

## POWERED DIRECT VENT SERIES GAS-FIRED COMMERCIAL WATER HEATER

A Spanish language version of these instructions is available by contacting the company listed on the rating plate.

La versión española de estas instrucciones se puede obtener al escribirle a la fábrica cuyo nombre aparece en la placa de especificaciones.

### INSTALLATION & OPERATING INSTRUCTION MANUAL

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

#### FOR YOUR SAFETY

-Do not store or use gasoline or other flammable, combustible, or corrosive 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 performed by a qualified installer, service agency or the gas supplier.

*For your family's comfort, safety and convenience, it is recommended this water heater be installed and serviced by a plumbing professional.*

## **CONGRATULATIONS!**

**You have just purchased one of the finest water heaters on the market today!**

**This installation, operation and instruction manual will explain in detail the installation and maintenance of your new Power Direct Vent Commercial Gas Water Heater. We strongly recommend that you contact a plumbing professional for the installation of this water heater.**

**We require that you carefully read this manual, as well as the enclosed warranty, and refer to it when questions arise. If you have any specific questions concerning your warranty, please consult the plumbing professional from whom your water heater was purchased. For your records we recommend that you write the model, serial number and installation date of your water heater in the maintenance section in the back of this manual.**

**This manual should be kept with the water heater.**



## TABLE OF CONTENTS

	Page
<b>GENERAL INFORMATION.....</b>	<b>4</b>
<b>INSTALLATION.....</b>	<b>6</b>
<b>Locating The Water Heater .....</b>	<b>6</b>
<b>Minimum Clearances.....</b>	<b>9</b>
<b>Venting.....</b>	<b>11</b>
<b>Horizontal and Vertical Direct Vent Lengths.....</b>	<b>13</b>
<b>Direct Vent System Installation.....</b>	<b>14</b>
<b>Water Connections .....</b>	<b>25</b>
<b>Gas Connections .....</b>	<b>28</b>
<b>Electrical Connections .....</b>	<b>29</b>
<b>Wiring Diagram .....</b>	<b>30</b>
<b>GENERAL OPERATION.....</b>	<b>31</b>
<b>Lighting and Shutdown Instructions .....</b>	<b>32</b>
<b>Temperature Adjustment .....</b>	<b>33</b>
<b>Burner Flame Check.....</b>	<b>35</b>
<b>MAINTENANCE .....</b>	<b>37</b>
<b>OPERATING &amp; TROUBLESHOOTING GUIDE.....</b>	<b>42</b>
<b>TEMPERATURE CONTROL CHECKOUT .....</b>	<b>47</b>
<b>VENTING PARTS LIST DRAWING .....</b>	<b>48</b>
<b>WATER HEATER PARTS LIST DRAWING .....</b>	<b>49</b>
<b>WATER HEATER PARTS LIST.....</b>	<b>50</b>
<b>INSTALLATION INSTRUCTIONS FOR POTABLE WATER AND SPACE HEATING .....</b>	<b>51</b>

## GENERAL INFORMATION

This gas-fired water heater is design certified by CSA International under the American National Standard, Z21.10.3 (as indicated on the rating plate) and CAN/CGA 4.3-M- (as indicated on the rating plate) available from CSA Standards Association, 178 Rexdale Blvd., Etobicoke, Ontario, Canada M9W 1R3.

This water heater must be installed in accordance with local codes. In the absence of local codes, it must be installed in compliance with the National Fuel Gas Code (ANSI Z223.1-Latest Edition), or in Canada CAN/CGA B149.1 Natural Gas Installation Code (Latest Edition) or CAN/CGA B149.2 Propane Installation Code (Latest Edition).

This water heater has been equipped for use with **one type of gas only**. Compare the information provided on the rating plate, affixed to the front of the water heater, making sure that the gas stated on the rating plate is the same as the gas to be used.

### CAUTION

**Do not attempt to use this water heater with any gas other than the type listed on the rating plate. Do not attempt to convert this water heater for use with a gas other than the type for which it is equipped. Failure to use the proper gas can create an unsafe condition resulting in property damage, bodily injury, or death. Consult your local gas supplier or gas company if there are any questions.**

The warranty for this water heater is in effect only when the water heater is installed, adjusted, and operated in accordance with these Installation and Operating Instructions. The warranty does not cover damage or injury caused by the use of any energy-saving devices (other than those authorized by the manufacturer) in conjunction with this water heater. The use of unauthorized energy-saving devices may decrease the life of the water heater and endanger life and/or property. The manufacturer will not be liable for any damage, injury, or loss of life resulting from alteration and/or failure to comply with these instructions.

For installations in high altitude regions, this water heater must be ordered from the supplier to the manufacturer's specifications for that particular altitude. Contact the company listed on the rating plate when ordering high altitude constructed water heaters.

**General Information continued-**

This water heater has been designed and certified for the purpose of heating potable water. The installation and use of this water heater for any purpose other than the heating of potable water may cause damage to the water heater, create a hazardous condition, and nullify the warranty.

**▲ CAUTION**

**Incorrect operation of this appliance may create a hazard to life and property and will nullify the warranty.**

**▲ DANGER**

**Do not store or use gasoline or other flammable, combustible, or corrosive vapors and/or liquids in the vicinity of this or any other appliance.**

**IMPORTANT**

Before proceeding, please inspect the water heater and venting components for possible damage. **DO NOT** install damaged components. If damage is evident then please contact the supplier where the water heater was purchased or the manufacturer listed on the rating plate for replacement parts.

Sacrificial anode rods are used to extend tank life. In areas where water is unusually active, an odor may occur at the hot water faucet due to a reaction between the sacrificial anode and the impurities in the water. **This is not the fault of the water heater.** If this should happen, alternative aluminum anode rods may be purchased from the supplier of this water heater or the manufacturer. This will minimize odor while protecting the tank. Additionally, the water heater should be flushed with appropriate dissolvers to eliminate any bacteria. **The removal of the anode rods will void the warranty.**

## INSTALLATION

### Locating The Water Heater

#### **WARNING**

Water heaters are heat-producing appliances. To avoid damage or injury there shall be no materials stored against the water heater and proper care shall be taken to avoid unnecessary contact (especially by children) with the water heater components. **UNDER NO CIRCUMSTANCES SHALL FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER, DIRECT VENT SYSTEM OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER OR DIRECT VENT SYSTEM.**

**This water heater must NOT be installed in any location where gasoline or flammable vapors are likely to be present.**

The location of this water heater is of the utmost importance. Before installing this water heater, you should read the Installation section of these instructions. After reading these Installation and Operating Instructions, select a location for the water heater where the floor is level and is easily accessible to water lines, gas supply (type identified on the rating plate), an adequate open drain, and within the maximum specified venting distance to an outside wall or roof for the direct vent terminal. **DO NOT locate the water heater where water lines could be subjected to freezing temperatures. Make sure the cold water pipes are not located directly above the gas control so that condensate during humid weather does not drip or accumulate on the controls.**

Adequate clearances must be provided for easy access to controls by service personnel to enable proper cleaning, servicing, and operation of the water heater. Under no circumstances is the front of the water heater to be placed in a position where the burner tray assembly cannot slide out for removal when servicing.

**This water heater MUST be installed indoors out of the wind and weather.**

To comply with NSF requirements this water heater is to be:

- a) Sealed to the floor with sealant, in a smooth and easily cleanable way, or
- b) Installed with an optional leg kit that includes legs and/or extensions that provide a minimum clearance of 6" beneath the water heater.

*Installation (Locating The Water Heater) continued-*

**Note: For California installation this water heater must be braced, anchored, or strapped 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, 400 P Street, Sacramento, CA 95814.**

**Water heater corrosion and component failure can be caused by the heating and breakdown of airborne chemical vapors.** Examples of some typical compounds that are potentially corrosive are: spray can propellants, cleaning solvents, refrigerator and air conditioning refrigerants, swimming pool chemicals, calcium and sodium chloride, waxes and process chemicals. These materials are corrosive at very low concentration levels with little or no odor to reveal their presence. **NOTE: DAMAGE TO THE WATER HEATER CAUSED BY EXPOSURE TO CORROSIVE VAPORS IS NOT COVERED BY THE WARRANTY. DO NOT OPERATE THE WATER HEATER IF EXPOSURE HAS OR WILL OCCUR. DO NOT STORE ANY POTENTIALLY CORROSIVE COMPOUNDS IN THE VICINITY OF THE WATER HEATER OR THE DIRECT VENT TERMINAL.**

** WARNING**

Liquefied petroleum gases/propane gas is heavier than air and will remain at floor level if there is a leak. Basements, crawl spaces, closets and areas below ground level will serve as pockets for accumulation of leaking gas. Before lighting, smell all around the appliance area for gas. Be sure to smell next to the floor.

**IF YOU SMELL GAS:**

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any telephone in your building.
- Immediately call your gas supplier from a telephone in another building. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

**DO NOT OPERATE THE APPLIANCE UNTIL THE LEAKAGE IS CORRECTED!**

**▲WARNING**

**DO NOT ATTEMPT TO LIGHT ANY GAS APPLIANCE IF YOU ARE NOT CERTAIN OF THE FOLLOWING:**

- Liquefied petroleum gases/propane gas and natural gas have an odorant added by the gas supplier that aids in detection of the gas.
- Most people recognize this odor as a “sulfur” or “rotten egg” smell.
- Other conditions, such as “odorant fade” can cause the odorant to diminish in intensity, or “fade”, and not be as readily detectable.
- If you have a diminished sense of smell, or are in any way unsure of the presence of gas, immediately contact your gas supplier from a telephone in another building.
- Gas detectors are available. Contact your gas supplier or plumbing professional for more information.

Proper venting practices must be considered when selecting a location for this water heater. For exact venting specifications, please consult the Venting section of these Installation and Operating Instructions.

This water heater must be located in an area where leakage of the tank, water line connections, or the combination temperature and pressure relief valve will not result in damage to the area adjacent to the water heater or to lower floors of the structure. When such locations cannot be avoided, a suitable drain pan must be installed under the water heater. The drain pan must have a minimum length and width of at least 4 in. (10.2 cm) greater than the diameter of the water heater and must not restrict proper combustion air flow to the water heater. The drain pan, as described above, can be purchased from your plumbing professional. The drain pan must be piped to an adequate drain. The piping must be at least 3/4 inch (1.9 cm) in diameter and pitched for proper drainage.

**Note: In order to provide clearance for the burner panel access screws to be removed, use a slab inside the drain pan to raise the water heater 1” (2.5 cm) so that the burner access panel clears the lip of the drain pan. There must be access to the burner assembly for servicing. Be sure the water heater remains level.**

It is recommended that a minimum clearance of four (4) inches (10.2 cm) be provided on the side of the water heater for servicing and maintenance of the combination temperature and pressure relief valve.



## Minimum Clearances

### **▲WARNING**

**Failure to adhere to these installation and operating instructions may create a hazard to life and property and will nullify the warranty.**

This installation shall allow access to the front of the water heater and adequate clearance shall be provided for servicing and operating this water heater. The water heater may be installed on either a combustible or non-combustible floor. If the installation is on carpeting, the water heater must be installed on top of a metal or wood panel (or equivalent) extending beyond the full width and depth of the appliance by at least three (3) inches (7.6 cm) in any direction. The panel must cover the entire floor if the water heater is to be installed in a carpeted alcove or closet. The panel must be strong enough to support the weight of the water heater when full of water.

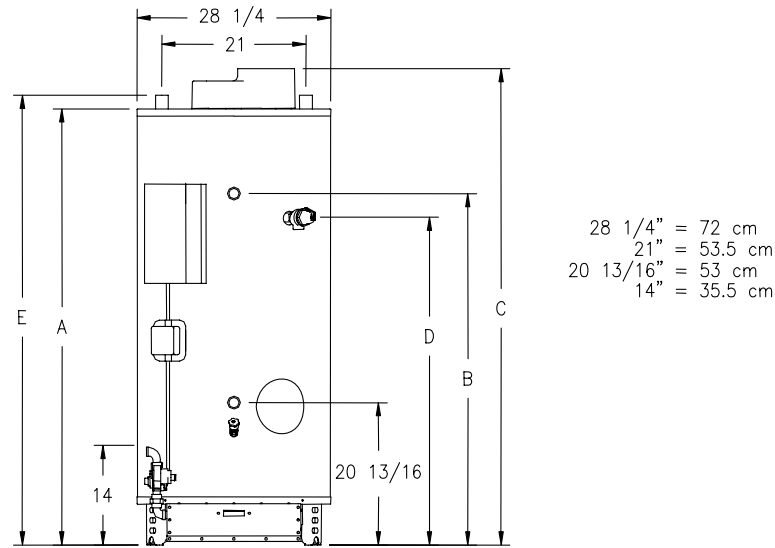
The minimum clearances to combustibles for this water heater are: two (2) inches (5.1 cm) from the sides and rear, two (2) inches (5.1 cm) from the front of the burner access box, sixteen (16) inches (40.6 cm) from the top jacket, zero (0) inch (0 cm) from the air intake boot and vent tubes and twelve (12) inches (30.5 cm) in any direction from the direct vent terminal. A minimum of 30 inches front clearance from the burner access panel is necessary for inspection and servicing.

This water heater may be installed in an alcove on combustible flooring with clearances from combustible materials as shown in the tables listed in the Installation Minimum Clearances section of this Installation and Operating Instruction Manual.

### **▲CAUTION**

**The National Fuel Gas Code (ANSI Z233.1-or latest edition) and CAN/CGA (B149.1-or latest edition), expressly prohibits the installation of a water heater in a garage, unless the unit is installed so that the burner and ignition devices are at least eighteen (18) inches (46 cm) above floor level and protected to avoid damage by a moving vehicle.**

**Installation (Minimum Clearances) continued-**



**Figure 1**

Model Description			Dimensions for Figure 1				
Capacity (Gal)	Input (BTU/hr)		A (In.)	B (In.)	C (In.)	D (In.)	E (In.)
	Nat.	LP					
100	199,999	199,999	72.88	60.44	78.69	56.94	74.81
100	360,000	360,000	72.88	60.44	78.69	56.94	74.81
80	199,999	199,999	63.88	51.44	69.69	47.94	65.81
80	300,000	300,000	63.88	51.44	69.69	47.94	65.81

Model Description			Clearances		
Capacity (Gal)	Input (BTU/hr)		Sides and Rear (In.)	Flue or Vent (In.)	Ceiling (In.)
	Nat.	LP			
100	199,999	199,999	2	0	16
100	360,000	360,000	2	0	16
80	199,999	199,999	2	0	16
80	300,000	300,000	2	0	16

Model Description			Dimensions for Figure 1				
Capacity (Liter)	Input (kW/hr)		A (Cm)	B (Cm)	C (Cm)	D (Cm)	E (Cm)
	Nat.	LP					
378.5	58.7	58.7	185.1	153.5	199.9	144.7	190.0
378.5	105.5	105.5	185.1	153.5	199.9	144.7	190.0
302.8	58.7	58.7	162.3	130.7	177.0	121.8	167.2
302.8	88.0	88.0	162.3	130.7	177.0	121.8	167.2

Model Description			Clearances		
Capacity (Liter)	Input (kW/hr)		Sides and Rear (Cm)	Flue or Vent (Cm)	Ceiling (Cm)
	Nat.	LP			
378.5	58.7	58.7	5.1	0	40.6
378.5	105.5	105.5	5.1	0	40.6
302.8	58.7	58.7	5.1	0	40.6
302.8	88.0	88.0	5.1	0	40.6

## Venting

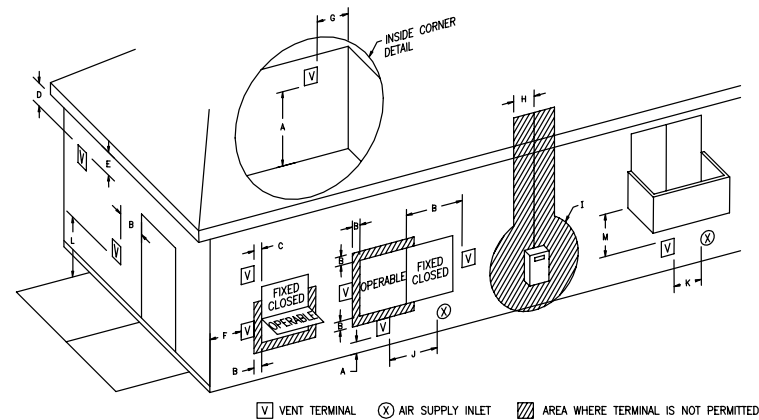
This is a Powered Direct Vent Gas Water Heater where all air for combustion is obtained from the outside atmosphere and all flue gases are discharged to the outside atmosphere. The venting system is a coaxial (pipe within a pipe) design where the flue products are discharged through the inside flue tube and the combustion air supply surrounds the flue tube enclosed by the outside pipe. The venting system incorporates both the combustion air supply and the flue exhaust. The venting system component, which is outside the building and takes in the combustion air supply and discharges the flue products, (while keeping them separate) is referred to as the “direct vent terminal”.

### ⚠ WARNING

The direct vent system must be properly installed. Failure to properly install the direct vent system could result in property damage, personal injury, or death.

DO NOT install any damaged direct vent system components. If damage is evident then please contact the supplier where the water heater was purchased or the manufacturer listed on the rating plate for replacement parts.

**Note:** Provide protection of the building materials from degradation by flue gases from the direct vent terminal.



**Figure 2**  
Direct Vent Terminal Clearances

**Installation (Venting) continued-**

		Canadian Installations <sup>1</sup>	US Installations <sup>2</sup>
A=	Clearance above grade, veranda, porch, deck or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to widow or door that may be opened	36 inches (91 cm)	12 inches (30 cm)
C=	Clearance to permanently closed widow	*b	*b
D=	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	12 inches (30 cm) *a	12 inches (30 cm) *a
E=	Clearance to unventilated soffit	12 inches (30 cm) *a	12 inches (30 cm) *a
F=	Clearance to outside corner	*b	*b
G=	Clearance to inside corner	*b	*b
H=	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.6 m) above the meter/regulator assembly	*b
I=	Clearance to service regulator vent outlet or oil tank vent	36 inches (91 cm)	*b
J=	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	36 inches (91 cm)	12 inches (30 cm)
K=	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet horizontally
L=	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m) †	*b
M=	Clearance under a veranda, porch, deck, or balcony	12 inches (30 cm) ‡	*b

<sup>1</sup> In accordance with the current CAN/CGA-B149 *Installation Codes*.

<sup>2</sup> In accordance with the current ANSI Z223.1-(Latest edition)/NFPA 54 *National Fuel Gas Code*.

† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single-family dwellings and serves both dwellings.

‡ Permitted only if a veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor.

\*a) A minimum clearance value determined by testing in accordance with section 2.20.

\*b) "Clearance in accordance with local installation codes and the requirements of the gas supplier".

The vent system must terminate so that proper clearances are maintained as cited in local codes or the latest edition of the National Fuel Gas Code, ANSI Z223.1.73.4e and 7.8a, b as follows:

1. Do not terminate near soffit vents or crawl space or other area where condensate or vapor could create a nuisance or hazard or cause property damage.
2. Do not terminate the exhaust vent terminal where condensate or vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.
3. Do not terminate the exhaust vent terminal over public area or walkways where condensate or vapor can cause nuisance or hazard.
4. The vent shall terminate a minimum of 12 inches above expected snowfall level to prevent blockage of vent termination.

**Installation (Venting) continued-**

Vent pipes serving power vented appliances are classified by building codes as “vent connectors”. Required clearances from combustible materials must be provided in accordance with information in this manual under LOCATION OF WATER HEATER and CLEARANCES, and with National Fuel Gas Code and local codes.

**Horizontal And Vertical Direct Vent Lengths**

This Powered Direct Vent Gas Water Heater comes with one (1) direct vent kit. The venting system supplied with this water heater is a coaxial (pipe within a pipe) design with the flue discharge tube on the inside and combustion air supply on the outside. Optional direct vent components are available that can extend the horizontal length and/or vertical height of the direct vent system to the maximum distances listed in the table below. This water heater must be installed using the supplied or optional listed components without modifications. Reference the Venting Component Tables listed in the Installation (Direct Vent System Installation) for the various system components.

**Note: The supplied horizontal vent terminal may be used to vent through outside walls up to 24 in. (61 cm) thick.**

**Maximum Venting Distances (Horizontal, Vertical, or Combined)**

Number of 90° Elbows	Maximum distance of straight pipe (excluding vent terminal) to exterior wall
0	22 ft. 9 in. (7 m)
1	19 ft. 6 in. (6 m)
2	16 ft. 3 in. (5 m)
3	13 ft. (4 m)

Note: Each 45° elbow reduces the maximum venting distance by 19 1/2 in. (50 cm).

**IMPORTANT**  
Do not exceed the venting distances or the number of elbows listed above. Exceeding the maximum venting distances may cause the water heater to malfunction or cause an unsafe condition.

## Direct Vent System Installation

### **⚠ WARNING**

The direct vent system must be properly installed. Failure to properly install the direct vent system could result in property damage, personal injury or death.

Do not install any damaged direct vent system components. Contact the manufacturer of the water heater for replacement parts.

The flow of combustion air must not be restricted. Keep the direct vent terminal openings clear of objects, shrubs, snow and debris.

### Tools Required For Direct Vent Installation

The following minimum tools are required to properly install the direct vent system. *Note: Wall construction will determine tool usage.*

- **Tape Measure**
- **Drill**
- **3/16 inch Diameter Drill Bit(s)**
- **1/8 inch Diameter Drill Bit(s)**
- **Masonry Drill Bit(s)** (*For Poured Concrete, Concrete Block and Brick Wall Construction*)
- **Reciprocating Saw w/appropriate Blade(s)** (*Dependent on Wall Construction*)
- **Chisel** (*For Poured Concrete, Concrete Block and Brick Wall Construction*)
- **Hammer** (*For Poured Concrete, Concrete Block and Brick Wall Construction*)
- **1/4 & 5/16 inch Nut Drivers (Preferred) or Slotted Head Screwdriver**
- **Phillips Head Screwdriver**

### Materials:

- **Metal strapping to support vent piping**

## **Installation Procedure**

### **A. Determine where the vent terminal will exit through the wall or roof.**

1. The supplied vent kit includes a horizontal (through the wall) vent terminal, an elbow, a condensate trap, vent connector clamps, and 6 1/2 ft. (2 m) of coaxial vent pipe. The 6 in. (15.3 cm) diameter venting system also is supplied with an 8 in. (20.3 cm) to 6 in. (15.3 cm) reducer for the water heater vent connection. The coaxial vent pipe includes both the flue exhaust (inside pipe) and combustion air intake (outside pipe). The coaxial vent pipe may be cut on the unflared end (end without gasket) as required for the installation.
2. Determine if additional venting components are required for the venting installation. Refer to the venting component table listed in the Direct Vent Installation section for available optional venting components.
3. Make sure the vent terminal location complies with the requirements described earlier and referenced in the latest edition of the National Fuel Gas Code.
4. Measure the vertical and horizontal distance from the water heater vent connection to determine the number of vent pipes needed.

*Installation (Direct Vent System Installation) continued-*

**Venting Component Table for 6 in. (15.3 cm) Diameter Vent Size  
(199,999 Btu/Hr. [58.7 kW/Hr.] Input Models)  
Supplied Kit Components**

Quantity	Vent Length	Part Description	Part Number
2	39 3/8 in. (100 cm)	Coaxial vent pipe, straight section with gasket and clamp	239-41594-00A
1		90° Elbow	239-41591-00A
1		Flue Exhaust Cap	239-41677-00A
1	23 5/8 in. (60 cm)	Horizontal Vent Terminal	239-41588-00A
1	7 1/4 in. (19 cm)	Condensate Trap Tee	239-41596-00A
1		Vent Adapter Connection Clamp	239-41459-00A
1		8 in. (20.3 cm) to 6 in. (15.3 cm) diameter vent reducer	239-41458-00A

**Venting Component Table for 8 in. (20.3 cm) Diameter Vent Size  
(300,000 Btu/Hr. [88.0 kW/Hr.] and 360,000 Btu/Hr. [105.6 kW/Hr.]  
Input Models)  
Supplied Kit Components**

Quantity	Vent Length	Part Description	Part Number
2	39 3/8 in. (100 cm)	Coaxial vent pipe, straight section with gasket and clamp	239-41593-00A
1		90° Elbow	239-41584-00A
1		Flue Exhaust Cap	239-41676-00A
1	23 5/8 in. (60 cm)	Horizontal vent Terminal	239-41589-00A
1		Vent Adapter Connection Clamp	239-41459-00A
1	7 1/4 in. (18.5 cm)	Condensate Trap Tee	239-41597-00A

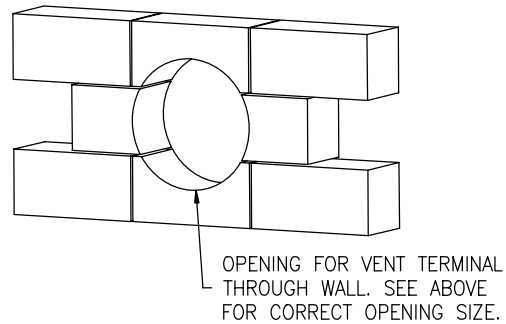


## **B. Install Vent Terminal**

**Note:** The supplied horizontal vent terminal may be used to vent through outside walls up to 24 in. (61 cm) thick.

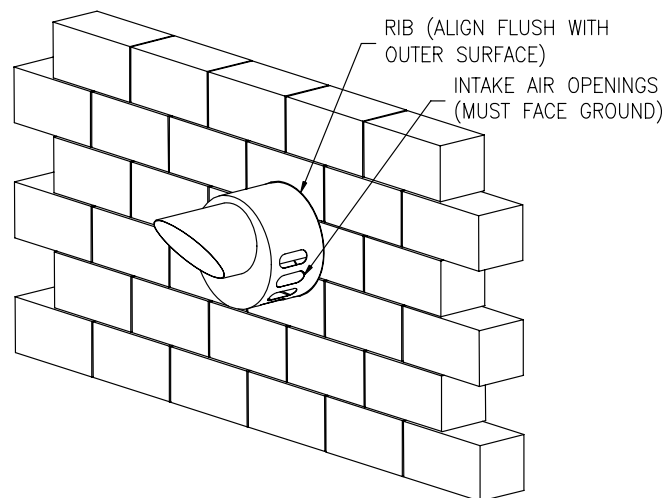
### **1. Horizontal Vent Terminal (Through the Wall) (Supplied)**

- (a) Cut an opening of at least 6 1/2 inch (16.5 cm) diameter through the outside wall for the 199,999 Btu/Hr. input models or an opening at least 8 1/2 inch (21.6 cm) in diameter for the 300,000 and 360,000 Btu/Hr. input models. (See Figure 3).



**Figure 3**

- (b) Slide the vent terminal through the wall opening until the rib closest to the intake air openings of the terminal is even with the outside wall.

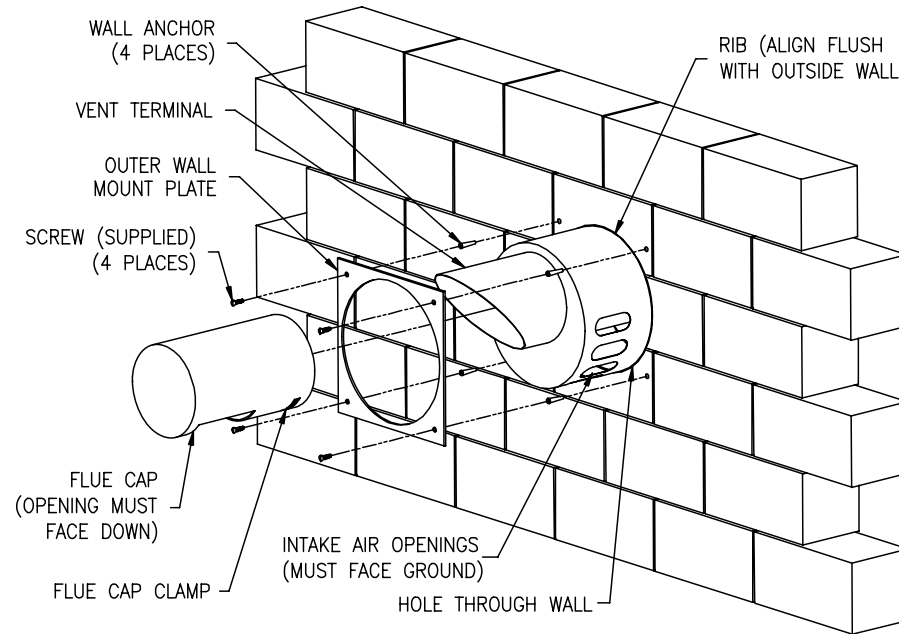


**Figure 4**

**Installation (Direct Vent System Installation) continued-**

- (c) Slide the outside wall plate over the vent terminal and fasten to the wall with 4 screws. Depending upon the wall construction, wall anchors may be required to reinforce the screws.
- (d) Install the flue cap over the outside of the angled flue discharge tube of the vent terminal. Rotate the cap so that the vent discharge opening is in line with the angled opening of the vent terminal. The vent and air intake openings must both be aligned to face the ground. Tighten the screw clamp so that the cap remains firmly in place.

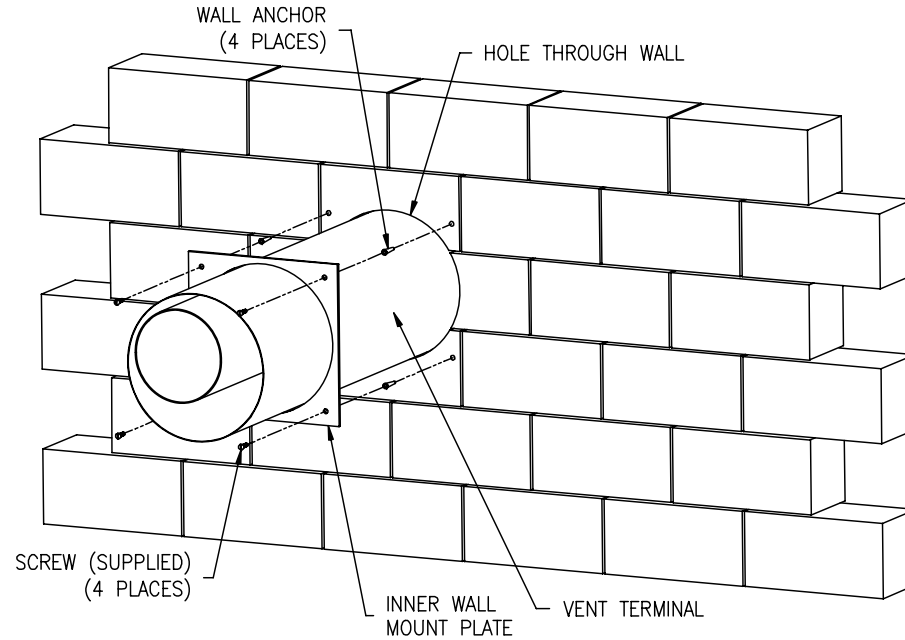
**IMPORTANT**  
**The flue cap must be installed over the angled flue discharge tube with the direct vent openings facing directly down for the water heater to operate properly during rain and wind conditions.**



**Figure 5**

**Installation (Direct Vent System Installation) continued-**

- (e) Install inside wall plate on the inside wall and fasten with 4 screws. Depending upon the wall construction, wall anchors may be required to reinforce the screws.



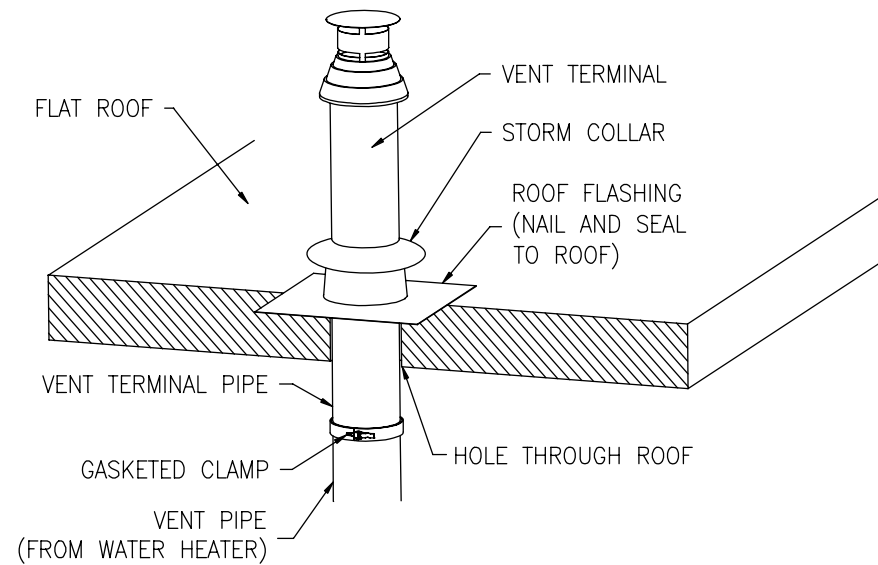
**Figure 6 (Inside Wall)**

**2. Vertical Vent Terminal (Through the Roof - Optional)**

- (a) Determine the exact location where the roof vent terminal will exit the roof, making sure the venting system clears all obstructions. For pitched roofs, the vent cap must be the distance above the roofline as specified in the local codes, or in the absence of local codes refer to the latest edition of the National Fuel Gas Code. The top of the roof terminal may extend up to 2 1/2 ft. (76.2 cm) above the roofline as needed.
- (b) Run the coaxial venting system to the proper distance below the roof sheathing required for the correct distance of the roof terminal above the roof surface. See the following sections on installing the rest of the venting system.

**Installation (Direct Vent System Installation) continued-**

- (c) Cut a minimum 6 1/2 inch (16.5 cm) diameter hole for the smaller vent size or an 8 1/2 inch (21.6 cm) minimum diameter hole for the larger vent size centered in the desired location for the roof terminal. (See Figure 7).
- (d) Center the roof flashing over the hole using either the flat roof flashing or universal flashing for pitched roofs.
- (e) Slip the storm collar supplied with the roof flashing kit over the outside of the vent terminal and align with the vent pipe end below roof opening. Insert the terminal into the vent pipe.
- (f) Fasten the roof flashing to the roof with nails. Seal the vent terminal and flashing to the roof.
- (g) Install the gasketed clamp around the joint between the vent terminal and vent pipe.



**Figure 7**

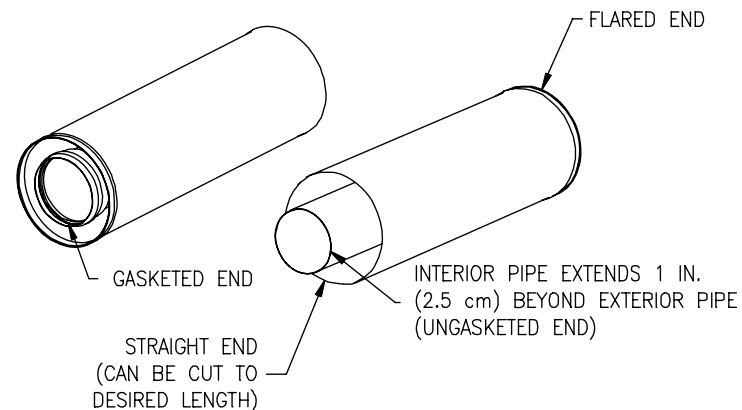
### **C. Install Vent Piping Sections**

#### **General Notes:**

- 1) The coaxial vent pipe sections are designed to fit tightly together and seal with the integral flue pipe seal and supplied pipe clamps. No silicone caulk or special tools are required.
- (2) All venting sections and fittings come complete with silicone flue pipe gaskets and outside gasketed pipe clamps for making airtight connections between the venting pipe connections.
- (3) Wetting the silicone gaskets with a solution of soapy water will make the pipe connections slide together easier.
- (4) The internal flue pipe of the straight vent pipe is not fastened to the outside pipe so that the last vent section can be cut to length. Remove the internal flue pipe from the outside pipe for easier handling during installation. Complete one section at a time by installing the outside pipe, then the inside flue pipe.

#### **Installation Procedure:**

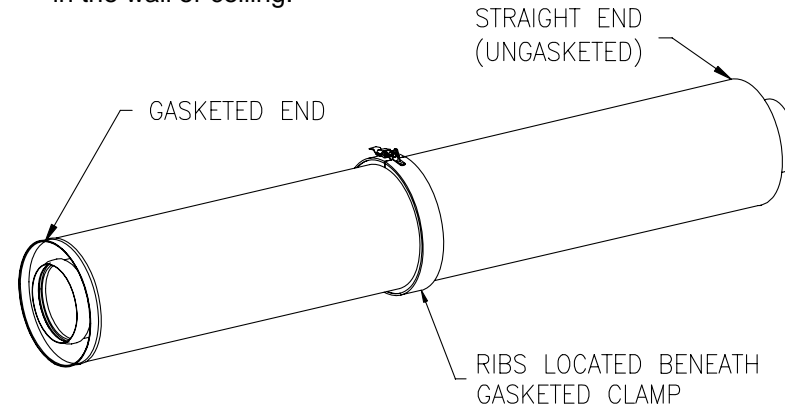
- (a) Raise the outside vent pipe to the vent terminal connection with the flared (female) end of the pipe toward the vent terminal. Insert the outside pipe into the vent terminal connection and grasp the end of the vent pipe while twisting and pushing the pipe until inserted all the way into the vent terminal.



**Figure 8**

**Installation (Direct vent System Installation) continued-**

- (b) Connect the outside pipes together using the gasketed clamps provided. The outside vent pipes have ribs located on the female end. When connecting the vent piping, the gasketed clamps must cover the ribs and joints of the connecting vent tubes (See Figure 9). Support each pipe section with hangers attached to supporting joists in the wall or ceiling.



**Figure 9**

- (c) Insert the inside flue pipe into the outer pipe with the female gasketed end toward the vent terminal. Push and twist on the end of the flue pipe until the flue pipe from the vent terminal is completely seated inside the female gasketed end.
- (d) Continue connecting pipe sections together with clamps and supporting with hangers. Follow the same procedure described in the previous steps for inserting and connecting the flue tubes inside the outer vent pipes. **Install one section at a time with the outside pipe first, followed by the inside flue pipe.**
- (e) The last pipe section may be cut to fit the distance required to reach the water heater vent connections. First, install the supplied condensate trap with the crimped end into the gasketed end of the elbow (horizontal vent installations) and clamp the condensate tee and elbow together. Then install the crimped end of the elbow into the vent connection of the water heater. On vertical vent installations, install the crimped end of the condensate trap directly onto the water heater vent connection. The 199,999 Btu/Hr. (58.7 kW/Hr.) models require the installation of a vent reducer (supplied with venting kit) into the water heater vent assembly before attaching the elbow or condensate trap (vertical vent).

**IMPORTANT**

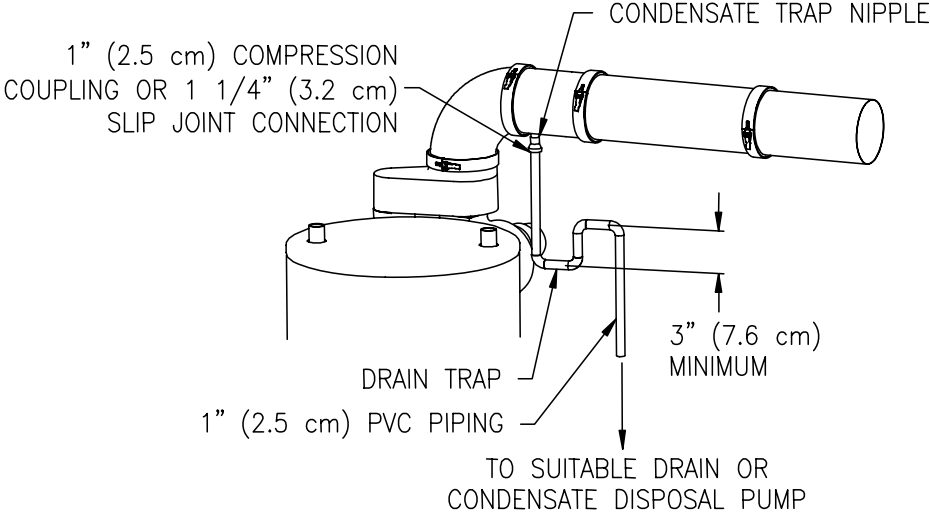
**In order for the condensate trap to collect and dispose of the condensate from the vent pipe, the venting system must have a downward slope of 1/4 in. per ft. (21 mm/m) toward the condensate trap. The condensate trap must be installed as close as possible to the vent adapter to prevent condensate from accumulating and draining into the vent adapter or blower.**

- (f) Carefully measure the length of straight vent pipe needed allowing for about 2 in. (5.1 cm) insertion into the elbow. Mark the ungasketed end of the pipe to be cut and carefully make a straight cut on the outside pipe to the desired length. **Remove the inside flue tube and cut each pipe separately.** Then cut the inside flue pipe about 1 in. (2.5 cm) longer than the outside pipe so that the flue pipe protrudes slightly beyond the outside pipe. Reinsert the inside flue pipe into the outside vent pipe. Connect the outside vent pipe and clamp at each end.
- (g) Use the large clamp supplied in the vent kit with the stepped gasket to seal the elbow or condensate trap to the blower vent connector. The larger step of the gasket seals the vent pipe to the cast vent adapter.
- (h) Condensate disposal: Connect either a 1 1/4 inch (3.2 cm) slip joint drain connection or a 1 inch (2.5 cm) PVC compression coupling from the condensate trap nipple to 1" (2.5 cm) PVC piping to a drain or condensate disposal pump. Install a drain trap after the condensate fitting to seal the venting system. Some local codes may require a condensate neutralizer before allowing the condensate to be disposed down the drain. Contact your plumbing professional. See Figure 10.

**▲ CAUTION**

**A trap or loop must be installed for the condensate drain to prevent leakage of potentially hazardous flue products from being discharged into the room.**

**Installation (Direct vent System Installation) continued-**



**Figure 10**



## Water Connections

NOTE: *BEFORE PROCEEDING WITH THE INSTALLATION, CLOSE THE MAIN WATER SUPPLY VALVE.*

After shutting off the main water supply, open a faucet to relieve the water line pressure to prevent any water from leaking out of the pipes while making the water connections to the water heater. After the pressure has been relieved, close the faucet. The COLD water inlet and HOT water outlet are identified on the top and front of the water heater. Make sure the diptube is in place before making the cold water connection. Make the proper plumbing connections between the water heater and the plumbing system to the house. Install a shut-off valve in the cold water supply line.

### CAUTION

If sweat fittings are to be used, **DO NOT** apply heat to the nipples on top or side of the water heater. Sweat the tubing to the adapter before fitting the adapter to the water connections. It is imperative that heat is not applied to the nipples containing a plastic liner.

### WARNING

**FAILURE TO INSTALL AND MAINTAIN A NEW, LISTED TEMPERATURE AND PRESSURE RELIEF VALVE WILL RELEASE THE MANUFACTURER FROM ANY CLAIM, WHICH MIGHT RESULT FROM EXCESSIVE TEMPERATURE AND PRESSURES.**

If this water heater is installed in a closed water supply system, such as the one having a back-flow preventer in the cold water supply, provisions shall be made to control thermal expansion. **DO NOT** operate this water heater in a closed system without provisions for controlling thermal expansion. Warranties do not cover damages from thermal expansions such as pressure bulges and/or deformities. Your water supplier or local plumbing inspector should be contacted on how to control this situation.

After installation of the water lines, open the main water supply valve and fill the water heater. While the water heater is filling, open several hot water faucets to allow air to escape from the water system. After steady stream of water flows through the faucets, close them and check all water connections for possible leaks. **NEVER OPERATE THE WATER HEATER WITHOUT FIRST BEING CERTAIN IT IS FILLED WITH WATER.**

### CAUTION

**Keep clear of combination temperature and pressure relief valve discharge line outlet.** The discharge may be hot enough to cause scald injury. The water is under pressure and may splash.

**▲WARNING**

For protection against excessive temperatures and pressure, install temperature and pressure protective equipment required by local codes, but not less than a combination temperature and pressure relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials as meeting the requirements of the Standard for *Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANS Z21.22* and the Standard *CAN1-4.4 Temperature, Pressure, Temperature and Pressure Relief Valves and Vacuum Relief Valves*. The combination temperature and pressure relief valve shall be marked with a maximum set pressure not to exceed the maximum working pressure of the water heater. The combination temperature and pressure relief valve shall also have an hourly rated temperature steam BTU discharge capacity not less than the hourly rating of the water heater.

Install the combination temperature and pressure relief valve into the opening provided and marked for this purpose on the water heater.

Note: Some models may already be equipped or supplied with a combination temperature and pressure relief valve. Verify that the combination temperature and pressure relief valve complies with local codes. If the combination temperature and pressure relief valve does not comply with local codes, replace it with one that does. Follow the installation instructions above on this page.

Install a discharge line so that water discharged from the combination temperature and pressure relief valve will exit within six (6) inches (15.2 cm) above, or any distance below the structural floor and cannot contact any live electrical part. The discharge line is to be installed to allow for complete drainage of both the combination temperature and pressure relief valve and the discharge line. The discharge opening must not be subjected to blockage or freezing. **DO NOT** thread, plug or cap the discharge line. It is recommended that a minimum clearance of four (4) inches (10.2 cm) be provided on the side of the water heater for servicing and maintenance of the combination temperature and pressure relief valve.

Do not place a valve between the combination temperature and pressure relief valve and the tank.

**▲WARNING**

Hydrogen gas can be produced in an operating water heater that has not had water drawn from the tank for a long period of time (generally two weeks or more). Hydrogen gas is extremely flammable. To prevent the possibility of injury under these conditions, we recommend the hot water faucet to be open for several minutes at the kitchen sink before you use any electrical appliance, which is connected to the hot water system. If hydrogen is present, there will be an unusual sound such as air escaping through the pipes as hot water begins to flow. Do not smoke or have open flame near the faucet at the time it is open.

This water heater can deliver scalding temperature water at any faucet in the system. Be careful whenever using hot water to avoid scalding injury. Certain appliances such as dishwashers and automatic clothes washers may require increased temperature water. By setting the thermostat on this water heater to obtain the increased temperature water required by these appliances, you might create the potential for scald injury. To protect against injury, you should install an ASSE approved 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 the manufacturer of this water heater or a local plumbing supplier. Please consult with a plumbing professional. For information regarding space-heating water connections and plumbing arrangements, refer to the section, "Installation Instructions for Potable Water and Space Heating" in this Installation and Operating Instruction Manual.



## Gas Connections

The gas supply lines must meet all requirements of the National Fuel Gas Code (ANSI Z223.1-Latest Edition), or in Canada CAN/CGA B149.1 Natural Gas Installation Code (Latest Edition) or CAN/CGA B149.2 Propane Installation Code (Latest Edition).

The minimum permissible gas supply pressure for the purpose of input adjustment is one (1.0) inch (0.25 kPa) water column above the operating manifold pressure. See the rating plate and gas valve for the manifold pressure and gas type. The maximum permissible gas supply pressure is fourteen (14.0) inches (3.5 kPa) water column for natural gas and liquefied petroleum gases/propane gas.

1. Connect this water heater only to the type of gas (Natural or Propane gas) as shown on the rating plate. Use clean black iron pipe or equivalent material approved by local codes and ordinances. (Dirt and scale from the pipe can enter the gas valve and cause it to malfunction). The inlet gas line must have a minimum length of three (3) inches (7.6 cm) drip leg (*sediment trap*) installed as close to the water heater's gas valve as possible. A ground joint union must be installed as close to the water heater as possible in the gas supply line feeding the water heater to permit servicing of the water heater. Compounds used on the threaded joints of the gas piping must be resistant to the action of liquefied petroleum gases/propane gas. DO NOT apply pipe dope to the gas valve inlet and make certain that no pipe dope has become lodged in the inlet screen of the gas valve. Extreme care must be taken to ensure no pipe dope enters the gas valve. Avoid excessive torque when tightening the gas supply line to the gas valve. Excessive torque may result in cracking of the gas valve housing and could create a gas leak. The suggested maximum torque is 31.5 ft. lbs. (4.4 kg-m).

### WARNING

The manufacturer of this water heater will not be liable for any damage or injury caused as a result of a cracked gas inlet as a result of excessive torque.

2. This water heater and its gas connection must be leak tested before placing the water heater in operation. Check for gas leaks with a soap and water solution and a brush or a commercial leak detector fluid. **NEVER USE A MATCH OR OPEN FLAME FOR TESTING!**

### CAUTION

The water heater and individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressures in excess of 1/2 psi (3.5 kPa). The water heater must be isolated from the gas supply piping system by closing its manual shutoff valve during any pressure testing of the gas supply system at test pressures equal to or less than 1/2 psi (3.5 kPa). The supply line must be capped when not connected to the water heater.

3. While checking for leaks care must be taken to prevent solution from contacting the electrical connections at the control. If electrical connections at the control become wet, they must be thoroughly dried before attempting to operate the water heater.

## Electrical Connections

All electrical wiring must be installed and grounded in accordance with local codes, or in the absence of local codes, the National Electrical Code, ANSI/NFPA 70 and/or the CSA C22.1 Electrical Code.

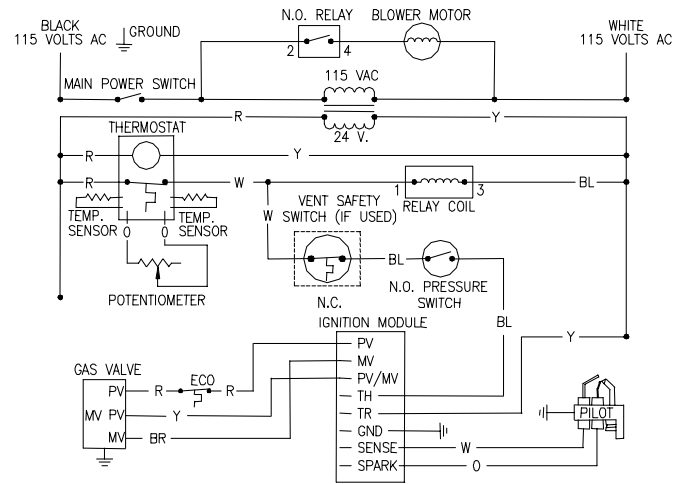
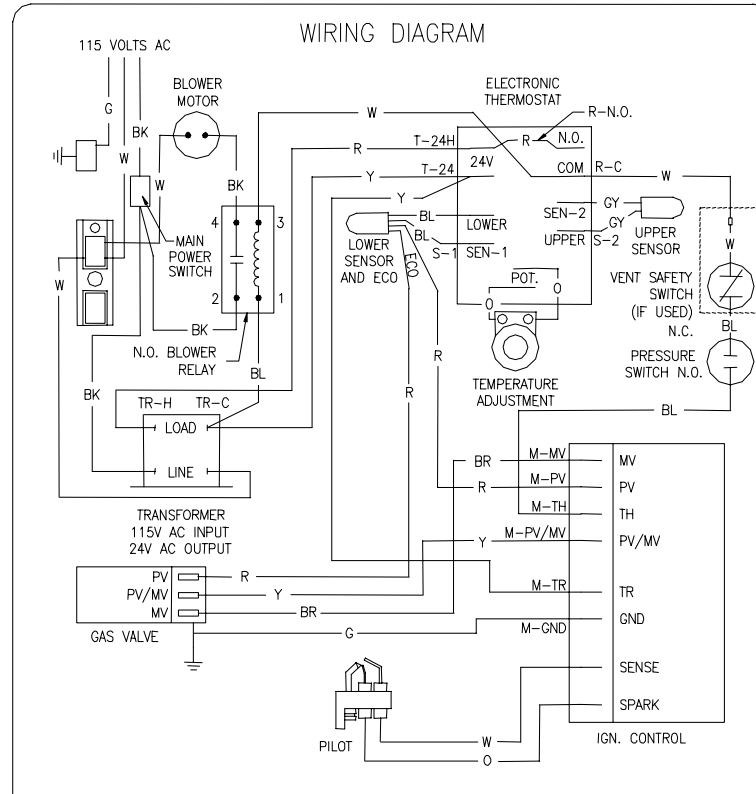
The water heater must be wired to a 115 volt, 60 Hz, AC power supply. The water heater should be wired on a separate circuit and breaker. If a flexible line cord and plug is permitted by local code, then provide a three wire grounding type receptacle within reach of the line cord provided on the control box. Do not plug the line cord into a receptacle that can have the power supply interrupted by a switch that is used to control lights or another appliance.

If wiring in conduit is required, remove the line cord and strain relief bushing in the control panel and install an electrical conduit connector. Connect the hot, neutral and ground leads to the terminal block using quick connect terminals. Refer to the wiring diagram for the correct terminal locations for each wire lead.

### CAUTION

**Turn off or disconnect the electrical power supply to the water heater before servicing. Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

# Wiring Diagram



NOTE:  
IF ANY OF THE ORIGINAL WIRES AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED,  
IT MUST BE REPLACED WITH 18. GA STRANDED 105°C WIRE OR ITS EQUIVALENT.

## GENERAL OPERATION

### WARNING

Water heaters are heat-producing appliances. To avoid damage or injury there must be no materials stored against the water heater or direct vent system, and proper care shall be taken to avoid unnecessary contact (especially by children) with the water heater and direct vent system.

**UNDER NO CIRCUMSTANCES SHALL FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER.**

#### TO FILL THE WATER HEATER

1. Close the water heater drain valve by turning the knob clockwise. If alternative water connections are provided but not used, make certain they are plugged (i.e. rear connections).
2. Open the cold water supply shut-off valve.
3. Open several hot water faucets to allow air to escape from the system.
4. When a steady stream of water flows from the faucets, the water heater is filled. Close the faucets and check for water leaks at the water heater drain valve, combination temperature and pressure relief valve and the hot and cold water connections.

#### TO DRAIN THE WATER HEATER

Should it become necessary to completely drain the water heater, make sure you follow the steps below:

1. Depress the control panel rocker switch on the side of the control box to the "OFF" position. Refer to the operating instructions.
2. Rotate and partially depress gas control knob clockwise to the "OFF" position.
3. Shut off the gas supply to the water heater.
4. Close the cold water supply shut-off valve.
5. Open the drain valve on the water heater by turning the knob counter-clockwise. The drain valve has threads on the end that will allow the connection of a standard hose coupling.
6. Open a hot water faucet to allow air to enter the system.

To refill the water heater, refer to "To Fill the Water Heater."



## Lighting And Shutdown Instructions

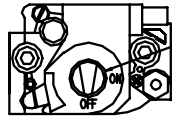
### FOR YOUR SAFETY READ BEFORE LIGHTING

**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 is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
  - Do not touch any electric switch; do not use any phone in your building.
  - Immediately call your gas supplier from a neighbor's phone. Follow the gas 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 service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

### OPERATING INSTRUCTIONS

1. STOP! read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
5. Turn gas control knob clockwise ↻ to "off."
6. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
7. Turn gas control knob counterclockwise ↻ to "ON."
8. Turn on all electric power to the appliance.
9. Set thermostat to desired setting.
10. 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 gas control knob clockwise ↻ to "OFF."

### ▲ CAUTION

Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system including gas controls, which has been under water.

## Temperature Adjustment

The temperature selector knob of the thermostat has been adjusted to its lowest setting when shipped from the factory.

The line on the thermostat temperature scale (see figure 11) is the preferred starting point for setting the temperature control. For energy-efficient operation of your water heater, the suggested initial temperature setting is approximately 130°F (55° C). Households with small children or invalids may require a 120°F (49° C) or lower temperature setting to reduce the risk of scald injury. Some states require a lower temperature setting. NOTE: The lower the temperature setting the greater the energy efficiency both to heat the water and to maintain its temperature during standby periods. Lower water temperatures also extend tank life. Remember, no water heating system will provide exact temperatures at all times. Allow a few days of operation at this setting to determine the correct temperature setting consistent with your needs. NOTE: This water heater, when set at a lower temperature setting, is not capable of producing hot water of sufficient temperature for sanitizing purposes.

During winter season or any cold period, you may desire a higher temperature setting to adjust for the colder incoming water. This adjustment, however, may cause additional condensation to form on the cooler tank surface. This does not mean the tank is leaking. During summer months, the warmer incoming water temperatures will benefit the performance of your water heater and reduce the amount of condensation developed.

Condensation does not mean your tank is leaking. Over 40% of reported tank leaks on installation are proven to be condensation. To avoid unnecessary inconvenience and expense, make sure the tank is leaking before calling a service person.

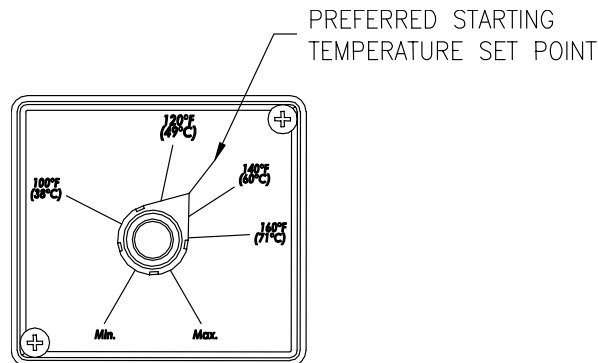


Figure 11

 **DANGER**

Hotter water increases the risk of scald injury. Scalding may occur within five (5) seconds at a temperature setting of 140°F (60°C). To protect against hot water injury, install an ASSE approved mixing valve in the water system. This valve will reduce point of discharge temperature by mixing cold and hot water in branch water lines. A licensed plumbing professional or local plumbing authority should be consulted.

**Note:** This water heater is equipped with an energy cut out device to prevent overheating. Should overheating occur or should the gas supply fail to shut off, turn off the manual gas control valve to the appliance and call a qualified service technician.

**Note:** Whenever the water heater is filled with cold water, condensate will form on the cool tank surface and drops of water will fall on the hot burner and combustion chamber surfaces producing a “sizzling” noise. Condensation is normal and does not indicate a leak. It will disappear when the tank becomes heated.

An automatic gas shut-off device (ECO) is incorporated in the thermostat circuit, which will shut off all gas supply to the burner and pilot if the water heater temperature exceeds 200°F (93° C). Should the ECO function (open), the water temperature should be reduced to approximately 120°F (49° C) and the Lighting Instructions followed to place the water heater in operation. Refer to the “Lighting and Shutdown Instructions” section of this Installation and Operating Instructions Manual. If a problem exists, contact your dealer for service. It is recommended that all service work be performed by a qualified service agency.

If the water heater is to remain idle for 30 days or more or is subjected to freezing temperatures while shut off, the water heater and piping should be fully drained and the drain valve should be left fully open. Refer to the “General Operation” section of this Installation and Operating Instructions Manual for the procedure on draining the water heater.

## **Burner Flame Check**

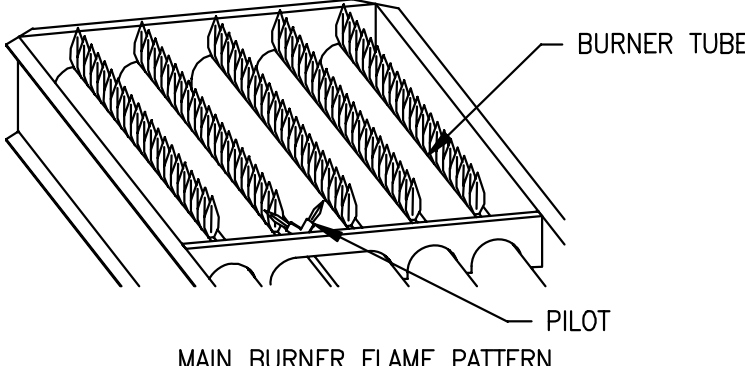
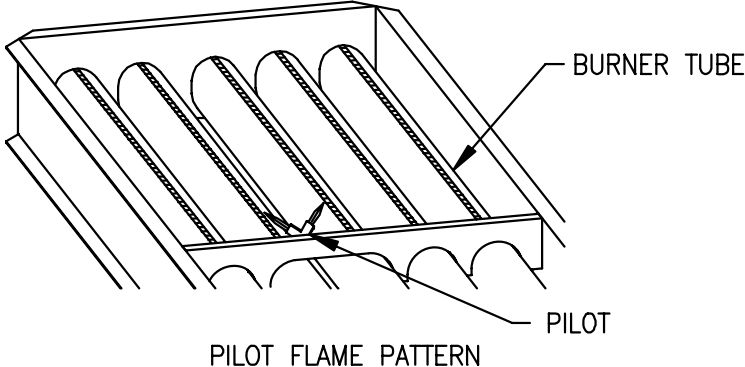
At the time of installation and at periodic intervals (at least once a year), a visual check of the pilot and burner flames should be made to determine if they are burning properly. The main burner and pilot flame may be viewed through the viewing window on the front of the combustion air box. An adjustment to the air shutter setting is not normally required for this heater. Some Liquefied Petroleum / Propane gas (LP) models may be pre-adjusted at the factory with the burner air shutters closed most of the way. The burner flames should be blue with yellow tips. A blue-orange flame is characteristic of operation on LP gas. The burner tube flames should light smoothly from the pilot.

If the burners resonate during warm-up (produce a harmonic noise and vibration, usually when operating with LP gas), close down the burner air shutters until the resonance stops. The resonance during burner operation should only be checked with the front panel held in place, since resonance may be more pronounced with the front panel off. Check to make sure the burner flame appearance is satisfactory after adjusting the burner air shutters (see above).

### **IMPORTANT**

In the event of an emergency, turn off the gas and electric (if applicable) to the appliance.

**General Operation (Burner Flame Check) continued-**



**Figure 12**

**Note: Actual burner may not appear as shown in Figure 12.**

## MAINTENANCE

### **WARNING**

Water heaters are heat-producing appliances. To avoid damage or injury there shall be no materials stored against the water heater or vent system, and proper care shall be taken to avoid unnecessary contact (especially by children) with the water heater and vent system. **UNDER NO CIRCUMSTANCES SHALL FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER, VENT SYSTEM OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER OR VENT SYSTEM.**

### **IMPORTANT**

**The water heater should be inspected at a minimum annually by a qualified service technician for damaged venting system components and/or vent and combustion air supply joints not sealed. DO NOT operate this water heater if any part is found damaged or if any joint is found not sealed.**

A qualified service technician should perform the following maintenance at the minimum periodic intervals suggested below. In some installations, the maintenance interval may be more frequent depending on the amount of use and the operating conditions of the water heater. Regular inspection and maintenance of the water heater will help to insure safe and reliable operation.

1. Annual checks of the ignition systems, temperature controls and any other water heater controls are necessary to ensure proper operation. Also, all safety shut-off valves must be checked to verify proper operation and tightness.
2. The entire combustion system must be sealed for this water heater to function properly. Make sure the burner access panel is kept tightly sealed. The combustion air supply pipe at the rear of the water heater must be tightly clamped to the vent adapter and combustion air box boot. Replace any damaged parts. The entire venting system and combustion air supply parts must be inspected at least annually for integrity of all joints and gaskets.
3. The flow of combustion and ventilation air **MUST NOT** be restricted. Keep the direct vent terminal openings clear of objects, shrubs, snow, and debris. Check to make sure the vent terminal is not damaged.  
**WARNING!** The ventilation air system may be **HOT**.

***Maintenance continued-***

4. At all times keep the water heater area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
5. Annually conduct a visual check of the pilot and burner flames to determine that they are burning properly. See "Burner Flame Check" section for an illustration of the proper burner flame pattern.
6. At annual intervals check the flue baffles for deterioration and scale or carbon deposits. Clean if necessary and brush the flue tubes if excessive scale or deposits are found on the baffles. Replace any baffles that have become excessively warped or deteriorated. Check the flue collector gasket for integrity and replace if necessary. Cleaning of the flue baffles and flue tubes should be done prior to cleaning the burners, since deposits may fall on the burners during cleaning or checking the baffles.
7. Annually remove the main burner rack assembly to clean orifices and related parts of any dirt or other foreign material. Inspect the burner ports for obstructions or debris and clean with a wire brush, vacuum, or use a mild detergent solution to clean as needed. Inspect the pilot. Carefully clean the electrode and flame sensor rod with emery cloth. The spark electrode (rod closest to the pilot hood) gap should be 1/8". **NOTE:** It is imperative for proper operation of the water heater that the main burner rack be replaced in the original location.

**To remove the burner rack assembly, follow the procedure outlined below:**

- a) Shut off the gas and electrical supply to the water heater.
- b) Remove the pilot tube fittings at the gas valve and combustion box.
- c) Disconnect wires to gas valve. Open control box and disconnect pilot spark and flame sensor wires. Remove the wire raceway cover below the control box.
- d) Disconnect the gas pipe union below the gas valve.
- e) Remove the three screws securing the gasketed manifold pipe flange on the left side of the combustion box.
- f) Remove the burner access panel from the front of the combustion box.
- g) Carefully remove and push the pilot wire grommet into the combustion box with the pilot wires.
- h) Disconnect the pilot tube fitting on the inside bulkhead fitting of the combustion box.
- i) Un-thread the gas pipe assembly from the manifold inside the combustion box.
- j) Remove the screw securing the burner rack on the top right panel of the combustion box.
- k) Slide out the burner rack assembly.

**To reinstall the burner rack, reverse the above procedure.**

*Maintenance continued-*

**▲WARNING**

**When lifting lever of the combination temperature and pressure relief valve, hot water will be released under pressure. Be careful that any released water does not result in bodily injury or property damage.**

8. At least once a year, check the combination temperature and pressure relief valve to insure that the valve has not become encrusted with lime. Lift the lever at the top of the valve several times until the valve seats properly without leaking and operates freely.
9. Monthly drain off a gallon of water to remove silt and sediment.

**▲WARNING! THIS WATER MAY BE HOT.**

10. If the combination temperature and pressure relief valve on the appliance discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct this situation. Do not plug the combination temperature and pressure relief valve outlet.
11. All models are equipped with a cleanout opening to aid in removal of hard water deposits from the tank bottom. If this water heater operates under hard water conditions, the following should be performed at least every 3 months: Drain the water heater. Remove the cleanout jacket cover and tank cover. When cleaning the tank, care must be taken to avoid trying to break deposits loose as this could damage the glass lining and shorten the life of the water heater. After cleaning, replace the cleanout tank cover and jacket cover, and refill with water. Refer to the section, "General Operation" in this Installation and Operating Instruction manual for the procedures for filling and draining the water heater.
12. Four sacrificial anode rods have been installed in the tank head to extend tank life. The anode rods should be inspected periodically for corrosion and replaced when necessary to prolong tank life. Water conditions in your area will influence the time interval for inspection and replacement of the anode rod. The use of a water softener may increase the speed of anode consumption. More frequent inspection of the anode is needed when using softened (or phosphate treated) water. Contact the plumbing professional who installed the water heater or the manufacturer listed on the rating plate for anode replacement information.
13. Oil the induced draft blower motor in the ports of the front and rear motor bearings every 6 months with 4 drops each of SAE 20 motor oil.
14. The vent system must be inspected at least once a year to ensure against leakage of exhaust products.



**Maintenance continued-**

**▲CAUTION**

FOR YOUR SAFETY, **DO NOT** ATTEMPT REPAIR OF COMBINATION GAS CONTROL, BURNERS OR GAS PIPING. REFER REPAIRS TO A QUALIFIED SERVICE TECHNICIAN.

Contact your supplier, plumbing professional or contact the company at the address given on the rating plate of the water heater for replacement parts.

Provide the part name as well as the model and serial number(s) of the water heater(s) when ordering parts.

**READ THE WARRANTY FOR A FULL EXPLANATION OF THE LENGTH OF TIME THAT PARTS AND THE WATER HEATER ARE WARRANTED.**

Manufactured under one or more of the following U.S. Patents: RE.34,534; B1 5,341,770; 4,416,222; 4,628,184; 4,669,448; 4,672,919; 4,808,356; 4,829,983; 4,861,968; 4,904,428; 5,000,893; 5,023,031; 5,052,346; 5,081,696; 5,092,519; 5,115,767; 5,199,385; 5,277,171; 5,372,185; 5,485,879; 5,574,822; 5,596,952; 5,660,165; 5,682,666; 5,761,379; 5,943,984; 5,954,492; 5,988,117; 6,142,216; 6,684,821; 7,063,132;  
Other U.S. and Foreign patent applications pending. Current Canadian Patents: 1,272,914; 1,280,043; 1,289,832; 2,045,862; 2,092,105; 2,107,012; 2,108,186; 2,112,515

Complete the following information and retain for future reference:

Model No: \_\_\_\_\_

Serial No: \_\_\_\_\_

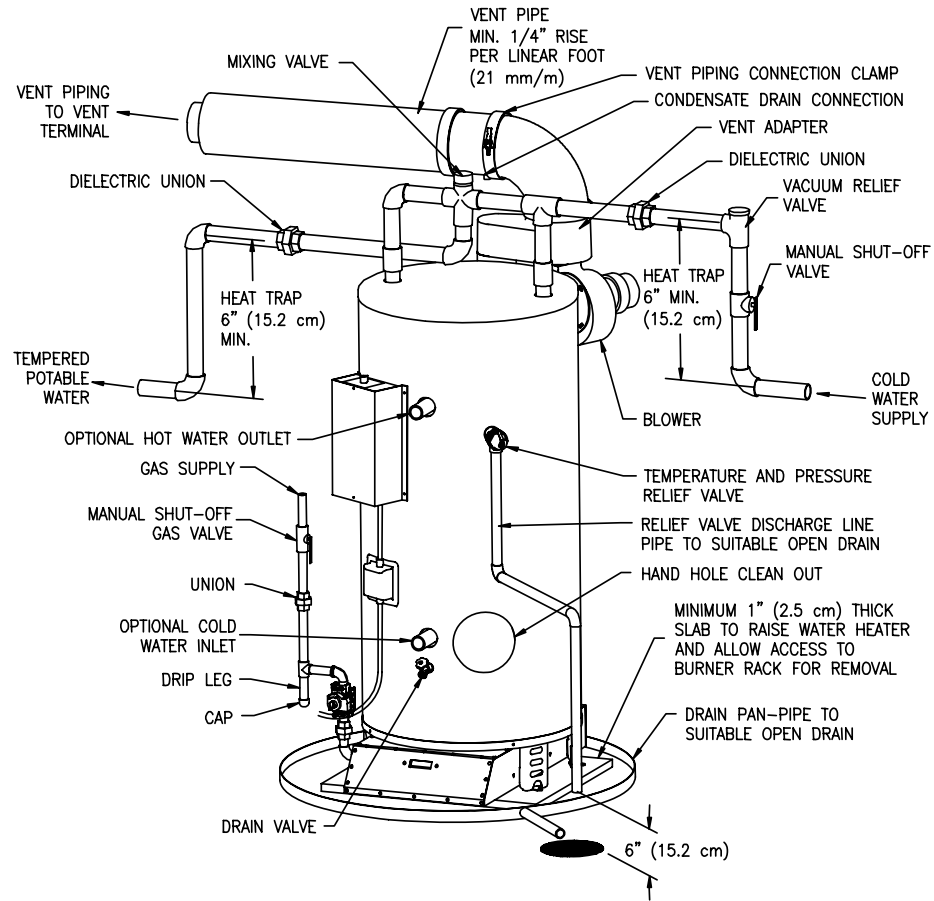
Service Phone  
Days: \_\_\_\_\_ Nights: \_\_\_\_\_

Address: \_\_\_\_\_

Supplier: \_\_\_\_\_

Supplier Phone No: \_\_\_\_\_

# TYPICAL INSTALLATION



## Operating and Troubleshooting Guide - Sequence of Normal Operation (Electronic Thermostat with Intermittent Pilot Ignition)

1. The electronic thermostat controls the 24-volt circuit to the ignition control. When the thermostat contacts close, a 24-volt circuit is completed from the transformer through the thermostat relay to the blower relay to start the induced draft blower.
2. When the blower reaches operating speed, the air pressure switch closes completing the 24-volt circuit to the ignition control module to start the ignition sequence.
3. After the 15-second pre-purge period, the ignition control sends 24-volt power through the normally closed high limit contacts to the pilot valve "PV" terminals on the gas valve allowing pilot gas to flow to the pilot. The ignition control also simultaneously sends high voltage low current electricity through the electrode wire to the pilot electrode causing sparks at the pilot electrode to ignite the pilot gas. If the pilot fails to ignite within 90 seconds, the ignition control stops the pilot gas and sparking for 15 seconds to allow gas to dissipate. The ignition control will then attempt 2 (two) more ignition trials as stated above. If the pilot does not ignite after 3 trials, the ignition control will then go into a "lockout mode", and the ignition system will remain shut down until the control is **reset** by interrupting power to the ignition module. The induced draft blower continues to run during this period.
4. When the pilot gas ignites the flame is sensed by the electrode or a flame-sensing rod. The flame-sensing signal received by the ignition control causes the sparking to stop and the main gas valve to open. The main burners ignite from the pilot flame. The flame sensing circuit continually monitors the pilot flame. If for any reason, the electrode or flame-sensing rod does not sense the pilot flame, the main gas valve closes, the spark electrode is re-energized, and the ignition trial period is reestablished. The same sequence occurs during a power or gas supply interruption.
5. The main burners continue to operate until the water temperature in the tank increases enough to cause the thermostat contacts to open (satisfied). When the thermostat contacts open the 24-volt power is interrupted to the ignition control module and the gas valve closes. The induced draft blower simultaneously stops.
6. If for some reason thermostat contacts fail to open, then the high temperature limit (ECO) contacts in the thermostat sensor open and interrupts power to the pilot valve causing the pilot to extinguish. The ignition module senses the pilot outage and attempts to re-light the pilot by reestablishing the sparking at the electrode as stated in paragraph 3 above. Since the pilot valve circuit is open, the pilot will not ignite and the system will go into "lockout mode" after 3 ignition trials. In the "lockout mode", the ignition system will remain shutdown until the control is re-set by interrupting power to the ignition module. The ECO will not reset to close the contacts until the tank water temperature drops to between 100°F (38°C) and 160°F (71°C). If the ECO contacts open, the cause for the high water temperature should be determined before resetting the ignition system.

## Troubleshooting Procedure for Electronic Thermostat

If water temperature is too hot, proceed as follows:

<b>Test or Condition:</b>	<b>Result:</b>	<b>Action Taken:</b>
Start - Disconnect sensor leads from electronic control module and measure resistance of sensor(s) with ohmmeter	Is resistance between 700 and 30K ohms (see "temperature control checkout chart" in this instruction manual)? YES↓      NO→	Sensor(s) may be shortened or open. Check for loose, broken or shorted wires. Replace sensing bulb(s) if necessary.
Sensors O.K. Disconnect ECO leads and measure resistance with ohmmeter	Is water temperature greater than 210° F (99° C) and ECO resistance less than 10 ohms (shorted)? YES→      NO↓	Replace sensing bulb with ECO limit and check out balance of system.
Disconnect potentiometer leads from electronic control module. Measure resistance of potentiometer with ohmmeter.	Is resistance greater than 4800 ohms at minimum temperature setting (checks for short)? YES↓      NO→	Replace electronic control module. Reconnect all leads and check out system
Potentiometer O.K.		Replace electronic control module. Reconnect all leads and check out system

If water temperature is too cold or heater does not come on, proceed as follows:

<b>Test or Condition:</b>	<b>Result:</b>	<b>Action Taken:</b>
Start: Check voltage at 24-volt terminals of electronic control module of thermostat board.	Is voltage between 21.5 and 28.5 VAC? YES↓      NO→	Check power supply, transformer. Correct as necessary.
Are main burners operating or is pilot trying to light (sparking)? YES↓      NO→	Check for voltage at N.O. thermostat terminals (terminal to meter to ground). Is voltage between 21.5 and 28.5 VAC? YES↓      NO→	Thermostat relay is not closing. Check thermostat setting. Refer to thermostat troubleshooting below.

**Troubleshooting Procedure for Electronic Thermostat continued-**

If water temperature is too cold or heater does not come on, proceed as follows:

<b>Test or Condition:</b>	<b>Result:</b>	<b>Action Taken:</b>
Are burners operating?	If pilot does not light and pilot is not sparking, check to make sure the induced draft blower is operating. Blower is operating? YES↓                      NO→	Check blower circuit wiring. With a voltmeter probe terminal 3 on the relay to ground. The meter should read 24 volts. Next, probe terminal 4 of the relay (wire going from relay to blower) to ground. The meter should read around 115 volts. If not, check terminal 2 of the relay. If voltage is present at this terminal and the thermostat is supplying 24 volts to the relay coil, replace the relay.
	Relay closes, but blower does not operate.	Open blower junction box cover, disconnect leads, and measure voltage between black and white wires. If 115 volts is present, replace blower. If no voltage, check wire terminals, wire, or relay.
	Blower operates, but no spark to pilot.	Check voltage at #2 (THS) terminal of the ignition control after turning power off a few seconds, then back on (allow 15 seconds for pre-purge). If no voltage is present and voltage is present at relay terminal of thermostat (to relay and pressure switch), check to see if pressure switch is closed. Pull terminals off part way and probe each switch terminal to ground. If 24 volts is not present at both terminals, switch is not closing. Make sure vacuum tubing is securely connected to switch body; tubing is not kinked or has pinhole leak. Check for plugged vent terminal. Is venting distance to proper specifications (see previous venting installation section)? If everything checks out and switch will not close, replace and recheck.

**Troubleshooting Procedure for Electronic Thermostat continued-**

<b>Test or Condition:</b>	<b>Result:</b>	<b>Action Taken:</b>
<p>Are burners operating? (continued)</p>	<p>Does pilot spark without lighting pilot? Make sure there is sufficient gas pressure at the gas valve inlet. Check the nameplate for minimum gas supply pressures for the type of gas used. Check for plugged pilot orifice. Check for improper pilot electrode gap or broken wire, loose connection.</p>	<p>If the pilot valve will not open when voltage is present to the PV terminal and the common terminal "PV/MV" wire has continuity to the module, the gas valve may be defective. If no voltage is present at "PV" on the ignition control and the ECO is closed (power to 24V and 24V GND terminals of module) the ignition control module may be defective. Replace and recheck system.</p>
	<p>Check gas valve by measuring voltage from "PV" to ground. If no voltage, check continuity across ECO circuit of thermostat (red wires). If ECO is open, it should reset after tank cools below 160° F (71° C). If it does not reset, replace sensing bulb with the ECO. If ECO has opened, there may be a problem with the thermostat.</p>	<p>Make sure pilot flame is steady and envelops the electrode or flame sensor. Turn pilot adjustment screw counter- clockwise to increase size of pilot flame. Make sure pilot shield is in place.</p>
	<p>Pilot lights, but main gas does not come on.</p>	<p>If pilot flame is stable, check for voltage at the "MV" terminal at the ignition module and gas valve. If no voltage is present at the ignition module, replace control. If voltage is present at the gas valve, replace valve.</p>

**Troubleshooting Procedure for Electronic Thermostat continued-**

If water temperature is too cold or heater does not come on, proceed as follows (continued from table above):

<b>Test or Condition:</b>	<b>Result:</b>	<b>Action Taken:</b>
If power is not present at the "NO" terminal of the thermostat board, and the heater operates if this wire is jumped to the "COM" terminal above it, then make the following checks to the thermostat circuit. This procedure also applies if the burners cycle on for short periods, but the water temperature seems low.	Disconnect sensor leads from electronic control module and measure resistance of sensor(s) with ohmmeter. Is resistance between 700 and 30K ohms ((see "temperature control checkout chart" in this instruction manual)? Measure water temperature from tank for an approximate correlation with the table. YES↓            NO→	Sensor(s) may be shorted or open. Check continuity of wires for loose, broken, or shorted wires. Replace sensing bulb or wire harness. If necessary.
Sensors O.K. Check remote potentiometer.	Disconnect potentiometer leads from electronic control module. Measure resistance of potentiometer with ohmmeter. Is resistance greater than 4800 ohms at the minimum temperature setting and less than 50 ohms at the maximum temperature setting (checks for open or shorts)? YES↓            NO→	Replace potentiometer. Reconnect all leads and check out system.
Potentiometer O.K.		Replace electronic control module. Reconnect all leads and check out system.

## Temperature Control Checkout

Set the thermostat above water temperature (See temperature adjustment section) and observe system through one (1) complete cycle. Make sure system operates as desired.

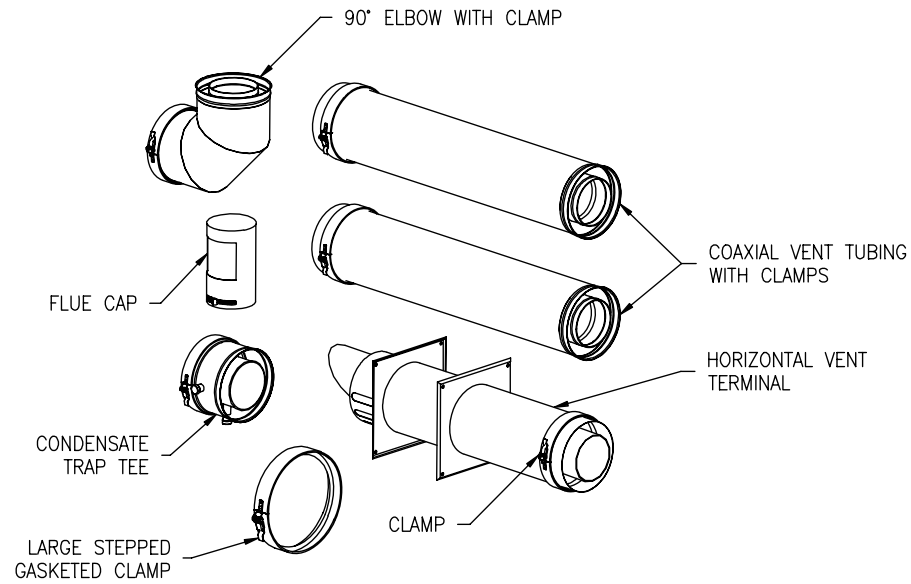
To check the thermistor or thermistor/ECO assembly, compare it's resistance as measured by an ohmmeter to the water temperature as measured by an accurate thermometer. Thermistor resistance increases as the temperature decreases. The tables below show the correct sensor resistance at various temperatures.

In Degrees F										
°F	0	1	2	3	4	5	6	7	8	9
40	26109	25400	24712	24045	23399	22771	22163	21573	21000	20445
50	19906	19383	18876	18383	17905	17440	16990	16553	16128	15715
60	15314	14925	14548	14180	13823	13477	13140	12812	12494	12185
70	11884	11592	11308	11032	10763	10502	10248	10000	9760	9526
80	9299	9078	8862	8653	8449	8250	8057	7869	7685	7507
90	7333	7165	7000	6839	6683	6531	6383	6238	6098	5961
100	5827	5697	5570	5446	5326	5208	5094	4982	4873	4767
110	4663	4562	4464	4368	4274	4183	4094	4006	3922	3839
120	3758	3679	3602	3527	3453	3382	3312	3244	3177	3112
130	3048	2986	2925	2866	2808	2752	3697	3643	2590	2538
140	2488	2439	2391	2344	2298	2253	2209	2166	2124	2083
150	2043	2004	1966	1928	1891	1856	1820	1786	1753	1720
160	1688	1656	1625	1595	1566	1567	1509	1481	1454	1427
170	1402	1376	1351	1327	1303	1280	1257	1235	1213	1191
180	1170	1150	1129	1110	1090	1071	1053	1035	1017	999
190	982	965	949	933	917	901	886	871	857	842
200	828	814	801	788	775	762	749	737	725	713

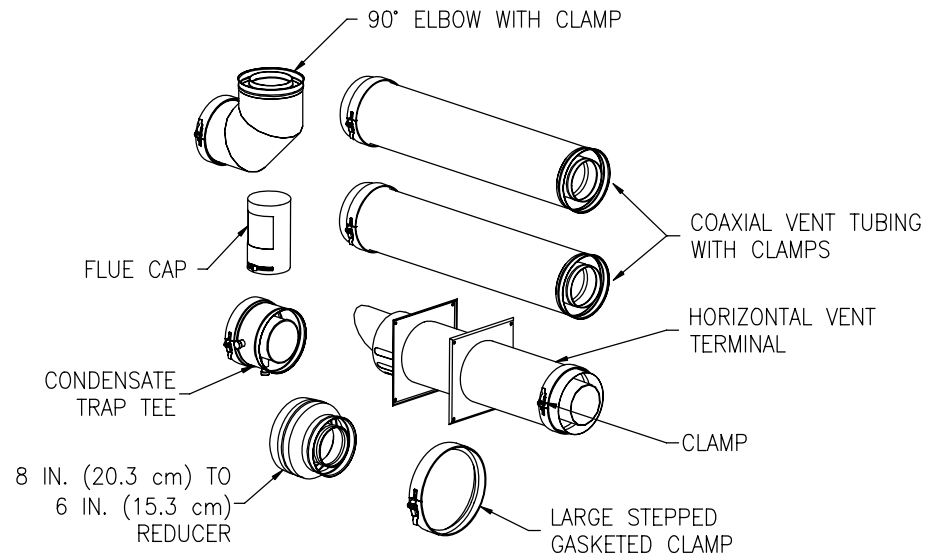
In Degrees C										
°C	0	1	2	3	4	5	6	7	8	9
0	32648	31026	29495	28049	26682	25389	24166	23010	21915	20879
10	19898	18968	18088	17253	16461	15710	14998	14322	13680	13071
20	12492	11942	11419	10922	10450	10000	9572	9165	8778	8409
30	8057	7722	7403	7099	6808	6532	6268	6016	5775	5546
40	5327	5117	4917	4726	4543	4368	4201	4042	3889	3742
50	3602	3468	3340	3217	3099	2986	2878	2774	2675	2579
60	2488	2400	2316	2235	2157	2083	2011	1942	1876	1813
70	1752	1693	1637	1582	1530	1480	1432	1385	1340	1297
80	1256	1216	1177	1140	1105	1070	1037	1005	974	944
90	916	888	861	835	810	786	763	741	719	698



## VENTING PARTS LIST DRAWING

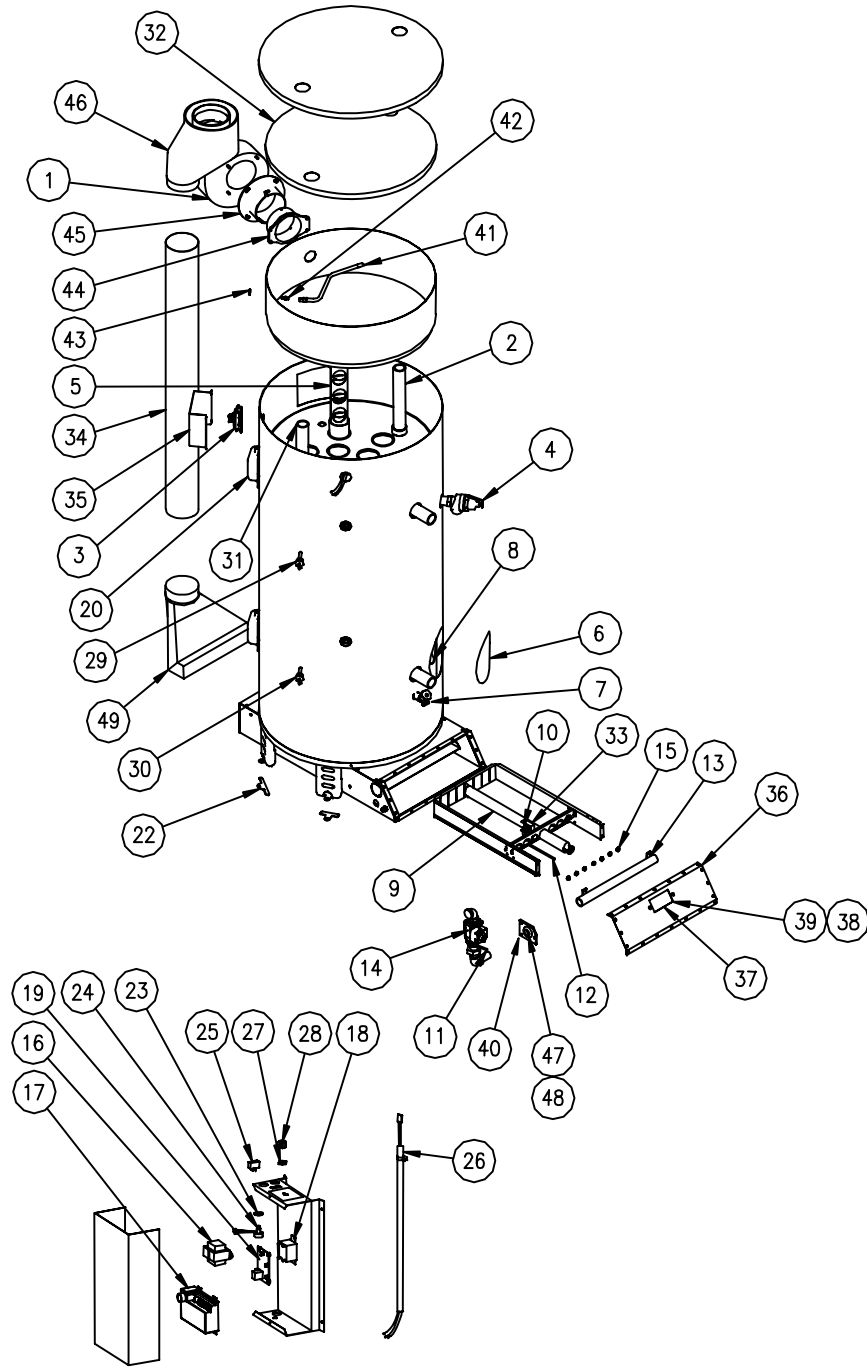


### 8" (20.3 cm) VENT KIT



### 6" (15.3 cm) VENT KIT

# PARTS LIST DRAWING



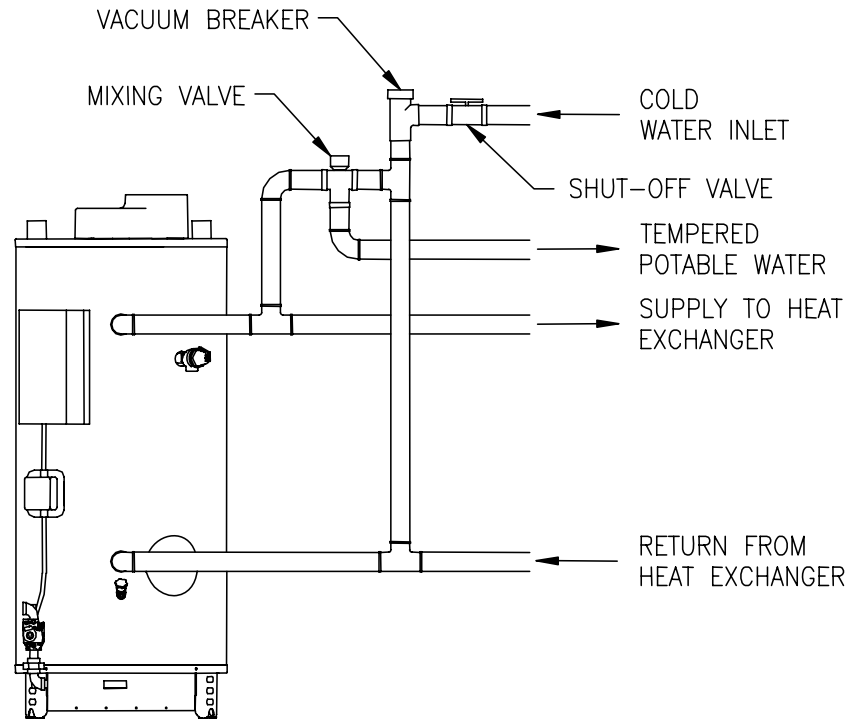
## PARTS LIST

PART NAME AND DESCRIPTION	
1. Induced Draft Blower Assembly	25. On/off switch
2. Diptube	26. Gas valve wire harness
3. Pressure Switch	27. Locknut Potentiometer
4. T&P Valve	28. Temperature Control Knob
5. Flue Baffle	29. Upper Temperature Sensor
6. Cleanout Access (Jacket) Cover	30. Lower Temperature Sensor
7. Drain Valve	31. Outlet Nipple
8. Cleanout Cover	32. Collector Head
8a. Cleanout Cover O-Ring	33. Pilot Shield
8b. Cleanout Cover Gasket	34. Combustion Air Intake Pipe
9. Main Burner Tubes	35. Pressure Switch Cover
10. Pilot Assembly	36. Burner Access Panel
11. Pilot Supply Tube (Control Side)	37. Sight Glass
12. Pilot Supply Tube (Burner Side)	38. Sight Glass Backing Plate
13. Main Burner Manifold	39. Sight Glass Gasket
14. Gas Valve	40. Gas Manifold Flange
15. Main Burner Orifice	41. Pressure Tube
16. Transformer	42. Hose Barb
17. Ignition Module	43. Pressure Tube Retaining Nut
18. Relay	44. Collector Transition
19. Thermostat Board	45. Blower Transition
20. Utility Cover	46. Vent Adapter
21. Anode Rods (Not Pictured)	47. Rubber Grommet
22. Tank Leg Thermal Break	48. Sealing Flange Gasket
23. Gasket Potentiometer	49. Combustion Air Transition
24. Temperature Control Potentiometer	

**THE FOLLOWING INSTRUCTIONS ARE FOR INSTALLATION OF:  
GAS WATER HEATERS SUITABLE FOR WATER (POTABLE)  
HEATING AND SPACE HEATING**

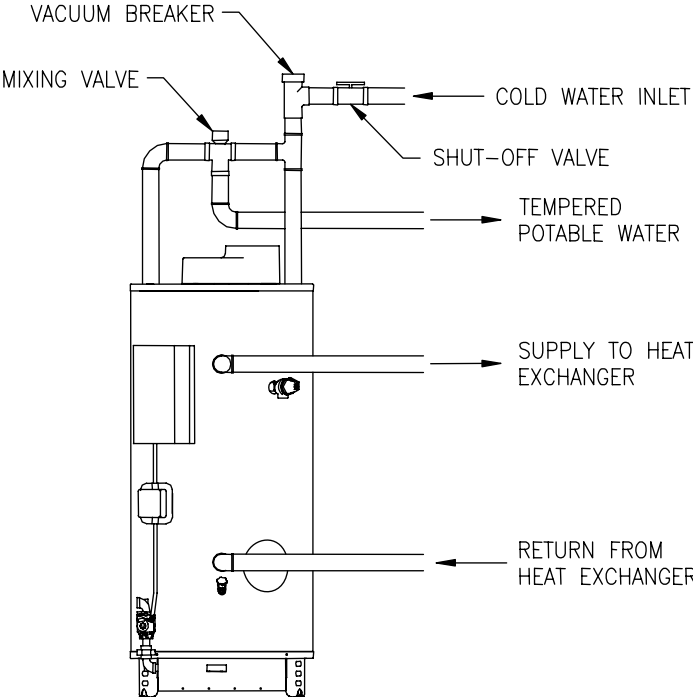
1. All piping components connected to this water heater for space-heating applications must be suitable for use with potable water. In Massachusetts, space heating piping length **must not** exceed 50 feet.
2. Toxic chemicals, such as those used for boiler treatment, **must not** be introduced into potable water used for space heating.
3. This water heater **must not** be connected to an existing heating system or component(s) previously used with a non-potable water heating appliance.
4. When the system requires water for space heating at temperatures higher than required for other uses, such as an ASSE approved mixing valve shall be installed to temper the water for those uses in order to reduce the scald hazard potential.

Please refer to the illustrations below and on the following pages for suggested piping arrangements.

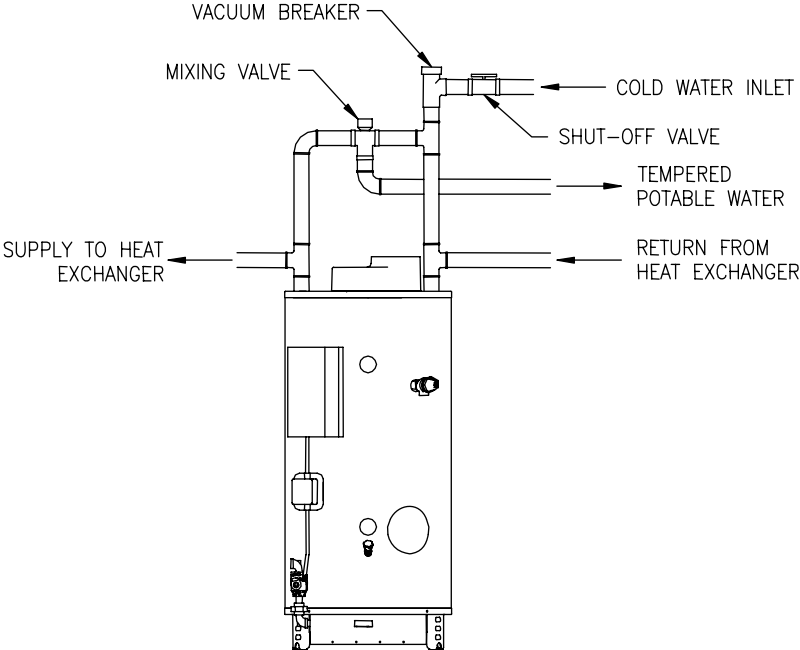


Suggested Piping Arrangement For Side Connections

**Install Instructions for potable water & space heating continued-**



**Suggested Piping Arrangement For Top & Side Connections**



**Suggested Piping Arrangement For Top Connections**