

GAS-FIRED COMMERCIAL WATER HEATER WITH CONTINUOUS PILOT AND MILLIVOLT DAMPER

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

La version espanola de estas instrucciones se puede obtener al escribirle a la fabrica 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 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
GENERAL INFORMATION.....	4
INSTALLATION.....	6
Locating The Water Heater	6
Minimum Clearances.....	8
Venting	13
Combustion Air Supply.....	15
Water Connections.....	17
Gas Connections	20
GENERAL OPERATION.....	21
Wiring Diagram	22
Lighting and Shutdown Instructions	23
Temperature Adjustment	24
Burner Flame Check.....	26
MAINTENANCE	27
OPERATING & TROUBLESHOOTING GUIDE.....	31
PARTS LIST & DRAWING	34
INSTALLATION INSTRUCTIONS FOR POTABLE WATER AND SPACE HEATING	35

GENERAL INFORMATION

This gas-fired water heater is design certified by the American Gas Association Laboratories under the applicable American National Standard, Z21.10.1 or Z21.10.3 (as indicated on the rating plate), available from the American Gas Association, 1515 Wilson Blvd., Arlington, VA 22209.

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.

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.

▲WARNING

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.

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).

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.

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.

General Information continued-

▲ 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 liquids in the vicinity of this or any other appliance.

IMPORTANT

Before proceeding, inspect the water heater and components for possible damage. **DO NOT** install any 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.

INSTALLATION

Locating The Water Heater

WARNING

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

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

This water heater must NOT be installed in any location where gasoline or flammable vapors are likely to be present, unless the installation is such to eliminate the probable ignition of gasoline or flammable vapors.

The location of this water heater is of the utmost importance. Before installing this water heater, you must 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 a chimney or exhaust gas vent. **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 on the controls.**

Adequate clearances shall 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 can not slide out for removal when servicing.

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.**

Installation (Locating The Water Heater) continued-

▲WARNING

Liquefied petroleum gases/propane gas are 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 APPLIANCE UNTIL 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, consult the Venting section, located on page 13, 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.

Installation (Locating The Water Heater) continued-

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.

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.

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.

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 must allow access to the front of the water heater and adequate clearance must 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 water heater is to be installed directly on carpeting, it 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 or, if the appliance is to be installed in an alcove or closet, the entire floor must be covered by the panel. The minimum clearances to combustibles for this water heater are given in the table on pages 10 - 12. A minimum of 24 inches front clearance must be provided for inspection and servicing.

▲WARNING

If combustible flooring is used, a leg kit must be installed before setting water heater in place. For three (3) leg water heaters, use kit p/n 243-42726-01. For four (4) leg water heaters, use kit p/n 243-42726-02. The appropriate leg kit has been included with this water heater.

▲CAUTION

The National Fuel Gas Code (ANSI Z233.1-or latest edition) and CAN/CGA (B149.1-or latest edition), expressly prohibits the following:

- a) Installation of a water heater in a bathroom, bedroom, or any occupied room normally kept closed.
- b) 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 (45.8 cm) above floor level and protected to avoid damage by a moving vehicle.

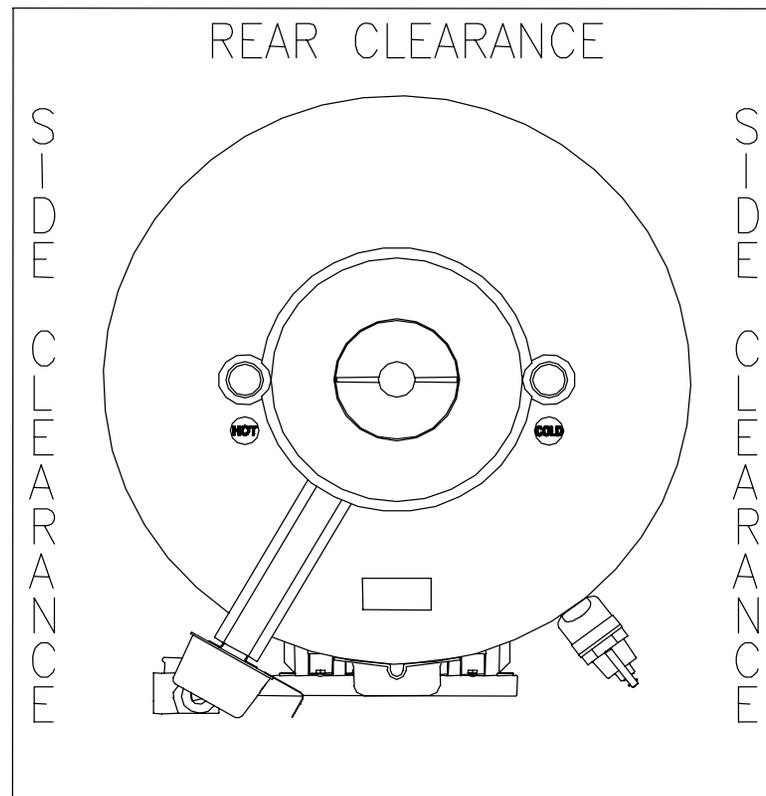


Figure 1

Installation (Minimum Clearances) continued-

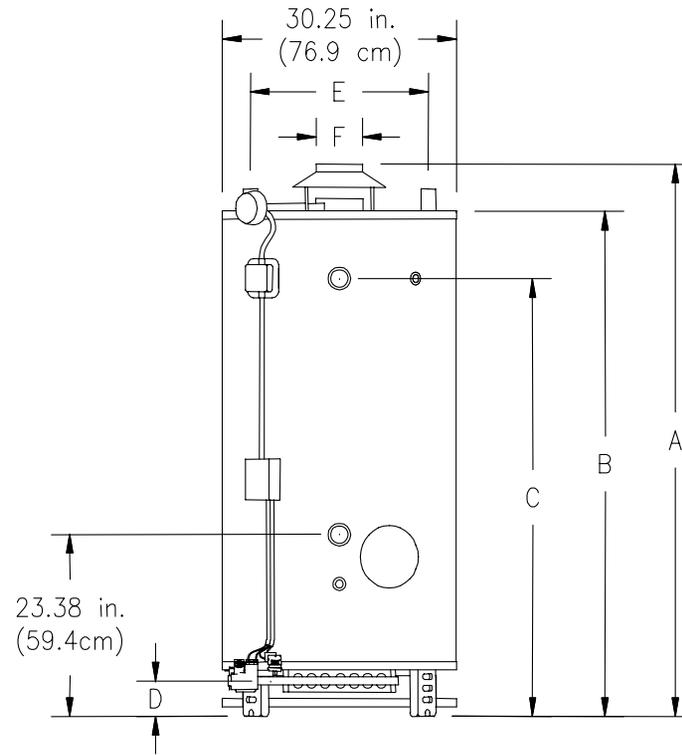


Figure 2

Model Description			A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	Clearances *		
Capacity (GAL)	Input (BTU/hr)								Sides and Rear (in)	Flue or Vent (in)	Ceiling (in)
	Nat.	LP									
100	199,999	199,999	74.88	65.19	56.38	4.56	23	6	2	6	20
100	250,000	225,000	74.88	65.19	56.38	4.56	23	6	2	6	20
100	270,000	250,000	74.88	65.19	56.38	4.56	23	6	2	6	20

Model Description			A (m)	B (m)	C (m)	D (cm)	E (cm)	F (cm)	Clearances *		
Capacity (Litres)	Input (kW)								Sides and Rear (cm)	Flue or Vent (cm)	Ceiling (cm)
	Nat.	LP									
378	58.7	58.7	1.90	1.66	1.43	11.6	58.4	15.2	5.1	15.3	50.8
378	73.3	66.0	1.90	1.66	1.43	11.6	58.4	15.2	5.1	15.3	50.8
378	79.3	73.3	1.90	1.66	1.43	11.6	58.4	15.2	5.1	15.3	50.8

Installation (Minimum Clearances) continued-

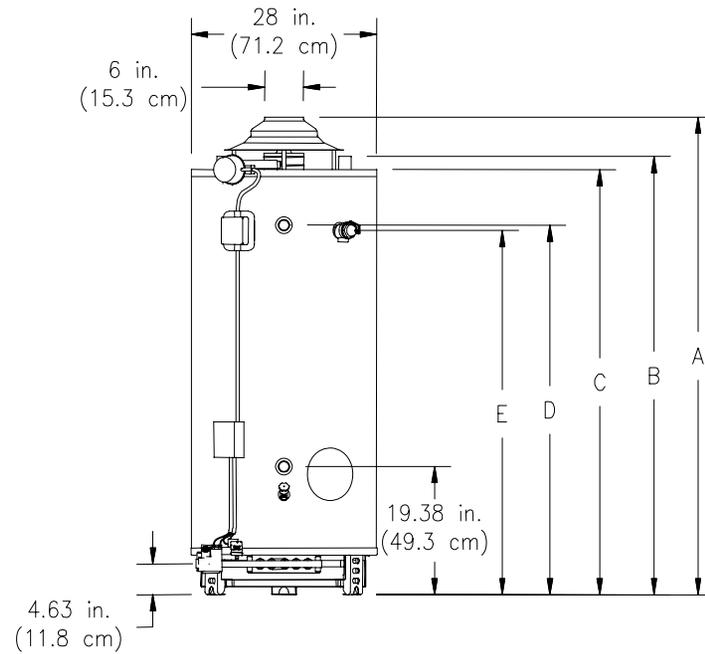


Figure 3

Model Designation		Clearances *							
Capacity (GAL)	Input (BTU/HR)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	Sides and Rear (in.)	Flue or Vent (in.)	Ceiling (in.)
80	180,000	71.88	66.25	64.38	56.00	55.13	2	6	20
80	199,999 (235,000 LP)	71.88	66.25	64.38	56.00	55.13	2	6	20
80	250,000 (235,000 LP)	71.88	66.25	64.38	56.00	55.13	2	6	20
98	199,999	82.88	77.25	75.38	67.00	66.13	2	6	20
98	250,000 (235,000 LP)	82.88	77.25	75.38	67.00	66.13	2	6	20
100	199,999	75.50	69.88	61.88	60.38	56.88	2	6	20
100	250,000	75.50	69.88	61.88	60.38	56.88	2	6	20

Model Designation		Clearances *							
Capacity (Liters)	Input (kW)	A (m)	B (m)	C (m)	D (m)	E (m)	Sides and Rear (cm)	Flue or Vent (cm)	Ceiling (cm)
302.8	52.8	1.83	1.69	1.64	1.43	1.40	5.1	15.3	50.8
302.8	58.7 (68.9 LP)	1.83	1.69	1.64	1.43	1.40	5.1	15.3	50.8
302.8	73.3 (68.9 LP)	1.83	1.69	1.64	1.43	1.40	5.1	15.3	50.8
371.0	52.8	2.11	1.97	1.92	1.71	1.68	5.1	15.3	50.8
371.0	73.3 (68.9 LP)	2.11	1.97	1.92	1.71	1.68	5.1	15.3	50.8
378.5	52.8	1.92	1.78	1.58	1.54	1.45	5.1	15.3	50.8
378.5	73.3	1.92	1.78	1.58	1.54	1.45	5.1	15.3	50.8

Installation (Minimum Clearances) continued-

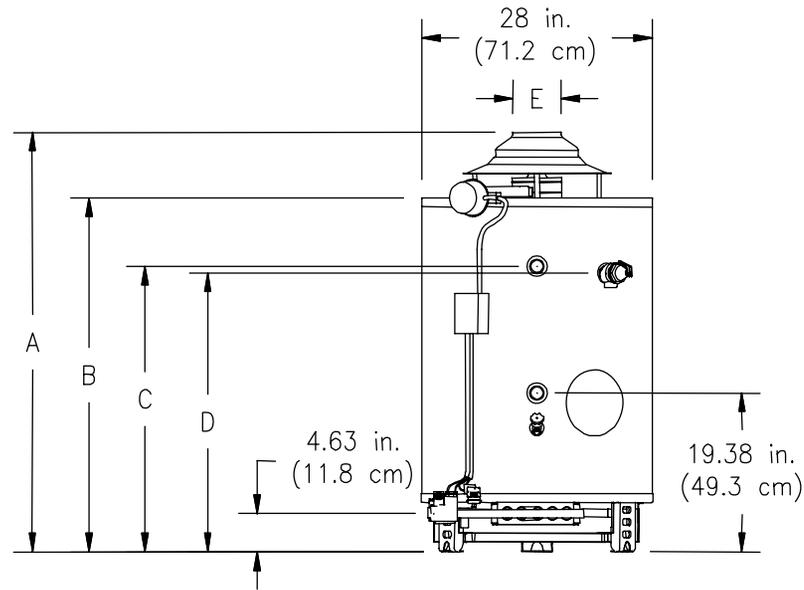


Figure 4

Model Designation		A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	Clearances *		
Capacity (GAL)	Input (BTU/hr)						Sides and Rear (in.)	Flue or Vent (in.)	Ceiling (in.)
38	155,000	51.00	43.00	34.75	33.75	6	2	6	20
75	125,000	70.13	65.00	54.25	54.25	6	2	6	20
75	160,000	70.13	65.00	54.25	54.25	6	2	6	20

Model Designation		A (m)	B (m)	C (m)	D (m)	E (cm)	Clearances *		
Capacity (Litres)	Input (kW)						Sides and Rear (cm)	Flue or Vent (cm)	Ceiling (cm)
144	45.4	1.30	1.10	0.88	0.86	15.3	5.1	15.3	50.8
284	36.6	1.78	1.65	1.38	1.38	15.3	5.1	15.3	50.8
284	46.9	1.78	1.65	1.38	1.38	15.3	5.1	15.3	50.8

- * -Denotes minimum clearances to combustible material. Some models may have different clearances. Check the label on the front of the water heater to verify proper installation clearances.
- Model number may have a suffix "N" for natural gas or "X", "P" or "L" for liquefied petroleum (LP) gases. Some models may have "A" as a suffix or prefix. Check the rating plate on front of the water heater for model number verification.

Venting

▲WARNING

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

This water heater must be connected to a masonry chimney or venting system approved by local codes or ordinances. The vent connector used to attach the draft diverter outlet to the chimney or approved vent must be of the same diameter as the draft diverter outlet or larger. For proper venting in certain installations, a larger vent connector may be needed. Consult venting tables in ANSI standard (Z223.1-or latest edition), National Fuel Gas Code and CAN/CGA (B149.1 or B149.2-latest editions), or local code officials for proper application for your area.

Flue Damper

Refer to Figure 5 and follow these instructions:

1. Remove the damper from the accompanying box shipped within the crate.
2. Locate the collector outlet on top of the water heater. Place the damper over the collector outlet and rotate it to so that the wire harness on the side of the water heater can be connected to the connector plug in the damper cover. There must be adequate clearance for removal and service of the damper.
3. Being certain that the damper vane will travel freely from the “closed” to “open” position, secure the flue damper to the jacket top with sheet metal screws. It must be possible to see the damper vane after the water heater has been installed.
4. Connect the wire harness on the side of the water heater to the connector plug in the damper cover. Note: The connector plug and socket receptacle on the wire harness can only be engaged one way (polarized).
5. The Lighting and Operating instructions are outlined beginning on page 23. The damper must be in the open position when the water heater main burner is operating.

Installation (Venting) continued-

Draft Diverter

This water heater has been shipped with a draft diverter for which it was designed. Remove the bag containing the legs and instructions from the draft diverter. Attach the legs to the draft diverter and attach the draft diverter to the water heater per the instructions in the bag.

▲WARNING
Modification to the flue damper or the draft diverter may result in personal injury, property damage or death. The flue damper and draft diverter are to be placed in position and operate exactly as stated in these instructions without modification.

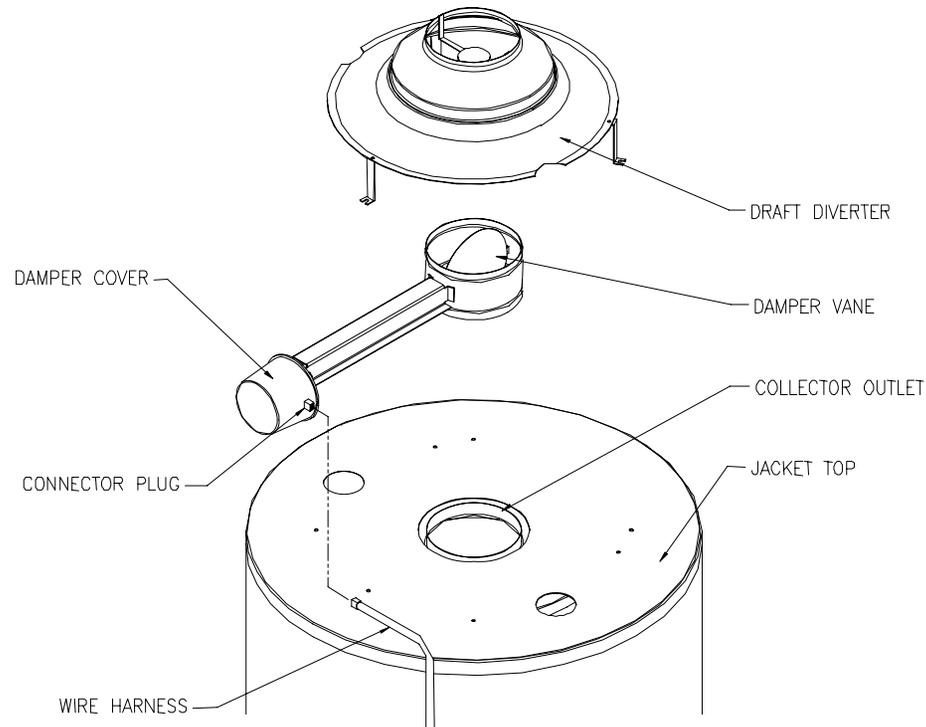


Figure 5

Combustion Air Supply

WARNING

Liquefied petroleum gases/propane gas are 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 APPLIANCE UNTIL LEAKAGE IS CORRECTED!

Provide adequate air for combustion and ventilation. An insufficient supply of air will cause recirculation of combustion products resulting in air contamination that may be hazardous to life. Such a condition often will result in a yellow, luminous burner flames, causing carboning or sooting of the burners and flue tubes with possible damage to the heater.

IMPORTANT

The flow of combustion and ventilating air must not be obstructed.

Confined Spaces

If the water heater is installed in a confined space (volume is less than 50 ft.³/1000 BTU (15 m³/0.29 kW) per hour of the total input rating of all gas appliances in that space), air must be supplied through two permanent openings. One opening shall be within 12 inches (30.5 cm) from the top of the enclosure and one within 12 inches (30.5 cm) of the bottom. The openings must be protected by metal louvers or 1/4" (6.4 mm) min. mesh metal screen. The size of the openings are as follows.

1. If the openings communicate directly with an additional room(s) of sufficient volume, each opening shall have a minimum free area opening of 1 in.²/1000 BTU (2.54cm²/0.29kW) per hour of the total input rating of all gas appliances in the confined space, but not less than 100 in.² (254 cm²).

Installation (Combustion Air Supply) continued-

2. If the openings communicate with the outdoors through horizontal ducts, each opening must have a minimum free area of 1 in.²/2000 BTU (2.54cm²/0.59kW) per hour of the total rating of all gas appliances in the enclosure.
3. If the openings communicate directly with the outdoors or through vertical ducts with the outdoors, each opening must have a minimum free area of 1 in.² /4000 BTU (2.54cm²/1.18kW) per hour of the total rating of all gas appliances in the enclosure.

▲ CAUTION

The draft diverter relief opening of the water heater and combustion air inlet must be in the same atmospheric pressure zone. Large exhaust fans in kitchens and other locations can lower the air pressure inside an enclosure and interfere with the proper operation and venting of the water heater. In these cases, the water heater should be installed in a separate room with the combustion and ventilation air supplied directly from outdoors as previously described.

All Air From Inside the Building: The confined space shall be provided with two permanent openings communicating directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space must be considered in making this determination. Each opening must have a minimum free area of 1 in.²/1000 BTU (2.54cm²/0.29kW) per hour of the total input rating of all gas utilization equipment in the confined space, but not less than 100 square inches (254cm²). One opening shall be within 12 inches (30.5 cm) of the top and one within 12 inches (30.5 cm) of the bottom of the enclosure.

Unconfined Spaces

In unconfined spaces in buildings, infiltration may be adequate to provide air for combustion, ventilation and dilution of flue gases. However, in buildings of tight construction (for example, weather stripping, heavily insulated, caulked, vapor barrier, etc.), additional air may need to be provided using the methods described above under CONFINED SPACES: All Air From Outdoors or SPECIALLY ENGINEERED INSTALLATIONS.

Installation (Combustion Air Supply) continued-

Specially Engineered Installations

The requirements noted under CONFINED SPACES above must not necessarily govern when special engineering, approved by the authority having jurisdiction, provides an adequate supply of air for combustion, ventilation, and dilution of flue gases.

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 dip tube 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 must 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. When a 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.

▲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 must 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 must 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

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.

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 vent-air intake system, and proper care must be taken to avoid unnecessary contact (especially by children) with the water heater and vent-air intake system. **UNDER NO CIRCUMSTANCES MUST 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.

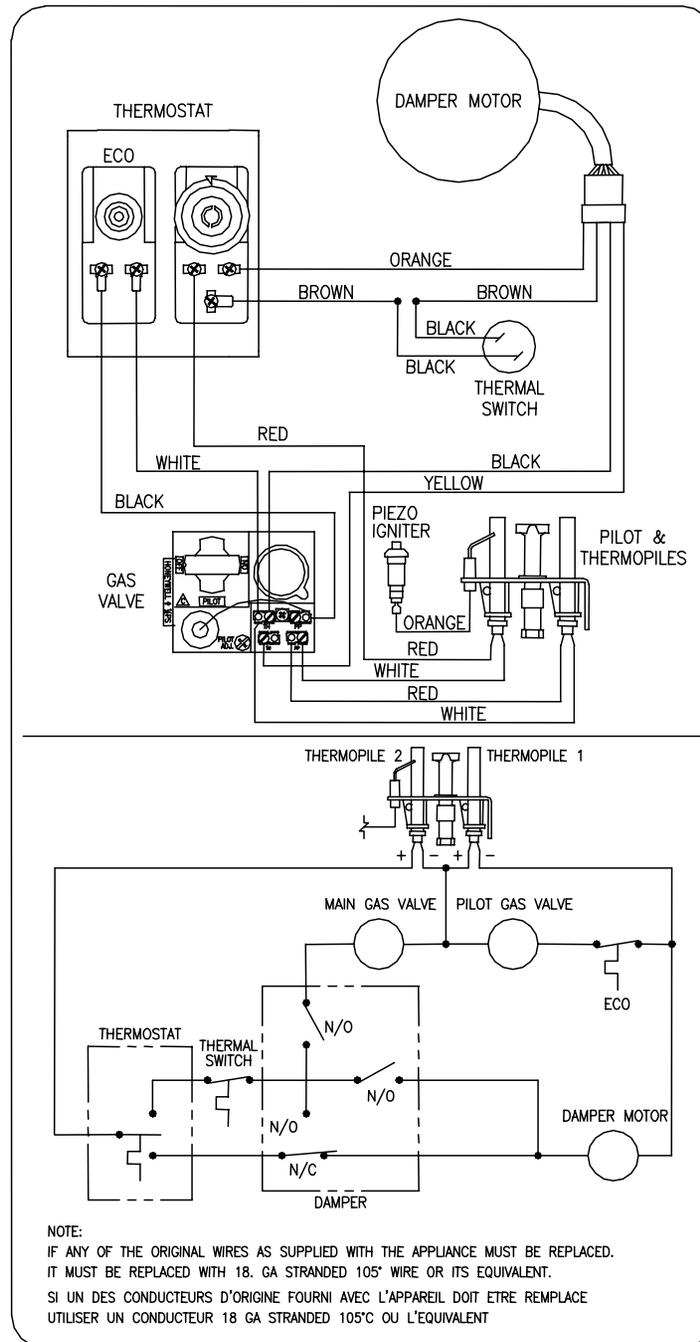
TO DRAIN THE WATER HEATER

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

1. Rotate the thermostat dial counterclockwise to the lowest position.
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 counterclockwise. 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."

Wiring Diagram



Lighting And Shutdown Instructions

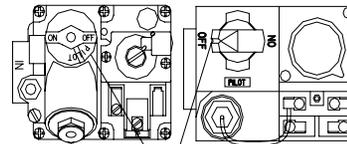
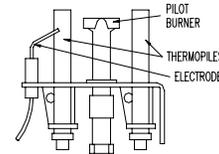
FOR YOUR SAFETY READ BEFORE LIGHTING

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 has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.
- B. BEFORE LIGHTING 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 neighbors 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.

LIGHTING INSTRUCTIONS

1. STOP! read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Push in gas control knob slightly and turn clockwise ↻ to "OFF."



NOTE: Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly. Do not force.

4. Wait (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.
5. Find pilot - follow metal tube from gas control. The pilot is located in the center of the burner rack between two burner tubes.
6. Turn knob on gas control counterclockwise ↻ to "PILOT."
7. Push in control knob all the way and hold in. Immediately depress piezo igniter button until you hear a "click" sound, then release. Continue to hold down the gas control knob for approximately one (1) minute after pilot is lit. If pilot is not lit, continue to depress the gas control knob and it should pop back up. Pilot should remain lit. If it goes out, repeat steps 3 through 7.
 - If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
 - If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.
8. Turn gas control knob counterclockwise ↻ to "ON."
9. Set the thermostat to desired setting.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Push in gas control knob slightly and turn clockwise ↻ to "OFF." Do not force.

238-42809-00B

Temperature Adjustment

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

The marking on the thermostat temperature scale (shown below) 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. Full counterclockwise rotation of the temperature selector dial is the minimum temperature setting. Full clockwise rotation of the temperature selector dial is the maximum 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 expense and inconvenience, make sure the tank is leaking before calling a service person.

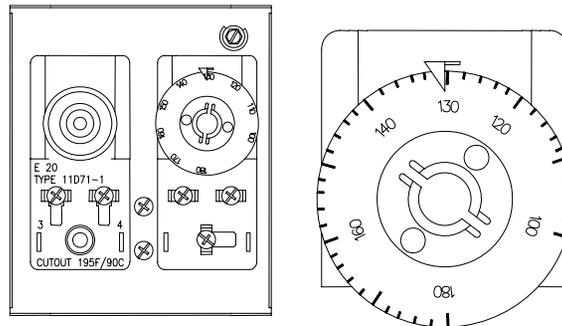


Figure 6

General Operation (Temperature Adjustment) continued-

⚠ 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 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 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). Push the reset button on the ECO portion of the thermostat and follow applicable Lighting Instructions (page 23) to place the water heater in operation. 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 (See page 21 To Drain the Water Heater”) and the drain valve should be left fully open.

⚠ 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.

Burner Flame Check

At the time of installation and at periodic intervals (about every 3 months), a visual check of the pilot and burner flames should be made to determine if they are burning properly. No adjustment to the air shutter is required for this heater. The burner flames should be blue with yellow tips. A blue-orange flame is characteristic of operation on liquefied petroleum (LP) gas. The burner tube flames should light smoothly from the pilot.

IMPORTANT

In the event of an emergency, turn off the gas to the appliance.

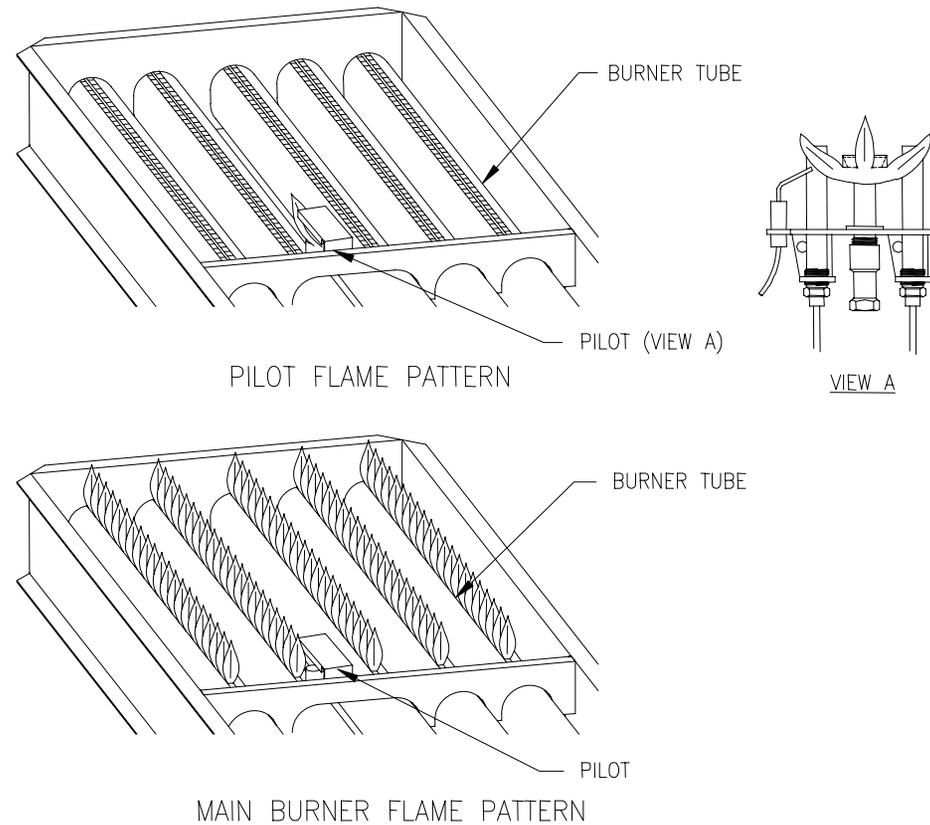


Figure 7

MAINTENANCE

▲WARNING

Water heaters are heat producing appliances. To avoid damage or injury there must be no materials stored against the water heater or vent system, and proper care must be taken to avoid unnecessary contact (especially by children) with the water heater and vent system. **UNDER NO CIRCUMSTANCES MUST 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 components and/or joints not sealed. DO NOT operate this water heater if any part is found damaged or if any joint is found not sealed.

The following maintenance should be performed by a qualified service technician 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 flow of combustion and ventilation air **MUST NOT** be restricted. Clear the combustion air openings of any dirt, dust, or other restrictions. **WARNING!** The ventilation air system may be **HOT**.
3. At all times keep the water heater area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
4. Bi-annually conduct a visual check of the pilot and burner flames to determine that they are burning properly. See "Burner Flame Check" section on page 26 for example of proper burner flame pattern.

Maintenance continued-

5. 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. **NOTE:** It is imperative for proper operation of the water heater that the main burner rack be replaced in the original location.

▲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.

6. 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.
7. Monthly drain off a gallon of water to remove silt and sediment.

▲WARNING! THIS WATER MAY BE HOT.

8. 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.
9. 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.
10. A combination sacrificial anode rod/hot water outlet nipple has been installed to extend tank life. The anode rod should be inspected periodically (every 2 years) 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. Contact the plumbing professional who installed the water heater or the manufacturer listed on the rating plate for anode replacement information. 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.
11. 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: _____

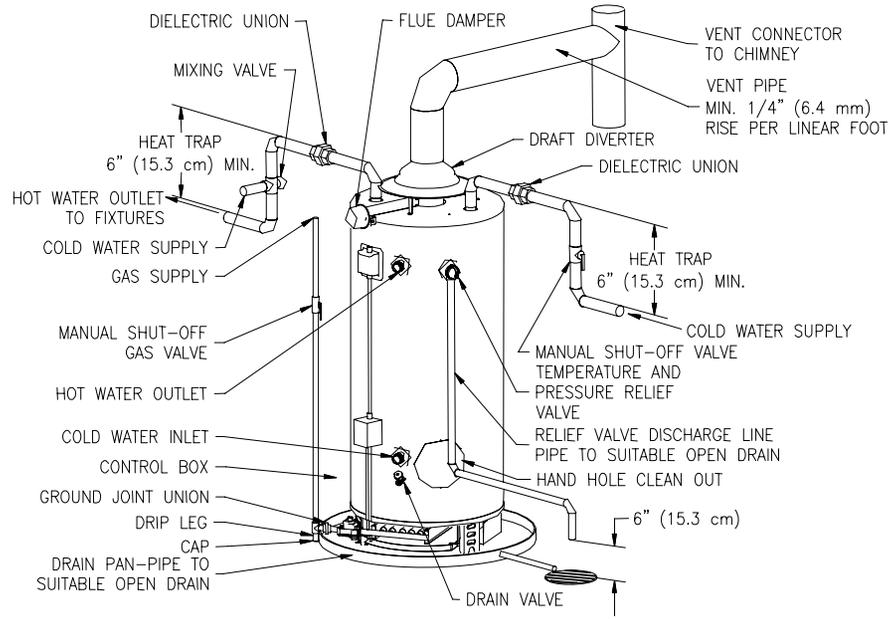
Service Phone
Days: _____ Nights: _____

Address: _____

Supplier: _____

Supplier Phone No: _____

TYPICAL INSTALLATION



Operating and Troubleshooting Guide – Sequence of Normal Operation

1. When the temperature of the water in the tank falls the switch in the thermostat completes a circuit between the thermopiles and the damper.
2. As a result of the completed circuit the damper vane moves to the open position.
3. When the damper vane reaches the full open position two switches are closed completing a circuit that powers the main gas valve.
4. The main burner is ignited by the standing pilot.
5. When the temperature of the water in the tank reaches the thermostat set point, the switch in the thermostat moves to a position that breaks the circuit powering the main valve and completes the circuit to the thermal switch.
6. When the main gas valve closes, and the temperature in the combustion chamber decreases the thermal switch closes completing the circuit between the thermopiles, thermostat, thermal switch and damper.
7. The damper vane moves to the closed position.
8. The damper remains closed with the water heater in the standby mode until the water temperature falls low enough to activate the thermostat.

The water temperature is cold and the main burner will not fire.

Test or Condition:	Result:	Action Taken:
Remove thermostat cover and check thermostat setting.	Is thermostat set at the desired temperature? Yes↓ No→	Set thermostat to desired temperature.
Look for pilot flame at the middle front of the burner rack.	Is there a pilot flame? Yes↓ No→	Relight the pilot.
Visually check the damper vane position.	Is the damper in the full open position (vertical)? Yes↓ No→	See damper will not open.
Measure the voltage between the lower TH and lower PP terminals on the gas valve.	Is the voltage between the terminals \geq 110 mV Yes→ No↓	Replace the gas valve.

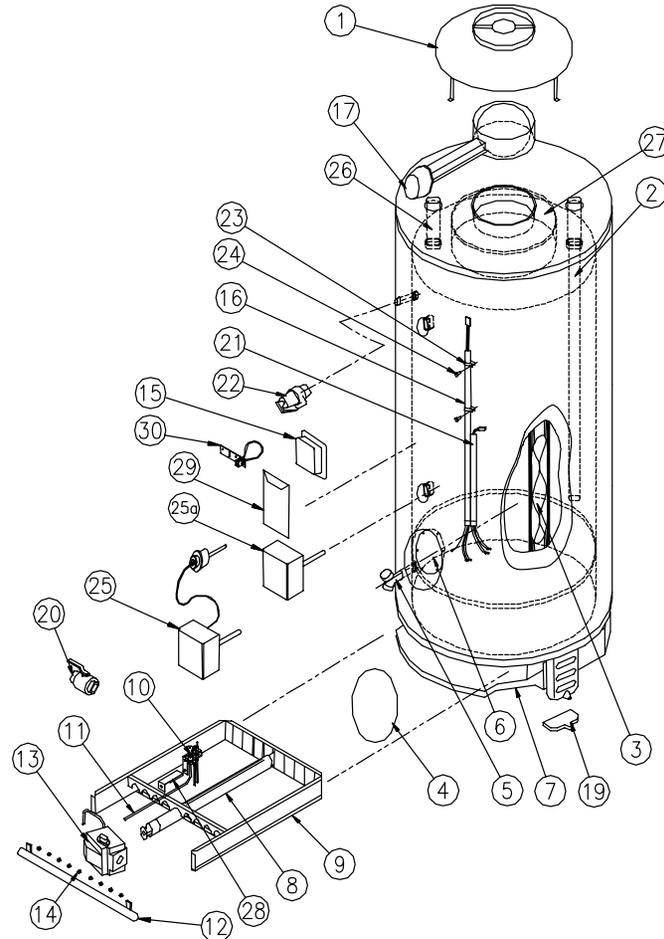
Operating and Troubleshooting Guide continued –

Test or Condition:	Result:	Action Taken:
Check wire harness connection at the damper.	Is the harness connection loose? Yes→ No↓	Secure the harness connection to the damper.
Measure the voltage between the upper TH terminal on the valve and the terminal connected to the red wire at the thermostat.	Is the voltage between the terminals ≥ 400 mV? Yes→ No↓	Locate the service part in the envelope on the side of the water heater and install the service part per the instructions.
Locate the pilot adjustment on the gas valve. Measure voltage between the upper TH terminal on the valve and the terminal connected to the red wire at the thermostat while adjusting the pilot.	Can the pilot be adjusted so that the voltage between the terminals is ≥ 400 mV? Yes→ No ↓	Adjust the flame to maximize the voltage.
One or both of the thermopiles is weak.		Check both thermopiles for voltage output. While holding the knob on the gas valve down to maintain a pilot flame measure the voltage of each thermopile while they are disconnected. If either thermopile produces less than 250 mV replace it.

Damper will not open.

Test or Condition:	Result:	Action Taken:
Check for anything that may be interfering with the damper vane moving freely. Remove the vent and draft diverter if necessary.	Is something interfering with the damper vane? Yes→ No↓	Fix the interference
Check wire harness connection at the damper.	Is the harness connection loose? Yes→ No↓	Secure the harness connection to the damper.
Measure the voltage between the upper TH terminal on the valve and the terminal connected to the red wire at the thermostat.	Is the voltage between the terminals ≥ 400 mV? Yes→ No↓	Locate the service part in the envelope on the side of the water heater and install the service part per the instructions.
Locate the pilot adjustment on the gas valve. Measure voltage between the upper TH terminal on the valve and the terminal connected to the red wire at the thermostat while adjusting the pilot.	Can the pilot be adjusted so that the voltage between the terminals is ≥ 400 mV? Yes→ No ↓	Adjust the flame to maximize the voltage.
One or both of the thermopiles is weak.		Check both thermopiles for voltage output. While holding the knob on the gas valve down to maintain a pilot flame measure the voltage of each thermopile while they are disconnected. If either thermopile produces less than 250 mV replace it.

PART LIST & DRAWING

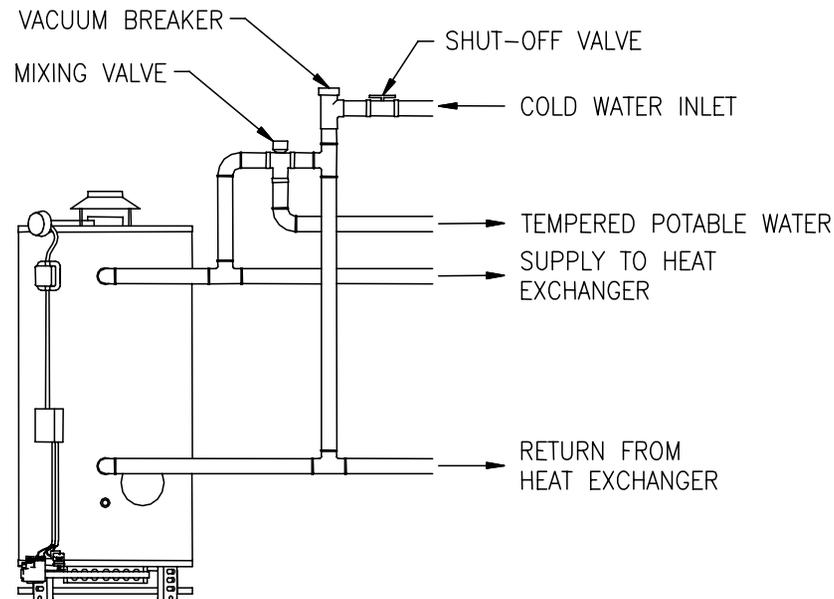


PART NAME AND DESCRIPTION	
1. Draft Hood	16. Wire Harness MV Valve to Thermostat
2. Diptube	17. Flue Damper
3. Flue Baffle	18. Anode Rod (Not Pictured)
4. Cleanout Access (Jacket) Cover	19. Leg Thermal Break
5. Drain Valve	20. Manual Shut Off Valve (Applicable Model)
6. Cleanout Cover	21. Wire Harness Millivolt Damper
6a. Cleanout Cover O-Ring (Not Pictured)	22. T&P Valve
6b. Cleanout Cover Gasket A.S.M.E. (Not Pic)	23. Nylon Cable Clamp
7. Heat Shield	24. Self Tapping Screw
8. Main Burner Tube(s)	25. Thermostat Dual Probe
9. Burner Tray	25a. Thermostat Single Probe
10. Pilot Burner Assembly	26. Outlet Nipple
11. Pilot Supply Tube	27. Collector Head
12. Main Burner Manifold	28. Pilot Shield
13. Gas Valve	29. Service Part-Envelope/Instructions
14. Main Burner Orifice	30. Service Part
15. Utility Cover	

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

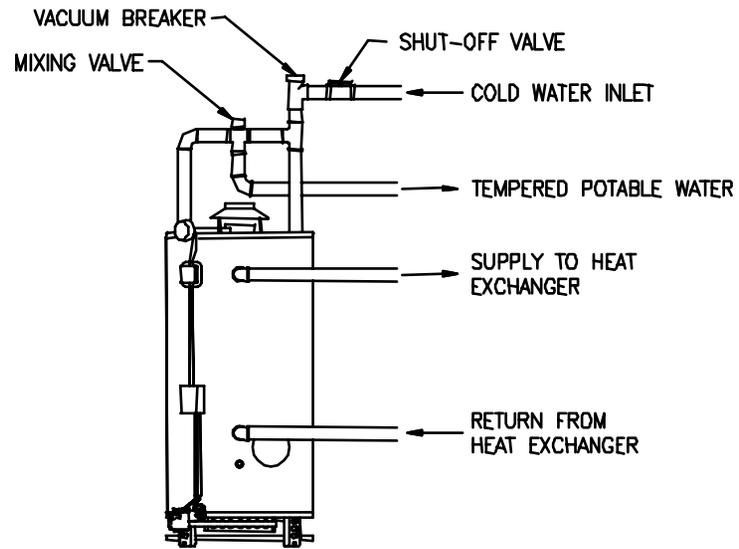
1. All piping components connected to this water heater for space heating applications must be suitable for use with potable water. In Massachusetts, space heating piping length **must not** exceed 50 feet.
2. Toxic chemicals, such as those used for boiler treatment, **must not** be introduced into potable 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 means, such as an ASSE approved mixing valve must 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.

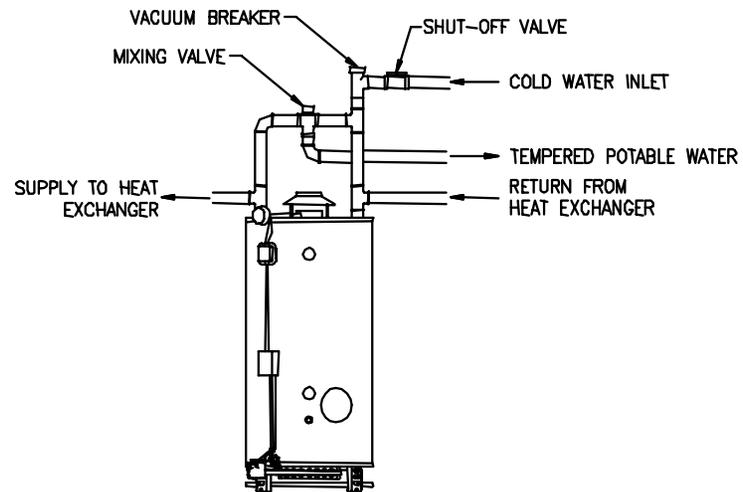


Suggested Piping Arrangement For Side Connections

Installation Instructions continued-



Suggested Piping Arrangement For Top Connections



Suggested Piping Arrangement For Side Connections (If Applicable)