

High Efficiency Models

HE 70-125, HE 100-150

HE 100-199 & HE 100-250

American Standard[®] Water Heaters

New standards in water heating

Operating, installation and service manual


Commercial Gas Water Heater



Operating, installation and service manual

AMERICAN STANDARD WATER HEATERS
HIGH EFFICIENCY MODELS: HE70-125, HE100-150, HE100-199 & HE100-250
REQUIRES 120V A.C. POWER SUPPLY
American Standard Water Heaters <http://www.waterheating.com>




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

-DO NOT store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- DO NOT try to light any appliance.
- DO NOT touch any 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.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

CAUTION THIS WATER HEATER SHOULD NOT BE USED TO HEAT A SPA OR HOT TUB

 **WARNING:** This water heater is equipped for one type of gas only. Check the data plate near the gas control valve for the correct gas. **DO NOT USE THIS WATER HEATER WITH ANY GAS OTHER THAN THE ONE LISTED ON THE DATA PLATE.** Failure to use the correct gas can cause problems which can result in **DEATH, SERIOUS BODILY INJURY OR PROPERTY DAMAGE.** If you have any questions or doubts consult your gas supplier or gas company. Water heaters for bottled, propane or liquefied petroleum gas (LPG) are different from natural gas models. A natural gas heater will not function safely on bottled, propane or liquefied petroleum gas (LPG) and no attempt should be made to convert a heater from natural gas to any other gas.

INSTALLER:

1. AFFIX THESE INSTRUCTIONS TO OR ADJACENT TO WATER HEATER.
2. BEFORE LEAVING PREMISES: **REVIEW** THIS OPERATION AND SERVICE MANUAL TO BE SURE HEATER HAS BEEN INSTALLED CORRECTLY. MAKE SURE UNIT IS STARTED AND OPERATED FOR ONE COMPLETE CYCLE AND WATER TEMPERATURE IS ACCEPTABLE TO THE CONSUMER AT THE FIXTURES.

OWNER:


1. RETAIN THESE INSTRUCTIONS AND WARRANTY FOR FUTURE REFERENCE.

IF YOU HAVE QUESTIONS THAT ARE NOT ANSWERED IN THE MANUAL YOU MAY CALL THE TOLL FREE NUMBER 800 900-9063 OR CONTACT US BY EMAIL AT: engineering@waterheaters.com.

DO NOT CONTACT US BY TELEPHONE OR EMAIL FOR WARRANTY REGISTRATION. YOUR WATER HEATER SERIAL NUMBER IS ALREADY ON FILE. THE WARRANTY IS ACTIVATED AT THE TIME OF PURCHASE. KEEP YOUR RECEIPT TO SHOW TO SERVICE PERSON IF SERVICE IS REQUIRED.

GENERAL SAFETY

NOTICE TO INSTALLERS & USERS. BE AWARE OF THE FOLLOWING DANGERS ASSOCIATED WITH THE INSTALLATION AND USAGE OF GAS WATER HEATERS:




! WARNING

Read and understand instruction manual and safety messages before installing, operating or servicing this water heater.

Failure to follow instructions and safety messages could result in death or serious injury.

Instruction manual must remain with water heater.

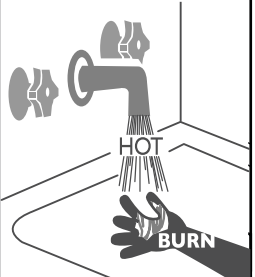


! WARNING

Fire Hazard

For continued protection against risk of fire:

- Do not install water heater on carpeted floor.
- Do not operate water heater if flood damaged.



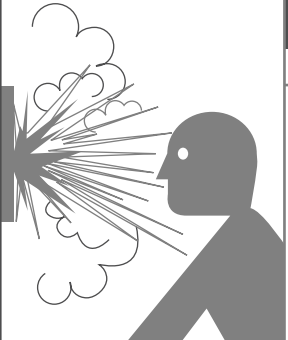
! DANGER

Water temperature over 125°F (52°C) can cause severe burns instantly resulting in severe injury or death.

Children, the elderly, and the physically or mentally disabled are at highest risk for scald injury.

Feel water before bathing or showering. Temperature limiting valves are available.

Read instruction manual for safe temperature setting.



! WARNING

Explosion Hazard

- Overheated water can cause water tank explosion.
- Properly sized temperature and pressure relief valve must be installed in opening provided.

The California Safe Drinking Water and Toxic Enforcement Act requires the Governor of California to publish a list of substances known to the State of California to cause cancer, birth defects, or other reproductive harm, and requires businesses to warn of potential exposure to such substances.

! WARNING: This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. This appliance can cause low-level exposure to some of the substances listed, including formaldehyde, carbon monoxide, and soot.

AIR REQUIREMENTS: KEEP APPLIANCE AREA CLEAR AND FREE OF COMBUSTIBLE MATERIALS, GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. DO NOT OBSTRUCT THE FLOW OF COMBUSTION AND VENTILATING AIR.

! WARNING: FOR SAFE OPERATION, PROVIDE ADEQUATE AIR FOR COMBUSTION AND VENTILATION. AN INSUFFICIENT SUPPLY OF AIR WILL CAUSE RECIRCULATION OF COMBUSTION PRODUCTS RESULTING IN CONTAMINATION THAT MAY BE HAZARDOUS TO LIFE. SUCH A CONDITION COULD AFFECT BURNER FLAME, CAUSING CARBONING OR SOOTING OF THE COMBUSTION CHAMBER, BURNERS AND FLUE TUBES AND CREATES A RISK OF ASPHYXIATION.

MECHANICAL EXHAUSTING OF ROOM AIR: WHERE AN EXHAUST FAN IS INSTALLED IN THE SAME ROOM WITH A HEATER, SUFFICIENT OPENINGS FOR AIR MUST BE PROVIDED IN THE WALLS. UNDERSIZED OPENINGS WILL CAUSE AIR TO BE DRAWN INTO THE ROOM THROUGH THE HEATER'S VENTING SYSTEM, CAUSING POOR COMBUSTION. SOOTING MAY RESULT IN SERIOUS DAMAGE TO THE HEATER AND RISK OF FIRE OR EXPLOSION. IT CAN ALSO CREATE A RISK OF ASPHYXIATION.

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Please complete the following information at the time of installation, retain and present along with the warranty in the event that a claim is necessary.

MODEL NUMBER _____
 TYPE OF GAS _____
 SERIAL NUMBER _____
 INSTALLATION ADDRESS: _____

DATE OF INSTALLATION: _____

THIS WATER HEATER HAS BEEN INSTALLED IN ACCORDANCE WITH THESE INSTALLATION INSTRUCTIONS AND LOCAL CODE REQUIREMENTS

INSTALLER _____

WARRANTY LIMITATIONS

THE MANUFACTURER OF THIS WATER HEATER WILL NOT BE RESPONSIBLE FOR TANK FAILURES OR WATER HEATER FAILURES RESULTING FROM ANY OF THE FOLLOWING. CONDITIONS AND MAY AT IT'S DISCRETION VOID THE WATER HEATER WARRANTY WHEN THESE CONDITIONS RESULT IN PREMATURE FAILURES OF THE TANK OR COMPONENTS...

1. INSTALLATIONS NOT COMPLYING WITH ALL LOCAL CODES.
2. FAILURES DUE TO UNDERSIZING OF THE WATER HEATER AND SUBSEQUENT EXCESSIVE BURNER FIRING.
3. BAD WATER CONDITIONS SUCH AS WELL WATER WITH EXCESSIVE MINERAL DEPOSITS. IT IS THE RESPONSIBILITY OF THE INSTALLER TO TAKE WHAT EVER STEPS ARE REQUIRED, INCLUDING THE INSTALLATION OF WATER SOFTENERS, TO PREVENT EXCESSIVE LIME BUILD UP AND SUBSEQUENT METAL FATIGUE DUE TO OVER HEATING OF THE TANK BOTTOM.
4. FAILURE TO USE THE HAND HOLE CLEANOUT PROVIDED IN THIS WATER HEATER TO KEEP LIME DEPOSITS IN THE TANK BOTTOM FROM EXCEEDING 2" IN HEIGHT.
5. INSTALLATION OF MULTIPLE HEATERS IN LINE RATHER THAN PARALLEL PER THE INSTRUCTIONS PROVIDED ON PAGES 9 AND 10 OF THIS MANUAL RESULTING IN EXCESS FIRING AND/OR EXCESSIVE CONDENSATION OF ONE OR MORE OF THE HEATERS.
6. FAILURE OF THE HEATER OR COMPONENTS AS A RESULT OF IMPROPER VENTING RESULTING IN NEGATIVE AIR PRESSURE DUE TO IMPROPER LOCATION OR OVERHEAD FANS.
7. FAILURE OF THE HEATER OR COMPONENTS CAUSED BY CHEMICALS OR SOLVENTS BEING STORED IN THE IMMEDIATE VICINITY OF THE WATER HEATER.

WARNING:

IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY, DEATH OR PROPERTY DAMAGE. READ AND REFER TO THIS MANUAL.

THIS WATER HEATER MUST BE PROPERLY AND REGULARLY MAINTAINED.
 FAILURE TO DO SO WILL VOID THE WARRANTY.

CONSUMER RESPONSIBILITIES

THIS MANUAL HAS BEEN PREPARED TO ACQUAINT YOU WITH THE INSTALLATION, OPERATION AND MAINTENANCE OF YOUR GAS WATER HEATER AND TO PROVIDE IMPORTANT SAFETY INFORMATION. WE URGE YOU TO READ ALL INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION OF YOUR WATER HEATER. KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE.

The manufacturer of this water heater will not be liable for any damages caused by failure to comply with the installation and operating instructions outlined on the following pages. These instructions are a guide for the correct installation of your water heater. If you lack the necessary skills required or have difficulty following the directions, you should not proceed but get help from a qualified person for that part of the installation you do not understand. Failure to follow this warning can result in an incorrect installation that can result in **DEATH, INJURY OR PROPERTY DAMAGE**.

This water heater is design-certified by CSA International as both a direct vent and a non-direct vented water heater, which takes its combustion air, either from the installation area or from air ducted to the unit from the outside.

Important **WARNINGS**

DO NOT use this appliance if any part has been under water. Immediately call a qualified service technician. Water heaters subjected to flood conditions, or anytime the gas controls, main burner or pilot have been submerged in water, require replacement of the entire water heater.

LOCATION

WARNING

Location selection should be as close to the stack or chimney as practical and as centralized with the piping system as possible.

Water heater should be located in an area not subject to freezing temperatures.

The water heater should be located so that the controls and drain are easily accessible (at least 24 inches in front of the water heater).

Important: The water heater should be located in an area where leakage of the tank or connections will not result in damage to the area adjacent to the water heater or to lower floors of the structure. Due to the normal corrosive action of the water, the tank will eventually leak after an extended period of time. Also, any external plumbing leak, including those from improper installation, may cause early failure of the water tank due to corrosion if not repaired. A qualified service technician should be contacted for repairs.

A suitable metal drain pan should be installed under the water heater as shown below (Figure 1), to help protect the property from damage which may occur from condensate formation or leaks in the piping connections or tank. The pan must limit the water level to a maximum depth of 1 3/4 " and be at least two inches wider than the heater and piped to an adequate drain. Locate the water heater near a suitable indoor drain. Outside drains are subject to freezing temperatures which can obstruct the drain line. The piping should be at least 3/4" ID and pitched for proper drainage.

Under no circumstances will the manufacturer or seller of this water heater be held liable for any water damage which is caused by your failure to follow these instructions.

WARNING

UNPACKING THE WATER HEATER

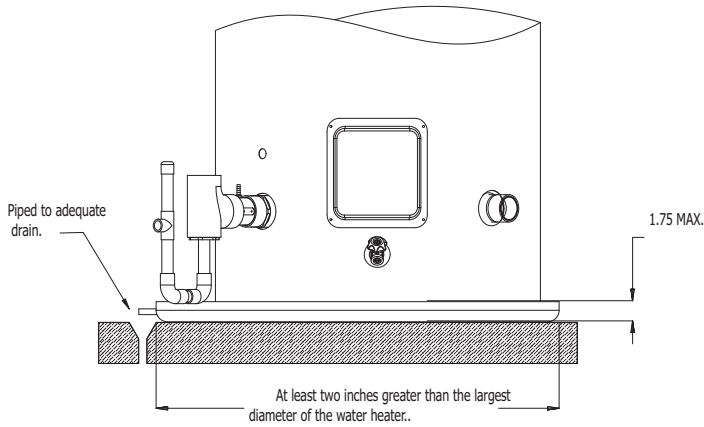
Use two or more people to move and install water heater, unless proper handling equipment is utilized. Failure to do so can result in back or other injury.

Important: DO NOT REMOVE any permanent instructions, labels, or the data label from outside of the water heater or on the inside of panels.

- Remove exterior packaging and place installation components aside.
- Inspect all parts for damage prior to installation and startup.
- Completely read all instructions before attempting to assemble and install this product.

When referring to your water heater always have the information listed on the rating plate readily available.

Figure 1. Metal Drain Pan



LOCATION REQUIREMENTS

If installed in a garage, avoid damage to your water heater by installing a vehicle stop as shown in figure 2. Check state and local codes for requirements prior to installation. This water heater is not certified for installation in mobile homes.

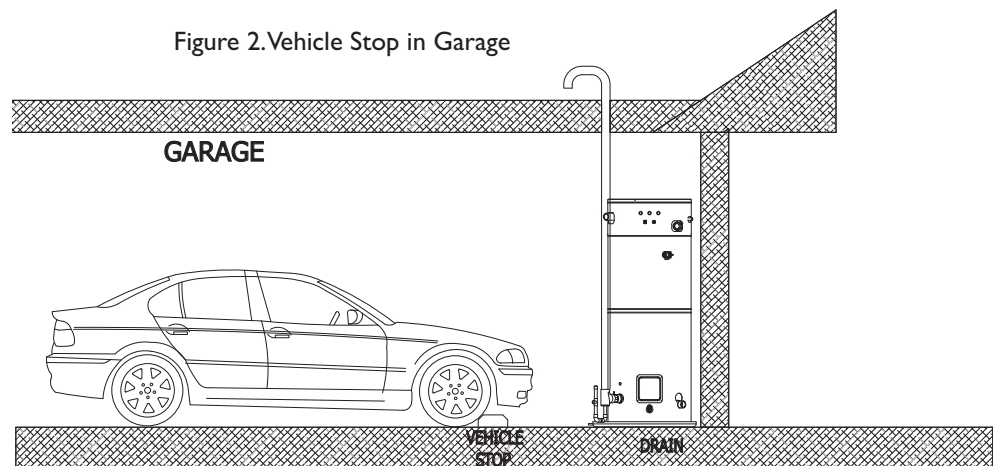
NOTE: In the State of California, the water heater must be braced, anchored, or strapped to avoid moving during an earthquake. Contact local utilities for code requirements in your area or call 1-800-456-9805 and request instructions.

The water heater must be installed indoors and in a vertical position on a level surface. **DO NOT** install in bathrooms, bedrooms, or any occupied room normally kept closed.

NOTE: The water heater may be installed in a closet with a door, other than a bedroom or bathroom, providing the units are installed and vented per the manufacturer's instructions. The venting system must comply with the requirements set forth in the venting section of this manual.

Important: Air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is excluded from warranty coverage.

Figure 2. Vehicle Stop in Garage



NOTE: This water heater must be installed according to all local and state codes; Or, in the absence of local and state codes; the "National Fuel Gas Code", ANSI Z223 .1 (NFPA 54)-Latest edition. This publication is available from the following:

American Gas Association
 Orders telephone No: (Toll Free)
 866.816.9444
 National Fire Protection Agency.
 1 Batterymarch Park.
 Quincy, MA 02269.

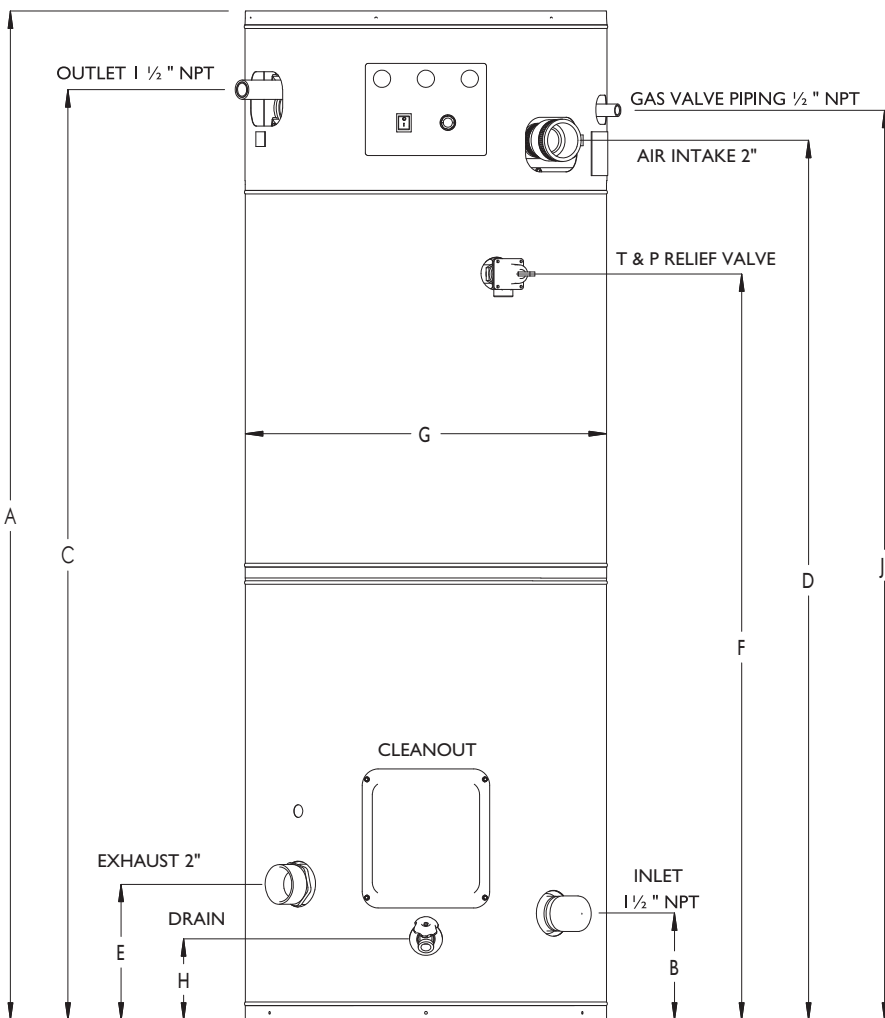
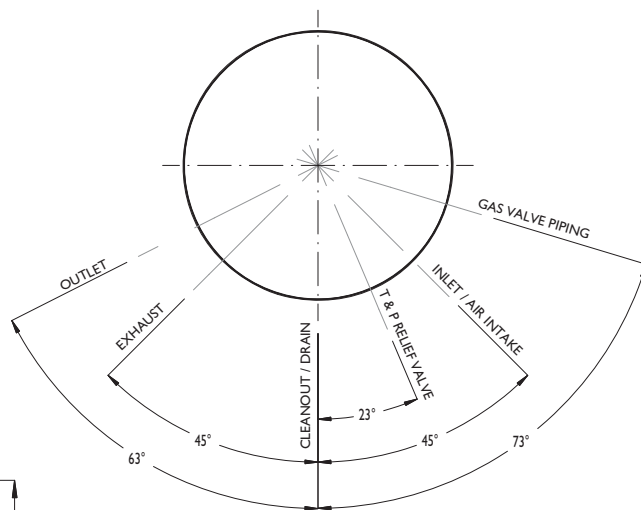
Check your local phone listings for the local authorities having jurisdiction over your installation.

SPECIFICATIONS

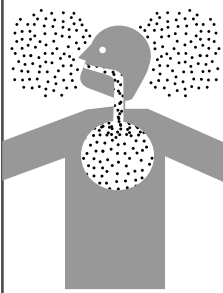


ALL DIMENSIONS IN INCHES. "TO" IS FROM FLOOR

MODEL	A TO TOP OF HTR	B TO COLD IN	C TO HOT OUT	D TO AIR INTAKE	E TO EXHAUST	F TO T & P	G HTR DÍA	H TO DRAIN	J TO GAS INLET	WTR CONN	GAS CONN	T & P CONN	APROX SHP WGHT
HE-70-125	69	7 1/4	63 3/4	60 1/8	9 1/4	51	26 3/8	5 1/2	62 1/4	1 1/2"	1/2"	3/4	290
HE-100-150	76 7/8	7 1/4	71 1/2	68 1/8	9 1/4	58	28 3/8	5 1/2	70 1/4	1 1/2"	1/2"	3/4	490
HE-100-199	76 7/8	7 1/4	71 1/2	68 1/8	9 1/4	58	28 3/8	5 1/2	70 1/4	1 1/2"	1/2"	3/4	490
HE-100-250	76 7/8	7 1/4	71 1/2	68 1/8	9 1/4	58	28 3/8	5 1/2	70 1/4	1 1/2"	1/2"	1	490
HE-100-250-ASME	76 7/8	7 1/4	70 1/2	68 1/8	9 1/4	58	28 3/8	5 1/2	70 1/4	1 1/2"	1/2"	1	490



WARNING: If replacing an existing water heater, the venting system must be reviewed to be certain it complies with the requirements in this manual.

⚠ WARNING	
Breathing Hazard - Carbon Monoxide Gas	
	<ul style="list-style-type: none"> ■ Install Vent system in accordance with codes. ■ Do not operate water heater if flood damaged. ■ Do not operate if soot build up is present. ■ Do not obstruct water heater air intake with insulating jacket. ■ Do not place chemical Vapor emitting products near water heater. ■ Gas and Carbon monoxide detectors are available.
<p>Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.</p>	

INSTALLATION CHECK LIST

This is presented for ease of reference. It is **not comprehensive**.
All instructions and warnings must be read and adhered to.

WATER HEATER LOCATION REQUIREMENTS

- Proper clearance from combustible surfaces observed and heater not installed directly on carpeted floor.
- Sufficient room to service the water heater.
- Provisions made to protect area from water damage. Properly sized drain pan installed and piped to an adequate drain.
- Installation area free of corrosive elements and flammable vapors or materials.
- Sufficient fresh air supply for proper operation of heater.
- Keep vent inlets and outlets free of obstructions.

CONDENSATE LINE

- Drain stem is fully inserted in the elbow and glued properly.
- Trap aligned so that the exhaust pipe is in a vertical position close to the surface of the water heater.
- Properly sloped to adequate drain or approved pump.
- Protected from freezing if required.

VENT PIPE SYSTEM

- Vent pipe and fittings of approved material.
- Acceptable size, length, and number of elbows on air inlet pipe.
- Installed in accordance with the prevailing provisions of Local codes, or in the absence of such, National Fuel Gas Code, NFPA 54, ANSI Z223.
- Not obstructed in any way.

VENT TERMINATION

- Correct relationship- outlet to inlet.
- 12" Min. above grade/snow level.
- 2" exhaust outlet/air inlet pipe sloped down towards water heater at 1/4" per foot. 3" piping sloped down towards the heater at 1/8" per foot.
- Away from corners, other vents, windows, etc.

ALTERNATE HORIZONTAL VENT TERMINATION

- Correct relationship - outlet to inlet.
- 12" Min. above anticipated snow level.
- Away from corners, other vents, windows, etc.

VERTICAL VENT TERMINATION - SINGLE TUBE

- Inlet -12" Min. above grade/snow level.
- Correct relationship - outlet to inlet.
- Away from corners, other vents, windows, etc.

CONCENTRIC VENT

- 12" Min. above grade/snow level.
- Away from corners, other vents, windows, etc.

WATER SYSTEM PIPING

- Temperature and pressure relief valve opening facing downward with a discharge line run to an open drain and protected from freezing.
- All piping properly installed and free of leaks.
- Heater completely filled with water.

- A properly sized expansion tank must be installed on all closed systems.
- Tempering valve properly installed per manufacturer's instructions- if desired.

GAS SUPPLY AND PIPING

- Adequate size for BTU input.
- Gas supply is the same type as listed on the water heater data plate.
- Gas line equipped with full opening shut-off valve, union and drip leg.
- Approved pipe joint compound used.

- Chloride-free soap and water solution or other approved means used to check all connections and fittings for possible gas leaks.

ELECTRICAL CONNECTIONS


- Unit connected to a dedicated power supply.
- Unit connected to a 120V electrical supply.
- Proper Polarity.

Water heater properly grounded. The appliance when installed must be electrically grounded in accordance with local codes or in the absence of local codes with the National Electrical code, ANSI/N FPA-70.

- Installed in accordance with prevailing provisions of local codes, or in the absence of such, National Fuel Gas Code, NFPA 54, ANSI Z223.

WATER PIPING

Pipes and fittings should be installed in compliance with the installation piping PAGE 9. Check for proper fitting in cold water connection before connecting of hot and cold water lines. If the indoor installation area is subject to freezing temperatures, water piping must be protected. The water heater should be drained from tank and lines if being shut down during freezing temperatures. If sweat connections are used, sweat tubing to the adaptor before fitting adaptor to the cold and hot water fittings. It is imperative that no heat be applied to the water heater fittings as they may contain nonmetallic parts.

 **WARNING:**  OPERATING AN EMPTY OR PARTIALLY FILLED WATER HEATER WILL RESULT IN DAMAGE TO THE TANK

Install the water piping and fittings as shown on PAGE 9.

1. Connect the cold water supply (3/4" NPT) to the bottom fitting marked "C". Connect the hot water supply (3/4" NPT) to the fitting marked "H" located on top of the unit.

Important: Some models may contain energy saving heat traps to prevent the circulation of hot water within the pipes. Do not remove the inserts within the heat traps.

2. The installation of unions in both the hot and cold water supply lines is recommended for ease of removing the water heater for service or replacement.
3. The manufacturer of this water heater recommends installing a tempering valve or anti-scald device for a domestic hot water line. These valves reduce the point-of-use temperature of the water by mixing cold and hot water and are readily available for use.
4. Install a shut-off valve in the cold water inlet line. It should be located close to the water heater and be

easily accessible. Know the location of this valve and how to shut off the water to the heater.

5. A temperature and pressure relief valve is installed in the opening marked "Temperature and Pressure (T & P) Relief Valve" on the water heater.
6. Add a discharge line to the opening of the T & P Relief valve. Follow the instructions under "Temperature and Pressure Relief Valve".
7. After piping has been properly connected to the water heater, open the nearest hot water faucet. Open the hot water faucet and allow the tank to completely fill with water. To purge the lines of any excess air, keep the hot water faucet open for 3 minutes after a constant flow of water is obtained. Close the faucet and check all connections for leaks.

Water supply pressure should not exceed 80% of the working pressure of the water heater. The working pressure is stated on the water heater's data plate. If this occurs a pressure reducing valve with a bypass should be installed in the cold water inlet line to the entire system. This should be placed on the supply to the entire structure in order to maintain equal hot and cold pressures.

CORROSION AND WATER QUALITY

Water quality will vary from location to location and may contain contaminants that may reduce the life or performance of the water heater.

Contaminants which can reduce the life or performance of the water heater if present in high quantities include those which contribute to hardness (dissolved minerals such as sodium, calcium and magnesium); plus chlorides and sulfates. Additionally, water that is too acidic or basic (measured as pH) can reduce the life of the water heater. Water treatment systems (such as water softeners or hardeners) can be used to maintain water quality.

TEMPERATURE & PRESSURE RELIEF VALVE

For protection against excessive pressures and/or temperatures, a temperature and pressure relief valve is installed in the opening marked, "temperature and pressure relief valve"; A design certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials, as meeting the requirements for Relief Valves and Automatic Gas Shut-Off Devices for Hot Water Supply Systems, Z21 .22 is furnished with this water heater. **DO NOT** thread, cap, or plug the end of this discharge line. Be certain that no contact is made with any live electrical part.

DO NOT connect discharge line directly to drain. PAGE 9 To prevent bodily injury, hazard to life or damage to property, the relief valve must be allowed to discharge water in the event of excessive temperature or pressure developing in the water heater.

The function of the temperature and pressure relief valve is to discharge water in large quantities should circumstances demand. If the discharge pipe is not directed to the drain, as shown on PAGE 9, or other suitable means, the water flow may cause property damage.

THE DISCHARGE LINE:

- (1) Must not be smaller than the pipe size of the relief valve.
- (2) Must not be plugged or blocked.,
- (3) Must be of material capable of withstanding 210°F without distortion.
- (4) Must be installed so as to allow complete drainage of both the temperature and pressure relief valve and discharge line.
- (5) Must terminate at an adequate drain.,
- (6) Must not have any valve between the relief valve and the heater.

Failure to maintain the properly listed temperature and pressure relief valve will release the manufacturer from any claims which might result from excessive temperature or water pressure.

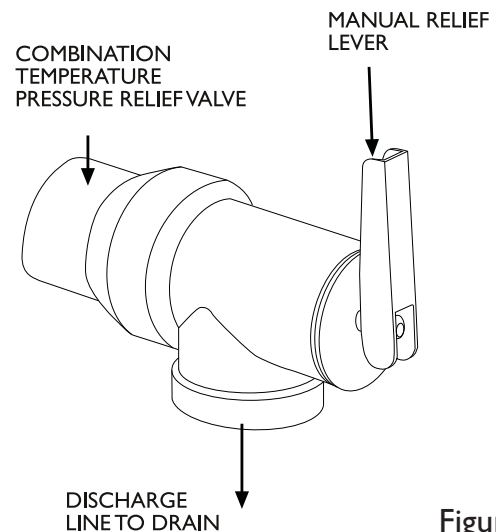


Figure 3.

⚠ WARNING: ⚠ Do not attempt to operate this water heater with cold water inlet valve closed. Manually operate the temperature and pressure relief valve at least once a year. (Figure 3) To prevent water damage, discharge line must terminate at an adequate drain. PAGE 9 Standing clear of the outlet (discharge water may be hot), lift and release the lever handle on the

temperature and pressure relief valve to make the valve operate freely. If the heater is installed in a closed system, the temperature and pressure relief valve may drip at times. If the temperature and pressure relief valve discharges a full stream of water, have the system checked. See “Pressure Build-Up in Water System” (Page 6). If the temperature and pressure relief valve on the appliance discharges periodically, this may be due to thermal expansion in a closed water supply system (see “Pressure Build-Up in Water System”). Contact the water supplier or local plumbing inspector on how to correct this situation. Do not plug the temperature and pressure relief valve.

TEMPERING VALVE INSTALLATION

It is recommended that a tempering valve be installed, per the manufacturer’s instructions, for water heaters supplying domestic hot water (See PAGE 8 for a sample tempering valve installation).

GENERAL INFORMATION

Water piping, fittings, and valves must be properly installed for the correct and safe operation of this water heater. Please note the following:

- The system should be installed only with piping that is suitable for potable (drinking) water such as copper, CPVC, or polybutylene. PVC water piping may be used on the cold water inlet supply but not within 18 inches of the cold water connection on the water heater.
- DO NOT use PVC piping on the hot water outlet, space heating supply, or space heating return.
- DO NOT use any pumps, valves, or fittings that are not compatible with potable water.
- DO NOT use valves that may cause excessive restriction to water flow. Use full flow ball or gate valves only.
- DO NOT use 50/50 tin-lead solder (or any lead based solder) in potable water lines. Use 95/5 solder or other equivalent material.
- DO NOT tamper with the thermostat, gas valve, blower, electrical components, or temperature and pressure relief valve. Tampering with any of the components is dangerous and can result in death, severe injury, or property damage. Tampering voids all warranties. Only qualified technicians should service these components.
- DO NOT use this water heater as a replacement for an existing boiler installation.
- DO NOT use with piping that has been treated with chromates, boiler seal, or other chemicals.
- DO NOT add any chemicals to the system piping which will contaminate the potable water supply.

PRESSURE BUILDUP IN CLOSED WATER SYSTEMS

The water utilities supply meter may contain a check valve, back blow preventer, or water pressure reducing valve. This will create a closed water system. During the heating of the water, water expands creating a pressure build-up in the water system. A temperature and pressure relief valve, must be installed on the water heater (150 PSI maximum pressure setting, see Temperature and Pressure Relief Valve-Figure 3). To prevent the temperature and pressure relief valve from discharging hot water, a loss of energy, and reduce the possible buildup of lime on the water temperature and pressure relief valve seat.

An expansion tank must be installed on the cold water supply line. For every 50 US gallons of stored water, the expansion tank must have a minimum capacity of 1.5 US gallons. See PAGE 9. It requires both T&P valves and expansion tanks for closed systems.

The manufacturer of this water heater will void the warranty if there is a failure to install a properly sized expansion tank.

SPACE HEATING POTABLE WATER SYSTEM

- Some water heater models are equipped with inlet/outlet tapplings for use with space heating applications. If this water heater is to be used to supply both space heating and domestic potable (drinking) water, the instructions listed below must be followed:
- Be sure to follow the manual(s) shipped with the air handler system. A properly installed flow control valve is required to prevent thermo-siphoning. Thermo-siphoning is the result of a continuous flow of water through the air handler circuit during the off cycle.
- Weeping (blow off) of the temperature and pressure relief valve (T & P) or higher than normal water temperatures are the first signs of thermo-siphoning.
- The domestic hot water line from the water heater should be vertical past any tempering valve or supply line to the air handler to remove air bubbles from the system. Otherwise, these bubbles will be trapped in the air handler heat exchanger coil, reducing the efficiency.

DO NOT use this water heater as a replacement for an existing boiler installation.

DO NOT use with piping that has been treated with chromates, boiler seal or other chemicals.

DO NOT add boiler treatment or any chemicals to any heat piping, since the piping contains potable water.

DO NOT use with PVC piping.

Water heaters, which will be used to supply potable water, shall not be connected to any heating system or components previously used with a non-potable water heating appliance.

DO NOT use any pumps, valves, or fittings that are not completely compatible with potable water piping.

DO NOT use valves that may cause excessive restriction to water flow.

USE FULL FLOW BALL OR GATE VALVES ONLY.

DO NOT tamper with the thermostat, gas valve, igniter control or temperature and pressure relief valve.

Tampering with any of these components is DANGEROUS and can result in property damage or severe injury. Tampering voids all warranties. Only qualified personnel should service these components.

DO NOT use 50/50 solder in potable water lines.

IF THE SPACE HEATING system requires water temperature in excess of 120° F, a mixing valve or other means should be installed in the domestic (potable) hot water supply to limit the RISK OF SCALD INJURY. (See Figure 5)

Some Jurisdictions may require a backflow preventer in the incoming cold water line to the water heater. In such cases, the temperature and pressure relief valve on the water heater may weep or relieve due to expansion of the heated water.

A diaphragm-type expansion tank (such as TACO or EXTROL) will normally eliminate this weeping condition. Please read and follow the manufacturer's instructions for installation of such tanks.

Some jurisdictions may require a backflow preventer in the incoming cold water line. This may cause the temperature and pressure relief valve on the water heater to discharge or weep due to expansion of the heated water. A diaphragm-type expansion tank suitable for potable water will normally eliminate this weeping condition. Please read and follow the manufacturer's instructions for the installation of such tanks.

Figure 4. Combination Space Heating / Potable Water Heating system

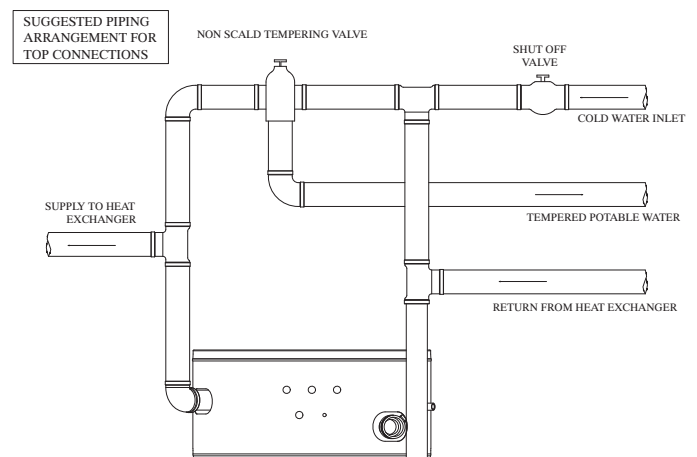


Figure 5. Water Piping Connections

NOTES:
**THE PRESSURE REDUCING VALVE MUST BE INSTALLED ON THE MAIN COLD WATER INLET LINE TO THE STRUCTURE IN ORDER TO REDUCE PRESSURE IN THE ENTIRE WATER SYSTEM.

MASSACHUSETTS: INSTALL A VACUUM RELIEF IN COLD WATER LINE PER SECTION 19 MGL 142.

OTHER AREAS CHECK LOCAL CODES.

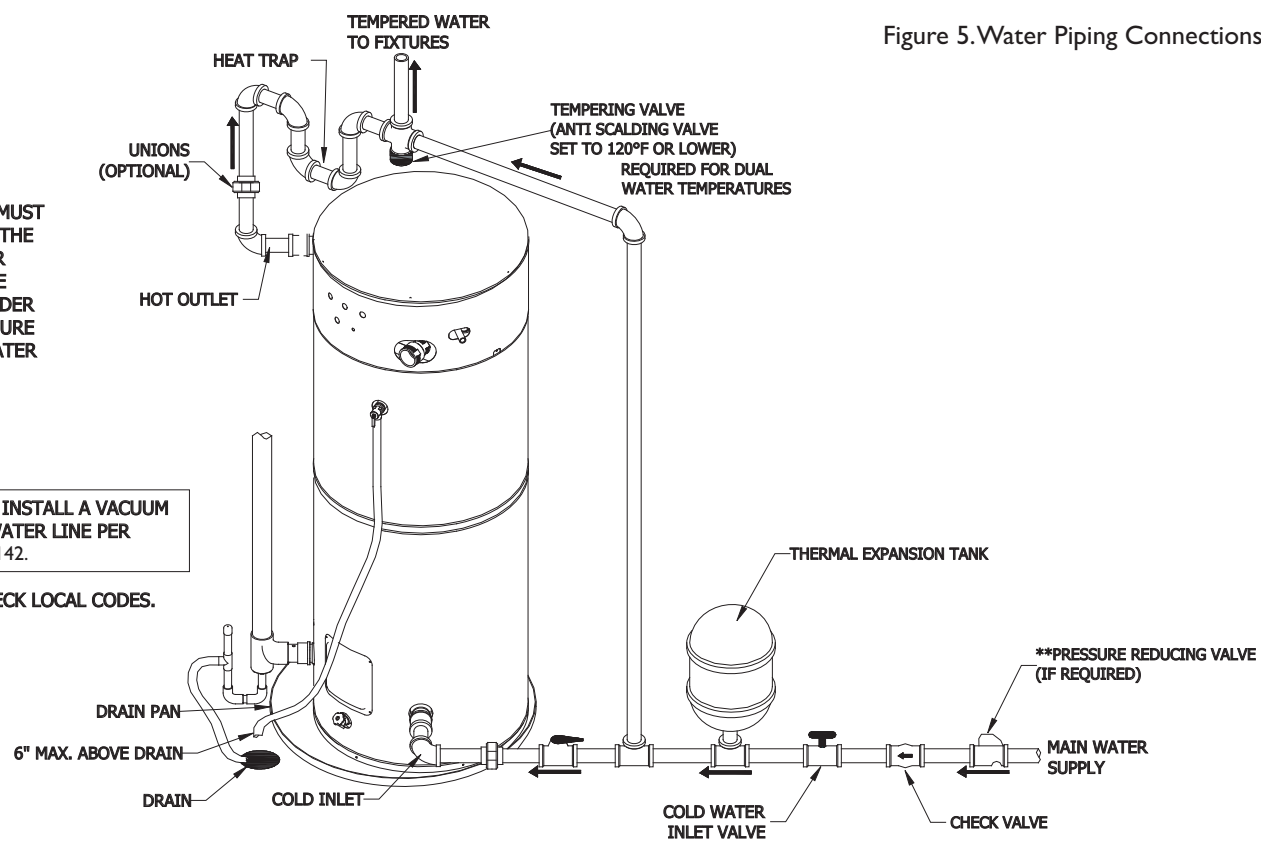


Figure 6. Typical Two Water Heater Connection

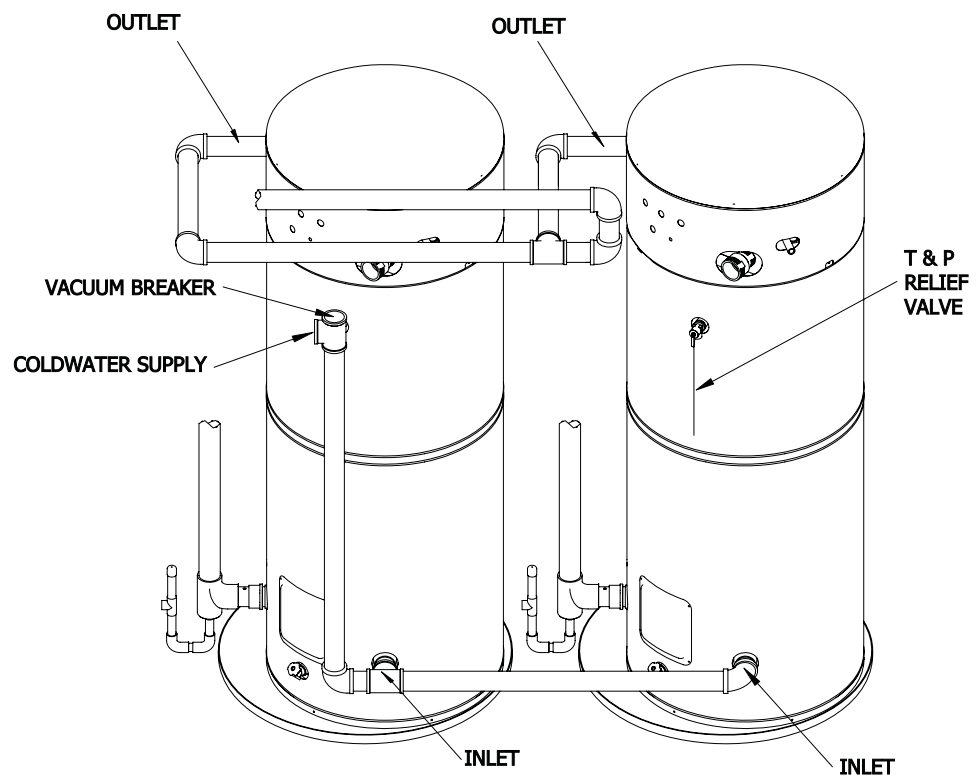


Figure 7. Typical Three Water Heater Connection

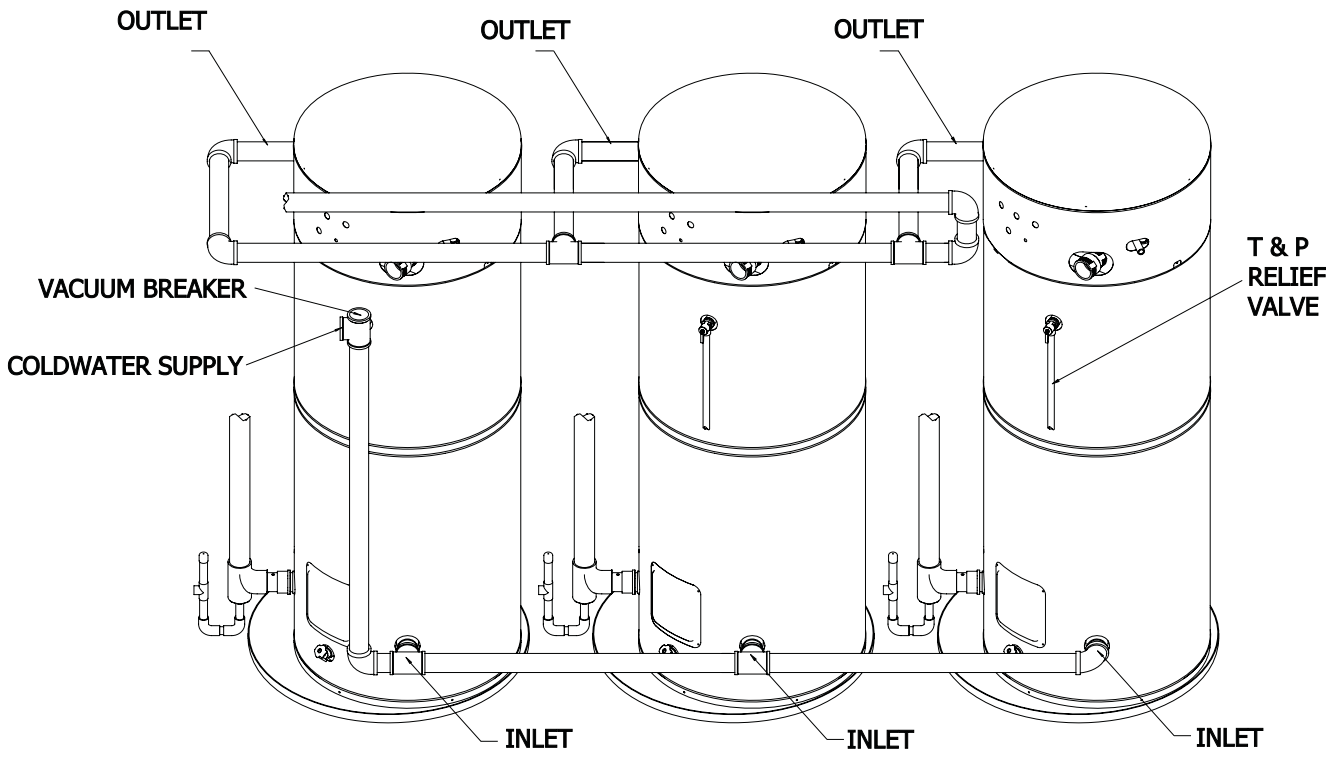
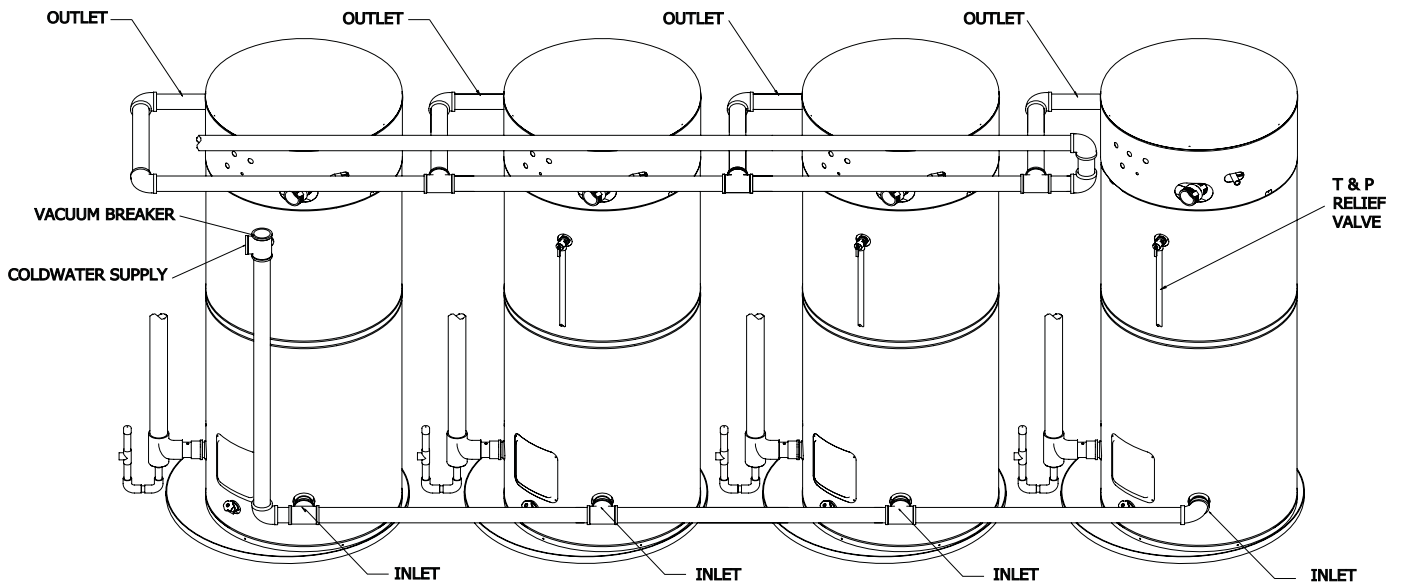


Figure 8. Typical Four Water Heater Connection



CLEARANCES AND ACCESSIBILITY

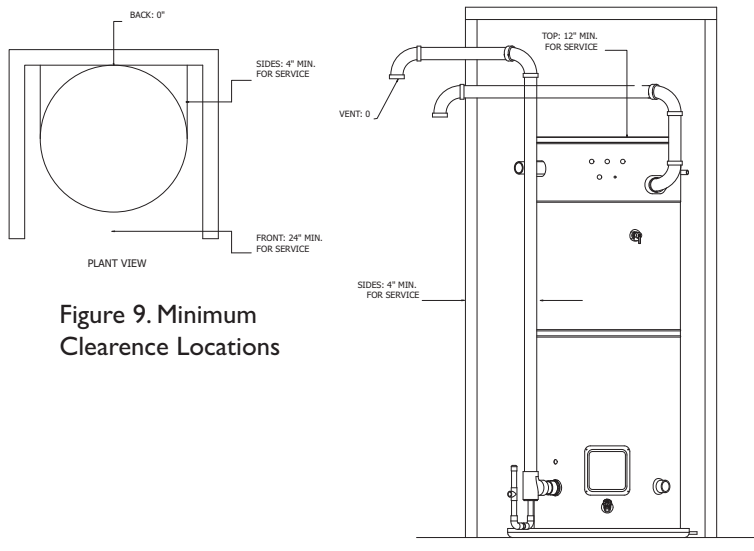


Figure 9. Minimum Clearance Locations

Notice: Minimum clearances from combustible materials are stated on the data plate located on the front of the water heater. The water heater is certified for installation on a combustible floor.

Important: If installing over carpeting, the carpeting must be protected by a metal or wood panel beneath the water heater. The protective panel must extend beyond the full width and depth of the water heater by at least 3 inches (76.2 mm) in any direction, or if an alcove or closeted installation, the entire floor must be covered by the panel. The panel must be strong enough to carry the weight of the heater when full of water.

Figure 9 may be used as a reference guide to locate the specific clearance locations. A minimum of 24 inches of front clearance and 4 inches on each side should be provided for inspection and service.

CONDENSATE LINE:

Important: DO NOT route the condensate drain in areas that are likely to freeze. Frozen condensate will block the drain line and result in property damage or water heater malfunction.

CONDENSATE TRAP ASSEMBLY

A condensate traps/drain stem assembly has been supplied with the water heater. This assembly must be installed between the water heater and the exhaust outlet piping to ensure proper operation of the water heater. To install, follow the instructions attached to the drain.

Note: The trap should be aligned so that the exhaust pipe is in a vertical position close to the surface of the water heater.

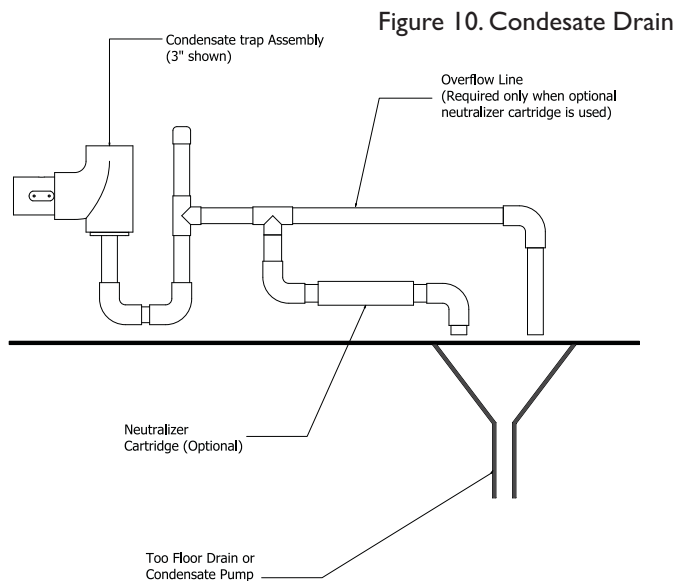


Figure 10. Condensate Drain

CONDENSATE DRAIN LINE

All parts of the condensate trap are PVC (figure 10). This assembly can be turned with the outlet of the tee oriented as needed. Once orientation direction is decided, glue the unglued joints. Connect the remaining piping and run the condensate drain line to a suitable drain.

Important: If required by local codes, install a condensate neutralizer cartridge in the drain line. The drain line must be routed to a suitable drain. If no drain is available or the drain is above the level of the condensate line, install a condensate pump that is resistant to the acidic condensate. These pumps are available from local distributors. If the pump is not resistant to acidic water, a condensate neutralizer must be used ahead of the pump.

When installing the drain line, note the following:

- Plastic pipe or tubing must be used to connect the condensate drain to a suitable drain or condensate pump. Do not use copper tubing, iron, or steel pipe for the condensate drain line.
- Condensate drain lines should be installed in temperature controlled areas only. Drain lines installed in areas that are subject to freezing temperatures should be wrapped with a nationally recognized/listed heat tape that is suitable for plastic pipe and/or approved insulation for freeze protection. Install per manufacturer's instructions.
- **DO NOT** common drain with the temperature and pressure relief valve or the condensate line from an air conditioner evaporator coil.
- Slope the condensate drain towards the inside floor drain or condensate pump.
- The condensate drain line and connection to the drain piping must comply with all local codes.
- **DO NOT** run the condensate line into the drain pan.

VENT PIPE SYSTEM



WARNING:



Carbon Monoxide Hazard Follow all instructions to locate and install the vent pipe system.

Instructions can be found in this manual, in state or local codes (or the authority having jurisdiction), or in the absence of such, the National Fuel Gas Code, ANSI Z223.1, NFPA 54, Latest Edition. Canadian installations must be performed in accordance with CAN/CGA-B149.

Failure to properly locate and install the vent pipe system can result in death or carbon monoxide poisoning.

VENTING

This water heater may be installed either as a power vent system, (one pipe), or as a direct vent system, (two pipe), in which all air for combustion is taken from the outside atmosphere and all combustion products are discharged to the outdoors.

This water heater must be properly vented for removal of exhaust gases to the outside atmosphere. Correct installation of the vent pipe system is mandatory for the safe and efficient operation of this water heater and is an important factor in the life of the unit. Vent pipe installation must be performed in accordance with state and local codes, or in the absence of such, The National Fuel Gas Code, NFPA 54, ANSI Z223.1-latest edition.

When replacing an existing water heater, it is recommended that the venting system be reviewed for compliance with the requirements contained in this installation manual. If the venting is not in compliance, it is recommended that the appropriate changes be made to bring it into compliance.

Note: If the vent system is not in compliance with the current or prior installation manuals, the manufacturer reserves the right to evaluate the installation prior to granting any warranty on service claims.

Important: Check to make sure the vent pipe is not blocked in any way.

Note: Do not common vent this water heater with any other appliance. Do not install in the same chase or chimney with a metal or high-temperature plastic vent from another gas or fuel burning appliance.

VENT PIPE MATERIAL

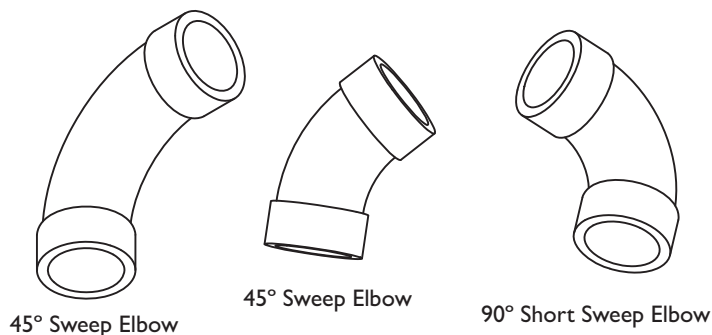
The following plastic materials may be used for both the combustion air inlet and exhaust outlet piping subject to state and local codes:

- Schedule 40 PVC or ABS
- Schedule 40 or 80 CPVC
- DWV pipe is acceptable

Note: Use only a solid (not foam core) piping. Plastic pipe and fittings are available through most plumbing suppliers. Always check the marking on the pipe to make sure you are using the correct material.

Important: Do not use vent elbows in this vent pipe installation. Use only “sweep” type elbows (see figure 11).

Correct Fittings



Incorrect Fittings

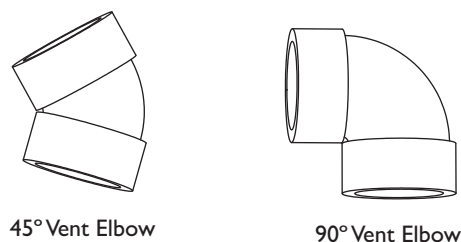


Figure 11: Correct & Incorrect Pipe Fittings

VENT PIPE INSTALLATION

The following guidelines should be followed when installing the air inlet and exhaust outlet piping:

Venting should be as direct as possible with a minimum number of pipe fittings.

Vent diameter must not be reduced unless specifically noted in the installation instructions.

All 2 inch horizontal vent piping must be sloped upward 1/4” per foot (3 inch piping must be sloped upward 1/8” per foot). So that condensate will run back to the heater and exit through the condensate trap.

Support all horizontal pipe runs every 4 feet and all vertical pipe runs every 6 feet or according to local codes.

If runs are made in areas where below freezing temperatures are expected, piping should be properly protected to prevent freezing.

For horizontal runs, wrap the pipe with nationally recognized/listed heat tape, and/or approved insulation for freeze protection. Install per the manufacturer’s instructions.

The piping and termination may be installed in one of the following type terminations:

1. Standard Horizontal (One or Two Pipe).
2. Vertical (One or Two Pipe).
3. Concentric Vent -- Through the Wall- Direct Vent Only.
4. Concentric Vent -- Through the Roof - Direct Vent Only.

All pipe, fittings, pipe cement, primers and procedures must conform to American National Standard Institute and a American Society for Testing and Materials (ANSI/ASTM) standards in the United States. This water heater has been design certified by the Canadian Standards Association for use with the specified (CSA) listed plastic vent pipe. All joints in the inlet and outlet piping must be properly cemented. Size and cut all piping before cementing.

1. Cut the pipe and square and remove all ragged edges and burrs. Make sure the inside of the pipe is clean and free of cuttings and loose dirt. Chamfer the end and apply primer to the fitting in pipe.
2. Using a suitable grade of pipe cement, apply a moderate, even coating inside the fitting. Apply a liberal amount of cement to the outside of the pipe to socket depth.

VENT PIPE LENGTH

Sizes and length of the exhaust and combustion air intake pipes are to be as specified in Table 1 for 1 pipe power vent installations or Table 2 for 2 pipe direct vent configurations.

These tables list the maximum allowable length in feet of the exhaust and combustion air inlet pipes as related to the number of elbows used.

The specified maximum lengths listed apply separately for the air inlet and exhaust pipe systems, and not for the combined length of both systems.

Minimum length for the vent is 12 equivalent feet, (7 feet and one elbow). This minimum vent length is needed to maintain sufficient backpressure. If the vent is either too short or oversized, the proof-of-flow pressure switch might not close and the burner will not ignite. To correct for this, some restriction has to be added at the vent end to increase the vent pressure.

Suitable restriction can be provided by a 2" to 1 1/2" reducer fitting applied at the vent termination.

VENT LAYOUT CALCULATIONS

1. Determine configuration (power or direct vent) and select vent size and type, (2" or 3", one or two pipe system). Use Table 1 for Power Vent and Table 2 for Direct Vent configurations.
2. Determine number of elbows required for vent system. Corresponding number shown on the tables below under "Number of elbows" indicates the maximum length of exhaust system. Do not include the elbow at the condensate trap. Use the larger size vent material if system design exceeds allowable lengths. Do not exceed either the number of allowed elbows or the allowed length of pipe corresponding to the number of elbows.
3. Repeat step 2 for air intake side of system for direct vented installations.

Table 1

Pipe Size (in)	POWER VENTING (SINGLE PIPE, EXHAUST ONLY) HE70-125. HE100-150, HE100-199. HE100-250							Vent Configuration type
	Number of 90° Elbows (long street style elbows only)							
	0	1	2	3	4	5	6	
2"	N/A	60	55	50	45	40	35	Horizontal
2"	65	60	55	50	45	40	35	Vertical
3"	N/A	130	115	120	115	110	105	Horizontal
3"	135	130	115	120	115	110	105	Vertical

NOTES:

- N/A - Not Applicable.
- Elbows used in vent system must be of "street" type (not of short hard turn type).
- Two 45° elbows are considered equivalent to one 90° elbow.
- A 90° elbow is considered equivalent to 5' of vent.
- The above stated vent lengths of Table 1 apply only for the outlet pipe system, starting at the condensate trap.
- Minimum length requirement is 12 equivalent feet of piping, (combinations of elbows and straight pipe).
- 2" piping may be used for the 125,000, 150,000, 199,000, and 250,000 BTU/Hr input models; however, on vent systems of over 25' it is recommended to use 3" piping to vent models of 250,000 BTU/Hr inputs in order to maintain highest firing rates and to reduce back pressure.
- Use an outlet reducer, (2" to 1.5" for 150,000 inputs and 2" to 1" for 125,000 BTU/Hr inputs) when vent outlets are less than 25'.

Table 2

Pipe Size (in)	DIRECT VENTING (TWO PIPE, SYSTEM) HE70-125. HE100-150, HE100-199. HE100-250							Vent Configuration type
	Number of 90° Elbows (long street style elbows only)							
	0	1	2	3	4	5	6	
2"	N/A	60	55	50	45	40	35	Horizontal
2"	65	60	55	50	45	40	35	Vertical
2"	N/A	130	115	120	115	110	105	Concentric
3"	N/A	130	115	120	115	110	105	Horizontal
3"	135	130	115	120	115	110	105	Vertical
3"	N/A	130	115	120	115	110	105	Concentric

NOTES:

- N/A - Not Applicable.
- Elbows used in vent system must be of "street" type (not of short hard turn type).
- Two 45° elbows are considered equivalent to one 90° elbow.
- A 90° elbow is considered equivalent to 5' of vent.
- The above stated vent lengths of Table 2 apply for both the combustion air inlet pipe from the outside of the building and to the outlet pipe system, starting at the condensate trap.
- Minimum vent length requirement is 12 equivalent feet of piping, (combinations of elbows and straight pipe).
- 2" piping may be used for the 125,000, 150,000, 199,000, and 250,000 BTU/Hr input models; however, on vent systems of over 25' it is recommended to use 3" piping to vent models of 250,000 BTU/Hr inputs in order to maintain highest firing rates and to reduce back pressure.
- Use an outlet reducer, (2" to 1.5" for 150,000 inputs and 2" to 1" for 125,000 BTU/Hr inputs) when vent outlets are less than 25'.

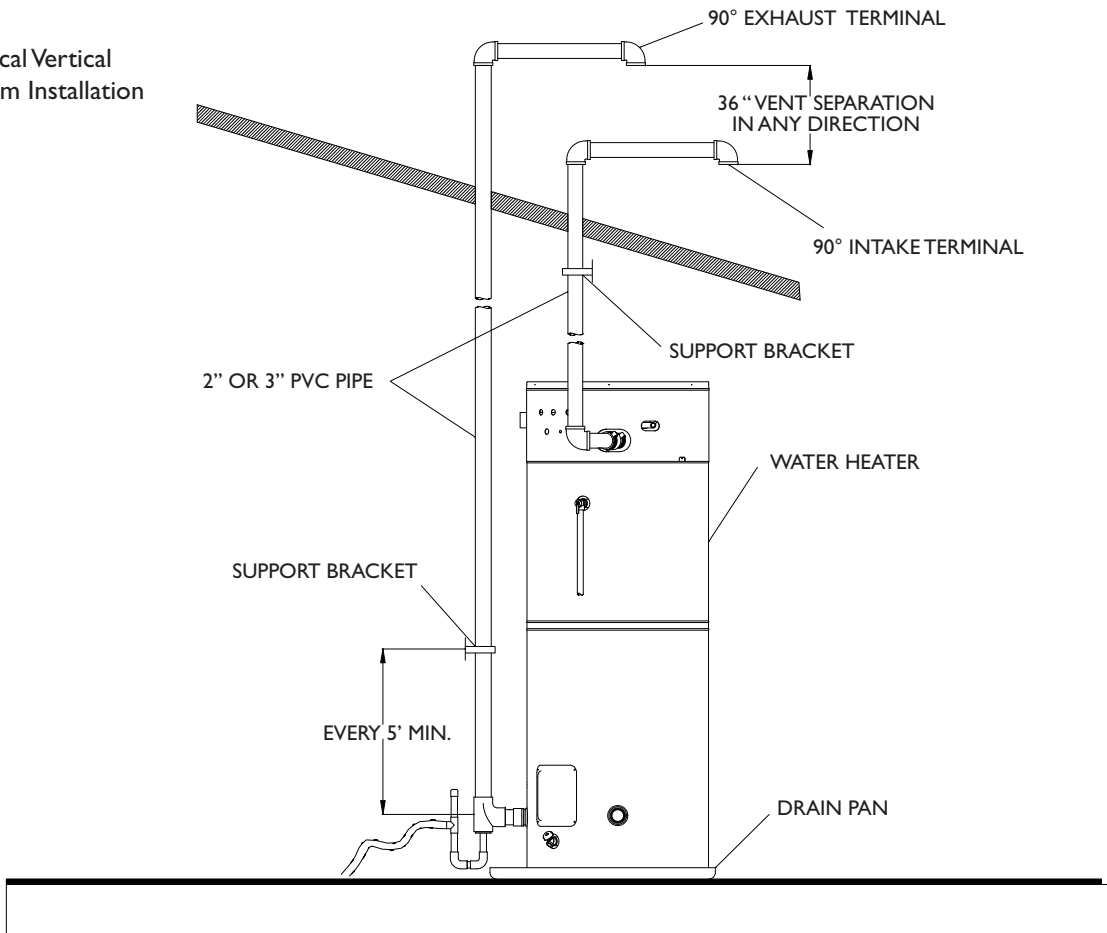
VENT TERMINATION LOCATIONS

In addition to maintaining the minimum clearances, the vent should terminate according to the following guidelines:

1. Do not expose any 3" x 2" reducers or bushings to outdoor ambient temperatures.
2. The air inlet and exhaust outlet must not terminate under a patio, deck or any covered area.
3. Do not terminate the vent near walkways or into alleys or other publicly accessible areas.
4. Do not terminate the vent in an area where children or animals could block pipes.
5. Do not locate the vent terminal too close to shrubs or bushes.
6. Caulk all cracks, seams and joints within 6 feet horizontally above and below the vent.
7. For two pipe systems, combustion air inlet termination and exhaust air termination must be located in the same pressure zone.
8. The vent for this appliance shall not terminate over public walways; or near soffit vent or crawl space vents or other areas where condensation or vapor could create a nuisance or hazard or cause property damage or where condensate or vapor could cause damage or be detrimental to the operation of regulators, relief valves or other equipment.

The air inlet and exhaust outlet must be installed with the following minimum clearances (see Figure 13):
 12 inches above grade or maximum anticipated snow level.
 12 inches from any opening through which blue gases could enter the structure.
 4 feet horizontally and vertically from gas or electric meters, gas regulators, dryer vents, vent hoods, bathroom fan exhaust, attic fans and air intake turbines.
 2 feet from an inside corner formed by two exterior walls.
 2 feet from porches, decks, overhangs and other obstructions.

Figure 12. Typical Vertical Direct Vent System Installation





THROUGH THE WALL VENTING WITH LOW GROUND CLEARANCE

When venting cannot exit through the wall at a height greater than or equal to 12" (30.5 cm) (and above expected snow level) from the ground, then the installation must be modified as shown in figure 13.

Figure 13; Vent Terminal (Low Ground Clearance)

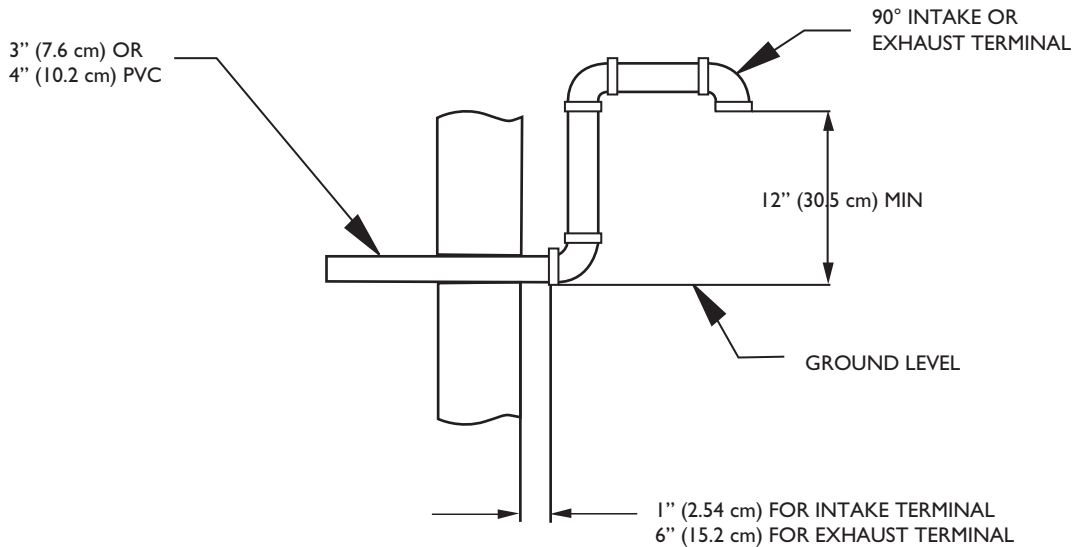
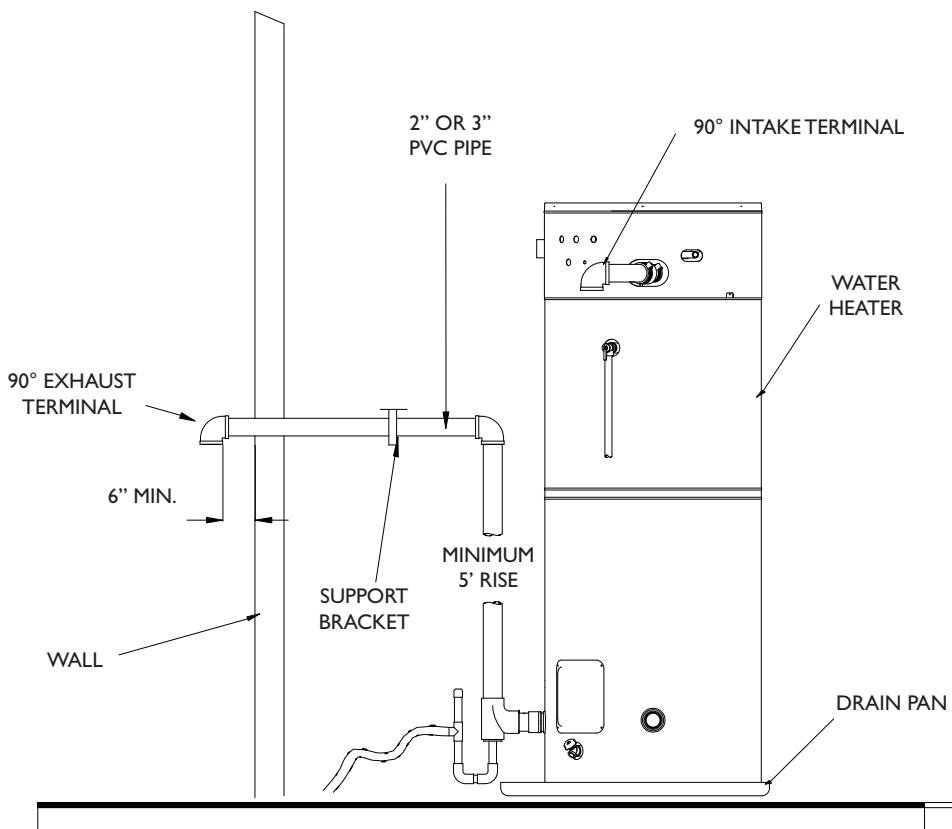


Figure 14. Typical Horizontal Power Direct Vent System Installation



VERTICAL INSTALLATION

Vertical vent must be supported every 5 feet of vertical run and every 3 feet of horizontal run of vent pipe length. Stress levels in the pipe and fittings can be significantly increased by improper installation. If rigid pipe clamps are used to hold the pipe in place, or if the pipe cannot move freely through a wall penetration, the pipe may be directly stressed, or high thermal stresses may be formed when the pipe heats up and expands. Install accordingly to minimize such stresses.

Use the following procedure to vent through the roof:

1. Cut the necessary holes through the roof and ceiling.
2. Install the exhaust vent and air intake plastic pipes, as shown. The installation must meet the local codes and/or The National Fuel Gas Code ANSI Z223 .1 (Latest Edition) Installation Code Requirements.

THROUGH THE WALL VENTING WITH LOW GROUND CLEARANCE

When venting cannot exit through the wall at a height greater than or equal to 12" (30.5 cm.), or above expected snow level from the ground, then the installation must be modified as shown in Figure 13 for maximum venting links using 2" (5.1 cm) or 3" (7.6 cm) diameter plastic pipe. See tables 1 and 2 on venting on Page 14.

Figure 15. Typical Vertical Power Vent System Installation

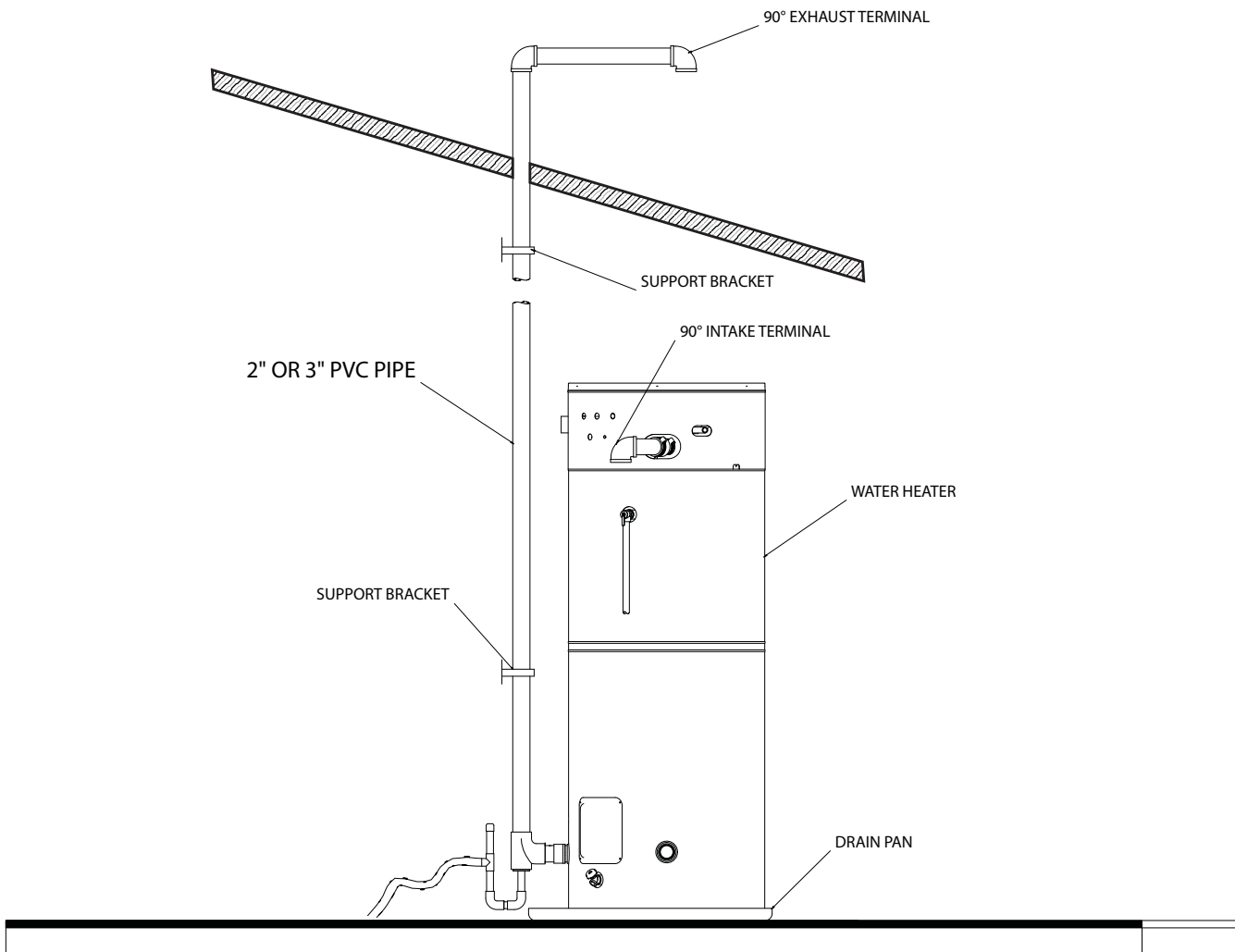
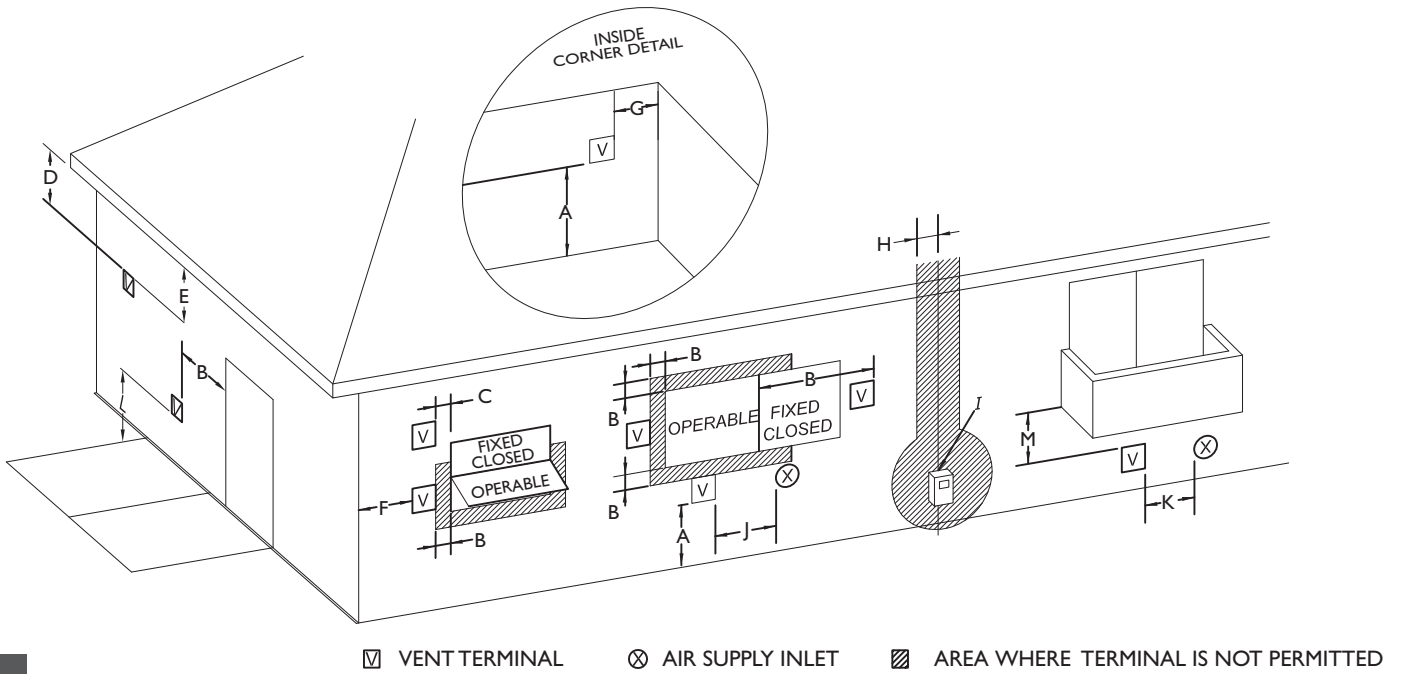


Figure 16: Direct Vent Terminal Clearances

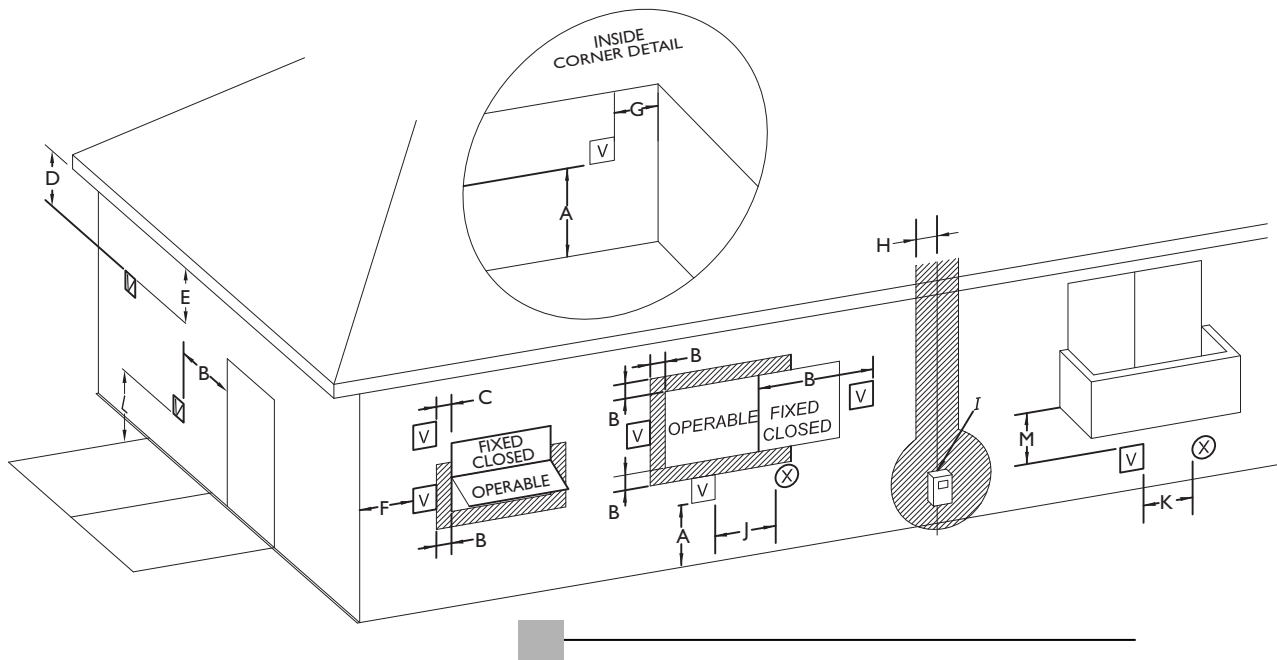


US installations²

A= Clearance above grade, veranda, porch, deck of balcony.	12 inches (30 cm)
B= Clearance to window or door that may be opened.	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3kW), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (15kW). 12 inches (30 cm) for appliances > 50,000 Btuh (15kW).
C= Clearance to window or door that may be opened.	*
D= Clearance to permanently closed window.	*
E= Clearance to unventilated soffit.	*
F= Clearance to outside corner.	*
G= Clearance to inside corner.	*
H= Clearance to each side of center line extended above meter/regulator assembly.	*
I= Clearance to service regulator vent outlet.	*
J= Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance.	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3kW), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (15kW). 12 inches (30 cm) for appliances > 50,000 Btuh (15kW).
K= Clearance to a mechanical air supply inlet.	3 feet (91 cm) above it within 10 feet (3 m) horizontally.
L= Clearance above paved sidewalk or paved driveway located on public property.	
M= Clearance under veranda, porch deck, or balcony.	*
2 In accordance with the current ANSI Z223.1/NFPA 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 veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.	
* For clearances not specified in ANSI Z223.1 / NFPA 54 or CSA-B149.1 one of the following shall be indicated:	
a) A minimum clearance value determined by testing in accordance with section 2.20 or,	
b) A reference to the following footnote.	

Figure 17: Other Than Direct Vent Terminal Clearances

☑ VENT TERMINAL ⊗ AIR SUPPLY INLET ▨ AREA WHERE TERMINAL IS NOT PERMITTED



US installations²

A= Clearance above grade, veranda, porch, deck of balcony.	12 inches (30 cm)
B= Clearance to window or door that may be opened.	4 feet (1.2 m) below or to side of opening. 1 foot (300 mm) above opening.
C= Clearance to permanently closey window.	*
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.	*
E= Clearance to unventilated soffit.	*
F= Clearance to outside corner.	*
G= Clearance to inside corner.	*
H= Clearance to each side of center line extended above meter/regulator assembly.	*
I= Clearance to service regulator vent outlet.	*
J= Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance.	4 feet (1.2 m) below or to side of opning. 1 foot (300 mm)above opening.
K= Clearance to a mechanical air supply inlet.	3 feet (91 cm) above it within 10 feet (3 m) horizontally,
L= Clearance above paved sidewalk or paved driveway located on public property.	7 feet (2.13m).
M= Clearance under veranda, porch deck, or balcony.	*

2 In accordance with the current ANSİK Z223.1/NFPA 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 veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

* For clearances not specified in ANSI Z223.1 / NFPA 54 or CSA-B149.1 one of the following shall be indicated:

a) A minimum clearance value determined by testing in accordance with section 2.20 or,

b) A reference to the following footnote.

CONCENTRIC VENT TERMINATIONS

For planning purposes, see figures 18, 19 & 20 for vent terminal specifications.

Figure 18: 2 inch Concentric Vent

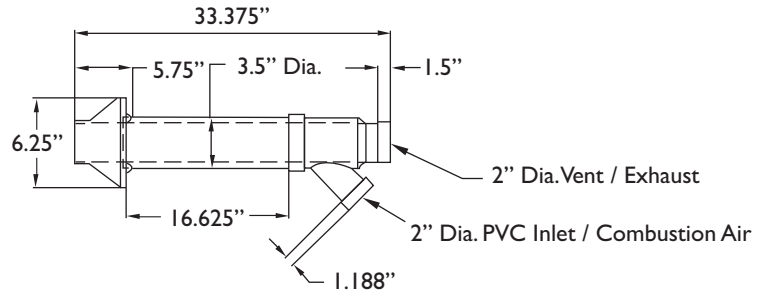


Figure 19: Through The Wall Termination

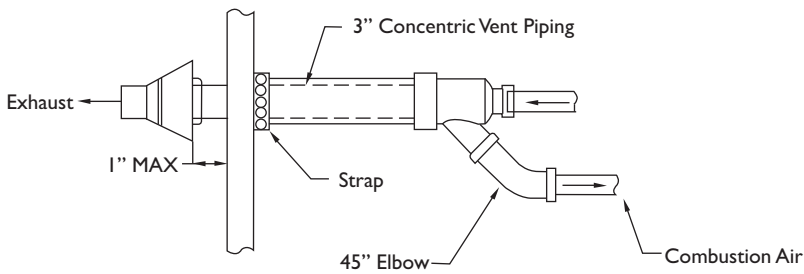


Figure 20: Through The Roof Termination

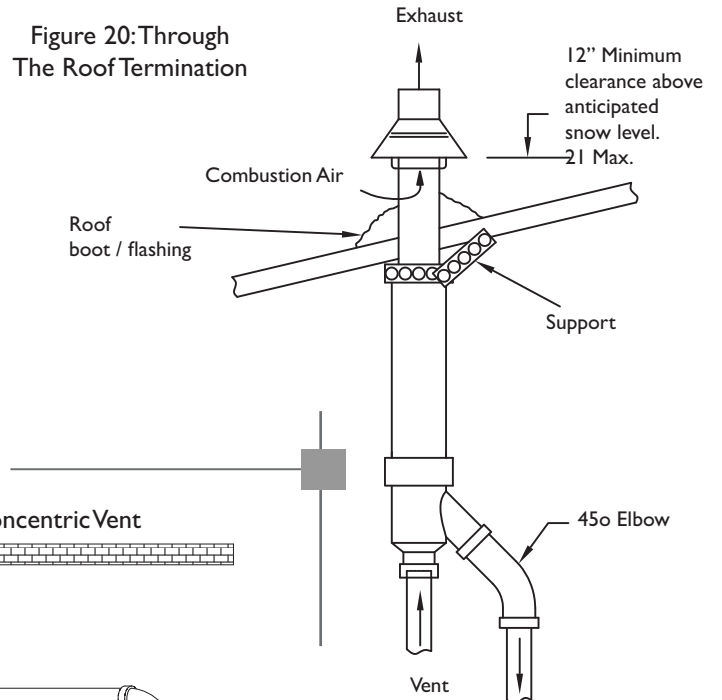
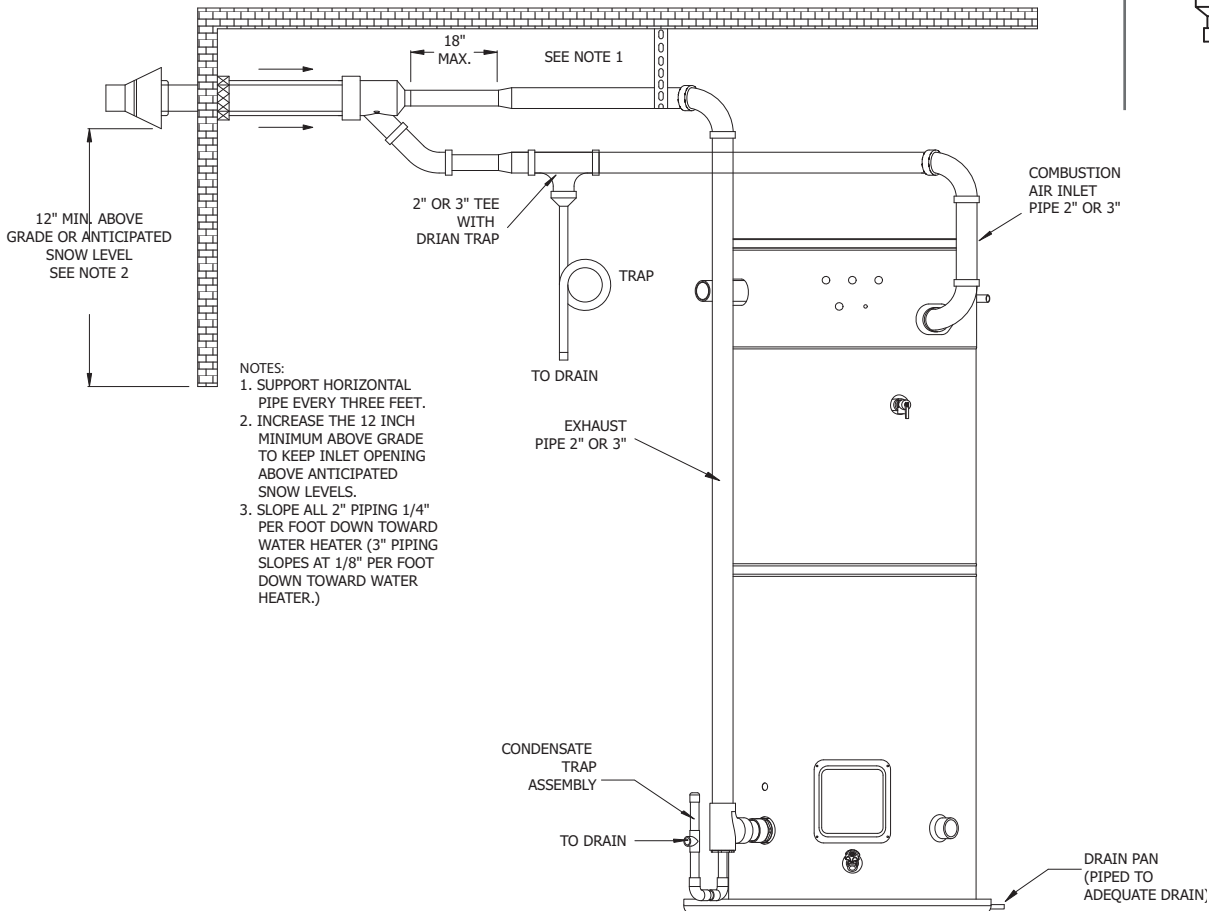


Figure 21. Through the Wall Termination - Concentric Vent



INLET / OUTLET VENT TERMINATIONS

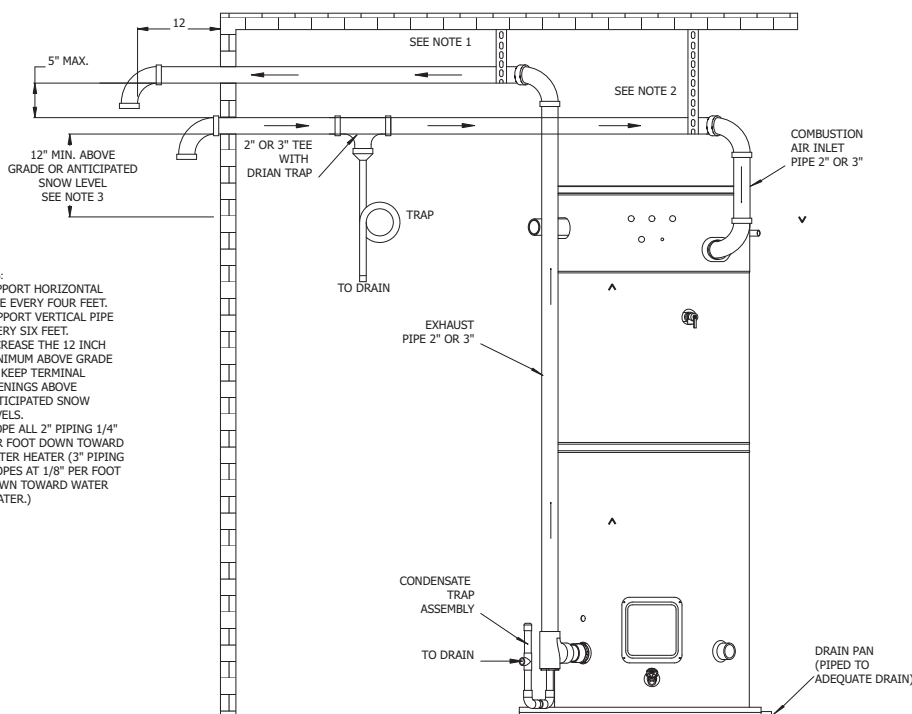
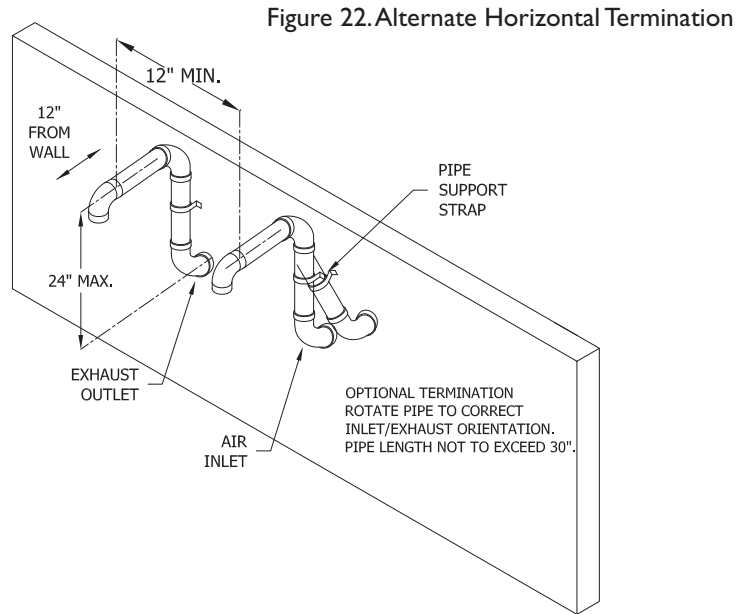
STANDARD HORIZONTAL

ALTERNATIVE HORIZONTAL TERMINATION

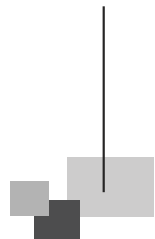
The standard horizontal air inlet termination is a pipe which terminates at the exterior wall and utilizes a coupling to prevent the pipe from being pushed back into the structure. The standard horizontal exhaust outlet termination is a pipe which terminates 12 inches from the outside wall. The air inlet must be located with respect to the exhaust outlet as shown in FIGURE 23 (bottom).

Install a coupling at the outside wall in both the inlet and exhaust to prevent the terminations from being pushed inward. Install a drain tee assembly and trap in the inlet vent as close to the water heater as possible. This is to drain any water that may be in the combustion air pipe and prevent it from entering the blower. Connect the trap drain line to a suitable drain or downstream of the condensate trap of the water heater.

The combustion air and exhaust terminations may be raised up to 24 inches above the wall penetrations if required for anticipated snow levels (see FIGURE 23).



- NOTES:
1. SUPPORT HORIZONTAL PIPE EVERY FOUR FEET. SUPPORT VERTICAL PIPE EVERY SIX FEET.
 2. INCREASE THE 12 INCH MINIMUM ABOVE GRADE TO KEEP TERMINAL OPENINGS ABOVE ANTICIPATED SNOW LEVELS.
 3. SLOPE ALL 2" PIPING 1/4" PER FOOT DOWN TOWARD WATER HEATER (3" PIPING SLOPES AT 1/8" PER FOOT DOWN TOWARD WATER HEATER.)

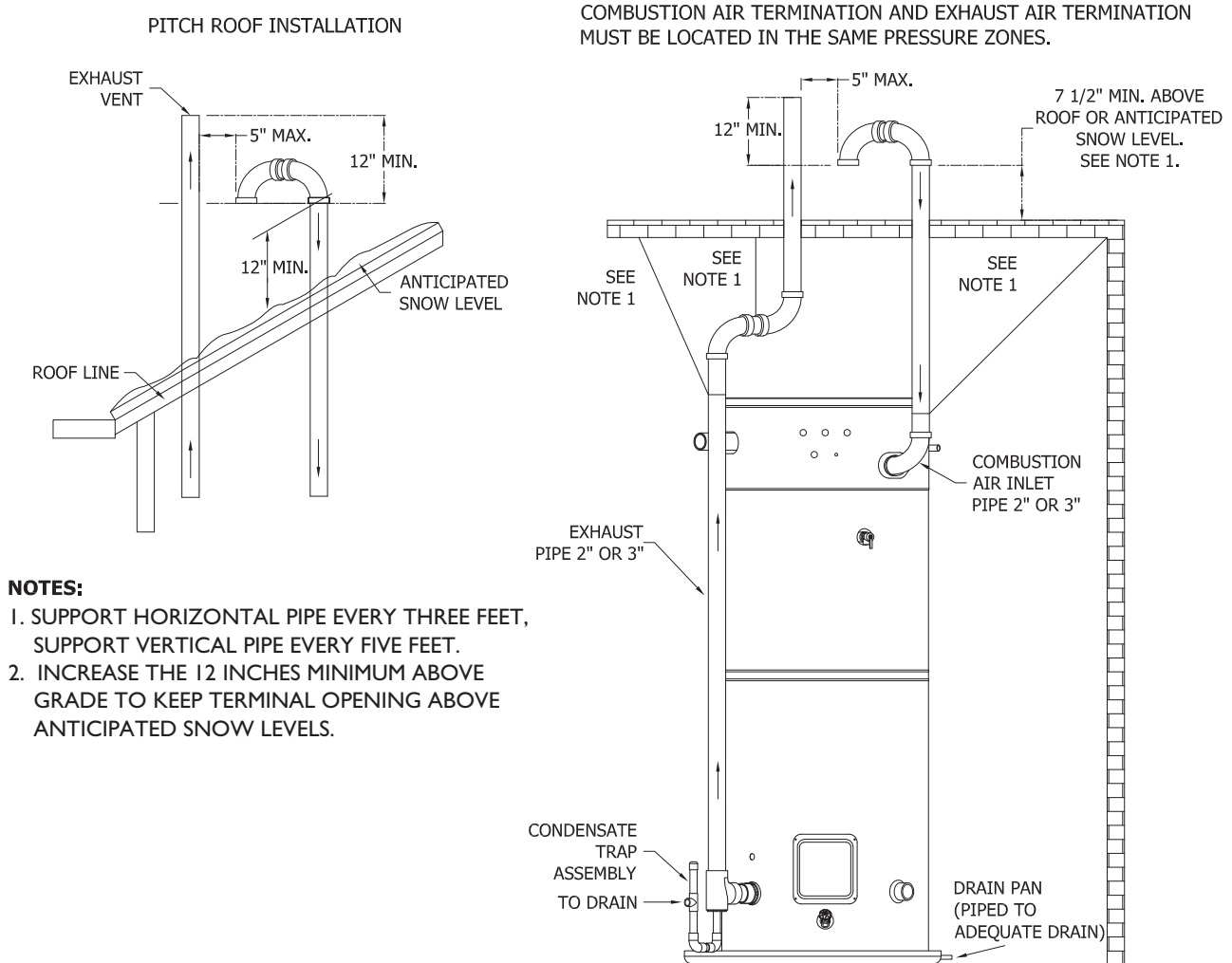


VERTICAL TERMINATIONS

Piping and fittings are 2" or 3". Do not reduce before penetrating the wall. The vertical inlet air termination requires a return bend or two short or long sweep radius 90° elbows to keep the inlet downward and prevent entry of rain. These elbows are

considered part of the termination and should not be included when calculating the maximum allowable vent pipe length. Refer to figure 24 (below) for the proper location of the air inlet with respect to the exhaust outlet termination. The vertical exhaust outlet termination is a 2" or 3" pipe which terminates at least 12 inches above the inlet air termination. The air inlet and exhaust outlet terminations must be at least 12 inches above the roof line or anticipated snow levels as shown in figure 24 below.

Figure 24. Vertical Termination



GAS REQUIREMENTS

Read the data plate to be sure the water heater is made for the type of gas you will be using. This information will be found on the data plate located near the gas control valve. If the information does not agree with the type of gas available, do not install. Call your dealer.

Note: An odorant is added by the gas supplier to the gas used by this water heater. This odorant may fade over an extended period of time. Do not depend upon this odorant as an indication of leaking gas.

GAS PIPING INSTALLATION

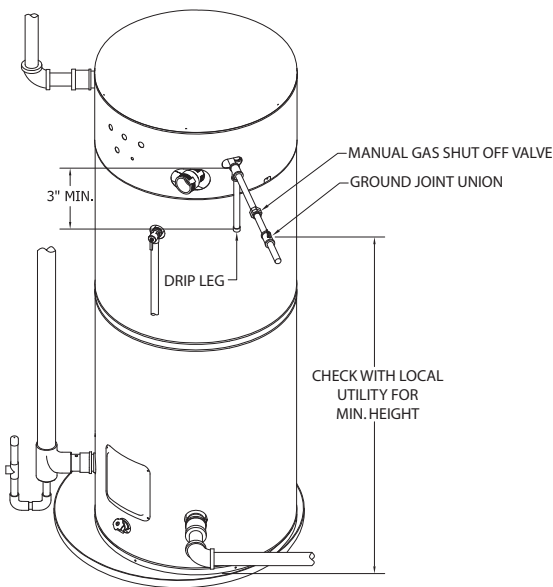
All piping must comply with local and state ordinances or with the National Fuel Gas code ANSI Z223.1 (NFPA 54), whichever applies.

Use clean black iron pipe or equivalent material approved by local codes and ordinances for gas piping. Install a ground-joint-union in the supply line as close to the water heater as possible. A manual gas shut-off valve should be at least 5 feet above floor level and readily accessible. A drip leg (consisting of a pipe tee, 4 inch nipple, and a cap) should be installed as shown in Figure 25.

Make sure the gas supplied to the heater is the same type as listed on the rating plate.

DO NOT ATTEMPT TO USE THIS WATER HEATER WITH ANY GAS OTHER THAN THE TYPE LISTED ON THE RATING PLATE.

Figure 25. Gas Piping



Compound used for the connection of all gas piping should be resistant to the action of liquefied petroleum (L.P.) gases. Apply pipe dope sparingly to the male threads only. **DO NOT** apply pipe dope to the gas valve.

The water heater and its individual gas shut off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (14" W.C.) or 3.5 kPa.

The water heater must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (14" W.C.) or 3.5 kPa.

If the gas valve is subjected to pressure exceeding 1/2 psig, the damage to the gas valve could result in an extremely hazardous condition. If this has occurred, the gas valve must be replaced contact your dealer for service.


It is recommended that all service work be done by a qualified service agency.

GAS PRESSURE

Important: The gas supply pressure must not exceed the maximum supply pressure as stated on the water heater's data plate. The minimum supply pressure is for the purpose of input adjustment.

Note: Air may be present in the gas lines and could prevent the pilot from lighting on initial start-up. The gas lines should be purged of air by a qualified service technician after installation of the gas piping system.

! WARNING



Explosion Hazard


Have a qualified service technician make sure L.P. gas pressure does not exceed 13" water column.

Failure to do so can result in death, explosion, or fire.

LP GAS INSTALLATION SAFETY WARNING

LP UNITS: Liquefied petroleum (LP) 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; sniff at floor level. **IF YOU SMELL GAS,** follow the instructions at the beginning of this manual or on page 35.

ELECTRICAL CONNECTIONS



⚠ WARNING

Electrical Shock Hazard

Disconnect power before servicing.
Replace all parts and panels before operating.
Failure to do so can result in death or electrical shock.

If you lack the necessary skills required to properly install the electrical wiring to this water heater, do not proceed but have a qualified electrician perform the installation.

When making the electrical connections, always make sure:

- The voltage and frequency correspond to that specified on the water heater data plate on the front of the water heater.
- The electrical supply has the proper overload fuse or breaker protection. The heater draws less than 12 amps.
- Wire sizes and connections comply with all applicable codes.
- Wiring enclosed in approved conduit (if required by local codes).
- The water heater and electrical supply are properly grounded.
- This water heater must be “hard-wired” - do not use an extension cord to supply electrical power to this water heater.

Note:

The wiring diagram can be found on page 25. Always reference the wiring diagram(s) for the correct electrical connections.

When installing the electrical wiring to the water heater:

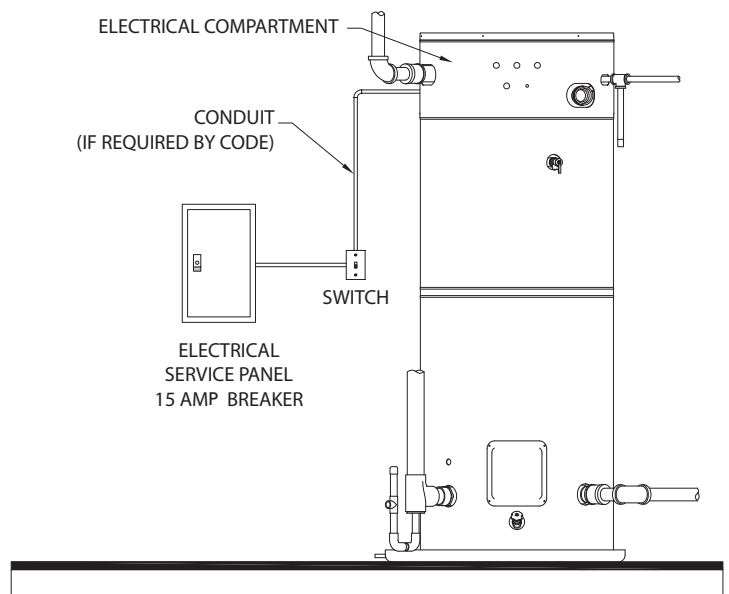
1. Shut off the power at the electrical service box.
2. Loosen the latches securing the access panel to the electrical compartment. (The electrical wiring diagram can be found on the inside of the access panel at the top of the water heater.)

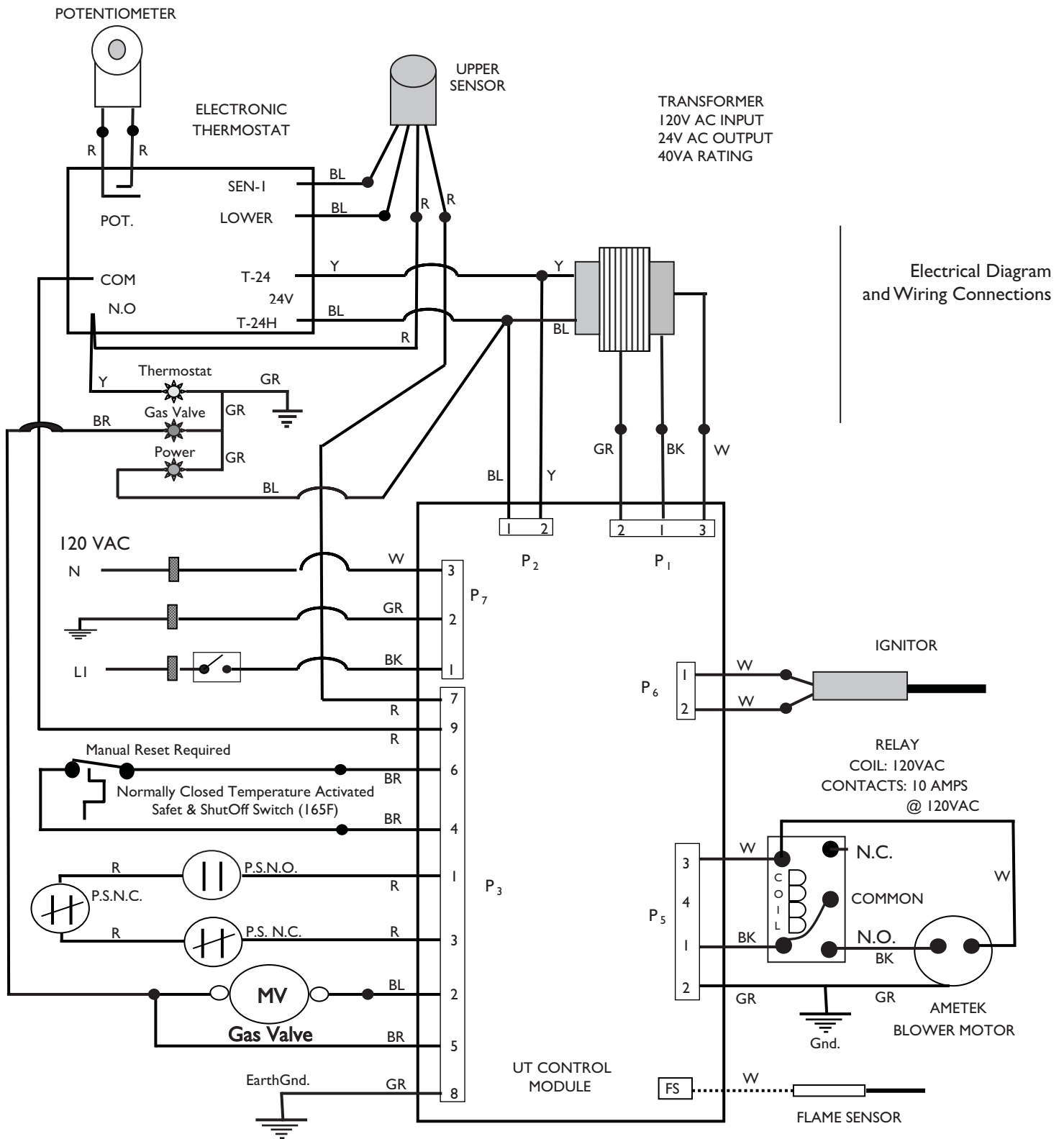
3. Connect the electrical supply to the water heater in accordance with local utility requirements and codes. Use only a dedicated electrical circuit containing a properly sized fuse or circuit breaker. Maximum overload protection should not exceed 15 amperes.
4. Connect this circuit (directly from the electrical service box) to an electrical disconnect switch.
5. Ground the water heater by connecting the electrical service ground wire to the green ground wire (provided).

Note: The power supply to this water heater must be properly polarized, [120 volts from the hot lead (black) to ground and 0 volts from the neutral lead (white) to ground] otherwise, the unit will not operate.

6. After making all electrical connections, completely fill the tank with water and check all connections for leaks. Open the nearest hot water faucet and let it run for 3 minutes to purge the water lines of air and sediment and to ensure complete filling of the tank. The electrical power may then be turned on. See below for completed installation.

Figure 26. Electrical Connections





Electrical Diagram and Wiring Connections

NOTICE: If any of the original wires as supplied with the appliance are replaced, they must be replaced with wires of equivalent gage and ratings.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

MAINTENANCE:

This appliance has been designed and built to operate with minimal maintenance requirements. However, to ensure optimal and safe operation, periodic maintenance is required. Such maintenance should be conducted by qualified persons who understand the principles of operating and are trained in and familiar with the proper maintenance methods.

- Maintenance should address all areas of operation, with special attention to maintaining filters, burners, controls, vents, electrical supplies, relief valve, and clearances.
- Always verify proper operation after servicing.
- Housekeeping issues such as not storing items, especially flammable liquids and corrosives in the vicinity of the unit should be constantly addressed.
- Air intakes should always be cleared of obstruction. **NO** items should be placed in the vicinity of intakes since they could interfere with delivery of combustion air and could be detrimental to operation.

FILTER INSPECTION AND SERVICE:

This appliance is provided with a built in air filter on the combustion air intake side.

- Every three months under normal use, conditions (More frequently if the unit is operated in a dusty or otherwise contaminated atmosphere) the filter should be inspected for signs of clogging.
- If filter is blocked beyond a certain point, a pressure switch will shut off the unit to prevent unsafe operation. Do not bypass this switch under any condition. To do so will create a hazardous operating condition that can result in fire and personal injury or death and void any warranties.
- If filter medium is collecting contaminants, the element should be removed and cleaned by gently blowing air on it from the rear surface.
- If filter is damaged, it should be replaced before operating the water heater.
- **DO NOT** operate the unit if there is no filter installed. Doing so will void the warranty.

VENTS AND AIR INTAKES INSPECTION AND SERVICE

Every three months under normal use conditions, (more frequently if the unit is operated under conditions that could adversely affect air intake it venting), the venting system should be inspected and serviced.

- Persons inspecting vents and intake should be able to identify conditions that impede flow, conditions such as warping and sagging of vent and intake systems, material deterioration in physical damage, blockage from animal or insect's or other sources. Any blockage should be removed.
- It should be verified that screens are in place at intakes and exhaust terminations.
- Vegetation should not be allowed to grow so as to interfere with venting and intakes. Remove and clear any such material as needed.
- Loose or separated tubes/tubing should be repaired or replaced immediately. The unit should be shut down until repairs are applied.
- Following natural incidents such as storms, flood, earthquakes, etc., the unit and vent systems should be verified to be undamaged before putting the unit back in service.
- Such service should also include inspection of the vent outlet temperature limit switch. If it is determined that the vent stacks which acted to shut off the unit burner, the cause of the shut off must be investigated and corrected prior to returning the unit to service.

BURNERS AND BLOWERS INSPECTION AND SERVICE

Every year, under normal use conditions (More frequently if the unit is operated in areas where airborne particles may plug the air passages in the burner matrix), the burner should be checked.

- The burner need not be removed for this procedure since it involves a measurement for carbon monoxide concentration (CO) of the flue gases. Persons doing such maintenance should be fully qualified.
- If CO levels under steady state firing are above 200 ppm, the cause of the high CO levels should be investigated and corrected.
- If a clogged or contaminated burner is identified as the cause of high CO it must be serviced and cleaned and the causes of the contamination removed.
- To clean the burner, it has to be removed from the unit. Care should be taken not to damage any parts in the process.
- To remove the burner, the top cover must be removed and the burner mounting bolts removed. Separate the burner from the controls and blower and carefully lift the burner upwards to clear all parts from the combustion chamber, while being especially careful not to damage the attached igniter.
- The unit installation should have the 12 inch additional recommended service clearance above the top cover if the burner is to be removed with the unit in place.
- Once the burner is removed, dislodge particulate matter from the burner surface matrix by blowing compressed air on it. Keep the compressed air nozzle at least 2" away from the burner surface. Direct the air straight down onto the burner surface while moving the nozzle back and forth along the length of the burner surface. This action dislodges particles

trapped in the matrix and pushes them back inside the burner tube.

- **AVOID** blowing air tangentially across the surface since this can damage the burner and erode the surface.



WARNING: Persons performing this maintenance should wear appropriate respiratory protection to avoid inhaling loose dust and refractory fibers.

- Allow loose dislodged particles to fall from the burner tube at the air/gas inlet side. A vacuum may be used at the burners air/gas inlet to assist in removing particles.
- Blower wheels should also be cleaned to remove particles adhering to blower blades. Compressed air blowing on blades is recommended.

SIGNAL LIGHTS

This unit is equipped with a lighting system which indicates the units operating status. Visible at the top of the appliance the lights are organized from left to right and signal certain operations as follows: Left, green light, indicates line voltage is registered and power is supplied to the unit. Middle, yellow light, indicates a request for heat, meaning the normal ignition sequence is operational and is expected to start or has started. Right, red light, the gas valve is open; gas is flowing and ignited within the unit.

DIAGNOSTIC LIGHTS

The UT Electronics controller is equipped with diagnostic LED lights that signal certain operational functions. (Top panel cover removal is necessary to view the diagnostic lights). If the lights are burning continually (Not flashing), the following is indicated: Top, green light illuminated, signifies that electrical power is on and being fed to unit. Top, red light, signifies the purge cycle. Second from the top, red light in the "ON" position, signifies igniter has been activated. Bottom, red light, "ON", signifies establishment of flame to the burner. During moments of abnormal operation the individual lights will flash signifying that there are coded diagnostic problems; when this occurs, consult the Troubleshooting & Service Guide to determine the specific failure being signaled by the flashing LED lights.

FOR YOUR SAFETY READ BEFORE OPERATING

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

- A.** This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B.** BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS**
Do not try to light any appliance. Do not touch any electric switch. Do not use any phone in your building. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you can not reach your gas supplier, call the fire department.
- C.** Use only your hand to push in gas control switch. Never use tools. If the switch will not push in, 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 counterclockwise ↶ to lowest setting.



- 3.** Turn off all electrical power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. To clear any gas that may have accumulated, wait ten (10) minutes. If you smell gas, **STOP!** Refer to B in the safety information above (to the left) on this label. If you don't smell gas, go to the next step.

- 6.** Turn on the electricity to the appliance. The green power light will glow.
7. Turn the thermostat clockwise ↷ to the desired setting. The yellow light will glow when the thermostat calls for heat. After 35 seconds, the burner will fire and the red burner light will glow.



- 8.** If the appliance will not operate after three automatic tries, follow these instructions once more. If the appliance still refuses to light, follow the instructions "**To Turn Off Gas To Appliance**" and call your service technician or gas supplier.

- 9.** This unit is provided with a group of signal lights that indicate operating status. These three colored lights are visible when looking at the top cover panel of the appliance. The lights are organized with the following operating conditions indicated by each light:

Green light: line voltage electric power is turned on to the unit.

Middle, yellow light: there is a call for heat. This means that the normal ignition sequence in operation mode is expected to start or has started.

Red light: the gas valve is open and gas is flowing and burning in the appliance.

TO TURN OFF GAS TO APPLIANCE

- Set the thermostat counterclockwise ↶ to lowest setting.
- Turn off all electric power to the appliance if service is to be performed.
- Close the manual gas shut-off valve in the gas supply line near to the appliance.

THE WATER HEATER - SEQUENCE OF OPERATION WITH UT CONTROL MODULE

KEY: Normal operation sequence shown in bold type. Fault detection or abnormal condition sequences shown underlined.

Thermostat Demand for Heat. **The control energizes the blower motor when the thermostat contacts are closed. If the thermostat contacts open, the blower motor shuts off automatically.**

If the ECO-Limit switch opens, the control waits indefinitely for the ECO-Limit switch to close. If the pressure switch contacts are closed prior to energizing the blower motor then the control will standby until the pressure switch opens before energizing the blower motor. If the pressure switch does not open within 45 seconds the control locks out and the PURGE light will flash indicating a pressure switch failure.

Pressure Switch Verification.

If the pressure switch does not close within five minutes of the blower ignition, the control locks out and the PURGE light flashes to indicate a pressure switch failure or fault.

Pre-Purge Period. The pre-purge period begins when the pressure switch closes. Pre-purge provides combustion chamber ventilation before ignition.

Should the pressure switch remain open for the duration of the Pressure Switch recognition period and during pre-purge, the control automatically reverts to the pressure switch proving mode.

Igniter Warm-Up. Upon completion of the pre-purge the control energizes the HSI igniter output for the HSI warm-up period. This function is indicated by the illumination of the IGNITER light. The igniter activates for a second and third attempt to achieve ignition, if required.

Ignition Verification. The ignition trial time is the total time spent during the Flame Establishing Period and the Flame Proving Period for each control.

A) Flame Ignition Period. The flame ignition period is established the moment the gas valve (VALVE light) is lit, gas flow begins, gas is ignited and the igniter remains on. **B) Flame Proving Period.** The flame proving period is the time in which the igniter is turned off and flame recognition is delayed. At the end of the flame proving period, the flame status will be tested.

If there is no flame at the end of the flame proving period, the gas is shut off and the control continues for retrieval or lockout, starting with the pre-purge.

Steady-State Operation. Once the flame has been recognized, the system is in a Steady-State heating mode with the burner firing. The control continuously monitors the thermostat, ECO limit switch, pressure switch, and the flame sensor. If the thermostat opens (Demand for hot water is satisfied) the control shuts off the gas valve, gas flow stops and the control begins a post-purge.

With an anormally hot water tank the ECO limit switch opens; the control shuts off the gas valve and cycles through post-purge. At this point the unit waits for the ECO limit switch to close before attempting ignition. During firing if the flame is lost the control stops the gas valve, runs through post-purge, and initiates the Pressure Switch Proving Mode for ignition. If the Pressure Switch opens for the specified open pressure switch recognition period, the blower turns off for 30 seconds, and the control moves to Pressure Switch Proving Mode for another ignition attempt.

Combustion Chamber Post-Purge. The purge period starts when the thermostat has satisfactorily reached a steady heating mode. The blower output remains on for the post-purge period and then shuts off. The post-purge procedure occurs every time the gas valve turns on and off, except when a loss of pressure is realized during the post-purge and would be ineffective. The post-purge must complete before a new ignition sequence can start.

Multiple Ignition Sequences.

A) Failed ignition. In the event of a failed initial ignition, the system cycles into a post-purge and stops energizing the blower. The control maintains in a standby mode until the pressure switch opens, at which point a new ignition sequence is attempted. Failure to establish a flame during the third attempt results in an ignition lockout mode. This is signaled by a flashing Valve light. **B) Loss of Flame.** In the event the flame signal is lost, after establishing a flame, the system automatically shuts off the gas flow valve within 2.0 seconds. At which point a Post Purge is conducted and repeats the ignition sequence. To assure that the gas does not continuously shut off, do to flickering; the system must witness a loss of flame for more than .05 seconds. **C) Loss of Blower Draft Pressure.** Should the Pressure Signal be lost for a minimum of the open pressure switch recognition period after it is established, the system control stops gas flow, bypasses the Post-Purge and locks out the blower for a period of 30 seconds. After which, the system automatically restarts the ignition sequence and restores to normal.

Flame Recognition. After the flame is recognized as lit at the end of the Flame Proving Period, the control enters a Steady-State Mode and remains, as long as a flame is witnessed, the thermostat and Eco-Limit switch closes and the pressure switch closes.

Should the flame disappear the circuit will shut off the gas valve within 2.0 seconds. If a flame is recognized at times other than normal, the control will enter a False Flame Lockout Mode that will prevent an ignition attempt until the false flame scenario disappears. ECO-High Limit Switch. When the ECO-Limit switch opens, the system shuts off the gas valve and enters the post-purge mode. When the ECO-Limit Switch closes, after the post-purge is completed, the system restarts the ignition sequence.

Lockout Mode.

1. The system enters lockout mode for the following reasons.
2. Pressure switch is stuck open or closed for longer than the allowed time.
3. Gas valve relay voltage does not match the gas valve on/off status.
4. No ignition after three attempts.

5. Flame is recognized when there should be no flame (gas valve off). Lockout due to false flame witnessed and is reset by the lack of flame, as an automatic reset feature. Lockout reset from other causes occurs by shutting off the line voltage to the system or opening the room thermostat contact for more than 2 seconds. The control will automatically reset lockout after one hour of continuous call from the thermostat. Three attempts for ignition will occur each hour until the thermostat is satisfied (or power removed) and lockout, due to the ECO-Limit switch and will result in a complete lockout.

Power Failure or Brown-Outs. During a momentary power interruption or when voltage levels are below the normal minimum operating voltage (line voltage or low-voltage) the system will self-recover without lockout when voltage returns to normal operating conditions.

MODEL 1013-1X	PREPURGE	HSI WARM-UP 1ST TRIAL/2ND AND 3RD TRIAL	IGNITION TRIAL	FLAME ESTABLISHING PERIOD	FLAME PROVING PERIOD	OPEN PRESSURE SWITCH RECOGNITION PERIOD* BEFORE GAS VALVE OPENS	OPEN PRESSURE SWITCH RECOGNITION PERIOD* AFTER GAS VALVE OPENS	POST PURGE
TIME DURATION FOR THIS SEQUENCE IN SECOND	10	30	6	2	4	0.1	0.1	15

INSULATION BLANKET

Insulation blanket kits which are available for external applications to water heaters are not recommended. However, some governing bodies require their use in new construction of additions, regardless of how efficient the water heater may be.

If an insulation blanket is applied to this heater **CAUTION** must be exercised not to restrict the proper function of the heater.

The manufacturer of this heater will not be liable for incidents arising, or resulting, from the use of external insulation blankets: The manufacturer will not be liable for corrosion of parts which may have resulted from the use of such insulation blankets.

The space around the water heater is necessary for proper ventilation air flow. This space must be maintained unobstructed.

As time passes, the blanket may sag causing an obstruction of this air passage, resulting in an unsafe operating condition.

- **DO NOT** apply insulation to the top of a gas water heater. This could affect the operation, resulting in an unsafe operating condition.
- **DO NOT** cover any access panels leading to burner compartments, thermostat(s) control, doors, or temperature & pressure relief valve on the water heater.
- **DO NOT** cover any labels or instruction material applied to this water heater. These safety labels and instruction materials must remain on the water heater and be visible for reference by the user.
- **DO NOT** attempt to remove these labels, as they are a permanent part of this water heater as required by Certification Agencies and/or the Federal Government.

DRAINING AND FLUSHING INTERIOR OF TANK

The water heater should be drained if being shut down during freezing temperatures. Also periodic draining and cleaning of sediment from the tank may be necessary.

VENTING SYSTEM INSPECTION

1. "TURN OFF GAS TO APPLIANCE."
2. Close the cold water inlet valve to the heater.
3. Open a nearby hot water faucet.
4. Open the heater drain valve.
5. Remove access cover on tank, remove plate and clean out tank. Replace all parts correctly.

At least every 3 months a visual inspection should be made of the venting system. You should look for:

WARNING: THIS WATER CAN BE HOT.

WARNING:

- Obstructions which cause improper venting.
- Sagging or warping of vent pipes and air intakes.
- Damage or deterioration which could cause improper venting or leakage of combustion products.

6. If the heater is going to be shut down and drained for an extended period, the drain valve should be left open. Refer to "Hydrogen Gas" warning. Page 30.
7. To start heater again, read paragraph "OPERATION" and "LIGHTING INSTRUCTIONS".

TAMPERING

Tampering with the thermostat, gas valve, pilot, burner, or temperature and pressure relief valve is DANGEROUS and voids all warranties. Only qualified personnel should service these components

TEMPERATURE ADJUSTMENT

The temperature selector dial has been adjusted to its lowest setting when shipped from the factory. For energy-efficient operation of your water heater, the recommended temperature setting is approximately 130°F. Households with small children or invalids may require a 120°F or lower temperature setting to reduce the risk of scald injury. Some states require a lower temperature setting. Check with your gas supplier for local requirements governing the temperature setting.

NOTE: The lower the temperature setting the greater the energy efficiency, both to heat water and to maintain its temperature during standby periods. Lower water temperatures also extend the 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 the 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. However, this adjustment may cause additional condensation to form on the cooler tank surface. This does not mean the tank is leaking. Refer to Page 34 for explanation of this condition. During the 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 that 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.

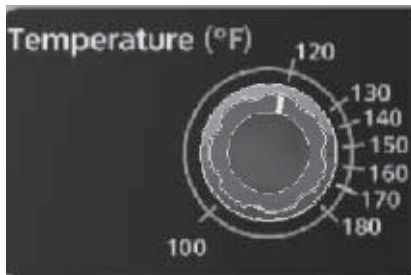
STACKING

Stacking occurs when a series of short draws of hot water (3 gallons or less) are taken from the water heater tank. This causes increased cycling of the burner and can result in increased water temperatures at the hot water outlet. A tempering valve must be installed in the hot water supply line to reduce the risk of scald injury.

Important: A tempering valve (not provided) must be installed in the hot water outlet to reduce the risk of scald injury when setting the thermostat in excess of 120°F.


Many home heating systems may be designed for temperatures higher than 130°F. Refer to the manufacturer's instruction manuals supplied with this type of equipment for recommended temperature settings.

Figure 27. Temperature Dial



WATER TEMPERATURE REGULATION

The thermostat is adjusted to its lowest temperature setting when it is shipped from the factory. Water temperature can be regulated by moving the temperature dial to the preferred setting. The preferred starting point is 130°F; however, in some instances, setting the water heater higher than 130°F can reduce the occurrence of igniter failure due to excessive condensation.



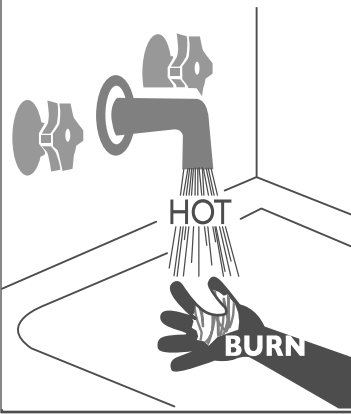
WARNING

Water temperature over 125°F can cause severe burns instantly or death from scalds.

Children, disabled and elderly are at highest risk of being scalded.

See instruction manual before setting temperature at water heater.

Feel water before bathing or showering.



Important: Adjusting the thermostat past the 120°F setting on the temperature dial (see figure 27) will increase the risk of scald injury.

Hot water can produce first degree burns within minutes:
120°F (49°C) more than 5 minutes.

130°F (54°C) at 20 seconds.

140°F (60°C) at 3 seconds.

150°F (66°C) at 1-1/2 seconds

160°F (71°C) at less than 1 second.

EMERGENCY SHUT DOWN

Important: If overheating occurs or the gas supply fails to shut off, close the manual gas supply valve. Turn off the electrical supply to the unit and close the cold water supply valve. Do not operate the water heater again until it has been thoroughly checked by an authorized service technician.

CAUTION Setting the temperature selector dial higher provides hotter water, which increases the risk of scald injury. The unit is also equipped with a high temperature limit switch ECO (Energy Cut Off). The Energy Cut Off will shut off all gas supplied to the Burner in the event the water temperature exceeds 180°F. Should the Energy Cut Off function (open), it must be reset before the water heater can be placed in operation again.

VACATION / FREEZING TEMPERATURES

If the water heater is to remain idle for 30 days or more, or is subject to freezing temperatures while shut off, the water heater and piping should be drained (refer to section Draining and Flushing Interior of Tank, page 30), and the drain valve should be left open. Refer to Hydrogen Gas Warning (below).

With the water heater in operation (main burner on), the maximum supply pressure must not exceed the specified value below, and the minimum supply and normal manifold gas pressures are as follows:

	Supply Pressure	
	MAX.	MIN.
Natural Gas	10.5" W.C.	3.5" W.C.
L.P Gas	13.0" W.C.	11" W.C.

GAS PRESSURE



WARNING:



HYDROGEN GAS

Hydrogen gas can be produced in a water system that has not been used 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 be open for several minutes at the kitchen sink before you use any electrical appliance which is connected to the hot water system.

- DO NOT light a cigarette, cigar or pipe.
- DO NOT smoke.

If hydrogen is present, there will probably be an unusual sound such as air escaping through the faucet, as the water begins to flow. Remember no smoking or open flame near the faucet at the time it is opened.

EXPOSURE TO WATER

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.

WATER HEATER SOUNDS

1. Possible noises due to expansion and contraction of some metal parts during periods of heat-up and cool-down do not represent harmful or dangerous conditions. Some units also occasionally rumble on ignition. The sounds leave after a few seconds.
2. Sediment build-up in the tank bottom will create varying amounts of noise, and may cause premature tank failure. Tank bottom may need cleaning. (See "DRAINING AND FLUSHING INTERIOR OF TANK" PAGE 30).
3. Condensation may cause sizzling and popping within the burner area during heating and cooling.

ANODE

In each water heater there is installed at least one anode rod (see Parts section) for protection of the tank. Certain water conditions will cause a reaction between this rod and the water. This is defined as smelly water and removal of the rod will void any warranties stated or implied. The parts list includes a special anode that can be ordered if odor and/or discoloration occur. However, this rod is only good to a certain point, after which, we can only suggest that a water conditioning company be contacted to supply filtration equipment.

TAMPERING

Firing rates are factory set.

DO NOT FIELD ADJUST

Tampering with the thermostat, gas valve, pilot, burner, or temperature and pressure relief valve is **DANGEROUS** and voids all warranties. Only qualified personnel should service these components.

EMERGENCY SHUT DOWN

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve and shut off electric power to the appliance and call a qualified service person to check for the cause.

OPERATION SAFETY PRECAUTIONS

WARNING:

- DO turn off heater if it has been subjected to physical damage, flooding, or fire.
- DO NOT turn on heater unless it is filled with water.
- DO NOT turn on heater if cold water supply inlet valve is closed.
- DO NOT attempt to operate heater until all instructions are understood and followed. See below and label on heater near thermostat.
- DO NOT allow flammable liquids, such as gasoline or paint thinner, to be stored or used near heater.
- DO NOT allow combustible materials such as newspaper, rags or mops to accumulate near heater.

WARNING:

TO AVOID POSSIBLE INJURY, FIRE AND EXPLOSION. READ THESE PRECAUTIONS BEFORE ATTEMPTING TO TURN HEATER ON.

Check the data plate near the gas control valve thermostat for the correct gas.

DO NOT USE THIS WATER HEATER WITH ANY GAS OTHER THAN THE ONE LISTED ON THE DATA PLATE. Failure to use the correct gas can cause problems which can result in **DEATH, SERIOUS BODILY INJURY, OR PROPERTY DAMAGE.** If you have any questions or doubts consult your gas supplier or gas company.

CONDENSATION

The water from condensation may be noted at different times of the year in varying quantities. This condensation may spill out of the collector pan onto the floor. Do not confuse this with a leak. Once the water inside of the heater reaches a temperature of 120°F, the condensation will stop.

Operating the water heater at the lowest thermostat temperature setting can keep the water heater in the condensation mode. Adjusting the thermostat setting slightly higher will overcome this problem. There is hot water scald potential however if thermostat is set too high.

SMOKE/ ODOR

The water heater may give off a small amount of smoke and odor during the initial start-up of the unit. This is due to the burning off of oil from metal parts of a new unit and will disappear after a few minutes of operation.

NATURAL GAS MODELS

IF YOU SMELL GAS:

1. Open windows.
2. Get all people out of building.
3. **DO NOT** light matches. Do not smoke.
4. **DO NOT** touch electrical switches (on or off).
5. Extinguish any open flames.
6. Shut off gas at manual shut-off valve.
7. Use an outside phone and immediately call the gas company and the fire department. Ask for instructions. Before hanging up, give your name and address.
8. **DO NOT** go back into the building. If help is coming, wait for it outside of the building.

BEFORE LIGHTING, SNIFF AT FLOOR LEVEL. IF YOU SMELL GAS, FOLLOW THESE RULES:

1. Open windows.
2. Get all people out of building.
3. **DO NOT** light matches. Do not smoke.
4. **DO NOT** touch electrical switches (on or off).
5. Extinguish any open flames.
6. Shut off gas at the L.P. tank outside of the building.
7. Use an outside phone and immediately call the gas company and the fire department. Ask for instructions. Before hanging up, give your name and address and a phone number if possible.
8. **DO NOT** go back into the building. If help is coming, wait for it outside of the building.

L.P.G. (PROPANE, BOTTLED) GAS MODELS


L.P.G. IS HEAVIER THAN AIR


Should there be a leak in the system, the gas will settle at **FLOOR LEVEL**. Basements, crawl spaces, skirted areas under mobile homes (even when ventilated), closets and areas below ground level will serve as pockets for the accumulation of gas.

OUT OF FUEL

When your L.P. tank runs out of fuel, turn off gas at all gas appliances -including gas to pilots. After L.P. tank is re-filled, all appliances must be turned on according to the manufacturer's instructions.

GAS SUPPLY


WARNING



Explosion Hazard

Use a new CSA approved gas supply line. Install a shut off valve.

Do not connect a natural gas water heater to a L.P. gas supply.

Do not connect a L.P. gas water heater to a natural gas supply.

Failure to follow these instructions can result in death, explosion, or carbon monoxide poisoning.

TROUBLESHOOTING GUIDE American Standard

Water Heater HE-70 and HE-100 Series

United Technologies Model 1013 Ignition Indicator LED Codes

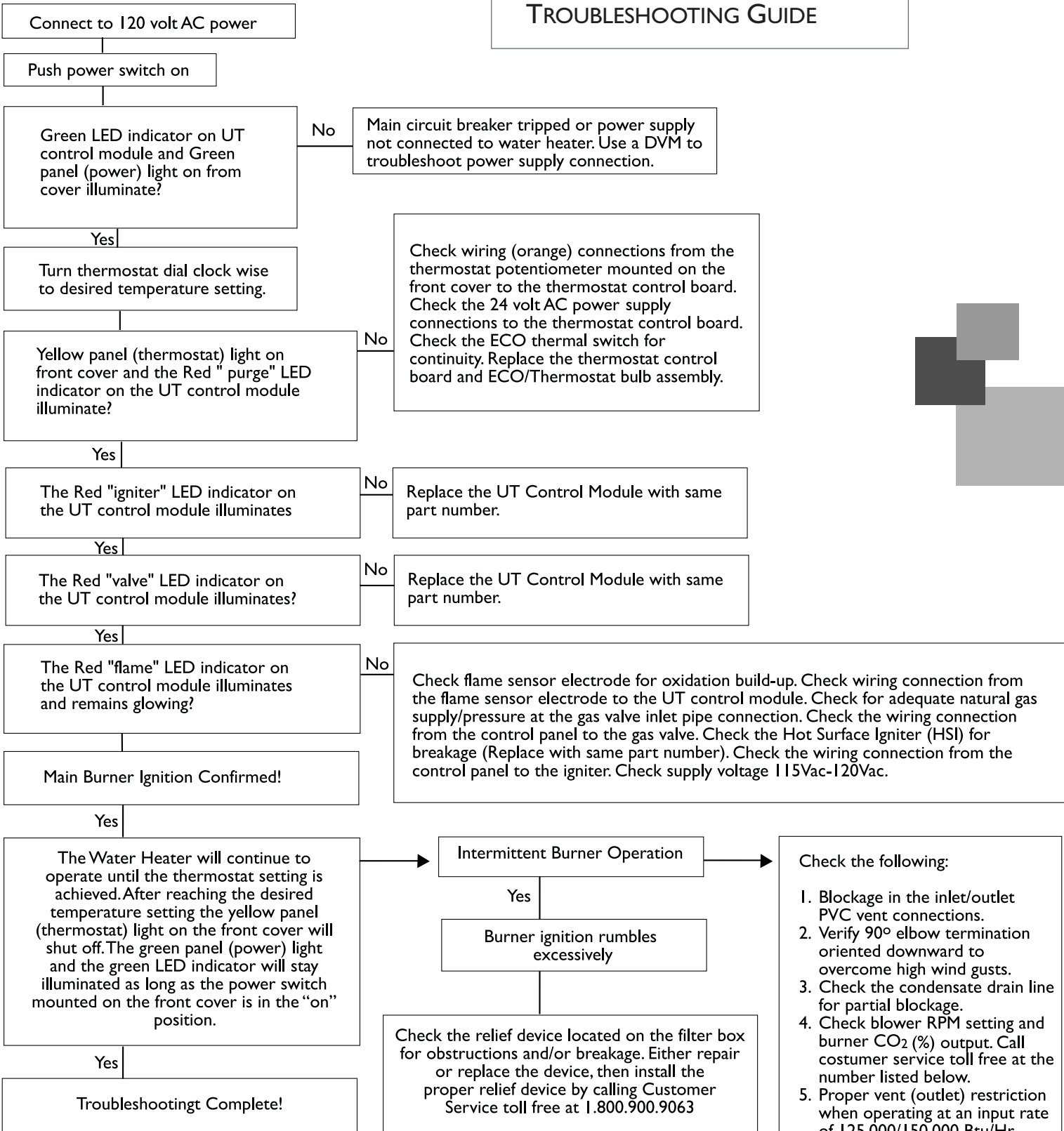
(Note To view flashing codes, remove front cover to expose the ignition module/LED indicators located on the module Face)

LED Indicators On UT Ignition Control	Error Condition Indicated By Flashing LED,s	Automatic Ignition Control Action	What To Check
Green "Power" LED	illuminated	System Power On	Will remain illuminated while voltage is applied to the control.
Red "Purge" LED	illuminated	PrePurge/InterPurge Cycle	Will only illuminate during the 10 second pre-purge/inter-purge and 15 second post-purge.
Red "Igniter" LED	illuminated	HSI Energized (Warm-Up)	Will only illuminate for the 30 second igniter warm-up time.
Red "Valve" LED	illuminated	Gas Valve Energized	Will illuminate for the 6 second trial for ignition period and remain glowing throughout the thermostat call for heat cycle.
Red "Flame" LED	illuminated	Main Burner Ignition Established	Will illuminate during flame (sense) rectification and remain glowing throughout the thermostat call for heat cycle.
Green "Power" LED	Flashing	Power Input (24VAC) "Over Voltage"	If additional transformers are used (i.e. zone controls) check wiring connections for proper phase alignment. Improper phase alignment will cause voltages to add exceeding the maximum 40AC input.
Red "Purge" LED	Flashing	Pressure Switch Fault	Check pressure switch contact operation (closed with combustion blower off or open with combustion blower on) and any associated rubber tubing connections, P1 = -5.0" W.C. NC. P2= +5.0"W.C. NC, P3 = +0.3"W.C. NO (See Note Below)
Red "Igniter" LED	On/Off	Igniter Relay Is On of Off	ON = Hot Surface Igniter Is Energized / OFF = Hot Surface Igniter Is De-Energized.
Red "Valve" LED	Flashing	Locked Out (Failed Ignition Attempt)	Confirm adequate gas supply to the unit. Check the Hot Surface Igniter for breakage. Check the Flame Sensor Electrode for damage/oxidation. Check Gas Valve operation and all associated wiring from the control panel for secure connections.
Red "Flame" LED	Flashing	LI/Neutral Line Polarity Error	LI power input must be the "hot" side of the line to achieve proper flame rectification.

NOTE: When rated at 125,000 and 150,000 Btu/Hr. and using 2" PVC plastic vent pipe in lengths less than 25, an additional restriction is required on the vent (outlet) connection to provide an adequate back pressure to satisfy the +0.3"W.C. air proving pressure switch during a thermostat call for heat. This is due to a lower fan (RPM) speed requirement at these two rates. If inadequate restriction is provided at the vent (outlet) connection the system will fail to satisfy the +0.3"W.C. pressure switch during the thermostat cycle and cause a premature lockout condition (flashing Red "Purge" LED). Reference this manual (Vent Tables I & II) for information pertaining to the restriction size required for each rate. **NOTE:** (NC) Normally Closed.

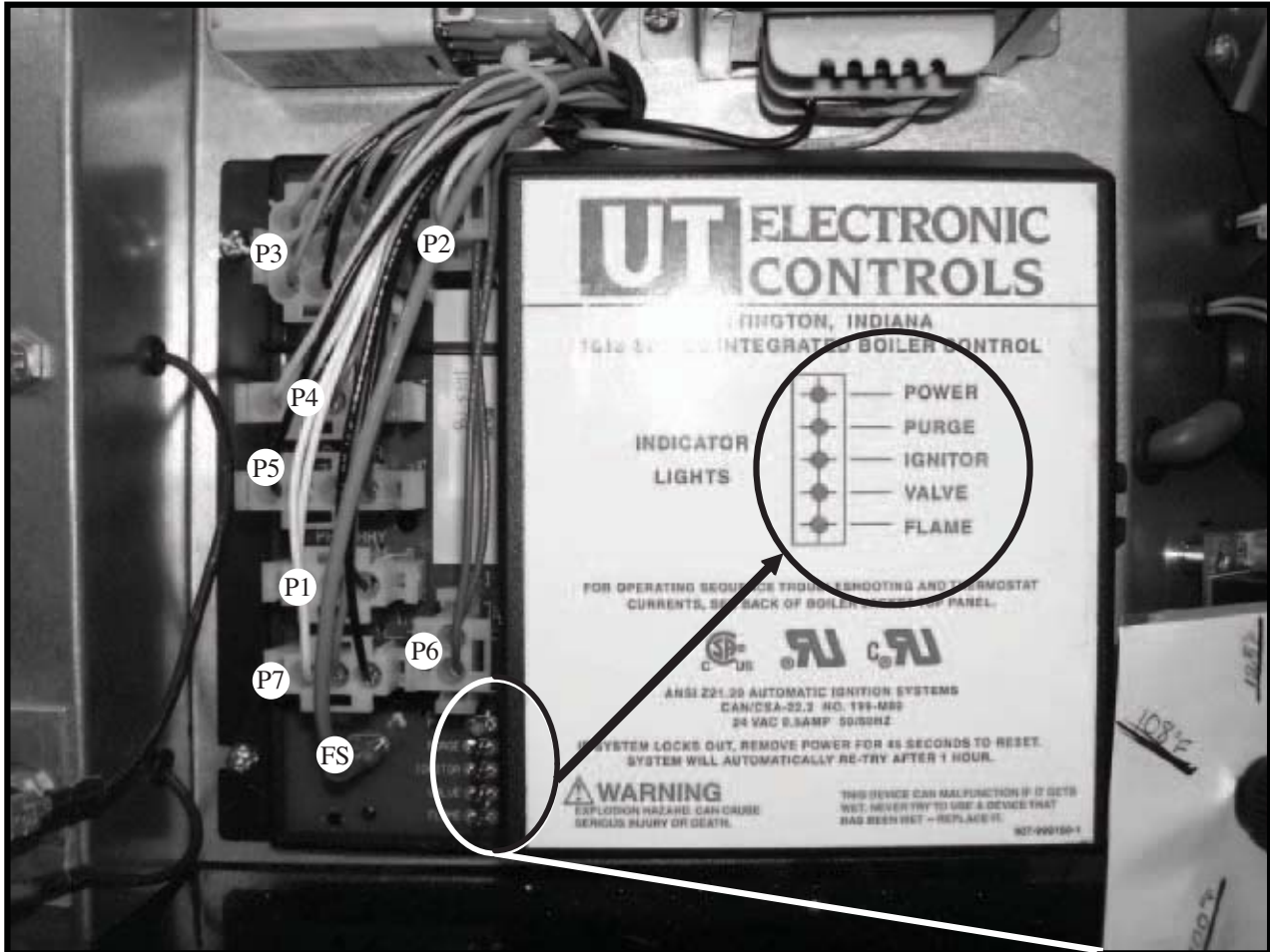
(NO) Normally Open / P1 = Inlet, P2 = Outlet, P3 = Blower Proving Pressure Switches.

TROUBLESHOOTING GUIDE



For additional Technical Assistance Contact:
AMERICAN STANDARD WATER HEATERS
 Tel: (800) 900-9063

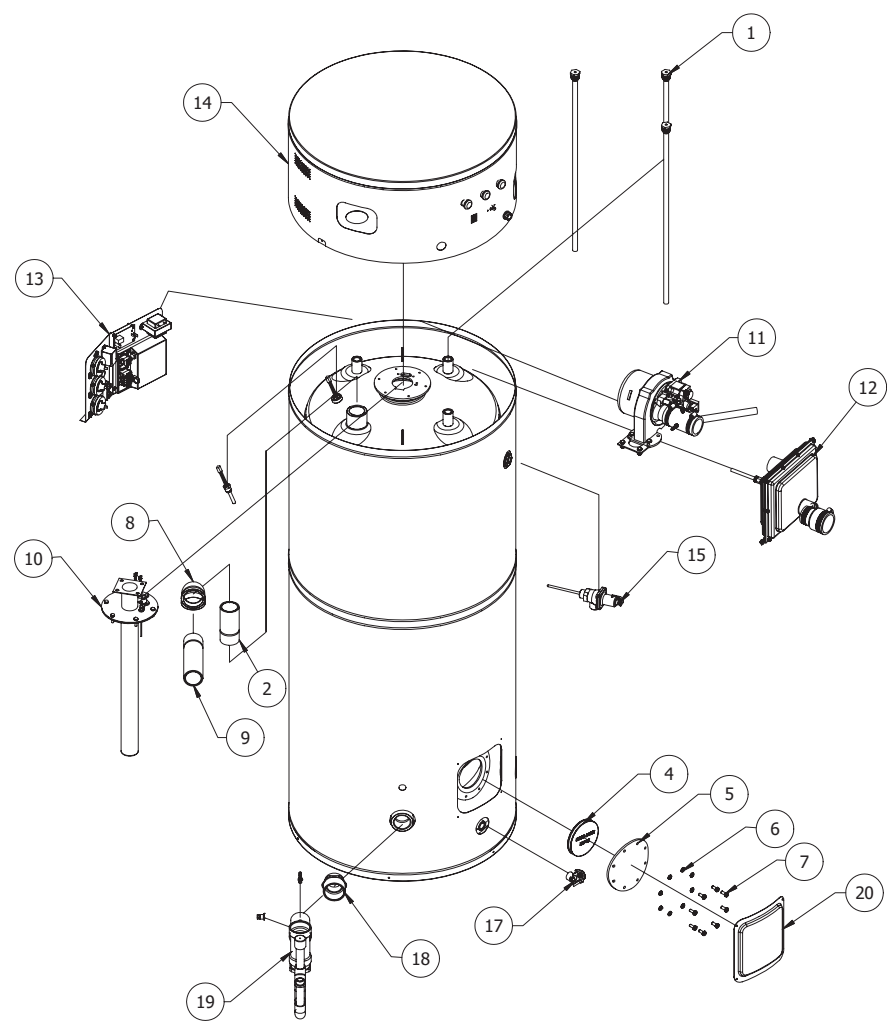
UT Control Module Wiring Connections & LED Diagnostic Indicators



LED Diagnostic Indicators

- P2 TRANSFORMER SECONDARY
- P3 CONTROL: LOW VOLTAGE, THERMOSTAT & SAFETY CHAIN
- P4 CIRCULATOR PUMP (Not Utilized)
- P5 BLOWER MOTOR
- P1 TRANSFORMER PRIMARY
- P7 120 VAC LINE INPUT
- P6 HOT SURFACE IGNITER
- FS FLAME SENSOR CONNECTION

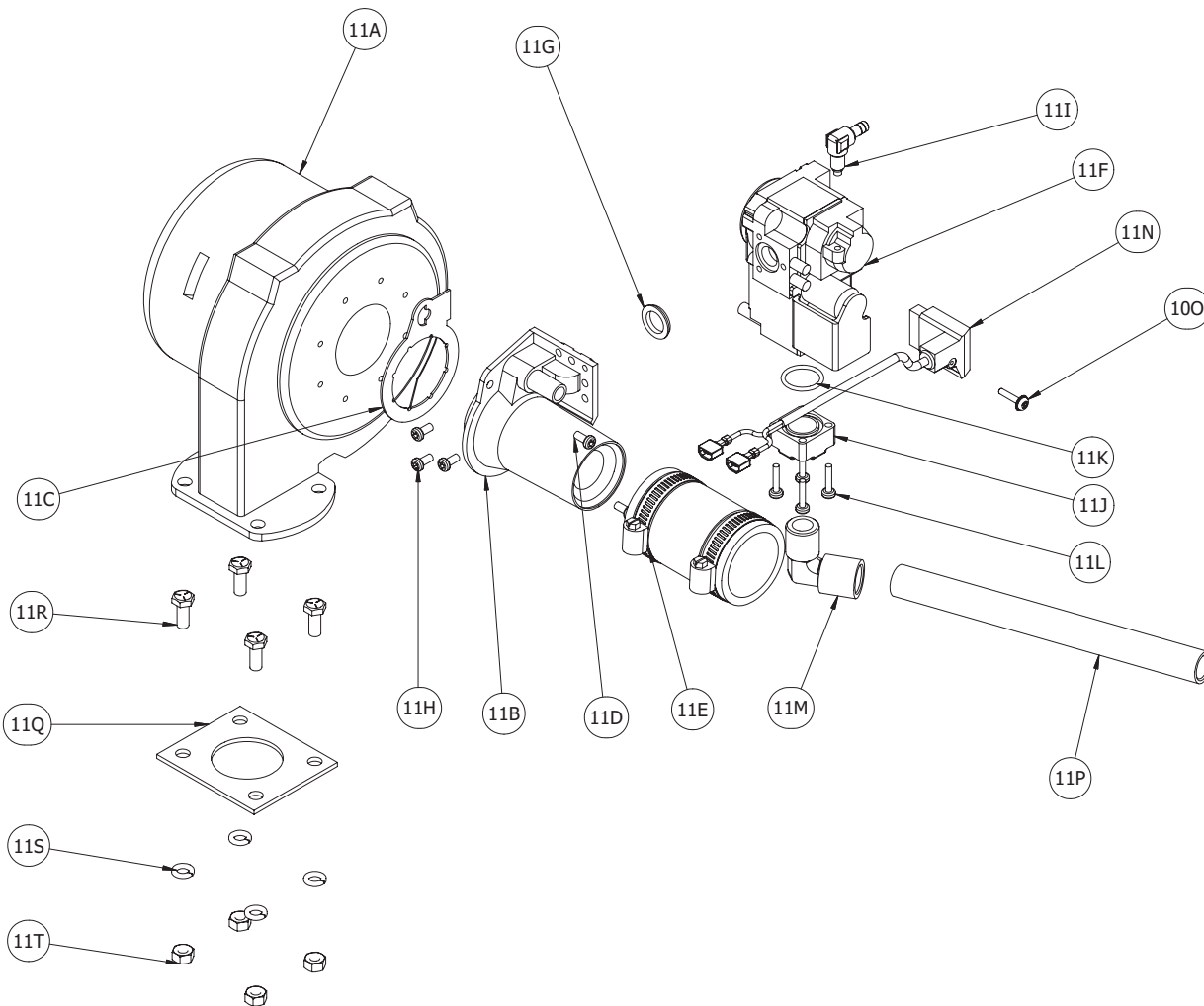
WATER HEATER ASSEMBLY HE-70-125, HE-100-150, HE-100-199 & HE-100-250



ITEM	DESCRIPTION	QTY.
1	MAGNESIUM ANODE 3/4" NPT X 27"	3
2	NIPPLE 1 1/2" - 11.5 NPT X 5"	1
3	THERMOSTAT & ECO SYSTEM 3/4"-18 UNS	1
4	CLEANOUT GASKET	1
5	CLEANOUT ACCESS COVER	1
6	PRESSURE WASHER 5/16"	8
7	SCREW 5/16"-18 UNC X 3/4" GRADE 5	8
8	ELBOW 90° 1 1/2" - 11.5 NPT	1
9	NIPPLE 1 1/2" - 11.5 NPT X 8"	1
10	BURNER ASSY	1
11	BLOWER-GAS VALVE ASSY	1
12	PLASTIC AIR FILTER	1
13	ELECTRONIC CONTROL ASSY.	1
14	UPPER COVER ASSY	1
15	T & P RELIEF VALVE 3/4" NPT OR 1" NPT	1
16	DIPTUBE 1 1/2" - 11.5 NPT X 6"	1
17	DRAIN VALVE 3/4" NPT	1
18	PVC MALE ADAPTER 2" NPT	1
19	PVC CONDESATION TRAP SCH. 40	1
20	CLEANOUT COVER	1

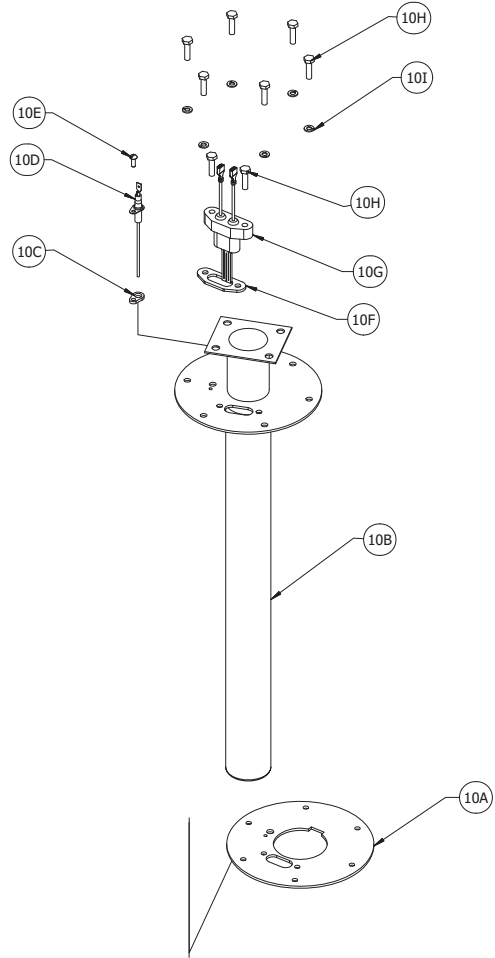
MOTOR BLOWER ASSEMBLY HE-70-125, HE-100-150, HE-100-199 & HE-100-250

ITEM	DESCRIPTION	QTY.
11A	BLOWER	1
11B	VENTURY (SPECIFY MODEL)	1
11C	CORK GASKET COVER	1
11D	BLOWER-VENTURI SCREW M5X0.8	2
11E	RUBBER PIPE CONNECTOR 1 1/2"	1
11F	GAS VALVE	1
11G	GAS VALVE GASKET	1
11H	GAS VALVE SCREW M5X0.8	3
11I	90° BRASS ELBOW	1
11J	GAS VALVE F_ ANGE	1
11K	RUBBER FLANGE O RING	1
11L	FLANGE SCREW M5X0.8	4
11M	BRASS ELBOW 1/2"-14 NPT MALE-FEMALE	1
11N	PLUG WITH RECTIFIER 24V	1
11O	PLUG RECTIFIER SCREW	1
11P	NIPPLE 1/2" NPT	1
11Q	BLOWER MOUNTING GASKET	1
11R	HEXAGONAL SCREW 5/16"-18 UNC X 3/4"	4
11S	PRESSURE WASHER 5/16"	4
11T	HEXAGONAL NUT 5/6"-18 UNC	4



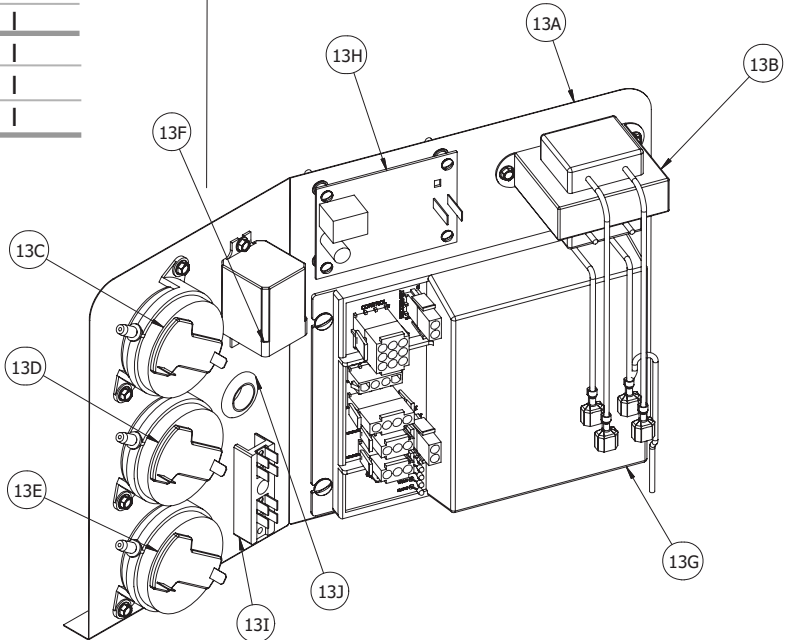
BURNER HE 70-125, 100-150, 100-199 & 100-250

ITEM	DESCRIPTION	QTY.
10A	BURNER MOUNTING GASKE	1
10B	BURNER	1
10C	FLAME SENSOR GASKET	1
10D	FLAME SENSOR	1
10E	SCREW 8-32 UNC X 1/2"	1
10F	IGNITER MOUNTING GASKET	1
10G	CERAMIC IGNITER	1
10H	HEXAGONAL SCREW 1/4"-20 UNC X 1" S.S. 304	2
10I	PRESSURE WASHER 1/4" S.S 304	6
10H	HEXAGONAL SCREW 1/4"-20 UNC X 1" S.S. 304	6



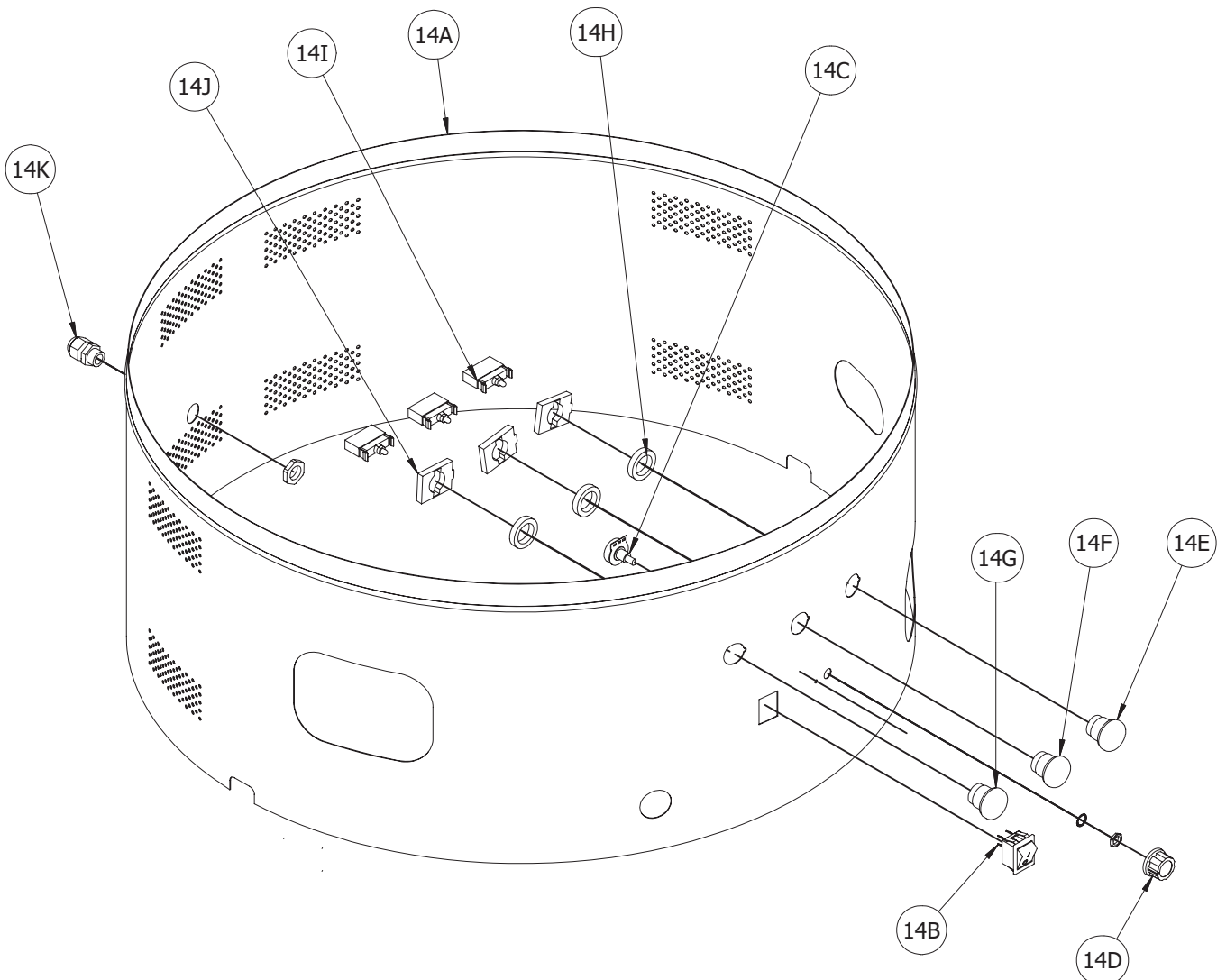
CONTROL ASSEMBLY HE-70-125, HE-100-150, HE-100-199 & HE-100-250

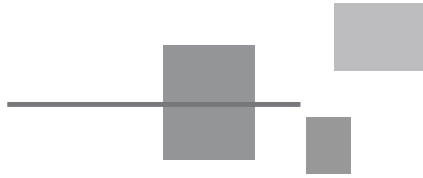
ITEM	DESCRIPTION	QTY.
13A	CONTROL SUPPORT	1
13B	120V - 24V TRANSFORMER	1
13C	+0.3" WC PRESSURE SWITCH	1
13D	+5.0" WC PRESSURE SWITCH	1
13E	-5.0" WC PRESSURE SWITCH	1
13F	10 AMP 120V RELAY SP DT	1
13G	INTEGRATED CONTROL MODULE	1
13H	THERMOSTAT & ECO SYSTEM CONTROL BOARD	1
13I	TERMINALS BLOCK	1
13J	RUBBER GROMMET 1"	1



TOP COVER ASSEMBLY HE-70-125, HE-100-150, HE-100-199 & HE-100-250

ITEM	DESCRIPTION	QTY.
14A	TOP COVER CONTROL	1
14B	BLACK 2P-1T SWITCH	1
14C	REMOTE MOUNT POTENTIOMETER 0-5.78 KOHM	1
14D	CONTROL KNOB FOR POTENTIOMETER	1
14E	GREEN INDICATOR LAMP	1
14F	YELLOW INDICATOR LAMP	1
14G	RED INDICATOR LAMP	1
14H	NUT FOR INDICATOR LAMP	3
14I	WHITE 24V LED WITH BASE	3
14J	BLACK LED BASE	1
14K	CABLE GLAND	1





American Standard[®]
Water Heaters



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