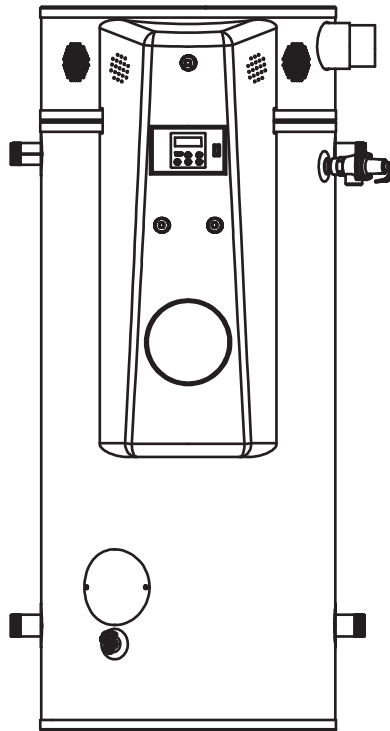


# Commercial High Efficiency Water Heater

# USE & CARE MANUAL

WITH INSTALLATION INSTRUCTIONS FOR THE CONTRACTOR



GAS-FIRED  
**UL** US  
LISTED



Recognize this symbol as an Indication of Important Safety Information!



Do Not Destroy this Manual. Please read carefully and keep in a safe place for Future Reference.



**NOTICE:** This water heater is designed for use in a commercial application and the installation and maintenance of it should be performed by a qualified, licensed service personnel. If the foregoing assumption is not appropriate, then we recommend that you obtain and retain our Commercial Use & Care Manual.



**CALIFORNIA PROPOSITION 65 WARNING:** This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.



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

## **FOR YOUR SAFETY!**

- Do not store or use gasoline or other flammable vapors or liquids or other combustible materials in the vicinity of this or any other appliance. To do so may result in an explosion or fire.

### – WHAT TO DO IF YOU SMELL GAS

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

- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Do not return to your building until authorized by the gas supplier or fire department.
- Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

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# READ THE SAFETY INFORMATION

Your safety and the safety of others are very important. There are many important safety messages in this manual and on your appliance. Always read and obey all safety messages.



This is the safety alert symbol. Recognize this symbol as an indication of Important Safety Information! This symbol alerts you to potential hazards that can kill or hurt you and others.

All safety messages will follow the safety alert symbol and either the word “DANGER”, “WARNING”, “CAUTION” or “NOTICE”.

These words mean:

### DANGER

An imminently hazardous situation that will result in death or serious injury.

### WARNING

A potentially hazardous situation that could result in death or serious injury and/or damage to property.

### CAUTION

A potentially hazardous situation that may result in minor or moderate injury.

### Notice:

Attention is called to observe a specified procedure or maintain a specific condition.

# Specifications

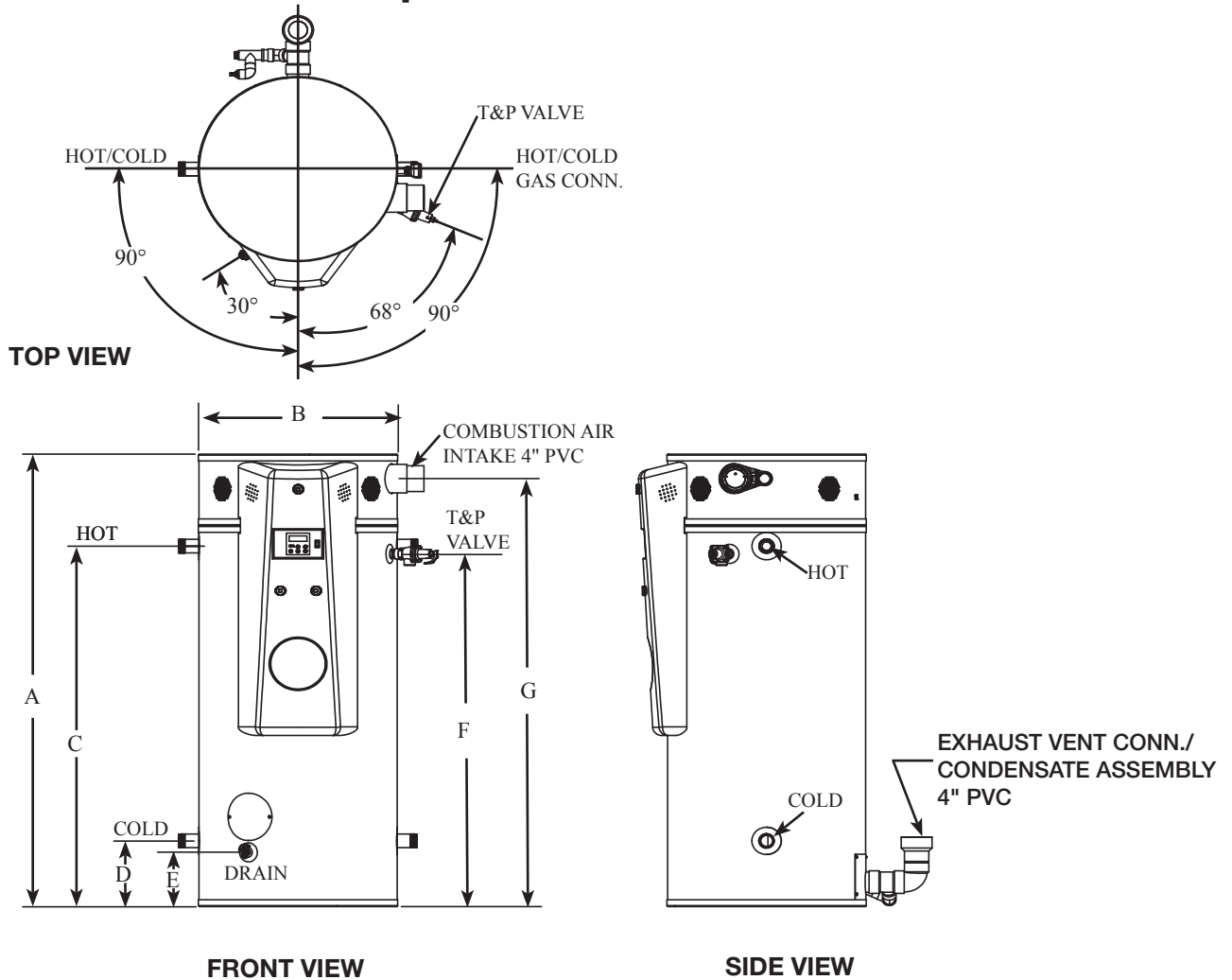


Figure: 1

Table 1: Specifications

Model	Rated Storage Capacity, GAL (L)	Rated Maximum Input, Btu/hr (kW)	Thermal Efficiency (%) @ Max. Input	Recovery @ 100°F rise, GAL/HR (L/HR)	1st Hr. Delivery @ 100°F rise, GAL (L)	Dimensions, inches (cm)							Connection Sizes					Shipping Weight, LBS (kg)
						A	B	C	D	E	F	G	COL D (NPT)	HOT (NPT)	Gas (NPT)	Air Intake (PVC)	Exhaust Vent (PVC)	
GHE 119-500	119 (450)	500,000 (146.5)	93	558 (2,112)	646 (2,445)	78.50 (199)	32.00 (81)	62.78 (159)	11.43 (29)	9.43 (24)	61.43 (156)	74.00 (188)	2"	2"	1-1/2"	4"	4"	1200 (544)
GHE 125-500A	125 (473)	500,000 (146.5)	93	558 (2,112)	646 (2,445)	78.50 (199)	32.00 (81)	62.78 (159)	11.43 (29)	9.43 (24)	61.43 (156)	74.00 (188)	2"	2"	1-1/2"	4"	4"	1200 (544)

NOTE: Suffix "-A" denotes ASME version.

**FOR PROPANE GAS models, suffix will be "LP"**

For HIGH ALTITUDE models, the following additional suffixes are defined as:

- HA (Natural Gas) = Approved for altitudes greater than 2,000 up to 7,800 FT
  - HA1 (LP Gas) = Approved for altitudes greater than 2,000 up to 5,400 FT
  - HA2 (LP Gas) = Approved for altitudes greater than 5,400 up to 7,800 FT
- (For LP Models see table 6 for approved altitude ranges)

**FOR NATURAL GAS:**

MINIMUM GAS SUPPLY PRESSURE (at gas control) = 6" W.C. (dynamic)  
 MAXIMUM GAS SUPPLY PRESSURE (at gas control) = 14" W.C. (static or dynamic)

**FOR LP GAS:**

MINIMUM GAS SUPPLY PRESSURE (at gas control) = 8" W.C. (dynamic)  
 MAXIMUM GAS SUPPLY PRESSURE (at gas control) = 14" W.C. (static or dynamic)

**Note: Dynamic pressure is measured while gas is flowing and static pressure is measured while gas is not flowing.**

All products meet or exceed current ASHRAE standards.


These products are design certified by UL (Underwriters Laboratories) and meet ANSI Z21.10.3/CSA 4.3 requirements for operation up to 180°F (82°C).


Approved for use as a direct vent automatic storage water heater.

## General Safety Precautions

To meet commercial water use needs, the temperature on this water heater is adjustable up to 180°F (82° C). However, water temperatures over 125°F (52° C) can cause severe burns instantly or death from scalds. This is the preferred starting point for setting the control for supplying general purpose hot water.

Safety and energy conservation are factors to be considered when setting the water temperature. The most energy efficient operation will result when the temperature setting is the lowest that satisfies the needs consistent with the application.

 **DANGER**



**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.**

**Temperature limiting valves are available, see manual.**

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

Time/Temperature Relationship in Scalds

Water Temperature	Time To Produce a Serious Burn
120°F (49°C)	More than 5 minutes
125°F (52°C)	1½ to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (66°C)	About 1½ seconds
155°F (68°C)	About 1 second

Table courtesy of Shriners Burn Institute

The temperature of the water in the heater can be regulated by setting the temperature on the display (see pages 25). To comply with safety regulations the temperature was set at 120°F before water heater was shipped from the factory. The illustration information on pages 25 shows the Display and how to adjust the water temperature.



### DANGER

Hotter water increases the Potential for Hot Water SCALDS.

**NOTICE:** Mixing valves are recommended for reducing point of use water temperature by mixing hot and cold water in branch water lines. It is recommended that a mixing valve complying with the Standard for Temperature Actuated Mixing Valves for Hot Water Distribution Systems, ASSE 1017 be installed. Contact a licensed plumber or the local plumbing authority for further information.

Maximum water temperatures occur just after burner has shut off. To find hot water temperature being delivered, turn on a hot water faucet and place a thermometer in the hot water stream and read the thermometer.

## ⚠️ General Safety Precautions

Be sure to read and understand the entire Use & Care Manual before attempting to install or operate this water heater. Pay particular attention to the following General Safety Precautions. Failure to follow these warnings could result in a fire or explosion, causing property damage, bodily injury or death. Should you have any problems understanding the instructions in this manual, STOP, and get help from a qualified installer or service technician or the gas supplier.

### ⚠️ WARNING

Gasoline, as well as other flammable materials and liquids (adhesives, solvents, etc.) and the vapors they produce, are extremely dangerous. DO NOT handle, use or store gasoline or other flammable or combustible materials anywhere near or in the vicinity of a water heater. Be sure to read and follow the warning label pictured below and other labels on the water heater, as well as the warnings printed in this manual. Failure to do so can result in property damage, bodily injury, or death.

### ⚠️ DANGER

Failure to properly vent the water heater to the outdoors as outlined in the Venting Section of this manual can result in unsafe operation of the water heater. To avoid the risk of fire, explosion, or asphyxiation from carbon monoxide, never operate this water heater unless it is properly vented and has an adequate air supply for proper operation. Be sure to inspect the vent system for proper installation at initial start-up and at least annually thereafter. Refer to the Maintenance section of this manual for more information regarding vent system inspections.

### ⚠️ DANGER

**LIQUEFIED PETROLEUM MODELS** – Propane (LP) gas, must be used with great caution.

- It is heavier than air and will collect first in lower areas making it hard to detect at nose level.
- Make sure to look and smell for LP leaks before attempting to light appliance. Use a soapy solution to check all gas fittings and connections. Bubbling at a connection indicates a leak that must be corrected. When smelling to detect an LP leak, be sure to sniff near the floor too.
- Gas detectors are recommended in LP applications and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations or customs.
- It is recommended that more than one method be used to detect leaks in LP applications.

#### IF LP GAS IS PRESENT OR SUSPECTED:

- DO NOT attempt to find the cause yourself;
- DO NOT try to light any appliance;
- DO NOT touch any electrical switch;
- DO NOT use any phone in your building.
- Leave the building immediately and make sure your family and pets leave also.
- Leave the doors open for ventilation and contact the gas supplier, a qualified service agency or the fire department.
- Keep the area clear until the service call has been made, the leak is corrected, and a qualified agency has determined the area to be safe. Read and Review this entire Manual with special emphasis on the Venting Sections (Pages 11-19) and Operation Section (Pages 23-26) prior to any installation work.

### ⚠️ WARNING

Both LP and natural gas have an odorant added to help detection. Some people may not physically be able to smell or recognize this odorant. If unsure or unfamiliar about the smell associated with LP or natural gas, ask the gas supplier. Other conditions, such as "Odorant Fade", which causes the odorant to "fade", or diminish in intensity can also hide or camouflage a gas leak.

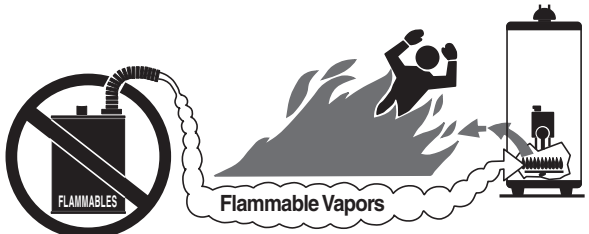
### ⚠️ DANGER

Water heaters utilizing Liquefied Petroleum gas (LP) are different from natural gas models. A natural gas heater will not function safely on LP gas and vice versa. No attempt should ever be made to convert a heater from natural gas to LP gas. To avoid possible equipment damage, personal injury or fire: DO NOT connect this water heater to a fuel type not in accordance with unit data plate. Propane for propane units. Natural gas for natural gas units. These units are not certified for any other type fuel.

### ⚠️ WARNING

LP appliances should not be installed below-grade (for example, in a basement) if such installation is prohibited by federal, state and/or local laws, rules, regulations or customs.

**⚠️ DANGER**



**⚠️ Vapors from flammable liquids will explode and catch fire causing death or severe burns.**  
Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near the water heater.  
Keep flammable products:  
1. far away from heater,  
2. in approved containers,  
3. tightly closed and  
4. out of children's reach.

**Installation:**  
Do not install water heater where flammable products will be stored or used unless the main burner and pilot flames

Water heater has a main burner and pilot flame. The pilot flame:  
1. which can come on at any time and  
2. will ignite flammable vapors.  
Vapors:  
1. cannot be seen,  
2. are heavier than air,  
3. go a long way on the floor and  
4. can be carried from other rooms to the pilot flame by air currents.

are at least 18" above the floor. This will reduce, but not eliminate, the risk of vapors being ignited by the main burner or pilot flame.

Read and follow water heater warnings and instructions. If owners manual is missing, contact the retailer or manufacturer.

# Introduction

## LOCAL INSTALLATION REGULATIONS

This water heater must be installed in accordance with these instructions, local codes, utility company requirements and/or, in the absence of local codes, the latest edition of the National Fuel Gas Code, ANSI Z223.1 in the United States, or CAN/CSA B149.1 Installation Codes in Canada.

## LOCATION

A. If this water heater is of the Direct Vent design, all air for combustion and all products of combustion are routed through the venting system, directly from and to the outside of the building.

Otherwise: This unit can also be set up as a Power Vent Unit. Combustion air for a power vent unit will be obtained from the surrounding area. Make sure that there is an adequate air supply for the water heater, see codes in "Local Installation Regulations".

The water heater should be installed in a clean, dry location as close as possible to the vent terminals. Long hot water lines should be insulated to conserve water and energy. The water heater and water lines should be protected from exposure to freezing temperatures.

B. A gas fired water heater should not be installed in a space where liquids which give off flammable vapors are to be used or stored. Such liquids include gasoline, LP gas (butane and propane), paint or adhesives and their thinners, solvents or removers. Because of natural air movement in a room or other enclosed space, flammable vapors can be carried some distance from where their liquids are being used or stored. The open flame of the water heater's main burner can ignite these vapors causing an explosion or fire which may result in severe burns or death to those in range, as well as property damage. For these reasons, installation of a gas fired water heater in a garage is not desirable.

C. All models are certified for installation on combustible floors and in alcoves. The minimum side and top clearance to walls and ceiling for providing protection of combustible materials are shown on the water heater's rating label. A front clearance of 24 inches (46 cm) should be provided for adequate inspection and servicing.

If the water heater must be installed on carpeting, place a metal or wood panel beneath water heater extending beyond its full width and depth at least 3 inches (7.6 cm) in all directions. If the water heater is installed in an alcove, the entire floor must be covered by the panel.

## CAUTION

**NOTICE:** Auxiliary catch pan installation **MUST** conform to the applicable local codes.

The water heater should not be located in an area where leakage of the tank or connections will result in damage to the area adjacent to it or to lower floors of the structure. When such areas cannot be avoided, it is recommended that a suitable catch pan, adequately drained, be installed under the water heater. The pan **MUST NOT** interfere with

the operation of the water heater and access of the serviceable components.

D. **RESTAURANT INSTALLATION:** — If the water heater is to be installed in a restaurant or other location where NSF International listing is required, this unit must be sealed to the floor. Use clear silicone RTV to seal the bottom pan to the floor, to comply with NSF requirements.

E. **CORROSIVE ATMOSPHERES** — The heater should not be installed near an air supply containing halogenated hydrocarbons. For example, the air in beauty shops, dry cleaning establishments, photo processing labs, and storage areas for liquid and powdered bleaches or swim pool chemicals often contain such hydrocarbons. The air there may be safe to breathe, but when it passes through a gas flame, corrosive elements are released that will shorten the life of any gas burning appliance. Propellants from common spray cans or gas leaks from refrigeration equipment are highly corrosive after passing through a flame. The limited warranty is voided when failure of water heater is due to a corrosive atmosphere. (Refer to the Certificate of Limited Warranty for complete terms and conditions.) The manufacturer's warranty does not cover any damage or defect caused by installation, or attachment, or use of any special attachment such as energy saving devices (other than those authorized by the manufacturer) into, onto, or in conjunction with the water heater. The use of such unauthorized devices may shorten the life of the water heater and may endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized devices.

1. **INSPECT SHIPMENT** — for possible damage. The manufacturer's responsibility ceases upon delivery of goods to the carrier in good condition. Any claims for damage, shortage in shipments, or non delivery must be filed immediately against carrier by consignee.

2. **THERMAL EXPANSION** — Determine if a check valve exists in the inlet water line. It may have been installed in the cold water line as a separate back flow preventer, or it may be part of a pressure reducing valve, water meter or water softener. A check valve located in the cold water inlet line can cause what is referred to as a "closed water system". A cold water inlet line with no check valve or back flow prevention device is referred to as an "open" water system. As water is heated, it expands in volume and creates an increase in the pressure within the water system. This action is referred to as "thermal expansion". In an "open" water system, expanding water which exceeds the capacity of the water heater flows back into the city main where the pressure is easily dissipated. A "closed water system", however, prevents the expanding water from flowing back into the main supply line, and the result of "thermal expansion" can create a rapid, and dangerous pressure increase in the water heater and system piping. This rapid pressure increase can quickly reach the safety setting of the relief valve, causing it to operate during each heating cycle. Thermal expansion, and

# Introduction

the resulting rapid, and repeated expansion and contraction of components in the water heater and piping system can cause premature failure of the relief valve, and possibly the heater itself. Replacing the relief valve will not correct the problem!

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

If a recirculation line is installed, the return connection should be made to a tee close to the inlet connection on the water heater. A check valve should always be installed in the recirculation line to prevent cold water from entering.

- 3. WATER CONNECTIONS** — This water heater may be connected individually, in multiples with others, or with an external hot water storage tank. Inlet water connections are made to the lower coupling on the heater, and outlet water connections are made to the upper coupling. Each water heater is supplied with the necessary components (Diffuser tubes) to make the water connections that will ensure proper performance. The components are supplied in a bag attached to the water heater. If special instructions are required for any specific water heater, they will be included in the bag.

Cap or plug unused connections. Use only clean, new galvanized steel, copper or approved plastic pipe for water connections. Local codes or regulations shall govern the exact type of material to be used. The installation of unions on the inlet and outlet water lines and a shut-off valve in at least the cold water inlet line is recommended, so the water heater may be easily disconnected for servicing. Dielectric unions are not required for protection of water heater.

When this water heater is supplying general purpose hot water requirements for use by individuals, a thermostatically controlled mixing valve is recommended to reduce the risk of scald injury. Contact a licensed plumber or the local plumbing authority for further information.

Thermometer(s) should be installed so that they indicate the temperature of the water at or near the outlet of the water heater and storage tank(s) if provided.

- 4. RELIEF VALVE** — A new factory installed combination pressure and temperature relief valve, complying with the Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22, or Standard CSA 4.4, Temperature, Pressure, Temperature and Pressure Relief Valves and Vacuum Relief Valves, is provided with the water heater. No valve is to be placed

between the relief valve and the water heater. For a circulating tank installation, the separate storage tank(s) must have similar protection. The pressure rating of the relief valve **MUST NOT EXCEED** 150 psi (1034 kPa) (160 psi for ASME models), the maximum working pressure as marked on front of the water heater.

## WARNING

Connect the outlet of the relief valve to a suitable open drain. The discharge line must pitch downward from the valve to allow complete draining (by gravity) of the relief valve and discharge line, and be no smaller than the outlet of the valve. The end of the discharge line should not be threaded or concealed and should be protected from freezing. No valve of any type, restriction or reducer coupling should be installed in the discharge line. Local codes shall govern the installation of relief valves.

The Btu/h rating of the relief valve must equal or exceed the Btu/h input of the water heater as marked on its rating plate.

- 5. GAS SUPPLY** — Prior to installation, contact your local gas utility to confirm that sufficient gas service is available for the water heater. The gas meter must have adequate capacity to supply the rated maximum gas input of the water heater in addition to other gas fired equipment connected to the meter.

### Minimum Gas Supply Pressure:

The gas supply must be capable of maintaining a minimum pressure at the inlet of the gas control during water heater operation at maximum input. The pressure will be lowest at the gas control during water heater operation (i.e. gas is flowing) at maximum input. For natural gas models, during operation at maximum input, the supply pressure at the gas control must be at least 6" W.C. For LP gas models, during operation at maximum input, the supply pressure at the gas control must be at least 8" W.C.

Refer to table 3 for gas supply line sizing. The table shows maximum input in thousands of BTU's per hour for various pipe sizes and lengths. The table assumes gas supply pressures of 14" W.C. or less and a pressure drop of 0.3" w.c.

### Maximum Gas Supply Pressure

The gas supply pressure shall never be greater than 14" W.C. Pressures greater than 14" W.C. may damage the gas control which could cause a fire or explosion.

A ground joint union and manual shutoff valve should be installed in the gas line near the water heater so that the burner assembly may be easily removed. The shut-off valve must be readily accessible for turning on or off. See Figure 6.

Where a sediment trap is not incorporated as part of the appliance, a sediment trap shall be installed downstream of the equipment shutoff valve as close to the inlet of the appliance as practical at the time of the appliance installation. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet or other device recognized as an effective sediment trap. See Figure 6.

# Installation

At a minimum, use 1 1/2" pipe for GHE119/125-500

**TABLE 3**  
For U.S. Installations  
**Maximum Capacity of Pipe in Cubic Feet of Gas per Hour for Gas Pressures of 0.5 psig or Less and a Pressure Drop of 0.3 Inch Water Column**  
Based on a 0.60 Specific Gravity Natural Gas; If 1.5 Specific Gravity L.P. Gas is used, multiply capacity by 0.63

Nominal Iron Pipe Size Inches	Internal Diameter Inches	Length of Pipe, Feet													
		10	20	30	40	50	60	70	80	90	100	125	150	175	200
1/2	.622	132	92	73	63	56	50	46	43	40	38	34	31	28	26
3/4	.824	278	190	152	130	115	105	96	90	84	79	72	64	59	55
1	1.049	520	350	285	245	215	195	180	170	160	150	130	120	110	100
1 1/4	1.380	1,050	730	590	500	440	400	370	350	320	305	275	250	225	210
1 1/2	1.610	1,600	1,100	890	760	670	610	560	530	490	460	410	380	350	320
2	2.067	3,050	2,100	1,650	1,450	1,270	1,150	1,050	990	930	870	780	710	650	610
2 1/2	2.469	4,800	3,300	2,700	2,300	2,000	1,850	1,700	1,600	1,500	1,400	1,250	1,130	1,050	980
3	3.068	8,500	5,900	4,700	4,100	3,600	3,250	3,000	2,800	2,600	2,500	2,200	2,000	1,850	1,700
4	4.026	17,500	12,000	9,700	8,300	7,400	6,800	6,200	5,800	5,400	5,100	4,500	4,100	3,800	3,500

**Maximum Pipe Capacity for Installations in Canada, refer to CAN/CSA B149.1.**

For Natural Gas see Tables A.1 to A.17  
For Propane (LP) Gas see Tables B.1 to B.12

**LEAK TESTING** — The water heater and its gas connections **MUST** be leak tested at normal operating pressure before it is placed in operation. Turn **ON** the manual gas shut-off valve near the water heater. Use a soapy water solution to test for gas leaks at all connections and fittings. Bubbles indicate a gas leak that must be corrected. The water heater factory connections to the gas valve should also be leak tested after placing the water heater in operation.

**NEVER** use open flame to test for gas leaks, as bodily injury or property damage could result.

**PRESSURE TESTING THE GAS SUPPLY SYSTEM**

— The water heater and its manual gas shut-off valve **MUST** be disconnected from the gas supply piping system during any high pressure testing of that system at pressures in excess of 1/2 psi (14" w.c. / 3.5 kPa).

The water heater **MUST** be isolated from the gas piping system by closing the manual gas shut-off valve during any pressure testing of the gas supply piping at pressures equal to or less than 1/2 psi (14" w.c. / 3.5 kPa).

**6. CONDENSATE**

This is a condensing high efficiency appliance, therefore this unit has a condensate removal system. Condensate is nothing more than water vapor, derived from the combustion products. This condensate does have a low pH and condensate removal must comply with all local codes. It is very important that the condensate line is sloped away from and down to a suitable inside drain. If the condensate outlet on this unit is lower than the drain, you must use a condensate removal pump. It is also very important that the condensate line is not exposed to freezing temperatures, or any other type of blockage. Plastic tubing should be the only material used for the condensate line. Steel, brass, copper, or other metals will be subject to corrosion

and deterioration. A second vent may be necessary to prevent condensate line vacuum lock if a long horizontal run is used. Also an increase to 1" tubing may be necessary.

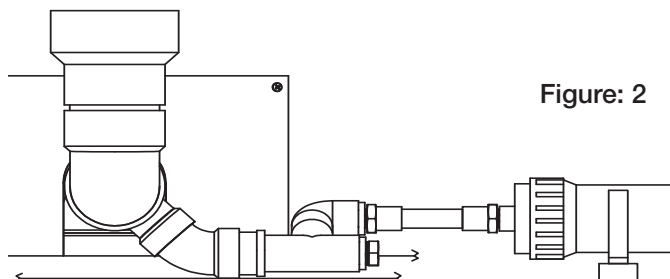


Figure: 2

**INSTALLATION OF A CONDENSATE NEUTRALIZER AND PUMP  
(Not Supplied)**

**CONDENSATION ELBOW ASSEMBLY**

Prior to connecting the exhaust vent pipe, the condensate elbow assembly (supplied, but not factory installed) must be connected to the exhaust pipe on the water heater (See Figure 2).

The free end of the 3 x 3 x 1.5 PVC reducing tee slip fits over the 3" exhaust pipe on the water heater. For maximum durability and sealing, use a high heat silicone sealant appropriate for direct vent appliances (rated for at least 150° F). Apply a bead of silicone around the inside of the free end of the reducing tee. Do the same around the end of the exhaust pipe on the heater. Push the end of the reducing tee onto the exhaust pipe as far as the tee allows. The orientation of the condensate elbow assembly is critical for proper venting of gas and drainage of condensate. See Figure 3 for proper final orientation of the assembly.



# Installation

## **WARNING**

The water heater must be vented to the outdoors as described in these instructions.

**DO NOT** connect this water heater to an existing Vent or Chimney; it must be vented separately from all other appliances.

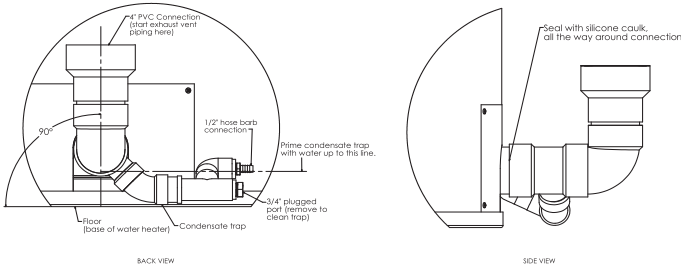


Figure: 3

## **WARNING**

Failure to properly vent the water heater to the outdoors as outlined above and in the following section can result in unsafe operation of the water heater causing bodily injury, explosion, fire and death.

Condensate line must be pitched down at least 1/4" per foot to properly drain. If this cannot be done or a very long length of condensate hose is used, you must increase the condensate hose to a minimum of 1" ID and place a tee in the line after the condensate neutralizer, to properly reduce vacuum lock in the drain line (See Figure 2).

Minimum clearance from combustible material is 0" for the sides, top, and back of this water heater. This water heater is approved for installation in an alcove with the required clearances shown in Figure 4.

## **WARNING**

**NOTICE: DO NOT** use in conjunction with a GFCI. To avoid the risk of fire, explosion or asphyxiation from carbon monoxide, **NEVER** operate this water heater unless it is properly vented and has an adequate air supply for proper operation. The vent pipe must overlap a minimum of 1/2" on each connection. It is important that the vent pipe engages fully into any pipe fitting and be kept in that position until the adhesive has fully cured. **DO NOT** drill or punch holes in the plastic pipe or fittings.

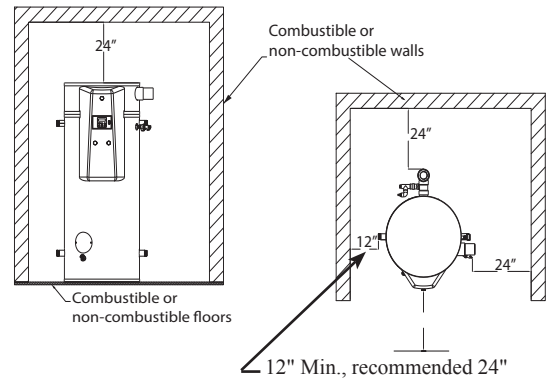







Figure 4  
Required Minimum Access Clearances

# Installation

## Typical Installation Drawing.

ONE UNIT, BASIC PIPING

WARNING: THIS DRAWING SHOWS SUGGESTED PIPING CONFIGURATION AND OTHER DEVICES; CHECK WITH LOCAL CODES AND ORDINANCES FOR ADDITIONAL REQUIREMENTS.

LEGEND	
	Full Port Ball Valve
	Union
	Check Valve
	Circulating Pump
	Temperature Control

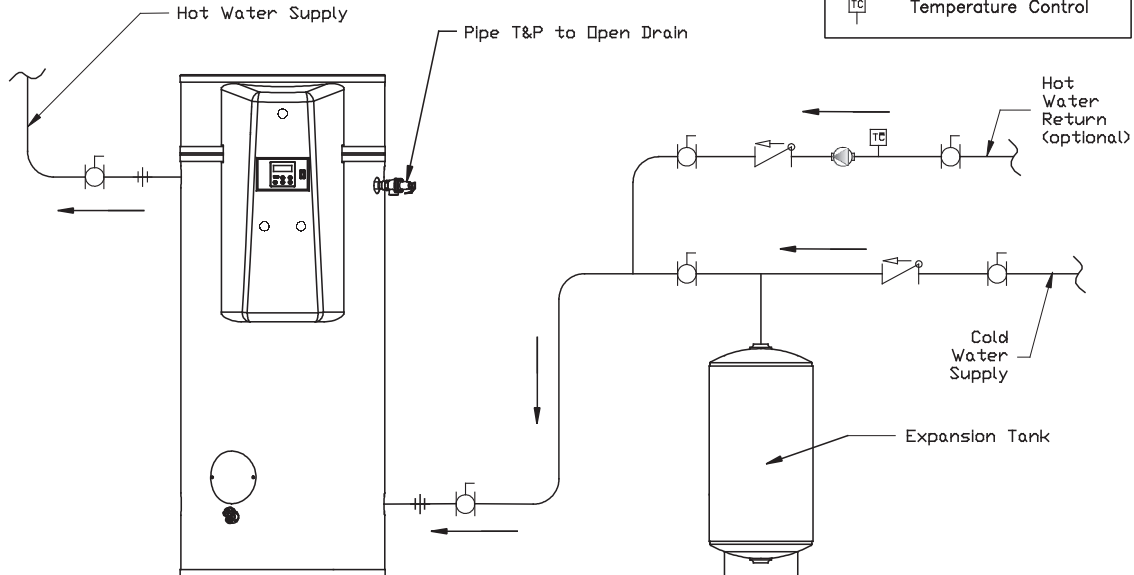


Figure: 5

### NOTES:

- 1.) The gas supply piping must be adequately supported and aligned to minimize loads (forces) on the water heater's gas valve and burner system.
- 2.) Refer to local codes for installation guidelines for the Thermal Expansion Tank (if required).

A manual valve, union, and a sediment trap shall be provided in front of the gas valve. All gas piping must conform to local codes and/or the National Fuel Gas Code ANSI 223.1/NFPA 54 or CSA B149.1. Figure 6 shows the installation of a sediment trap to the gas piping on the water heater

Regulated Gas Supply Line

Main Gas Shutoff Valve

Union

Tee

Sediment Trap

Pipe Cap

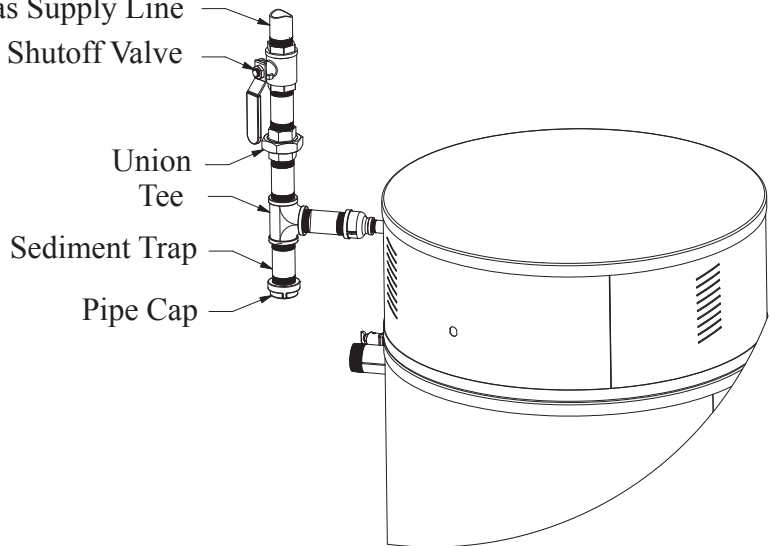


Figure: 6

# Installation

## 7. VENTING —

**NOTE:** This unit can be vented either as a Direct Vent or Power Vent configuration.

**NOTICE:** This unit can be vented using only the following recommended pipe material. Use only 4 or 6-inch diameter pipe.

Refer to local codes for restrictions on the use of PVC, CPVC or ABS pipe and fittings. All exhaust venting materials for product installed in Canada must meet ULC-S636.

PVC (Schedule 40, ASTM D-1785)

CPVC (Schedule 40, ASTM F-441)

ABS (Schedule 40, ASTM D-2661)(Not permitted in Canada)

PVC Cellular Core (Schedule 40, ASTM F-891)(Not Permitted in Canada)

The fittings, other than the VENT TERMINAL, should be equivalent to the following:

PVC (Schedule 40 DWV, ASTM D-2665)

CPVC (Schedule 40 DWV, ASTM F-438)

ABS (Schedule 40 DWV, ASTM D-2661)(Not permitted in Canada)

The unit may be vented horizontally through a wall or vertically through the roof. Pipe runs must be adequately supported along both vertical and horizontal runs. Maximum unsupported span is recommended to be no more than 3 feet. It is imperative that the first hanger be located on the horizontal run immediately adjacent to the first 90° elbow from the vertical rise or at the blower outlet in the case of a horizontal blower position. Support method used should isolate the vent pipe from floor joists or other structural members to help prevent the transmission of noise and vibration. **DO NOT** support, pin or otherwise secure the venting system in a way that restricts the normal thermal expansion and contraction of the chosen venting material.

If the water heater is being installed as a replacement for an existing power vented water heater, a thorough inspection of the existing venting system must be performed prior to any installation work. Verify that the correct materials, as detailed above have been used, and that the minimum or maximum vent length and terminal locations as detailed in this manual have been met. Carefully inspect the entire venting system for any signs of cracks or fractures, particularly at the joints between elbows or other fittings and the straight runs of vent pipe. Check the system for signs of sagging or other stresses in the joints as a result of misalignment of any components in the system. If any of these conditions are found, they must be corrected in accordance with the venting instructions in this manual before completing the installation and putting the water heater into service.

Failure to properly vent the water heater to the outdoors as outlined above and in the following section can result in unsafe operation of the water heater causing bodily injury, explosion, fire or death.

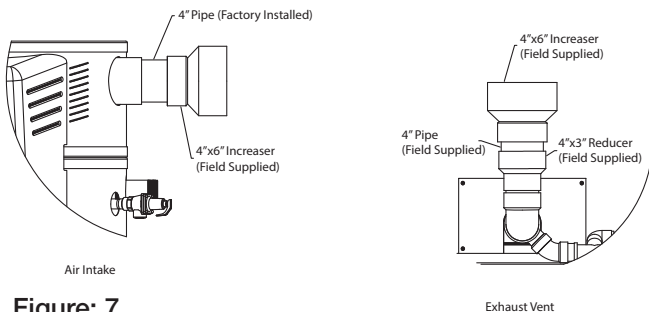


Figure: 7

## VENT PIPE CONNECTION —

Refer to Figure 7, for connecting 6" vent pipe to the water heater.

**NOTICE:** If the unit is installed as a Power Vent water heater, the vent terminal with screen must still be installed on the inlet air side.

Before starting the vent installation, careful planning should be given to the routing and termination of the vent pipes. The length of the vent pipes (inlet and outlet) should be kept to a minimum. Also, see Figure 10 for vent terminal placement. Refer to the venting charts on Table 4 & 5, for the pipe sizes that can be used and the total equivalent length of pipe that can be used. **DO NOT** exceed equivalent length of pipe in charts.

Depending on the size of pipe that is chosen for venting the water heater, it might be necessary to use a fitting for stepping up or down in pipe size, to connect to the water heater. If another size of pipe is used for venting the unit, the proper vent terminal must be installed.

When the unit is vented as a Power Direct Vent, though a side wall, the vent terminals must be on the same exterior wall mounted horizontally and at least twenty-four (24) inches apart (on center). See Figure 17 for other vent terminal restrictions.

**JOINING PIPES AND FITTINGS** – All pipe, fittings, solvent cement, primers and procedures, for the U.S., must conform to American National Standards Institute and American Society for Testing and Materials (ANSI/ASTM) standards. For Canada, all pipe, fittings, solvent cement, primers and procedures must conform to ULC-S636 and vent manufacture specifications.

**CEMENTING JOINTS** – All joints in the vent piping must be properly sealed and we recommend using the following material:

PVC materials should use ASTM D-2564 grade cement.

CPVC materials should use ASTM F-493 grade cement.

ABS materials should use ASTM D-2235 grade cement.

(ABS is not allowed in Canada)

Cleaner-Primer and Medium Body Solvent Cement

1. Cut pipe end square, remove jagged edges and burrs. Chamfer end of pipe, then clean fitting socket and pipe joint area of all dirt, grease or moisture.
2. After checking pipe and socket for proper fit, wipe socket primer to inside surface of socket and outside of pipe. **DO NOT** allow primer to dry before applying cement.
3. Apply a thin coat of cement evenly in the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into fitting with a slight twisting motion until it bottoms out.

**NOTICE:** Cement must be fluid; if not, re-coat.

4. Hold the pipe fitting for 30 seconds to prevent the tapered socket from pushing the pipe out of the fitting.
5. Wipe all excess cement from the joint with a rag. Allow 15 minutes before handling. Cure time will vary according to fit, temperature and humidity.

# Installation

**NOTICE:** Stir the solvent cement frequently while using. Use a natural bristle brush or the dauber supplied with the can. The proper brush size is one inch and pipe with cleaner-primer. Apply a liberal coat of

## CAUTION

### FOR PROPER INSTALLATION:

- **DO NOT** use solvent cement that has become curdled, lumpy or thickened.
- **DO NOT** thin solvent cement. Observe shelf recautions printed on the containers.
- For applications below 32°F use only low temperature type solvent cement.
- Appropriate solvent and cleaner must be used for the type of vent pipe used (PVC, CPVC or ABS).

## WARNING

**DANGER OF FIRE OR BODILY INJURY – Solvent cements and primers are highly flammable. Provide adequate ventilation and do not assemble near heat source or open flame. DO NOT smoke. Avoid skin or eye contact. Observe all cautions and warnings on material containers.**

**DIRECT VENT INSTALLATION** - Check to make sure flue gases do not recirculate into the air intake terminal when using direct venting. If the water heater is having service issues, flue recirculation may be a contributing factor. Even when the minimum vent terminal separation distances are followed, recirculation may still occur depending upon the location outside the building, the distance from other buildings, proximity to corners, weather conditions, wind patterns, and snow depth. Periodically check to make sure that flue recirculation is not occurring. Signs of flue gas recirculation include frosted or frozen intake terminals, condensate in the intake terminal and venting system, oxidation or white chalk material on the flame sensor or igniter shield. Correction to flue recirculation may involve angling the intake away from the exhaust terminal, increasing the distance between them, or using inside air for combustion. Check to be sure the intake and exhaust terminals are not obstructed, especially during periods of below freezing weather. All intake and exhaust venting components must have the same diameter size. **DO NOT** use a different size on the intake and exhaust venting.

Be sure the condensate runs freely to a drain and does not accumulate inside the water heater. In cold climates, precautions may need to be taken to insure that the condensate drain does not freeze. Make sure the condensate trap or drain loop is installed to prevent flue gases from being discharged into the room. Refer to the Venting

section of the Installation and Operating Instructions Manual for complete instructions on venting and condensate drainage.

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. Follow the following procedure to vent through the wall:

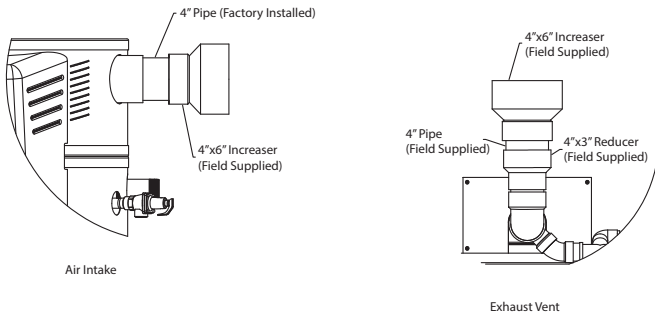
1. Cut two 4 1/2" (11.4 cm) diameter holes (for a 4" (10.2 cm) diameter pipe), 6 1/2" (16.5 cm) diameter holes (for 6" (15.2 cm) diameter pipe) in the wall. Vent terminals must be a minimum of 24 inches (61 cm) and a maximum of 36 inches (91.4cm) horizontally apart (See Figure 9).
2. Use the proper PVC cement to secure the exhaust vent and air intake terminals provided with the water heater to the plastic pipes. The distance between the back edge of the exhaust vent terminal and the exterior wall (see Figure 10) must be 6 inches (12.7 cm) more for the exhaust vent terminal than the air intake terminal. Use the proper cement or sealant and assembly procedures to secure the vent connector joints between the terminal and the blower outlet. Provide support brackets for every 3 feet (.91 m) of horizontal vent beyond the intake terminal as seen in Figure 12.

**NOTICE:** Installations in Canada must conform to the requirements of CSA B149 code. Plastic vent systems must be assembled with pipe, fittings, cements, and primers listed to ULC S636. Components of this listed system shall not be interchanged with other vent systems or unlisted pipe/fittings. In Canada, the primer and cement must be of the same manufacture as the vent system; **DO NOT** mix primers and cements from one manufacture with a vent system from a different manufacturer. The supplied plastic pipe/fittings are certified as part of the water

### Minimum and Maximum System Lengths

The water heater should be located such that plastic vent pipe lengths and the number of connection fittings are minimized. Minimum and maximum equivalent pipe lengths for the vent and combustion air intake systems are given in Tables 4 and 5. Either 4 in. or 6 in. plastic piping may be used. The water heater is provided with fittings that readily adapt to 4 in. plastic pipe. **DO NOT** use less than 4 in. diameter plastic pipe and **DO NOT** use unequal sizes except as shown to increase from 4 in. to 6 in. diameter at the point of connection to the water heater. Figure 8 shows the proper connections to increase from 4" to 6" plastic pipe.

# Installation



**NOTE:** The equivalent straight pipe length of a 90°, ¼ standard bend elbow and a 45°, 1/8" standard bend elbow is 5 feet, respectively. **DO NOT** use short bend elbows.

**NOTE:** An elbow used as an exhaust vent termination fitting must be included when determining the total number of elbows.

**Figure 8**

## MINIMUM AND MAXIMUM VENT LENGTHS

**Note:** Vent pipe size should not be mixed for venting these units. Use same size pipe for all venting of the unit.

**Notice:** Vent terminals need to be mounted horizontally a minimum of 24 inches (center to center) horizontally apart and a maximum of 36 inches apart (center to center). See Figure 17 for venting multiple units.

**\*NOTICE:** The GHE Prefix on the model numbers above can also be "THE"

**DO NOT** exceed the venting distances or the number of elbows listed in this manual.

**Exceeding the maximum lengths may cause the water heater to malfunction or cause a lock-out condition.**

**Table 4:** Minimum and Maximum Vent and Air Intake Pipe Lengths (4" Pipe)

Model(s)	Fuel Type	Vent Arrangement	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
			Air Intake <sup>1</sup> (ft)	Vent <sup>2</sup> (ft)	Air Intake <sup>1</sup> (ft)	Vent <sup>2</sup> (ft)
GHE119-500 GHE125-500A	NAT or LP	Direct Vent	20	20	50 <sup>‡</sup>	50 <sup>‡</sup>
		Power Vent	0	20	0	100

<sup>1</sup> Equivalent length is measured **between** the 4" pipe connection on the water heater and the required 90° elbow termination fitting.

<sup>2</sup> Equivalent length is measure **after** the point of connection to the condensate assembly and includes the termination fitting (if used).

<sup>‡</sup> Shown as a balanced system. Vent length may exceed air intake length if total combined length does not exceed 100 ft. **Intake length cannot exceed exhaust length.**

**Table 5:** Minimum and Maximum Vent and Air Intake Pipe Lengths (6" Pipe)

Model(s)	Fuel Type	Vent Arrangement	Minimum Equivalent Pipe Length (per pipe run)		Maximum Equivalent Pipe Length (per pipe run)	
			Air Intake <sup>3</sup> (ft)	Vent <sup>4</sup> (ft)	Air Intake <sup>3</sup> (ft)	Vent <sup>4</sup> (ft)
GHE119-500 GHE125-500A	NAT or LP	Direct Vent	50	50	120 <sup>‡</sup>	120 <sup>‡</sup>
		Power Vent	0	50	0	240

<sup>3</sup> Equivalent length is measured **between** the 4" pipe connection on the water heater and the required 90° elbow termination fitting.

<sup>4</sup> Equivalent length is measure **after** the point of connection to the condensate assembly and includes the termination fitting (if used).

<sup>‡</sup> Shown as a balanced system. Vent length may exceed air intake length if total combined length does not exceed 240 ft. **Intake length cannot exceed exhaust length.**

# Installation

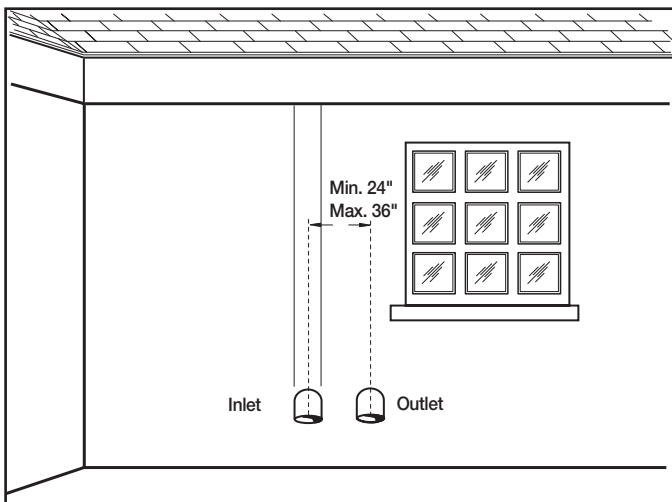


Figure 9

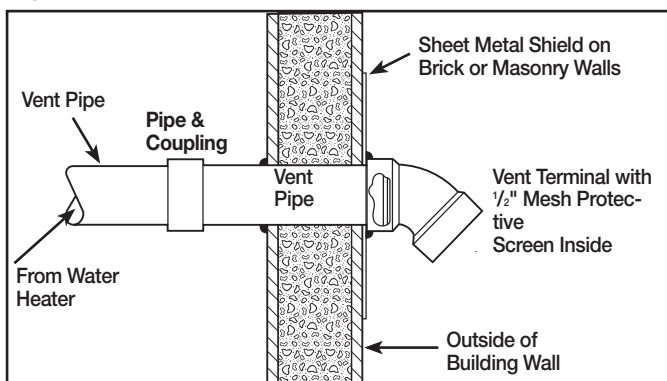


Figure 10 – Typical Horizontal Vent Installation

Additional Considerations (See Figure 15 & 16)

1. **DO NOT** install vent terminals under any patio or deck.
2. To help prevent moisture from freezing on walls and under eaves, **DO NOT** locate outlet vent terminal on the side of a building with prevailing winter winds.
3. **DO NOT** terminate vent pipe directly on brick or masonry surfaces. Use a rust-resistant sheet metal backing plate behind vent. (See Figure 10.)
4. **DO NOT** locate vent terminal too close to shrubbery, since flue gases may damage them.
5. Caulk all cracks, seams and joints within six (6) (1.83 m) feet of vent terminal.
6. All painted surfaces should be primed to lessen the chance of physical damage. Painted surfaces will require maintenance.
7. Insulate vent pipe exposed to cold conditions (attics, crawl spaces, etc.) to help prevent moisture from accumulating in vent pipe.
8. This water heater requires its own separate venting system. **DO NOT** connect the exhaust vent to an existing vent pipe or chimney.

## ⚠ WARNING

Moisture in the flue gas will condense as it leaves the vent terminal. In cold weather this condensate can freeze on the exterior wall, under the eaves and on surrounding objects. Some discoloration to the exterior of the building is to be expected. However, improper location or installation can result in severe damage to the structure or exterior finish of the building.

**HORIZONTAL VENT INSTALLATION** – Once the vent terminal location has been determined, make a hole through the exterior wall to accommodate the vent pipe. Vent pipe must exit exterior wall horizontally only (See Figure 12).

Insert a small length of vent pipe through the wall and connect the coupling as shown in Figure 10. Connect terminal as shown to the vent pipe on the exterior of the building. Seal any opening around the vent pipe or fittings with mortar or silicone caulk as shown in Figure 10.

Complete the rest of the vent pipe installation to the water heater's vent connector fitting on the blower outlet. If necessary support horizontal run as previously mentioned.

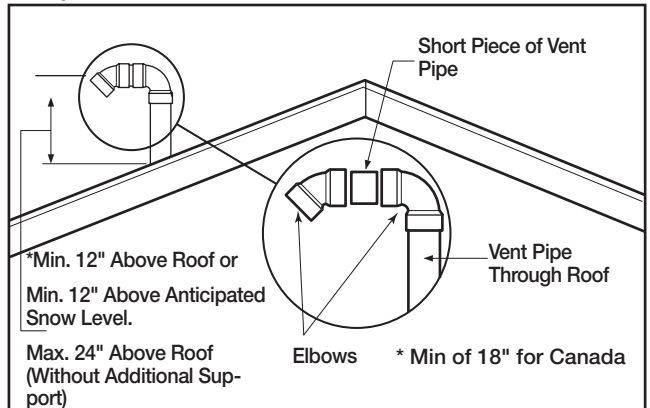


Figure 11 – Vertical Vent Terminal Location

**VERTICAL VENT INSTALLATION** – Once the vent terminal location has been determined, make a hole through the roof and interior ceiling to accommodate the vent pipe. Complete the vent pipe installation to the water heater's vent connector fitting on the blower outlet. Support vertical or horizontal runs as previously mentioned (See Figure 12).

Install adequate flashing where the vent pipe passes through the roof. Determine the vent terminal height and cut vent pipe accordingly. Refer to Figure 11 for proper vent terminal height. Connect vent elbow onto vertical pipe through roof. Connect short piece of vent pipe (approximately 3" (7.6 cm) long) to elbow, then join terminal to the short piece of vent pipe.

**VERTICAL VENT TERMINAL LOCATION** – The location of vertical vent terminal depends on the following considerations (see Figure 11):

1. Minimum twelve (12 inches) (30.5 cm) above roof 18" inches (46 cm) for Canada.
2. Minimum twelve (12 inches) (30.5 cm) inches above anticipated snow level.
3. Maximum twenty-four (24 inches) (61 cm) inches above roof level without additional support for vent pipe.
4. Four (4) feet (1.22 m) from any gable, dormer or other roof structure with building interior access (i.e., vent, window, etc.).
5. Ten (10) feet (3.05 m) from any forced air inlet to the building. Any fresh or make-up air inlet such as a dryer or furnace area is considered to be a forced air inlet.
6. Vent Terminals are a minimum of twenty-four (24) inches (61 cm) and a max of 36" horizontally apart.

**VENT INSTALLATION** – Before proceeding, make certain you understand the procedure and cautions covered in the section "Joining Pipes and Fittings."

## Installation

Install piping through the wall as shown in Figure 10 and 12. Adequate length of pipe must protrude beyond the exterior wall for attachment of the termination fitting. The recommended distance between the terminal fitting and the exterior walls is 6 inches (2.5 cm). Directions for cementing joints (such as the terminal fittings to the straight pipe) can be found on page 11. A single 90° elbow is supplied with the water heater for the termination fitting on the air intake. If other fittings are required they must be purchased separately. The supplied 90° elbow contains a protective screen to block foreign debris or small animals from entering the pipe. If a screen is preferred at the exhaust termination, it must have a low resistance to airflow. Refer to the type of screen used in the supplied elbow. A screen that significantly restricts airflow will reduce the performance of the water heater

and could cause nuisance control lockouts. Complete the installation of the remainder of the vent and air intake system and attach to the water heater as shown in Figure 12. Horizontal sections of the exhaust vent shall slope upward and away from the water heater a minimum of 1/8" per foot (10 mm per meter). This will allow the condensate in the vent to run back to the condensate drain on the water heater. Horizontal sections of air intake piping shall slope downward away from the water heater a minimum of 1/8" per foot.

### **CAUTION**

**Annular spaces around vent pipe wall penetrations shall be permanently sealed using approved materials to prevent entry of combustion products into the building.**

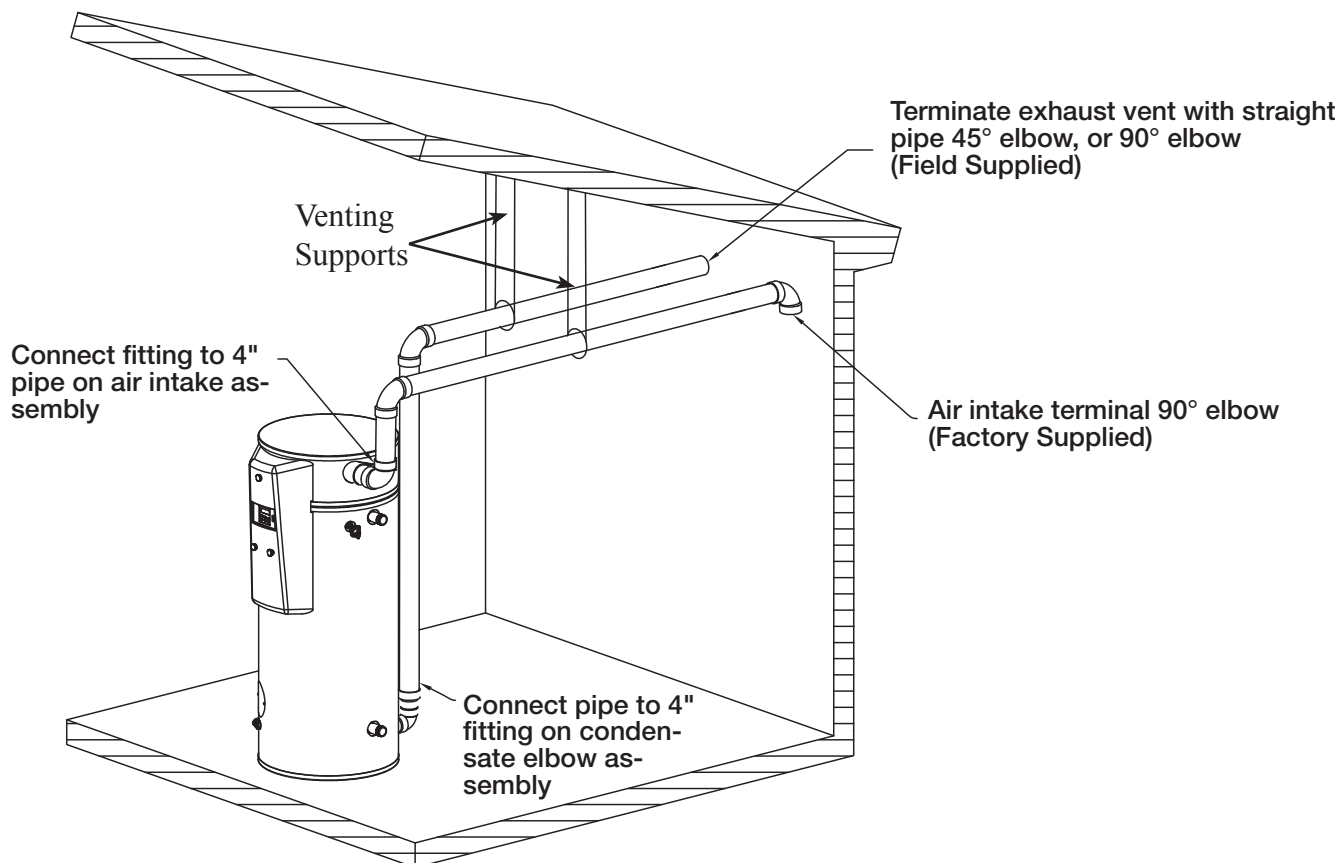


Figure: 12

### Typical Horizontal Direct Vent System

# Installation

## Typical vertical Direct Vent System Installation

**NOTICE:** Intake and exhaust terminals must be on the same outside wall.

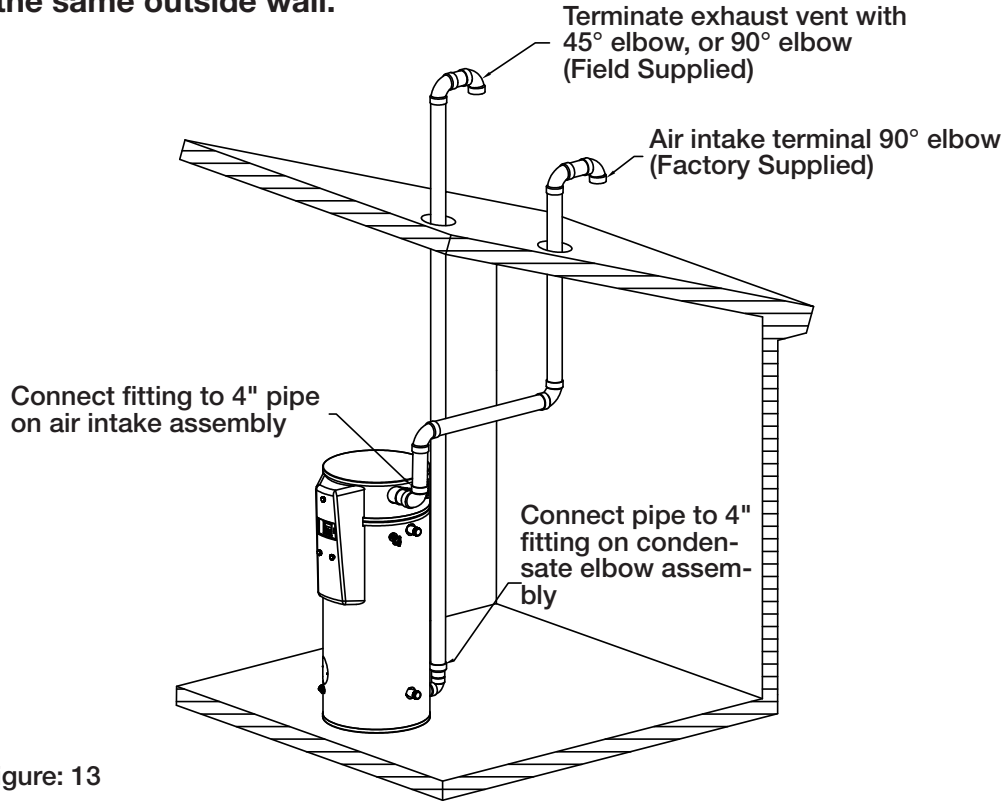


Figure: 13

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 expect-

ed snow level) from the ground, the installation must be modified as shown below (See Figure 14)

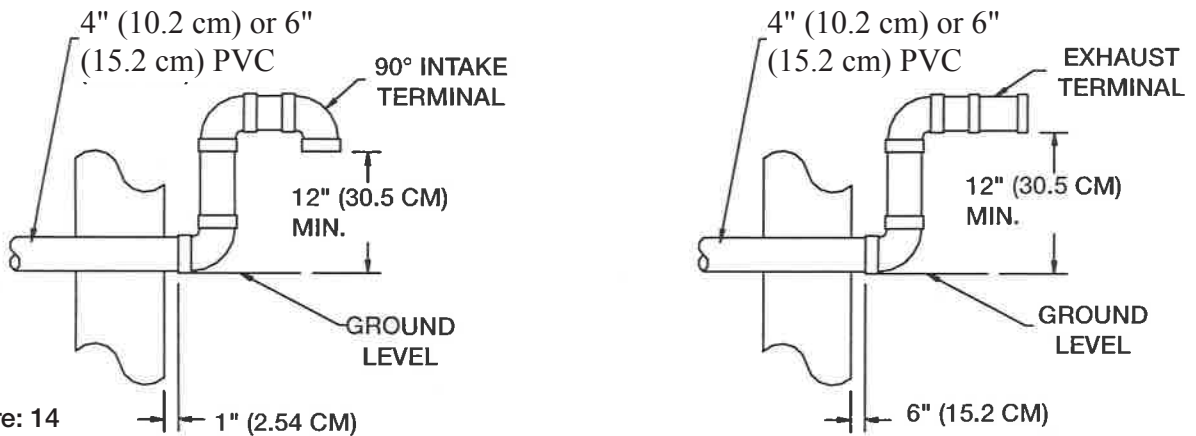


Figure: 14

Vent Terminal (Low ground clearance)



# Installation

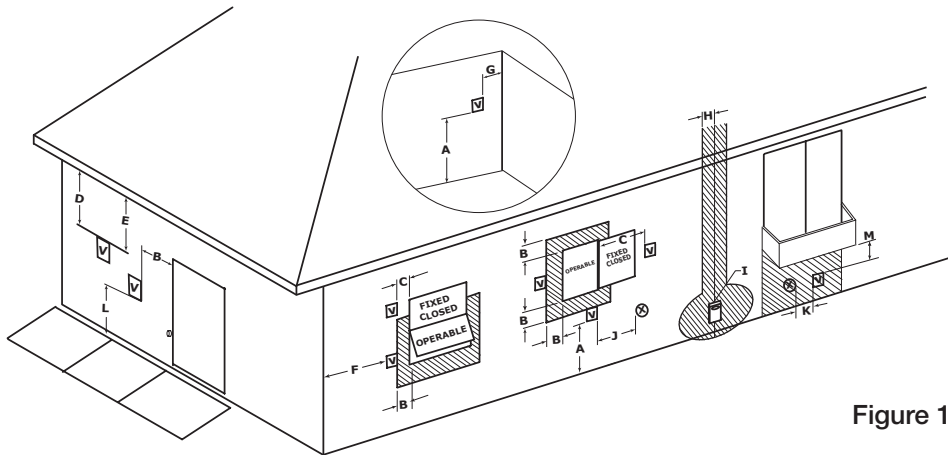


Figure 15

V VENT TERMINAL    
 X AIR SUPPLY INLET    
  AREA WHERE TERMINAL IS NOT PERMITTED

## Horizontal Vent Terminal Location for Power Vent

The following information should be used for determining the proper location of the vent terminal for direct vent water heaters.

	Canadian Installations <sup>1</sup>	US Installations <sup>2</sup>
A= Clearance above grade, veranda, porch, deck or balcony.	12 inches (30 cm) above anticipated snow level.	12 inches (30 cm) above anticipated snow level.
B= Clearance to window or door that may be opened.	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3kW) and ≤ 100,000 Btuh (30kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30kW).	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening.
C= Clearance to permanently closed window.	*	*
D= Vertical Clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (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 meter/regulator assembly above	3 feet (91 cm) within a height 15 feet (4.57 m) above the meter/regulator assembly.	*
I= Clearance to service regulator vent outlet.	3 feet (91 cm)	*
J= Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance..	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3kW) and ≤ 100,000 Btuh (30kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30kW).	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening.
K= Clearance to mechanical air supply inlet.	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally.
L= Clearance above paved side walk or paved driveway located on public property.	7 feet (2.13 m)+	7 feet (2.13 m)+
M= Clearance under veranda, porch, deck or balcony.	Not Allowed	Not Allowed

<sup>1</sup> In accordance with current CAN/CSA-B149.1 Installation Codes.

<sup>2</sup> In accordance with current ANSI Z223.1/ NFPA 54 National Fuel Gas Code.

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

\* For clearances not specified in ANSI Z223.1 / NFPA 54 or CAN/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:

"Clearance in accordance with local installation codes and the requirements of the gas supplier."

# Installation

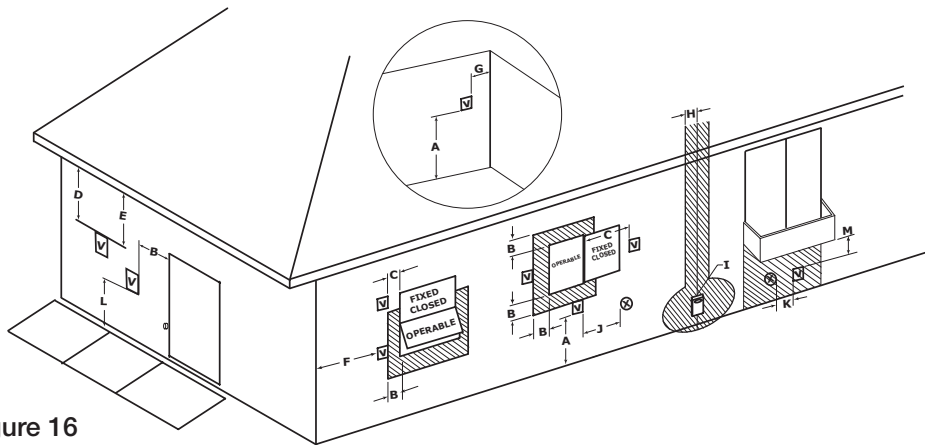


Figure 16

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

## Horizontal Vent Terminal Location for Power Direct Vent

The following information should be used for determining the proper location of the vent terminal for direct vent water heaters.

	Canadian Installations <sup>1</sup>	US Installations <sup>2</sup>
A= Clearance above grade, veranda, porch, deck or balcony.	12 inches (30 cm) above anticipated snow level.	12 inches (30 cm) above anticipated snow level.
B= Clearance to window or door that may be opened.	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3kW) and ≤ 100,000 Btuh (30kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30kW).	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (15 kW), 12 inches (30 cm) for appliances > 50,000 Btuh (15 kW)
C= Clearance to permanently closed 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 meter/regulator assembly above	3 feet (91 cm) within a height 15 feet (4.57 m) above the meter/regulator assembly.	*
I = Clearance to service regulator vent outlet.	3 feet (91 cm)	*
J = Clearance to nonmechanical air supply inlet to the building or the combustion air inlet of any other appliance..	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3kW) and ≤ 100,000 Btuh (30kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30kW).	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 inches (23 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (15 kW), 12 inches (30 cm) for appliances > 50,000 Btuh (15 kW)
K = Clearance to mechanical air supply inlet.	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet(3 m) horizontally.
L = Clearance above paved side walk or paved driveway located on public property.	7 feet (2.13 m)+	7 feet (2.13 m)+
M = Clearance under veranda, porch, deck or balcony.	Not Allowed	Not Allowed

<sup>1</sup> In accordance with current CAN/CSA-B149.1 Installation Codes.

<sup>2</sup> In accordance with current ANSI Z223.1/ NFPA 54 National Fuel Gas Code.

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

\* For clearances not specified in ANSI Z223.1 / NFPA 54 or CAN/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:

"Clearance in accordance with local installation codes and the requirements of the gas supplier."

# Installation

## POWER VENT INSTALLATION:

Power venting is where the indoor air is used and the exhaust is vented to the outside. Venting may be run horizontally through an outside wall or vertically through a roof using either 4" (10.2 cm) or 6" (15.2 cm) diameter PVC, ABS or CPVC. This water heater is supplied with a screened intake elbow and exhaust coupling referred to as the air intake terminal and the exhaust vent terminal

In a horizontal application, it is important that condensate not be allowed to buildup in the exhaust

vent pipe. To prevent this from happening, the pipe should be installed with a slight upward slope of 1/8" per foot. The vent system must be supported every 5 feet of vertical run and every 3 feet of horizontal run of vent pipe length.

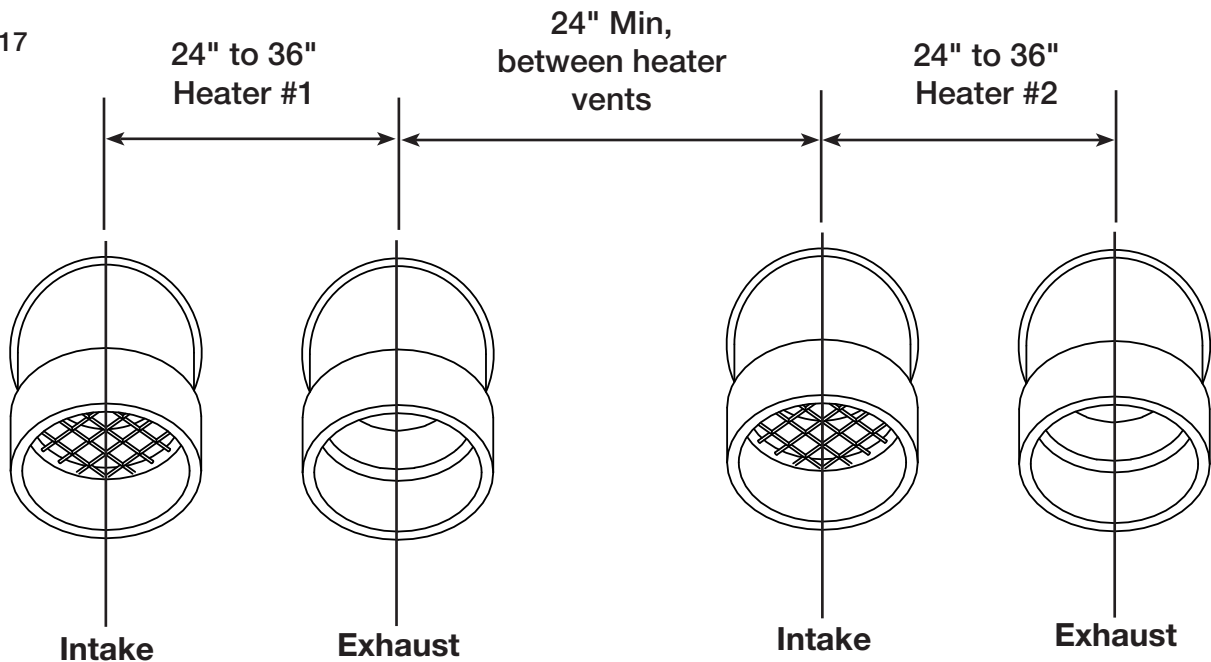
### CAUTION

Failure to properly support the vent piping with hangers and clamps may result in damage to the water heater or venting system.

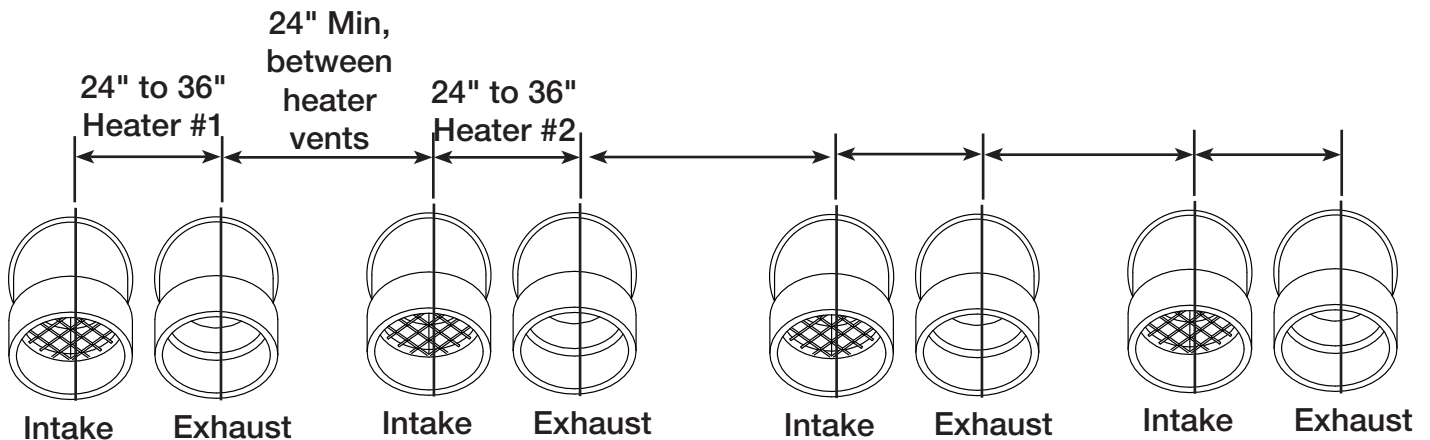
## Multiple Unit Venting

**NOTICE: All spacing is horizontal. DO NOT stack kits vertically.**

Figure: 17



Example of 2 Units' Vents.



Example of 4 Units' Vent.

# Installation

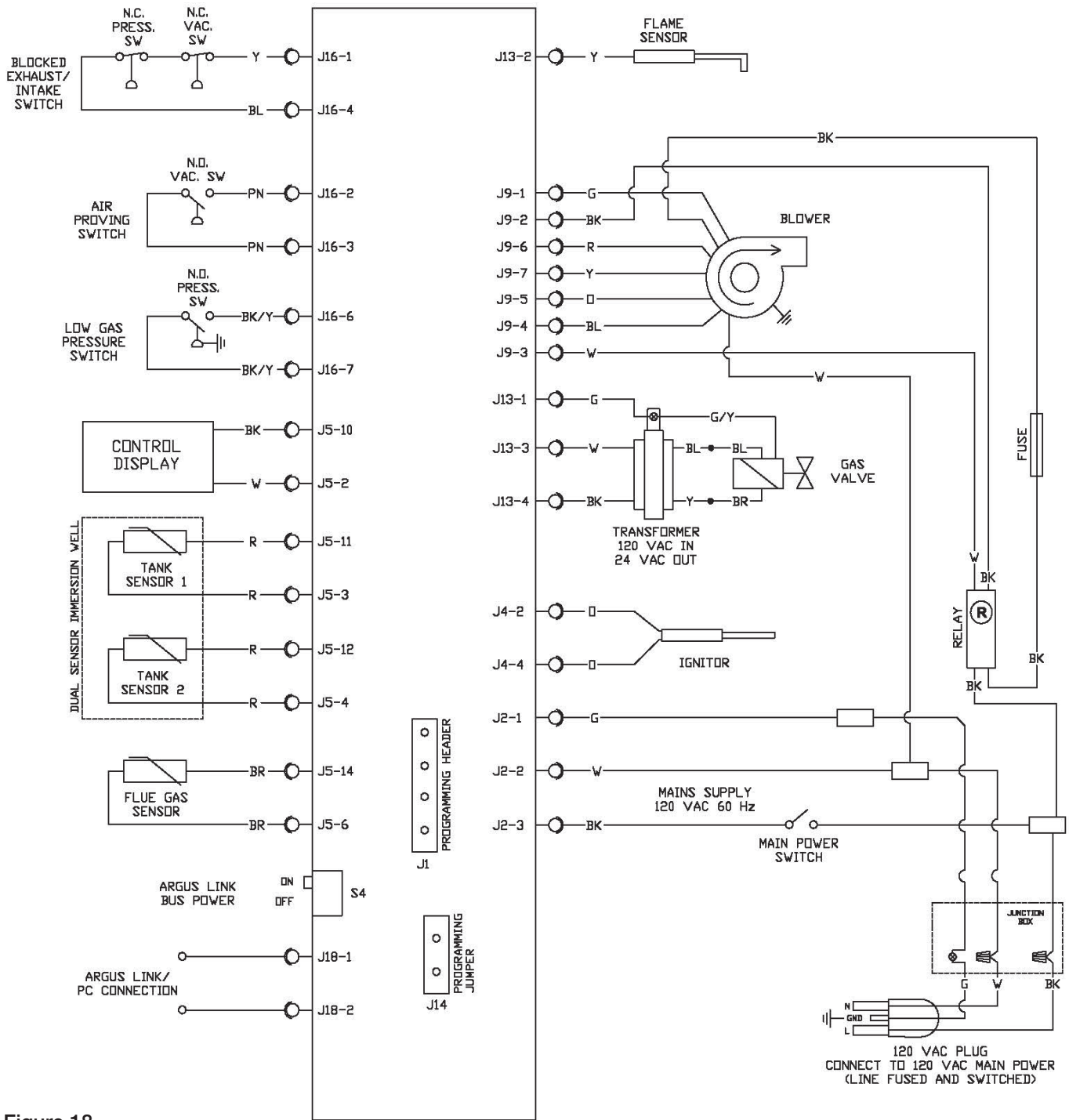


Figure 18

Schematic Diagram

# Installation

**Wiring** — A polarized 120V 50/60 Hz power supply, with suitable disconnect means, must be connected to the black and white leads provided. The maximum current draw by these models are 5 Amps. The water heater, when installed, must be electrically grounded in accordance with local codes, or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70 in the United States; or CSA C22.1 Electrical Code, in Canada. Improper grounding may result in abnormal operation of the unit. Refer to Figure 18 in this manual for water heater internal wiring diagrams.

All electrical wiring and connections must be

in accordance with local codes. This water heater must be electrically grounded. Electrical power should be supplied through a fused disconnect switch located near the water heater. Where local codes permit, use the supplied power cord for field connection. A grounding receptacle is required. If local codes **DO NOT** permit the use of the supplied cord, disconnect the power cord from the junction box and replace with suitable power supply (120V, 60Hz) wiring and connections. The water heaters draws less than 5 amps (maximum). Check for proper polarity at the main power connection prior to operating the water heater.

## CAUTION

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

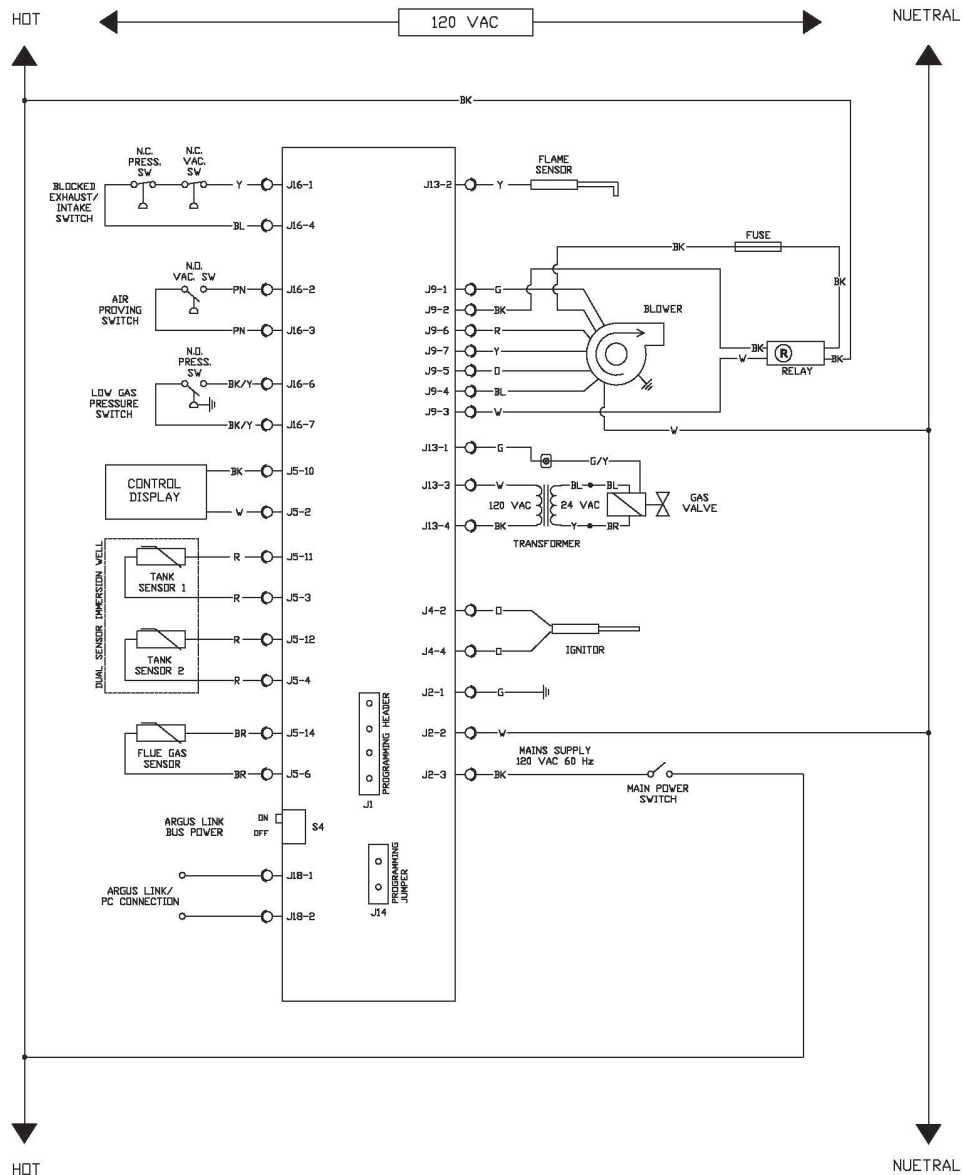


Figure 19

Component Wiring Diagram

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## Installation Check List

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### A. Water Heater Location

- Close to area of vent.
- Indoors and protected from freezing temperatures.
- Proper clearance from combustible surfaces observed and water heater not installed on carpeted floor.
- Air supply free of corrosive elements and flammable vapors.
- Provisions made to protect area from water damage.
- Sufficient room to service heater.

### B. Water Supply

- Water heater completely filled with water.
- Water heater and piping air vented.
- Water connections tight and free of leaks.

### C. Gas Supply

- Gas line equipped with shut-off valve, union, and sediment trap/drip leg.
- Approved pipe joint compound used.
- Soap and water solution used to check all connections and fittings for possible gas leak.
- Gas Company inspected installation (if required).

### D. Relief Valve

- Discharge line run to open drain.
- Discharge line protected from freezing.

### E. Venting

- All pipe connections are secure (at blower, vent terminals and for each pipe joint connection)
- Vent terminals mounted properly and in correct location.

### F. Condensate

- Condensation trap installed and primed.

# Operation

## SAFETY PRECAUTIONS

- A. Do not turn off manual gas shut-off valve if water heater has been subjected to over heating, fire, flood, physical damage or if gas supply fails to shut off.
- B. **DO NOT** turn on water heater unless it is filled with water.
- C. **DO NOT** turn on water heater if cold water supply shut-off valve is closed.
- D. **DO NOT** store or use gasoline or other flammable vapors and liquids, such as adhesives or paint thinner, in vicinity of this or any other appliance. If such flammables must be used, open doors and windows for ventilation, and all gas burning appliances in vicinity should be shut off, including their pilot lights, to avoid vapors igniting.  
**NOTICE:** Flammable vapors may be drawn by air currents from surrounding areas to the water heater.
- E. **DO NOT** allow combustible materials such as newspaper, rags or mops to accumulate near water heater.

- F. If there is any difficulty in understanding or following the OPERATION or MAINTENANCE instructions, it is recommended that a qualified person or serviceman perform the work.

### CAUTION

Hydrogen gas can be produced in a hot water system served by this water heater that has not been used for a long period of time (generally two weeks or more). **HYDROGEN GAS IS EXTREMELY FLAMMABLE!!** To dissipate such gas and to reduce risk of injury, it is recommended that the hot water faucet be opened for several minutes at the kitchen sink before using any electrical appliance connected to the hot water system. If hydrogen is present, there will probably be an unusual sound such as air escaping through the pipe as the water begins to flow. **DO NOT** smoke or use an open flame near the faucet at the time it is open.

- 1. **TEMPERATURE SETTINGS** – The temperature is adjusted to 120° F when shipped from the factory. To meet commercial water use needs, it is adjustable up to 180°F (82°C). However, water temperatures over 125°F (52°C) can cause severe burns instantly or death from scalds. This is the preferred starting point for setting the control for supplying general purpose hot water.

Safety and energy conservation are factors to be considered when setting the water temperature. The most energy efficient operation will result when the temperature setting is the lowest that satisfies the needs consistent with the application.

### DANGER

Hotter water increases the Potential for Hot Water SCALDS.

### WARNING

When this water heater is supplying general purpose hot water requirements for individuals, a thermostatically controlled mixing valve for reducing point of use water temperature is recommended. Contact a licensed plumber or the local plumbing authority for further information.

Outlet water temperature will vary during normal operating cycles. Reliable temperature readings should be taken shortly after main burner cycles off during a period of little or no use.

- 2 **CHECK INPUT** – Consult the local Gas Company to determine the heating value of the gas supplied. Check input by clocking gas meter with all other gas appliances turned off. Use the following formula:

**DO NOT** exceed Input shown on the water heater's rating plate! To insure accuracy for rating, clock enough cubic feet of gas so that the clocked time is at least 60 seconds.

$$\text{INPUT (btu/h)} = \frac{(3,600) \times (\text{Heating Value}) \times (\text{Number of Cubic Feet Timed})}{\text{Seconds Clocked}}$$

### WARNING

**DO NOT** exceed Input shown on the water heater's rating plate!

- 3. **EMERGENCY SHUTDOWN** – Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance.

### WARNING

**NOTICE:** **DO NOT** use this appliance if any part has been under water. Immediately call a qualified installer or service agency to replace a flooded water heater. **DO NOT** attempt to repair the unit! It must be replaced.

## Adjusting the Controls

Following adjustment of the setpoint to a higher temperature (see Figure 21), the main burner should relight. Next, adjust the setpoint to a lower temperature (i.e. back to 120°F) and the gas valve will close, extinguishing the burner flame. The temperature should be adjusted to the minimum setting that will meet the hot water needs of the application.

### CAUTION

There is a scald potential if the thermostat is set too high. The recommended temperature setting for normal residential use is 120°F. If higher temperature settings are needed for combined appliance applications or commercial use, an automatic tempering valve must be installed on all domestic hot water lines

**MEASURING THE POINT-OF-USE WATER TEMPERATURE**  
The thermostat is factory set at 120°F for domestic use. It is the responsibility of the building owner to verify that the installer follows the recommended quantitative testing for measuring the point-of-use water temperature. To make sure that the system

# Operation

works properly after installation and in the future, it is recommended that the heater's performance be measured and monitored. Run water out of a faucet nearest the heater until it comes out warm.

Using a calibrated thermometer, take a measurement. If the water is not at a suitable temperature for the application, adjust the setting on the control or the tempering valve.

This log (or a similar one) should be filled out as follows:

Date	Time	Person Running Test	Setpoint Temperature °F	Faucet Temperature °F

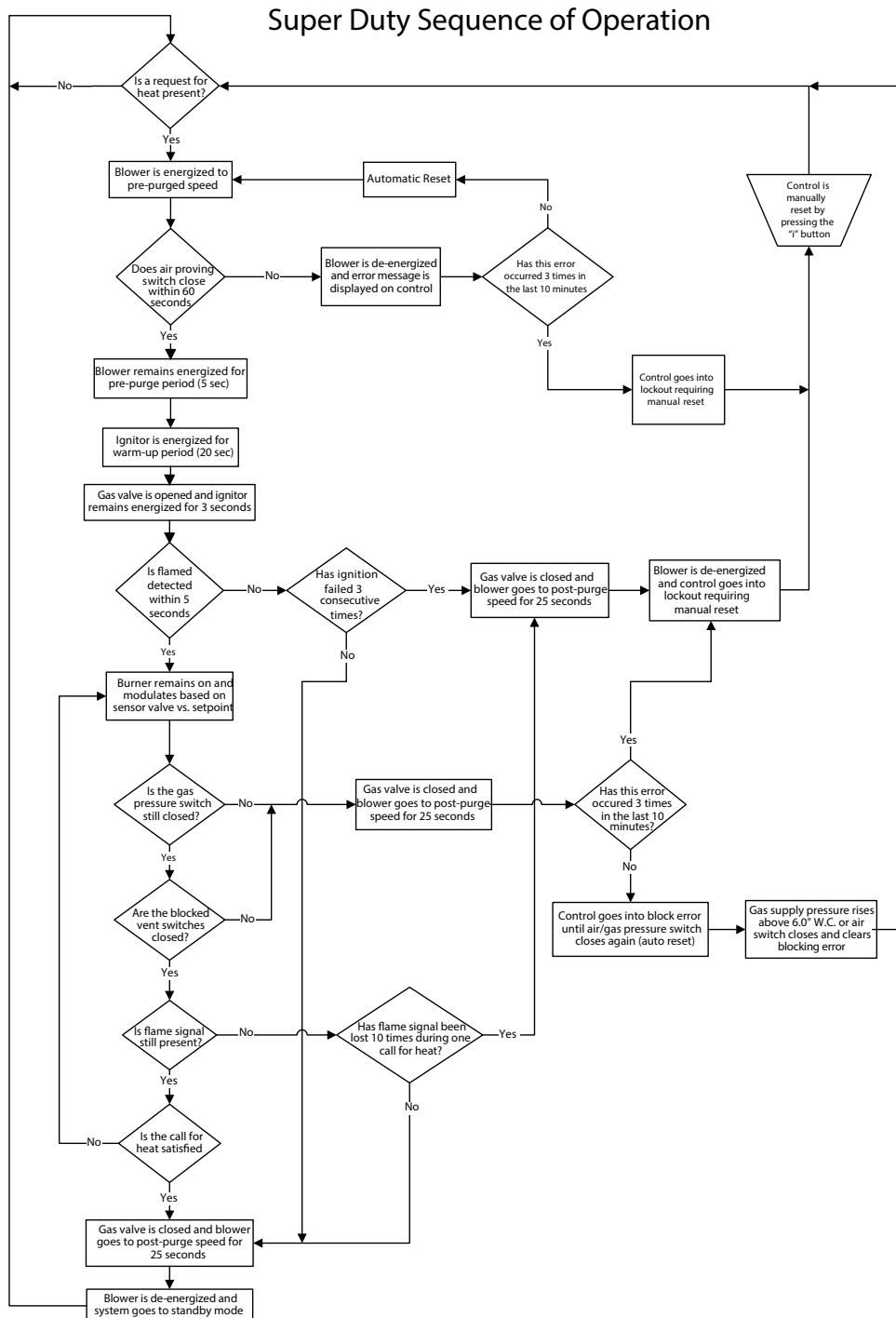
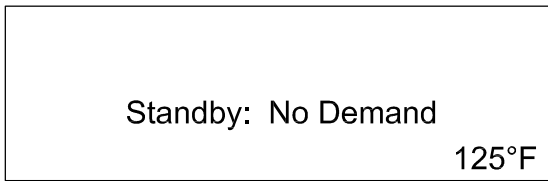


Figure 20



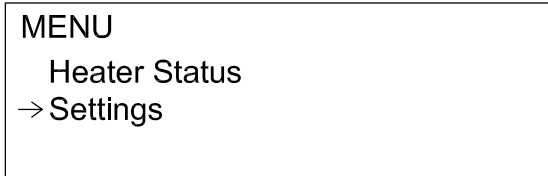
# Operation



The home screen displays the current status of the water heater (i.e. demand or no demand for heat).

**AT THE HOME SCREEN, THE TEMPERATURE DISPLAYED IN THE LOWER RIGHT CORNER OF THE SCREEN IS THE ACTUAL WATER TEMPERATURE AT THE TOP OF THE TANK.**

Press the "M" button to enter the main menu.



In the MENU screen, use the down arrow ("-") button to move the cursor to SETTINGS.

Press the "OK" button to select SETTINGS.



The first screen in the SETTINGS menu displays the setpoint temperature.

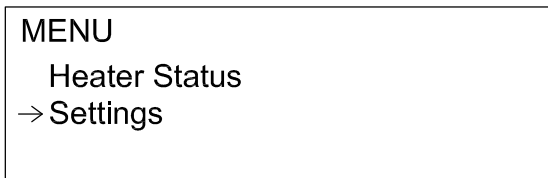
To change the setpoint, press the "OK" button. The temperature will start blinking.



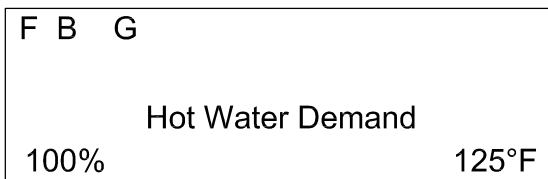
Use the up arrow ("+") button or down arrow ("-") button to adjust the setpoint temperature.

For the purposes of this section of the manual, raise the setpoint temperature to 135°F. Press the "OK" button to save the new setting.

To exit from the SETTINGS menu, press the "M" button.



To exit the MENU screen, press the "M" button.



If the setpoint temperature was increased enough, the home screen will now display the heater status as "Hot Water Demand".

The main control should now be running through the ignition sequence and eventually light the burner.

**Note: The percentage value that is displayed in the lower left corner of the screen is the magnitude of the fan speed within the factory set range. 100% indicates "Hi Power"**

**The letters displayed in the upper left corner of the screen are shown when certain components are energized or actions are detected during the heating sequence. F = flame is present; B = blower is running; I = ignitor is energized; G = gas valve is open.**

Figure: 21

## Steps to adjust the setpoint temperature

# Operation

Before operating this water heater, be sure to read and follow the instructions on the label pictured below and all other labels on the water heater, as well as the warnings printed in this manual. Failure to do so can result in unsafe operation of the water heater resulting in property damage, bodily injury, or death. Should you have any problems reading or following the instructions in this manual, STOP, and get help from a qualified person.

## 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 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 electrical switch; do not use any phone in your building.
  - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to turn the gas control knob. Never use tools. If the knob will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempt to 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 "ON/OFF" SWITCH NEXT TO THE CONTROL DISPLAY TO THE "OFF" POSITION.
3. THIS APPLIANCE IS EQUIPPED WITH AN IGNITION DEVICE WHICH AUTOMATICALLY LIGHTS THE BURNER.
7. WATER TEMPERATURE ADJUSTMENT IS APPROXIMATELY 120° F. SET THE THERMOSTAT TO THE DESIRED TEMPERATURE SETTING.

### DO NOT TRY TO LIGHT THE BURNER BY HAND

4. IF YOU THEN SMELL GAS, STOP! FOLLOW "B" IN THE SAFETY INFORMATION ABOVE ON THIS LABEL. IF YOU DON'T SMELL GAS, GO TO THE NEXT STEP.
5. TURN ON ELECTRICAL POWER TO THE APPLIANCE SWITCH LOCATED TO THE LEFT OF THE CONTROL DISPLAY.
6. IF THE APPLIANCE WILL NOT OPERATE, FOLLOW THE INSTRUCTIONS "TO TURN OFF GAS TO APPLIANCE"



CAUTION: HOTTER WATER INCREASES THE RISK OF SCALD INJURY. CONSULT THE INSTRUCTION MANUAL BEFORE CHANGING TEMPERATURE.

WARNING: TURN OFF ALL ELECTRIC POWER BEFORE SERVICING.

## TO TURN OFF GAS TO APPLIANCE

1. TURN OFF ALL ELECTRIC POWER TO THE APPLIANCE IF SERVICE IS TO BE PERFORMED.
2. TURN THE "MANUAL GAS VALVE KNOB" TO THE "OFF" POSITION.

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# Maintenance

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Properly maintained, this water heater will provide years of dependable, trouble free service. It is strongly suggested that a regular routine maintenance program be established and followed by the owner. It is further recommended that a periodic inspection of the relief valve and venting system should be made by service technicians qualified in gas appliance repair.

## 1. ROUTINE PREVENTIVE MAINTENANCE

**A. PRESSURE SWITCH** — Inspect the inlet to the pressure switch and the tubing for debris or blockage. Clean out the tubing periodically to prevent buildup of debris.

**B. COLLECTOR PAN** — Remove any particles.

**C. CONDENSATE TRAP** — Check for blockages.

### CAUTION

**D. ELECTRICAL CONNECTIONS** — Periodic inspection of all electrical connections and wiring conditions. Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

### CAUTION

**VERIFY PROPER OPERATION AFTER SERVICING !**  
Make certain all power to the water heater is turned "OFF" before performing any maintenance or inspection work on this water heater.

Before manually operating the relief valve, make certain no one will be exposed to the danger of coming in contact with the hot water released by this valve. The water may be hot enough to create a SCALD hazard. The water released should be directed to a suitable drain to prevent injury or damage.

**NOTICE: If the temperature and pressure relief valve on the water heater discharges periodically, this may be due to thermal expansion in a "closed" water system. Contact the water supplier or local plumbing inspector on how to correct this. DO NOT plug the relief valve outlet.**

**E. TANK**— Good maintenance requires that the tank be cleaned of deposits. Unless the water supply is soft (0 to 5 grains hardness), scale or lime deposits will accumulate in the tank. Hard water scale is deposited at an increasingly high rate in proportion to increased water temperature. Accumulation of these deposits may reduce efficiency, and shorten the life of the water heater. Any new installation should have a tank inspection program set up initially for frequent inspection. The first inspection should be within a six month period. Once the scaling tendencies have been established, the inspection program can be modified to suit the water conditions. Cleaning should be performed if the scale has accumulated above the drain valve opening.

A wet-dry shop vac with a nozzle fashioned from 1"

and/or 3/4" polyethylene pipe makes a good tool for scraping and removing scale.

## TO CLEAN OR INSPECT TANK:

1. Shut off gas valve and drain tank.
2. Remove tank clean-out cover on jacket and with pocket knife cut and remove a circular plug of insulation the full size of jacket opening.
3. Loosen bolts and remove plate and gasket.
4. Remove as much built-up scale from flue tubes and tank bottom as practical. **DO NOT** attempt to clean so thoroughly that the tool used damages the glass lining.
5. Clean the seal plate and install a new gasket. Wipe clean the interior surface of the tank that contacts the gasket. Reinstall the seal plate and tighten in position. Fill tank with water and check for leaks. If no leaks are found, install insulation plug and clean-out cover on jacket and re-light the water heater.

If chemical lime dissolving cleaners are preferred, cautiously follow the instructions supplied with the cleaner. **DO NOT** use a muriatic or hydrochloric acid (HCl) base cleaner.

2. **ANODE INSPECTION** — The water supply in certain areas contains very aggressive elements. In these areas, periodic inspection of the anode is recommended to determine if replacement is necessary. The anode(s) supplied in this water heater is slowly consumed, thereby eliminating or minimizing corrosion and protecting the glass lined tank. The anode(s) should be replaced when more than 6 inches (15 cm) of core wire is exposed at either end.
3. **SEASONAL OPERATION** - If the water heater is to remain idle for an extended period (60 days or more) the heater should be turned off. The water heater and piping should be drained if they might be subjected to freezing temperatures. It is recommended that the water heater's operation is thoroughly checked (by a qualified service technician) before it is placed back in service.

**NOTICE: Refer to the Hydrogen Gas caution notation on page 23.**

**F. VENTING SYSTEM** — Inspect venting system at least yearly to make certain the passageways are free and unobstructed, and that the vent connector from the water heater's blower assembly is properly positioned and securely attached. Remove any obstructions in vent connector or vent terminal.

# Maintenance

## Flush The Tank

Elements in the water such as lime and iron may accumulate in the heater. Accumulation of these elements can keep your water heater from operating

at peak efficiency and may lead to premature tank failure. It is recommended that the tank is drained and flushed thoroughly twice a year to prevent buildup

## Check The Combustion System

On an annual basis, verify that the combustion system is operating within acceptable parameters. Gas pressures and combustion measurements can be used to verify proper operation.

Check the inlet gas pressure to the gas control. The pressure should be greater than 6" W.C. (natural gas) and 8" W.C. (LP gas) when the burner is operating at high fire. Gas pressure shall not exceed 14" W.C. when the burner is off. Measure the products of combustion in the

exhaust vent. At maximum input, the % O<sub>2</sub> in the exhaust gas should be in the range of 3.0 - 4.5%. CO should be less than 25 ppm.

In the combustion readings are outside of the specified ranges, check the manifold pressure on the gas control at the outlet pressure tap. See figure 21 for the location of this pressure tap on the gas control. At maximum input and minimum vent lengths with 4" pipe, the manifold pressures for each model are given in Table 6.

Table 6 - Manifold Pressures.

MODELS	GAS TYPE	APPROVED	Manifold
		ALTITUDE RANGE (ft.)	Pressure (in. W.C.)
GHE119-500	NAT.	0 - 2000	-2.4
GHE125-500A	NAT.	0 - 2000	-2.4
GHE119-500HA	NAT.	2000 - 7800	-2.1
GHE125-500A HA	NAT.	2000 - 7800	-2.1
THE119-500	NAT.	0 - 2000	-2.4
THE125-500A	NAT.	0 - 2000	-2.4
THE119-500 HA	NAT.	2000 - 7800	-2.1
THE125-500A HA	NAT.	2000 - 7800	-2.1
GHE119-500	LP	0 - 2000	-2.0
GHE125-500A	LP	0 - 2000	-2.0
GHE119-500HA1	LP	2000 - 5400	-1.3
GHE119-500HA2	LP	5400 - 7800	-1.3
GHE125-500A HA1	LP	2000 - 5400	-1.3
GHE125-500A HA2	LP	5400 - 7800	-1.3
THE119-500	LP	0 - 2000	-2.0
THE125-500A	LP	0 - 2000	-2.0
THE119-500HA1	LP	2000 - 5400	-1.3
THE119-500HA2	LP	5400 - 7800	-1.3
THE125-500A HA1	LP	2000 - 5400	-1.3
THE125-500A HA2	LP	5400 - 7800	-1.3

Contact Rheem if the measured manifold pressure varies by +/-0.5" W.C. or greater from the specified value.

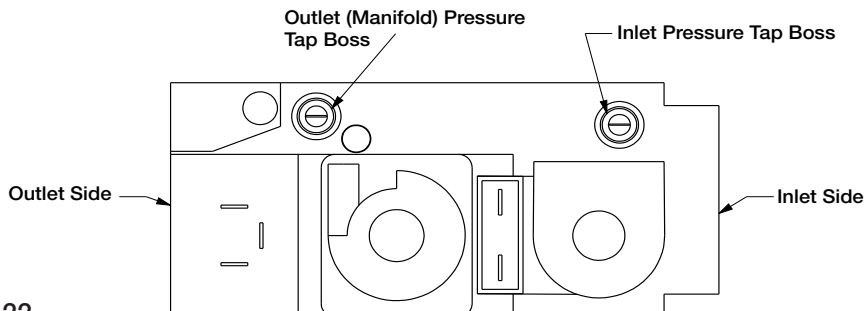


Figure 22

# Troubleshooting

**Table 7: General Troubleshooting**

Problem	Possible causes	Recommended Action
Unable to the burner	Check display for error code	See tables 8 and 9
	Air in the gas line	Contact qualified agency to purge the air from the gas line
	Loose wire connection	Contact qualified agency to inspect the wire.
Burner does not stay lit	Check display for error code	See tables 8 and 9
Rumbling noise in the tank during burner operation	Scale or sediment built-up in the tank	Drain the water heater to remove scale and sediment
Insufficient hot water	Heater undersized for load	Reduce hot water usage rate
	Check display for error code	See tables 8 and 9
	Temperature setting of control is to low	Adjust setting as required
Water to hot or not hot enough	Control temperature settings is to high or to low	Adjust setting as required
T&P relief valve is dripping water	Excessive pressure condition in tank (Greater than 150psi)	Contact qualified agency to inspect water pipe system. Expansion tanks are required in closed systems.
T*P relief valve is gushing hot water	Excessive temperature condition in tank (Greater than 210°F).	Lower the temperature setting on the control. See Figure 21: Operation" for instructions to adjust the temperature setting.

**⚠ CAUTION:**For your safety, the repair and serving of this equipment shall only be performed by a qualified agency.

# Troubleshooting

Table 8 shows a list of lockout error codes. A lockout code will be visible on the control display in the form of a code (letter "A" followed by a number) and a short message. Lockout errors

require a manual reset to resume operation after the root cause of the problem has been solved. To manually reset the control, press the "i" button on the user interface.

**Table 8 - Lockout Error Codes**

LOCKOUT ERRORS			
Code	Error Message	Description & Possible Causes	
A00	EXTND BLOCKING ERROR	<b>Description:</b>	A blocking error has been present for more than 20 hours in a row.
		<b>Causes &amp; Actions:</b>	Investigate the blocking error that caused the lockout.
A01	IGNITION LOCKOUT	<b>Description:</b>	There have been three unsuccessful ignition attempts in a row.
		<b>Causes &amp; Actions:</b>	Dirty or faulty flame rod - see manual.
			Damaged or worn hot surface igniter - see manual.
			Faulty or loose wiring - check wiring and connections to flame rod, hot surface igniter, gas valve and blower.
		Improper venting or restricted inlet/outlet - see manual.	
A05	GV RELAY ERROR	<b>Description:</b>	A failure was detected in the gas valve relay in the main control.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
A06	SAFETY RELAY ERROR	<b>Description:</b>	A failure was detected in the Safety Relay in the main operating control.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
A09, A11, A13, A14	RAM, X-RAM, STATE, OR ROM ERRORS	<b>Description:</b>	Various internal software errors.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
A10, A12	E2PROM ERRORS	<b>Description:</b>	Various errors caused by E2PROM file (i.e. software error).
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
A15	AIR PROVING SW ERROR	<b>Description:</b>	The air proving switch is not opening when the blower is OFF.
		<b>Causes &amp; Actions:</b>	Short in the wiring - check the two pink wires.
			Excessive wind or room draft is creating negative pressure.
A16	15MS XRL ERROR	<b>Description:</b>	Internal software error.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
A17	AIR PROVING SW ERROR	<b>Description:</b>	The air proving switch is not closing when the blower is ON.
		<b>Causes &amp; Actions:</b>	Switch openings are blocked - inspect switch and tubing.
			Loose or damaged wiring - inspect pink wires and connections.
		Blower is not turning on when energized by the control.	
A19, A22, A23, A27, A28, A29, A30	various software errors	<b>Description:</b>	Internal software error.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
A20	FLAME ERROR 2	<b>Description:</b>	The flame is still present 10 seconds after closing the gas valve.
		<b>Causes &amp; Actions:</b>	The gas valve is not closing properly - contact a qualified agency.
A21	FLAME ERROR 1	<b>Description:</b>	A flame is detected before ignition.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the controls.
A24	FLAME FAIL LOCKOUT	<b>Description:</b>	Flame signal has been lost ten times during one demand.
		<b>Causes &amp; Actions:</b>	Dirty or faulty flame rod - see manual.
			Faulty or loose wiring to gas valve - check wiring and connections.
A36	BLOCKED VENT	<b>Description:</b>	Blocked vent error occurs 3 times in a 10 minute period.
		<b>Causes &amp; Actions:</b>	See blocking error E36.
A38	LOW GAS PRESSURE	<b>Description:</b>	Low gas pressure error occurs 3 times in a 10 minute period.
		<b>Causes &amp; Actions:</b>	See blocking error E38.

# Troubleshooting

Table 9 shows a list of blocking error codes. A blocking code will be visible on the control display in the form of a code (letter "E" followed by

a number) and a short message. Blocking errors automatically reset once the error is corrected.

**Table 9 - Blocking Error Codes**

BLOCKING ERRORS			
Code	Error Message	Description & Possible Causes	
E34 - E38	WD INTERNAL ERROR	<b>Description:</b>	Internal software error.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
E31 - E34	REF HI/LO TOO HI/LO	<b>Description:</b>	Internal hardware error.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
E35	FALSE FLAME	<b>Description:</b>	A flame is detected when no flame is allowed.
		<b>Causes &amp; Actions:</b>	The control and/or gas valve is not working properly - contact a qualified agency.
E36	BLOCKED VENT	<b>Description:</b>	The blocked vent circuit is open.
		<b>Causes &amp; Actions:</b>	Intake or exhaust vent is blocked - inspect and clean.
			Faulty or loose wiring to switches - check blue and yellow wires. Excessive wind or room draft is creating high pressures.
E38	LOW GAS PRESSURE	<b>Description:</b>	The gas supply pressure is too low.
		<b>Causes &amp; Actions:</b>	Low supply pressure or undersized piping - see manual.
			Gas supply is turned off.
			Pressure drop due to other appliances on the same supply line. Faulty or loose wiring to switch - check black/yellow wires.
E39	FLUE GAS LIMIT	<b>Description:</b>	The flue gas temperature has exceeded the high limit.
		<b>Causes &amp; Actions:</b>	Exhaust pipe is blocked - inspect and clean.
E43, E47	various WD ERRORS	<b>Description:</b>	Various WD communication errors.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control.
E44	PHASE ERROR	<b>Description:</b>	The polarity at the main power supply is reversed.
		<b>Causes &amp; Actions:</b>	The hot and neutral wires are reversed - Contact a qualified agency to inspect the installation.
E46	EARTH GROUND ERROR	<b>Description:</b>	A faulty earth ground connection is detected.
		<b>Causes &amp; Actions:</b>	Improper wiring - check all green wires.
E51 or E52	WATER T SENSOR OPEN	<b>Description:</b>	The water temperature sensor is open.
		<b>Causes &amp; Actions:</b>	Faulty or loose wiring - check sensor, wires and connections.
E59 or E60	WATER T SENSOR SHORT	<b>Description:</b>	The water temperature sensor is shorted.
		<b>Causes &amp; Actions:</b>	Short in circuit - check sensor, wires and connections.
E65	FLUE SENSOR SHORT	<b>Description:</b>	The flue sensor is shorted.
		<b>Causes &amp; Actions:</b>	Short in circuit - check sensor, wires and connections.
E66	RESET BUTTON ERROR	<b>Description:</b>	An error has occurred with the reset button ("i" button)
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control display.
E72	APPLIANCE SEL ERROR	<b>Description:</b>	An error has occurred due to incorrect appliance selection.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the controls.
E76, E77, E79, OR E81	various fan errors	<b>Description:</b>	A communication error has occurred with the fan.
		<b>Causes &amp; Actions:</b>	Contact a qualified agency to inspect the control

# Troubleshooting

<p>B</p> <p>Hot Water Demand</p> <p>20% 110°F</p>	<p>To access the Installer Menu, hold down the "OK" and "M" buttons together for 5 seconds. Make sure the display is at the home screen before pressing the buttons.</p>
<p>INSTALLER MENU</p> <p>→Heater Status Heater Config System Test ▼</p>	<p>The Installer Menu screen will be displayed. Heater Status contains useful, real-time information pertaining to fan speeds, flame current, flame failure history, ignition attempt history, and lockout/blocking error history. The Heater Status menu can be used when troubleshooting the water heater.</p>
<p>STATUS</p> <p>Fan Speed</p> <p>Actual xxxx RPM Low xxxx RPM ▼</p>	<p><b>The Heater Config menu can be used to set a service reminder and System Test will not need to be accessed.</b></p>
<p>STATUS ▲</p> <p>Fan Speed</p> <p>Ignition xxxx RPM High xxxx RPM ▼</p>	<p>Press the "OK" button to select Heater Status.</p>
<p>STATUS ▲</p> <p>Flame Signal 0.0 uA Failures 0 ▼</p>	<p>The first screen in the STATUS menu displays actual fan speed and the low power fan speed (factory setting). As a reference point, when the fan speed is displayed as "1%" at the home screen the actual speed will match the low power speed.</p>
<p>STATUS ▲</p> <p>Ignition Attempts</p> <p>Successful 0 Failures 0 ▼</p>	<p>Use the down arrow ("-") to advance to the next screen.</p>
<p>STATUS ▲</p> <p>Heater Run Time</p> <p>DHW 0 HR ▼</p>	<p>The second screen in the STATUS menu shows the ignition speed and high power fan speed (both are factory settings). As a reference, when the fan speed is displayed as "100%" at the home screen the actual speed will match the high power speed.</p>
<p>STATUS ▲</p> <p>E x x</p> <p>x Hrs to prev. Block error message ▼</p>	<p>Use the down arrow ("-") to advance to the next screen.</p>
<p>STATUS ▲</p> <p>A x x</p> <p>x Hrs to prev. Lock error message ▼</p>	<p>The third screen displays the present flame current measurement. When a flame is present this value will vary based on fan speed, but it will be in the range of 5 - 7 microamps most of the time.</p>
	<p>A running total of the number of flame failures is also displayed. A flame failure is defined as a loss in flame signal after the flame has been proven during the trial for ignition period.</p>
	<p>Use the down arrow ("-") to advance to the next screen.</p>
	<p>The fourth screen displays the history of ignition attempts. A running total of successful and failed attempts is given.</p>
	<p>Use the down arrow ("-") to advance to the next screen.</p>
	<p>The fifth screen displays the total hours of heating time for the water heater.</p>
	<p>Use the down arrow ("-") to advance to the next screen.</p>
	<p>The sixth screen displays the history of blocking errors. The time interval between errors is given in MIN/HRS/DAY/WK as needed. To the right of the word "STATUS" is the error code ("E" followed by a number) and the error message is shown below the time interval.</p>
	<p>Use the down arrow ("-") to advance to the next screen.</p>
	<p>The final screen displays the history of lockout errors. The time interval between errors is given in MIN/HRS/DAY/WK as needed. To the right of the word "STATUS" is the error code ("A" followed by a number) and the error message is shown below the time interval.</p>
	<p>Press the "M" button to exit the STATUS menus.</p>

Table 10 - Using the Installer Menu



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## Troubleshooting

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### Servicing The Flame Rod and Ignitor

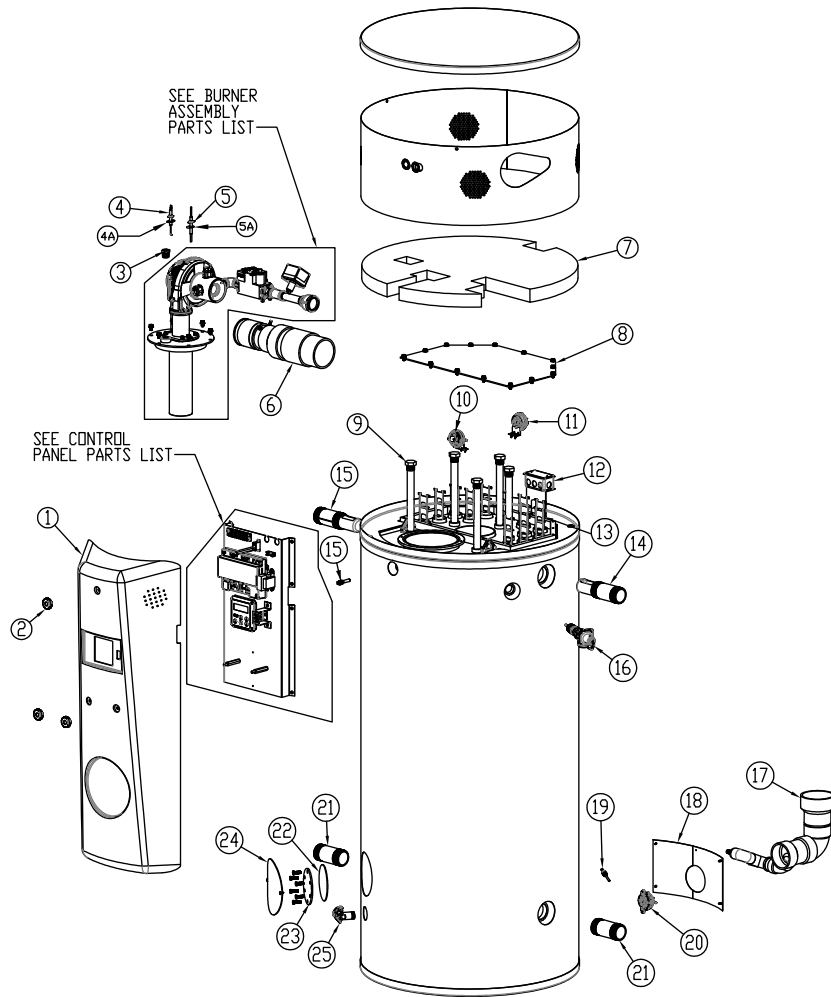
If an A01 lockout error code is present there has been a problem with lighting the burner. Two possible causes for this error are a dirty or faulty flame rod or a faulty ignitor. Each component can be checked for proper operation.

The hot surface ignitor can be checked with a visual inspection through the burner assembly sight glass. Before the gas valve opens in the ignition sequence, the ignitor will warm-up for 20 seconds. During this time, an orange glow will be visible through the sight glass. If accessing the sight glass is not feasible, two simple checks can be made with a multimeter. First, ignitor resistance may be measured at the end of the ignitor wiring terminal. Turn off power to the water heater and disconnect the ignitor wire harness from the wire harness with the two orange wires. Insert the multimeter probes into the ignitor wire harness terminal. At normal room temperature, the ignitor resistance will be approximately 38 ohms. After a heating cycle, the resistance will be in the range of 38 - 80 ohms (depending on when the measurement is taken after the cycle). Besides resistance, the continuity of the ignitor circuit

can be checked. With the multimeter probes still in the terminal, switch the meter to check for continuity. If continuity is not indicated, the ignitor must be replaced.

If the ignitor is working properly and the burner lights but goes out right away, check the flame rod. The rod may be dirty or it could be damaged and a replacement will be required. Start by turning off power to the water heater and remove the flame rod. Inspect the ceramic insulator for cracks (replace if cracked). Clean the rod with fine steel wool and reinstall. Turn on power to the water heater and enter the Installer Menu on the control display (see table 10). Arrow down until the third screen that displays the flame signal. During the next ignition attempt, a flame signal (in microamps, "uA") will be displayed. Under normal operation, the flame signal will be between 2 - 5 uA during a successful ignition period. As the fan speed increases the flame signal will become stronger and eventually be in the 5 - 7 uA range. A minimum flame signal of 1.25 uA is required to avoid a flame failure. If the flame signal is 0 uA when a flame is present during the ignition period, the flame rod needs to be replaced

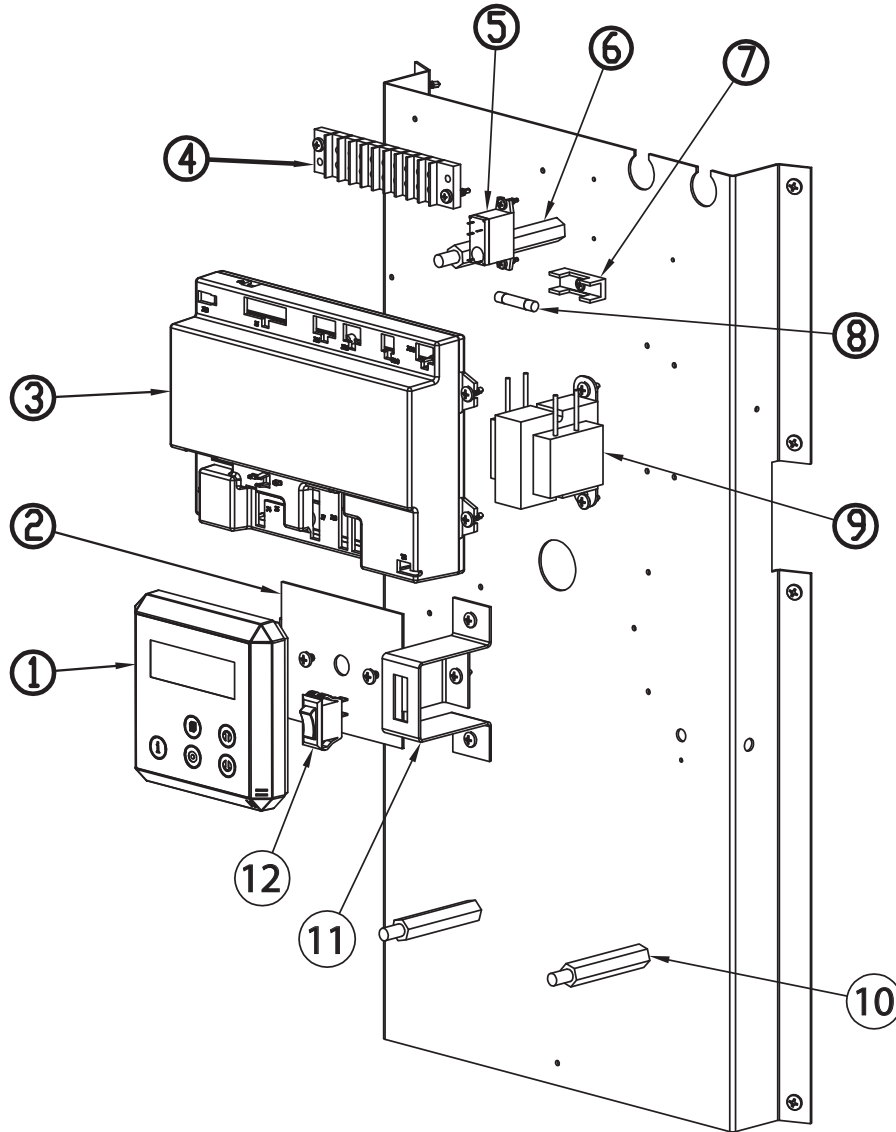
# Parts List



**Table 11 - Parts**

#	Description	#	Description
1	Control Panel Cover	13	Baffle
2	Knob	14	Outlet Pipe Nipple Assembly
3	Sight Glass	15	Tank Temperature Sensors (2-in-1)
4	Flame Rod	16	T&P Relief Valve
4A	Flame Rod Gasket	17	Condensate Elbow Assembly
5	Hot Surface Ignitor	18	Trim Plate (2 pcs.)
5A	Hot Surface Ignitor Gasket	19	Flue Gas Temperature Sensor
6	Air Intake Assembly	20	Blocked Exhaust Switch
7	Insulation (Tank Top)	21	Inlet Pipe Nipple
8	Cover Plate (Transition Chamber 2)	22	Hand Hole Gasket
9	Anode Rod (Magnesium)	23	Hand Hole Cover Plate
10	Air Proving Switch (w/ bracket)	24	Hand Hole Access Cover
11	Blocked Intake Switch (w/ bracket)	25	Drain Valve
12	Power Supply Junction Box		

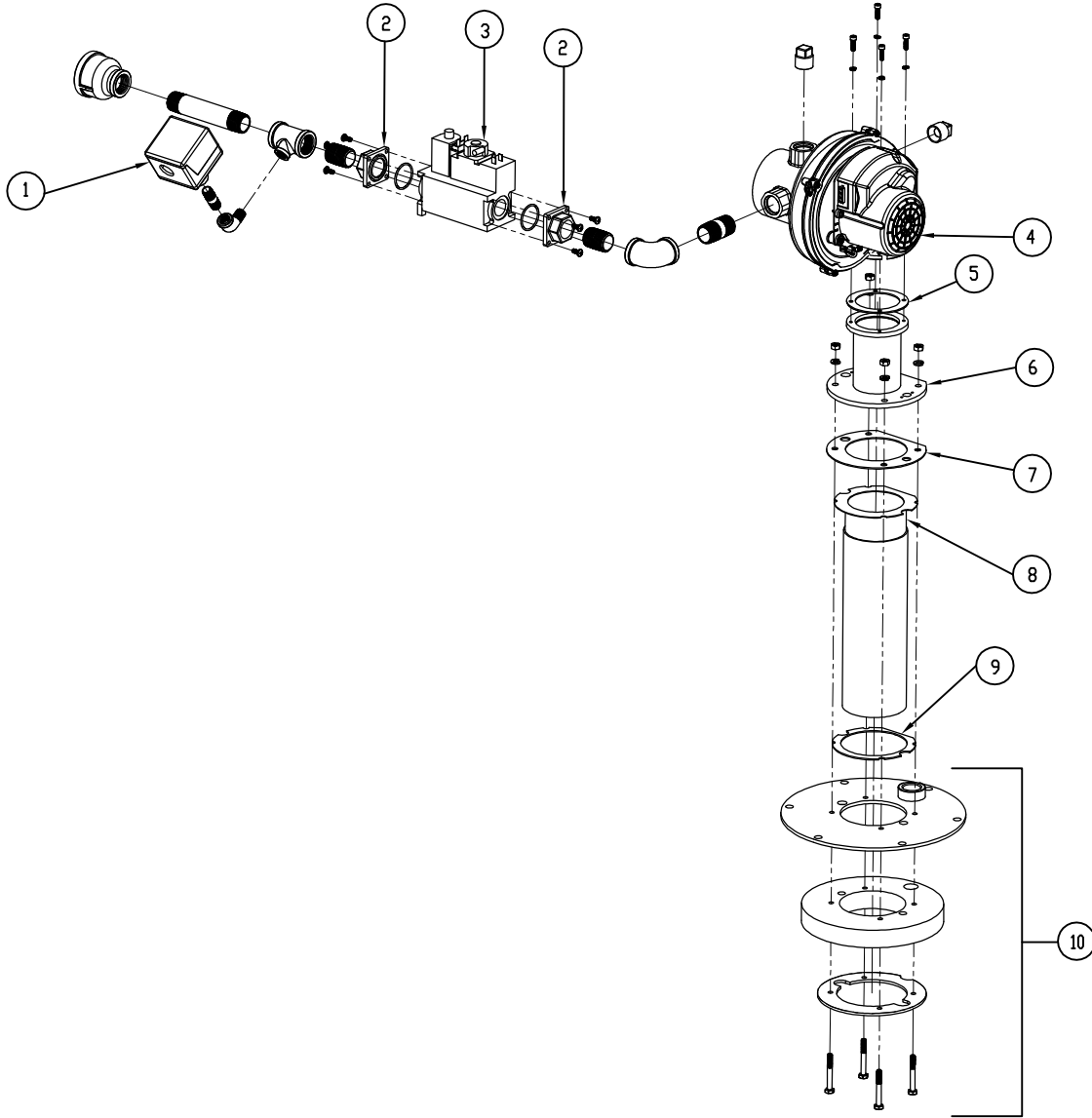
## Parts List



**Table 12 - Control Panel Parts**

#	Description	#	Description
1	Control Display	7	Fuse Block
2	Display Bracket	8	Fuse, 5A (delay)
3	Main Operating Control	9	Transformer (120 VAC / 24 VAC)
4	Terminal Block	10	Standoff, 2.5 in. length
5	Relay	11	Power Switch Bracket
6	Standoff, 3.5 in. length	12	Power Switch (for main control)

# Parts List



**Table 13 - Burner Assembly Parts**

#	Description	#	Description
1	Gas Pressure Switch	6	Transition Tube
2	Gas Control Flange (w/ gasket)	7	Gasket (transition tube to burner)
3	Gas Control	8	Burner
4	Blower	9	Gasket (burner to mounting flange)
5	Gasket (blower to transition tube)	10	Flange Assembly**

\*\* - includes mounting flange, insulation disk, retaining plate and bolts

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## How to Obtain Service Assistance

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1. Should you have any questions about your new water heater, or if it requires adjustment, repair, or routine maintenance, it is suggested that you first contact your installer, plumbing contractor or previously agreed upon service agency. In the event that the firm has moved, or is unavailable, refer to the telephone directory commercial listings or local utility for qualified service assistance.

2. Should your problem not be solved to your complete satisfaction, you should then contact the Manufacturer's National Service Department at one of the following address:

In The U.S.A.:  
Rheem Sales Co., Inc.  
1241 Carwood Court  
Montgomery, Alabama 36117  
Phone: 1-800-432-8373.

In CANADA:  
Rheem Canada, Ltd. / Ltée  
125 Edgeware Road, Unit 1  
Brampton, ON L6Y 0P5  
Phone: 1-800-268-6966.

When contacting the manufacturer, the following information should be made available:

- a. Model and serial numbers of the water heater as shown on the rating plate attached to the jacket of the heater.
- b. Address where water heater is located and can be seen.
- c. Name and address of installer and any service agency who performed service on the water heater.
- d. Date of original installation and dates any service work was performed.
- e. Details of the problem as you can best describe them.
- f. List of people, with dates, who have been contacted regarding your problem.

The following Gaskets are required for Normal Maintenance for all Models:

SP20772 Tank Handhole Sealplate Gasket

All other Parts can be ordered by providing the following information:

1. Description of Part(s), such as:  
Gas Valve  
Igniter  
Burner  
Switch/Sensor  
Blower Assembly  
Anode Rod  
Or other parts as required (see replacement parts section).
2. Quantity of each part required.
3. Complete model number and name of the water heater.
4. Serial Number of water heater.
5. Specify Type of Gas.
6. Address Parts Orders to your distributor or dealer.