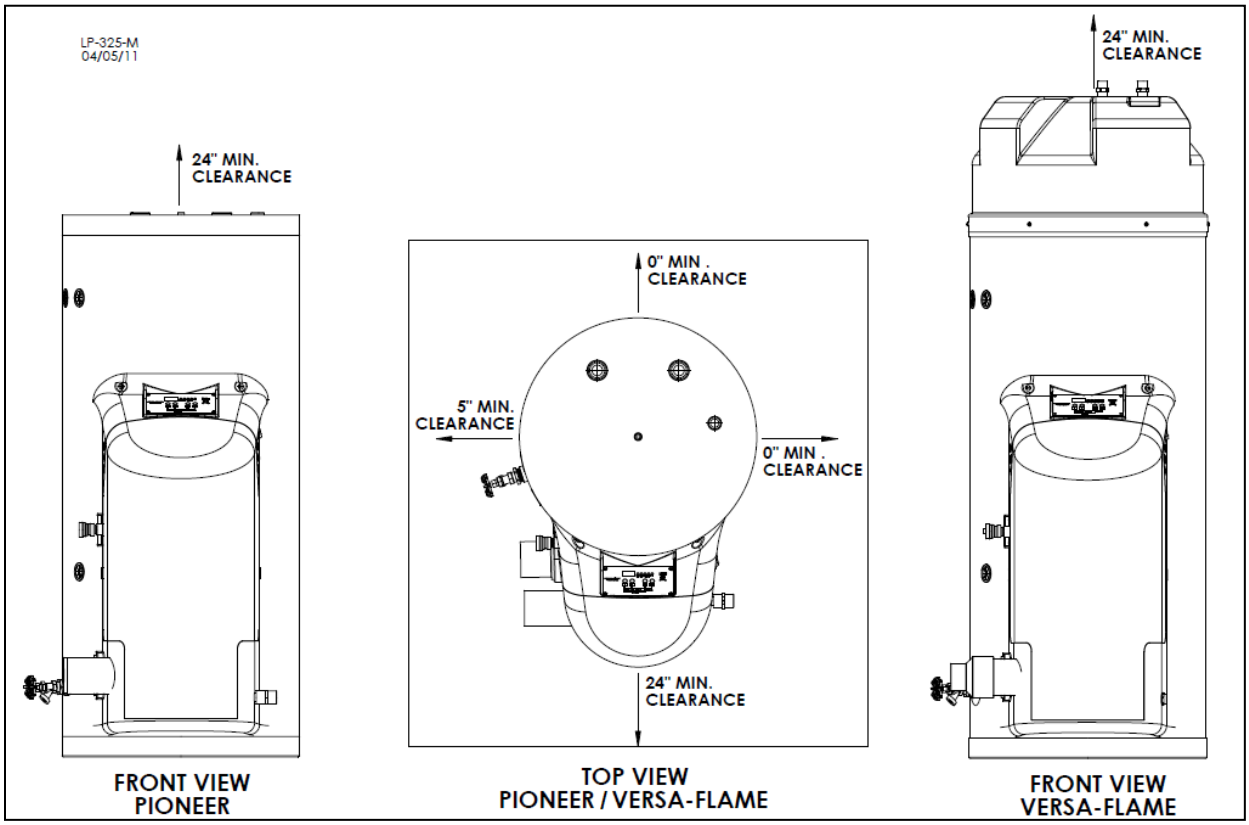


Figure 2 – Recommended Service Clearances

PART 4 – PREPARE APPLIANCE LOCATION

Before considering location, there are many factors to be addressed. These factors are covered in detail in this installation manual. Please read the entire manual, as it could save time and money. Piping, Venting, and Condensation Removal are just a few of the issues that need attention prior to the installation of the appliance.

A. BEFORE LOCATING THE APPLIANCE

Check for nearby connections to:

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

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

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

The appliance gas control system components must be protected from dripping water during operation and service.

If replacing an existing appliance, check for and correct any existing system problems, such as:

- System leaks
- Appliance is located in a condition that could cause the system to freeze and leak.
- Incorrectly-sized expansion tank

Clean and flush system when reinstalling an appliance.

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 appliance when filled with water (650 lbs).

C. CLEARANCES FOR SERVICE ACCESS

See Part 3 for recommended service clearances. If you do not provide the minimum clearances shown, it may not be possible to service the appliance without removing it from the space.

⚠ 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 form 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.

D. RESIDENTIAL GARAGE INSTALLATION

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

- Mount the bottom of the appliance a minimum of 18” above the floor of the garage, to ensure the burner and ignition devices are well off the floor.
- Locate or protect the appliance so it cannot be damaged by a moving vehicle.

E. EXHAUST VENT AND INTAKE AIR VENT

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 Venting, Part 8 in 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

Vents must be properly supported. Appliance intake and exhaust 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 the first 3’ from the appliance.

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 air intake and exhaust vent 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 air intake and exhaust vent piping lengths, routing and termination methods must all comply with the methods and limits given in the Venting section, Part 8 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 1.**

2. INDOOR COMBUSTION AIR INSTALLATION 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 1.**

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 1) 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. See Figure 18 for installation diagram.

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 ($22cm^2$/kW) of the total input of all appliances in the space, but not less than 100 square inches ($645cm^2$).

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, Part 8 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

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.

⚠ WARNING

Failure to provide an adequate supply of fresh combustion air can cause poisonous flue gases to enter living space, which could result in severe personal injury or death. **NOTE: To prevent combustion air contamination, see Table 1.**

F. PREVENT COMBUSTION AIR CONTAMINATION

Install intake air piping for the appliance as described in the Venting Section. 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 listed in Table 1. Contaminated air will damage the appliance, resulting in possible substantial property damage, severe personal injury, or death. For example, do not pipe intake air vent near a swimming pool. Also, avoid areas subject to exhaust fumes from laundry facilities. These areas always contain 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).

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

Table 1 – Contaminant Table

G. 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.

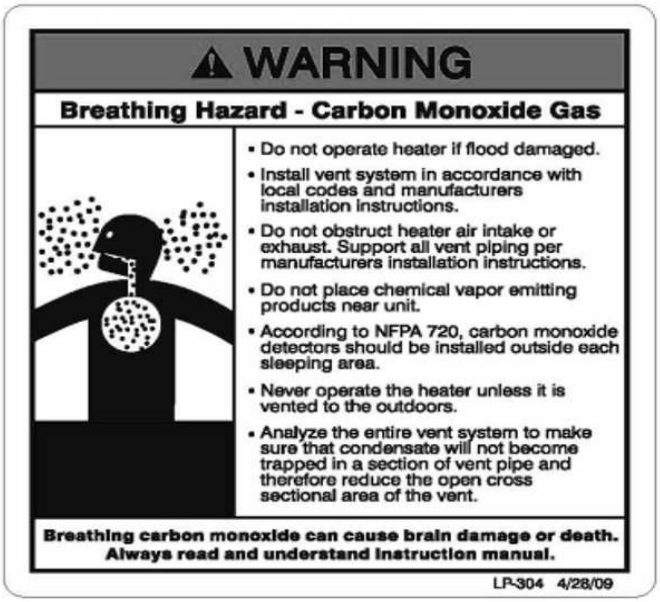


Figure 3 - CO Warning Label

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 common venting system properly vents when tested as outlined, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance 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 in the National Fuel Gas Code, ANSI Z 223.1.

H. WHEN RECEIVING THE APPLIANCE

⚠ WARNING
UNCRATING APPLIANCE – Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

⚠ CAUTION
COLD WEATHER HANDLING – If the appliance has been stored in a very cold location (BELOW 0^{o}F) before installation, handle with care until the plastic components come to room temperature.

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

PART 5 – PIPING

Plumbing of this appliance should only be done by a qualified, licensed plumber in accordance with all local plumbing codes. 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 connection.

⚠ WARNING
Never use dielectric unions for galvanized steel fittings when connecting to an indirect stainless steel storage tank or appliance.

A. GENERAL PIPING INFORMATION

CAUTION
Use two wrenches when tightening water piping at the 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.

CAUTION

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.

B. RELIEF VALVE

Install supplied pressure and temperature relief valve. Connect discharge piping to a safe disposal location, following the guidelines below. Replacement is available. See parts list.

⚠ WARNING

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

- Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the relief valve discharge.
- Discharge line must be as short as possible and the same size as the valve discharge connection throughout its entire length.
- Discharge line must pitch downward from the valve and terminate at least 6" above the floor drain, making discharge clearly visible.
- The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375^{o}F or greater.
- Do not pipe discharge to any location where freezing could occur.
- No shutoff valve may be installed between the relief valve and 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, replace with a new properly rated relief valve.

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.

C. BACKFLOW PREVENTER

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

D. SYSTEM WATER PIPING METHODS

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 the Appliance Piping Details, 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.

E. 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.

F. DHW HEAT PACK AND INDIRECT FIRED WATER APPLIANCE SCALDING

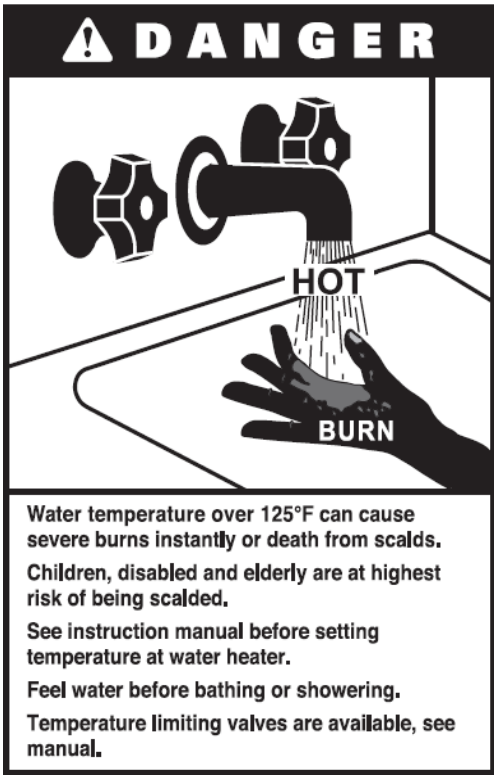
APPROXIMATE TIME / TEMPERATURE RELATIONSHIPS IN SCALDS	
120°F	More than 5 minutes
125°F	1 ½ to 2 minutes
130°F	About 30 seconds
135°F	About 10 seconds
140°F	Less than 5 seconds
145°F	Less than 3 seconds
150°F	About 1 ½ seconds
155°F	About 1 second

Table 2

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 temperature. 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, you should install a mixing valve in the water system. This valve will reduce point of discharge temperature by mixing cold and hot water in branch supply lines. Such valves are available from your local plumbing supplier.

Table 2 details the relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.



G. HYDRONIC PIPING - CIRCULATORS, ZONE VALVES AND MULTIPLE APPLIANCES

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 ¾" 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.

H. FILL AND PURGE HEATING SYSTEM

- 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.

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^{o}F to 180^{o}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.

I. ZONING WITH ZONE VALVES

1. Connect appliance to system as shown in the Piping Details 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.

J. ZONING WITH CIRCULATORS

1. Connect appliance to system as shown in the Piping Details 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.

K. 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.

L. CENTRAL HEATING PIPING DETAIL

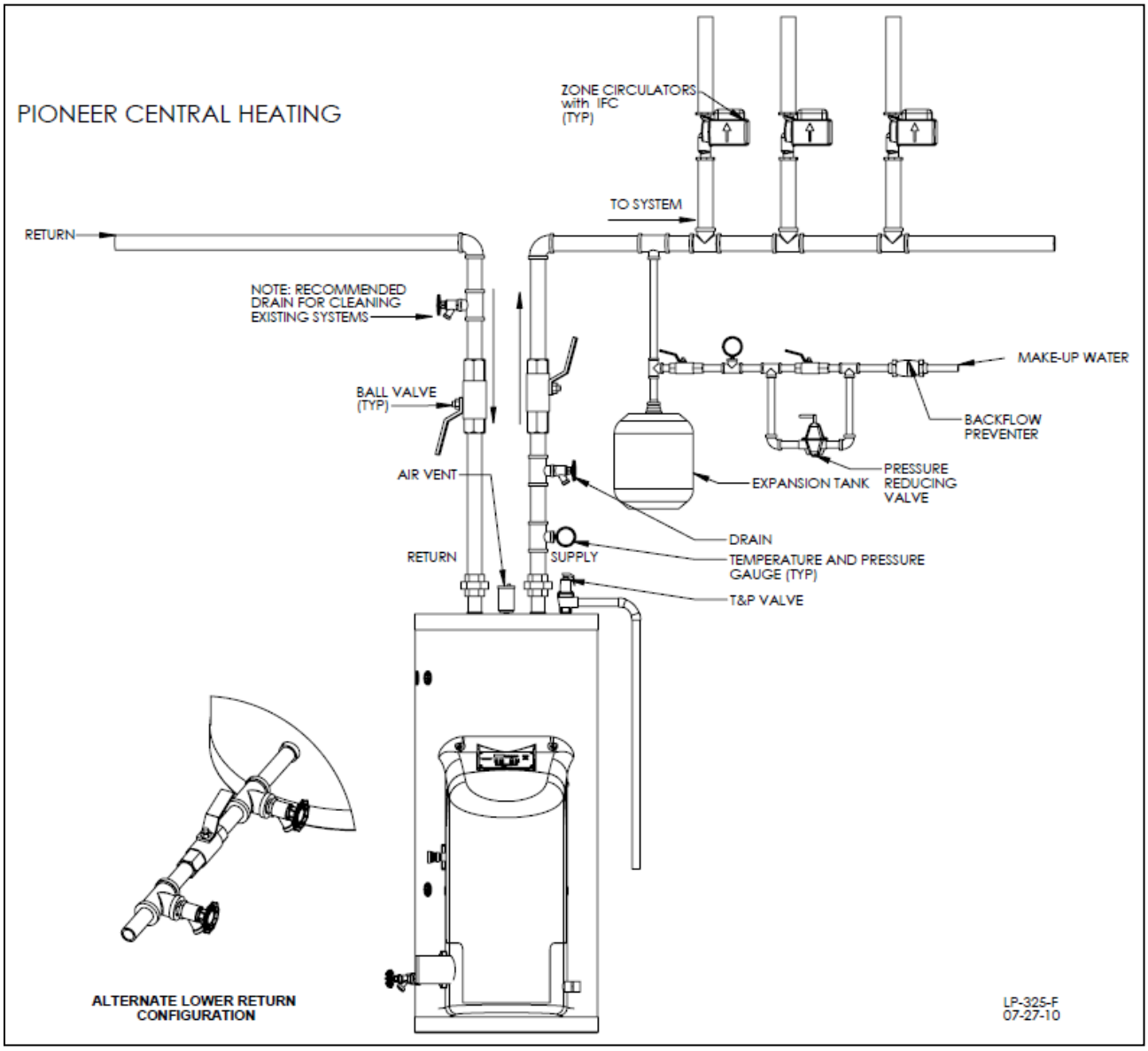


Figure 4 –Central Heating Detail – LP-325-F NOTES:

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.

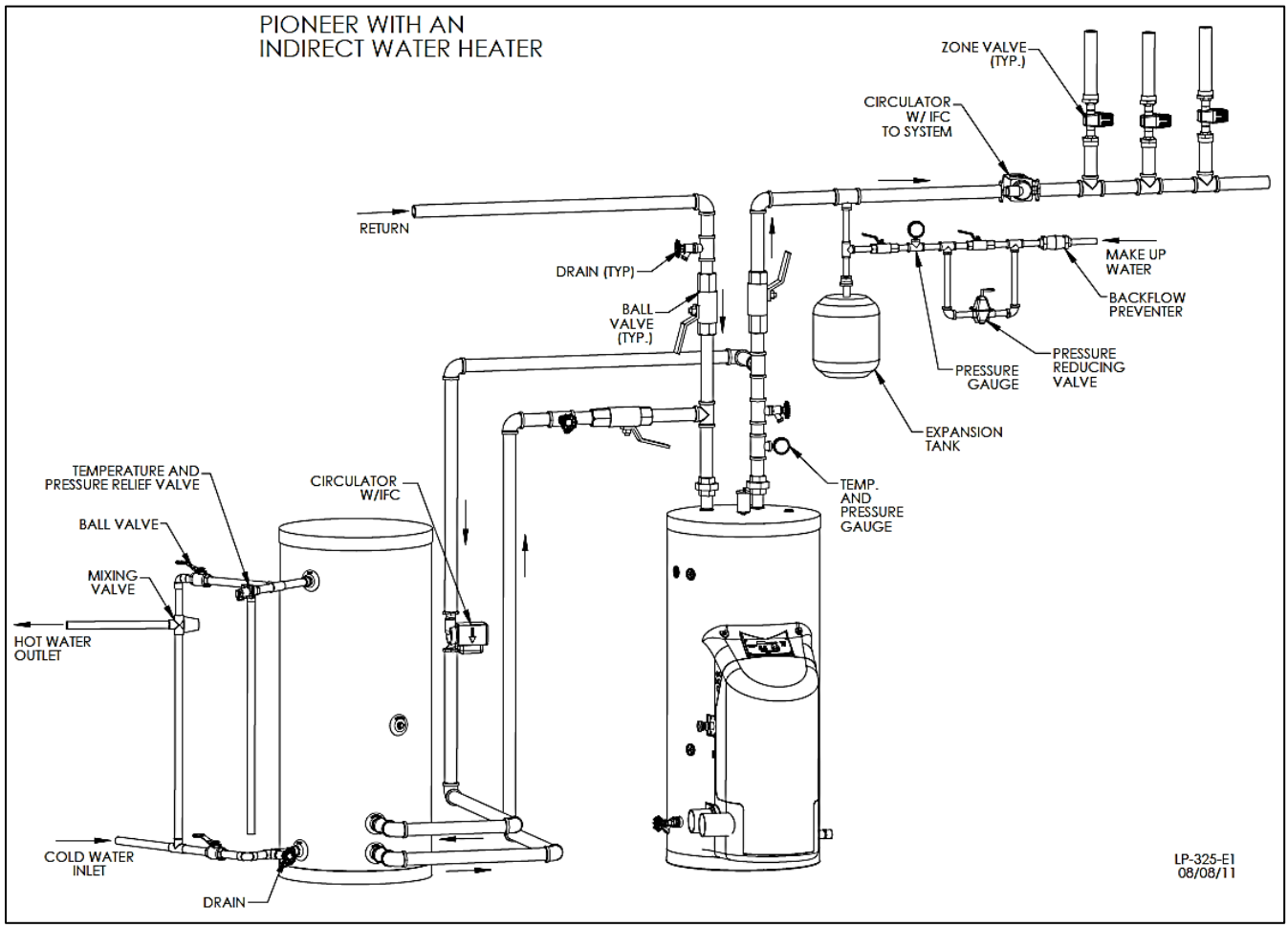


Figure 5 – Appliance with Indirect Water Heater Detail*

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.

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

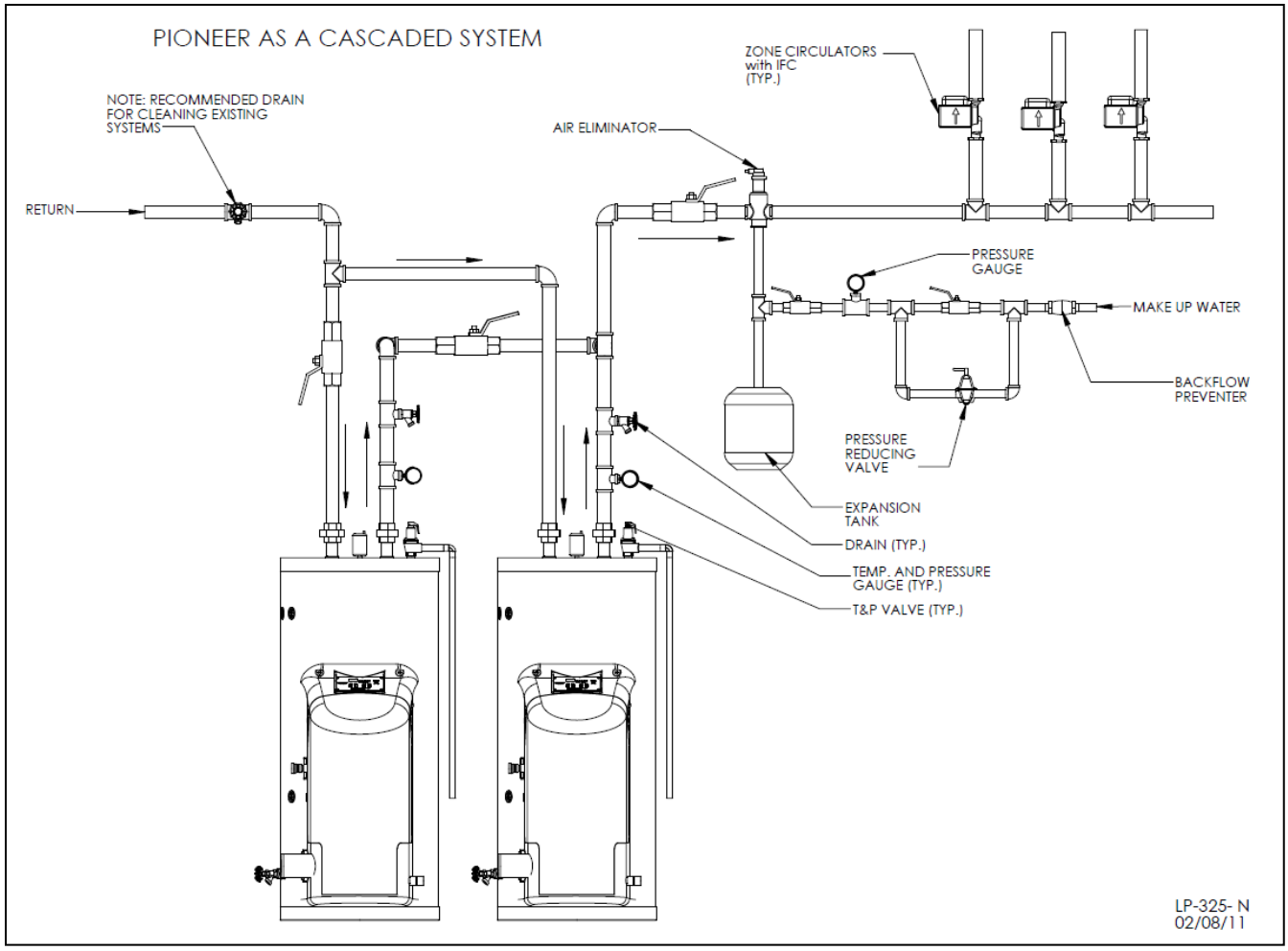


Figure 6 – Cascaded System

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.

M. PIPING INTO THE DHW PACK ON THE VERSA-FLAME

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 ¾" 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 assure 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.

N. MIXING VALVE INSTALLATION

⚠ WARNING

The mixing valve provided with this appliance must be installed on the hot water outlet connection to reduce the risk of scalding. This mixing valve only reduces the risk of scalding injury.

1. All installations must be carried out by licensed professionals.

2. Local codes shall take priority over any inconsistency in these instructions.

3. 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.

APPROXIMATE TIME / TEMPERATURE RELATIONSHIPS IN SCALDS	
120°F	More than 5 minutes
125°F	1 ½ 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 ½ seconds
155°F	About 1 second

Table 3

⚠ DANGER

Water temperature over 125 degrees F. can cause severe burns instantly, or death from scalds. Children, disabled, and elderly are at highest risk of being scalded.

⚠ DANGER

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. Feel water before bathing or showering!

⚠ 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 an 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) in the system. This valve will reduce point of discharge temperature in branch supply lines. This appliance was shipped with an ASSE approved thermostatic mixing valve. Install this valve according to the directions in the mixing device container. 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.

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 Specification

Min. – Max. Hot Water Inlet Temperature	140 - 210°F (60 - 100°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	95 – 131°F (35 – 55°C)
Min. Temperature Differential (Between Hot Supply and Outlet)	27°F (15°C)
Allowable Supply Pressure Variation	+/- 10%
Performance –	
CV – ½"	3.3
Max Flow – 1"	24 gpm

The mixing valve maintains a constant outlet temperature of +/– 5˚ F given limited variation of water inlet temperature and pressure.

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 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.

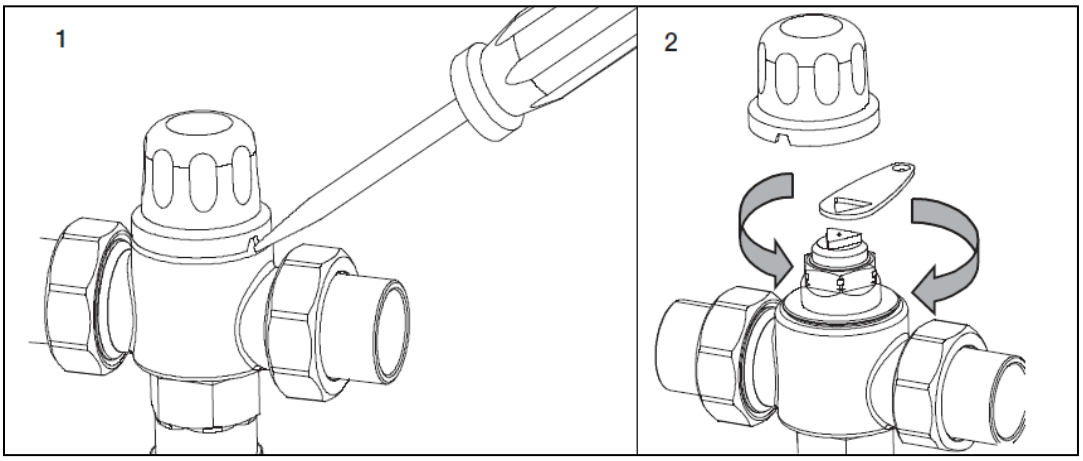
⚠ DANGER

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.

Setting the Mixing Valve Outlet Temperature

1. Remove the green cap by inserting a small screw driver in the notch and gently prying up as shown in Fig. 7-1.

2. 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. Using the adjustment tool provided to fit over the spindle end, adjust the spindle counter clockwise to increase temperature and clockwise to decrease temperature, as shown in Fig. 7-2.



Figures 7 – 1 and 7 – 2

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

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.

O. VERSA-FLAME DHW PERFORMANCE

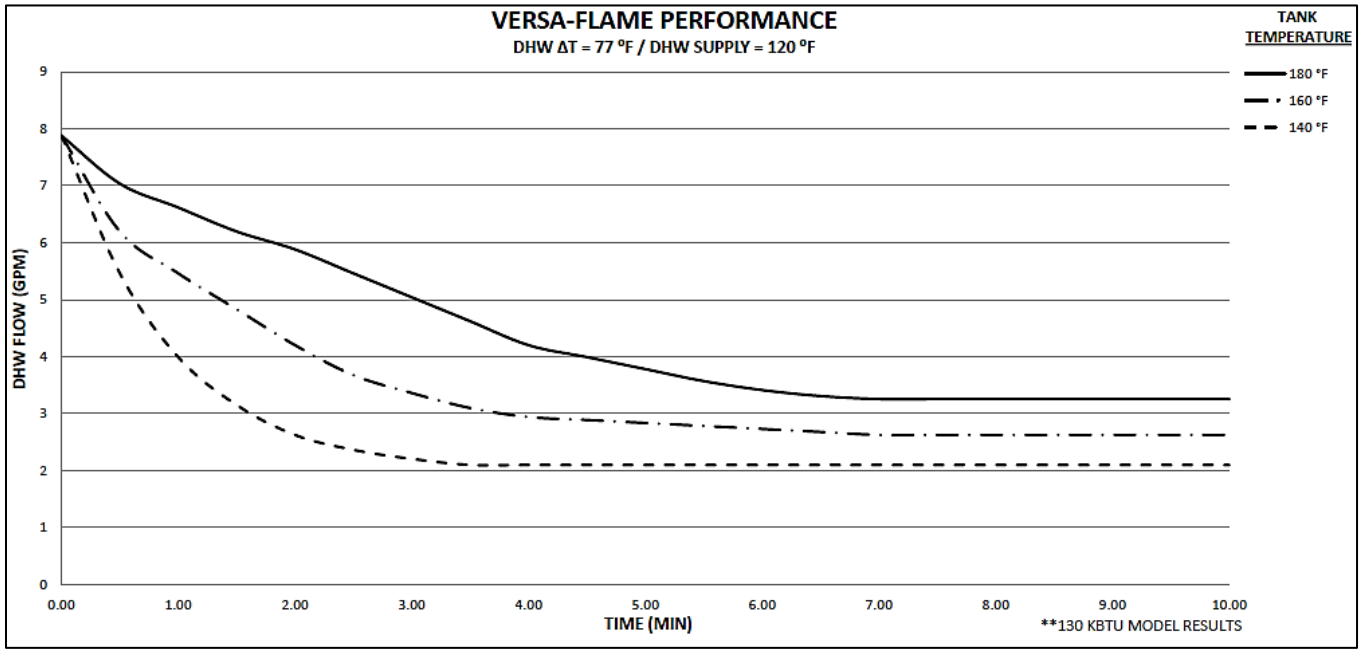


Figure 8 – DHW Pack Performance on 130K BTU Models

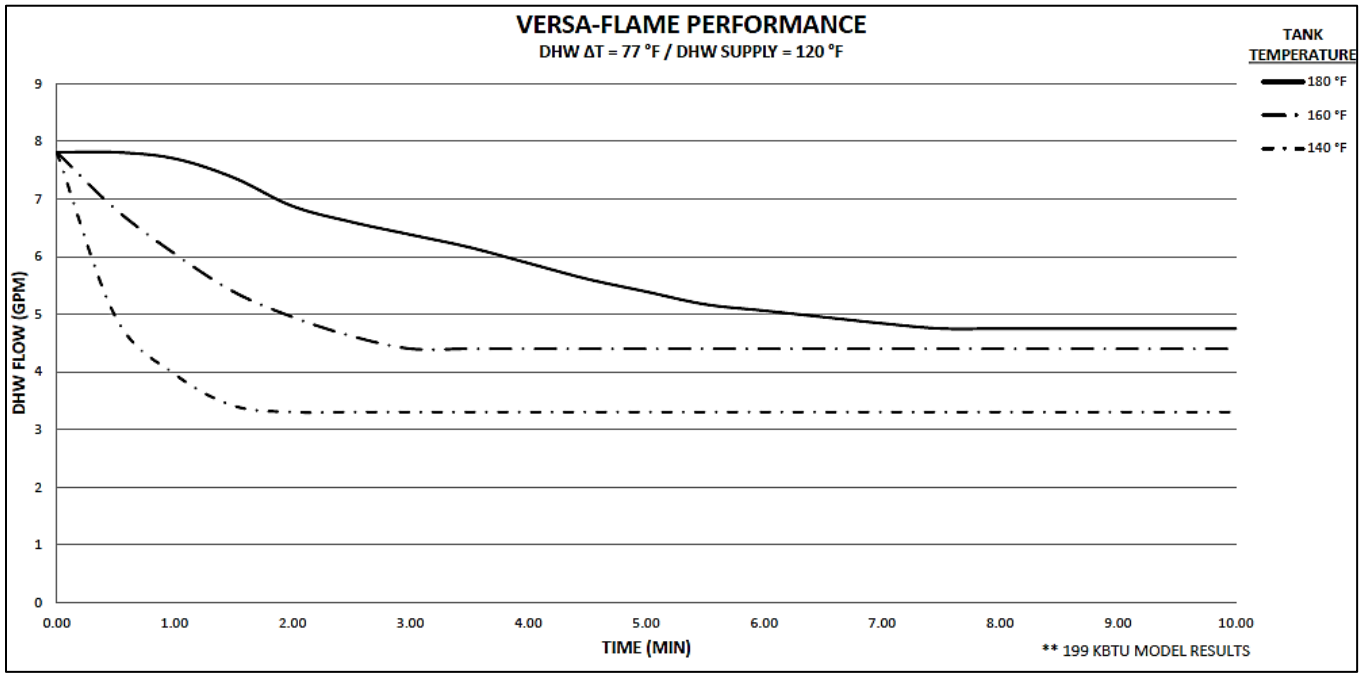


Figure 9 – DHW Pack Performance on 199K BTU Models

P. DHW PIPING WITH THE VERSA-FLAME

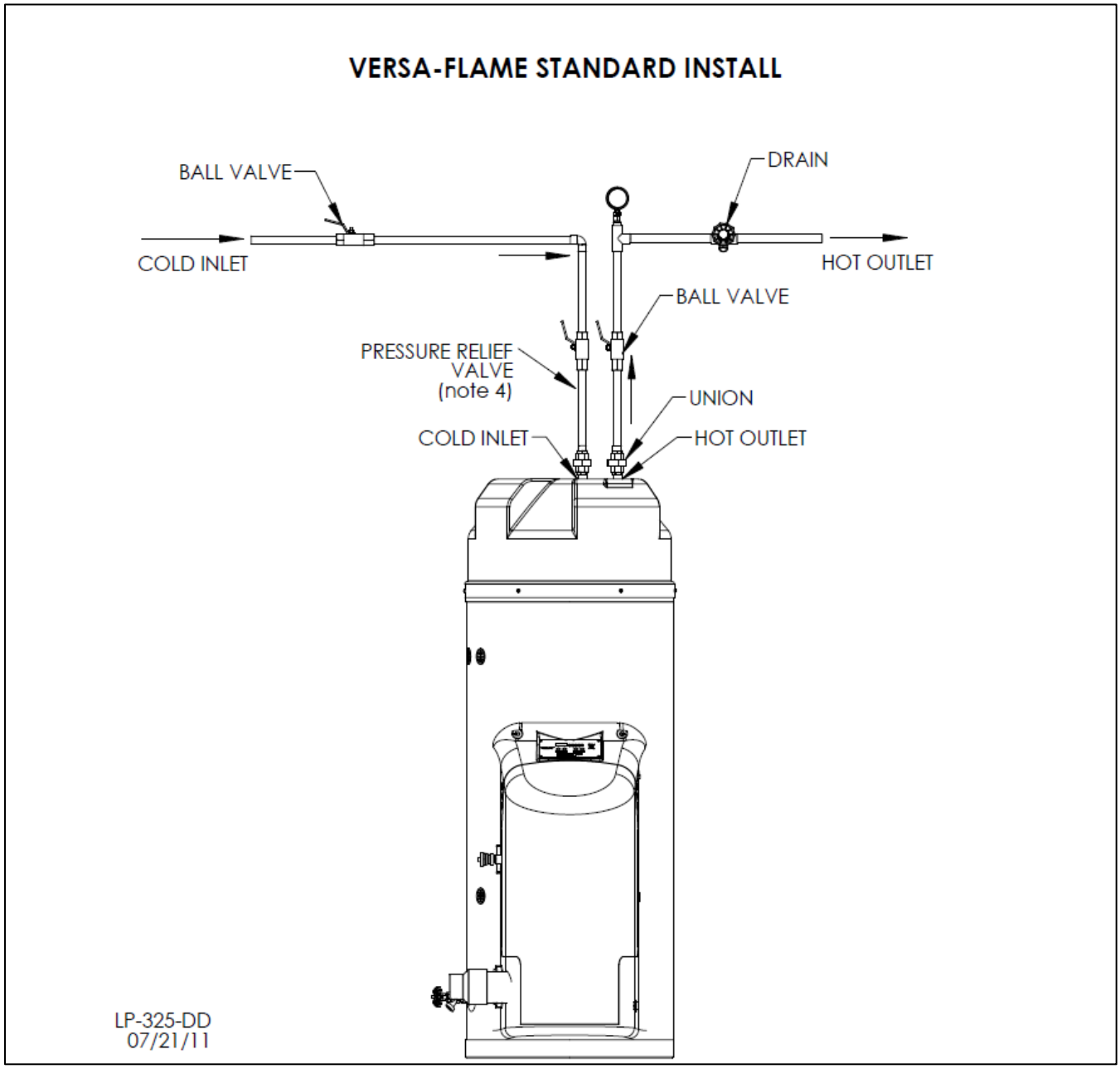


Figure 10 – Versa-Flame Standard Installation

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 248 CMR.
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.

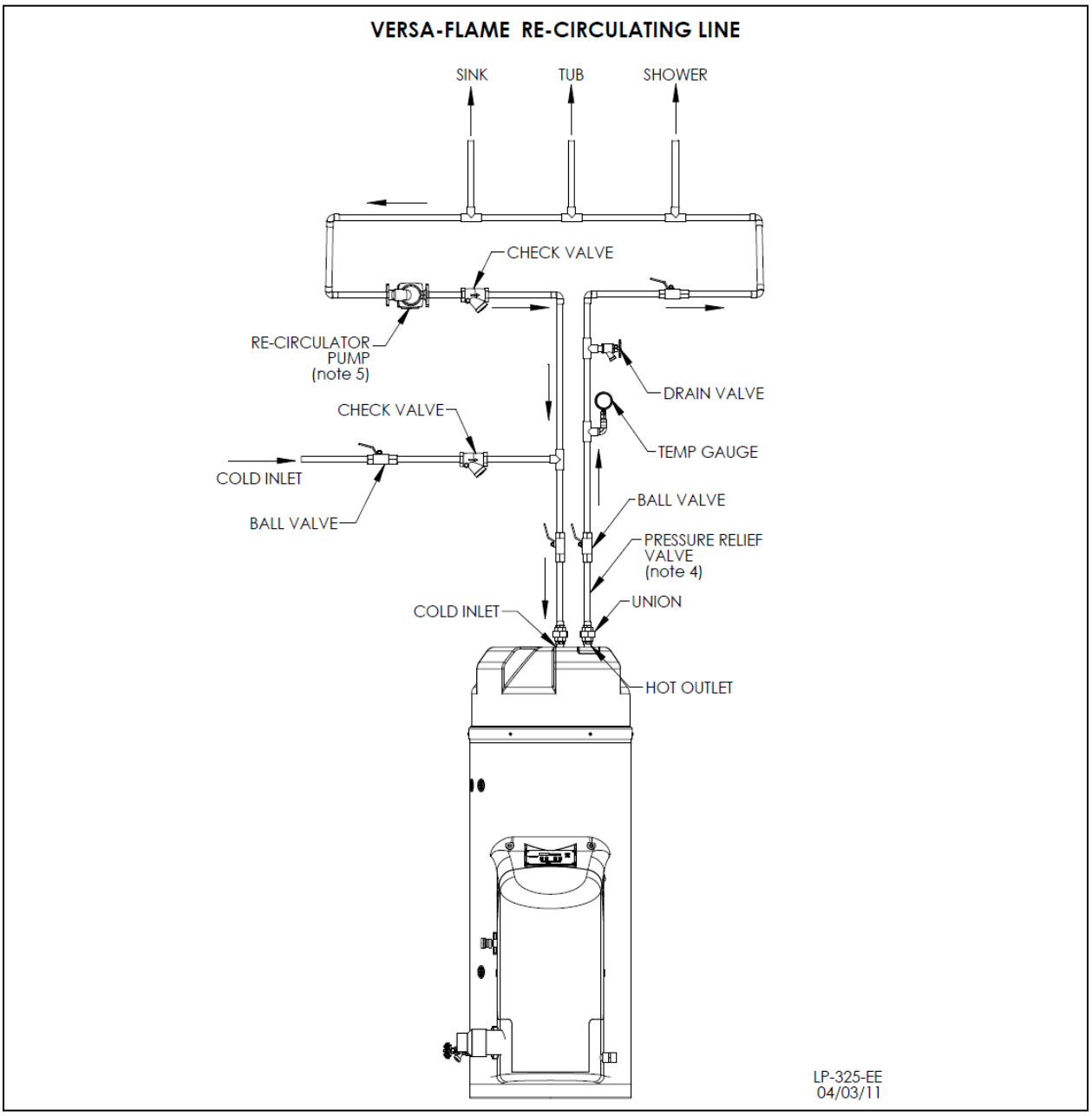


Figure 11 – Versa-Flame with Re-Circulating Line

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 248 CMR.
8. Recirculator pump must be sized to flow 0.6 GPM or greater to the appliance.

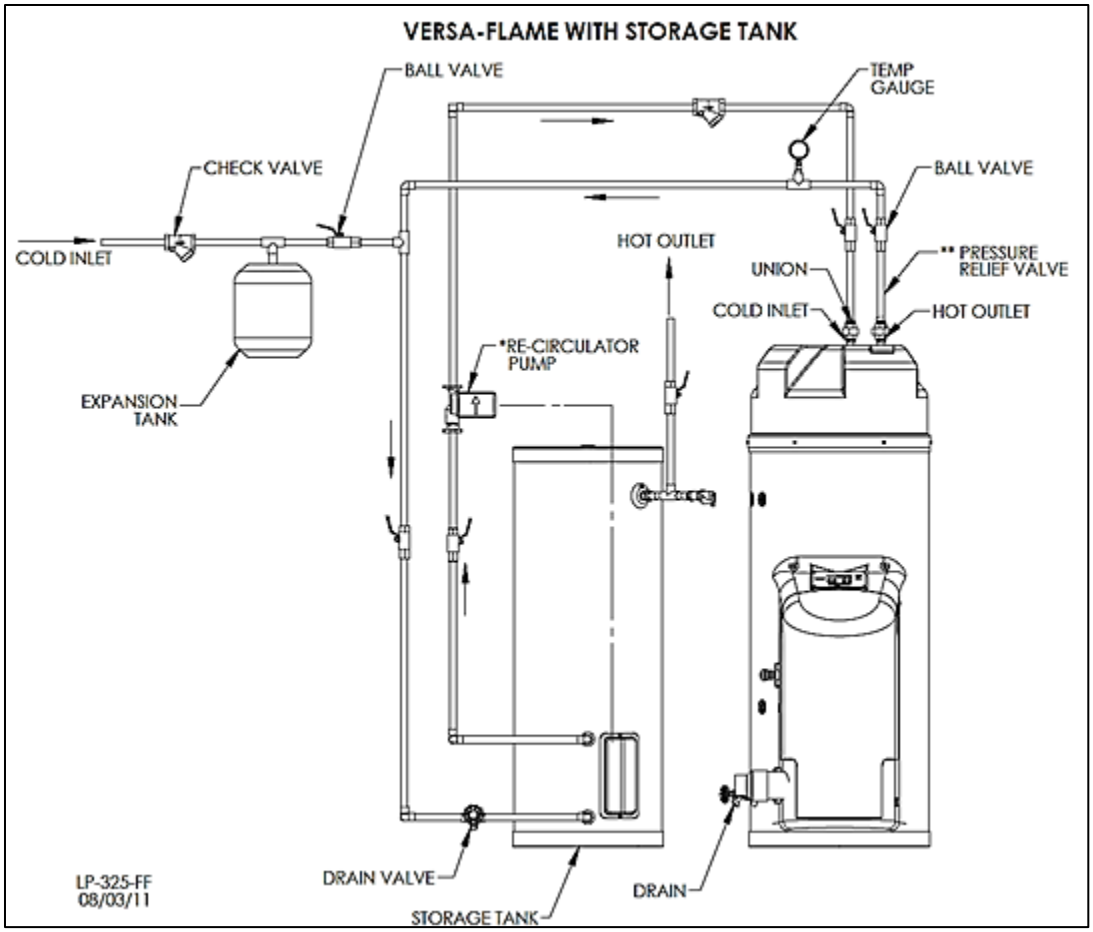


Figure 12 – Versa-Flame with Storage Tank NOTES:

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 248 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^{o}F minimum) than storage tank set point.

PART 6 – VENTING, COMBUSTION AIR AND CONDENSATE REMOVAL

⚠ DANGER

The appliance must be vented as detailed in this Venting Section. Ensure exhaust and intake piping complies with these instructions regarding vent system. Inspect finished combustion air intake and exhaust piping thoroughly to ensure all joints are well secured, airtight, and comply with all applicable code requirements, as well as with 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 vent system will operate with a positive pressure in the pipe. 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 below carefully. Failure to do so may result in substantial property damage, severe personal injury, or death.

1. Install the water appliance 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.

2. This water appliance is a direct vent appliance and is listed as a Category IV appliance with Underwriters Laboratories, Inc. VENT AND INTAKE AIR VENT.

3. This water appliance must be vented with materials, components, and systems listed and approved for Category IV appliances.

B. APPROVED MATERIALS FOR EXHAUST AND INTAKE AIR VENTS

APPROVED VENTING MATERIAL			
Item	**Material**	**Standards for Installation in:**	
		United States	**Canada**
Vent or air pipe and fittings	PVC schedule 40/80	ANSI/ASTM D1785	CPVC and PVC venting must be ULC-S636 Certified. IPEX is an approved manufacturer in Canada, supplying vent material listed to ULC-S636.
	PVC-DWV	ANSI/ASTM D2665	
	CPVC schedule 40/80	ANSI/ASTM F441	
	Polypropylene	ULCS636	
	Stainless Steel AL29-4C	Certified for Category IV and direct vent appliance venting	Certified for Category IV and direct vent appliance venting
Pipe cement/primer	PVC	ANSI/ASTM D2564	IPEX System 636 Cements & Primers
	CPVC	ANSI/ASTM F493	

Table 4

⚠ DANGER

- Do NOT use Foam Core Pipe in any portion of the exhaust piping from this water heating appliance.
- DO NOT connect different types of plastic piping together.
- When installing AL29-4C vent piping, install a PVC-to-stainless adapter at the boiler vent connection, and at the termination when using an HTP PVC termination kit. DO NOT mix piping from different manufacturers unless using adapters specifically designed for the purpose by the manufacturer.

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

C. EXHAUST AND INTAKE AIR VENT PIPE LOCATION

1. DETERMINE EXHAUST VENT LOCATION

a. The vent piping for this water appliance is approved for zero clearance to combustible construction.
b. See illustration within this section of clearances for location of exit terminals of direct-vent venting systems.
c. This water 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.
d. Provide a minimum of 1 foot distance from any door, operable window, or gravity intake into any building.
e. Provide a minimum of 1 foot clearance from the bottom of the exhaust above the expected snow accumulation level. Snow removal may be necessary to maintain clearance.

f. 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.
g. When adjacent to a public walkway, locate exit terminal at least 7 feet above grade.
h. Do not locate the exhaust directly under roof overhangs to prevent icicles from forming.
i. Provide 4 feet clearance from the inside corner of vertical walls, chimneys, etc., as well as horizontal corners created by roof overhangs.

2. DETERMINE AIR INTAKE VENT LOCATION

a. Provide 1 foot clearance from the bottom of the intake air vent and the level of maximum snow accumulation. Snow removal may be necessary to maintain clearances.
b. Do not locate intake air vent in a parking area where machinery may damage the pipe.
c. When venting with a two pipe system, maximum distance between intake air vent and exhaust vent is 6 feet (1.8 m). Minimum distance between exhaust vent and intake air vent on single water appliance is 10” (0.255 m) center-to-center. Minimum distance between exhaust vents and intake air vents on multiple water appliances is 10” (0.255 m) center-to-center.

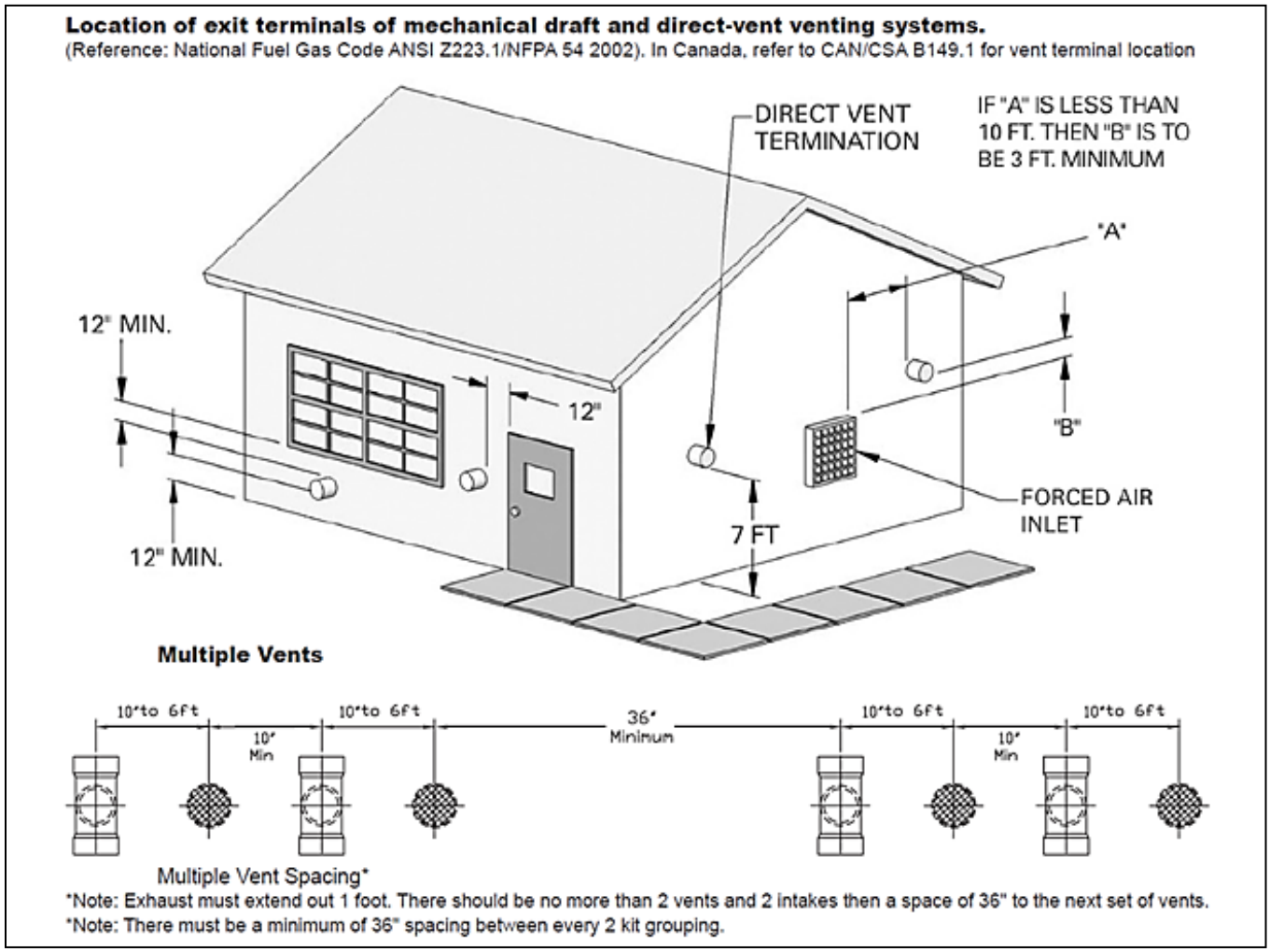


Figure 13 – Venting

D. EXHAUST AND INTAKE AIR VENT SIZING

1. The exhaust and intake vent size is 2" for the PHR100 and PHR130(C) and 3" for the PHR160(C) and PHR199(C).

2. The maximum combined equivalent length of 2” exhaust vent and intake air pipe **must not exceed 85 feet**. The total maximum combined equivalent length of 3” exhaust vent and intake air pipe **must not exceed 200 feet**.

E. LONGER VENT RUNS

1. The maximum combined equivalent length can be extended by increasing the diameter of both exhaust vent and intake air pipe equally. However, the transitions should begin a minimum of 15 combined equivalent feet from the water appliance.

a. **The maximum combined equivalent length for increased diameter vent pipes is 125 feet for 2” transitioning to 3” pipe (this number includes the minimum 15 combined equivalent feet necessary for transition), and 200 maximum combined equivalent feet for 3” transitioning to 4” pipe (including the minimum 15 combined equivalent feet necessary for transition).**

b. Transitions should always be made in vertical sections of pipe to prevent the condensate from pooling in the vent pipe.

MODEL	MAXIMUM COMBINED EQUIVALENT LENGTH AT STANDARD VENT CONNECTION	REDUCING COUPLING	MAXIMUM COMBINED EQUIVALENT LENGTH AT MAXIMUM INCREASED VENT SIZE
PHR100(C) PHR130(C)	85’ @ 2”	3” X 2”	125’ at 3”
PHR160(C) PHR199(C)	200’ @ 3”	4” X 3”	200’ at 4”

Table 5 – Vent Sizing – Diameter and Length

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

⚠ DANGER

Total maximum combined equivalent length of increased diameter exhaust vent and intake air pipe must not exceed the lengths defined in this manual. 125 maximum combined equivalent feet for 2” increased to 3” diameter vent pipe; 200 maximum combined equivalent feet for 3” increased to 4” diameter vent pipe. Failure to keep the combined 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 WATER 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 6 – TEL = Total Equivalent Length *Oversized vent pipe diameter is 1” or greater than factory supplied connection.

DETERMINING FRICTION LOSS

a. The equivalent length of elbows, tees, and other fittings are listed in the Friction Loss Table, Table 7:

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 VENT KIT	3’	3’	N/A
V500 2” VENT KIT	1’	N/A	N/A
V1000 3” VENT KIT	N/A	1’	1’
V2000 4” VENT KIT	N/A	1’	1’

Table 7 - *Friction loss for long radius elbow is 1 foot less. NOTE: Consult Polypropylene venting instructions for friction loss and pressure drop equivalents.

For example: If the exhaust vent has two 90° elbows and 10 feet of PVC pipe we will calculate:
Exhaust Vent Pipe Equivalent Length = (2x5) + 10 = 20 feet.
Further, if the intake air vent pipe has two 90° elbows, one 45° elbow and 10 feet of PVC pipe, the following calculation applies:
Intake Air Vent Pipe Equivalent Length = (2x5) + 3 + 10 = 23 feet.
Finally, if a concentric vent kit is used we find:
Total Combined Equivalent Length = 20 + 23 + 3 = 46 feet.
Therefore, the total combined equivalent length is 46 feet which is well below the maximum of 85 feet.

b. Effort should be made to keep a minimum difference in equivalent length between the intake air vent pipe and the exhaust vent.

3. The minimum combined equivalent length is 16 equivalent feet.

F. EXHAUST VENT AND INTAKE AIR PIPE INSTALLATION

⚠ WARNING

All joints of positive pressure vent systems must be sealed completely to prevent leakage of flue products into living space.

1. Use only solid PVC or CPVC pipe, or a Polypropylene vent system approved for use with Category IV appliances. FOAM CORE PIPING IS NOT APPROVED.

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. Horizontal lengths of exhaust vent must slope back towards the water appliance not less than ¼" per foot to allow condensate to drain from the vent pipe.

5. 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.

6. Do not use the appliance to support any piping.

7. A screened straight coupling is provided with the appliance for use as an outside exhaust termination.

8. A screened inlet air tee is provided with the appliance to be used as an outside intake termination.

Table 8 lists optional intake air/exhaust vent terminations available from HTP:

DESCRIPTION	STOCK CODE
2” PVC CONCENTRIC VENT TERMINATION KIT	KGAVT0501CVT
3” PVC CONCENTRIC VENT TERMINATION KIT	KGAVT0601CVT
2” STAINLESS STEEL VENT TERMINATION KIT	V500
3” STAINLESS STEEL VENT TERMINATION KIT	V1000
4” STAINLESS STEEL VENT TERMINATION KIT	V2000
3” POLYPRO VENT KIT	8400P-001

Table 8

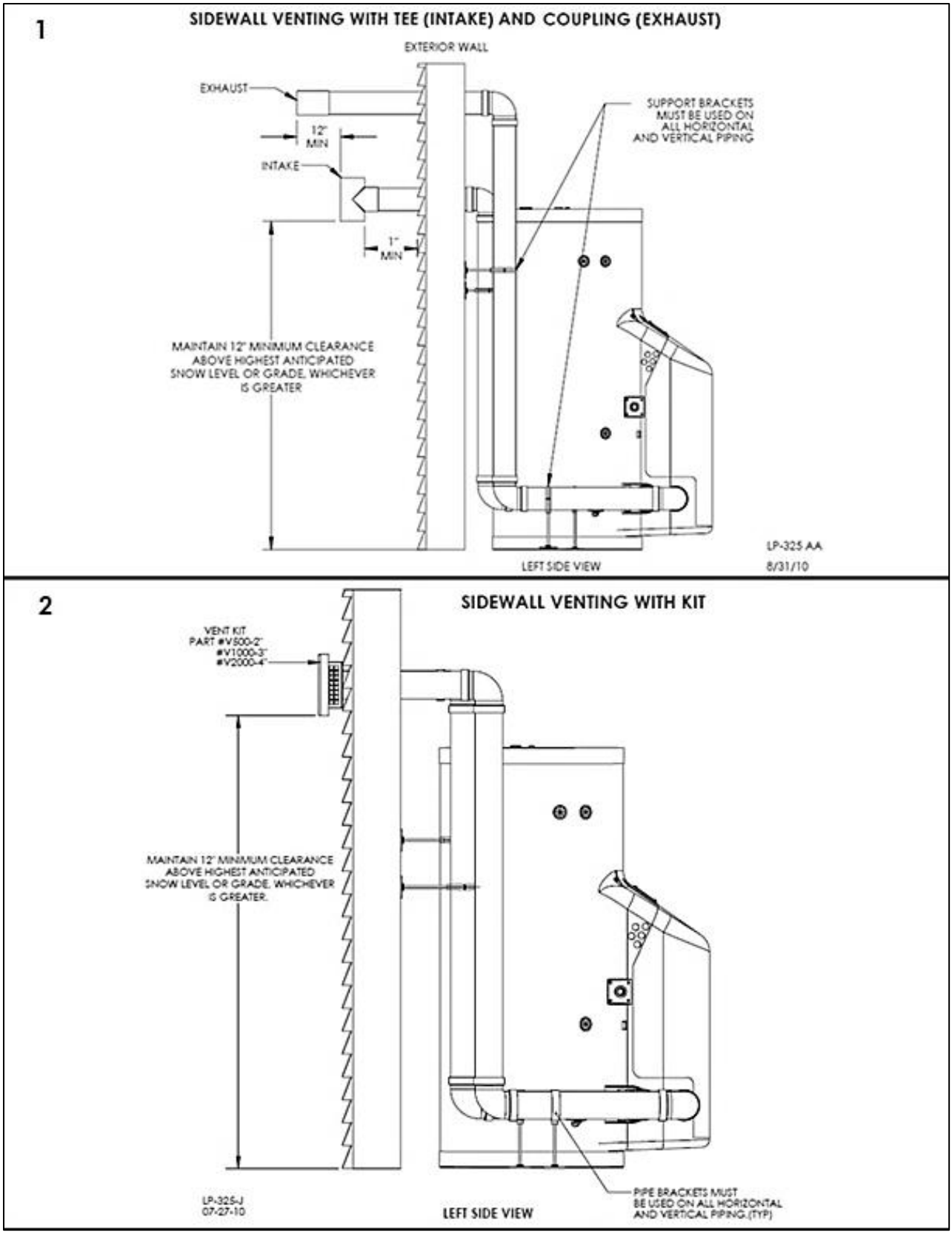
G. VENTING DRAWINGS

1. DIRECT VENT INSTALLATION OF EXHAUST AND INTAKE

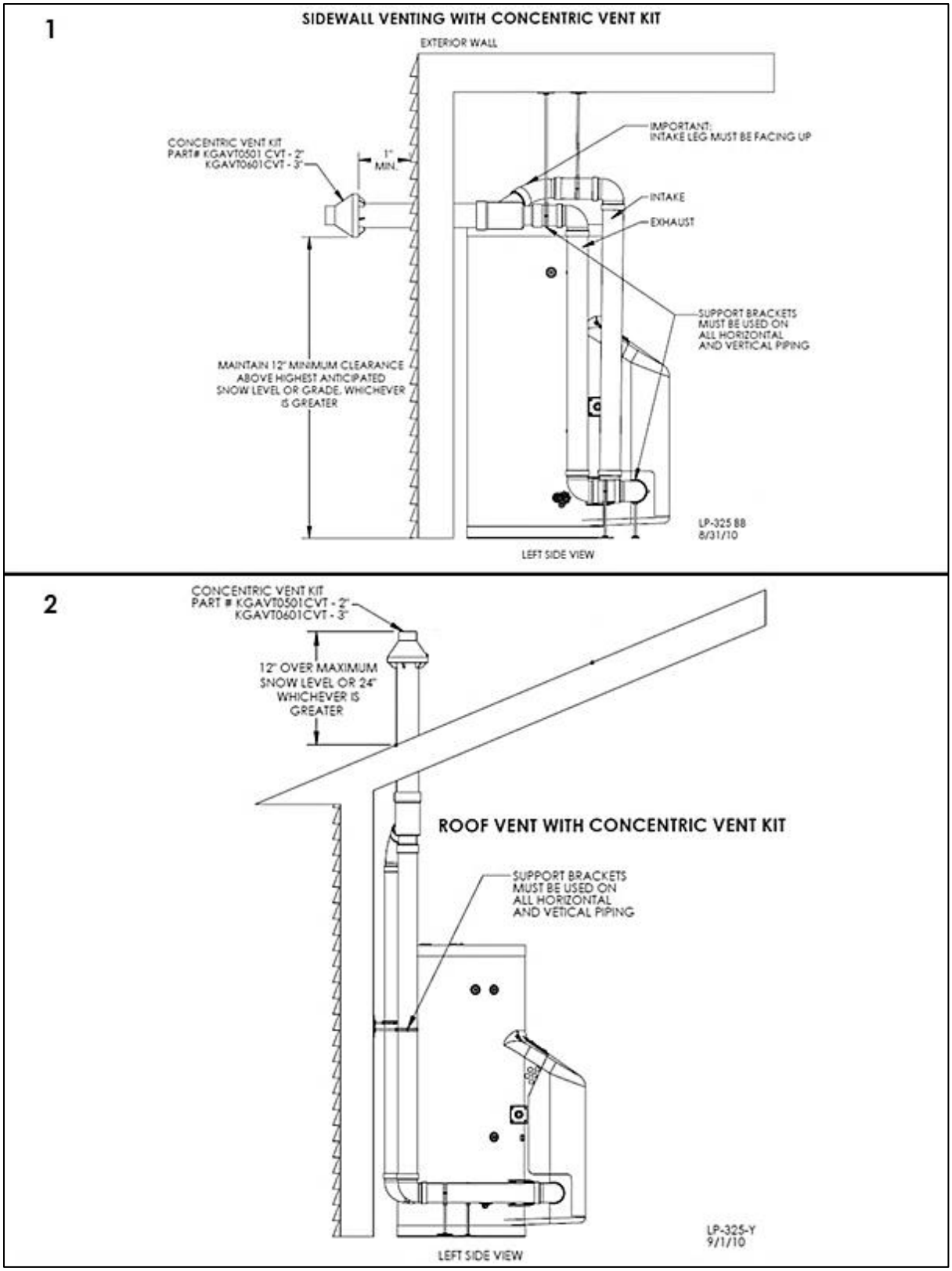
If installing a direct vent option, combustion air must be drawn from the outdoors directly into the appliance intake, and exhaust must terminate outside. There are three basic direct vent options detailed in this manual: 1. Side Wall Venting, 2. Roof Venting, and 3. Unbalanced Venting.

Be sure to locate the appliance such that the air intake and exhaust vent 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 air intake and exhaust vent piping lengths, routing and termination methods must all comply with the methods and limits given in the Venting section, Part 6 of this manual.

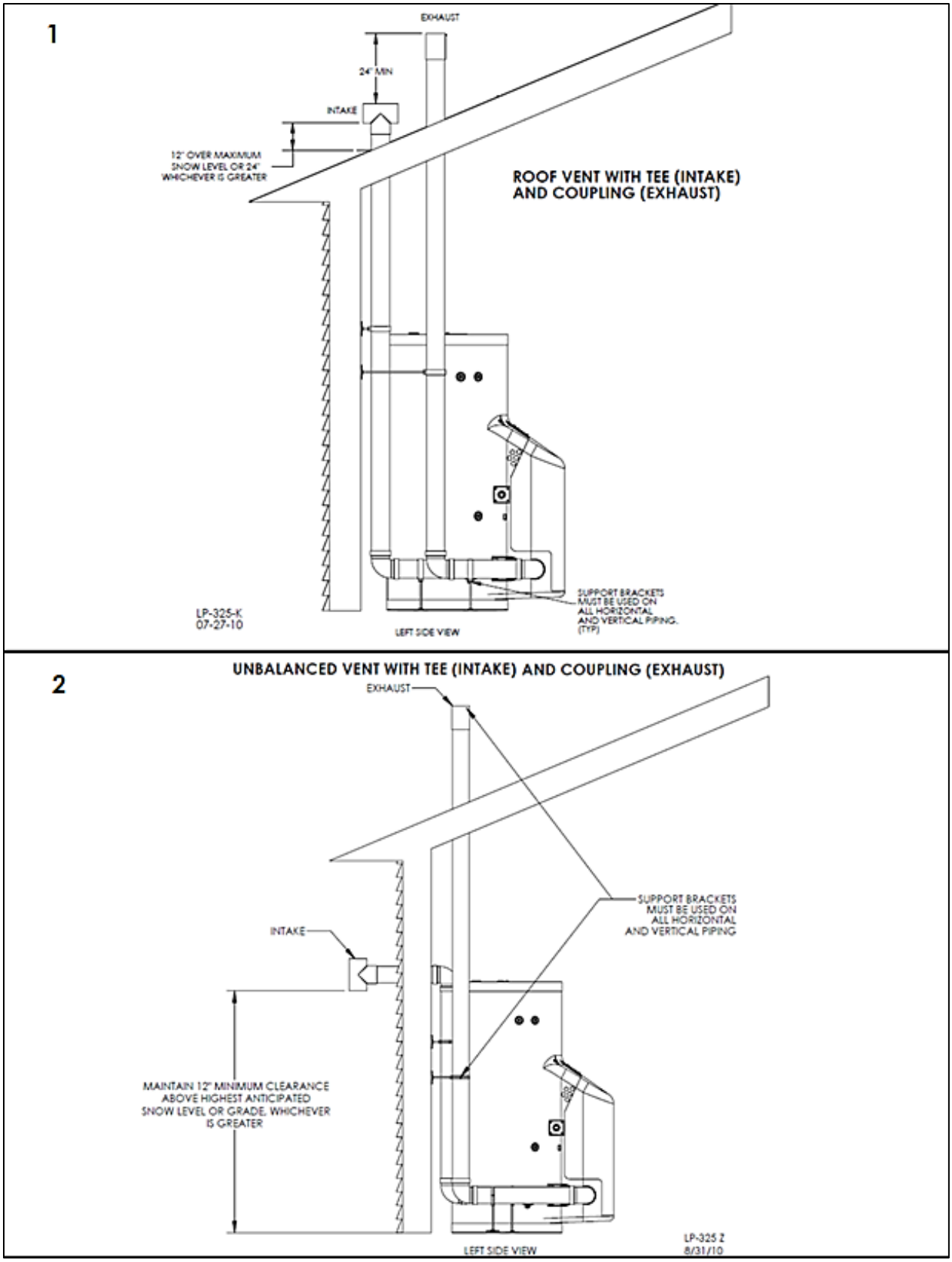
When installing a combustion air intake from outdoors, care must be taken to utilize uncontaminated combustion air. **NOTE: To prevent combustion air contamination, see Table 1.**



Figures 14 – 1, 14 - 2 NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.



Figures 15 - 1, 15 - 2 NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.



Figures 16 – 1, 16 - 2 NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

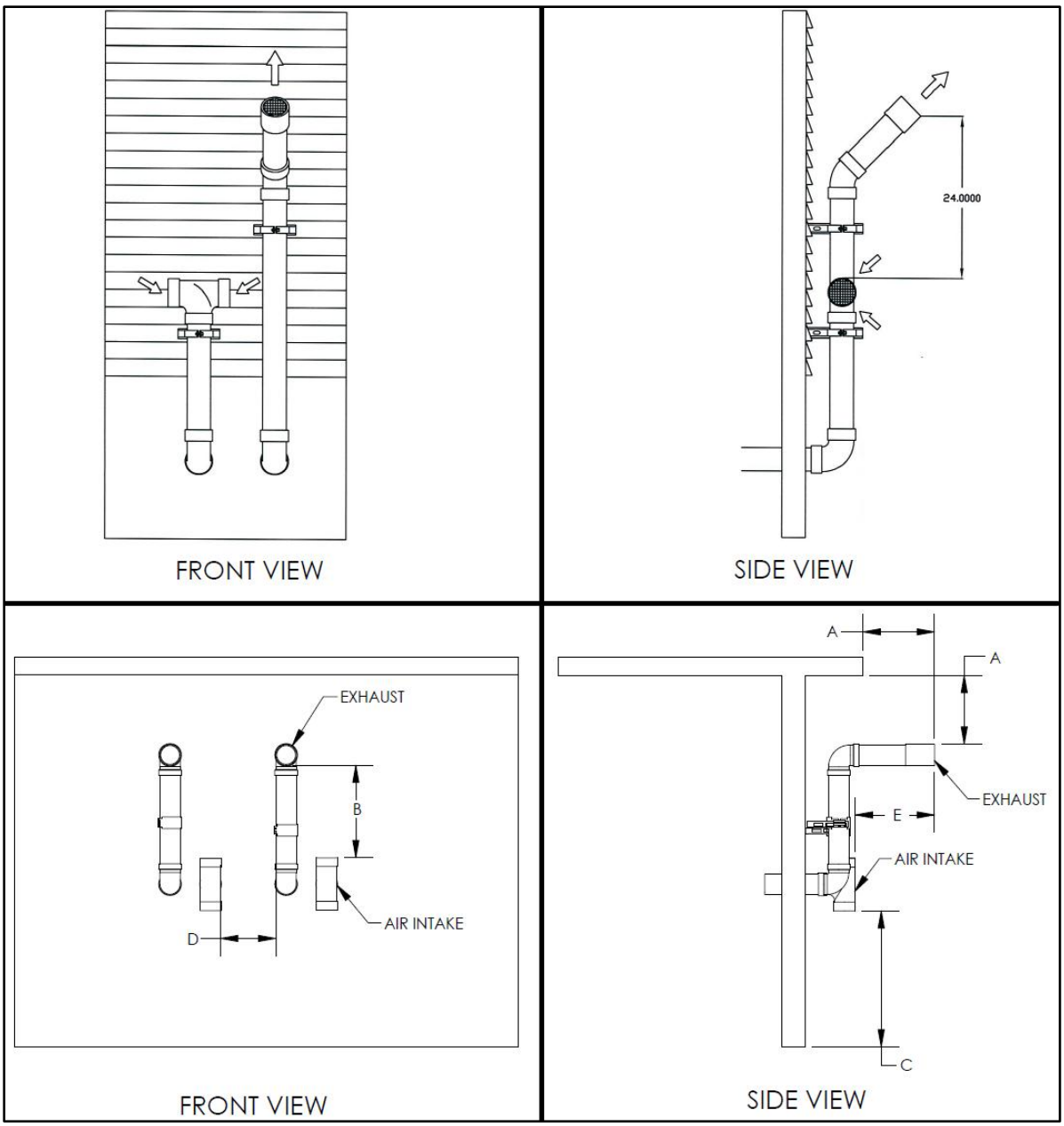


Figure 17 – Horizontal Venting - NOTE: Drawing is meant to demonstrate system venting ONLY.

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.

⚠ WARNING

All vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of ¼” per foot back to the heater 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 at 4 foot intervals on the vent pipe. Boiler venting must be readily accessible for visual inspection for the first three feet from the boiler.

2. INDOOR COMBUSTION AIR INSTALLATION 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 1.**

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 18) 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 not 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.

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.

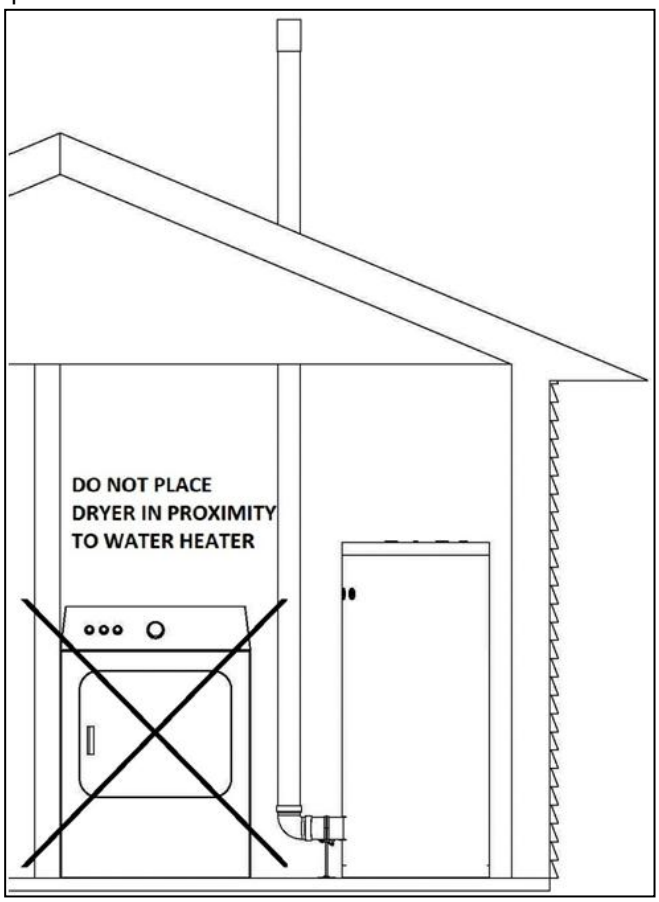


Figure 18 – LP-179-AA

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 (22cm^2/kW) of the total input of all appliances in the space, but not less than 100 square inches (645cm^2).

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.

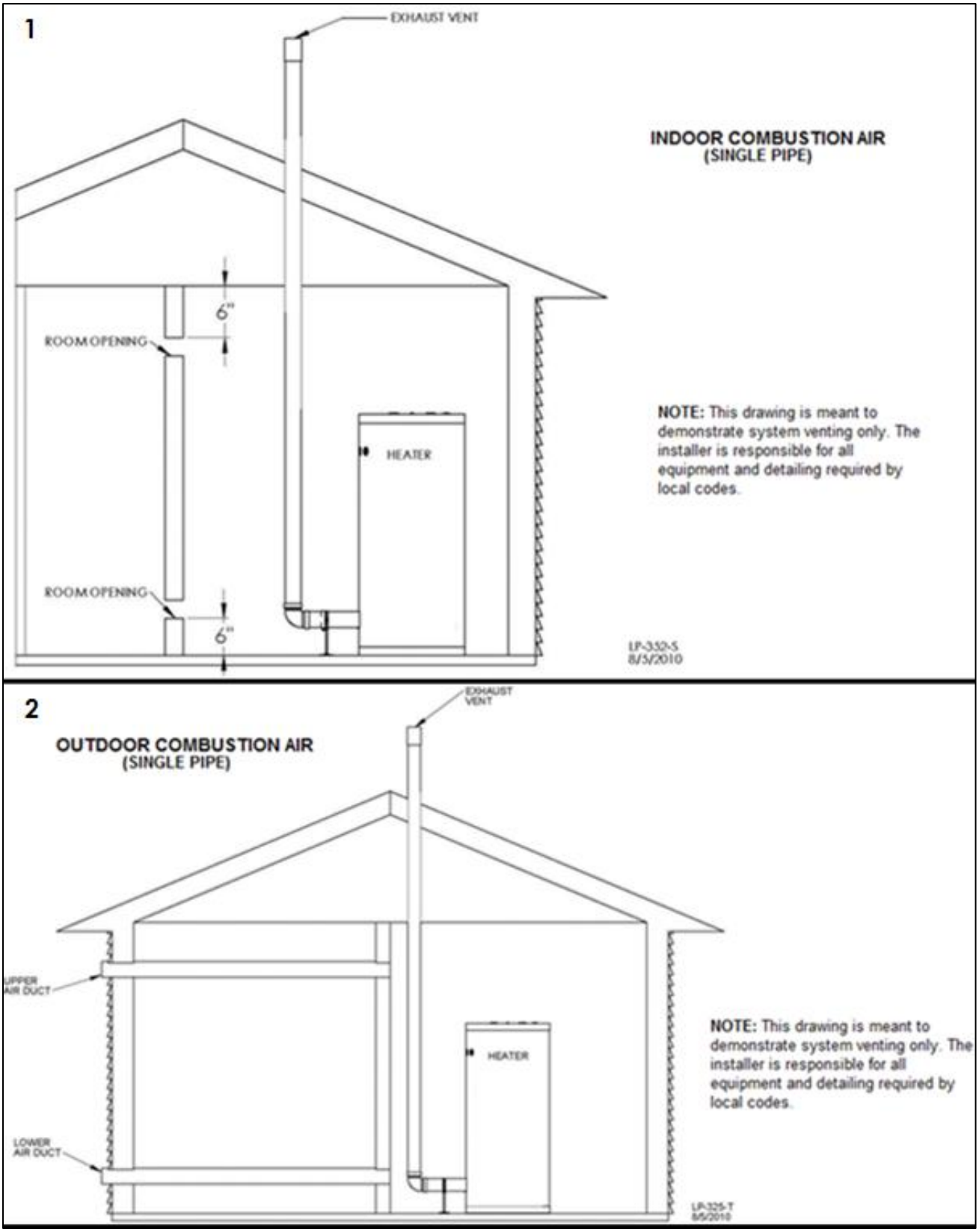


Figure 19 – 1, 19 - 2 NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

H. REMOVING AN EXISTING APPLIANCE

When removing an existing appliance, the follow the steps below with each appliance remaining connected to the common venting system in operation, while other appliances remaining connected to common venting system are not operating.

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 all doors between the space in which the appliance remains connected to the common venting system located 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 common venting system properly vents when tested as outlined, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance 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 in the National Fuel Gas Code, ANSI Z 223.1.

I. CONDENSATE REMOVAL SYSTEM

This condensing high efficiency appliance has a condensate removal system. Condensate is water vapor derived from combustion products, similar to 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 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 (7450P-212).

⚠ CAUTION

The condensate line must remain unobstructed. If allowed to freeze in the line or obstructed in any other manner, condensate can exit from the water appliance tee, resulting in potential water damage to property.

When installing a condensate pump, select one approved for use with condensing appliances and furnaces. The condensate pump should have an overflow switch to prevent property damage from spillage. Condensate from the appliance will be slightly acidic (pH from 3.2 to 4.5). Install a neutralizing filter if required by local codes.

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 a condensate line vacuum lock if a long horizontal run is used. An increase in condensate line diameter may be necessary to allow

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

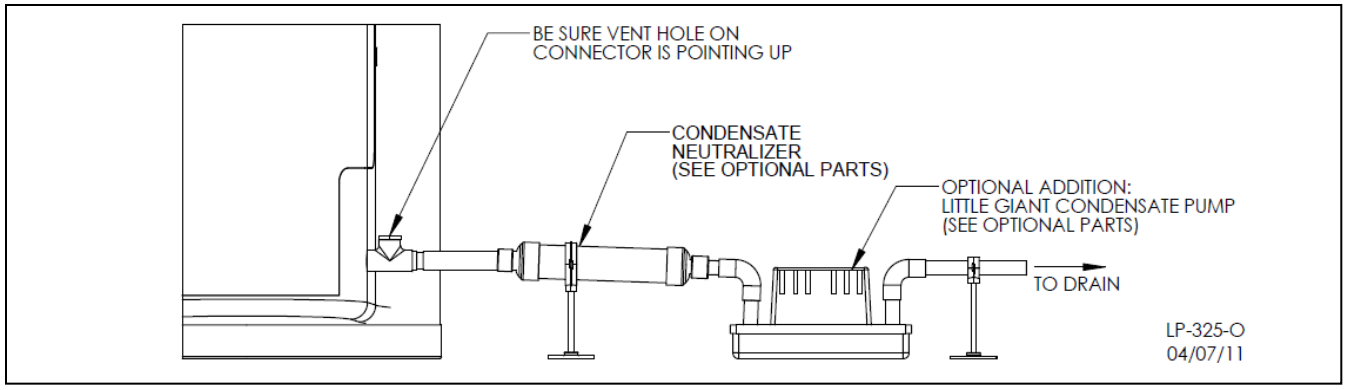


Figure 20 – Condensate Line Detail

NOTES:
1. Condensate line must be pitched at least 1/4" per foot to properly drain. If this cannot be done, or a very long length of condensate hose is used, you must 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. Plastic pipe should be the only material used for the condensate line. Steel, brass, copper, or other materials will be subject to corrosion or deterioration.
3. It is also very important that the condensate line is not exposed to freezing temperatures or any other type of blockage.

PART 7 – FIELD WIRING

⚠ WARNING

ELECTRICAL SHOCK HAZARD – For your safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

CAUTION

Wiring must be N.E.C. Class 1.

If original wiring supplied with the appliance must be replaced, use only TEW 105 ^{o}C wire or equivalent.

Appliance must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 – Latest Edition.

A. INSTALLATION MUST COMPLY WITH:

1. National Electrical Code and any other national, state, provincial, or local codes or regulations.

2. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.

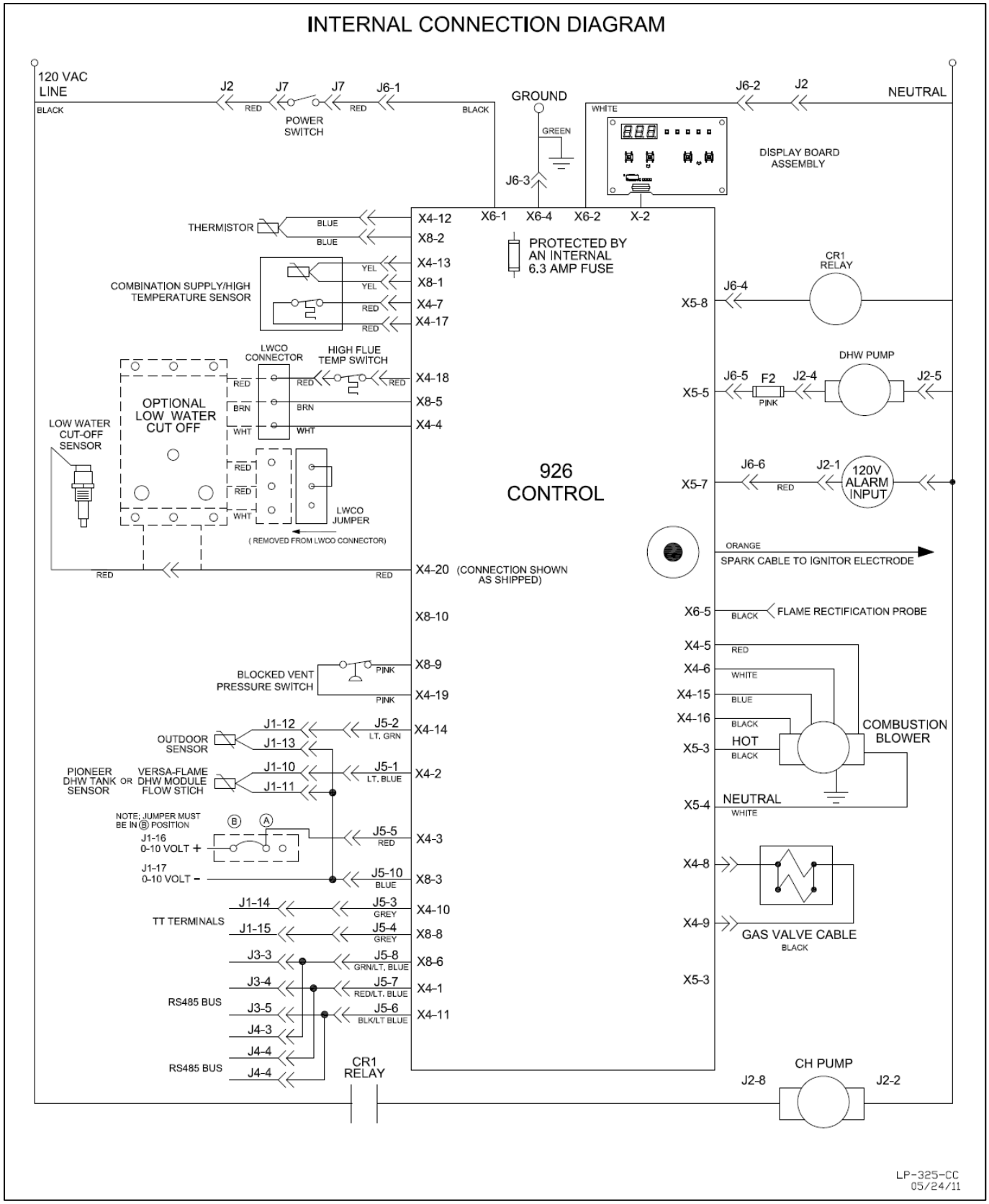


Figure 21 – Internal Wiring Diagram

B. FIELD WIRING

All connections made to the appliance in the field are done on the field connection board located in the cabinet on the top left area of the unit. 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 boiler 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. 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.

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.

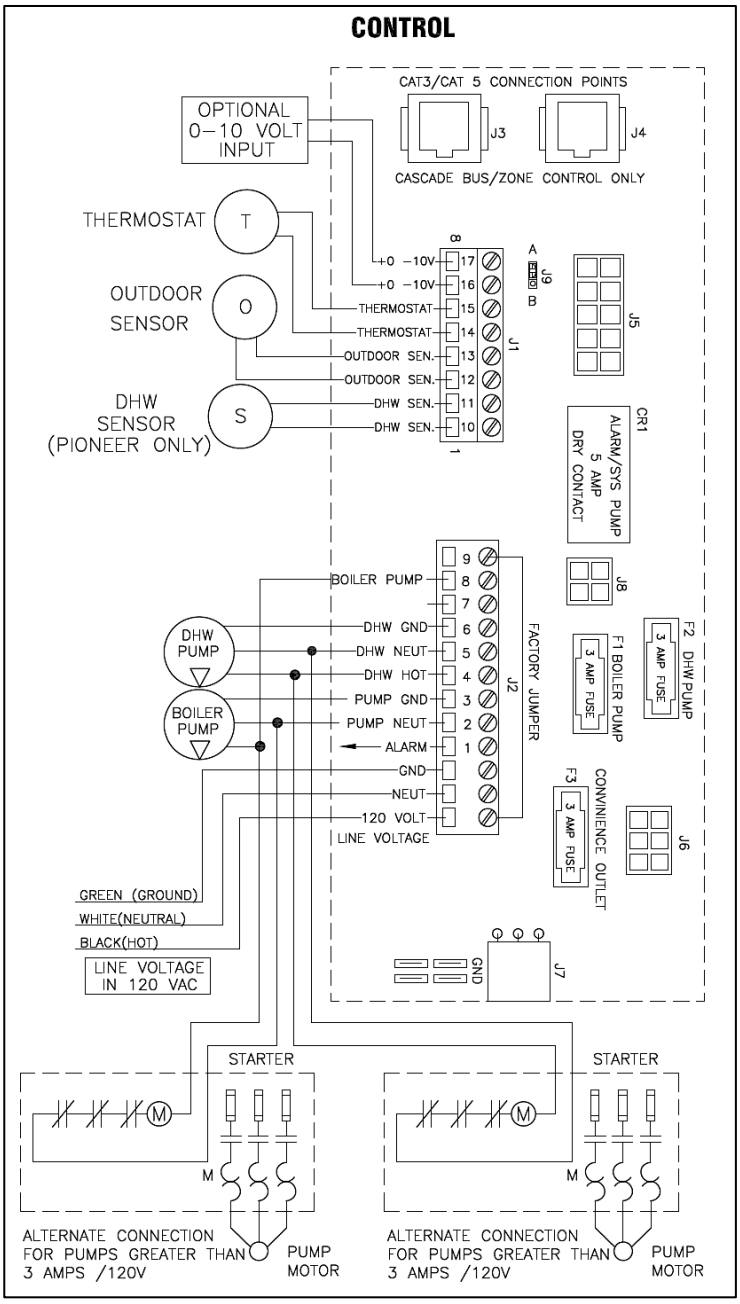


Figure 22 –Control Detail LP-325-P1

C. 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.

D. 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. Caution should be used 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.

E. OUTDOOR SENSOR (OPTIONAL)

1. If an HTP 7250P-319 outdoor sensor is not used in this installation, move on to Section F.

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.

F. INDIRECT SENSOR (OPTIONAL)

1. If an indirect water tank is not used in the installation, move on to Section G.

2. The appliance will operate an indirect fired water tank with either a thermostat type aquastat installed in the indirect tank or an HTP 7250P-325 tank sensor. When a tank sensor is used, the appliance control will automatically detect its presence and a demand for heat from the indirect water tank 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 sensor measures that the indirect water tank temperature is above the set point.

Connect the indirect tank sensor (7250P-325) or mechanical aquastat to the terminals marked 10 and 11 on the field connection board.

⚠ 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.

G. 0-10 VOLT BUILDING CONTROL SIGNAL (OPTIONAL)

1. If a 0-10 volt building management system is not used in the installation, move on to Section H.

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.

H. UL353 LOW WATER CUT-OFF INTERFACE 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.

I. WIRING OF 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).

J. VERSA-FLAME WIRING FOR DHW PRIORITY WITH ZONE VALVES OR CIRCULATORS

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

For proper installation of the appliance with zone valves, follow the wiring instructions below. 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.

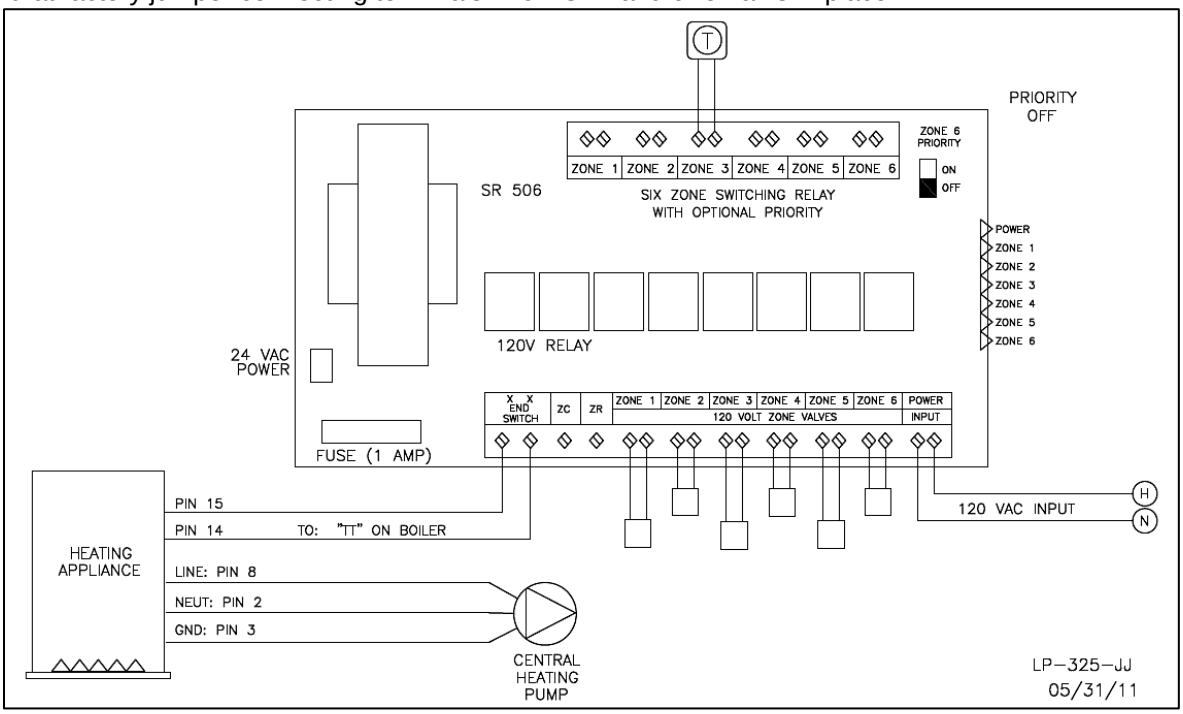


Figure 23 – Wiring with Zone Valves

2. WIRING WITH ZONE CIRCULATOR PUMPS

For proper installation of the appliance with zone circulator pumps, follow the wiring instructions below. 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 relay 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.

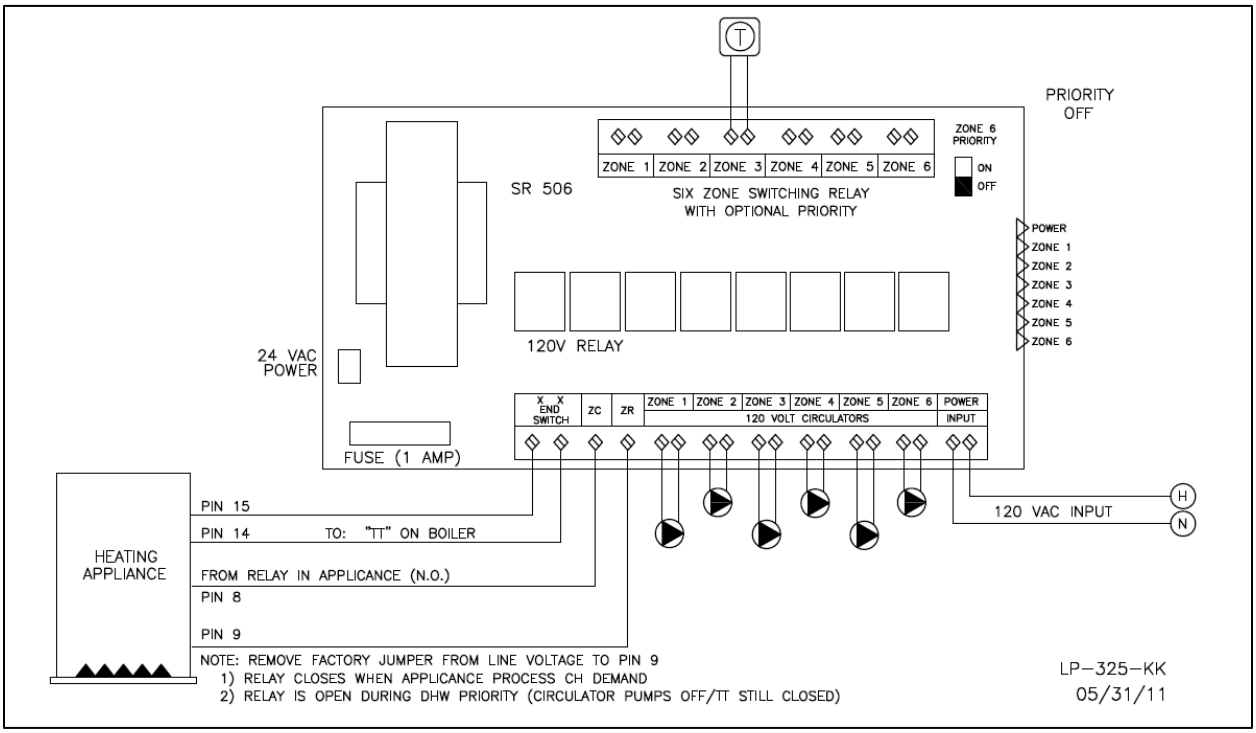


Figure 24 – Wiring with Zone Circulator Pumps

K. WIRING OF CASCADE SYSTEM COMMUNICATION BUS (PIONEER ONLY)

1. Use standard CAT3 or CAT5 computer network patch cables to connect the communication bus between 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 that the maximum length of communication bus cables not exceed 200 feet.

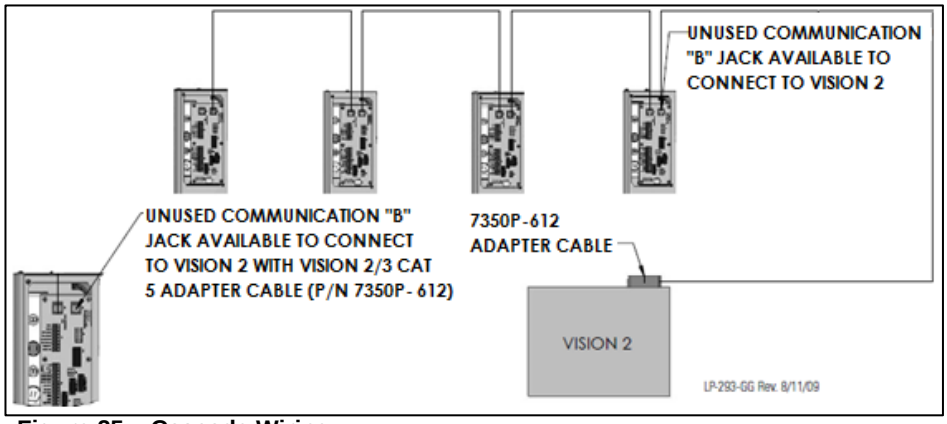


Figure 25 – Cascade Wiring

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 (see Figure 6 – Cascaded System, p. 24), two of the appliances will have single open connection ports.

L. CASCADE MASTER PUMP AND SENSOR WIRING (PIONEER 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.

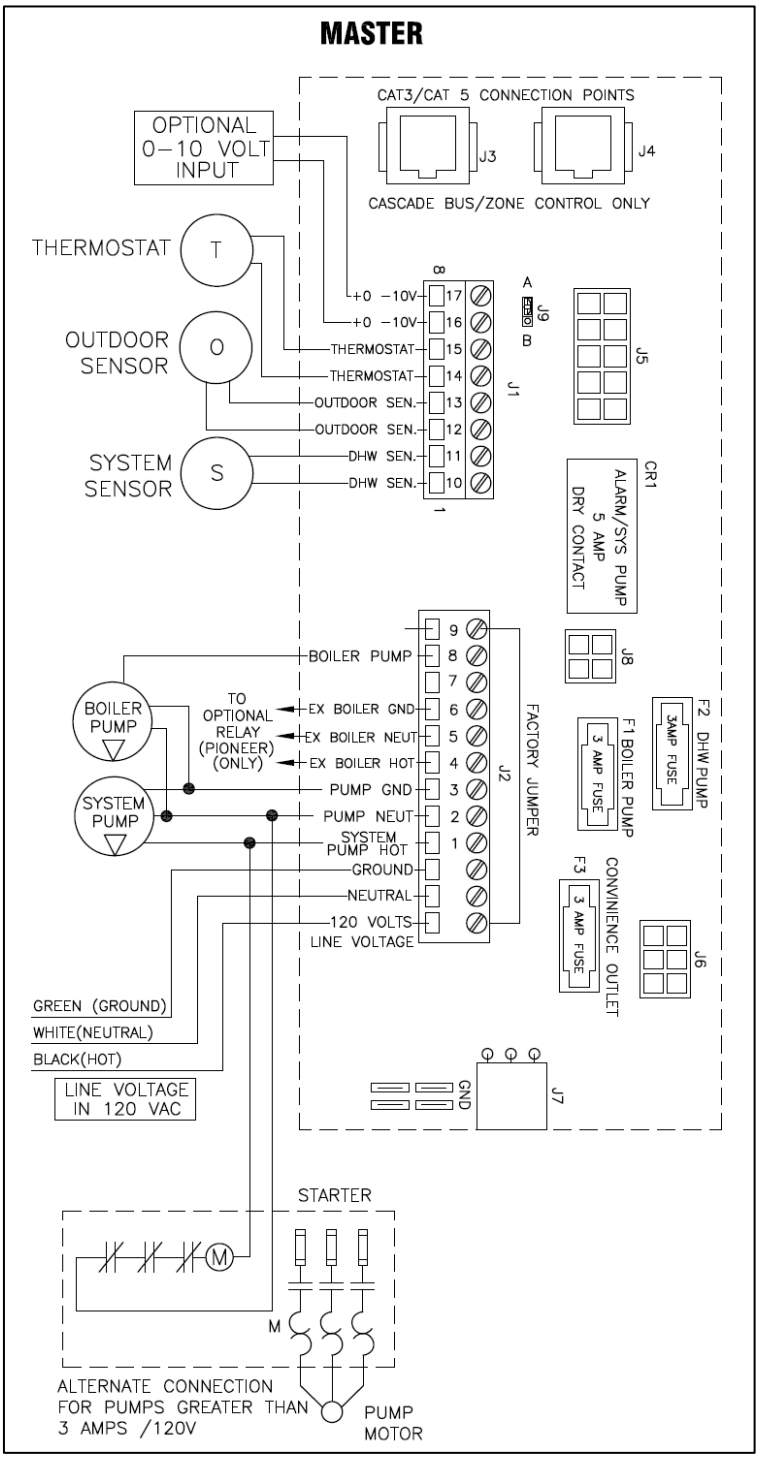


Figure 26 – Cascade Master Detail – LP-325-P3

M. CASCADE FOLLOWER PUMP AND SENSOR WIRING (PIONEER ONLY)

1. Connect the appliance pump to the terminals labeled 8, 2, and 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.

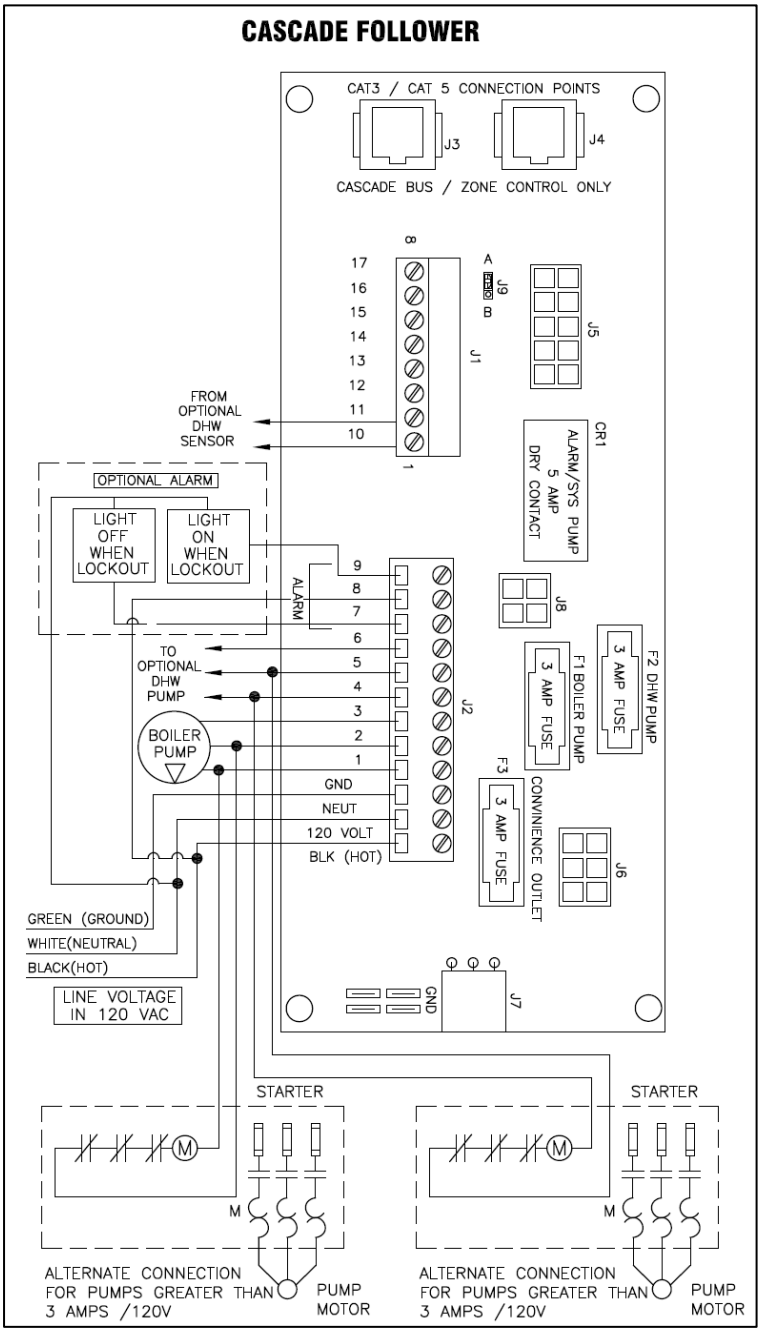


Figure 27 – Cascade Follower Detail – LP-325-P2

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.

⚠ WARNING

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

A. CHECK/CONTROL HYDRONIC WATER CHEMISTRY

Water pH between 6.0 and 8.0

1. Maintain appliance water pH between 6.0 and 8.0. Check with litmus paper or have chemically analyzed by a water treatment company.

2. If the pH differs from above, consult local a water treatment company for treatment required.

Hardness less than 7 grains

Consult local water treatment companies in circumstances of unusually hard water (above 7 grains hardness).

Chlorine concentration less than 200 ppm

1. Filling with chlorinated fresh water should be acceptable since drinking water chlorine levels are typically less than 5 ppm.

2. Do not use the appliance to directly heat swimming pool or spa water.

3. Do not fill appliance or operate with water containing chlorine in excess of 200 ppm.

Clean system to remove sediment

1. You must thoroughly flush the system (without the 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.

B. VERSA-FLAME DHW HEAT PACK WATER QUALITY

CAUTION

Chemical imbalance of your water can cause severe damage to your water heater 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 heater, 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.**

Water Hardness

Water hardness is mainly due to the presence of calcium and magnesium salts dissolved in the water. The concentration of these salts is expressed in mg/L, ppm or grains per gallon, as a measure of relative hardness of water. Grains per gallon is the common reference measurement used in the U.S. water heater industry. Hardness expressed as mg/L or ppm may be divided by 17.1 to convert to grains per gallon. Water may be classified as

very soft, slightly hard, moderately hard, or hard based on its hardness number. The minerals in the water precipitate out when the water is heated and cause accelerated lime and scale accumulation on a heat transfer surface.

If the hardness of the water exceeds the maximum level of 7 grains per gallon, water should be softened to a hardness level no lower than 5 grains per gallon. Water softened as low as 0 to 1 grain per gallon may be under-saturated with respect to calcium carbonate, resulting in water that is aggressive and corrosive.

pH of Water
pH is a measure of relative acidity, neutrality or alkalinity. Dissolved minerals and gases affect water pH. The pH scale ranges from 0 to 14. Water with a pH of 7.0 is considered neutral. Water with a pH lower than 7 is considered acidic. Water pH higher than 7 is considered alkaline. A neutral pH (around 7) is desirable for most potable water applications. **Corrosion damage and heater failures resulting from water pH levels of lower than 6 or higher than 8 ARE NOT covered by the warranty.** The ideal pH range for water used in a storage tank or a water heater system is 7.2 to 7.8.

Total Dissolved Solids
Total Dissolved Solids (TDS) is a measurement of all minerals and solids dissolved in a water sample. The concentration of total dissolved solids is usually expressed in parts per million (ppm).

Water with a high TDS concentration will greatly accelerate lime and scale formation in the hot water system. Most high TDS concentrations precipitate out of the water when heated. This can generate a scale accumulation on the heat transfer surface that will greatly reduce the service life of a water heater. This scale accumulation can also impede the ability of the heat exchanger to transfer heat into the water. A heat exchanger damaged or blocked by lime/scale accumulation must be replaced.

The manufacturer of the water heater has no control of water quality, especially TDS levels in your system. Total dissolved solids in excess of 2,000 ppm will accelerate lime and scale formation in the heat exchanger. Heat exchanger failure due to total dissolved solids in excess of 2,000 ppm is a non-warrantable condition. **Failure of a water heater due to lime scale build up on the heating surface IS NOT covered by the warranty.**

Hardness: 7 grains
Chloride levels: 100
pH levels: 6-8
TDS: 2000

C. FREEZE PROTECTION (WHEN USED)

1. Determine freeze protection fluid quantity following fluid manufacturer instructions. Remember to include expansion tank water content.

2. Local codes may require back flow preventer or disconnect from city water supply.

3. When using freeze protection fluid with automatic fill, install a meter to monitor water makeup. Freeze protection fluid may leak before 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

1. Fill system only after ensuring the water meets the requirements of this manual.

2. Close manual and automatic air vents and appliance drain valve.

3. Fill to 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 25 psig.

4. At initial fill and during appliance startup and testing, check system thoroughly for any leaks. Repair all leaks before proceeding further.

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

E. PURGE AIR FROM THE HYDRONIC SYSTEM (PIONEER AND VERSA-FLAME)

CAUTION

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)

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 intake piping and exhaust piping for signs of deterioration from corrosion, physical damage or sagging. Verify intake and exhaust piping are intact and correctly installed per Venting section and local code.

PART 9 – START-UP PROCEDURE

FOR YOUR OWN SAFETY READ BEFORE OPERATING

⚠ WARNING

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

⚠ WARNING

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.

⚠ 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.

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^{o}F**. If changes are necessary, follow, “Adjusting the Set point”, 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 Part 10 of 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).

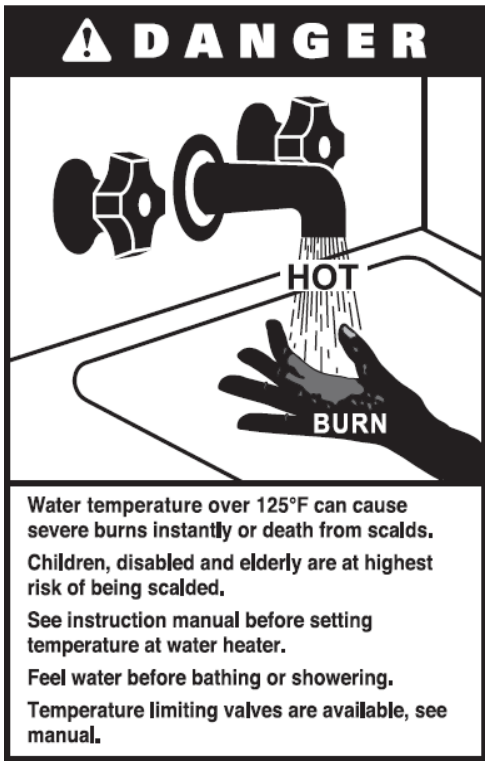
4. To program follower appliance(s):
   a. Make sure there is no demand for heat being supplied to the Master Appliance.
   b. Apply power to the follower appliance you are working on.
   c. Enter the installer Menu following instructions in Part 10 of this manual.
   d. Set parameter 15 to 1 for the 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 SET POINT

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

4. PIONEER: 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. 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. **(*NOT IN USE ON VERSA-FLAME.)**

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 Part 5, Section N of 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. COMBUSTION SYSTEM TEST MODE

This function is intended to simplify the gas valve adjustment if needed. Listed below 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 increase or decrease fan speed by pressing either {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.

COMBUSTION SETTINGS HIGH FIRING RATES and LOW FIRING RATES ON ALL MODELS				
	NATURAL GAS		PROPANE LP	
	Low	High	Low	high
Carbon Monoxide (CO%)	0 – 10 ppm	0 – 20 ppm	0 – 10 ppm	0 – 20 ppm
Carbon Dioxide (CO_2%)	9% - 10 ½%	9% - 10 ½%	9 ½% - 11%	9 ½% - 11%

Table 9

FAN SPEEDS			
BTU	**IGNITION**	**MIN**	**MAX**
100,000	3000	2000	5400
130,000	3000	2000	6950
160,000	3000	2000	6850
199,000	3000	2000	8500

Table 10

F. PURGE AIR FROM SYSTEM

Manually Operating CH/DHW Pumps to Commission System
Disconnect the wires connected to the THERMOSTAT terminals of the field connection board. Apply power to 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 entrapped air. Some good indicators that air is removed include the absence of gurgling noises in the pipes and pump operation becoming very quiet. Press {S1} and {S2} together at any time to return the control to normal operation.

PART 10 – PROGRAMMING THE APPLIANCE

The control allows the installer to set system limits and the heat curve for the Appliance. These system limits should not be changed by the user. It is important to document your settings within this manual after you program 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 decrease 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 then show a |1| alternating to |de|. This first function verifies that the control will function with the SuperStor Indirect Fired Water Appliance.

B. PROGRAM SYSTEM SETTINGS

Next you will have to press the {S3} key to move through each function. To increase or decrease a value, you will need to press either the {S1} key or {S2} key to change the default values. If there is no key action for 1 minute, the display returns to normal operation. Changes are effective immediately but not directly stored until the {S4} key is pressed down for 3 seconds then the new values are stored. Listed below are the varieties of functions the installer can program.

DEFAULT FUNCTION	VALUE	DESCRIPTION
1	|de|	N/A
2	149°F	N/A
3	180°F	PIONEER ONLY: Maximum set point for indirect water appliance temperature (NOTE: Does not apply if used with mechanical control) Range: 95°F to 185°F
4	36°F	N/A
5	7°F	PIONEER ONLY: Change differential in indirect water appliance Range: 1°F to 18°F
6	0 min.	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 to 10 minutes
7	68°F	Warm weather shutoff Range: 41°F to 122°F
8	5°F	Changes the minimum outside design temperature Range: -49°F to 32°F
9	180°F	Changes design supply water temperature based on minimum outside design temperature Range: 77°F to 180°F
10	68°F	Changes maximum outside design temperature for central heating Range: 32°F to 95°F
11	95°F	Changes design supply water temperature based on maximum outside design temperature Range: 32°F to 185°F
12	68°F	Sets the lowest temperature on the appliance for central heating Range: 32°F to 185°F
13	0 min.	Changes central heating circulator post purge time once thermostat is satisfied. Range: 0 to 10 minutes
14	30 min.	Sets maximum run time for the indirect water appliance and minimum run time for central heating. Range: 0 to 60 minutes
15	0	Bus address (0 = zone master 1 – 8 = cascade follower)
16	0	Allows the installer to connect a 0-10 volt directly from 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	Allows the user to control the function of the 0-10 volt input 0 = Appliance Temperature 1 – Appliance Power

18	1	Step Modulation – Regulates burner output in 6 steps in 1 minute intervals. Reduces short cycling. 1 = On 0 = Off
19	180°F	PIONEER: Indirect Appliance Set point (flow) Range = 95°F to 185°F
	150 °F	**VERSA-FLAME: DHW Active Flow Tank Temperature Set point** **Range = 95°F to 185°F**
20	3	N/A
21	0	Allows the installer to set the control to display FOU error. If outdoor sensor is open or shorted, FOU error does not prevent the appliance from running. 0 = No FOU displayed. 1 = FOU displayed if outdoor sensor is shorted or open.
22	100%	Maximum appliance output percentage. Default = 100%. This parameter can be adjusted to lower the maximum appliance output if necessary. Range: 50 – 100%.
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 this 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 parameter is used to set how many power on hours will go by before the priority appliance will be rotated in the cascade system.
25	0	Not applicable, must be at 0.
26	---	System Pump Freeze Protection (Default – Disabled) Use this function on a cascade master to activate the system pump if the outdoor temperature drops below the set value. Use the S/2+ key to increase from the default disabled upward to the desired temperature. Range: (---disabled to 104°F).
27	0	Parameter set on 0 then E03 will be displayed if system sensor fails. Parameter set on 1, no code will be displayed if system sensor fails. 0 = E03, 1 = no code displayed.
28	0	Parameter set on 0 = Frost protection active. Parameter set on 1 = Frost protection disabled.
29	0	Parameter set on 0 = Normal DHW modulation. Parameter set on 1 – DHW will begin modulation on low fire rather than high fire
30	0	Parameter set on 0 = There will be no extra appliance on the Cascade Master. Parameter set on 1 = Extra appliance is connected to the Cascade Master.
31	0	Do not change.
37	0	Allows users to activate 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	**Allows the contractor to activate a low limit storage tank setting. This limit is preset on all Versa- Flame models at 150°F. Raising this low limit will provide greater domestic hot water production.** **1 – Tank Min. ON (VERSA-FLAME DEFAULT)**
49	150°F	Tank Min. Set Point* This parameter sets the minimum temperature inside the storage tank in both cold and warm outdoor temperatures. Range: 32 – 180°F

Table 11

* 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**.

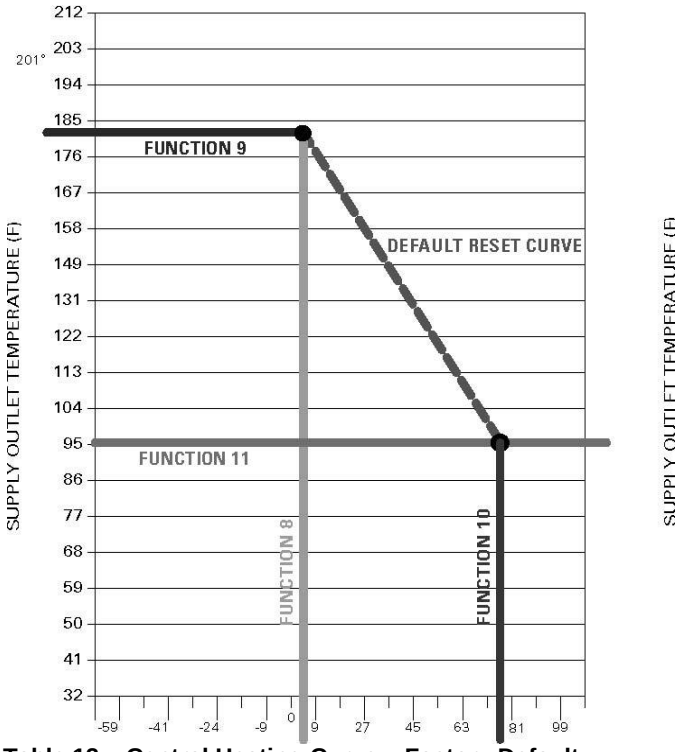


Table 12 – Central Heating Curve – Factory Default

CONTROL PROGRAM REFERENCE CHART		
FUNCTION	**DEFAULT SETTING**	**PROGRAMMED SETTING**
1	de	No change allowed
2	149°F	No change allowed
3	160°F	
4	36°F	No change allowed
5	7°F	
6	0 Min.	
7	68°F	
8	5°F	
9	180°F	
10	68°F	
11	95°F	
12	68°F	
13	0 Min.	
14	30 Min.	
15	0	
16	0	
17	0	
18	1	
19	185°F	
20	3	N/A
21	0	
22	100%	
23	0	
24	24 hrs.	
25	0	
26	---	
27	0	
28	0	
29	0	
30	0	
31	N/A	

Table 13

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.

PART 11 – TROUBLESHOOTING

A. APPLIANCE ERROR CODE

An error code may occur in the installation of the appliance. This condition may lead to a lock out condition of the controller, which will need to be manually reset through the {S4} button. These temporary codes will help the installer correct the problem before going into a lock out condition, which will require a manual reset.

B. APPLIANCE ERROR

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 Table 15.

C. APPLIANCE FAULT

1. When a fault condition occurs the controller will illuminate the red "fault" indication light and display a fault code in the format (Example: F00) on the display module.

2. Note the fault code and refer to Table 16 for an explanation of the fault code along with several suggestions for corrective actions.

3. Press the reset key 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)

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. Check the flow switch. Ensure that 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).

3. Adjust the low limit setting higher.

RESISTANCE TABLE FOR SUPPLY TEMPERATURE SENSOR	
HIGH/LOW TEMP. SENSOR TEMP. (^{o}F)	RESISTANCE (ohms)
32	32550
41	25340
50	19870
59	15700
68	12490
77	10000
86	8059
95	6535
104	5330
113	4372
122	3605
131	2989
140	2490
149	2084
158	1753
167	1481
176	1256
185	1070
194	915
202	786
212	667

Table 14

926 CONTROL BOARD ERROR CODES		
CODE	**DESCRIPTION**	**CORRECTIVE ACTION**
Fou	Outdoor sensor shorted or temperature less than -40^{o}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	1. Check the flue vent to be sure it is not blocked or damaged. 2. Check the 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	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	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.

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.

Table 15

926 Control Board FAULT		
Codes	**Description**	**Remedy**
F00	High temperature switch limit exceeded 194°F.	1. Try reset. If F00 repeats, create a demand for hot water. **(DANGER: Use caution to prevent burn 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 did reset successfully, let the appliance run and go into the status menu to check the upper and lower temperature sensor. If either reading displayed 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 RESET 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 begins to flash 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.
F10	Loss of flame signal – The appliance will relight 4 times before the control goes into this lockout condition. Will reset in 1 hour.	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.	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.	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 16 - NOTE: If you replace a part to remedy a fault, it is recommended that you cycle the unit at least three or four times to assure the fault has been resolved.

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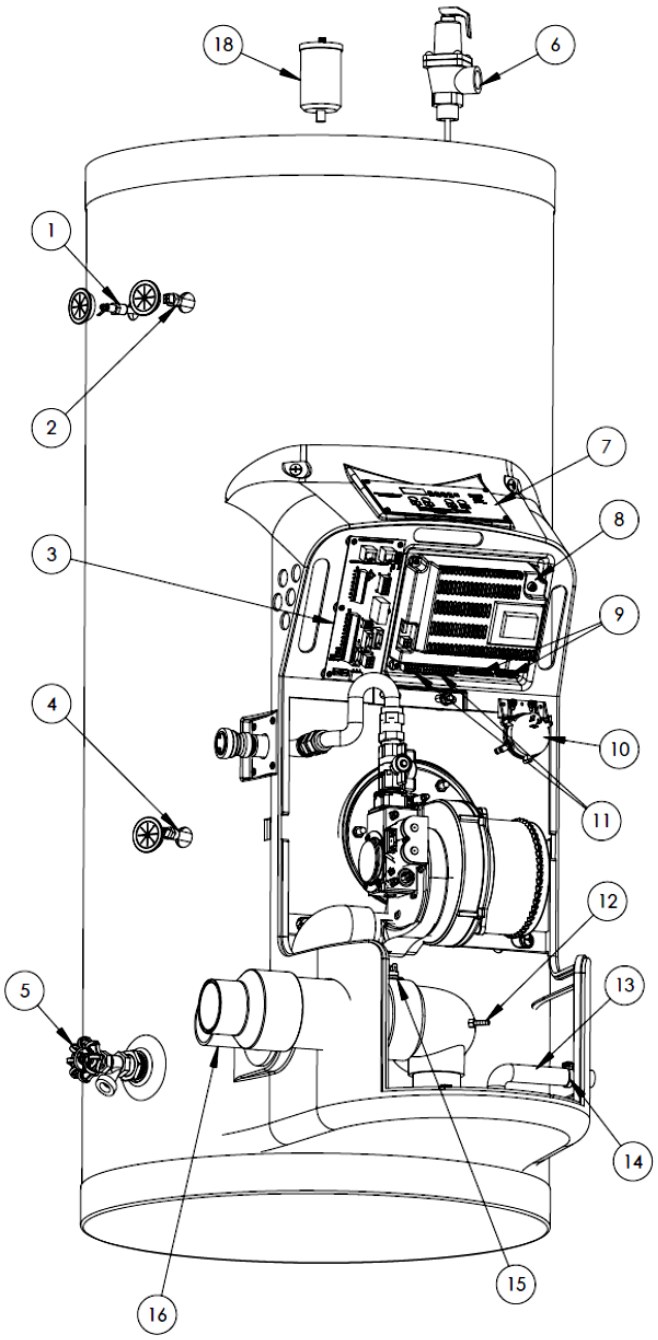
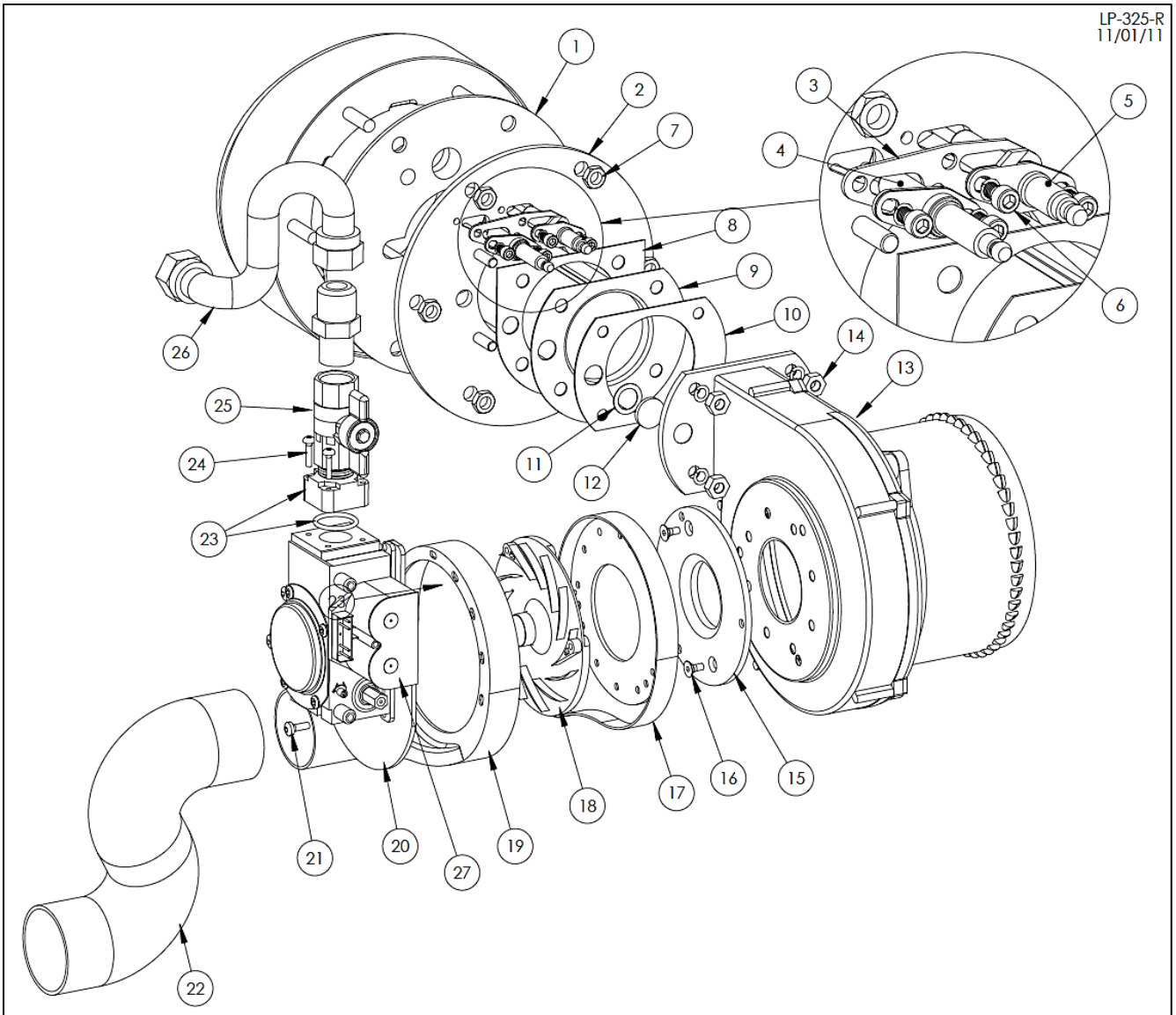


Item #	Description	Replacement Part #
1	LOW WATER CUT-OFF SENSOR	7000P-852-1
2	COMBINATION SUPPLY/HIGH TEMP SENSOR	7450P-192
3	CUSTOMER CONNECTION BOARD	7350P-070
4	THERMISTOR	7100P-005
5	3/4" NPT DRAIN VALVE	7100P-278
6	3/4" NPT - 30 PSI RELIEF VALVE	7100P-279
7	CONTROL DISPLAY	7350P-009
8	CONTROL BOARD	7450P-122
9	120 VOLT WIRE HARNESS (LOCATION SHOWN)	7100P-343
10	BLOCKED VENT PRESSURE SWITCH	7250P-150
11	LOW VOLTAGE WIRING HARNESS (LOCATION SHOWN)	7100P-280
12	S.S. HOSE BARB	7250P-154
13	CONDENSATE HOSE	7100P-043
14	HOSE CLAMP - CONDENSATE HOSE	7250P-215
15	HIGH FLUE TEMP SWITCH	VS210
16	2" COUPLING (w/NUT) - AIR LINET (100/130K BTU)	7100P-114
	3" COUPLING (w/NUT) AIR INLET (160/199K BTU)	7100P-103
17	SENSOR WIRE HARNESS KIT (NOT SHOWN)	7100P-282
18	AIR VENT	7450P-197

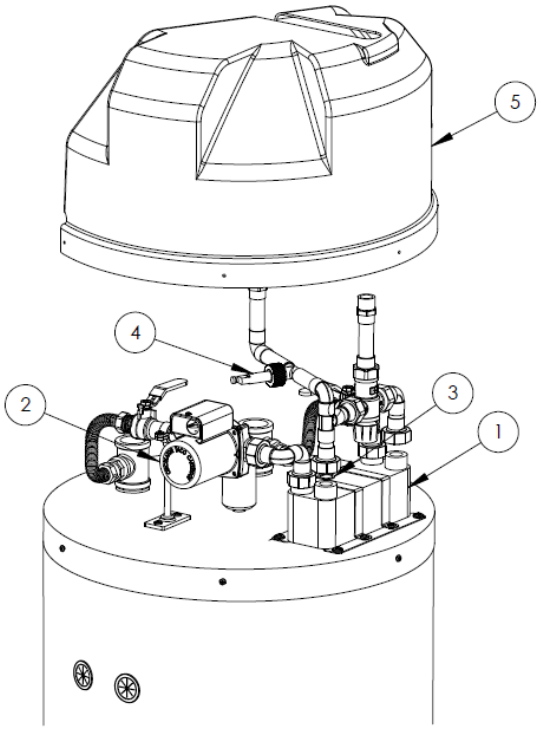
Figure 28 – Pioneer and Versa-Flame



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-094
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-096
	BURNER - 160-199K BTU	7100P-095
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

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 29 – Pioneer and Versa-Flame



ITEM #	Description	Replacement Part #
1	BRAZED PLATE EXCHANGER	7100P-132
2	TACO PUMP	8600P-028
3	WASHERS (10 PK)	8600P-044
4	FLOW SWITCH	7100P-290
5	VERSA-FLAME COVER	7100P-298

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Figure 30 – DHW Module - *Versa-Flame ONLY

PART 12 – MAINTENANCE

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.

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 they are properly supported.				
Vent	Check condition of all vent pipes and joints. Check for any obstructions on intake and exhaust termination points. Check clearances (see Venting Section for further details).				
Gas	Check Gas piping, test for leaks and signs of aging. Make sure all pipes are properly supported.				
SYSTEM					
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				
Temperatures	Verify programmed temperature settings				
ELECTRICAL					
Connections	Check wire connections. Make sure they 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					
Combustion Chamber	Check burner tube. If dirty, clean with compressed air. Clean chamber with vacuum.				
Spark Electrode	Clean. Set gap at ¼". For natural, ¼" between probes. For LP, a ¼" gap from single probe to burner.				
Flame Probe	Clean. Check ionization in uA (d7 on status menu in Start-up Procedures). Record high fire and low fire.				
CONDENSATE					
Neutralizer	Check condensate neutralizer. Replace if necessary.				
Condensate hose	Disconnect condensate hose. Clean out dirt. Fill with water to level of outlet and re-install. (NOTE: Verify the flow of condensate, making sure that the hose is properly connected during final inspection.)				
GAS					
Pressure	Measure incoming gas pressure (3.5" to 14" W.C.)				
Pressure Drop	Measure drop in pressure on light off (no more than 1" W.C.)				
Check gas pipe for leaks	Check piping for leaks. Verify that all are properly supported.				
COMBUSTION					
CO/CO2 Levels	Check CO and CO2 levels in Exhaust (See Start-up Procedures for ranges). Record at high and low fire.				
SAFETIES					
ECO (Energy Cut Out / Low cut-off)	Check continuity on Flue and Water ECO.				
Thermistors	Check wiring. Verify through ohms reading.				
FINAL INSPECTION					
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 17 - *Continue annual maintenance beyond the 4th year as required.

***VERSA-FLAME DHW MODULE –** ONCE ANNUALLY - In areas with hard water, 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.

ADDITIONAL INSTALLATION REQUIREMENTS FOR THE COMMONWEALTH OF MASSACHUSETTS

In the Commonwealth of Massachusetts, the installer or service agent shall be a plumber or gas fitter licensed by the Commonwealth.

When installed in the Commonwealth of Massachusetts or where applicable state codes may apply; the unit shall be installed with a CO detector per the requirements listed below.

5.08: Modifications to NFPA-54, Chapter 10

(1) Revise NFPA-54 section 10.5.4.2 by adding a second exception as follows:

Existing chimneys shall be permitted to have their use continued when a gas conversion burner is installed, and shall be equipped with a manually reset device that will automatically shut off the gas to the burner in the event of a sustained back-draft.

(2) Revise 10.8.3 by adding the following additional requirements:

(a) For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. INSTALLATION OF CARBON MONOXIDE DETECTORS. At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter 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 equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. 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 side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision 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.

2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "GAS VENT DIRECTLY BELOW, KEEP CLEAR OF ALL OBSTRUCTIONS".

4. INSPECTION. The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08 (2)(a) 1 through 4.

(b) EXEMPTIONS: the following equipment is exempt from 248 CMR 5.08 (2)(a) 1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required to be Vented" in the most current edition of NFPA 54 as adopted by the Board; and

2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(c) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED. When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components; and

2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED. When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer:

1. The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and

2. The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

(e) A copy of all installation instructions for all Product Approval side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

MAINTENANCE NOTES

HTP 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:	
Installation Address:	
Date of Installation:	
Installer's Code/Name:	
Product Serial Number(s):	
Comments:	
Installer's Phone Number:	
Signed by Installer:	
Signed by Customer:	

IMPORTANT:

Customer: Please only sign after the installer has reviewed the installation, safety, proper operation and maintenance of the system. In the case that the system has any problems, please call the installer. If you are unable to make contact, please contact your HTP Sales Representative.

Distributor/Dealer: Please insert contact details.