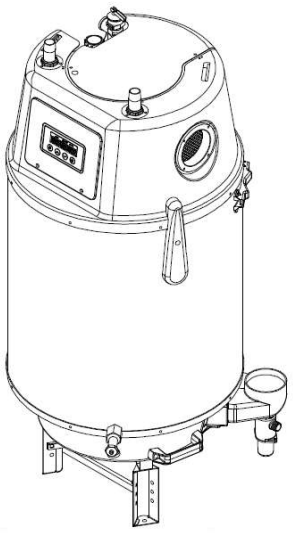
Residential Gas Hybrid Water Heater



INSTALLATION

START-UP

MAINTENANCE

PARTS

WGRGH20NG75F / WGRGH20NG76F / WGRGH20NG100F

WGRGHNG75F / WGRGHNG76F / WGRGHNG100F Models*

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

NOTICE: *Westinghouse 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.

The surfaces of these products contacted by consumable water contain less than 0.25% lead by weight, as required by the Safe Drinking Water Act, Section 1417.

⚠ WARNING

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

- Do not store or use 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.

Improper installation, adjustment, alteration, service, or maintenance can cause injury, property damage, or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency, or gas supplier.

California Proposition 65 Warning: This product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

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 touch any electric switch; do not use any phone in your building.
- Do not try to light any appliance.
- 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.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified 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 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 on this label.
2. Set the thermostat to lowest setting.
(Never use Water Heater unless it is completely filled with water.)
3. Turn OFF electrical power supply to the Water Heater.
4. Don't try to light the burner by hand.
5. Turn gas shut-off valve clockwise ↷ to "OFF" position. Do not force.
6. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow step "B" above on this label.
If you don't smell gas, go to the next step.
7. Turn manual gas shut-off valve countclockwise ↶ to "ON" position.
8. Turn ON electrical power to the appliance.
9. Wait until default temperature (125°F) is displayed. Set desired water temperature. Turn on hot water faucet.
10. Set thermostat to desired setting.
11. 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. Turn manual gas shutoff valve to "OFF".

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

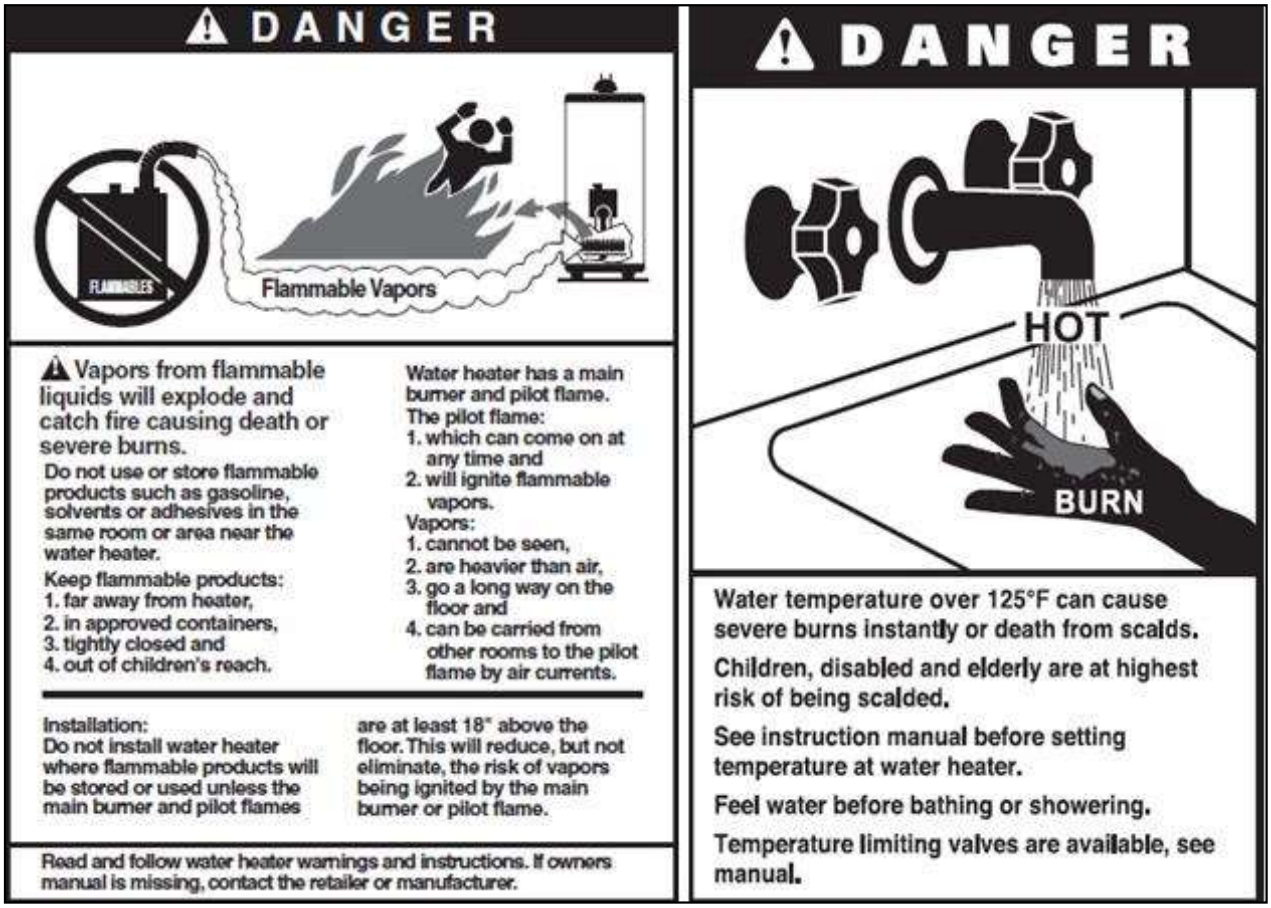
CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

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

NOTICE	*SAFETY INSTRUCTIONS*
NOTICE is used to address practices not related to personal injury.	**SAFETY INSTRUCTIONS** (or equivalent) signs indicate specific safety related instructions or procedures.

NOTE: Contains additional information important to a procedure.



FOREWORD

This manual is intended to be used in conjunction with other literature provided with the water heater. 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 Authority Having Jurisdiction, local code authorities, and utility companies which pertain to this type of water heating equipment.

Authority Having Jurisdiction (AHJ) – The Authority Having Jurisdiction may be a federal, state, local government, or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department or health department, building official or electrical inspector, or *others having statutory authority*. In some circumstances, the property owner or his/her agent assumes the role, and at government installations, the commanding officer or departmental official may be the AHJ.

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

FOR THE INSTALLER

⚠ DANGER

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 substantial property damage, severe personal injury, or death.

This water heater must be installed by qualified and licensed personnel. The installer should be guided by the instructions furnished with the water heater, 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.

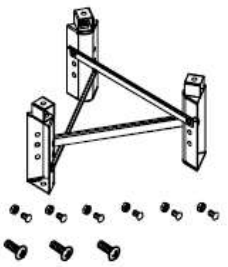
Code for the installation of Heat Producing Appliances (latest version), from American Insurance Association, 85 John Street, New York, NY 11038.

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

NOTE: The gas manifold and controls met safe lighting and other performance criteria when the water heater underwent tests specified in ANSI Z21.10.1 – latest edition for 75F models, and ANSI Z21.10.3 – latest edition for 76F and 100F models.

TABLE OF CONTENTS

PART 1 – ITEMS SHIPPED WITH THE WATER HEATER

ITEM	DESCRIPTION	QUANTITY
Hybrid Water Heater		1
User and Installation Manuals		1 Each
3” Mesh Screens		2
¾” X ½” Gas Adaptor		1
Drain Valve Assembly		1
Propane Gas Conversion Kit		1
3” Pipe Clamp	 Philips Head Screw M5x12 : 2pcs	1
Condensate Trap Assembly		1
Water Heater Stand Assembly	 Philips Head Screw : 5/16”x18 : 6pcs Nut : 5/16”x6pcs Philips Head Screw : M8x12 : 3pcs	1

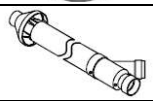
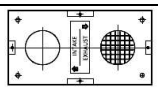
OPTIONAL PARTS (Not Included)		
3” Power Vent Exhaust Termination Part # 8100P-029		1
3” Exhaust Extension Adapter w/ Combustion Test Port Part # 8100P-030		1
Concentric Vent Termination Kit 2” – Part # KGAVT0501CVT 3” – Part # KGAVT0601CVT		1
Condensate Neutralizer Kit Part # 7450P-212		1
Stainless Steel Vent Termination Kit 2” – Part # V500 3” – Part # V1000		1
2” Mesh Screens		2
Temperature and Pressure Relief Valve Part # - TP1700		1
Heating Application Kit 8100P-049	Required for heating application (air handler) use.	1

Table 1 – Items Included with the Water Heater

PART 2 – SAFETY REGULATIONS

A. OPERATION AND INSTALLATION WARNINGS

To avoid serious injury or death, read, understand, and follow all the precautions listed here.

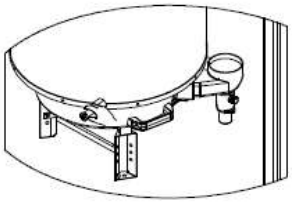
⚠ DANGER
Vapors from flammable liquids will explode and can cause a fire, resulting in personal injury or death. The water heater has a burner that can come on at any time and ignite vapors. DO NOT use or store flammable liquids around the water heater.
Improper venting can cause a build-up of carbon monoxide. Breathing carbon monoxide can result in brain damage or death. A concentration of carbon monoxide as small as .04% (400 parts per million) in the air can be fatal. DO NOT operate the water heater unless it is properly vented to the outside and has an adequate fresh air supply for safe operation. Inspect the exterior exhaust gas outlet port and fresh air inlet port on a regular basis to ensure they are functioning properly.
The internal computer controlled regulator is preset by the manufacturer and should not be adjusted by the installer.
⚠ WARNING
This water heater must be installed by a licensed plumber, licensed gas fitter, and/or professional service technician. Improper installation and/or operation can cause a potentially hazardous situation, which, if not avoided, could result in serious injury or death, and will void the warranty.
California Proposition 65 lists chemical substances known to the state to cause cancer, birth defects, serious illness, reproductive harm, or death. This product may contain such substances, be their origin from fuel combustion (gas, oil) or components of the product itself.
Westinghouse cannot anticipate every circumstance that might involve a potential hazard. Each installation has its own specialized characteristics, requirements, and possible hazards. Therefore, all possible incidents are not included in these warnings. Proper and safe installation, operation, and service are the responsibility of the professional service technician.
Proper care of the water heater is the user’s responsibility. Ensure the user carefully reads and understands the User’s Information Manual before operating and maintaining the water heater.
Make sure the user knows the location of the gas shut-off valve and how to operate it. Immediately close the gas shut-off valve if the water heater is subjected to fire, overheating, flood, physical damage, or any other damaging condition that might affect the operation of the unit. Have the water heater checked by a qualified technician before resuming operation.
Do not power up the unit unless the gas and water supply valves are fully opened. Make sure the fresh air intake port and exhaust gas port are open and functional.
No one but a professional service technician should attempt to install, service, or repair this water heater. There are no serviceable parts which can be changed by the user / owner. User / Owner: Contact the original professional service technician if the water heater needs repair or maintenance. If the original technician is unavailable, ask your gas supplier for a list of qualified service providers.
Keep the area around the water heater clean and free of all materials that can burn. DO NOT store or place gasoline, oils, spray paint, or other flammable products near the water heater. DO NOT use spray paint, hair spray, or any other flammable spray near the water heater or near the exterior fresh air intake port. DO NOT place any items in or around the exterior exhaust gas outlet port and/or fresh air inlet port that could restrict or block the flow in or out of the vent system.

⚠ WARNING
DO NOT store or place newspapers, laundry, or other combustible items near the water heater or the exterior exhaust gas outlet and/or fresh air inlet port.
The owner should inspect the system monthly for damage, water stains, signs of rust, corrosion, and exhaust vent and air intake blockage. If inspection of the unit shows signs of damage, the water heater should be shut off until the problem is repaired by a qualified technician.
After installation, all water heater safety devices should be tested.
This water heater is certified for indoor installations only. The water heater consists of gas ignition system components which must be protected from water (dripping, spraying, etc.) during operation and service. Carefully consider installation location and the placement of critical components (circulators, condensate neutralizers, etc.) before installing the water heater.
DO NOT allow children to operate this unit. DO NOT use this unit if it does not appear to be operating correctly. A qualified technician should service and inspect the water heater annually.
The water heater temperature is factory set to 120°F (49°C). To avoid scalding, always check the temperature of the hot water before bathing, showering, washing, etc. DO NOT adjust the water temperature while the water heater is being used by other persons.

NOTICE
If the water heater is exposed to the following, do not operate until all corrective steps have been made by a qualified service technician: 1. FIRE 2. DAMAGE 3. WATER
DO NOT alter or modify the water heater or water heater controls. This can be dangerous and WILL VOID the warranty.
This water heater is equipped with a three prong plug. It should only be plugged directly into a properly grounded three prong receptacle. DO NOT remove the ground plug from the plug. Ensure the water heater can be shut off at an outside source (such as a fuse box or circuit breaker).
Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.
This water heater provides an overheat shutdown limit. In the event the water heater water exceeds the set point of the control limit, the cutoff will trip and the water heater will shut down. Certain local codes require additional temperature limits. In addition, certain types of systems may operate at temperatures below the minimum set point of the limit provided with the water heater. Contact Westinghouse for additional overheat controls.

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

⚠ WARNING
DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN SUBMERGED IN WATER. Immediately call a qualified service technician. The water heater MUST BE replaced if it has been submerged. Attempting to operate an water heater that has been submerged could create numerous harmful conditions, such as a potential gas leakage causing a fire and/or explosion, or the release of mold, bacteria, or other harmful particulates into the air. Operating a previously submerged water heater could result in property damage, severe personal injury, or death. **NOTE:** Water heater damage due to flood or submersion is considered an Act of God, and IS NOT covered under product warranty.
Be sure to disconnect electrical power before opening water heater cabinet or performing service. Label all wires while performing service to ensure proper re-wiring of the water heater. Wiring errors can cause improper or dangerous operation. Failure to do so could result in an electrical shock, improper water heater operation, property damage, serious personal injury, or death.

CAUTION	
	When installing the drain valve take care not to overtighten it. Doing so could result in damage to the water heater and property damage due to leaks. Such damages ARE NOT covered by warranty.

B. IMPROPER COMBUSTION

⚠ WARNING
Do not obstruct the flow of combustion and ventilating air. Adequate air must be provided for safe operation. Failure to keep the exhaust vent and intake pipe clear of ice, snow, or other debris could result in property damage, serious personal injury, or death.

C. GAS

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

D. WHEN SERVICING THE WATER HEATER

- To avoid electric shock, disconnect electrical supply before performing maintenance.
- To avoid severe burns, allow water heater to cool.
- Do not use petroleum-based cleaning or sealing compounds in a water heater system. Gaskets and seals in the system may be damaged, possibly resulting in substantial property damage.
- Do not use “homemade cures” or “patent medicines”. Substantial property damage, damage to water heater, and/or serious personal injury may result.
- Always verify proper operation after servicing the water heater.

E. WATER CHEMISTRY

CAUTION

Chemical imbalance of the water supply may affect efficiency and cause severe damage to the appliance and associated equipment. Water quality must be professionally analyzed to determine whether it is necessary to treat the water. Various solutions are available to adjust water quality. Adverse water quality will affect the reliability of the system. In addition, operating temperatures above 135°F will accelerate the build-up of lime scale and possibly shorten appliance service life. Failure of an appliance due to lime scale build-up, low pH, or other chemical imbalance IS NOT covered by the warranty.

The water must be potable, free of corrosive chemicals, sand, dirt, and other contaminates. It is up to the installer to ensure the water does not contain corrosive chemicals or elements that can damage the heat exchanger. Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3) as shown in the table below. If the water contains contaminants higher than outlined by the EPA, water treatment is recommended and additional, more frequent maintenance may be required.

If you suspect that your water is contaminated in any way, discontinue use of the appliance and contact an authorized technician or licensed professional.

Contaminant	Maximum Allowable Level	Contaminant	Maximum Allowable Level
Total Hardness (Residential Use - Below 140°F water temperature)	200 mg/l (12 grains/gallon)	Manganese	0.05 mg/l or PPM
Total Hardness (Commercial Use - 140°F and above water temperature)	120 mg/l (7 grains/gallon)	pH	6.5-8.5
Aluminum	0.05 to 0.2 mg/l or PPM	Sulfate	205 mg/l or PPM
Chloride	100 mg/l or PPM	Total Dissolved Solids (TDS)	500 mg/l or PPM
Copper	1 mg/l or PPM	Zinc	5 mg/l or PPM
Iron	0.3 mg/l or PPM	Dissolved Carbon Dioxide (CO2)	15 mg/l or PPM

Table 2 – Water Chemistry Specifications

F. FREEZE PROTECTION

CAUTION

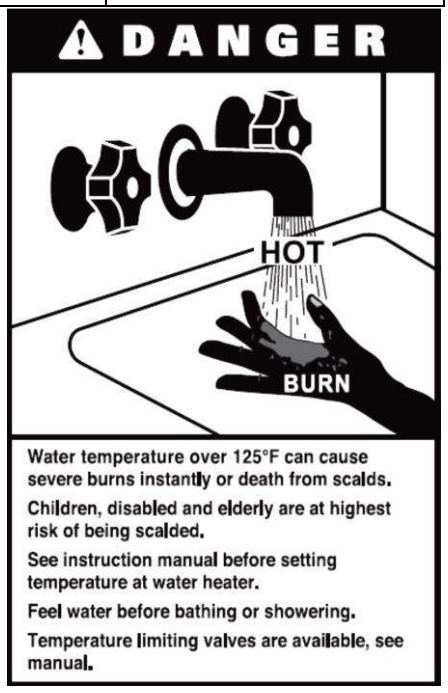
Consider water heater piping and installation when determining water heater location.

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

G. 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 3 – Time and Temperature Relationship in Scalds



This heater can deliver scalding water. Be careful whenever using hot water to avoid scalding injury. Certain appliances, such as dishwashers and automatic clothes washers may require increased water temperature. By setting

the thermostat on this heater to obtain the increased water temperature required by these appliances, you may create the potential for scald injury.

To protect against injury, 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.

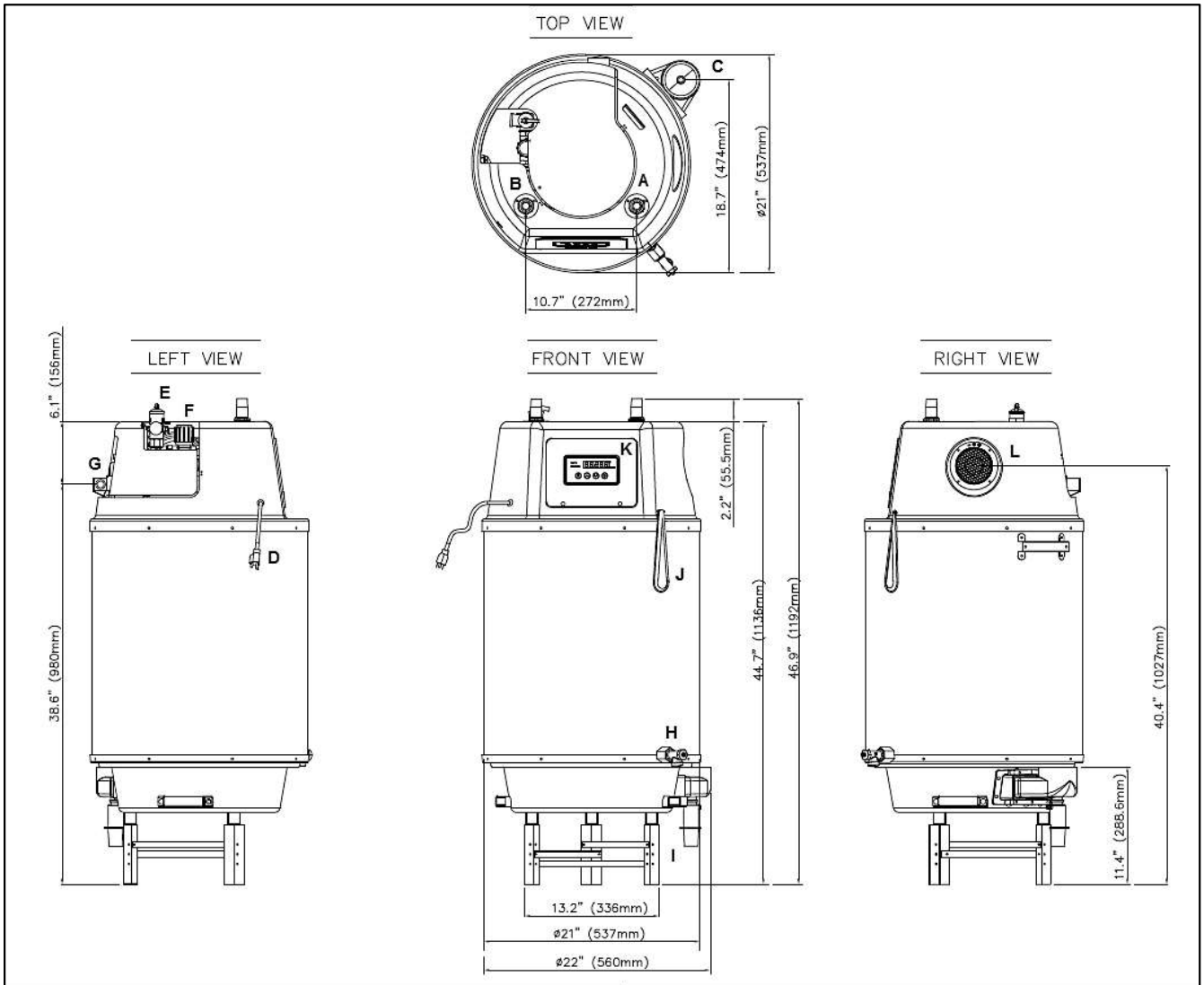
Table 3 details the relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.

PART 3 – TECHNICAL SPECIFICATIONS

MODEL		75F	76F	100F
Energy Factor (*) / Uniform Energy Factor (*) / Thermal Efficiency (*)		0.83 EF / 0.88 UEF	96 TE	95 TE
Installation		Indoor, Floor Mount, Fully Condensing		
Minimum to Maximum Input (Btu/Hr)		37,500 to 75,000	37,500 to 76,000	50,000 to 100,000
Condensate pH Level		4 pH		
Flue System		Sealed Combustion Direct Vent, Power Vent		
3" Vent Run		100 feet, 6 elbows max, 5 ft deduction per 90° elbow Schedule 40 PVC, CPVC, PP		
2" Vent Run		50 feet, 6 elbows max, 8 ft deduction per 90° elbow Schedule 40 PVC, CPVC, PP		
Weight (lbs)		110		
Gas Type		Pre-set for NG / LP Conversion Kit Included		
Orifice Size	NG	3.9 mm (0.154")		5.7 mm (0.224")
	LP	2.8 mm (0.11")		3.5 mm (0.137")
Gas Supply Pressure	NG	3.5" to 14" WC		
	LP			
Manifold Pressure	Min (3")	NG: -0.15" / LP: -0.10" WC		
	Max (3")	NG: -0.15" / LP: -0.10" WC		
Power Supply	Main Supply	Dedicated 120VAC 60 Hz with 3 Pronged Power Cord		
	Maximum Power Consumption	45W		53W
Ignition System		Direct Electronic Spark Ignition with Automatic Flame Sensing		
Burner System		Single Orifice Premixed Fuel Injection Metal Fiber Premix Burner		
Gas Valve System		Dual Stage Air Ratio Negative Pressure		
Minimum Flow Rate		Zero activation with 20 gallons capacity tank		
Internal Pipe Material		Copper		
Dimensions		21" Diameter – 47" Height		
Reserve Tank		20 Gallons		
First Hour Rating at 90°F Rise		107 Gallons		130 Gallons
Water Pressure		Min 12 – Max 150 PSI		
DHW Setpoint Temperature Range		Mechanical Tempering Valve from 70°F – 145°F (21°C – 63°C) Factory Preset to 120°F (48.9°C)		
Activation Sensing		Tank Temperature		
Temperature Control		Thermistor Starts with Heating Cycle		
Connection Sizes	Cold Water Inlet / Hot Water Outlet	¾" Male NPT		
	Gas Inlet	½", ¾" Female NPT		
Materials	Cabinet	Cold Rolled Carbon Steel		
	Heat Exchanger	Stainless Steel		
Safety Devices		T&P Valve, Flame Rod, Remaining Flame Detection, Fan RPM Check, Vent Blockage Detection, ECO Burner Plate (305°F), ECO Hot Water Cutoff (194°F), 1 x 5A Fuse, Intake Blockage Detection		

Table 4 – Technical Specifications

*Maximum manifold pressure is indicated on the rating label on right side of the unit.
*Independent DOE tested.



DESCRIPTION	DESCRIPTION
A – Cold Water Inlet 3/4" Male NPT	G – Gas Connection 1/2" or 3/4" Female NPT
B – Hot Water Outlet 3/4" Male NPT	H – Drain Valve
C – 3" Exhaust	I – Condensate System 1/2" Male NPT
D – Electric Cord	J – Tank Sensor
E – T & P Valve	K – Display Control
F – Thermostatic Mixing Valve	L – 3" Air Intake

Figure 1 – Specifications and Dimensions

PART 4 – PREPARE WATER HEATER LOCATION

CAUTION

Carefully consider installation when determining water heater location. Please read the entire manual before attempting installation. Failure to properly take factors such as water heater venting, piping, condensate removal, and wiring into account before installation could result in wasted time, money, and possible property damage and personal injury.

A. BEFORE LOCATING THE WATER HEATER

⚠ WARNING

Incorrect ambient conditions can lead to damage to the water heating system and put safe operation at risk. Ensure that the water heater installation location adheres to the information included in this manual. Failure to do so could result in property damage, serious personal injury, or death.

CAUTION
Failure of water heater or components due to incorrect operating conditions IS NOT covered by product warranty.

1. Installation Area (Mechanical Room) Operating Conditions
   - Ensure ambient temperatures are higher than 32°F/0°C and lower than 114°F/46°C.
   - Prevent the air from becoming contaminated by the products, places, and conditions listed in this manual.
   - Avoid continuously high levels of humidity
   - Never close existing ventilation openings

CAUTION
The service life of the water heater's exposed metallic surfaces, such as the cabinet, as well as internal surfaces, such as the heat exchanger, are directly influenced by proximity to damp and salty marine environments. In such areas, higher concentration levels of chlorides from sea spray coupled with relative humidity can lead to degradation of the heat exchanger and other water heater components. In these environments, water heaters must not be installed using direct vent systems which draw outdoor air for combustion. Such water heaters must be installed using room air for combustion. Indoor air will have a much lower relative humidity and, hence, potential corrosion will be minimized.
⚠ WARNING
This water heater is certified for indoor installations only. Do not install the water heater outdoors. Failure to install this water heater indoors could result in substantial property damage, severe personal injury, or death.
This water heater must be installed as described in this manual: upright, with the exhaust vent adapter in the vertical position. DO NOT attempt to install this water heater in any other orientation. Doing so will result in improper water heater operation and property damage, and could result in serious personal injury or death.

2. Check for nearby connections to:
   - System water piping
   - Venting connections
   - Gas supply piping
   - Electrical power
   - Condensate / floor drain

CAUTION
All water heaters eventually leak. Locate the water heater where any leakage from the relief valve, related piping, tank, or connections will not result in damage to surrounding areas or lower floors of the building. The water heater should be located near a floor drain, or installed in an adequately drained drain pan. Such a drain pan must have a clearance of at least 1.0" (2.5 cm) greater than any point on the water heater's outer jacket and must be piped to an adequate drain. Westinghouse WILL NOT be held liable for leakage damages.
To conserve water and energy, insulate all water piping, especially the hot and recirculation water lines.

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

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

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

5. If the water heater is to replace an existing water heater, check for and correct any existing system problems, such as:
   - System leaks
   - Location that could cause the system and water heater to freeze and leak.
   - Incorrectly-sized expansion tank

CAUTION
Do not connect the water heater to any heating systems or components that have been previously used for non-potable applications.
Do not introduce toxic chemicals, such as antifreeze or water heater treatments, into the water heater or any piping meant for potable water purposes.
Ensure that all piping and components connected to the water heater are suitable for potable water applications.
Do not use this water heater for space heating applications.
Circulators suitable for DHW applications must be used.

6. Clean and flush system when reinstalling a water heater.

7. When the appliance is installed directly on carpeting, the appliance shall be installed on a metal or wood panel extending beyond the full width and depth of the appliance by at least 3" (76.2 mm) in any direction or, if the appliance is installed in an alcove or closet, the entire floor shall be covered by the panel. The panel must be strong enough to carry the weight of the heater when full of water.

B. LEVELING

CAUTION
In order for the condensate to properly flow out of the collection system, the water heater must be installed level.

C. CLEARANCES FOR SERVICE ACCESS

See Table 5 for recommended service clearances. If these minimum clearances are not provided, it may not be possible to service the water heater without removing it from the space.

⚠ WARNING	
Space must be provided with combustion/ventilation air openings correctly sized for all other water heaters located in the same space as the water heater. The water heater cover must be securely fastened to prevent it from drawing air from the water heater room. This is particularly important if the water heater is in a room with other water heaters. Failure to comply with the above could result in substantial property damage, severe personal injury, or death.	
MINIMUM CLEARANCES	
Installation Clearances from Non-Combustibles / Combustibles	Recommended Service and Proper Operation Clearances
Top	12 in. (30.5 cm)
Back	2 in.* (5.08 cm)
Front	2 in.* (5.08 cm)
Right Side	3 in. (7.62 cm)
Left Side	2 in. (5.08 cm)

Table 5 – Minimum Installation and Service Clearances - *A minimum front clearance of 24 in. (60.9 cm) is recommended for accessibility when performing maintenance.

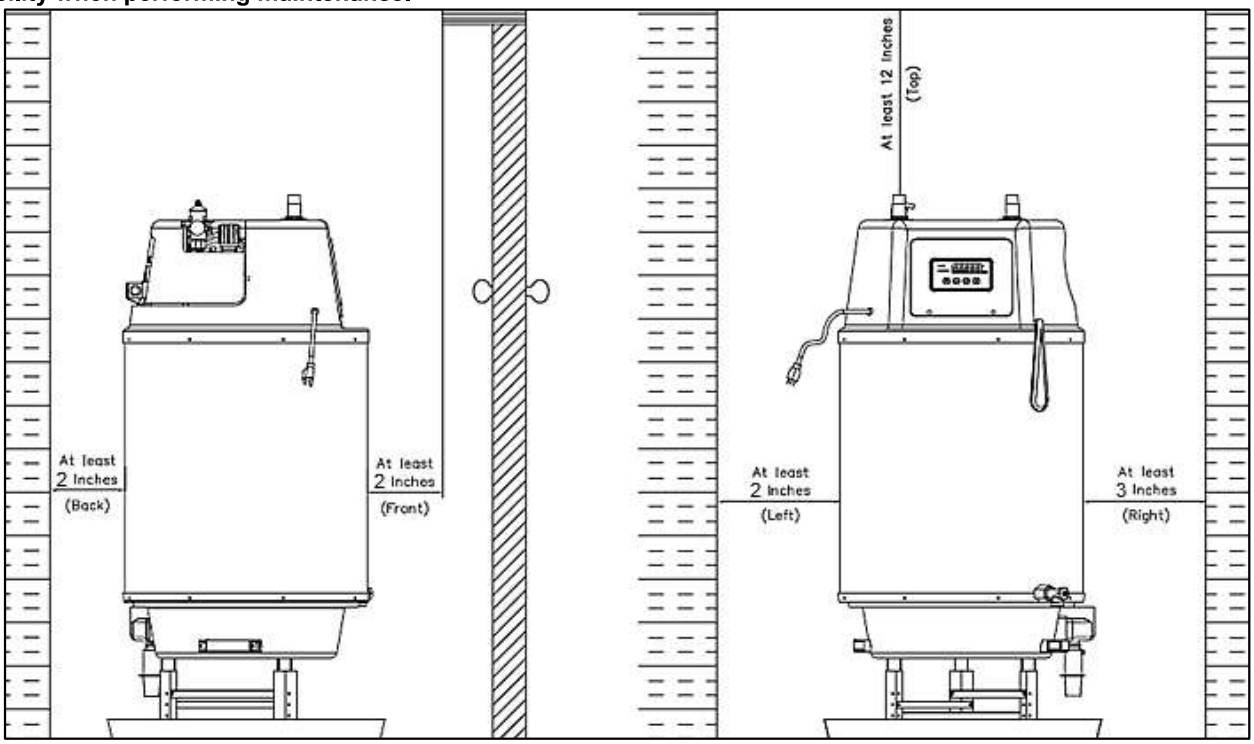


Figure 2 – Minimum Clearances

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

MINIMUM CLEARANCES FROM COMBUSTIBLE MATERIALS

- Hot water pipes – at least 1" from combustible materials.
- Exhaust vent pipe – at least 1" from combustible materials.

CAUTION

Always take future maintenance into consideration when locating the water heater. If the water heater is located in an installation location with limited clearances, it may be necessary to remove the water heater from the space to perform maintenance. Failure to consider maintenance when determining installation location could result in property damage.

D. RESIDENTIAL GARAGE AND CLOSET INSTALLATIONS

CAUTION

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

PRECAUTIONS

If the water heater is located in a residential garage, it should be installed per the latest edition of the National Fuel Gas Code, ANSI Z223.1, and CGA-B149 Installation Code in Canada.

- Mount the bottom of the water heater 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 water heater so it cannot be damaged by a moving vehicle.

⚠ WARNING

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

E. EXHAUST VENT AND INTAKE PIPE

⚠ WARNING

Vents must be properly supported. The water heater exhaust and intake connections are not designed to carry heavy weight. Vent support brackets must be within 1' of the water heater and the balance at 4' intervals. Venting must be readily accessible for visual inspection for the first 3' from the water heater.

NOTE: To prevent combustion air contamination, see Table 6 when considering exhaust vent and intake pipe termination.

Exhaust vent and intake pipe may be vented vertically through the roof or out a side wall. Venting methods are detailed in the Venting Section. Do not attempt installation using any other means. Be sure to locate the water heater so exhaust vent and intake piping can be routed through the building and properly terminated. Exhaust vent and intake piping lengths, routing, and termination method must comply with methods and limits given in the venting section.

F. CARBON MONOXIDE DETECTORS

In the Commonwealth of Massachusetts and As Required by State and Local Codes

Installation of Carbon Monoxide Detectors: At the time of installation or replacement of the vented gas fueled appliance, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas appliance is installed, unless the appliance is located in a detached, uninhabitable structure separate from the dwelling, building, or structure used in whole or in part for residential purposes.

In addition, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on each additional level of the dwelling, building, or structure served by the vented gas appliance. It shall be the responsibility of the property owner to secure the service of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

a. In the event that the vented gas fueled appliance is installed in a crawl space or attic, the hard wired carbon monoxide detector with alarm and battery back-up shall be installed on the next adjacent floor level.
b. In the event that these requirements cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

⚠ WARNING

Failure to comply with these requirements could result in product damage, severe personal injury, or death.

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

G. PREVENT COMBUSTION AIR CONTAMINATION

Install intake piping for the water heater 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 below. For example, do not pipe intake near a swimming pool. Avoid areas subject to exhaust fumes from laundry facilities. These areas always contain contaminants. Contaminated air will damage the water heater, resulting in possible substantial property damage, severe personal injury, or death.

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 6

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

H. REMOVING A WATER HEATER FROM A COMMON VENT SYSTEM

⚠ DANGER

Do not install the water heater 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.

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

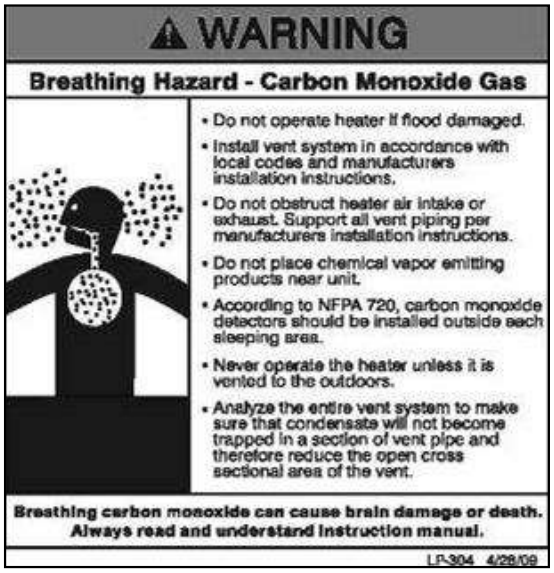


Figure 3 - CO Warning Label

When removing an existing water heater, the following steps must be followed.

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 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 so the installation conforms to the National Fuel Gas Code, ANSI Z223.1. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the National Fuel Gas Code, ANSI Z 223.1.

I. HIGH ELEVATION INSTALLATIONS

⚠ WARNING

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

J. UNCRATING THE WATER HEATER

⚠ WARNING

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

CAUTION

Cold weather handling – If water heater has been stored in a very cold location (below 0°F) before installation, handle with care until the plastic components come to room temperature.

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

K. INSTALLING THE WATER HEATER STAND, EXHAUST PIPE CLAMP, AND CONDENSATE TRAP

⚠ DANGER

The factory supplied water heater stand and condensate trap must be installed with the water heater. Failure to do so will result in property damage, serious personal injury, or death.

⚠ WARNING

The water heater must be installed on a surface that can bear its weight (more than 120 lbs. when fully plumbed and full of water). Installing the water heater on a surface which cannot support its weight could result in property damage, personal injury, or death.

This water heater is too heavy for one person to lift. It is highly recommended to install the water heater with two people. Use caution as to not drop the water heater, which could damage the water heater and cause property damage and/or severe personal injury. Verify that the water heater is properly and securely mounted before leaving unsupervised. Failure to comply with the above and properly mount the water heater could result in substantial property damage, severe personal injury, or death.

This stand assembly is not seismic rated and should not be applied as such. Failure to comply with the above and properly mount the water heater could result in substantial property damage, severe personal injury, or death.

1. ASSEMBLING THE WATER HEATER STAND

NOTE: Ensure the Water Heater Stand Assembly has shipped with all included components. See Figure 4.

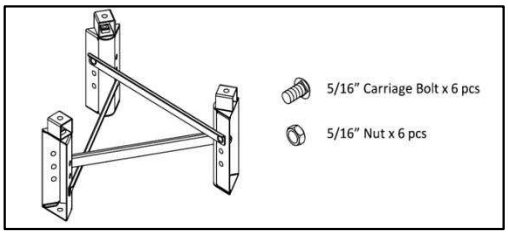


Figure 4 – Water Heater Stand Components

1. Use a 5/16" socket and two (2) carriage bolts and nuts to connect a cross beam to two legs. See Figure 5, Step 1.
2. Use a 5/16" socket and two (2) carriage bolts and nuts to connect a cross beam to the third leg. See Figure 5, Step 2.
3. Use a 5/16" socket and two (2) carriage bolts and nuts to connect the final cross beam. See Figure 5, Step 3.

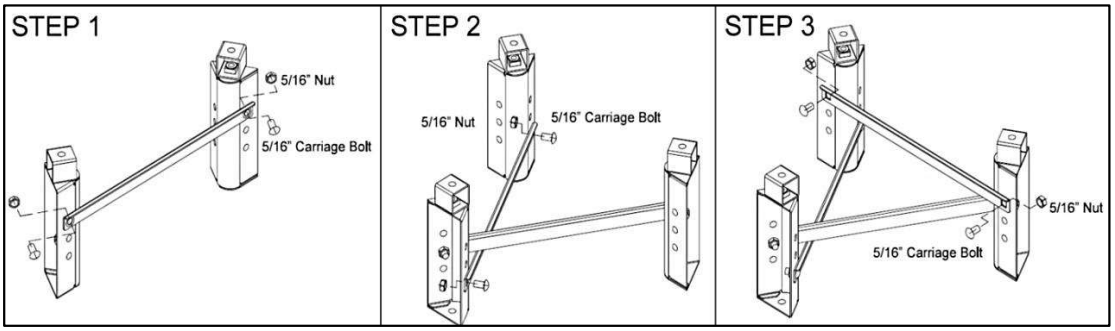


Figure 5 – Installing the Water Heater Stand

4. It is highly recommended that two people lift and gently lower the water heater onto the water heater stand. See Figure 6.

2. FLOOR MOUNTING THE WATER HEATER

For Installations in the State of California

For installation in California this water heater must be braced or anchored to avoid falling or moving during an earthquake. See instructions for correct installation procedures. Instructions may be obtained from California Office of the State Architect, 1102 Q Street, Suite 5100, Sacramento, CA 95811.

3. INSTALLING THE EXHAUST PIPE CLAMP AND CONDENSATE TRAP

⚠ WARNING

The factory supplied water heater stand and condensate trap must be installed with the water heater. Failure to properly install condensate trap will allow dangerous gas to contaminate the structure and result in property damage, serious personal injury, or death. DO NOT operate the water heater for any amount of time for any reason until the condensate trap is installed.

1. Insert the Condensate Trap into the Exhaust Adaptor. Install the Condensate Trap Clamp to hold it in place.
2. Place the exhaust pipe inside the Exhaust Adaptor socket bottom. While holding the exhaust pipe in place, attach the pipe clamp to the pipe support with a screw driver and two (2) M5 screws.

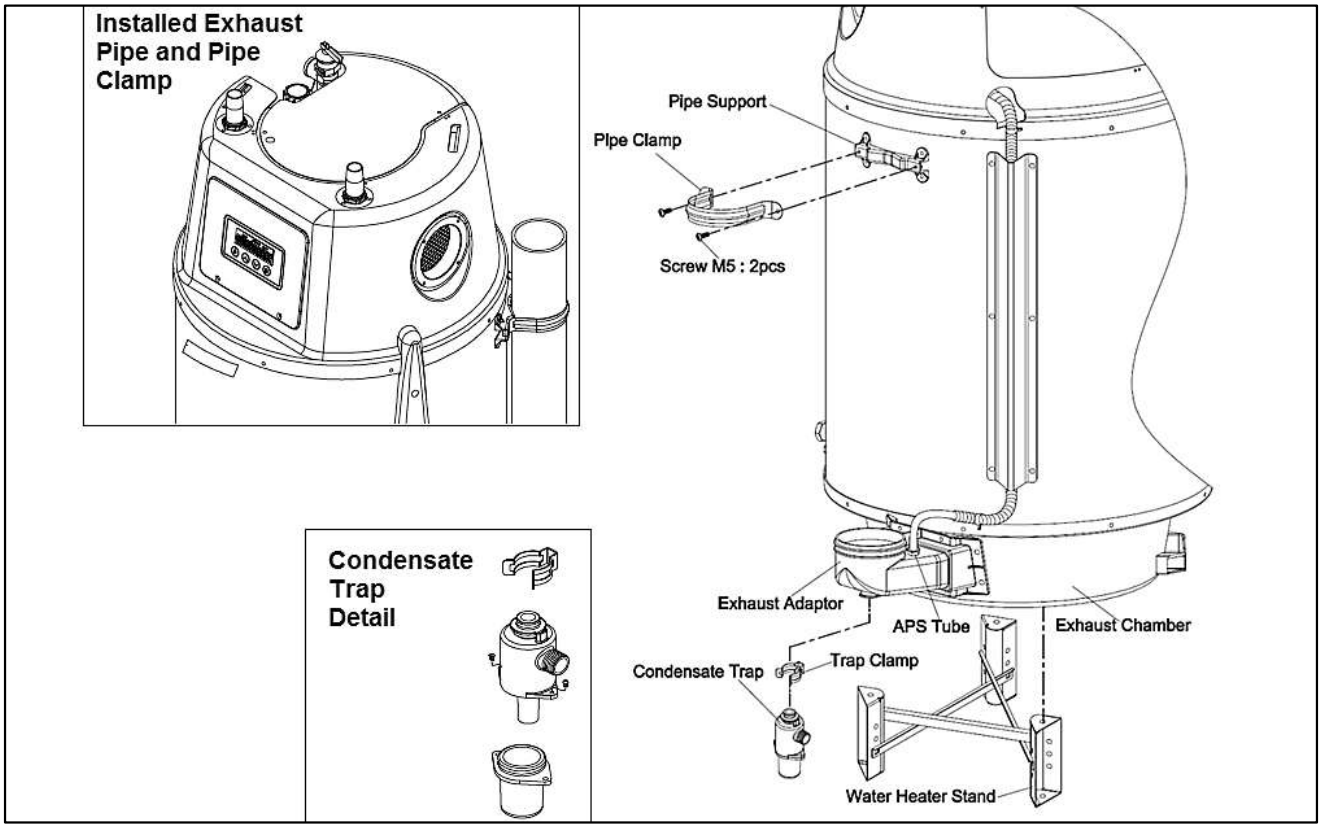


Figure 6 – Installing the Water Heater Exhaust Pipe Clamp, Condensate Trap, and Setting the Water Heater on the Stand

PART 5 – VENTING

⚠ DANGER

This water heater must be properly vented for removal of exhaust gases to the outside of the home. Correct installation of the vent pipe system is mandatory for the safe and efficient operation of this water heater and is an important factor in the life of the unit. Vent this water heater in accordance with these instructions. Failure to do so will result in property damage, severe personal injury, or death.

⚠ WARNING

DO NOT mix vent systems or materials unless specifically told to do so in this manual.

DO NOT thermally insulate the exhaust vent or intake pipes.

DO NOT use an electric damper, vent damper, or draft hood with this water heater.

DO NOT locate the exhaust vent or intake pipe terminations where exposed to prevailing winds.

⚠ WARNING

Moisture will be produced by the exhaust vent. Take precautions when determining exhaust vent termination. Moisture may fall from the vent termination to the ground and turn to ice in freezing conditions. Moisture or ice can produce a hazardous condition.

Exhaust condensate is acidic, and could deteriorate the surface below the exhaust vent termination. Ensure this surface is in good repair (sealed, painted, etc.) to prevent deterioration.

Keep vent pipe runs as direct and with the minimum number of pipe fittings as possible.

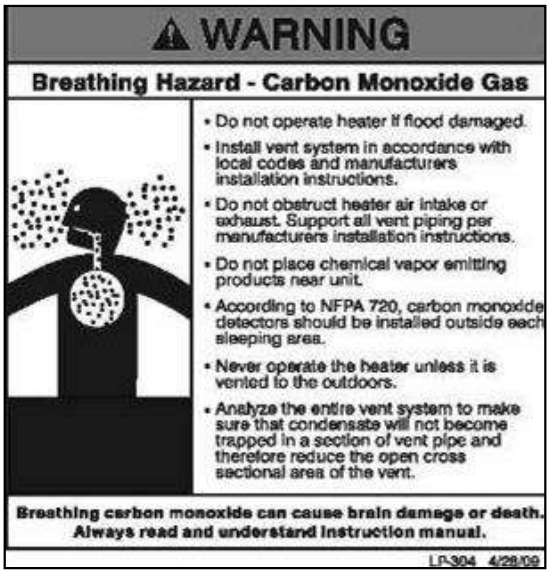
Failure to follow these instructions could result in property damage, severe personal injury, or death.

A. INTAKE PIPE AND EXHAUST VENT GUIDELINES

1. Vent system must be installed in accordance with local codes, or, in absence of local codes, the National Fuel Gas Code, ANSI Z223.1 / NFPA 54 and/or CSA B149.1, Natural Gas and Propane Installation Code.

2. **For installation in Canada**, installer supplied plastic vent piping must comply with CAN/CGA B149.1 and be certified to the Standard for Type BH Gas Venting Systems, ULC-S636. Components of this listed system must not be interchanged with other vent systems or unlisted pipes or fittings. All plastic components and specified primers and glues must be from a single system manufacturer and must not be intermixed with another system manufacturer's products. Clean and dry all applicable surfaces before applying cement.

3. This water heater is designed to be installed in a power vent (using indoor air for combustion and vented to the outdoors) type, or as a direct vent (sealed combustion) type. In power vent installations, indoor air is used for combustion and exhaust gases are vented directly to the outdoors through a sealed exhaust vent piped through the wall or roof. In direct vent installations, combustion air must be supplied directly from the outdoors to the burner, and the flue (exhaust) gases should be vented directly to the outdoors through the wall or roof.



4. This water heater uses 2" or 3" diameter pipe for exhaust vent and intake pipe. In order to use 2" diameter pipe, it is required to reduce pipe size in a vertical section of pipe with a reducing coupling (not included). See Figure 8. The reducing coupling must be installed in a vertical section of pipe located ABOVE the pipe clamp installed on the water heater.

⚠ DANGER

Installing a reducing coupling BELOW the pipe clamp installed on the water heater is strictly prohibited. Doing so will result in property damage, personal injury, or death.

It is important to ensure an airtight seal from the water heater collar to the vent terminations. It is EXTREMELY IMPORTANT that the maximum allowed combined venting lengths are not exceeded. See Table 8 for a list of Approved Vent Materials and Table 9 for Approved Vent Lengths.

5. Do not install venting system components on the exterior of the building except as specifically required by these instructions.

- Vent terminals must be at least 1 foot from any door, window, or gravity inlet into the building.
- Maintain the correct clearance and orientation between the exhaust vent and intake pipe terminals.
- The exhaust vent and air intake terminals must be at the same height and their center lines must be spaced apart 1 foot minimum.
- The bottom of the exhaust vent and intake pipe terminals must be at least 1 foot above the normal snow accumulation level. In no case should these terminals be installed less than 1 foot above normal snow accumulation level.
- Do not install the exhaust vent terminals directly above windows or doors.
- Intake pipe terminal must not terminate in areas that might contain combustion air contaminates, such as near swimming pools.
- For sidewall venting, the minimum horizontal distance between adjacent exhaust vent terminations is 1 foot. It is recommended this distance be greater than 1 foot to better avoid frost damage to building surfaces.
- For roof venting, minimum horizontal distance between any adjacent exhaust vent termination is 1 foot.
- If the exhaust vent is to be terminated in a walled off area (such as a roof with a parapet wall), ensure the exhaust vent terminates a minimum of 10' from nearest wall and extends level with or above the top of the wall. This will ensure flue gas does not get trapped and possibly recirculated into the intake air pipe, which could contaminate the combustion air.

⚠ WARNING

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

- When using PVC or CPVC pipe, all joints must be properly cleaned, primed, and cemented. Remove all burrs and debris from joints and fittings. 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.**
- Ensure the vent is located where it will not be exposed to prevailing winds.
- In all roof venting applications, exhaust discharge must point away from the pitch of the roof.
- To prevent water leakage, install adequate roof flashing where the pipe enters the roof.
- Do not locate vent over public walkways, driveways, or parking lots. Condensate could drip and freeze, resulting in a slip hazard or damage to vehicles and machinery.
- Due to potential moisture build-up, sidewall venting may not be the preferred venting option. To save time and cost, carefully consider venting installation and location.
- Horizontal lengths of exhaust vent must slope back towards the water heater not less than ¼" per foot to allow condensate to drain from the vent pipe.
- The exhaust vent must terminate where vapors cannot make accidental contact with people or pets, or damage shrubs or plants.
- In vacant chimney applications, install and seal a rain cap over existing chimney openings.
- 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.
- Do not use the water heater to support any piping.
- Seal any opening around vent pipe or fittings with mortar or silicone caulk to prevent exhaust circulating into the living space.
- DO NOT vent near soffit vents, crawl space vents, or other areas where condensate or vapor could create a nuisance or hazard or cause property damage.
- DO NOT vent where condensate vapor could cause damage or could be detrimental to the operation of regulators, relief valve, or other equipment.
- DO NOT vent the water heater in a chimney flue serving a separate appliance designed to burn solid fuel. The water heater may only be vented in vacant chimneys.
- Maximum Snow Level Determination: These installation instructions reference snow levels in establishing a minimum height for the installation of exhaust vent or air intake terminations. Snow levels shall be determined as follows:
  a. The installation location may, by ordinance, designate how snow levels are calculated in that location; or
  b. In the absence of specific ordinances, snow levels shall be calculated from the average monthly maximum depth of snow accumulation as indicated by the National Weather Service's 10 year statistics for the installation location/geographical area.

In addition:

- Total length of vent piping shall not exceed the limits specified in this manual.
- The vent piping for this direct vented appliance is approved for zero clearance to combustible construction.
- The flue products coming from the exhaust vent will create a large plume when the heater is in operation. Avoid venting in areas that will affect neighboring buildings or be considered objectionable.
- DO NOT locate exhaust vent or intake pipe in a parking area where machinery may damage the pipe.

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

- The vented gas fueled appliance shall not be installed so its combustion, ventilation, or dilution air is obtained from a bedroom or bathroom.
- Signage: Whenever any through-the-wall (horizontal or sidewall) vent is installed less than seven feet above the finished grade, a metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight feet above grade directly in line with the exhaust vent terminal. The sign shall read, in print no less than 0.5 inches in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".
- Marking of Exhaust Vent and Intake Pipe: Piping used for ventilation, make-up, or combustion air intake shall be labeled as follows:
  a. Throughout the entire developed length:
     i. Labels must be placed every ten feet for exposed/visible piping; or
     ii. Labels must be placed every three feet for concealed piping.
  b. At all changes of direction;
  c. On each side of a penetration through a partition, wall or ceiling; and
  d. The labels shall be black lettering that:
     i. Indicates that the piping is used for ventilation, make-up, or combustion air intake, and
     ii. The letters shall be sized equal to a minimum of the pipe diameter. However, for piping with a diameter exceeding two inches, said lettering does not need to be larger than two inches.

⚠ WARNING

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

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

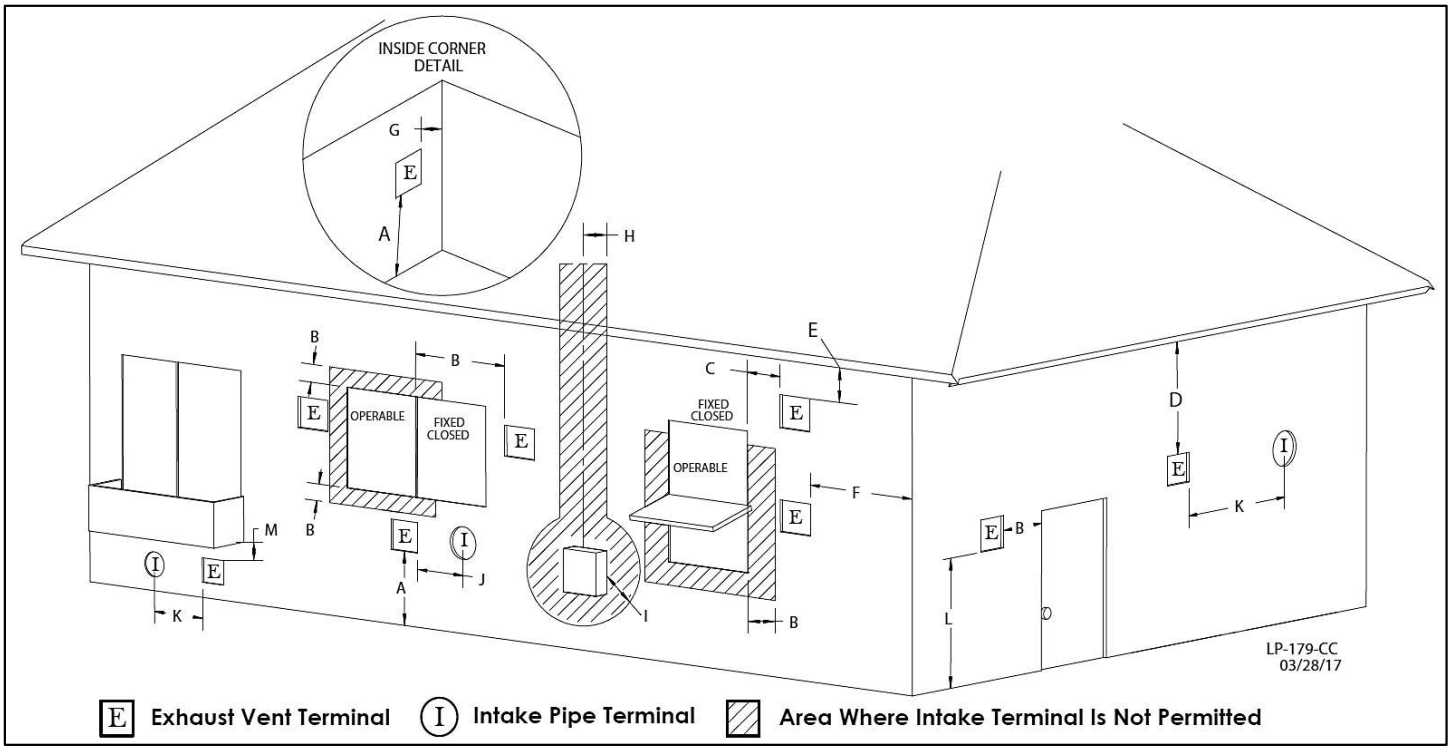


Figure 7 – Vent Termination Detail

	DESCRIPTION		US	CANADA
A	Clearance above grade, veranda, porch, deck, or balcony		1 foot (30 cm)	
B	Clearance to window or door that may be opened	Direct Vent	1 foot	3 feet (91 cm)
		Power Vent	4 feet below or to side of opening; 1 foot above opening	
C	Clearance to permanently closed window		*	
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet from the center line of the terminal		*	
E	Clearance to unventilated soffit		*	
F	Clearance to outside corner		*	
G	Clearance to inside corner		*	
H	Clearance to each side of center line extended above meter / regulator assembly		*	
I	Clearance to service regulator vent outlet		*	Above a regulator within 3 feet (91 cm) horizontally of the vertical center line of the regulator vent outlet to a maximum vertical distance of 15 ft (4.5 m)
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	Direct Vent	1 foot	3 feet (91 cm)
		Power Vent	4 feet below or to side of opening; 1 foot above opening	
K	Clearance to a mechanical air supply inlet		3 feet above if within 10 feet horizontally	6 feet (1.83 cm)
L	Clearance above paved sidewalk or driveway located on public property	Direct Vent	*	7 feet (2.13 m)
		Power Vent	7 feet	
M	Clearance under veranda, porch, deck, or balcony		*	1 foot (30 cm)

Table 7 – Vent Termination Clearances - *NOTE: For clearances not specified in ANSI Z223.1/NFPA 54 or CAN/CSA-B 149.1, please use clearances in accordance with local installation codes and the requirements of the gas supplier.

B. APPROVED VENT MATERIALS

NOTICE

Consult Table 8 or the most recent edition of ANSI Z223.1/NFPA 54 or CAN/CGA B149.1 as well as all applicable local codes and regulations when selecting vent pipe materials.

APPROVED EXHAUST VENT AND INTAKE PIPE MATERIAL			
Item	**Material**	**Standards for Installation in:**	
		United States	**Canada**
Exhaust vent or Intake pipe and fittings	CPVC schedule 40	ASTM-D2846	PP, CPVC, and PVC venting must be ULC-S636 Certified. IPEX is an approved manufacturer in Canada, supplying vent material listed to ULC-S636.
	PVC schedule 40	ANSI/ASTM D1785	
	Polypropylene	ULC-S636, UL-1738	
	Stainless Steel AL29-4C	Certified for Category IV and direct vent appliance venting	Certified for Category IV and direct vent appliance venting
Pipe Cement	PVC	ANSI/ASTM D2564	IPEX System 636 Cements & Primers
	CPVC	ANSI/ASTM F493	
Pipe Primer	PVC / CPVC	ASTM F656	

⚠ DANGER

- The exhaust and intake components installed with this water heater must be used for near water heater piping BEFORE transitioning to the approved materials listed above. DO NOT REMOVE these installed components. Doing so WILL VOID warranty.
- PVC/CPVC pipe and fittings of the same diameter are considered interchangeable.
- Use of cellular core pipe PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenysulfone) in nonmetallic venting systems is prohibited.
- DO NOT connect PVC/CPVC to Polypropylene without an approved vent connector.
- Any transition to Polypropylene MUST be done in the vertical within five (5) feet of the appliance.
- When installing AL29-4C vent piping, install a PVC-to-stainless adapter at the water heater vent connection, and at the termination when using an Westinghouse PVC termination kit. DO NOT mix AL29-4C piping from different manufacturers unless using adapters specifically designed for the purpose by the manufacturer.
- Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.
- DO NOT obstruct the flow of combustion or ventilation air.
- When using Pipe Cement/Primer, follow the instructions included with the Cement/Primer closely. Clean and dry all applicable surfaces before applying.

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

Table 8 – Approved Venting Materials

CAUTION

High heat sources (sources generating heat 100°F / 37°C or greater, such as stove pipes, space heaters, etc.) may damage plastic components of the heater as well as plastic vent pipe materials. Such damages ARE NOT covered by warranty. It is recommended to keep a minimum clearance of 8" from high heat sources. Observe heat source manufacturer instructions, as well as local, state, provincial, and national codes, laws, regulations and ordinances when installing this heater and related components near high heat sources.

⚠ WARNING

Vent adaptors are not designed as load-bearing devices, and must not be used to support exhaust vent piping. All vent pipes must be properly connected, supported, and the exhaust must be pitched a minimum of ¼" per foot back to the heater to allow drainage of condensate. Failure to properly support vent piping and follow the information in this statement could result in product damage, severe personal injury, or death.

C. ALLOWED COMBINED VENT LENGTHS – ALL MODELS

2" COMBINED VENT LENGTH		3" COMBINED VENT LENGTH		MAXIMUM # OF 90° ELBOWS (2" and 3" VENT DIAMETERS)
MINIMUM	**MAXIMUM**	**MINIMUM**	**MAXIMUM**	6
7' (2.1M)	50' (15M)	7' (2.1M)	100' (30M)	

Table 9 – Approved Vent Lengths

The total equivalent length of exhaust vent and intake pipe should not exceed fifty (50) feet (15M) in 2" pipe, or one hundred (100) feet (30M) in 3" pipe.

a. The equivalent lengths of friction loss in elbows are listed below:
   - 5 feet (1.5M) for each additional 3" 90° elbow
   - 3 feet (0.91M) for each additional 3" 45° elbow

- 8 feet (2.4M) for each additional 2" 90° elbow
- 5 feet (1.5M) for each additional 2" 45° elbow
- Some terminations are considered elbows, and deduction should be applied. For example, a turndown 90° or an open T termination should be considered a 90° elbow.
- For 2" diameter installations, install a reducing coupling in a vertical section of pipe ABOVE the pipe clamp installed on the water heater. See Figure 8.

b. For example: If the 2" exhaust vent has two 90° elbows and 10 feet of PVC pipe we will calculate: Exhaust Vent Equivalent Length = (2x8) + 10 = 26 feet.

Further, if the 2" intake pipe has one 90° elbow, one 45° elbow, and 10 feet of PVC pipe, the following calculation applies: Intake Pipe Equivalent Length = 8 + 5 + 10 = 23 feet.

The Exhaust Vent Equivalent Length + the Intake Pipe Equivalent Length equal the Total Equivalent Length. In this example, the Total Equivalent Length is 49 feet.

c. The minimum Total Equivalent Length is seven (7) feet (2.1M).

NOTE: The intake pipe and exhaust vent lengths do not have to be of equal length. There is no balancing requirement between intake and exhaust.

⚠ WARNING

Vent adaptors are not designed as load-bearing devices, and must not be used to support exhaust vent piping. All vent pipes must be properly connected, supported, and the exhaust must be pitched a minimum of ¼" per foot back to the boiler to allow drainage of condensate. Failure to properly support vent piping and follow the information in this statement could result in product damage, severe personal injury, or death.

CAUTION

Failure to provide a minimum total vent length of 7 equivalent feet could result in property damage and improper appliance operation.

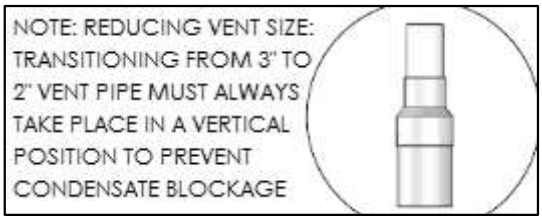


Figure 8 – Transitioning from 3" to 2" Vent Pipe

D. DIRECT VENT INSTALLATION

1. Direct Vent, Two Pipe Roof and Sidewall Vent Terminations

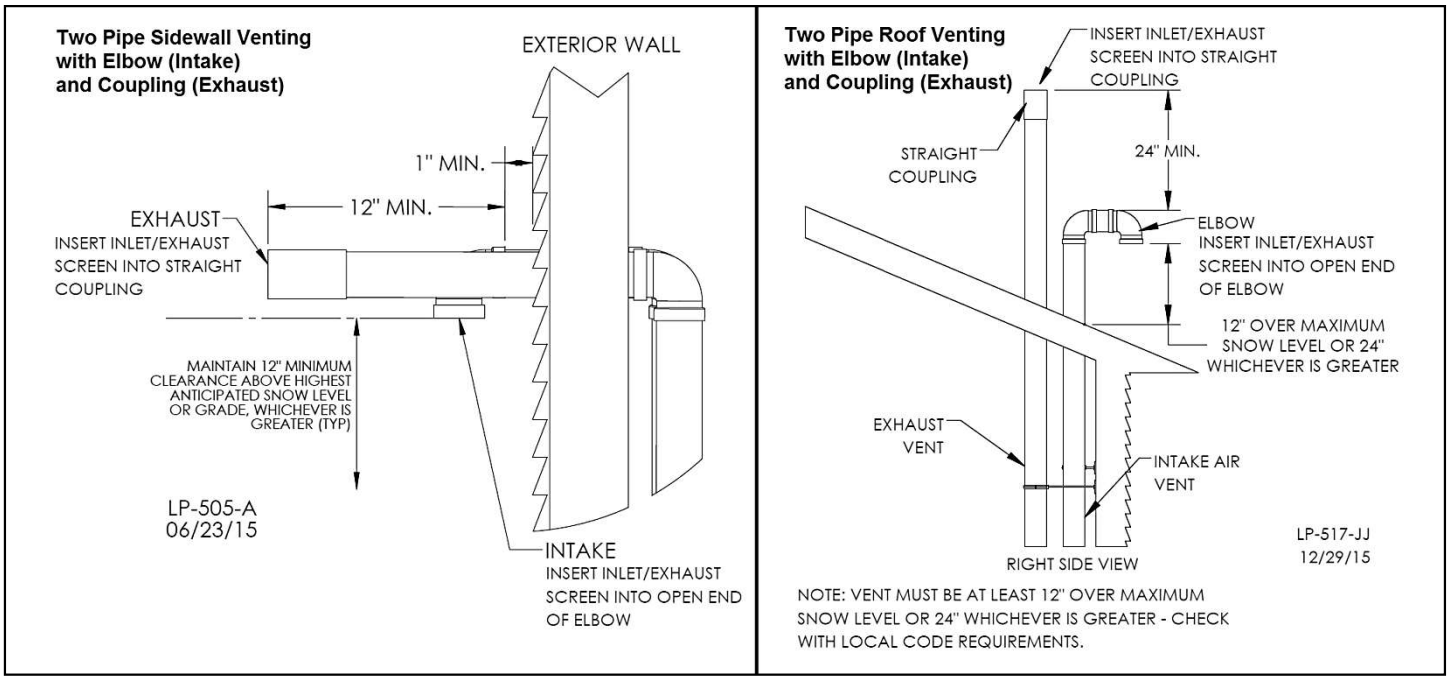


Figure 9 – Direct Vent, Roof and Sidewall Vent Terminations

⚠ WARNING

All vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of ¼" per foot back to the water heater to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the water heater and the balance at 4 foot intervals on the vent pipe. Water heater venting must be readily accessible for visual inspection for the first three feet from the water heater.

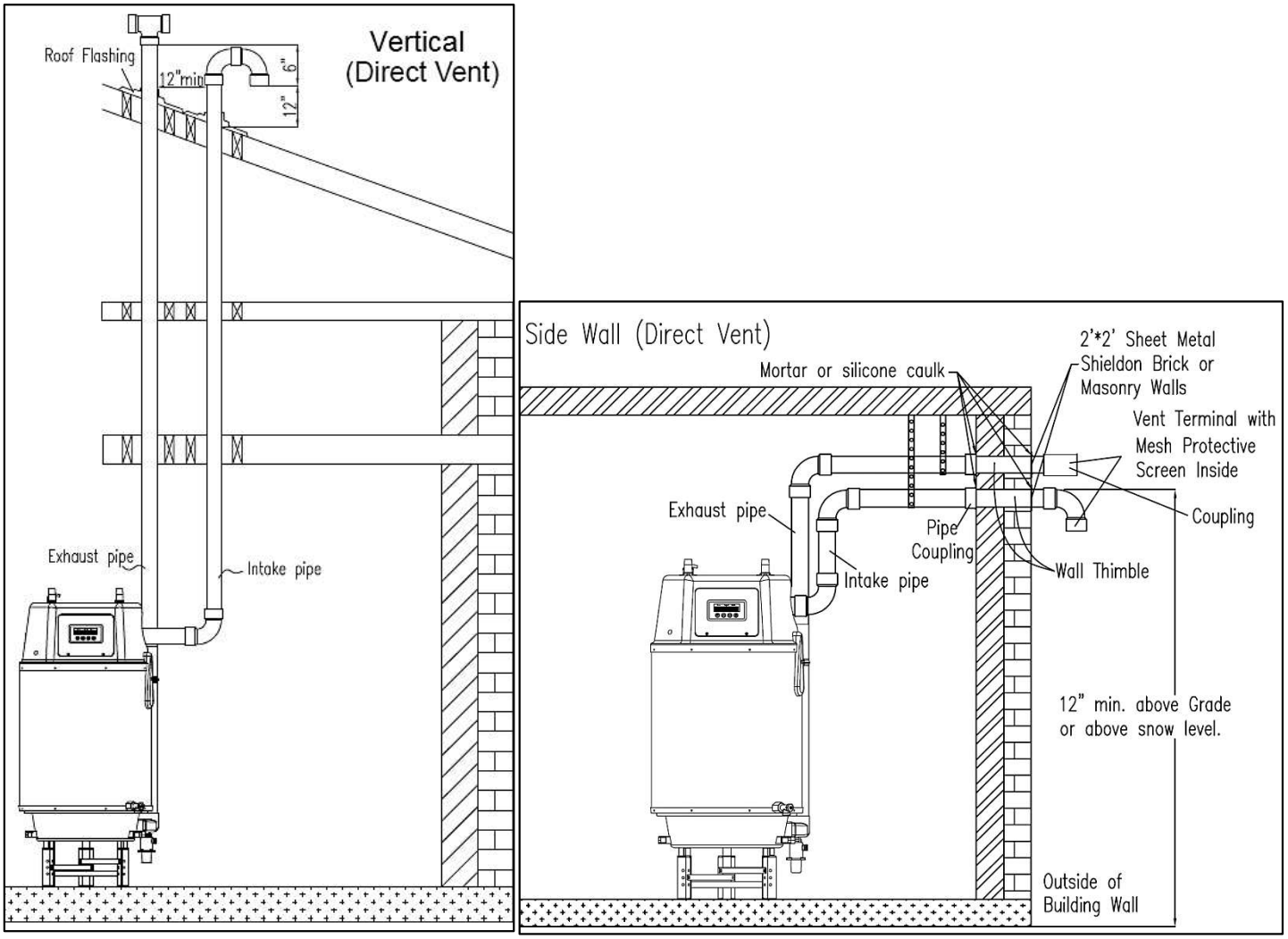


Figure 10 – Direct Vent, Roof and Sidewall Vent Terminations

⚠ WARNING

All vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of ¼" per foot back to the water heater to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the water heater and the balance at 4 foot intervals on the vent pipe. Water heater venting must be readily accessible for visual inspection for the first three feet from the water heater.

2. Direct Vent, Optional Horizontal and Vertical Vent Kits

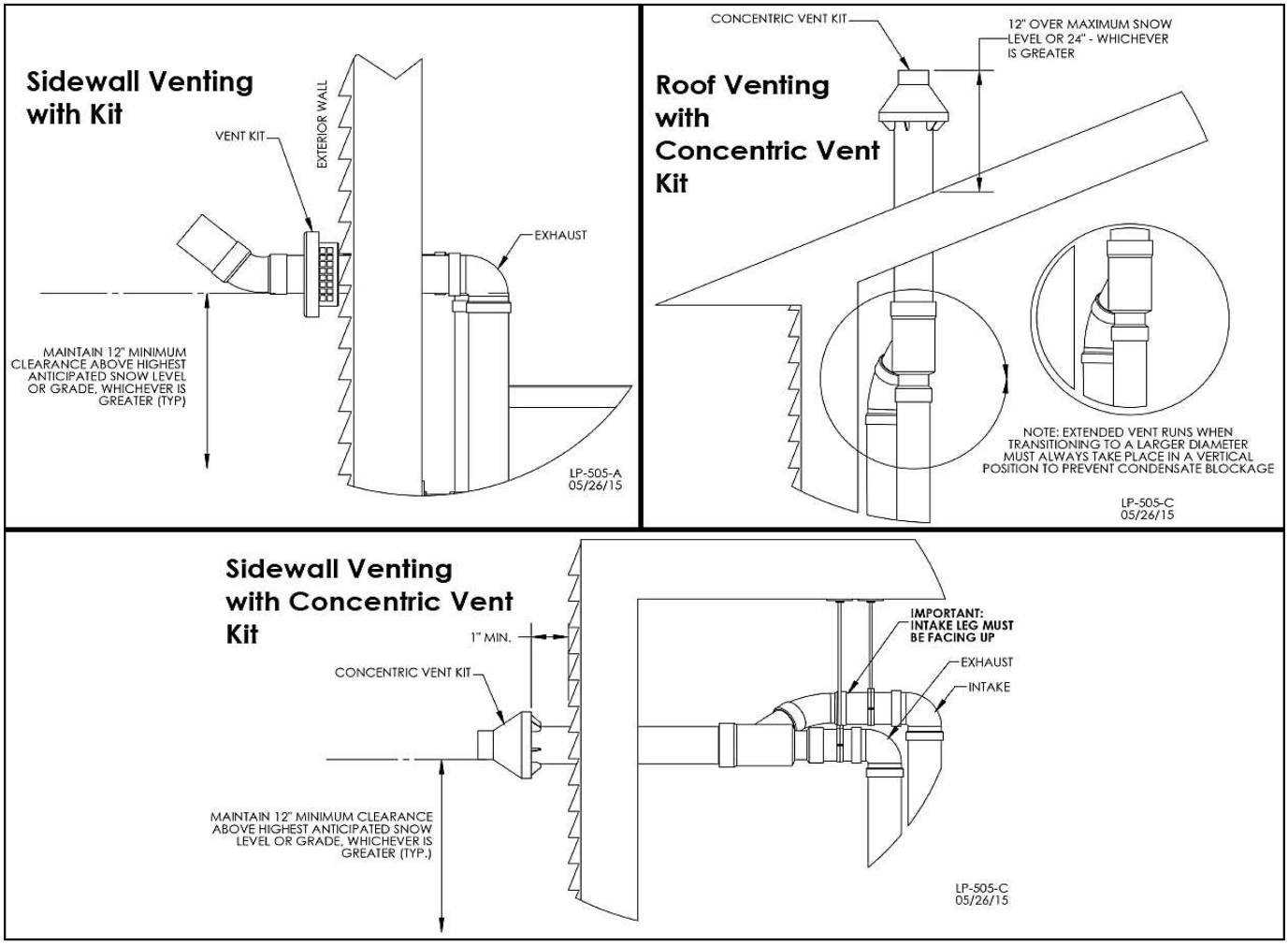


Figure 11 – Direct Vent, Vent Terminations (With Optional Kits)

⚠ WARNING
All vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of ¼" per foot back to the water heater to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the water heater and the balance at 4 foot intervals on the vent pipe. Water heater venting must be readily accessible for visual inspection for the first three feet from the water heater.

3. Screen Installation

After connecting the intake air and exhaust vent pipes, it is required to install the included screens into the exhaust vent and intake pipe terminations to prevent damages to the unit due to blockages. See Figure 12 for installation detail.

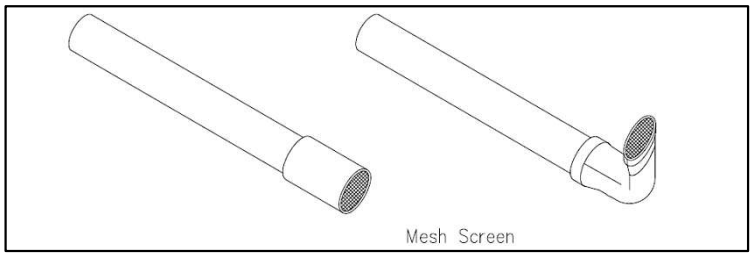


Figure 12 - Screen Installation - NOTE: Vent termination elbow is meant to be installed open end facing the ground. Orientation in Figure 12 is meant to demonstrate proper Vent Screen installation ONLY.

SAFETY INSTRUCTIONS
Do not connect any other appliance vents to the water heater exhaust vent or intake pipes.

E. POWER VENTING, INDOOR COMBUSTION AIR INSTALLATION IN CONFINED OR UNCONFINED SPACE

This heater 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 6.**

When used as a Power Vent appliance, the water heater should be located in an area where enough air is available for proper combustion and ventilation. 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. Follow the latest edition of ANSI Z223.1 and any applicable local codes.

In general, these requirements specify that if the unit is installed in a **confined space**, there must be permanent air supply openings if the water heater is not installed as a direct vent. **Never obstruct the supply of combustion air to the appliance.** If the appliance is installed in areas where indoor air is contaminated it is imperative that the appliance be installed as direct vent so that all combustion air is taken directly from the outdoors into the appliance intake connection.

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

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

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.

Minimum Air Supply to Water Heater as Power Vent

Model	Water Heater Capacity	Outside Air Area	Inside Air Area	Minimum Required Air Volume
75F / 76F	Max. 75,000 BTU/hr	20 sq. in.	75 sq. in.	3,750 cu. ft
100F	Max. 100,000 BTU/hr	25 sq. in.	100 sq. in.	5,000 cu. ft

Table 10 – Minimum Air Supply to Water Heater

⚠ WARNING

Insufficient air supply used with a Power Vented appliance may cause the building to experience negative pressure inside. Negative pressure is not allowable by most building codes and can cause back drafting of cold air from outside through the unit, potentially freezing the heat exchanger / tank.

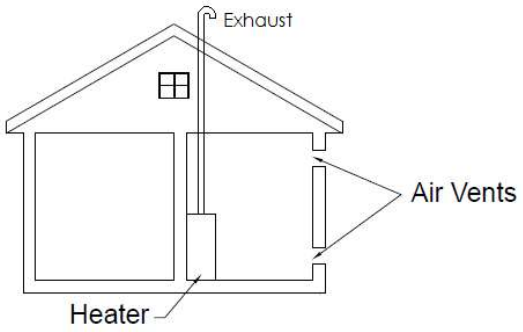
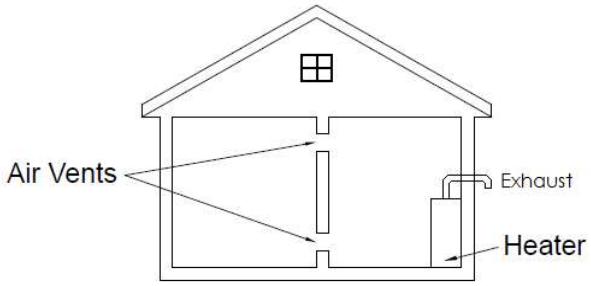
Air Supply from Outside Building (Figure 13)	
When combustion air is supplied directly through an outside wall, such as intake louver openings into the dwelling, each opening should give a minimum free area of one square inch per 4,000 BTU/hour on the total input ratings of all appliances in the enclosed area.	 **Figure 13 – Air Supply from Outside Building**
Air Supply from Inside Building (Figure 14)	
When combustion air is supplied from inside the building, each opening should give a minimum free area of one square inch per 1,000 BTU/hr on the total input ratings of all appliances in the enclosed area. These openings should never be less than 40 sq. in. **NOTE:** The minimum required total space volume without air vents is 50 cu. ft. per every 1,000 BTU/hr.	 **Figure 14 – Air Supply from Inside Building**

Table 11 – Indoor Combustion Air Installation Details

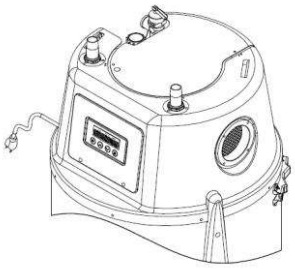
How to Configure the Unit for Power Venting	
To configure the water heater for power vent, leave the air intake open.	 Figure 15 – Unit Configured for Power Venting

Table 12 – Configuring the Unit for Power Venting

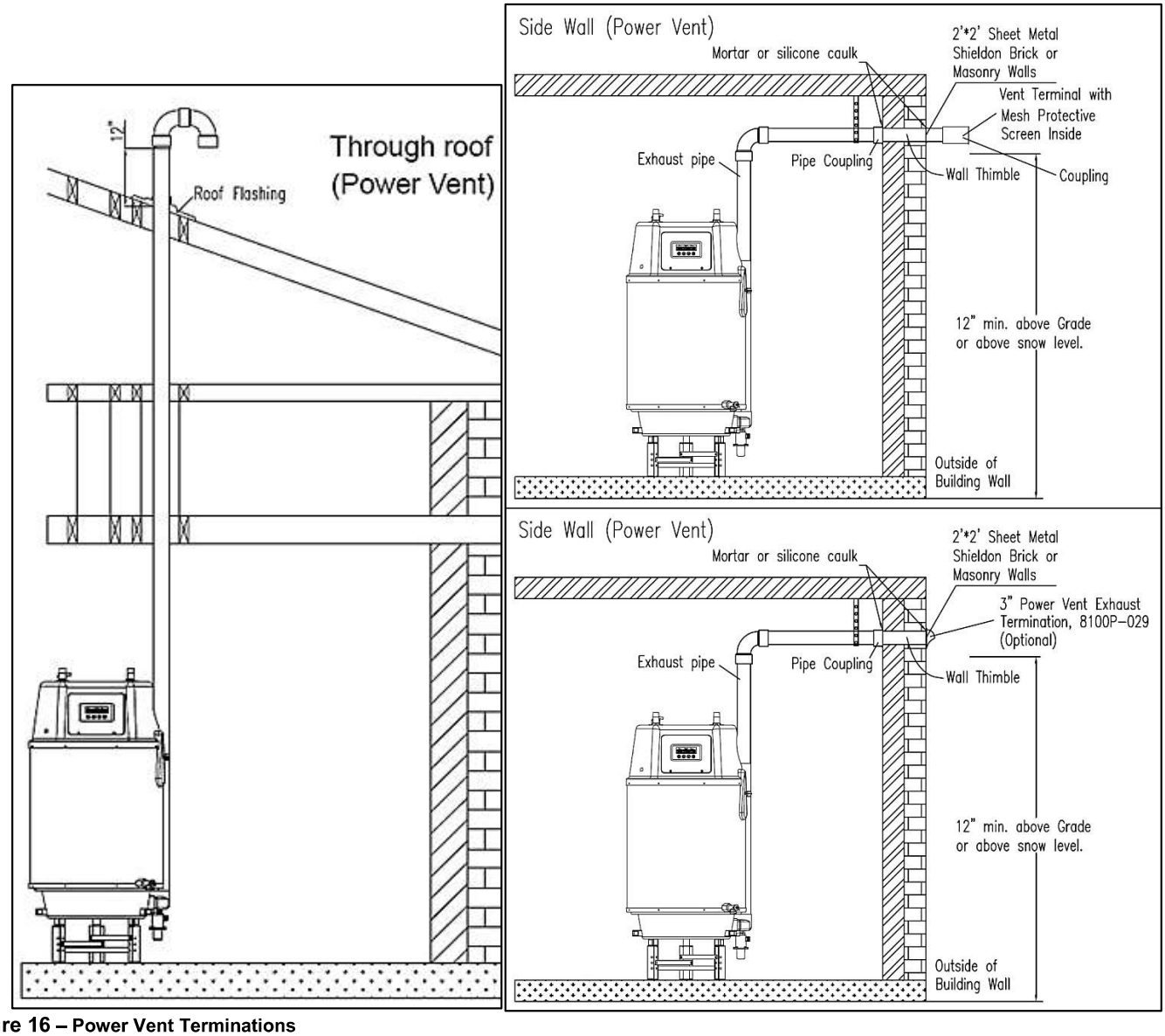


Figure 16 – Power Vent Terminations

⚠ WARNING

All vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of ¼" per foot back to the water heater to allow drainage of condensate. When placing support brackets on vent piping, the first bracket must be within 1 foot of the water heater and the balance at 4 foot intervals on the vent pipe. Water heater venting must be readily accessible for visual inspection for the first three feet from the water heater.

PART 6 – CONDENSATE DISPOSAL

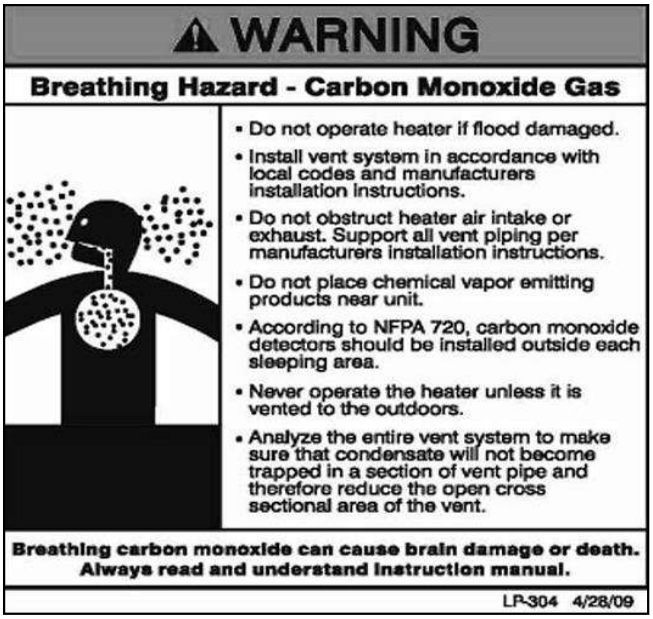
1. This water heater is a high efficiency, fully condensing appliance which produces condensate during operation. The water heater incorporates a collection and removal system of condensate which must be properly drained in order to ensure proper operation of this appliance.

2. Use corrosion-resistant materials to drain condensate. ½" PVC and CPVC drain pipe complying with ASTM D1785 or D2846 may be used. Cement must comply with ASTM D2564 for PVC or ASTM F493 for CPVC. For Canadian applications, use CSA or ULC certified PVC or CPVC pipe, fittings, and cement. DO NOT use steel, black iron, or any other material which can corrode when contacting acidic condensate.

3. Horizontal runs must be sloped ¼" per foot towards the drain or condensate pump.

4. Ensure condensate is freely flowing from the drain piping after the system has been installed. Condensate will begin flowing out of the water heater within 15 minutes after operation has started.

5. An error will appear on the water heater display if condensate line is blocked. The water heater will not operate with a blocked condensate line. It is extremely important to have this condition repaired by a qualified service technician.



⚠ CAUTION

The condensate trap must be filled and unobstructed to allow unrestricted flow of condensate. The condensate should not be subject to freezing conditions. If the condensate is subjected to freezing or obstruction, it will result in potential water damage to the water heater and surrounding area, and possible personal injury. Such damages are not covered under warranty.

The condensate trap must be filled with water prior to using the water heater. Pour water into the exhaust adaptor until it flows out of the condensate drain before using the water heater to fill the trap. See Figure 17.

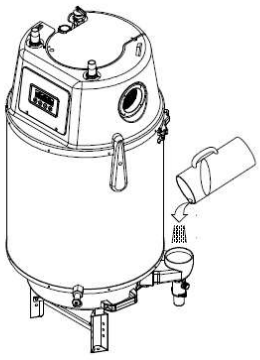


Figure 17 – Filling the Condensate Trap

NOTICE

The condensate drain line material must be an approved material by the AHJ. In absence of such an authority, PVC or CPVC piping must comply with ASTM D1785 or D2846. This pipe must be connected to the condensate trap. The end of the pipe should drain to a laundry tub or floor drain. See Figure 18.

The water heater will typically produce a condensate that is considered slightly acidic with a pH content of approximately 3 – 4. Install a neutralizing filter if required by the AHJ. See Figure 18 below.

Ways to dispose of Condensate:

1. Direct to drain from unit.
2. Drain through neutralizer. Local building codes may require an in-line neutralizer to be installed (not included) to treat the condensate. Follow all the installation instructions included with the neutralizer. If a neutralizer is installed, periodic replacement of the limestone (or neutralizing agent) will be required. The rate of depletion of the limestone varies with usage of the water heater. During the first year of water heater operation, check the neutralizer every few months for depletion.
3. Drain to laundry tub from the unit. In this case, the unit must be higher than the laundry tub.

NOTE: If a nearby laundry tub is used as a disposal for waste water from the washing machine, draining the condensate into this tub allows the soapy water discharge to neutralize the acidic condensate.

4. Long runs, or applications where the nearest drain is above the water heater, will require the use of a condensate pump. Size the pump to allow for a maximum condensate discharge of 2 GPH from the water heater. When installing a condensate pump, ensure the pump is approved for use with a condensing appliance. The pump should be equipped with an overflow switch to prevent property damage from potential condensate spillage. Keep the length of the drain pipe as short as possible.

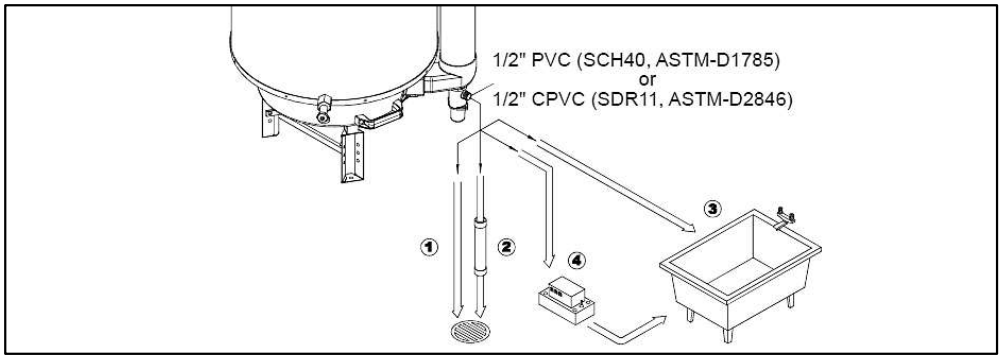


Figure 18 – Condensate Disposal Options

⚠ CAUTION

The end of the condensate drain pipe must not be submerged in water or blocked in any way. Take measures to prevent the condensate drain lines from freezing (insulation, heat tape, etc.)

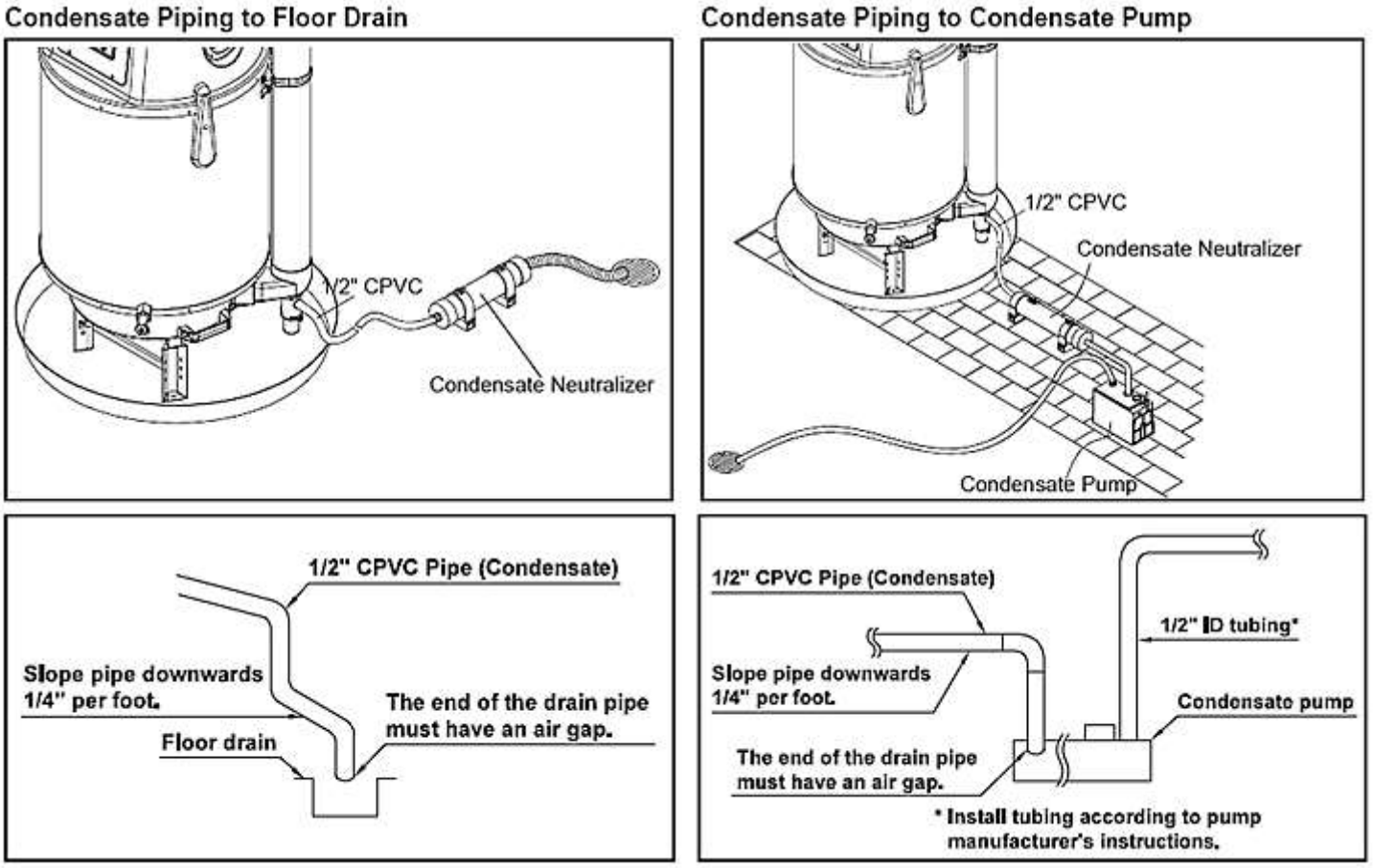


Figure 19 – Condensate Piping Details

PART 7 – GAS PIPING

⚠ WARNING
FIRE AND/OR EXPLOSION HAZARD
To avoid serious injury or death, the gas line installation and the gas line inlet pressure test must be done by a licensed professional.
Always match the water heater with the type of gas supplied to the unit (natural gas or LP gas). This water heater must be converted into propane operation unless it is specifically manufactured to operate on propane. Propane-ready water heaters have the suffix "LP" after the model serial number. Failure to ensure the water heater is set to operate on the provided gas supply could result in property damage, personal injury, or death.
Make sure the gas line pressures are within normal limits. Pressures outside normal limits can result in poor performance and hazardous operating conditions.
A manual gas control valve (shut-off valve) must be connected to the unit before the gas line.
Check the gas inlet pressure and make sure your gas meter is capable of supplying sufficient BTU load to all appliances. Insufficient gas pressure and volume will cause your water heater to be deficient in performance and operation.
When connections are completed check for gas leaks by applying soapy water to all gas fittings and connections. Presence of soap bubbles foaming is a sign of a gas leak.
This water heater and its individual shut-off valve must be isolated from the gas supply piping system by unplugging the unit and turning off the main gas valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ PSI.

A. GAS PIPE SIZING TABLES

1. Gas Pipe Sizing

This information is for reference use only. Refer to gas pipe manufacturer specifications for actual delivery capacity. The DOE standard for Natural Gas is 1100 BTU/ft^3. Contact the local gas supplier for actual BTU/ft^3 rating. Size gas piping system by following ANSI Z223.1/NFPA 54 or local codes.

- When measuring the inlet supply pressure, the water heater and all other gas appliances sharing the gas supply line must be firing at maximum capacity.
- Maximum gas pressure must not exceed listed value.
- Low gas pressure could be caused by an undersized gas pipe. This will cause the water heater's performance to diminish, limiting the ability to reach maximum performance.

2. Natural Gas Pipe Sizing

The following tables list maximum capacity of pipe in cubic feet of gas per hour for gas pressures of 11" or less and a pressure drop of 0.5 inches water column, based on a 0.60 specific gravity for natural gas.

Maximum Natural Gas Delivery Capacity – Length of Corrugated Stainless Steel Pipe in Feet										
Pipe Size	Cubic Feet per Hour (0.60 Specific Gravity, 0.5 WC Pressure Drop)									
	10	20	30	40	50	60	80	100	150	200
½"	82	58	47	41	37	37	29	26	20	18
¾"	192	137	112	97	87	80	69	62	48	44
1"	383	269	218	188	168	153	132	118	91	82
1 ¼"	639	456	374	325	292	267	232	208	171	148
1 ½"	1260	888	723	625	559	509	440	393	320	277
2"	2930	2080	1700	1470	1320	1200	1040	933	762	661

Table 13 – Natural Gas Delivery Capacity – Corrugated Stainless Steel Pipe – Refer to ANSI Z223.1 – National Fuel Gas Code, Latest Edition

Maximum Natural Gas Delivery Capacity – Length of Black Iron Pipe (Sch. 40 Metallic) in Feet										
Pipe Size	Cubic Feet per Hour (0.60 Specific Gravity, 0.5 WC Pressure Drop)									
	10	20	30	40	50	60	80	100	150	200
½"	172	118	95	81	72	65	56	50	40	34
¾"	360	247	199	170	151	137	117	104	83	71
1"	678	466	374	320	284	257	220	195	157	134
1 ¼"	1390	957	768	657	583	528	452	400	322	275
1 ½"	2090	1430	1150	985	873	791	677	600	482	412
2"	4020	2760	2220	1900	1680	1520	1300	1160	928	794

Table 14 – Natural Gas Delivery Capacity – Black Iron Pipe – Refer to ANSI Z223.1 – National Fuel Gas Code, Latest Edition

3. LP (Liquid Propane) Gas Pipe Sizing

The following is intended for use for piping between a Single or Second Stage (Low Pressure) Regulator and the water heater. The following tables list maximum capacity of pipe in cubic feet of gas per hour for an inlet pressure of 14 inches water column and specific pressure drop of 0.5 inches water column based on 1.5 specific gravity for liquid propane.

Maximum Liquid Propane Delivery Capacity – Length of Corrugated Stainless Steel Pipe in Feet										
Pipe Size	Cubic Feet per Hour (1.5 Specific Gravity, 0.5 WC Pressure Drop)									
	10	20	30	40	50	60	80	100	150	200
½"	129	91	74	64	58	53	45	41	31	28
¾"	303	216	177	153	137	126	109	98	75	69
1"	605	425	344	297	265	241	208	186	143	129
1 ¼"	971	661	528	449	397	359	307	270	217	183
1 ½"	1990	1400	1140	988	884	805	696	621	506	438
2"	4640	3290	2680	2330	2080	1900	1650	1480	1210	1050

Table 15 – Liquid Propane Delivery Capacity – Corrugated Stainless Steel Pipe – Refer to ANSI Z223.1 – National Fuel Gas Code, Latest Edition

Maximum Liquid Propane Delivery Capacity – Length of Black Iron Pipe (Sch. 40 Metallic) in Feet										
Pipe Size	Cubic Feet per Hour (1.5 Specific Gravity, 0.5 WC Pressure Drop)									
	10	20	30	40	50	60	80	100	150	200
½"	291	200	160	137	122	110	101	94	84	67
¾"	608	418	336	287	255	231	212	197	175	140
1"	1150	787	632	541	480	434	400	372	330	265
1 ¼"	2350	1620	1300	1110	985	892	821	763	677	543
1 ½"	3520	2420	1940	1660	1480	1340	1230	1140	1010	814
2"	6790	4660	3750	3210	2840	2570	2370	2200	1950	1570

Table 16 – Liquid Propane Delivery Capacity – Black Iron Pipe – Refer to ANSI Z223.1 – National Fuel Gas Code, Latest Edition

B. LP GAS CONVERSION

⚠ WARNING

The following instructions MUST BE FOLLOWED when converting the water heater from Natural Gas to Propane. Improper fuel conversions could result in property damage, severe personal injury, or death.

Contact the local propane gas supplier for recommended sizing of piping, tanks, and 100% gas regulator. Adjust the propane supply regulator provided by the gas supplier for 13" w.c. maximum pressure.

It is required to use a combustion analyzer to verify final adjustment according to the combustion chart (Table 18).

An LP Gas Conversion Kit is included in the accessory box. Conversion can only be completed by a qualified licensed professional.

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

How to Convert the Water Heater to LP Gas Operation	
1. Remove top service panel by loosening five (5) screws.	2. Locate the gas valve towards the lower left of the unit.

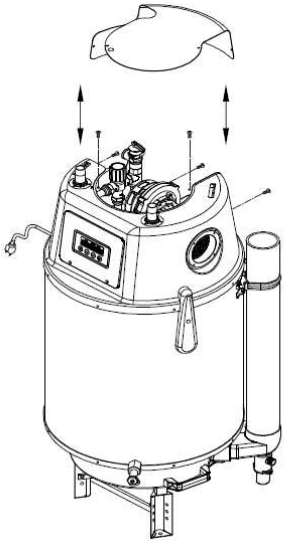


Figure 20 – Removing the Top Service Panel

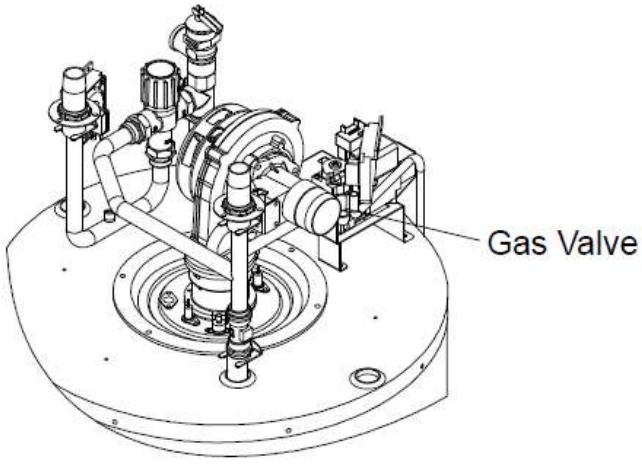


Figure 21 – Locate the Gas Valve

3. Loosen the two nuts connecting the gas tube to the gas valve.

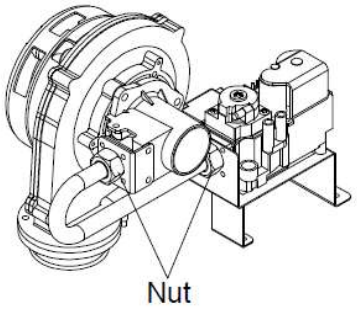


Figure 22 – Gas Valve Nut Locations

4. Insert the LP orifice into the nozzle. Retighten the gas tube and ensure there are no gas leaks.

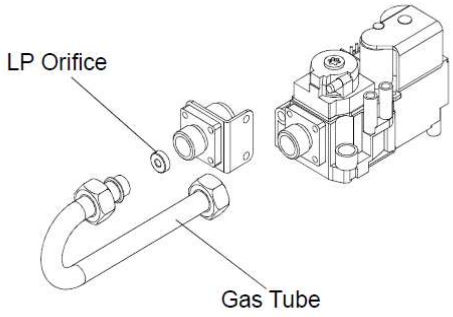


Figure 23 – Inserting the LP Orifice

5. Reassemble the top service panel and apply the LP label which is in the accessory kit.

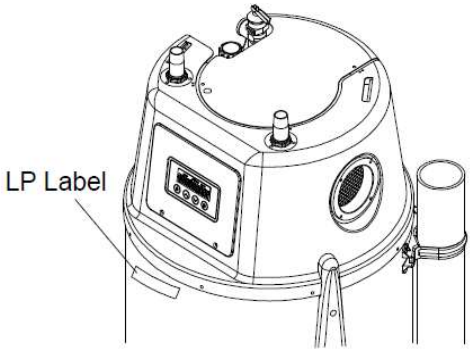
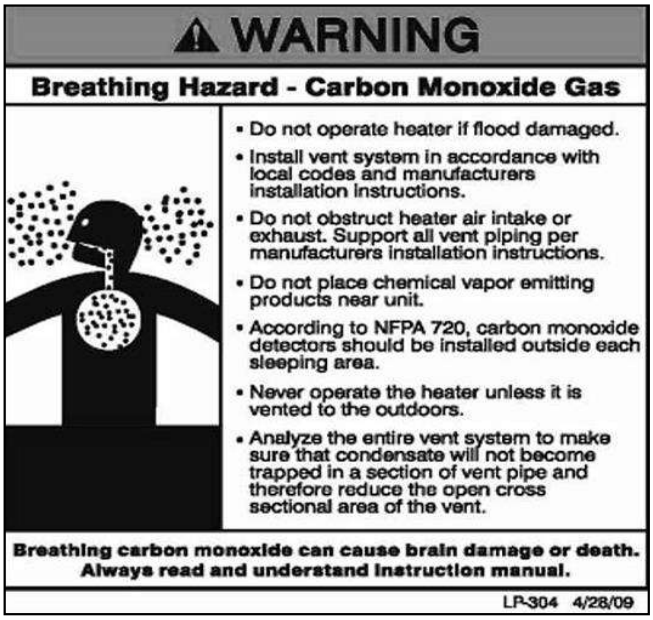


Figure 24 – Reassembled Top Service Panel and Applied LP Label

⚠ WARNING

Prior to start-up, ensure the unit is set to fire on propane. Check the rating label for the type of fuel. Use a combustion analyzer to ensure the CO / CO2 limits are within the limits listed in Table 18. If there is a conflict or doubt on the setup, remove the gas tube and check for the propane orifice. Failure to ensure proper setup could result in property damage, severe personal injury, or death.



C. GAS CONNECTION REQUIREMENTS

1. The gas connection fitting on the water heater is ¾" female NPT. **NOTE:** A ¾" x ½" reducer is provided with the water heater for connection to ½" gas lines. It is important to review the gas table to ensure that the gas line is properly sized for the BTU output of the water heater.

2. The supply line must be sized for the maximum output of the water heater being installed. If there are additional gas appliances from the main supply line, measure the size of the supply line according to the COMBINED total maximum BTUH draw for the appliances as if they were operating at the same time.

3. Measure the length of the gas supply line from the

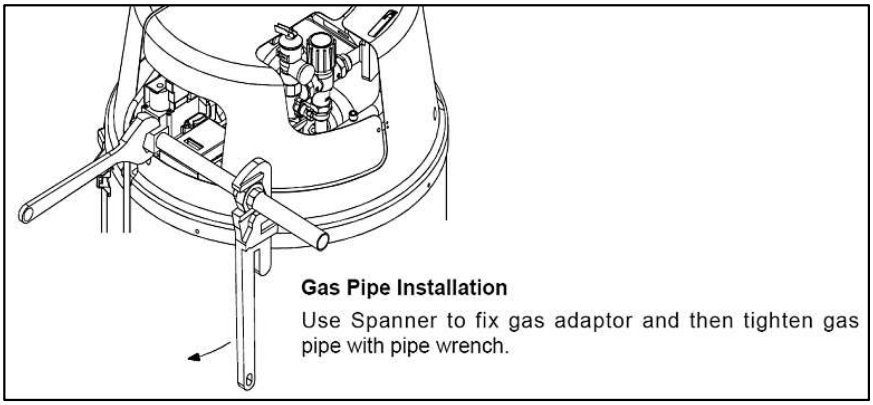


Figure 25 – Installing the Gas Line to the Water Heater

gas meter to the water heater. Water heater must be installed downstream of the gas meter to ensure adequate gas supply. Use the tables in this manual or refer to the gas line manufacturer's sizing information to determine the correct supply pipe size.

4. A manual gas shut-off valve should be installed in the gas supply line close to the water heater.

5. To facilitate any future maintenance, it is also recommended that an approved gas union fitting be installed in the supply line between the shut-off valve and the connection on the water heater.

6. Test the gas pressure to make sure it meets the minimum standards and does not exceed the maximum standards of the water heater.

7. Leak test the gas line pipe before placing the water heater in operation. Only use approved leak detector liquid solutions to check for leaks.

8. Do not operate the water heater until all connections have been completed and the water heater is filled with water.

D. ADDITIONAL PRECAUTION FOR EXCESS FLOW VALVE (EFV)

If an excess flow valve (EFV) is in the gas line, check the manufacturer's minimum and maximum flow capacity ratings. An improperly sized EFV will not allow for a full flow of gas to the water heater and will cause the water heater to malfunction. See Figure 26.

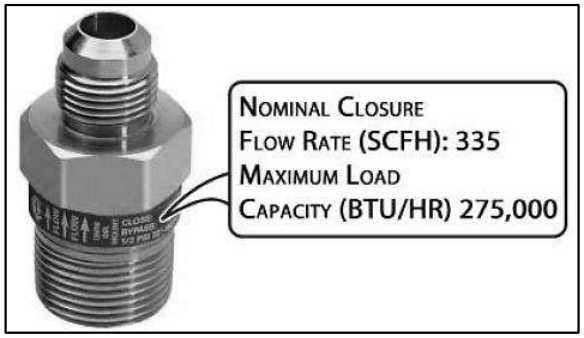


Figure 26 – Excess Flow Valve (EFV)

E. ADJUSTING GAS PRESSURE AT THE WATER HEATER

NOTE: Refer Figure 27 when adjusting gas pressure. Loosen the bolts before checking the gas inlet pressure.

1. The water heater and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressures greater than ½ psi (3.5 kPa).

2. The water heater must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psi (3.5 kPa).

The minimum and maximum inlet gas line pressures must meet the requirements shown in Table 17.

LP GAS		NATURAL GAS	
Minimum Pressure	3.5" WC	Minimum Pressure	3.5" WC
Maximum Pressure	14" WC	Maximum Pressure	14" WC

Table 17 – Gas Pressure Requirements

NOTICE

Do not fire (operate) the water heater until all connections have been completed and the water heater is filled with water. Doing so will damage the water heater and void the warranty.

F. SETTING AND VERIFYING THE COMBUSTION SETTING

1. After the water heater has fired, flip DIP switch three (3) in Group 1 to the ON position (low fire). Proceed to check heater combustion values.

NOTE: Use a combustion analyzer to ensure CO and CO_2 values are within the range shown in Table 18.

⚠ WARNING

It is required to use a combustion analyzer to verify final adjustment according to the combustion chart (Table 18). Failure to do so could result in serious personal injury or death.

If the readings obtained are lower or higher than the combustion readings in Table 18, use a T40 Torx Screwdriver to adjust the offset screw in a clockwise (positive) or counterclockwise (negative) direction (approximately 1/4 turn). See Figure 27. Check your combustion values. Repeat this procedure until the values obtained on the combustion analyzer agree with those stated in Table 18.

NOTE: If the heater makes a whistling sound (harmonics) at low fire, adjust the offset screw in a clockwise (positive) direction (approximately 1/8 turn). Check your combustion values and ensure they agree with those stated in Table 18 before proceeding.

⚠ WARNING

It is very important that the combustion system be set within the recommended CO measurements listed in Table 18. Visually looking at the burner does not determine combustion quality. Failure to measure combustion with a Combustion Analyzer and set the throttle within the recommended CO measurements could result in property damage, severe personal injury, or death.

COMBUSTION SETTINGS				
	NATURAL GAS		LP GAS	
FAN SPEED	LOW	HIGH	LOW	HIGH
CO PPM	≤30	≤50	≤50	≤100
CO_2 (%)	8 – 9 ½	8 ½ - 10	9 – 10 ½	9 ½ - 11

Table 18 – Combustion Settings

2. When low fire settings have been obtained, flip DIP switch three (3) in Group 1 to its original (OFF) position. This will return the heater to normal operation.

3. Open a hot water faucet or faucets and run hot water at more than 2 gpm to put the water heater into high fire. Again check combustion readings with a combustion analyzer.

NOTE: DO NOT adjust the gas valve offset screw at high fire. The offset screw is only used to adjust combustion values at low fire. Any adjustments to the gas valve MUST BE VERIFIED with a Combustion Analyzer.

4. When complete, turn off the hot water faucet(s). Allow the water heater to operate normally. Ensure it is operating properly.

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

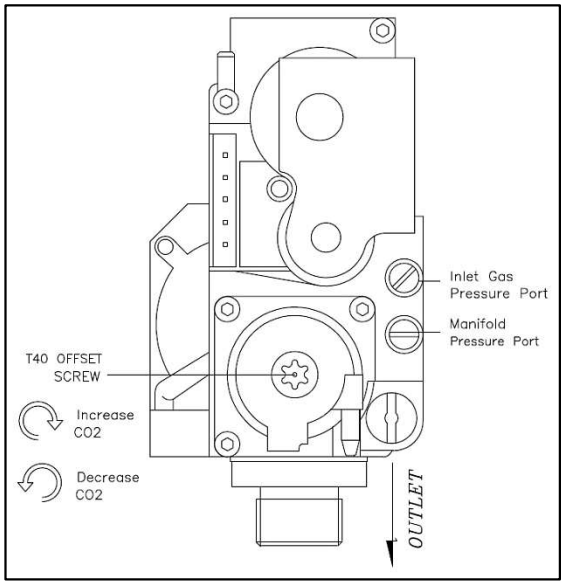


Figure 27 – Gas Valve Offset Screw

PART 8 – WATER PIPING

A. THERMAL EXPANSION

Determine if a check valve exists in the cold inlet water line. Check with your local water utility company. It may have been installed in the cold water line as a separate backflow preventer, or it may be part of a pressure reducing valve, water meter, or water softener. A check valve located in the cold water inlet line can cause what is referred to as a "**closed water system**". A cold water inlet line with no check valve or backflow prevention device is referred to as an "**open water system**".

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

A closed water system, however, prevents the expanding water from flowing back into the main supply line, and the result of thermal expansion can create a rapid and dangerous pressure increase in the water heater and system piping. This rapid pressure increase can quickly reach the safety setting of the relief valve, causing it to operate during each heating cycle. Thermal expansion, and the resulting rapid and repeated expansion and contraction of components in the water heater and piping system, can cause premature failure of the relief valve and possibly the heater itself. Replacing the relief valve will not correct the problem of thermal expansion.

The suggested method of controlling thermal expansion is to install an expansion tank in the cold water line between the water heater and the check valve. See Figure 35. The expansion tank is designed with an air cushion built-in that compresses as the system pressure increases, thereby relieving the over pressure condition and eliminating the repeated operation of the relief valve. Other methods of controlling thermal expansion are also available. Contact your installing contractor, water supplier, or plumbing inspector for additional information regarding this subject.

B. WATER SUPPLY CONNECTIONS

CAUTION

Do not install this water heater with iron or galvanized piping, or galvanized or dielectric unions. Doing so will result in system problems, property damage, and premature water heater failure. Such problems ARE NOT covered by product warranty.

- The water cold inlet and hot outlet fittings are ¾" NPT.
- When installing more than one water heater to supply higher volumes of hot water in residential applications, the number of water heaters required and the header pipe sizing needs to be properly sized to meet the total hot water demand.

- All pipes, pipe fittings, valves, and other components including solder, must be approved for use in potable water systems.
- The use of unions and manual shut-off valves on both the cold water inlet and hot water outlet are recommended.
- It is recommended to use of brass, stainless steel, or copper unions / nipples in the water heater system.
- Take measures to prevent water pipes from freezing.
- Pipes must be cleaned and without blemish before any connections are made.
- Do not apply a torch within 12" of the connections of the water heater. Doing so could damage the water heater. Such damages ARE NOT covered by product warranty.
- The size of the water pipes should be ¾" diameter.
- Isolation (shutoff valves) should be used to ease future servicing.
- All water piping should be insulated to prevent freezing and increase efficiency.

CAUTION

Ensure the cold water inlet and hot water outlet pipes are not reversed. Doing so will cause the water heater to operate improperly and void warranty. Ensure the hot and cold lines are connected properly.

C. INSTALL A BACKFLOW PREVENTER

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

⚠ WARNING

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

D. PIPING THE WATER HEATER

CAUTION

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

Use both thread tape and pipe dope to connect to the ¾" domestic water inlet and outlet. Isolation valves between the city water supply and tank inlet are recommended for ease of service.

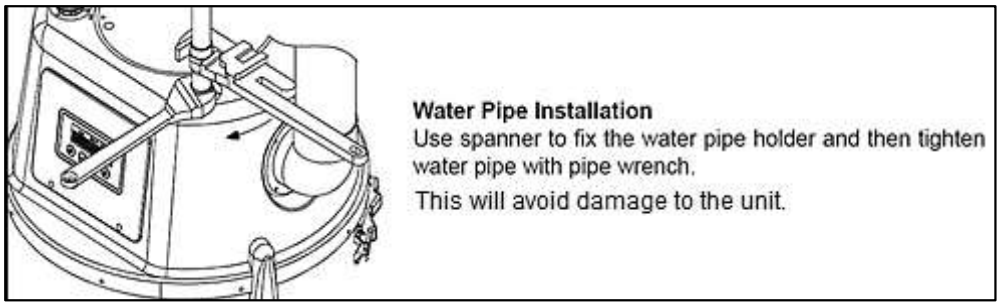


Figure 28 – Installing the Water Pipes

E. APPLICATIONS

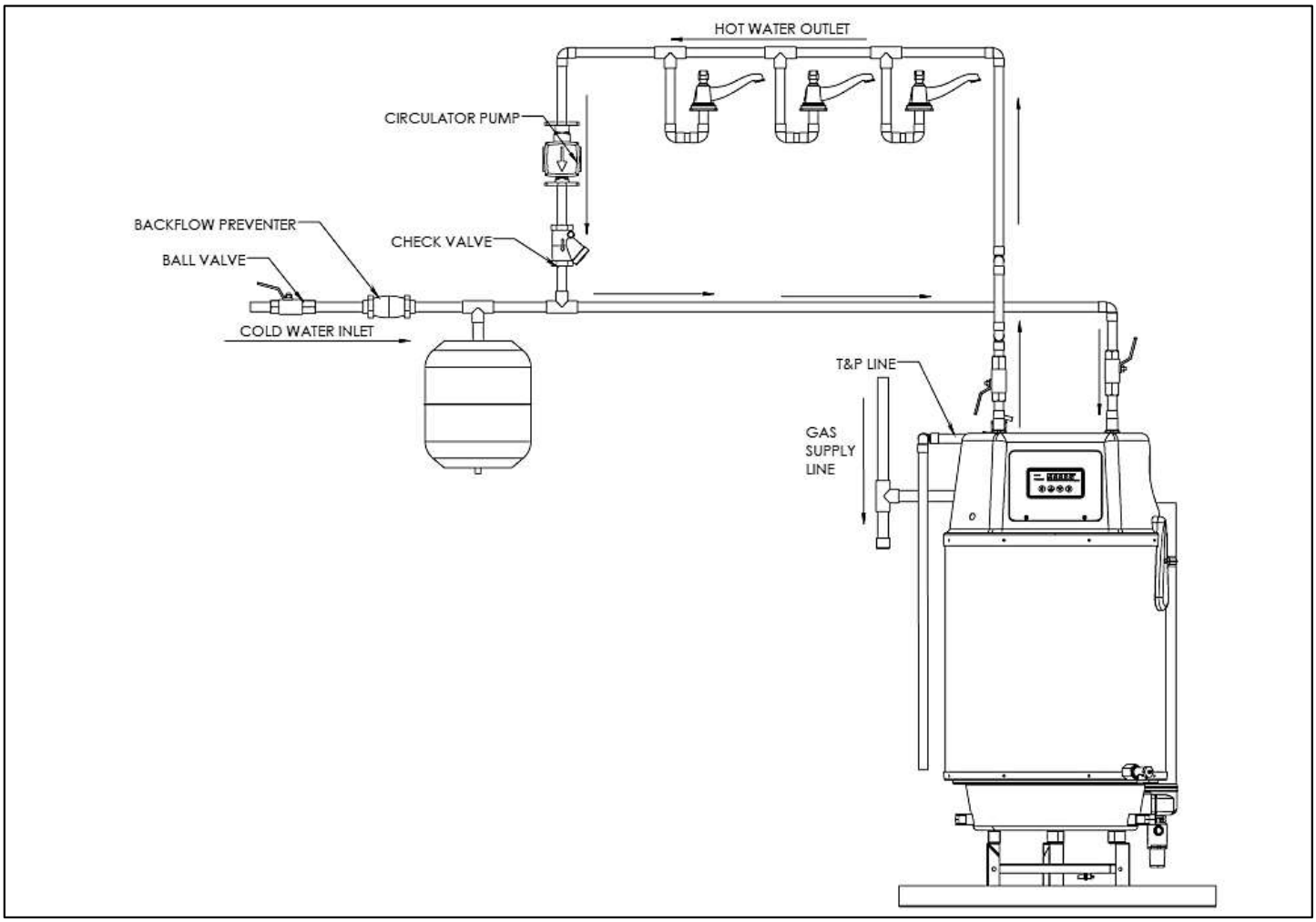


Figure 29 – Piping with Recirculation

NOTES:
1. Minimum pipe size should match connection size. Upsize pipe accordingly if greater flow is required.
2. A thermal expansion tank suitable for potable water must be sized and installed within this piping system between the backflow preventer and the cold water inlet.
3. All circulators should have an integral flow check.
4. Drains and check valve between water heater and piping will assist in purging air from system.
5. These drawings are meant to demonstrate system piping only. The installer is responsible for all equipment and detailing required by local codes. In Massachusetts, you must install a vacuum breaker per 248 CMR.
6. Always shut off power to the water heater or isolate the heater from the system if ANY plumbing work is to be done. Running the water heater without water will result in dry-firing.
7. Thermostatic mixing valve should be set 5°F below the maximum stored tank temperature setpoint. For example: 125°F stored tank temperature setpoint = 120°F thermostatic mixing valve setpoint.

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

CAUTION
Pump control such as aquastat or timer must be used in recirculation applications or long burner runtime will occur and cause premature failure. Daily usage should not exceed 6 hours of burner runtime. Failure to comply WILL VOID product warranty.

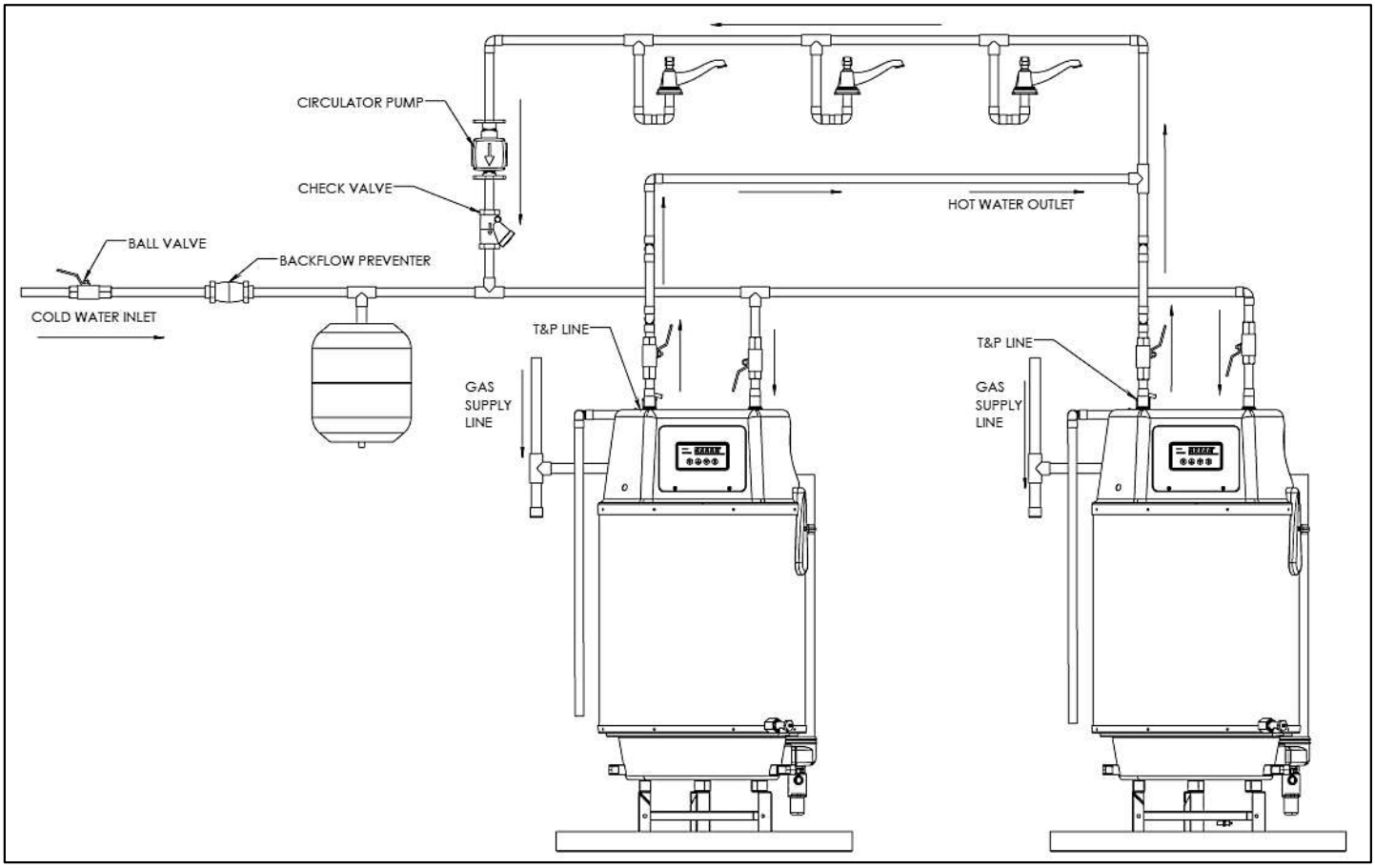


Figure 30 – Two Water Heaters with Recirculation

NOTES:
1. Minimum pipe size should match connection size. Upsize pipe accordingly if greater flow is required.
2. A thermal expansion tank suitable for potable water must be sized and installed within this piping system between the backflow preventer and the cold water inlet.
3. All circulators should have an integral flow check.
4. Drains and check valve between water heater and piping will assist in purging air from system.
5. These drawings are meant to demonstrate system piping only. The installer is responsible for all equipment and detailing required by local codes. In Massachusetts, you must install a vacuum breaker per 248 CMR.
6. Always shut off power to the water heater or isolate the heater from the system if ANY plumbing work is to be done. Running the water heater without water will result in dry-firing.
7. Thermostatic mixing valve should be set 5°F below the maximum stored tank temperature setpoint. For example: 125°F stored tank temperature setpoint = 120°F thermostatic mixing valve setpoint.

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

CAUTION
Pump control such as aquastat or timer must be used in recirculation applications or long burner runtime will occur and cause premature failure. Daily usage should not exceed 6 hours. Failure to comply WILL VOID product warranty.

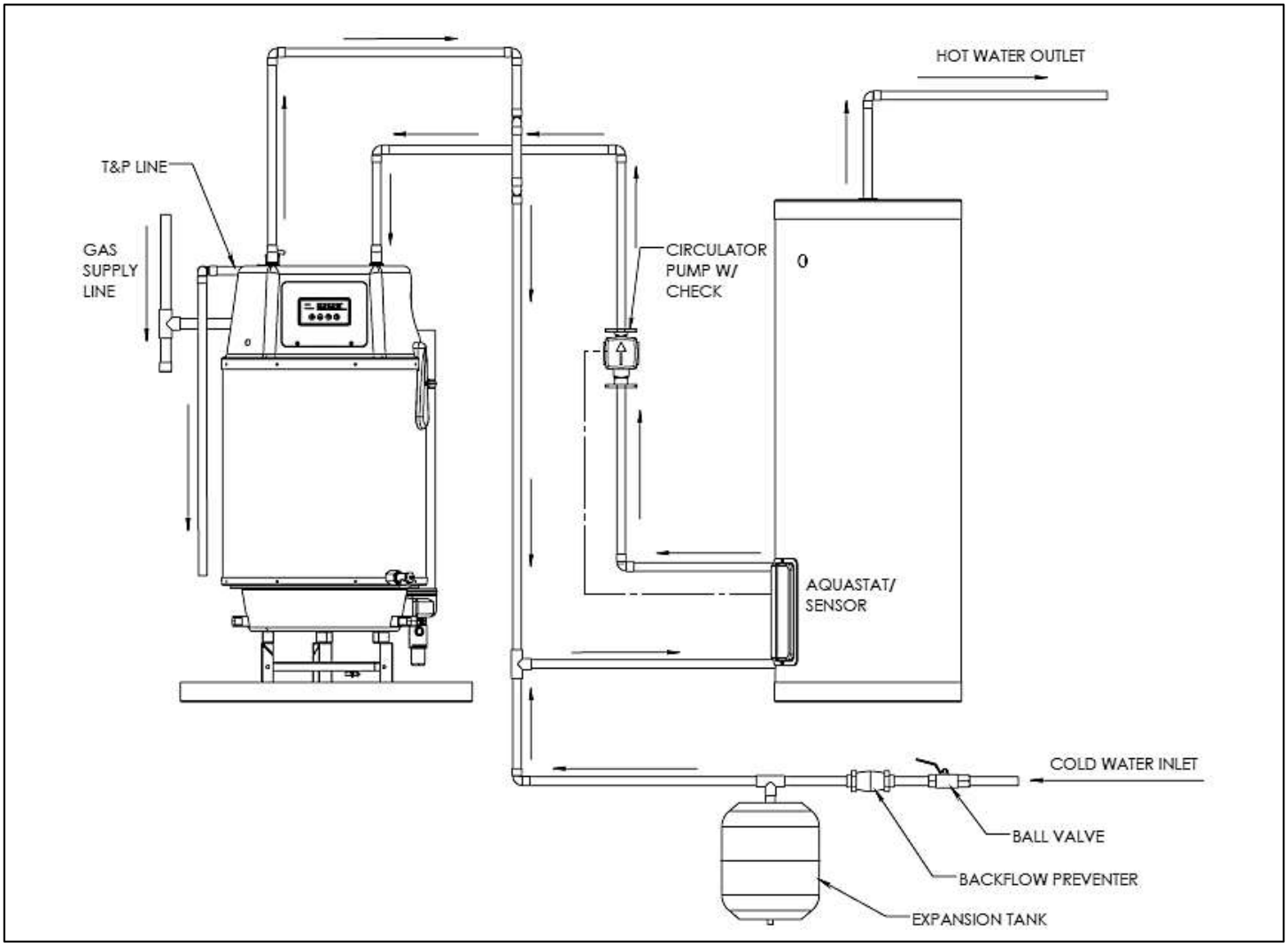


Figure 31 – Water Heater with Storage Tank

NOTES:
1. Minimum pipe size should match connection size. Upsize pipe accordingly if greater flow is required.
2. A thermal expansion tank suitable for potable water must be sized and installed within this piping system between the backflow preventer and the cold water inlet.
3. All circulators should have an integral flow check.
4. Drains and check valve between water heater and piping will assist in purging air from system.
5. These drawings are meant to demonstrate system piping only. The installer is responsible for all equipment and detailing required by local codes. In Massachusetts, you must install a vacuum breaker per 248 CMR.
6. Always shut off power to the water heater or isolate the heater from the system if ANY plumbing work is to be done. Running the water heater without water will result in dry-firing.
7. Thermostatic mixing valve should be set 5°F below the maximum stored tank temperature setpoint. For example: 125°F stored tank temperature setpoint = 120°F thermostatic mixing valve setpoint.

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

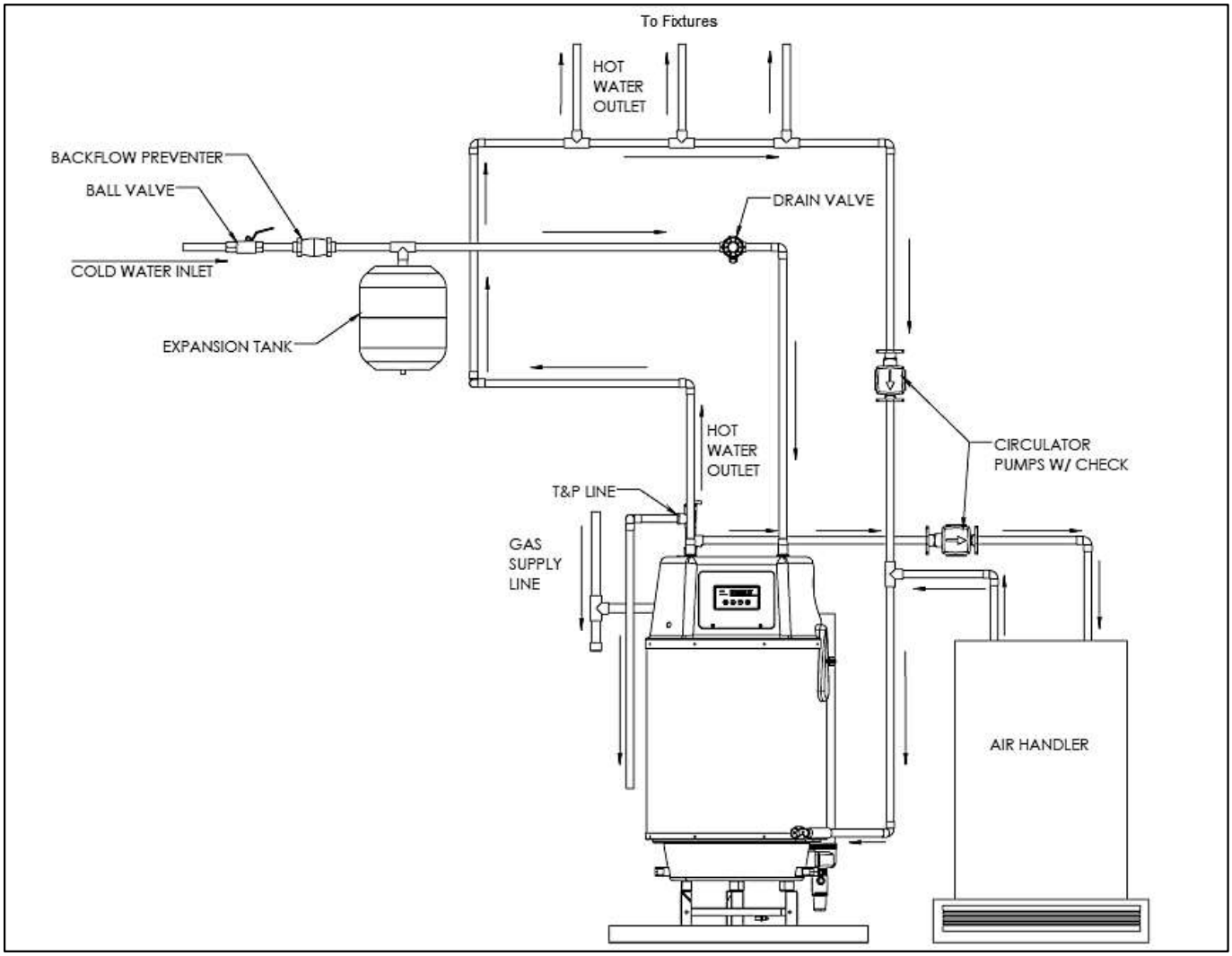


Figure 32 – Water Heater with Air Handler and Multiple Outlets

NOTES:
1. The Heating Application Kit (Part # 8100P-049, not included with the water heater) MUST BE installed when using an air handler. Failure to install the Heating Application Kit when using the water heater for heating applications WILL VOID product warranty.
2. Minimum pipe size should match connection size. Upsize pipe accordingly if greater flow is required.
3. A thermal expansion tank suitable for potable water must be sized and installed within this piping system between the backflow preventer and the cold water inlet.
4. All circulators should have an integral flow check.
5. Drains and check valve between water heater and piping will assist in purging air from system.
6. These drawings are meant to demonstrate system piping only. The installer is responsible for all equipment and detailing required by local codes. In Massachusetts, you must install a vacuum breaker per 248 CMR.
7. Always shut off power to the water heater or isolate the heater from the system if ANY plumbing work is to be done. Running the water heater without water will result in dry-firing.
8. Thermostatic mixing valve should be set 5°F below the maximum stored tank temperature setpoint. For example: 125°F stored tank temperature setpoint = 120°F thermostatic mixing valve setpoint.

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

NOTES FOR AIR HANDLER APPLICATION:
1. MASSACHUSETTS STATE PLUMBING CODE REQUIRES A DISTANCE NO GREATER THAN 50 FEET FROM THE WATER HEATER TO THE FAN COIL IN THE AIR HANDLER.
2. MASSACHUSETTS STATE PLUMBING CODE REQUIRES AN ELECTRONICALLY TIMED CIRCULATOR PUMP TO ACTIVATE EVERY SIX HOURS FOR 60 SECONDS. THIS CIRCULATOR IS REQUIRED TO BE BRONZE OR STAINLESS.
3. ALL WATER PIPING MUST BE INSULATED.
4. YOU MUST INSTALL A VACUUM BREAKER PER 248 CMR.

NOTE: THIS DRAWING IS MEANT TO DEMONSTRATE SYSTEM PIPING ONLY. THE INSTALLER IS RESPONSIBLE FOR ALL EQUIPMENT AND DETAILING REQUIRED BY LOCAL CODES.

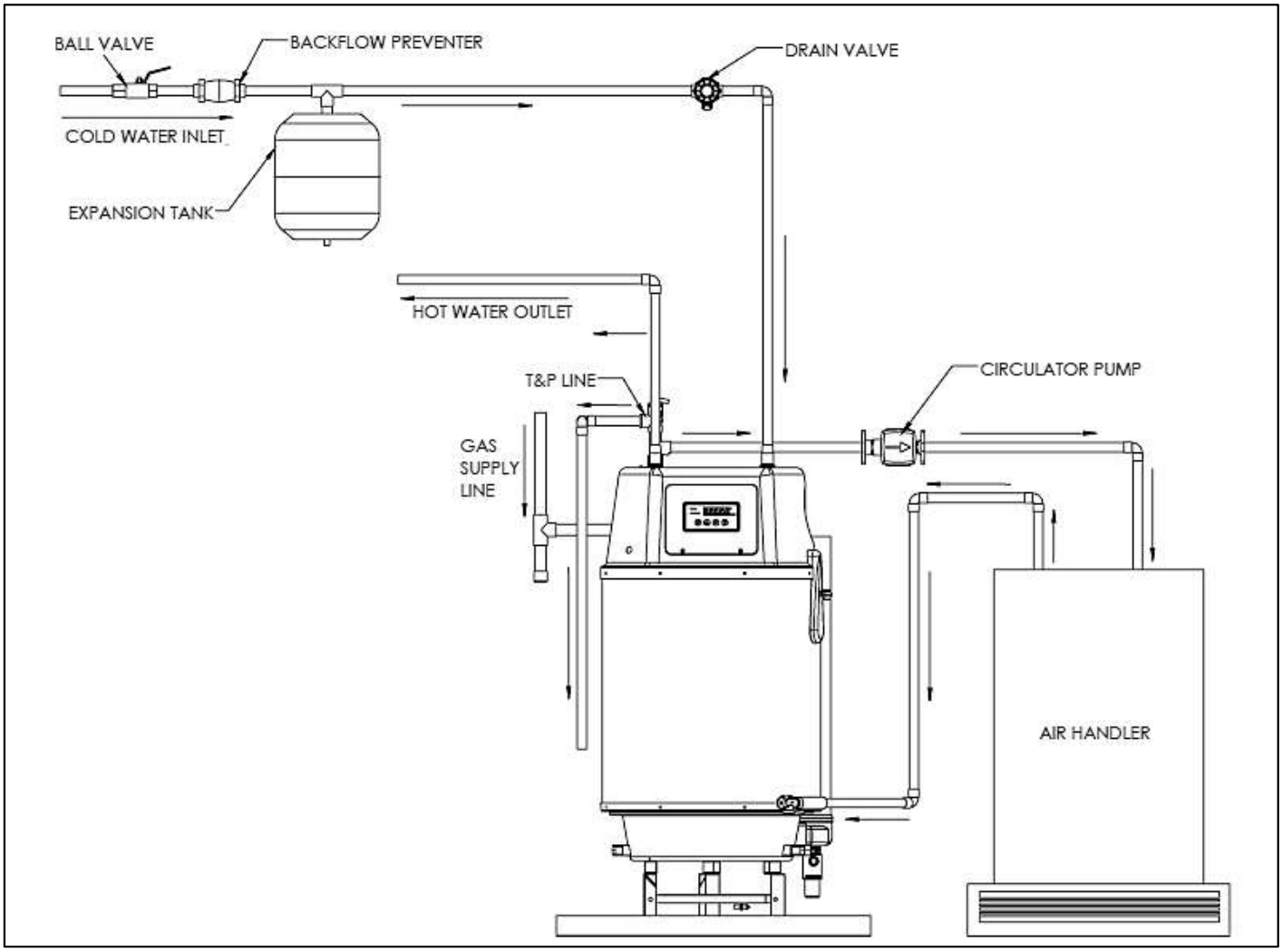


Figure 33 – Water Heater with Air Handler and Multiple Outlets

NOTES:
1. The Heating Application Kit (Part # 8100P-049, not included with the water heater) MUST BE installed when using an air handler. Failure to install the Heating Application Kit when using the water heater for heating applications WILL VOID product warranty.
2. Minimum pipe size should match connection size. Upsize pipe accordingly if greater flow is required.
3. A thermal expansion tank suitable for potable water must be sized and installed within this piping system between the backflow preventer and the cold water inlet.
4. All circulators should have an integral flow check.
5. Drains and check valve between water heater and piping will assist in purging air from system.
6. These drawings are meant to demonstrate system piping only. The installer is responsible for all equipment and detailing required by local codes. In Massachusetts, you must install a vacuum breaker per 248 CMR.
7. Always shut off power to the water heater or isolate the heater from the system if ANY plumbing work is to be done. Running the water heater without water will result in dry-firing.
8. Thermostatic mixing valve should be set 5°F below the maximum stored tank temperature setpoint. For example: 125°F stored tank temperature setpoint = 120°F thermostatic mixing valve setpoint.

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

NOTES FOR AIR HANDLER APPLICATION:
1. MASSACHUSETTS STATE PLUMBING CODE REQUIRES A DISTANCE NO GREATER THAN 50 FEET FROM THE WATER HEATER TO THE FAN COIL IN THE AIR HANDLER.
2. MASSACHUSETTS STATE PLUMBING CODE REQUIRES AN ELECTRONICALLY TIMED CIRCULATOR PUMP TO ACTIVATE EVERY SIX HOURS FOR 60 SECONDS. THIS CIRCULATOR IS REQUIRED TO BE BRONZE OR STAINLESS.
3. ALL WATER PIPING MUST BE INSULATED.
4. YOU MUST INSTALL A VACUUM BREAKER PER 248 CMR.

NOTE: THIS DRAWING IS MEANT TO DEMONSTRATE SYSTEM PIPING ONLY. THE INSTALLER IS RESPONSIBLE FOR ALL EQUIPMENT AND DETAILING REQUIRED BY LOCAL CODES.

F. TEMPERATURE AND PRESSURE RELIEF VALVE

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

This water heater must be provided with an approved 210°F, 150 psi, ¾" ANSI Z21.22 certified temperature and pressure relief valve. An approved valve is manufactured by WATTS, part # TP1700. The T&P valve must be installed on the port on the water heater provided for this purpose.

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

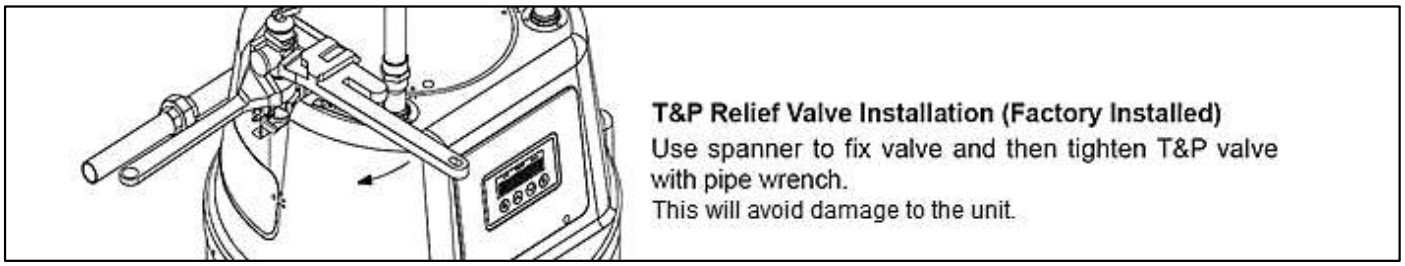


Figure 34 – Relief Valve Installation Details

⚠ WARNING

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

- Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the relief valve discharge.
- Discharge line must be as short as possible and the same size as the valve discharge connection throughout its entire length.
- Discharge line must pitch downward from the valve and terminate at least 6" above the floor drain, making discharge clearly visible.
- Discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375°F or greater.
- Do not pipe discharge to any location where freezing could occur.
- No shutoff valve may be installed between the relief valve and water heater or in the discharge line. Do not plug or place any obstruction in the discharge line.
- Test the operation of the relief valve after filling and pressurizing the system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve.
- Test relief valve at least once annually to ensure the waterway is clear. If valve does not operate, turn the water heater "off" **and call a plumber immediately.**
- Take care whenever operating relief valve to avoid scalding injury or property damage.
- For water heaters installed with only a pressure relief valve, the separate storage vessel must have a temperature and pressure relief valve installed. This relief valve shall comply with *Relief Valves for Hot Water Supply Systems, ANSI Z21.22 CSA4.4.*

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

G. TYPICAL INSTALLATION

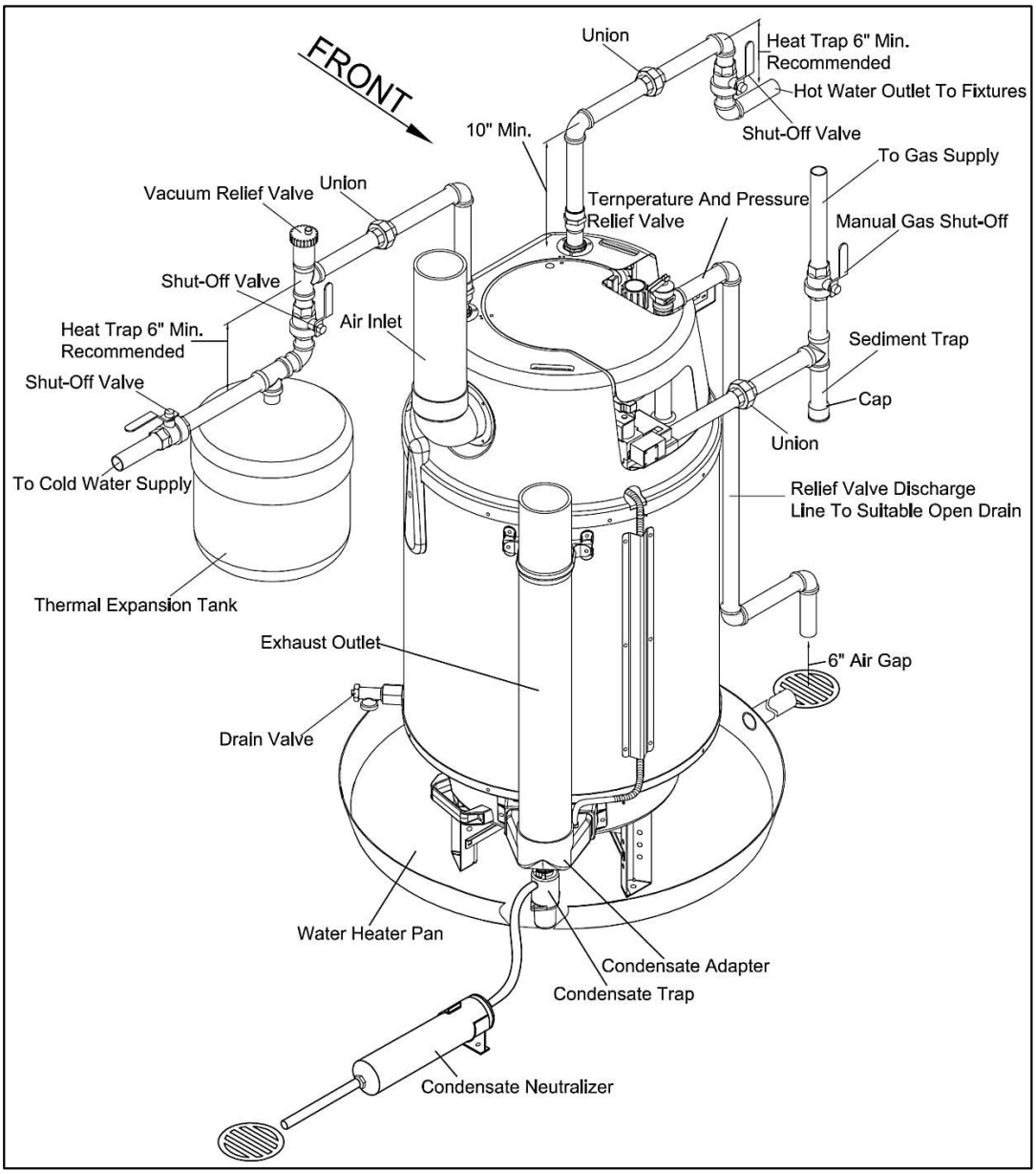


Figure 35 - Typical Water Heater Installation, with Catch Pan and Condensate Neutralizer

H. FILLING THE WATER HEATER

⚠ WARNING

Ensure the water heater is full of water before operating it. Failure to do so will damage the heater. Such damage IS NOT covered by warranty, and could result in property damage, serious personal injury, or death.

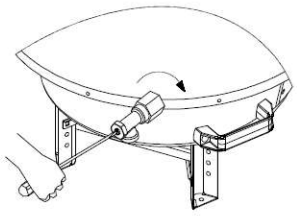
1. Close the water heater drain valve by turning the knob to the right. The drain valve is on the lower right side of the water heater. Refer to the figure below.
2. Open the cold water supply valve to the water heater.
3. To ensure complete filling of the tank, allow air to purge by opening the nearest hot water faucet. Allow water to run until a constant, smooth flow is obtained.
4. Check all new water piping for leaks. Repair as needed.

CAUTION

Be certain there are no loose particles or dirt in the piping. Keep a copper pipe diameter of NPT ¾" diameter to allow full flow. If the hot and cold connections are reversed the water heater will not work properly. Be sure to connect them correctly.

I. DRAINING THE WATER HEATER

1. Close water supply shut-off valve to the water heater.
2. Connect garden hose to the drain valve located on the lower left side of the unit.
3. Open the valve with a flat heat screwdriver.
4. After draining the tank, turn the drain valve body clockwise by hand to remove the drain valve from the unit and clean the filter.

CAUTION	
Do not open the drain valve without connecting a hose so that water can be diverted to an area where water damage is not a problem. Use a flat head screwdriver to open and close the drain valve. Do not remove the drain valve from the unit without first draining the water heater. ONLY remove the drain valve by hand. Failure to follow these instructions could result in leakage or property damage. Such damages ARE NOT covered by product warranty.	 **Figure 36 – Closing Drain Valve**

PART 9 – CONNECT ELECTRICAL POWER / INITIAL STARTUP

⚠ WARNING
Install wiring and electrically ground water heater in accordance with the authority having jurisdiction or, in the absence of such an authority, follow the National Electrical Code, NFPA 70, and/or CSA C22.1 Electrical Code-Part 1 in Canada. Failure to follow all applicable local, state, and national regulations, mandates, and building supply codes for guidelines to install the electrical power supply could result in property damage, serious personal injury, or death.
ELECTRICAL SHOCK HAZARD – To ensure safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so could result in property damage, serious personal injury, or death.

A. WIRING INFORMATION

- Do not plug electrical power to the unit until all plumbing and gas piping is complete and the water heater has been filled with water.
- The use of a surge protector is recommended to protect from power surges.
- This water heater requires a power supply of 120 VAC/60 Hz. Do not connect 220-240 VAC to this unit. It will damage the water heater and void the warranty.
- A means for switching off the 120 VAC power supply must be provided (circuit breaker).
- Do not disconnect the power supply when the unit is in normal operation.
- A battery back-up may be used to supply hot water during periods of power outages. It is recommended to install a computer grade UPS (uninterruptable power supply; true sine wave) with at least 600 VA rating for extended coverage.

1. This water heater must be properly grounded. Ensure the electrical receptacle that the water heater will be plugged into is properly grounded.

2. Do not attach the ground wire to either the gas or water piping.

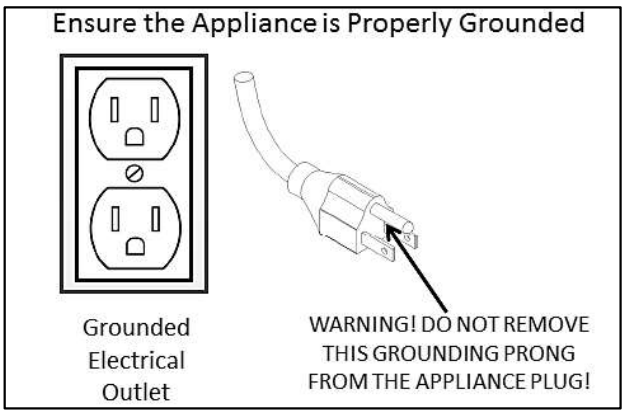


Figure 37 – Proper Grounding – Internal Manual Power Switch

3. The wiring diagrams in this manual are to be used for reference purposes only.

4. Refer to these diagrams and the wiring diagrams of any external controls used with the installation when wiring the water heater. Read, understand, and follow all wiring instructions supplied with the controls.

5. Do not disconnect the power supply when the water heater is in normal operation.

NOTE: For additional electrical protection, the use of a whole house surge protector is recommended. Damage caused by power surges is not covered by the warranty.

NOTICE

If the water heater display does not come ON, first check the plug. Also check the electrical panel circuit breaker and reset it if necessary. If the circuit breaker trips again, do not reset. Disconnect the plug and have a qualified technician diagnose the problem.

B. DIP SWITCHES

There are two DIP switches.

Figure 38 – Dip Switch Details

DIP SWITCH GROUP 1			DIP SWITCH GROUP 2		
	ON	OFF (Default Position)		ON	OFF (Default Position)
Switch 1	Temperature Reading in °C	Temperature Reading in °F	**Switch 1**	High Elevation Operation On (Above 4500 Feet)	Normal Operation (Below 4500 Feet)
Switch 2	High Output On	High Output Off			
Switch 3	Low Fire On	Low Fire Off			
Switch 4	Inline Test On	Inline Test Off			
	NOTE: Switch 4 must not be changed and remain OFF.				

Table 19 – DIP Switch Group – NOTE: The Default setting for all DIP Switches is OFF.

CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

All units come with a factory installed 3-pronged power (grounded) plug. It is required to run a dedicated electrical line to the water heater to prevent electrical interference.

SYSTEM CONTROL SETTINGS

MAXIMUM FLAME DETECTING VOLTAGE	AC200V
MINIMUM FLAME DETECTING VOLTAGE	AC150V
PRE-PURGE TIME (Tp)	5 - 10 seconds
SAFETY TIME (IGNITING TIME) (Ts)	<5 seconds
IGNITING INTERVAL TIME	<10 seconds
POST-PURGE TIME (Tip)	20 seconds
OVER-HEATING 1,2,3 PROTECTION DETECTION TIME	<1 second
TEMPERATURE SENSOR FAULT DETECTION TIME	<10 seconds
# OF IGNITION ATTEMPTS (Ntl)	5
STORED TANK TEMPERATURE SETTING	Three (3) Settings – Normal, Hotter, High Output
BURNER OFF STORED TANK TEMPERATURE	Normal - 128°F, Hotter - 147°F, High Output - 167°F
BURNER ON STORED TANK TEMPERATURE	Normal - 120°F, Hotter - 140°F, High Output - 160°F
HIGH FIRE ACTIVATION - WATER FLOW RATE	Greater than 1.0 gallons (3.8 liters)*
LOW FIRE ACTIVATION - WATER FLOW RATE	Less than 0.9 gallons (3.4 liters)*

Table 20 – System Control Settings – *NOTE: Zero Activation with 20 Gallon Tank Capacity

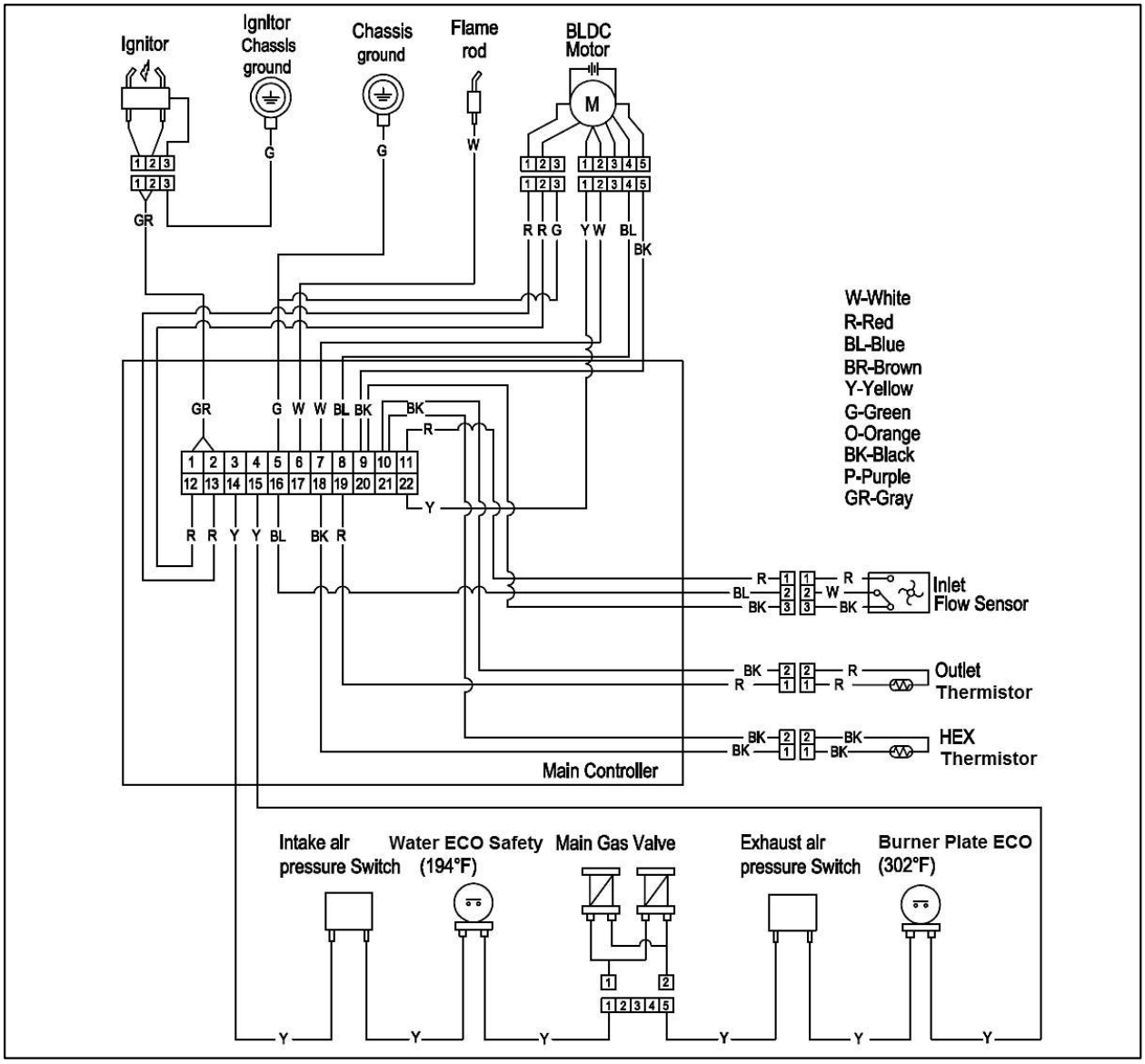


Figure 39 – Electrical Wiring Diagram

PART 10 – OPERATING SYSTEM INSTRUCTIONS

A. START-UP

Once the unit has been properly installed, check the gas and water connections for leaks. Check for proper ventilation and combustible air supply to the water heater. Purge the gas and water lines to remove debris. Then follow the steps below to power on the water heater.

1. Close the manual gas shut-off valve located on the gas line.
2. Fully open the manual water shut-off valve on the water supply line.
3. To ensure complete filling of the tank, allow air to exit by opening the nearest hot water faucet. Allow water to run until a constant flow is obtained. This will let air out of the water heater and piping.
4. Open each hot water tap to ensure that water will flow. Then close the hot water tap.
5. Fully open the manual shut-off gas valve.
6. Plug in the 120 VAC / 60 Hz power supply to the water heater and turn on the unit.

CAUTION
DO NOT use this water heater unless it is completely filled with water. Water must flow from the hot water faucet before turning “ON” gas to the water heater. The water heater will be damaged if it is operated while empty. Such damages ARE NOT covered by product warranty.

B. HOW TO USE THE CONTROL INTERFACE

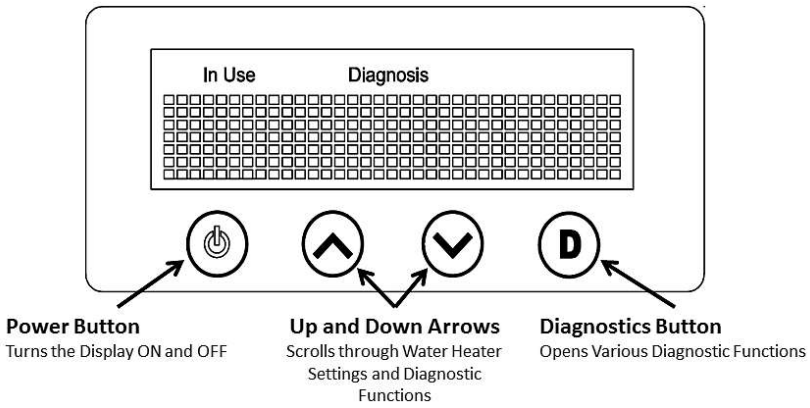


Figure 40 – LCD Display Detail

1. To turn the Water Heater LCD Display from ON to OFF, press the ⏻ Button. The current stored water temperature setting based on DIP Switch 2 setting will display (NORMAL and HOTTER are the default settings. For HIGH OUTPUT, see Section C below.) Press the ⌃ or ⌄ buttons to select your temperature setting.
2. When tank water temperature is lower than setting temperature, the water heater will start the burner automatically and LCD monitor will display IN USE.
3. To turn the water heater display OFF press ⏻.
   NOTE: The temperature on the LCD display does not control the output temperature of the water heater. To adjust hot water output temperature, see Section B.

C. HOW TO SET THE WATER HEATER FOR HIGH OUTPUT OPERATION

1. Press ⏻ to turn OFF the water heater. If the water heater has been operating, wait for the blower to finish cycling. Then unplug the water heater.
2. Use a Phillips Head screwdriver to remove the two screws attaching the Display / Control panel to the water heater.
   NOTE: DO NOT lose the two screws. These are needed for reinstallation.
3. Reach under the water heater cover and gently but firmly push the Display / Control out. The Display / Control should release and tilt.
4. Lift the Display / Control out and tilt flat.
   NOTE: DO NOT pull the Display / Control too hard. DO NOT disconnect the wire harnesses.
5. Change the operation of DIP Switch 2 from OFF to ON. See Figure 38 for DIP Switch details.
6. Lift and tilt the Display / Control into position. Gently but firmly press it into place until it clicks.
7. Use a Phillips Head screwdriver to reinstall the Display / Control panel.
8. Plug the water heater in.
9. Press ⏻ to turn ON the water heater. HOTTER will display. Press the ⌃ or ⌄ buttons to select HIGH OUTPUT.

D. TEMPERATURE SETTING PROCEDURE

The water heater is shipped ready to operate at NORMAL 125°F (51.7°C), and can be field adjusted to operate at HOTTER (145°F [62.8°C]) and HIGH OUTPUT (165°F [73.9°C]) temperatures. See Section C for setting HIGH OUTPUT.

After turning on the water heater and selecting the temperature setting, let it operate and come to temperature.

After the water heater comes to temperature, open a hot water faucet.

The water heater mixing valve is factory set to operate at 120°F (48.9°C). The mixing valve setpoint temperature can be adjusted from 70 – 145°F (21.1 - 62.8°C).

To adjust the mixing valve:

1. Ensure the water heater is filled with water and powered on.
2. Loosen the knob screw. Lift knob.
3. Turn knob clockwise or counter clockwise to adjust temperature. The temperature will change on the water heater display. Adjust to the desired temperature.
4. Reposition knob to lock position.
5. Retighten screw.

NOTE: To ensure proper operation, the mixing valve temperature should be set at least 5°F below that of the tank setpoint temperature.

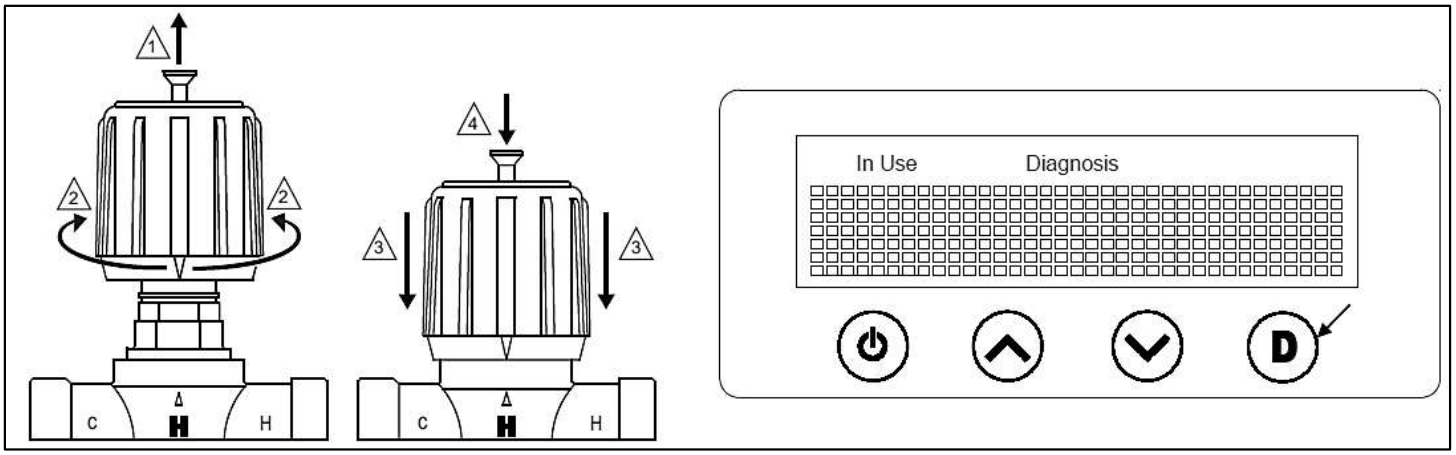


Figure 41 – Adjusting Temperature at the Mixing Valve

⚠ 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. Mixing valve temperature settings should be done by a licensed contractor per local requirements. To ensure correct temperature control, check water temperature with a thermometer at a faucet. Feel water before bathing or showering!

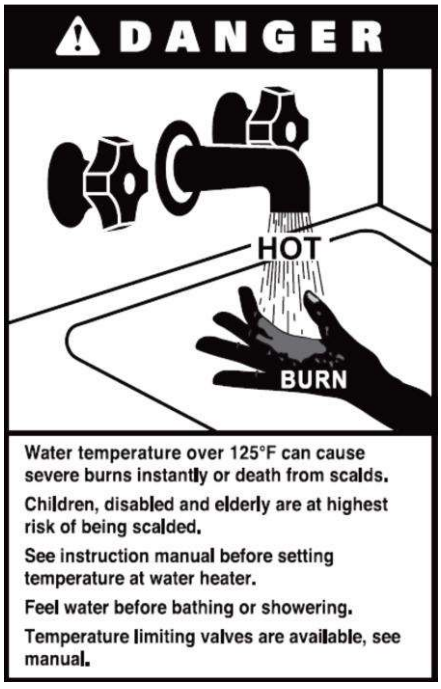
NOTICE

It is recommended to inspect the mixing valve annually. Ensure the proper water temperature is being delivered. If not, replace the mixing valve.

E. 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 21 – Time and Temperature Relationship in Scalds



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

To protect against injury, 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 3 details the relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.

F. DIAGNOSTIC BUTTON FUNCTION

The water heater control allows the user to review various diagnostic functions, including: Outlet Temperature, Fan RPM, and Error Code History. Press the (D) button on the display to review various diagnostic functions. Press the (^) or (v) buttons to scroll through the functions.

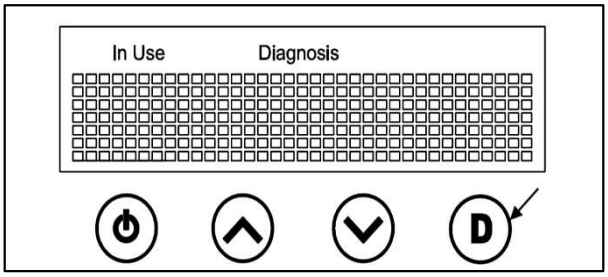


Figure 42 – Press the "D" Button to Review Diagnostic Functions

Display	Detail	Example	Description
Ver	Main CPU Software Version	Ver: 1	Current version of software running on the PCB
Ht	Hot Water Stored / Tank Temperature	Ht: 145	Tank temperature is 145°F
Ot	Outlet Temperature	Ot: 134	Outlet temperature is 134°F
Gpm	Water Flow Rate into Tank	1.2	Current water flow rate into tank is 1.2 gpm
Rpm	Fan RPM	Rp 4500	Fan is spinning at 4500 RPM
H	Burner Time Hours	2h	Total burn time is 2 hours, 10 minutes, and 14 seconds
	Burner Time Minutes and Seconds	10m 14s	
T	Ignition Cycles	7T	Seven total ignition cycles
E1 – E9	Error Code History	E1: E4	The most recent error stored is E1. E9 is the oldest.

Table 22 – Diagnostic Function Screen Descriptions

G. ERROR CODE SCREENS

The water heater continuously monitors its own operation. If an error occurs a message will scroll across the display on the front panel and an error code will display. These error codes assist in troubleshooting system issues, and may enable the user to overcome a problem without calling for service. If calling Technical Support for assistance, please reference the displayed error code to aid in troubleshooting. Press ⏻ to turn the water heater OFF and ON to reset an error code.

Error Code	Description	Cause	Possible Remedies
E1	Abnormal Flame Detected	Abnormal flame detected.	Call for service. Replace the main controller.
E2	Ignition Failure	Ignition failure. Water heater does not detect a flame signal.	1. Check gas line, ignitor, and flame rod. 2. Check wire connection of 22p wire and ignitor wire. 3. Check ignition noise. If fuel supply is low ignition will make noise. 4. Check gas type and manifold pressure.
E3	Flame Loss	Abnormal combustion – Flame has been lost after it was detected.	1. Check the gas supply. 2. Check the gas valve. 3. Check wire connection of 22p wire and ignitor wire. 4. Check gas type and pressure. 5. Check power supply for proper voltage.
E4	Outlet Thermistor Open	The outlet thermistor is open.	1. Check the outlet thermistor. 2. Check wire connection of 22p wire and thermistor wire.
E5	Outlet Thermistor Short	The outlet thermistor has shorted.	
E6	Tank Thermistor Open	The H/E thermistor is open.	1. Check the H/E thermistor. 2. Check wire connection of 22p wire and thermistor wire.
E7	Tank Thermistor Short	The H/E thermistor has shorted.	
E11	Blower Motor	The DC blower motor has failed.	1. Check the DC blower motor. 2. Check wire connection of 22p wire.
E28	Gas Valve	The gas valve has lost power.	1. Unplug the water heater. 2. Check wire connections of the gas valve, thermostat, and air pressure switches. 3. Use an ohmmeter to check for continuity of the following items: a. The thermostat. b. The intake air pressure switch. c. The exhaust air pressure switch. d. The gas valve. 4. Replace the defective item.

E30	RPM too High	DC blower motor is rotating too fast.	Call for service. Replace the blower motor.
E31	RPM too Low	DC blower motor is rotating too slow.	
E36	Relay Error	Controller failure concerning the gas valve.	Call for service. Replace the main controller.
E37	Communication Problem	Communication failure concerning the subsidiary CPU.	
E38	Sub RAM Failure	Subsidiary RAM failure.	
E39	Sub CPU Hardware Problem	Control failure concerning subsidiary flame signal.	
E40	Main RAM Failure	Main RAM failure.	
E41	Flame Signal Problem	Controller failure concerning flame signal.	
E42	Main ROM Failure	Main ROM failure.	
E43	Main AD MUX Failure	Main MUX failure.	
E54	Gas Valve Leak Detected	Gas valve failure.	

Table 23 – Error Codes and Suggested Corrective Actions

NOTE: In some cases the Error Code may be cleared by pressing the  button to turn the water heater OFF, then ON again. If this does not clear the Error Code, contact your water heater installer for service.

PART 11 – FINAL INSTALLATION CHECKLIST

		YES	NO
BEFORE INSTALLING	Is there enough space to ensure proper installation?		
	Does installation location allow for proper service clearances?		
	Are water and gas lines properly sized and set at proper pressures for the installation?		
	Is water heater location as near the exhaust vent / intake pipe terminations as possible?		
	Have combustible materials been cleared from the installation location?		
	Is there a drain close to the water heater?		
INSTALL WATER PIPING	Does water heater loop piping meet the minimum sizing requirements listed? **NOTE:** Smaller piping will cause performance problems.		
	Has water chemistry been checked?		
	Does water chemistry meet requirements?		
	If water chemistry does not meet requirements, have treatment measures been put in place?		
	Has the system been cleaned and flushed?		
INSTALL EXHAUST VENT AND INTAKE PIPING	Has the water heater been vented with the approved materials listed in this manual (3" PVC, CPVC, Polypropylene, etc.) or to meet local codes?		
	Is air supply sufficient for proper water heater operation?		
	Is total vent piping length within the maximum vent length restriction listed in this manual?		
	Have venting lengths been minimized?		
	Are terminations properly spaced from windows, doors, and other intake vents?		
	Have all vent terminations been installed at least one foot above exterior grade and one foot above normal snow accumulation level?		
	Is vent piping properly supported?		
	Has vent piping been checked for leaks?		
	Has the exhaust vent line been pitched back to the water heater at a rate of ¼" per foot?		
	Have the exhaust vent and intake pipes been properly installed into the connectors provided on the water heater?		
INSTALL CONDENSATE PIPING / TUBING AND COMPONENTS	Have all condensate line components included with the water heater been installed?		
	Is the condensate line piped with the approved materials listed in this manual?		
	Has the condensate line been routed to a laundry tub or other drain?		
INSTALL GAS PIPING	Is the gas supply line a minimum of ½" in diameter?		
	Is the gas supply line length and diameter adequate to deliver the required BTUs?		
	Has gas supply line pressure been measured?		
	Does the gas type match the type indicated on the water heater rating plate?		
	Has a union and shut-off valve been installed?		
TEMPERATURE AND PRESSURE RELIEF VALVES	Is the pressure relief valve in the DHW line at least ¾" in diameter?		
WIRE THE WATER HEATER	Connect the power and control wiring per water heater wiring diagram, this manual.		
	Have all DIP switches been set on the main water heater board?		
	Is electrical connection polarity within water heater requirements?		
	Do power specifications meet water heater requirements? 120V AC?		
START-UP, ADJUST, AND TEST	Has the water heater been started?		
	If necessary, has the water heater gas valve been adjusted?		
	Has the installation been customized per installation location requirements?		
	Have all customized system parameters been tested?		
	Has proper water heater operation been confirmed?		
BURNER FLAME	Has the burner flame been checked?		
	Have combustion values been verified with a meter?		
	If the flame does not appear normal, it may need to be cleaned by a qualified service technician. See Figure 43 for flame inspection hole location.		
RECIRCULATION SYSTEM	If a recirculation system is installed, check to see that the total runtime per day does not exceed 6 hours. **NOTE:** Warranty is voided on runtimes for recirculation above 6 hours.		
FINAL INSTALLATION APPROVALS	**SIGNED BY TECHNICIAN**	**DATE**	

Table 24 – Final Installation Checklist

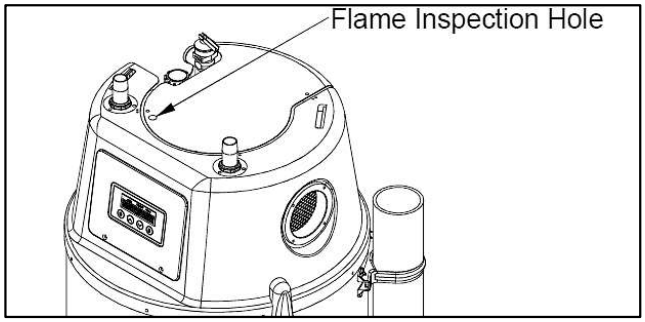


Figure 43 – Flame Sight Glass

DHW Outlet (Ot) Temperature Sensor (8100P-016) HX (Ht) Temperature Sensor (8100P-014)	
Temperature (◦F)	**Resistance (Ω)**
-4	61353
5	48126
14	37979
23	30153
32	24085
41	19354
50	15645
59	12721
68	10403
77	8555
86	7075
95	5882
104	4915
113	4129
122	3485
131	2956
140	2518
149	2155
158	1852
167	1599
176	1385
185	1205
194	1052
203	921
212	847

Table 25 – Temperature Sensor Resistance

PART 12 – TROUBLESHOOTING

TROUBLESHOOTING CHART		
PROBLEM	**POSSIBLE CAUSES**	**POSSIBLE REMEDIES**
No electrical power to the water heater	1. Is the plug on the power supply cord unplugged from the electrical outlet? 2. Is electrical panel's 10 Amp circuit breaker tripped? 3. Is the fuse on the circuit board good? 4. Is there a power outage to the home?	1. Reset the plug. 2. Reset the circuit breaker. 3. If the display panel is blank, unplug the unit or contact an authorized service technician. 4. Contact the power company.
No water available when a faucet is opened	1. Is the water supply valve shut off at the meter (do cold water faucets work)? 2. Is the water supply valve near the unit open? 3. Is the water pipe frozen? 4. Is an error code flashing on the display panel (leak detected)?	1. Open the closed supply valve. 2. Open the water supply valve. 3. Turn OFF the unit, close all water valves and the gas valve. Contact an authorized service technician. 4. Refer to error code information and contact an authorized service technician.

PROBLEM	POSSIBLE CAUSES	POSSIBLE REMEDIES
Hot water is not available when the faucet is opened.	1. Does the water heater have power (plugged in)? 2. Is the water heater turned ON? 3. Is an error code flashing on the display panel? 4. Is the gas supply valve open or shut off at the meter (do other gas devices work)?	1. Restore electrical power to the unit. 2. Press and hold the **Power** button to turn the unit ON. 3. Refer to the Diagnostic and Error Codes section in this manual. 4. Open the gas supply valve.
The water temperature is not hot enough or turns cold during use.	1. Is an error code flashing on the display panel? 2. Is the water temperature on the thermostatic mixing valve set too low?	1. Refer to the Diagnostic and Error Codes section in this manual. 2. Adjust the outlet water temperature on the thermostatic mixing valve (refer to the procedure in this manual).
It takes a long time before hot water flows from the faucet.	Is the faucet some distance from the water heater?	1. Allow time for the cold water already in the pipes to flow from the faucet. 2. Have recirculation valves and/or plumbing return line(s) installed and program the unit for recirculation mode.
The water is not hot enough.	Is the water temperature on the thermostatic mixing valve set too low?	Adjust the temperature setting.
The water at the faucet is too hot.	Is the water temperature on the thermostatic mixing valve set too high?	Adjust the temperature setting.
A fan can be heard even when the unit is not operating.	1. The fan continues to operate after the burner shuts off to clear the exhaust vent of combustion gases. 2. The fan may run to help prevent freezing.	1. This is normal operation – no action is required. 2. Protect the water heater from freezing temperatures or shut off and drain the unit.
White “smoke” can be seen coming out of the exterior exhaust gas vent.	Depending on the outside temperature, water vapor can be produced as the exhaust is vented.	This is normal operation – no action is required.

Table 26 – Troubleshooting Chart

DIAGNOSTICS AND SUGGESTED CORRECTIVE ACTIONS

The water heater control is able to record information about the water heater’s condition at the time of the ten previous faults or errors. This information is available to view in the Installer Mode under the History screen.

The following screens may be displayed when reviewing the water heater history. The table below also includes diagnostic information and possible corrective actions.

Display	Condition	Diagnostic	Possible Corrective Actions
Nothing appears on the display control panel but the fan runs at full speed	Control is not receiving power	Check wiring for short circuit or incorrect wiring	Correct wiring per wiring diagram including connection of transformer to the control
		Check 5P wire connection to the Fan Motor per wiring diagram	Push the Power button on the control panel
Nothing appears on the display control panel and no other water heater components are operating	Control is not receiving 120V power	Ensure service switch and/or circuit breaker to water heater is turned ON	Turn on service switch or circuit breaker to power water heater
		Is there 120V at the service switch	Troubleshoot and correct the power supply to the manual switch
		Is the ON/OFF switch inside the water heater cabinet is turned on	Turn ON the manual power switch inside the water heater cabinet
		Check for 120V at the line voltage terminal block located inside the water heater cabinet	Correct wiring inside the water heater cabinet using the wiring diagram in the installation manual
		Inspect the fuse. Replace as necessary	Replace the fuse with the proper part found in the replacement part section of this manual. If fuse blows again, recheck the wiring per diagram
Nothing appears on the display control panel, but the water heater is operating	Occurs when communications is lost from the control to the display	Check for loose connections and proper pin alignment / engagement on the control’s plug	Check for continuity on the wire harness from the display to the control. See repair parts section for proper replacement part.
		Cycle power off and on using water heater power switch and check for operation	Replace with new display module. See repair parts section for proper replacement part.

Display	Condition	Diagnostic	Possible Corrective Actions
Display repeatedly goes through initialization sequence	Occurs when control does not receive signal from fan	Cycle power off and on using water heater power switch and check for operation	Replace fan.

Table 27 –Diagnostics and Suggested Corrective Actions

PART 13 – MAINTENANCE PROCEDURES

⚠ DANGER

The water heater must be inspected and serviced annually, preferably at the start of the heating season, by a qualified service technician. In addition, the maintenance and care of the water heater as outlined in this manual must be performed by the user/owner to assure maximum efficiency and reliability. Follow the maintenance procedures given throughout this manual. Failure to perform the service and maintenance or follow the directions in this manual could damage the water heater or system components, resulting in substantial property damage, severe personal injury, or death.

Check the Surrounding Area

⚠ DANGER

To prevent the potential of substantial property damage, severe personal injury, or death, eliminate all the materials listed in Table 6 from the area surrounding the water heater and the vicinity of the combustion air intake. If contaminates are found:

- Remove products immediately from area.
- If contaminates have been there for an extended period, call a qualified service technician to inspect the water heater for possible damage from acid corrosion.

If products cannot be removed, immediately call a qualified service technician to re-pipe the combustion air intake piping away from the contaminated areas.

Combustible/Flammable Materials
Do not store combustible materials, gasoline, or other flammable vapors or liquids near the water heater. If found, remove these materials immediately.

Air Contaminates
If allowed to contaminate combustion air, products containing chlorine or fluorine will produce acidic condensate that will cause significant damage to the water heater. Read the list of potential contaminates and areas likely to have these contaminates in Table 6. If any of these contaminates are in the room where the water heater is located, or combustion air is taken from one of the areas listed, the contaminants must be removed immediately or the intake pipe must be relocated to another area.

Check the Power Source
Make sure the power cord is properly connected. The main power line is connected to the manual switch box inside the water heater.

Check the Status of the Control Panel
Observe the Control Panel to ensure the water heater is powered on, and to check for any error codes. Clear any debris from the panel.

Check Exhaust Vent and Intake Pipe Terminations
Verify that the water heater exhaust vent and intake pipe terminations are clean and free of obstructions. Remove any debris from the exhaust vent or intake pipe openings. If removing the debris does not allow the water heater to operate correctly, contact your qualified service technician to inspect the water heater and the vent system.

Check Exhaust Vent and Intake Piping
Visually inspect the exhaust vent for any signs of blockage, leakage, or deterioration of the piping. Inspect the exhaust vent bracing. Ensure bracing is undamaged and in good condition. Notify a qualified service technician immediately if any problems are found.

⚠ WARNING

Failure to inspect the venting system and have it repaired by a qualified service technician can result in vent system failure, causing severe personal injury or death.

Visually inspect the intake piping for any signs of blockage. Inspect the entire length of the intake pipe to ensure piping is intact and all joints are properly sealed. Inspect the intake pipe bracing. Ensure bracing is undamaged and in good condition. Notify a qualified service technician if any problems are found.

Check the Condensate Drain System

- While the water heater is running, check the discharge end of the condensate drain tubing. Ensure no flue gas is leaking from the condensate drain tubing by holding your fingers near the opening.
- If you notice flue gas leaking from the opening, this indicates a dry condensate drain trap. If problem persists, contact a qualified service technician to inspect the water heater and condensate line and refill the condensate trap.
- If applicable, check the condensate neutralizer and ensure it is full of condensate neutralizing marble chips.

Cleaning the Condensate Trap

- Over time, blockage of the trap by debris may occur. When the condensate cannot be released the unit will go into error and shut down. When this occurs the trap must be cleaned.

To Remove Trap

- 1. Remove clip securing trap to the nipple.
- 2. Gently pull trap body downwards to remove.

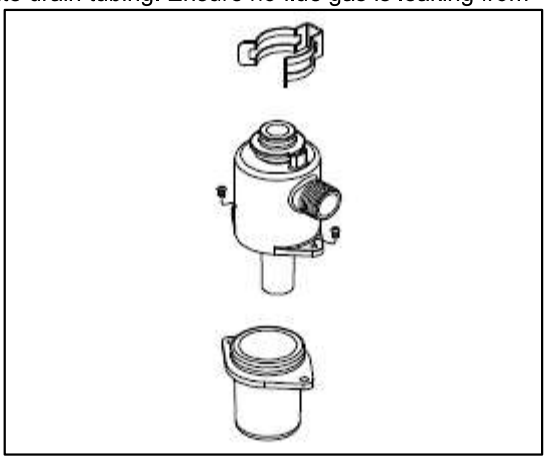


Figure 44 – Condensate Trap Details

Check Primary and Gas Piping

- Remove the water heater cover and perform a gas leak inspection following Operating Instructions, page 2, this manual. If gas odor or leak is detected, follow procedures on page 2. Call a qualified service technician.
- Visually inspect for leaks around the internal water heater water connections and around the water heater. Visually inspect the external system piping, circulators, and system components and fittings. Immediately call a qualified service technician to repair any leaks.

⚠ WARNING

Have leaks fixed at once by a qualified service technician. Failure to comply could result in substantial property damage, severe personal injury, or death.

Check and Operate Pressure Relief Valve

- Visually inspect the primary pressure relief valve and discharge pipe for signs of weeping or leakage.
- If the pressure relief valve often weeps, the expansion tank may not be operating properly. Immediately contact a qualified service technician to inspect the water heater and system.
- Before proceeding, verify that the relief valve outlet has been piped to a safe place of discharge, avoiding any possibility of scalding from hot water.
- Shut power off to the water heater. To avoid scalding, wait for water heater to cool before operating the relief valve.

⚠ WARNING

To avoid water damage or scalding due to relief valve operation, a discharge line must be connected to the valve outlet and directed to a safe place of disposal. This discharge line must be installed by a qualified service technician or heating/plumbing installer in accordance with the water heater installation manual. The discharge line must be terminated so as to eliminate possibility of severe burns or property damage should the valve discharge.

- List the relief valve lever. If water flows freely, release the lever and allow the valve to seat. Watch the end of the relief valve discharge pipe to ensure that the valve does not weep after the line has had time to drain. If the valve weeps, lift the lever again to attempt to clean the valve seat. If the valve does not properly seat and continues to weep, contact a qualified service technician to inspect the valve and system.
- If water does not flow from the valve when you completely lift the lever, the valve or discharge line may be blocked. Immediately shut the water heater down per instructions on page 2 and call a qualified service technician to inspect the valve and system.
- If relief valve seats properly, restore power to the water heater. Observe operation for five minutes and ensure it operates properly.

Check Burner Flame Quality

This water heater has an automatic ignition system. Once you open a hot water tap, the system electronically ignites the burners. Observe burner flame via the flame inspection hole. See Figure 43 for flame inspection hole location.

⚠ WARNING

Turn off the electrical power supply, gas shutoff valve, and cold water shutoff valve before proceeding. Failure to comply could result in substantial property damage, severe personal injury, or death.

Service and Cleaning of the Burner
Only specially trained and authorized personnel are permitted to service the burner.

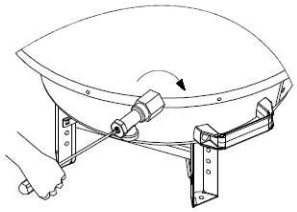
Sediment Buildup
Over time, sediments from water supply could settle inside the tank and cause the water heater to lose holding capacity and heating efficiency. It is recommended that the water heater be drained down completely once every other year to flush out sediments. Buildup of sediment in faucet aerators, shower heads, and screens could also impair water flow and cause the water heater to deliver less than its full output, or to shut down completely. Check any of these screens or shower heads on your faucets periodically and clean as necessary.

Cleaning the Water Strainer
The water strainer should be checked at least once annually to ensure it is not blocked. To do this:

1. Connect garden hose to the drain valve located on the lower left side of the unit.
2. Open the valve with a flat heat screwdriver.
3. Drain a few gallons of water from the water heater. If water flows freely, the strainer is clean. If water does not flow freely, follow the steps below to drain the water heater and clean the strainer.

Draining the Water Heater

1. Close water supply shut-off valve to the water heater.
2. Connect garden hose to the drain valve located on the lower left side of the unit.
3. Open the valve with a flat heat screwdriver.
4. After draining the tank, turn the drain valve body clockwise by hand to remove the drain valve from the unit and clean the filter.

CAUTION	
Do not open the drain valve without connecting a hose so that water can be diverted to an area where water damage is not a problem. Use a flat head screwdriver to open and close the drain valve. Do not remove the drain valve from the unit without first draining the water heater. ONLY remove the drain valve by hand. Failure to follow these instructions could result in leakage or property damage. Such damages ARE NOT covered by product warranty.	 **Figure 45 – Closing Drain Valve**

Thermistors
After draining the water heater, remove the HX thermistors from the unit and check for mineral coating. A mineral coating on the thermistor requires cleaning. See Figure 46.

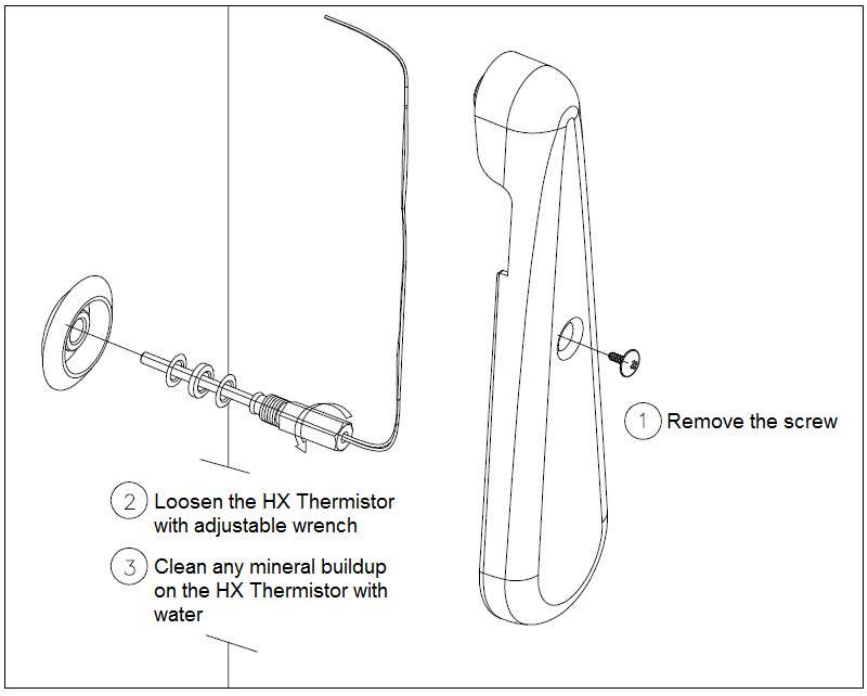


Figure 46 – Cleaning the Thermistor

REPLACEMENT PARTS

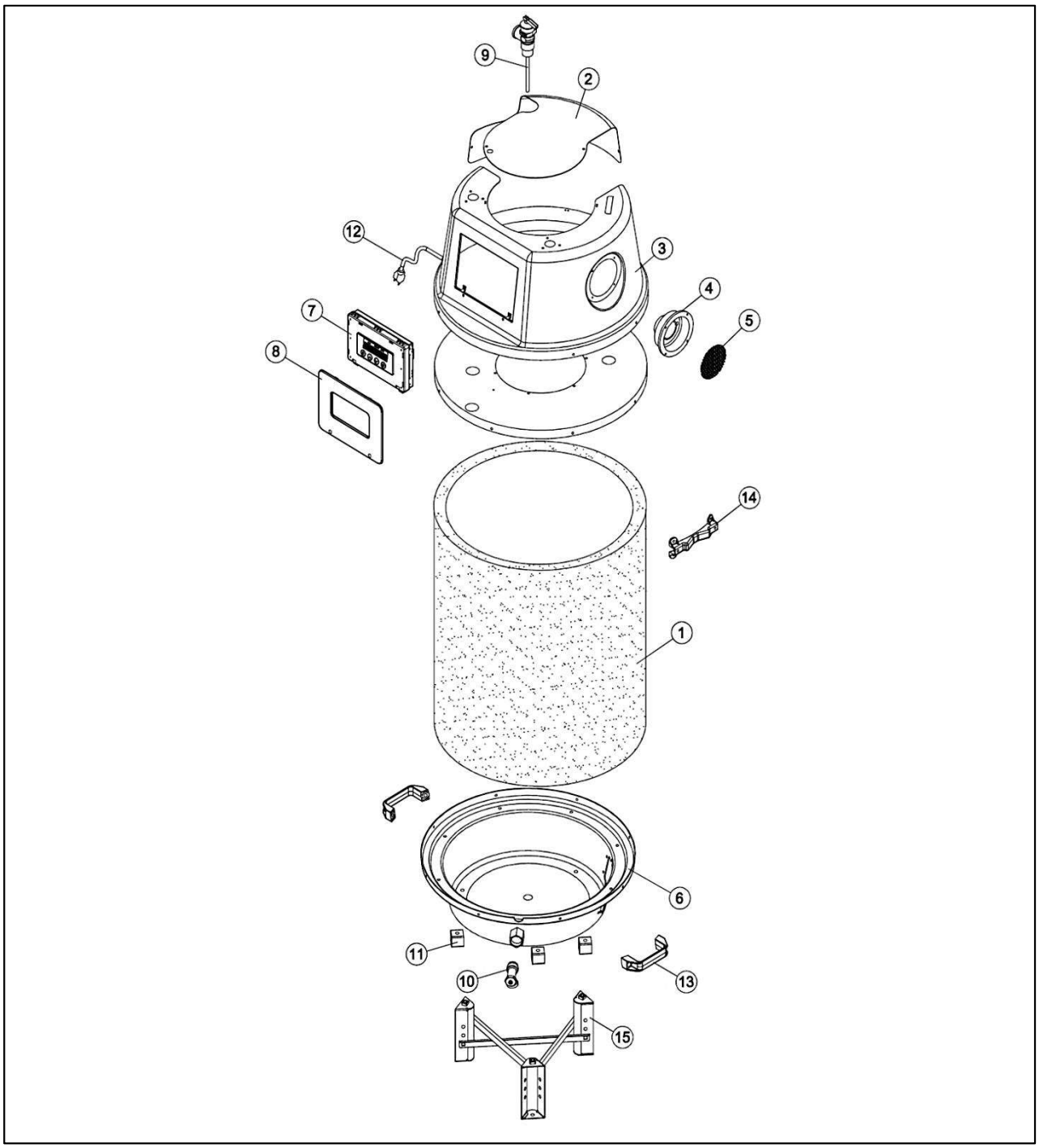


Figure 47 - Cabinet Replacement Parts

NUMBER	DESCRIPTION	PART NUMBER	NUMBER	DESCRIPTION	PART NUMBER
1	Pour Form (PU)	N/A	8	Controller Cover	8100P-034
2	Top Service Panel	8100P-031	9	T&P Relief Valve	8100P-015
3	Top Cover	N/A	10	Drain Valve	8100P-005
4	Air Intake	8100P-032	11	Pipe Foot	N/A
5	Mesh Screen	8100P-033	12	Main Power Cord	8100P-009
6	Chassis	N/A	13	Handle	N/A
7	Main Controller (75 and 76kBTU Models)	8100P-011	14	Pipe Support	8100P-037
	(100kBTU Model)	8100P-012	15	Water Heater Stand	8100P-038

Table 28 – Cabinet Replacement Parts

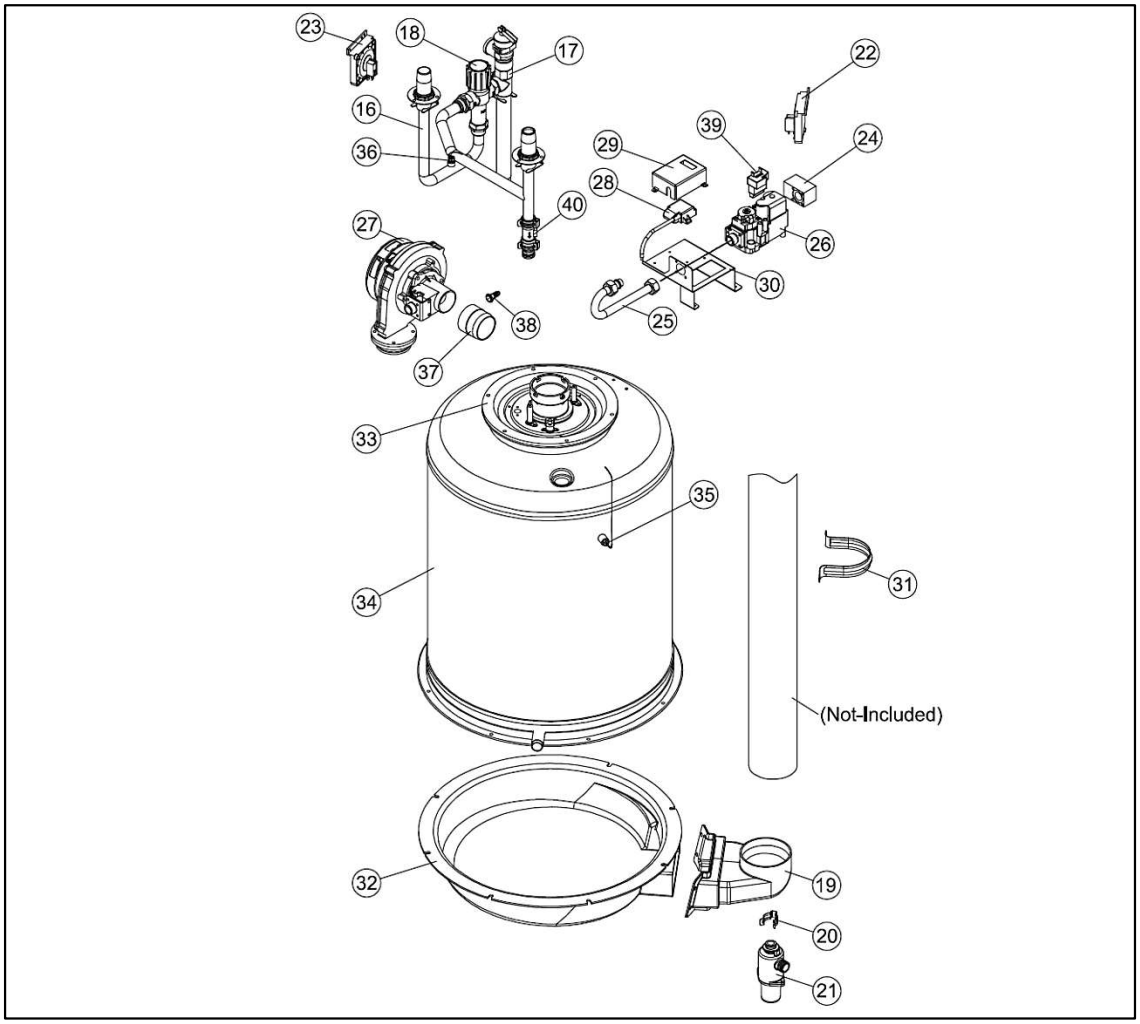


Figure 48 – Combustion System Replacement Parts

NUMBER	DESCRIPTION	PART NUMBER	NUMBER	DESCRIPTION	PART NUMBER
16	Hot Outlet Water Pipe	8100P-021	31	Pipe Clamp	8100P-045
17	T&P Relief Valve	8100P-015	32	Exhaust Chamber	N/A
18	Tempering Valve	8100P-018	33	Burner Assembly	8100P-004
19	Exhaust Adaptor	8100P-039	34	Water Tank	N/A
20	Trap Clamp	8100P-040	35	H/E Thermistor	8100P-014
21	Condensate Trap	8100P-024	36	Outlet Thermistor	8100P-016
22	Intake Air Pressure Switch (75 and 76kBTU Models)	8100P-006	37	Radial Blower Adaptor	8100P-046
	(100kBTU Model)	8100P-008	38	APS Adaptor	
23	Exhaust Air Pressure Switch (75 and 76kBTU Models)	8100P-007	39	GV Power Plug	8100P-047
	(100kBTU Model)	8100P-008	40	Inlet Water Flow Sensor	8100P-023
24	Gas Adaptor	8100P-041	Not Shown	Wire Harness	8100P-013
25	Gas Tube	8100P-042		ECO Hot Water Outlet	8100P-017
26	Gas Valve (75 and 76kBTU Models)	8100P-035		Outlet Fitting	8100P-019
	(100F Model)	8100P-001		Cold Inlet Water Pipe	8100P-020
27	Blower Assembly with Mixer (75 and 76kBTU Models)	8100P-002		ECO Burner Plate	8100P-022
	(100kBTU Model)	8100P-003		Accessory Kit (75 and 76kBTU Models)	8100P-025
28	Ignitor	8100P-010		(100kBTU Model)	8100P-026
29	Ignitor Box	8100P-043		Spare Parts Kit	8100P-036
30	Gas Valve Support	8100P-044			

Table 29 – Combustion System Replacement Parts

Limited Warranty for WGRGH Floor Mounted Water Heaters

Westinghouse warrants each instantaneous water heater and its parts to be free from defects in materials and workmanship according to the following terms, conditions, and time periods. **UNLESS OTHERWISE NOTED THESE WARRANTIES COMMENCE ON THE DATE OF INSTALLATION.** This limited warranty is only available to the **original owner** of this water heater, and is non-transferable.

Residential Use Warranty	Commercial Use Warranty
Six (6) years – Tank, One (1) years – Parts	**Three (3) years – Tank, One (1) Year – Parts**
USE DEFINTIONS - Residential Use means heating in a single family dwelling. This dwelling must be either: a) owned and resided in by the original purchaser; or b) a residential rental property that services a single dwelling in which the original purchaser resides on a permanent basis. Commercial Use refers to all other applications.	

COVERAGE

A. During the first year after the original date of installation, Westinghouse warrants that it will repair or replace, at its option, any defective or malfunctioning component of the water heater with a component of equivalent size and current model. Replacement components will be warranted for ninety (90) days.
B. Should a defect or malfunction result in a leakage of water within the above-stated warranty periods due to defective material or workmanship, malfunction, or failure to comply with the above warranty, Westinghouse will replace the defective or malfunctioning water heater with a replacement of the nearest comparable model available at the time of replacement. The replacement water heater will be warranted for the unexpired portion of the applicable warranty period of the original water heater.
C. In the event of a leakage of water of a replacement water heater due to defective material or workmanship, malfunction, or failure to comply with the above warranty, Westinghouse reserves the right to refund to the original purchaser the published wholesale price available at the date of manufacture of the original water heater.
D. If government regulations, industry certification, or similar standards require the replacement water heater or part(s) to have features not found in the defective water heater or part(s), the owner will be charged the difference in price represented by those required features. If the owner pays the price difference for those required features and/or to upgrade the size and/or other features available on a new replacement water heater or part(s), the owner will also receive a complete new limited warranty for that replacement water heater or part(s).
E. If at the time of a request for service the owner cannot provide a copy of the original sales receipt or the warranty registration, the warranty period for the water heater shall then be deemed to have commenced thirty (30) days after the date of manufacture of the water heater and **NOT** the date of installation of the water heater.
F. This warranty extends only to water heaters utilized in heating applications that have been properly installed by qualified professionals based upon the manufacturer's installation instructions.
G. It is expressly agreed between Westinghouse and the original consumer purchaser that repair, replacement, or refund are the exclusive remedies of the original consumer purchaser.

OWNER RESPONSIBILITIES

To avoid the exclusion list in this warranty, the owner or installer must:
1. Maintain the water heater in accordance with the maintenance procedure listed in the manufacturer's provided instructions. Preventive maintenance can help avoid any unnecessary breakdown of your water heater and keep it running at optimum efficiency.
2. Maintain all related system components in good operating condition.
3. If the cold water supply line has a backflow preventer, then an expansion tank should be installed to allow for water expansion.
4. Use the water heater at water pressures not exceeding the working pressure shown on the rating plate.

WARRANTY EXCLUSIONS

This limited warranty will not cover:
1. Any water heater purchased from an unauthorized dealer or online retailer.
2. Any water heater not installed by a qualified heating installer/service technician, or installations that do not conform to ANSI, CSA, and/or ETL standards, as well as any applicable national or local building codes.
3. Service trips to teach you how to install, use, maintain, or to bring the water heater installation into compliance with local building codes and regulations.
4. Failure to locate the water heater in an area where leakage of the tank or water line connections and the combination temperature and relief valve will not result in damage to the area adjacent to the water heater or lower floors of the structure.
5. Any failed components of the heat system not manufactured by Westinghouse as part of the water heater.
6. Water heaters repaired or altered without the prior written approval of Westinghouse.
7. Damages, malfunctions, or failures resulting from failure to install the water heater in accordance with applicable building codes/ordinances or good plumbing and electrical trade practices.
8. Damages, malfunctions, or failures resulting from improper installation, failure to operate the water heater at pressures not exceeding the working pressure shown on the rating plate, or failure to operate and maintain the water heater in accordance with the manufacturer's provided instructions.
9. Failure to operate the water heater in an open system with a properly sized and installed thermal expansion tank.
10. Failure or performance problems caused by improper sizing of the water heater, expansion device, piping, or the gas supply line, the venting connection, combustion air openings, electric service voltage, wiring or fusing.
11. Damages, malfunctions, or failures caused by improper conversion from natural gas to LP gas or LP gas to natural gas.

12. Damages, malfunctions, or failures caused by operating the water heater with modified, altered, or unapproved parts.
13. Damages, malfunctions, or failures caused by abuse, accident, fire, flood, freeze, lightning, acts of God and the like.
14. Tank failures (leaks) caused by operating the water heater in a corrosive or contaminated atmosphere.
15. Damages, malfunctions, or failures caused by operating the water heater with an empty or partially empty tank ("dry firing"), or failures caused by operating the water heater when it is not supplied with potable water, free to circulate at all times.
16. Failure of the heater due to the accumulation of solid materials and lime deposits.
17. Any damage or failure resulting from improper water chemistry, or heating anything other than potable water. DEFINITION OF POTABLE WATER - Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3) as shown in the table.
18. Components of the water heater that are not defective, but must be replaced during the warranty period as a result of reasonable wear and tear.
19. Damages, malfunctions, or failures caused by subjecting the water heater to pressures or firing rates greater than those shown on the rating label.
20. Damages, malfunctions, or failures resulting from the use of any attachment(s) not supplied by Westinghouse.
21. Water heaters moved from the original installation location.
22. Water heaters that have had their rating labels removed.

EPA DEFINITION OF POTABLE WATER	
Contaminant	**Level**
Total Hardness (Residential Use - Below 140°F water temperature)	200 mg/l (12 grains/gallon)
Total Hardness (Commercial Use - 140°F and above water temperature)	120 mg/l (7 grains/gallon)
Aluminum	0.05 to 0.2 mg/l
Chloride	100 mg/l
Color	15 color units
Copper	1.0 mg/l
Corrosivity	Non-corrosive
Fluoride	2.0 mg/l
Foaming Agents	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	3 threshold odor number
pH	6.5 – 8.5
Silver	0.1 mg/l
Sulfate	250 mg/l
Total Dissolved Solids (TDS)	500 mg/l
Zinc	5 mg/l
Dissolved Carbon Dioxide (CO2)	15 mg/l or ppm

PROCEDURES FOR WARRANTY SERVICE REQUESTS

Any claim for warranty assistance must be made promptly. Determine if the water heater is "in-warranty" (that is, within the applicable warranty period) by reviewing a copy of the original sales receipt or warranty registration. The owner must present a copy of the original sales receipt or warranty registration for a warranty service request.
If the water heater is "in-warranty", contact the distributor from whom the water heater was purchased (or the installer) for assistance. Be prepared to provide the retailer or installer with a copy of the original receipt, complete model and serial numbers, and the date of installation of the water heater, in addition to explanation of the water heater problem.
Warranty coverage is subject to validation of "in-warranty" coverage by Westinghouse claims department personnel. All alleged defective or malfunctioning parts must be returned to Westinghouse via the **local distribution channels** where original purchase was made. **NOTE: Any parts or heaters returned to Westinghouse for warranty analysis will become the property of Westinghouse and will not be returned, even if credit is denied.** If all warranty conditions are satisfied, Westinghouse will provide replacement parts to the retailer.
For questions about the coverage of this warranty, please contact Westinghouse at the following phone number: 1-774-417-6000.

SERVICE, LABOR AND SHIPPING COSTS

This limited warranty does not extend to any shipping charges, delivery expenses, or administrative fees incurred by the owner in repairing or replacing the water heater or part(s). This warranty does not extend to labor costs beyond the coverage specified in this warranty document. All such expenses are the owner's responsibility.

LIMITATIONS OF YOUR WESTINGHOUSE WARRANTY AND REMEDIES

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY IN CONTRACT OR TORT, WHETHER OR NOT ARISING FROM WESTINGHOUSE'S NEGLIGENCE, ACTUAL OR IMPUTED. THE REMEDIES OF THE PURCHASER SHALL BE LIMITED TO THOSE PROVIDED HEREIN TO THE EXCLUSION OF ANY OTHER REMEDIES INCLUDING WITHOUT LIMITATION, INCIDENTAL OR CONSEQUENTIAL DAMAGES, SAID INCIDENTAL AND CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, PROPERTY DAMAGE, LOST PROFIT OR DAMAGES ALLEGED TO HAVE BEEN CAUSED BY ANY FAILURE OF WESTINGHOUSE TO MEET ANY OBLIGATION UNDER THIS AGREEMENT INCLUDING THE OBLIGATION TO REPAIR AND REPLACE SET FORTH ABOVE. NO AGREEMENT VARYING OR EXTENDING THE FOREGOING WARRANTIES, REMEDIES OR THIS LIMITATION WILL BE BINDING UPON WESTINGHOUSE. UNLESS IN WRITING AND SIGNED BY A DULY AUTHORIZED OFFICER OF WESTINGHOUSE. THE WARRANTIES STATED HEREIN ARE NOT TRANSFERABLE AND SHALL BE FOR THE BENEFIT OF THE ORIGINAL PURCHASER ONLY.

NO OTHER WARRANTIES

This Westinghouse Warranty gives you specific legal rights, and you may also have other rights that vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages so this limitation or exclusion may not apply to you.
These are the only written warranties applicable to the commercial water heater manufactured and sold by Westinghouse. Westinghouse neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said commercial water heaters. Westinghouse reserves the right to change specifications or discontinue models without notice.

MAINTENANCE REPORT

CAUTION

In unusually dirty or dusty conditions, care must be taken to keep water heater cabinet door in place at all times. Failure to do so VOIDS WARRANTY!

⚠ WARNING

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

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

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

INSPECTION ACTIVITIES		DATE LAST COMPLETED			
PIPING		1st YEAR	2nd YEAR	3rd YEAR	4th YEAR*
Near water heater piping	Check water heater and system piping for any sign of leakage. Leaking pipes could cause property damage. Make sure all piping is properly supported. Flush water heater annually (more in hard water conditions). See User's Information manual for instructions.				
Vent	Check condition of all vent pipes and joints. Ensure all vent piping is properly supported. Check for obstructions at exhaust and intake termination points.				
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 water heater 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.				
Plug	Verify that the power plug is functional and ground prong is intact.				
CONDENSATE					
Condensate Trap	Clean debris from the condensate trap. Fill with clean water.				
Neutralizer	Check condensate neutralizer. Replace if necessary.				
Condensate hose	Disconnect condensate hose. Clean out dirt 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. Record at high and low fire.				
SAFETIES					
Thermistor	Check continuity on thermistor. Clean any build-up. Replace if corroded.				
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.				
TECH SIGN OFF					

Table 30 - *Continue annual maintenance beyond the 4th year as required.

MAINTENANCE NOTES

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):	
Combustion Setting at Time of Installation:	
Comments:	
Installer's Phone Number:	
Signed by Installer:	
Signed by Customer:	

IMPORTANT NOTES:

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 Sales Representative.

Distributor/Dealer: Please insert contact details.