



Hydra Smart Commercial



INSTALLATION

OPERATION

START-UP

MAINTENANCE

PARTS

WARRANTY

Models*
CT-250

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



Heat Exchanger Bears the ASME "HLW" Stamp

DANGER

To avoid product damage, personal injury, or possible death, carefully read, understand, and follow all the instructions included in this manual before installing the product. Improper installation, adjustment, alteration, or maintenance can cause property damage, injury, or death. This water heater should be installed and serviced by a qualified technician. The lack of proper service can result in dangerous conditions.

NOTICE: HTP reserves the right to make product changes or updates without notice and will not be held liable for typographical errors in literature.

NOTE: This manual contains safety information, installation instructions, and maintenance procedures. It must be left with the homeowner or placed near the water heater in a noncombustible location.

NOTE TO CONSUMER: PLEASE KEEP ALL INSTRUCTIONS FOR FUTURE REFERENCE.

WARNING

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

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

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

AVERTISSEMENT

Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort.

- Ne pas entreposer ni utiliser d'essence ou ni d'autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ

- Ne pas tenter d'allumer d'appareil.
 - Ne touchez à aucun interrupteur; ne pas vous servir des téléphones se trouvant dans le bâtiment.
 - Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les instructions du fournisseur.
 - Si vous ne pouvez rejoindre le fournisseur, appelez le service des incendies.
- L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.

SPECIAL ATTENTION BOXES

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important product information.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

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

CAUTION

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

NOTICE

NOTICE is used to address practices not related to personal injury.

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS (or equivalent) signs indicate specific safety related instructions or procedures.

NOTE: Contains additional information important to a procedure.

FOREWORD

This manual is intended to be used in conjunction with other literature provided with the water heater. This includes all related control information. It is important that this manual, all other documents included with this system, and additional publications including the National Fuel Gas Code, ANSI Z223.1-2002, be reviewed in their entirety before beginning any work.

Installation should be made in accordance with the regulations of the Authority Having Jurisdiction, local code authorities, and utility companies which pertain to this type of water heating equipment.

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

NOTE: For water heater installations in Massachusetts, the water heater must be installed by a plumber or gas-fitter licensed within the Commonwealth of Massachusetts. Refer to the Massachusetts Statement section in this manual for additional information.

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

FOR THE INSTALLER

DANGER

This manual must only be used by a qualified heating installer/service technician. Read all instructions in this manual before installing. Perform steps in the order given. Failure to comply could result in substantial property damage, severe personal injury, or death.

This appliance must be installed by qualified and licensed personnel. The installer should be guided by the instructions furnished with the water heater, and with local codes and utility company requirements. In the absence of local codes, preference should be given to the National Fuel Gas Code, ANSI Z223.1-2002.

INSTALLATIONS MUST COMPLY WITH:

Local, state, provincial, and national codes, laws, regulations and ordinances.

The latest version of the National Fuel Gas Code, ANSI Z223.1, from American Gas Association Laboratories, 8501 East Pleasant Valley Road, Cleveland, OH 44131.

In Canada – CGA No. B149 (latest version), from Canadian Gas Association Laboratories, 55 Scarsdale Road, Don Mills, Ontario, Canada M3B 2R3. Also, Canadian Electrical Code C 22.1, from Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.

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

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

NOTE: The gas manifold and controls met safe lighting and other performance criteria when the water heater underwent tests specified in ANSI Z21.13 – latest edition.

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PART 1 – GENERAL INFORMATION

A. ITEMS SHIPPED WITH THE WATER HEATER

Also included with the water heater:

- (1) Upper Mounting Bracket
- (2) Condensate Drain Hose
- (3) Communication Cable
- (4) Installation and Operation Manual

NOTE: Items 5 - 8 are spare items shipped with the water heater.

- (5) Fuses
- (6) Electrode Seal
- (7) O-Rings (#015)
- (8) Face Seals

NOT SHOWN: 3" Exhaust and Intake Screens

B. OPTIONAL EQUIPMENT

Below is a list of optional equipment available from HTP. These additional options may be purchased through your HTP distributor:

- 3" PVC Concentric Vent Kit (Part # KGAVT0601CVT)
- 3" Stainless Steel Outside Termination Vent Kit (Part # V1000)
- 4" Stainless Steel Outside Termination Vent Kit (Part # V2000)
- 6" Stainless Steel Outside Termination Vent Kit (Part # V3000)
- 3" Polypro Vent Kit (Part # 8400P-001)
- 3" Polypro Pipe (33' length Part # 8400P-002, 49.5' length Part # 8400P-003)
- Condensate Neutralizer (Part # 7450P-212)
- Intake / Exhaust Screen (6" – Part # SSV6.6, 8" – Part # SSV8.6)

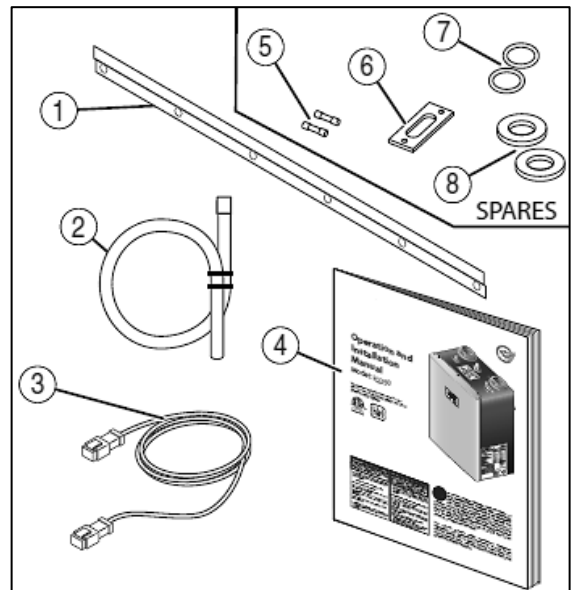


Figure 1 – Included with Water Heater

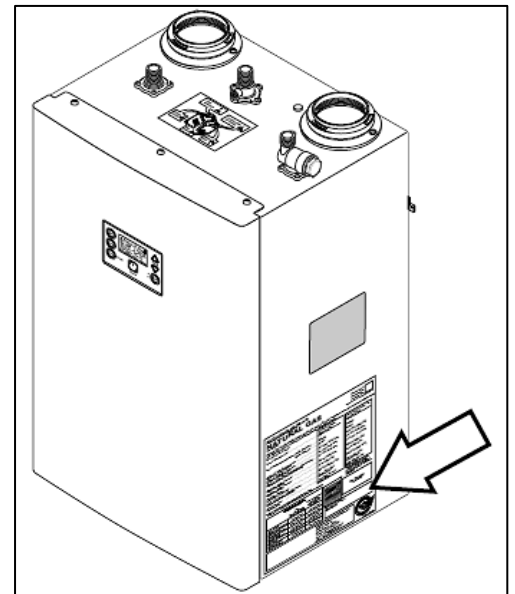


Figure 2 – Serial Number Location

⚠ WARNING

The condensate drain line (2) is shipped from the factory with a loop held together with plastic ties. DO NOT remove the ties and/or straighten the loop. This loop forms an air block (trap) which prevents carbon monoxide from exiting the water heater through the drain line. Improper installation of the drain line can result in excessive levels of carbon monoxide, which can lead to severe personal injury or death.

C. SERIAL NUMBER PLATE LOCATIONS

Each heat exchanger module has its own ASME certification plate. A rating plate below the ASME certification plates has the serial number for the water heater. Please provide this serial number whenever contacting HTP, Inc. for service or warranty.

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

PART 2 – OPERATION AND INSTALLATION WARNINGS

A. GENERAL

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

⚠ WARNING

DO NOT use this water heater for any purpose other than water heating. Failure to do so could result in property damage, serious personal injury, or death, and WILL VOID product warranty.

This water heater must be installed by a licensed plumber, licensed gas fitter, and/or professional service technician. Improper installation and/or operation can cause a potentially hazardous situation, which, if not avoided, could result in serious injury or death, and will void the warranty.

Proper care is the homeowner / end user's responsibility. INSTALLER: Carefully read and understand the Operation Information in this manual and communicate that information to the homeowner / end user before completing installation.

⚠ DANGER

A. This water heater does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner manually.

B. Before operating, smell all around the water heater area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle to the floor.

WHAT TO DO IF YOU SMELL GAS

- DO NOT try to light any appliance.
- DO NOT touch any electric switch; DO NOT use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire or police department.

C. Use only your hand to turn the manual gas shut-off valve. Never use tools. If manual gas shut-off valve will not turn by hand, don't try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion, causing substantial property damage, severe personal injury, or death.

⚠ WARNING

DO NOT use or store flammable liquids or sprays such as gasoline, oils, spray paints, etc. around the water heater. The water heater has a burner that can come on at any time and ignite vapors. Vapors from flammable liquids will explode and can cause a fire, resulting in personal injury or death.

DO NOT operate this water heater unless it is properly vented to the outdoors (the exhaust vent piping must be connected from the appliance flue collar directly to the outdoors. Exhaust gases must be completely expelled out of the building. Improper venting can cause a build-up of carbon monoxide which can result in severe personal injury or death.

This water heater is factory preset for NATURAL GAS but may be field converted for use with propane. For propane conversion, refer to the gas conversion section of this manual. Connecting the water heater to any other gas supply can result in property damage, serious injury, or death.

This water heater is suitable for use in potable water heating applications. The cold and hot water fittings on the top of the water heater MUST NOT be connected to any heating system.

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

LP-304 4/26/09

⚠ WARNING

The water heater temperature is factory set to 120°F (49°C). Hot water temperatures above 125°F can cause severe burns instantly or death from scalds. If the proposed water heater outlet temperature is to be set above 125°F, installation of a thermostatically controlled (or temperature limiting) mixing valve is recommended for all hot water going to faucets to avoid risk of scalding. Examples include commercial applications where 140°F (60°C) is often needed or if the space heating temperature required is higher than domestic hot water. To avoid scalding, always check the temperature of the hot water before bathing, showering, washing, etc. DO NOT adjust the water temperature while the water heater is being used by other persons.

Protect against snow and debris accumulation around the vent terminations. Regularly inspect the exhaust vent and air intake pipes to ensure they remain clear from obstructions at all times.

DANGER

Improper venting can cause a build-up of carbon monoxide. Breathing carbon monoxide can result in brain damage or death. **DO NOT** operate the water heater unless it is properly vented to the outside and has an adequate fresh air supply for safe operation. Inspect the exterior exhaust gas outlet port and fresh air inlet port on a regular basis to ensure they are functioning properly.

A concentration of carbon monoxide as small as .04% (400 parts per million) in the air can be fatal. When making high fire or low fire adjustments, CO levels must be monitored using a flue gas analyzer such that a CO level of no more than 400 ppm is exceeded at any time during operation.

Adjusting the “low fire offset” or the “main flow restrictor” in small increments can result in a significant increase in CO concentration. To avoid serious injury or death, **DO NOT** make any adjustments to the gas valve without monitoring the exhaust gases with a fully functional and calibrated flue gas analyzer.

WARNING

DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN SUBMERGED IN WATER. Immediately call a qualified service technician. The appliance **MUST BE** replaced if it has been submerged. Attempting to operate an appliance that has been submerged could create numerous harmful conditions, such as a potential gas leakage causing a fire and/or explosion, or the release of mold, bacteria, or other harmful particulates into the air. Operating a previously submerged appliance could result in property damage, severe personal injury, or death.

NOTE: Appliance damage due to flood or submersion is considered an Act of God, and IS NOT covered under product warranty.

NOTICE

If the water heater is exposed to the following, do not operate until all corrective steps have been made by a qualified service technician:

1. FIRE
2. DAMAGE
3. WATER

This water heater is equipped with a three prong plug. It should only be plugged directly into a properly grounded three prong receptacle. **DO NOT** remove the ground plug from the plug.

DO NOT alter or modify the water heater or water heater controls. This can be dangerous and **WILL VOID** the warranty.

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

SAFETY INSTRUCTIONS

DO NOT reverse the cold water and gas connections as this will damage the gas valve.

DO NOT over-tighten fittings as damage may occur, causing internal leakage.

The appliance should be located in an area where leakage within the water heater or its connections will not result in damage to the surrounding area. The manufacturer **WILL NOT** be responsible for any property damages resulting from leakage.

NOTE: For residential applications, because of the powerful, commercial grade blower motor used in this water heater, take precautions **NOT** to install the heater near bedrooms or sensitive areas. **DO NOT** install on uninsulated interior walls or where water heater venting will touch interior ducting. Direct venting (2 pipe) is recommended for all noise sensitive areas.

B. IMPROPER COMBUSTION

WARNING

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

C. GAS

Should overheating or gas supply fail to shut off, do not turn off or disconnect electrical supply to the circulator. Instead, shut off the gas supply at a location external to the appliance.

WARNING

INSTALLER: Make sure homeowner / end user knows the location of the gas shut-off valve and how to operate it. Immediately close the gas shut-off valve if the water heater is subjected to fire, overheating, flood, physical damage, or any other damaging condition that might affect the operation of the water heater. Have the water heater checked by a qualified technician before resuming operation.

Do not power up the water heater unless the gas and water supply valves are fully opened. Make sure the fresh air intake port and exhaust gas port are open and functional.

D. WHEN SERVICING THE WATER HEATER

- To avoid electric shock, disconnect electrical supply before performing maintenance.
- To avoid severe burns, allow water heater to cool.

- Do not use petroleum-based cleaning or sealing compounds in a water heater system. Gaskets and seals in the system may be damaged, possibly resulting in substantial property damage.
- Do not use “homemade cures” or “patent medicines”. Substantial property damage, damage to water heater, and/or serious personal injury may result.

E. WATER QUALITY

Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3) as shown in Table 1. If your water contains contaminants higher than outlined by EPA, then water treatment is recommended and additional maintenance may be required. If you suspect that your water is contaminated in any way or water heater errors occur, discontinue use of the water heater and contact an authorized technician or licensed professional.

Contaminant	Maximum Allowable Level
Aluminum	0.05 to 0.2 mg/l
Chloride	250 mg/l
Copper	1 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
pH	6.5-8.5
Sulfate	205 mg/l
Total Dissolved Solids (TDS)	500 mg/l
Zinc	205 mg/l

Table 1 – Water Quality Specifications

CAUTION

Water treatment is recommended if the water quality is known to have high acidity and/or hardness. Consult the local water authority for water quality information and treatment suggestions.

F. FREEZE PROTECTION

CAUTION

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

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

PART 3 – SPECIFICATIONS

A. TECHNICAL SPECIFICATIONS

Model	CT-250
Type	Indoor, Wall Hung, Fully Condensing
Fuel	Preset for NG / LP Convertible
Minimum / Maximum Input (Btu/Hr)	30,000 / 250,000
Thermal Efficiency	96%
Energy Factor	N/A
Dimensions H X W X D (Inches)	26 X 17.4 X 14.9 (3.9 cu. ft.)
Weight (lbs)	90
Water Inlet / Outlet Connection	¾" NPT
Gas Inlet Connection	¾" NPT
Minimum Flow Rate for Activation	0.6 GPM
Ignition	Electronic Spark Ignition
Venting Type	Direct Vent (2 pipe – intake and exhaust), Power vent (1 pipe, exhaust only)
Venting Materials	Sch. 40 PVC, Sch. 40 CPVC, Polypropylene, Stainless Steel
Max 3" Vent Length – Single Pipe / Power Vent	130 ft, deduct 5 ft per 90° elbow and 2 feet per 45° elbow
Max 3" Vent Length – Two Pipe / Direct Vent	65 ft, deduct 5 ft per 90° elbow and 2 feet per 45° elbow
Common Venting	Yes
Safety	Flame Rod, Thermal Fuse, Overheat Prevention Device, Blower Speed Monitor, Flue Temperature Monitor, Blocked Vent Detector, Water Shut Off Valve, 2X10A Fuse, Dual Flame Sensing, Flue Damper
Water Pressure Min / Max (PSI)	30 / 160
NG/LP Minimum Static Gas Pressure ½" Black Iron	6"
NG/LP Minimum Static Gas Pressure ¾" Black Iron	2.5"
NG/LP Maximum Static Gas Pressure	14"
Gas Pressure for Adjustments	8" for NG, 11" for LP
Electrical	120V AC, 60 Hz
Power Consumption	500W (Max 4.2 Amps), 8W (Standby)
Features	
Listing	ETL (Z21.10.3 / CSA 4.3), ASME HLW
Cascading	Masterless, Up to 10 water heaters
Heat Exchanger	Expandable, Stainless 316L
Performance	
Hot Water Capacity (35°F Rise)	13.8 gallons
Hot Water Capacity (45°F Rise)	10.7 gallons
Hot Water Capacity (77°F Rise)	6.3 gallons
Domestic Mode Temp. Settings	100 – 140°F
Commercial Mode Temp. Settings	100 – 190°F
Warranty (With Recirculation)	Heat Exchanger Coil – 6 years, Parts – 1 year

Table 2 – Technical Specifications

NOTE: Due to HTP's policy of continuous product improvements, design, and technical specifications are subject to change without notice.

NOTICE

The hot water delivery capacity should be reduced by 4% for each 1,000 feet above sea level for operation at elevations above 2,000 feet.

B. SPECIFICATIONS AND DIMENSIONS

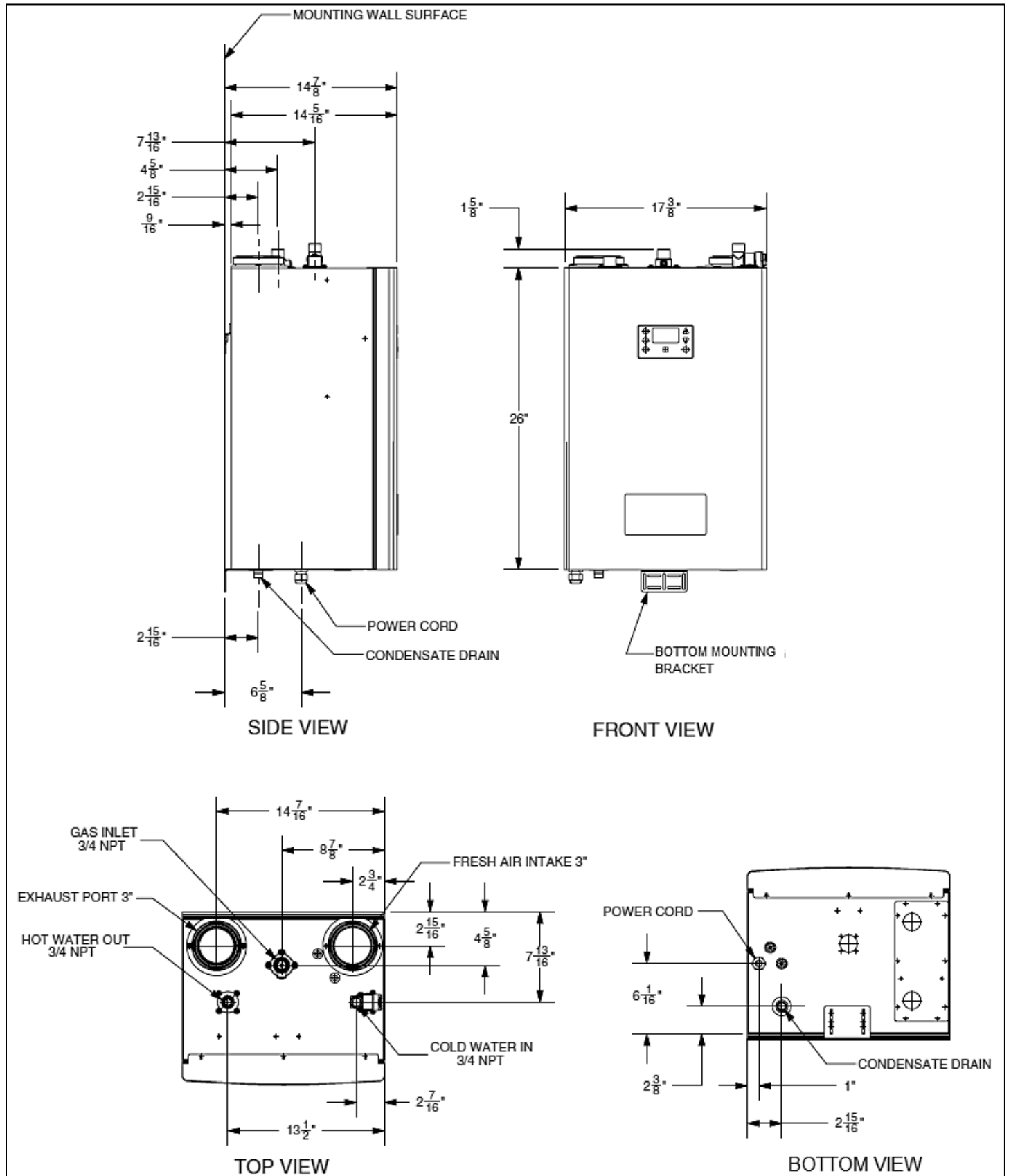


Figure 3 – Specifications and Dimensions

C. CLEARANCE REQUIREMENTS

In order for the water heater to operate properly and efficiently, the clearances specified in the table below are required.

Required Mounting Clearances			
Location	From Combustibles	From Non-Combustibles	Service Clearance ¹
Top	6" (15.2 cm)	2" (5.1 cm)	12" (30.4 cm)
Back ²	5/8" (15.8 mm)		
Sides	1" (25.4 mm)	1/2" (12.7 mm)	5/8" (15.8 mm)
Front	2" (5.1 cm)		30" (76.2 cm)
Bottom	12" (30.4 cm)		

Table 3 – Required Mounting Clearances

¹Service clearances are suggested dimensions to allow for normal service of the water heater.

²Installing (hanging) the water heater with the included bracket automatically sets this dimension.

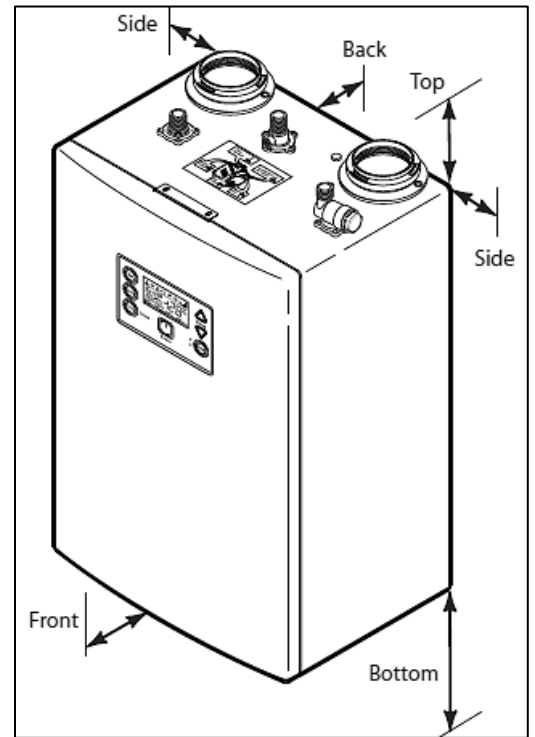


Figure 4 – Cabinet Dimensions

D. WATER HEATER CONNECTIONS

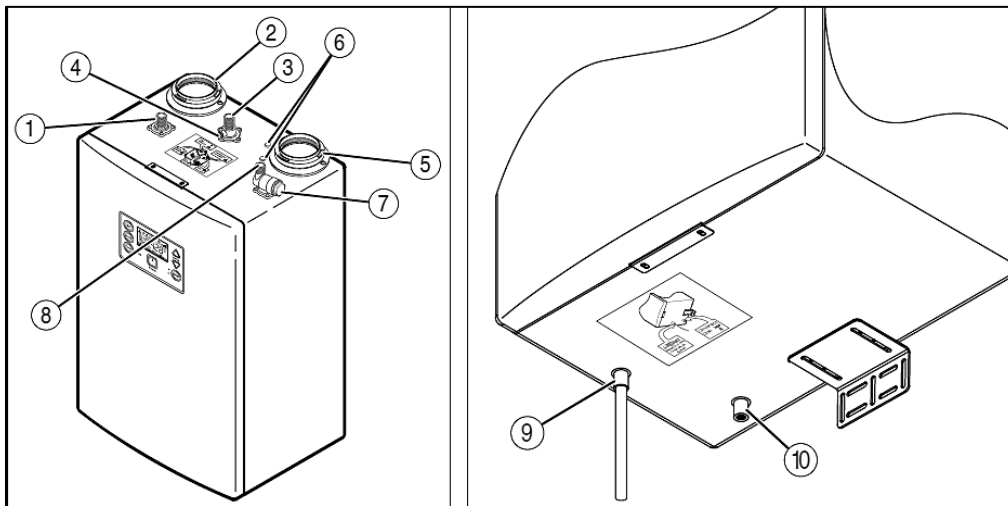


Figure 5 – Top and Bottom Connections

Top and Bottom Connections		
Item	Description	Specification*
1	Hot Water Outlet Connection	3/4" Male NPT
2	Exhaust Gas Vent	3" OD
3	Gas Supply Inlet Connection	3/4" Male NPT
4	Gas Pressure Analyzer Port	1/8" Female NPT
5	Fresh Air Intake	3" OD
6	Access Ports for Blower Mounting Hardware	-
7	Water Inlet Strainer	-
8	Cold Water Inlet Connection	3/4" Male NPT
9	Power Supply	120V AC Power Cord
10	Condensate Drain Connection	3/4" Nipple (3/4" flex hose)

Table 4 – Top Connection Specifications

*Using sizes other than specified can cause damage to the water heater and will void the warranty.

E. CO₂ REQUIREMENTS

CO ₂ and CO Standards		
Description	CO ₂ Range (%)	Max. CO Level (ppm)
Natural Gas		
High Fire	8.8 – 9.1%	< 200 ppm
Low Fire	8.6 – 8.9%	< 60 ppm
LP Gas		
High Fire	8.8 – 10%	< 200 ppm
Low Fire	8.6 – 9.8%	< 60 ppm

Table 5 – CO₂ and CO Standards**PART 4 – PREPARATION BEFORE INSTALLATION****A. SELECTING AN INSTALLATION SITE****NOTICE**

When installing this water heater, follow all local building codes and the current edition of the National Fuel Gas Code (ANSI Z223.1/NFPA 54) in the USA or National Gas and Propane Installation Code (CAN/CGA B149.1) in Canada.

1. Select an interior location for the installation. Each installation is unique; therefore, take the time to find the best location for the water heater.
 - a. Install the water heater near locations that use hot water, such as the bathroom, kitchen, or laundry room faucets.
 - b. Select a location that minimizes the length of the water pipe.
 - c. If the distances are long or if the faucet or appliance requires “instant” hot water, we recommend running a recirculation line back to the water heater from the furthest fixture.
 - d. Insulate the hot water supply and recirculation lines.
 - e. Select a location away from foot traffic and areas where dust, debris, chemical agents, or other combustible materials could accumulate.
 - f. Allow sufficient space for service and maintenance access to all gas, water, and drain connections.
 - g. Make sure the location meets all building code requirements.
 - h. Make sure the wall surface the water heater will be mounted onto will support the weight of the filled water heater and all associated piping. The water heater weighs approximately 90 lbs. when empty.

 CAUTION

LIFTING HAZARD: The water heater weighs approximately 90 lbs. To prevent personal injuries, always use two people when lifting heavy or bulky objects. DO NOT attempt to lift objects that are too heavy.

According to the National Institute for Occupational Safety and Health, the recommended maximum safe lifting weight is 51 pounds, with all lifting conditions perfect – minimal forward reach, steady load close to the body, straight back, load between knees and shoulders, and good grips. To avoid personal injury, always use these proper lifting techniques and use two people or appropriate lifting devices to move the water heater.

2. Minimize the distance the exhaust vent and intake pipe must travel to an exterior wall.
 - a. The exhaust vent must not terminate near a walkway, near soffit vents, crawl space vents, or other areas where condensate (water vapor) could cause damage or create a hazard.
 - b. The fresh air intake opening must be located at least 12” from the exhaust vent.
 - c. Contaminated or dirty air drawn into the intake can damage the water heater. The warranty does not cover damage caused by airborne contaminants.

NOTICE

Reduce the maximum equivalent length by 5 feet per 90° elbow and 2 feet per 45° elbow. Exhaust vent and intake pipes have the same allowable lengths. Do not exceed these limits.

EXAMPLE: A water heater with a 3” exhaust vent or intake pipe with the maximum six (6) 90° elbows would be limited to a length of 170 feet in a power vent configuration or 70 feet in a direct vent application.

3. Locate the water heater close to a drain and near gas and water connections.

The water heater produces a significant amount of condensate during normal operation and should be located near a suitable drain where damage from a possible leak will be minimal. Installing the water heater in a location without a drain will void the warranty, and HTP, Inc. will not be responsible for any resulting water damages that may occur as a result. For additional information, refer to the Install Condensate Line section of this manual.

The water heater should be located in an area where leakage from the water heater or water pipes will not result in damage to the area around the appliance or to lower floors of the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the water heater. The pan must not restrict combustion air flow.

4. Locate the water heater and all water pipes in an area where the ambient temperature always remains above freezing.
 - a. When the water heater is connected to an electrical power supply, it will automatically prevent the water inside the water heater from freezing.
 - b. The water heater's freeze protection system will not prevent the water in the surrounding pipes from freezing.

NOTICE

In cold climates, if there is a power failure, the water heater's freeze protection system will not operate, and can result in water freezing inside the heat exchanger. To prevent damage to the water heater, turn OFF the gas supply and inlet water valve. Open the drain valve and completely drain the water heater.

Damage cause by freezing water is not covered by the warranty.

5. Select an appropriate location for the exhaust vent and intake pipes to exit the house. Use the diagrams and charts in the Venting section of this manual to aid in making this determination.

B. HIGH ELEVATION INSTALLATIONS

For operation at elevations above 2,000 feet, model ratings should be reduced by 4% for each 1,000 feet above sea level.

C. WATER QUALITY

Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3) as shown in Table 6. If your water contains contaminants higher than outlined by EPA, then water treatment is recommended and additional maintenance may be required. If you suspect that your water is contaminated in any way or water heater errors occur, discontinue use of the water heater and contact an authorized technician or licensed professional.

Contaminant	Maximum Allowable Level
Aluminum	0.05 to 0.2 mg/l
Chloride	250 mg/l
Copper	1 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
pH	6.5-8.5
Sulfate	205 mg/l
Total Dissolved Solids (TDS)	500 mg/l
Zinc	205 mg/l

Table 6 – Water Quality Specifications

PART 5 – WALL MOUNTING

All water heaters come with an upper mounting bracket with predrilled holes spaced at 16" centers to facilitate easy installation on standard wall studs.

If the strength of the wall is insufficient, or if the framing is non-standard or uneven, reinforce the area using a sheet of plywood or mounting blocks before installing the water heater.

 WARNING

The water heater weighs approximately 90 lbs and must be securely attached to the wall. The weight will increase substantially when the water heater is fully installed (piped and full of water). Ensure the wall can support the weight of the water heater BEFORE mounting the water heater. Failure to do so could result in property damage, severe personal injury, or death. Such damages ARE NOT covered by warranty.

Avoid installation on walls that can transmit operational noises to occupants while the water heater is operational.

To mount the water heater to the wall:

1. Place the upper mounting bracket on the wall and ensure that it is level. See Figure 6. Use two appropriately sized wood screws to mount the bracket securely to the studs. Ensure that the bracket is affixed securely and can support the weight of the water heater.

SAFETY INSTRUCTIONS

It is important that only the brackets included with the water heater be used to mount it. These brackets have been specifically designed to mount the water heater at a proper clearance, and accommodate the approximate filled weight of the water heater (90 lbs).

2. With assistance, hang the water heater on the upper wall bracket, interlocking the bracket on the back of the water heater (1) and the wall bracket (2). See Figure 6.

⚠ CAUTION

LIFTING HAZARD – According to the National Institute for Occupational Safety and Health, the recommended maximum safe lifting weight is 51 pounds, with all lifting conditions perfect – minimal forward reach, steady load close to the body, straight back, load between knees and shoulders, and good grips. To avoid personal injury, always use these proper lifting techniques and use two people to move the water heater which weighs approximately 90 pounds.

3. Install two appropriately sized wood screws in the lower bracket (3) to secure the water heater to the wall. See Figure 6.

4. Make sure the water heater is plumb and level, and tighten the four sheet metal screws on the bottom bracket (3). When properly installed, there should be a 5/8" air space between the back of the water heater and the wall. See Figure 6.

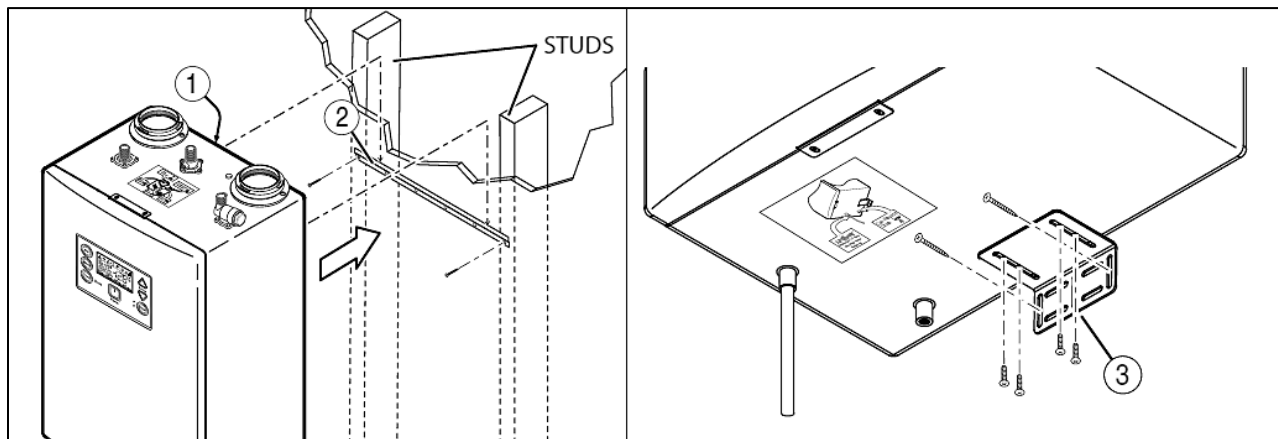


Figure 6 – Mounting to Studs

PART 6 – GAS PIPING

A. GAS CONNECTION GUIDELINES

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD

To avoid serious injury or even death, the gas line installation and the gas line inlet pressure test must be done by a licensed professional.

The water heater is factory preset for natural gas.

Make sure the gas line pressures are within normal limits. Pressures outside normal limits can result in poor performance and hazardous operating conditions.

1. Determine if the water heater will use natural gas (factory preset) or LP (propane) gas. To convert the water heater to propane, refer to the Propane (LPG) Conversion section of this manual.
2. Make sure the gas pressure meets the requirements for the water heater as shown below.

Parameters	
NG/LP – Minimum Static Gas Pressure (1/2") Black Iron Pipe	6"
NG/LP – Minimum Static Gas Pressure (3/4") Black Iron Pipe	2.5"
NG/LP – Maximum Static Gas Pressure	14"
Gas Pressure Adjustments	8" for NG, 11" for LP

Table 7 – Gas Pressure Requirements

3. Select the proper gas piping.
 - a. All gas piping and components must comply with the NFPA, local codes, and utility requirements. Only approved gas fittings, valves, or pipe should be used.
 - b. Assembled piping should be clean of all scale, debris, metal particles, or foreign material.
 - c. The piping must be supported from the floor, ceiling, or walls.
4. Make sure the pipe diameter length is correctly sized to meet the maximum output of the water heater(s) being installed.
 - a. The maximum gas flow rate required is the sum of the maximum inputs of each water heater divided by the heat of combustion of the fuel supplied at the location. Use 1030 BTU per cubic foot for natural gas and 2520 BTU per cubic foot for propane.
 - b. The fuel supplier or utility should be consulted to confirm that sufficient volume and normal pressure is provided to the building at the discharge side of the gas meter or supply pipe.
 - c. Use the Gas Pipe Sizing tables in this section or refer to the gas line manufacturer's sizing information to determine the correct diameter for the supply pipe.
5. Make sure a drip leg is installed on the gas piping.
 - a. Drip legs are required at the gas supply of each heater to prevent any dirt, condensation, or debris from entering the gas inlet.
 - b. When multiple heaters are installed, some utilities and local codes require a full size drip leg on the main gas supply line in addition to the drip leg at each water heater.
 - c. The bottom of the gas drip leg should be removable without disassembling any gas piping.
 - d. The weight of the gas pipe should not be supported from the bottom of the drip leg.

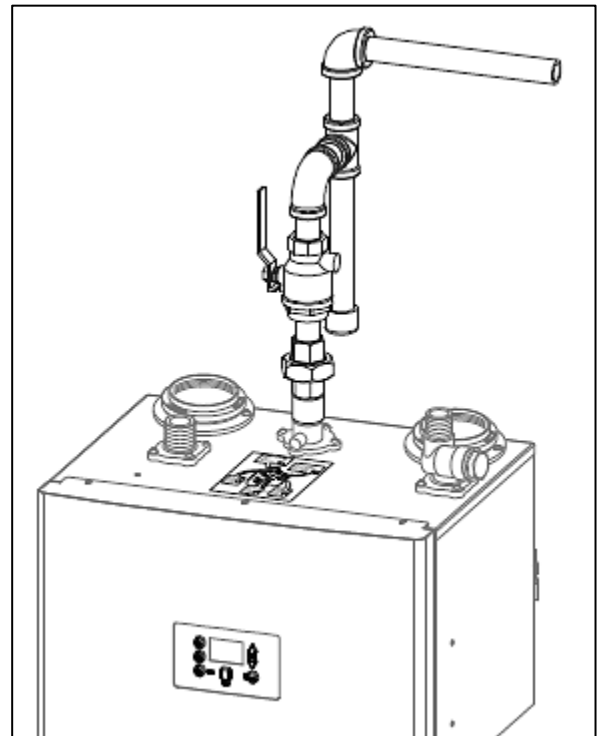


Figure 7 – Gas Piping with Drip Leg

NOTE: Always clean the inside of the gas line of any dirt or debris before connecting the pipe to the water heater.

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

NOTICE

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

B. ADDITIONAL PRECAUTION FOR EXCESS FLOW VALVE (EFV)

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

C. GAS PIPE SIZING TABLES

This information in Tables 8 – 10 is for reference use only. Refer to gas pipe manufacturer specifications for actual delivery capacity. The DOE standard for Natural Gas is 1100 BTU/ft³. Contact the local gas supplier for actual BTU/ft³ rating. This data from the National Fire Protection Association Article 54 (NFPA 54).

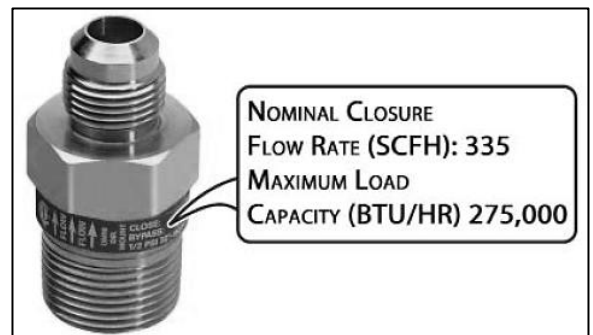


Figure 8 – Excess Flow Valve (EFV)

PIPE SIZES AND BTU/H CAPACITY (NATURAL GAS) FOR STATIC GAS PRESSURE LESS THAN 5"								
Length Including Fittings	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"
10	360,000	678,000	1,390,000	2,090,000	4,020,000	6,400,000	11,300,000	23,100,000
20	247,000	466,000	957,000	1,430,000	2,760,000	4,400,000	7,780,000	15,900,000
30	199,000	374,000	768,000	1,150,000	2,220,000	3,530,000	6,250,000	12,700,000
40	-	320,000	657,000	985,000	1,900,000	3,020,000	5,350,000	10,900,000
50	-	284,000	583,000	873,000	1,680,000	2,680,000	4,740,000	9,660,000
60	-	257,000	528,000	791,000	1,520,000	2,430,000	4,290,000	8,760,000
70	-	237,000	486,000	728,000	1,400,000	2,230,000	3,950,000	8,050,000
80	-	220,000	452,000	677,000	1,300,000	2,080,000	3,670,000	7,490,000
90	-	207,000	424,000	635,000	1,220,000	1,950,000	3,450,000	7,030,000
100	-	-	400,000	600,000	1,160,000	1,840,000	3,260,000	6,640,000
125	-	-	355,000	532,000	1,020,000	1,630,000	2,890,000	5,890,000
150	-	-	322,000	482,000	928,000	1,480,000	2,610,000	5,330,000
175	-	-	296,000	443,000	854,000	1,360,000	2,410,000	4,910,000
200	-	-	275,000	412,000	794,000	1,270,000	2,240,000	4,560,000

NOTE: BTU/H Capacities are based on specific gravity of 0.6, pressure drop of .5" WC

Table 8 – Pipe Sizes and BTU/H Capacity for Natural Gas Pressures Less Than 5"

PIPE SIZES AND BTU/H CAPACITY (NATURAL GAS) FOR STATIC GAS PRESSURE GREATER THAN 5"									
Length Including Fittings	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"
10	404,000	949,000	1,787,000	3,669,000	5,497,000	10,588,000	16,875,000	29,832,000	43,678,000
20	286,000	652,000	1,228,000	2,522,000	3,778,000	7,277,000	11,598,000	20,503,000	30,020,000
30	233,000	524,000	986,000	2,025,000	3,034,000	5,844,000	9,314,000	16,465,000	24,107,000
40	202,000	448,000	844,000	1,733,000	2,597,000	5,001,000	7,971,000	14,092,000	20,632,000
50	-	397,000	748,000	1,536,000	2,302,000	4,433,000	7,065,000	12,489,000	18,286,000
60	-	360,000	678,000	1,392,000	2,085,000	4,016,000	6,401,000	11,316,000	16,569,000
70	-	331,000	624,000	1,280,000	1,919,000	3,695,000	5,889,000	10,411,000	15,243,000
80	-	308,000	580,000	1,191,000	1,785,000	3,437,000	5,479,000	9,685,000	14,181,000
90	-	289,000	544,000	1,118,000	1,675,000	3,225,000	5,140,000	9,087,000	13,305,000
100	-	273,000	514,000	1,056,000	1,582,000	3,046,000	4,856,000	8,584,000	12,568,000
125	-	242,000	456,000	936,000	1,402,000	2,700,000	4,303,000	7,608,000	11,139,000
150	-	219,000	413,000	848,000	1,270,000	2,446,000	3,899,000	6,893,000	10,093,000
175	-	202,000	380,000	780,000	1,169,000	2,251,000	3,587,000	6,342,000	9,285,000
200	-	-	353,000	726,000	1,087,000	2,094,000	3,337,000	5,900,000	8,638,000

NOTE: For ½" line BTU/H Capacities are based on specific gravity of 0.6, pressure drop of 4.6" WC and 5" WC. For all other line sizes, capacities are based on a specific gravity of 0.6, pressure drop of 3" WC

Table 9 – Pipe Sizes and BTU/H Capacity for Natural Gas Pressures Greater Than 5"

PIPE SIZES AND BTU/H CAPACITY (PROPANE) FOR STATIC GAS PRESSURE GREATER THAN 5"									
Length Including Fittings	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"
10	409,000	608,000	1,150,000	2,350,000	3,520,000	6,790,000	10,800,000	19,100,000	39,000,000
20	289,000	418,000	787,000	1,620,000	2,420,000	4,660,000	7,430,000	13,100,000	26,800,000
30	236,000	336,000	632,000	1,300,000	1,940,000	3,750,000	5,970,000	10,600,000	21,500,000
40	204,000	287,000	541,000	1,110,000	1,660,000	3,210,000	5,110,000	9,030,000	18,400,000
50	-	255,000	480,000	985,000	1,480,000	2,840,000	4,530,000	8,000,000	16,300,000
60	-	231,000	434,000	892,000	1,340,000	2,570,000	4,100,000	7,250,000	14,800,000
80	-	212,000	400,000	821,000	1,230,000	2,370,000	3,770,000	6,670,000	13,600,000
100	-	-	372,000	763,000	1,140,000	2,200,000	3,510,000	6,210,000	12,700,000
125	-	-	349,000	716,000	1,070,000	2,070,000	3,290,000	5,820,000	11,900,000
150	-	-	330,000	677,000	1,010,000	1,950,000	3,110,000	5,500,000	11,200,000
175	-	-	292,000	600,000	899,000	1,730,000	2,760,000	4,880,000	9,950,000
200	-	-	265,000	543,000	814,000	1,570,000	2,500,000	4,420,000	9,010,000

NOTE: For ½" line BTU/H Capacities are based on specific gravity of 0.6, pressure drop of 4.6" WC

Table 10 – Pipe Sizes and BTU/H Capacity for Liquid Propane (LP) Gas Pressures Greater Than 5"

D. VENTING OF GAS SUPPLY REGULATORS

These are the general guidelines for venting a gas supply regulator. HTP, Inc. recommends these guidelines be followed to ensure reliable operation of the water heater. Local codes and the gas regulator manufacturer should also be consulted for additional installation information.

1. When venting the gas supply regulator, the vent pipe must be at least the same size as the regulator vent.
2. When multiple water heaters are connected, each regulator must have a separate vent line.
3. Vent lines must not be connected together or connected with any other appliance requiring external venting.
4. When selecting the size, the pipe diameter must be increased by one size for every 20 feet of pipe.
5. Each 90° elbow is equivalent to approximately:
 - 4.5 feet for nominal pipe sizes up to 1 ½"
 - 10.5 feet for nominal pipe sizes up to 4"
6. Each 45° elbow is equivalent to approximately:
 - 2 feet for nominal pipe sizes up to 1 ½"
 - 5 feet for nominal pipe sizes up to 4"

E. GAS PRESSURE REGULATOR

Depending on the gas inlet pressure at the installation location, it may be necessary to install a gas pressure regulator to lower gas pressures to an acceptable level. Please ensure that the gas pressure regulator has the same or higher minimum to maximum modulation range as the water heater model it is connected to. In the case of multiple water heaters it is recommended to use a dedicated gas pressure regulator for each water heater.

Regulators should be mounted with a minimum of 12" straight lengths on each side.

PART 7 – VENTING

⚠ DANGER

This water heater must be vented in accordance with the "Venting of Equipment" section of the latest edition of the ANSI Z223.1 / NFPA 54 (National Fuel Gas Code) in the USA. In Canada, refer to the "Venting Systems and Air Supply for Appliances" section in the latest version of CAN/CGA B149.1 (National Gas and Propane Installation Code, and all applicable local building codes. Vent installation should be performed only by a licensed professional. Improper venting of the water heater can result in excessive levels of carbon monoxide, which can lead to property damage, severe personal injury, or death.

A. VENTING GUIDELINES

- This water heater must be properly vented to ensure that there is a constant supply of clean intake air and exhaust is properly evacuated from living areas. All seal connections should be air tight.
- This water heater should be located as close to the vent termination and the vents kept short and straight as possible.
- Do not connect the water heater vent to a vent of any other appliance.
- Combustion air may be drawn from the room where the water heater is installed (single pipe / power vent) or directly from the outdoors (2 pipe / direct vent).
- Ensure a sufficient supply of clean combustion air, free of any contaminants such as sawdust, chemical fumes (i.e. aerosols, chlorine, paint, etc.) grass, drywall dust, construction dust, or other airborne contaminants. Clean the exhaust and intake screens regularly to ensure an adequate supply of clean combustion air.
- Do not operate the water heater in an area that is or will be under construction or renovation.
- The warranty does not cover damage caused by contaminants in the installation area. If you must install the water heater in an area with contaminated air, use direct venting to supply air from outside the building.
- All horizontal runs should be sloped upwards towards the vent termination at a rate of ¼" per foot.
- To avoid moisture and frost build-up to openings on adjacent homes, use 45° elbows, 90° elbows, or tee vent terminations to direct the exhaust plumes away.

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

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- If the exhaust vent is to be terminated in a walled off area (such as a roof with a parapet wall), ensure the exhaust vent terminates a minimum of 10' from nearest wall and extends level with or above the top of the wall. This will ensure flue gas does not get trapped and possibly recirculated into the intake air pipe, which could contaminate the combustion air.

B. EXHAUST VENT MATERIALS.

The materials listed in the table below outline the acceptable exhaust vent materials.

UNITED STATES EXHAUST VENT PIPE STANDARDS	
MATERIAL	DESCRIPTION
EXHAUST VENT PIPE	PVC Schedule 40
	CPVC Schedule 40 / 80
	Approved Polypropylene
	AL-294C Stainless Steel
CANADIAN EXHAUST VENT PIPE STANDARDS	
MATERIAL	DESCRIPTION
EXHAUST VENT PIPE	Type BH Special Gas Vent Class IIA (PVC)
	Type BH Special Gas Vent Class IIB (CPVC)
	Type BH Special Gas Vent Class IIC (Polypropylene)
	Type BH Special Gas Vent Class I (AL-294C Stainless Steel)
<p>NOTE: DO NOT use cellular foam core pipe for the exhaust.</p> <p>NOTE: The components (pipe, fittings, primers, and glues) must be from a single manufacturer. Do not interchange components. Follow the vent manufacturer's certified instructions.</p>	

Table 11 – Exhaust Vent Materials

This water heater has a built-in exhaust vent temperature control that limits the exhaust temperature to a maximum of 149°F (65°C). If the temperature approaches this upper limit, the burner will turn off automatically to protect the vent pipe. As a result, this water heater can be vented with PVC pipe. Once the exhaust temperature has dropped to a normal operating level, the water heater will automatically restart. If the inlet/return water temperature will exceed 150°F (66°C), DO NOT use PVC venting. Refer to the Programming section for Flue Type Selection (PVC or CPVC) for additional information.

CAUTION

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

C. INTAKE PIPE MATERIALS

Air intake pipe can be of any plastic or metal vent material available. ABS, PVC, Polypropylene, galvanized steel, and flexible corrugated ducting are all examples of such material. If you are using a corrugated material, ensure there is no inadvertent crimping or blockage to the intake pipe.

D. VENTING CONFIGURATIONS – SINGLE WATER HEATER INSTALLATIONS

Water heaters may be installed in a two pipe (direct vent) configuration, or with one pipe exhausting to the outdoors (power vent) configuration.

1. TWO PIPE VENT SYSTEM (DIRECT VENT)

The water heater can be direct vented without any modification using 3 inch diameter pipe.

The following diagrams represent some typical direct venting configurations and are included to assist in designing the vent system. Possible configurations are not limited to the following diagrams.

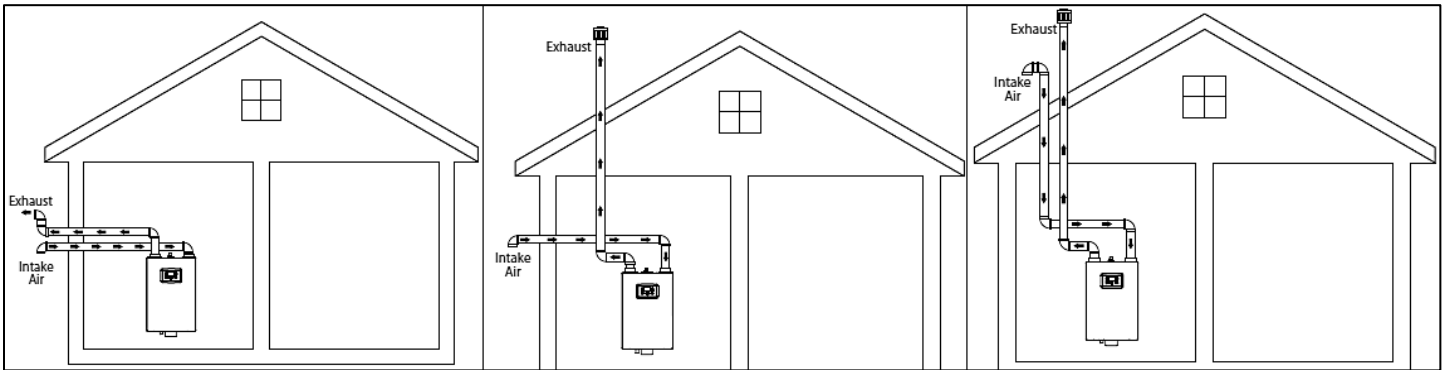


Figure 9 – Direct Venting Configurations - NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

2. SINGLE PIPE VENTING SYSTEM (POWER VENT)

The following table outlines the required opening sizes for the combustion and ventilation air in the mechanical room when using this single exhaust power vent method.

REQUIRED COMBUSTION AND VENTILATION AIR OPENING SIZES (SQ. INCHES) PER HEATER PER ROOM					
INPUT BTU/HR	AIR TYPE	AIR DRAWN DIRECTLY FROM OUTSIDE INTO THE MECHANICAL ROOM			AIR DRAWN FROM ANOTHER INTERIOR SPACE INSIDE BUILDING
		Through Two Openings*, Direct or Vertical	Through One Opening**	Through Two Horizontal Ducts***	
250,000	Combustion Air	63	84	125	84
	Ventilation Air				

*Where two openings are used, one must be within 12 inches of the floor and the other must be within 12 inches of the ceiling of the mechanical room.
 **Where one opening is required, it must be located within 12 inches of the ceiling. See diagrams below.

Table 12 – Power Venting, Required Air Opening Sizes

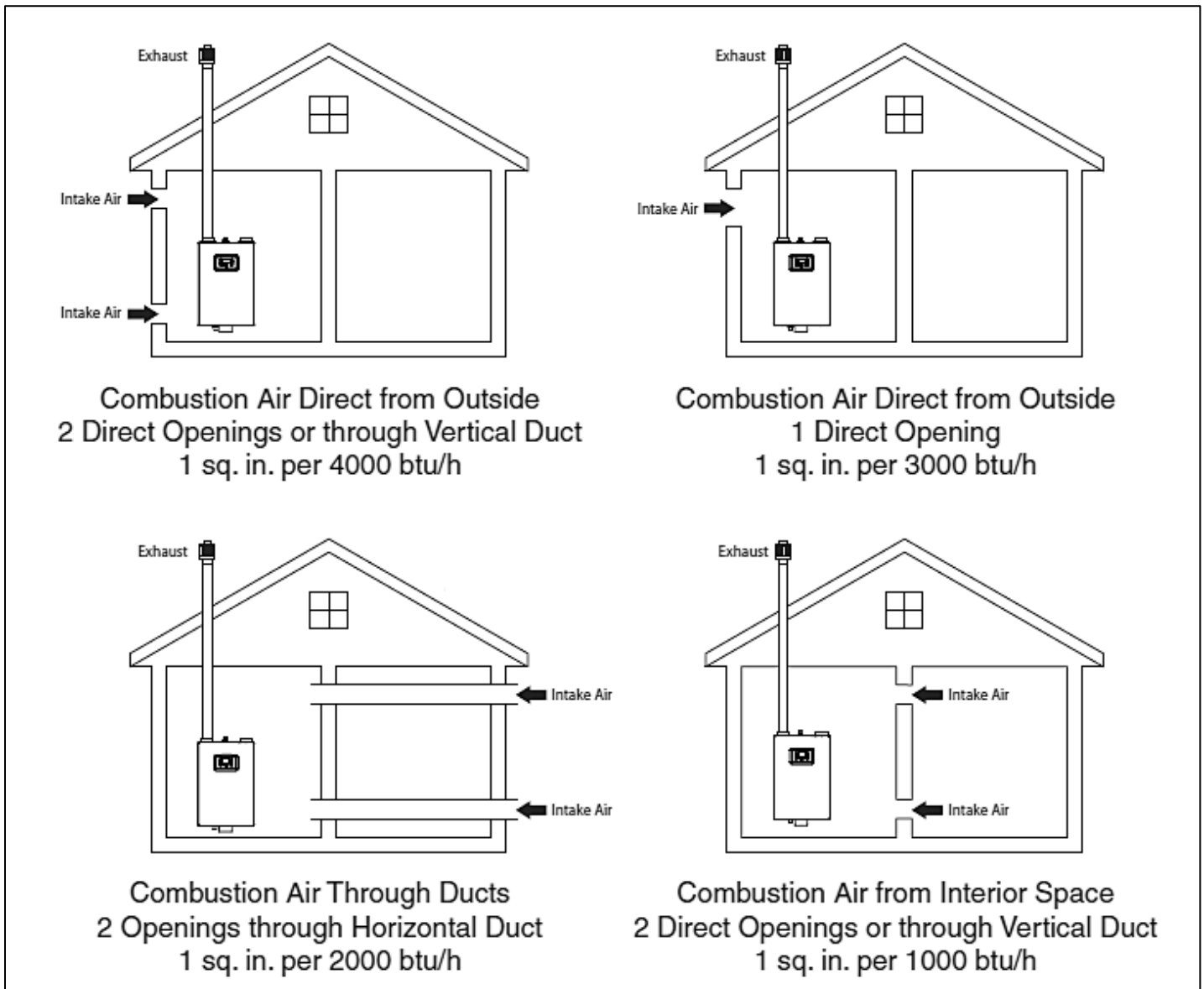


Figure 10 – Power Venting Configurations

NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

The following diagrams represent some typical power venting configurations and are included to assist in designing the vent system. Possible configurations are not limited to these diagrams.

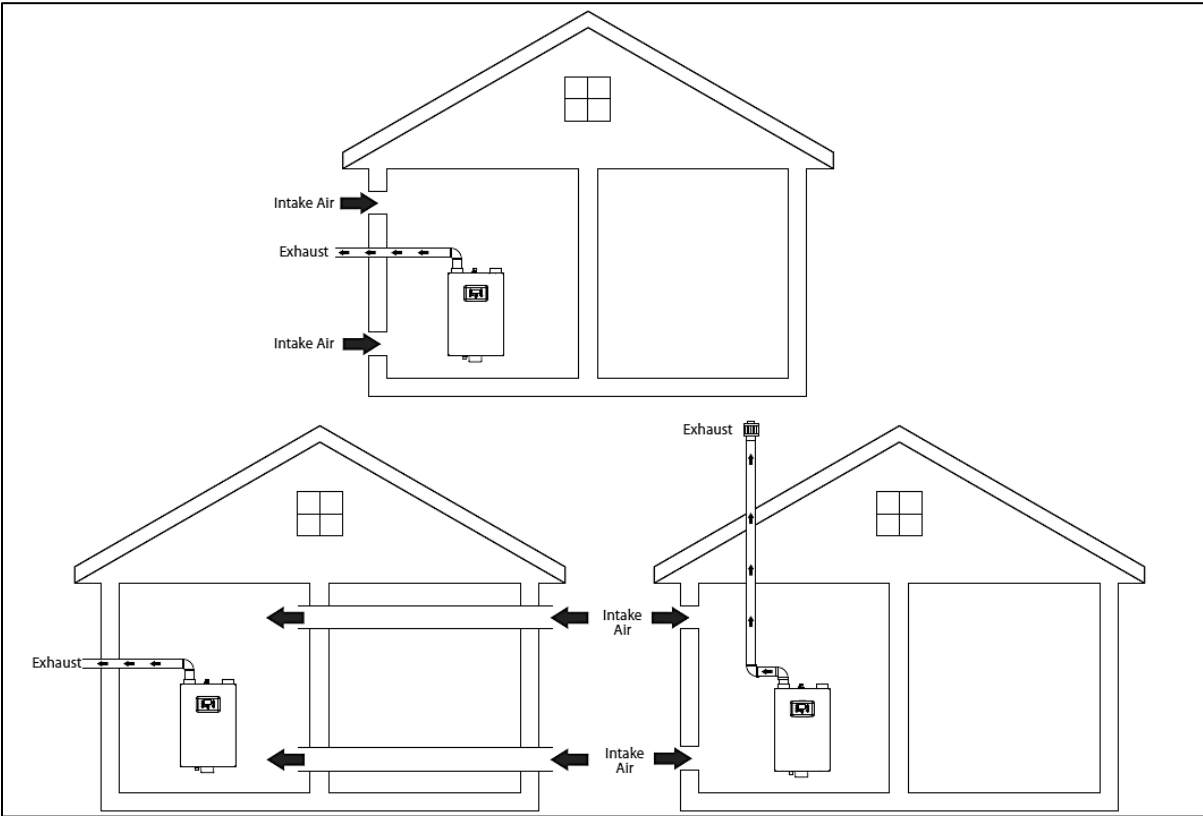


Figure 11 – Power Venting Configurations

NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes.

E. VENTING TERMINATIONS

1. SIDEWALL TERMINATION

- a. Terminate the combustion air intake with a 90° elbow (angled down). Use a flange and PVC screen.
- b. Terminate the exhaust gas outlet on the exterior wall at least 12" above the ground and at least 12" apart from the intake, or as required by local building codes. In areas of high snowfall, protect the vent terminations from blockage by installing at least 12" above the maximum anticipated snowfall accumulation. On an exterior wall, use a flange and PVC guard.

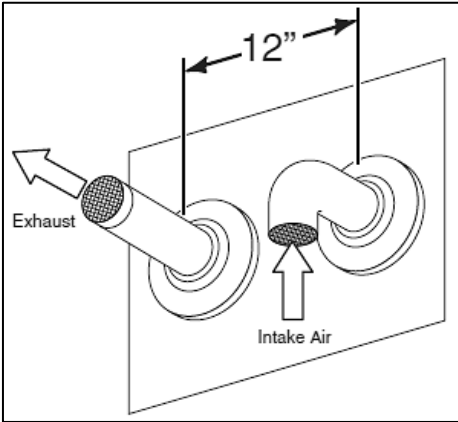


Figure 12 – Sidewall Termination Detail

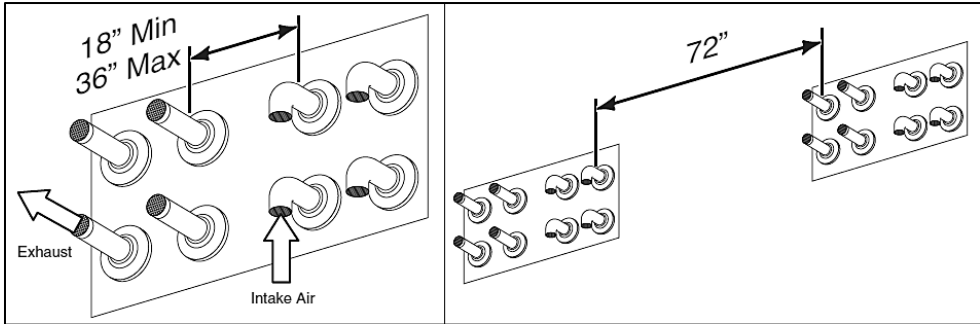


Figure 13 – Multiple Water Heaters – Sidewall Terminations

2. ROOF TERMINATION

Venting the water heater through the roof is also an option. In this installation method, the terminations must extend at least 12" over maximum potential snow levels, or as required by local building codes. In areas of high snowfall, protect the vent terminations from blockage.

Terminate the combustion air inlet with a 90° elbow (angled down). A suitable roof flashing and vent cap (not supplied) should be installed.

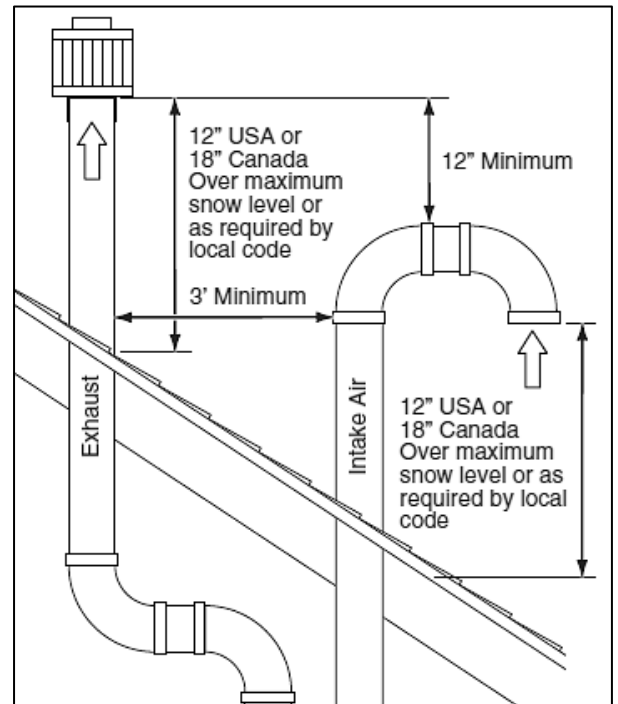


Figure 14 – Roof Termination Detail

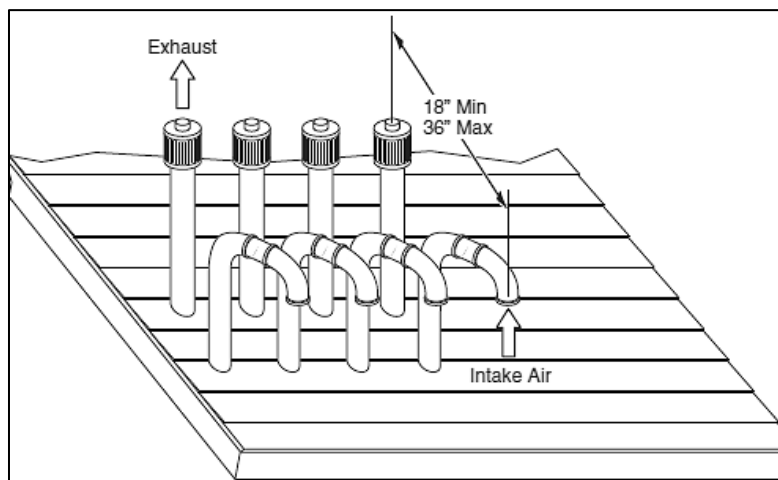


Figure 15 – Multiple Water Heaters – Roof Terminations

3. CONCENTRIC VENTING TERMINATION

If desired, an optional concentric venting system, which uses one 5" opening in an exterior wall or roof, as opposed to two 3" openings, may be installed.

Follow all installation instructions included with the concentric vent kit when installing a concentric vent system. For sidewall applications, terminate the outlet on the exterior wall at least 12" above the ground, or as required by local building codes. In areas of high snowfall, protect the vent terminations from blockage by installing at least 12" above the maximum anticipated snowfall accumulation.

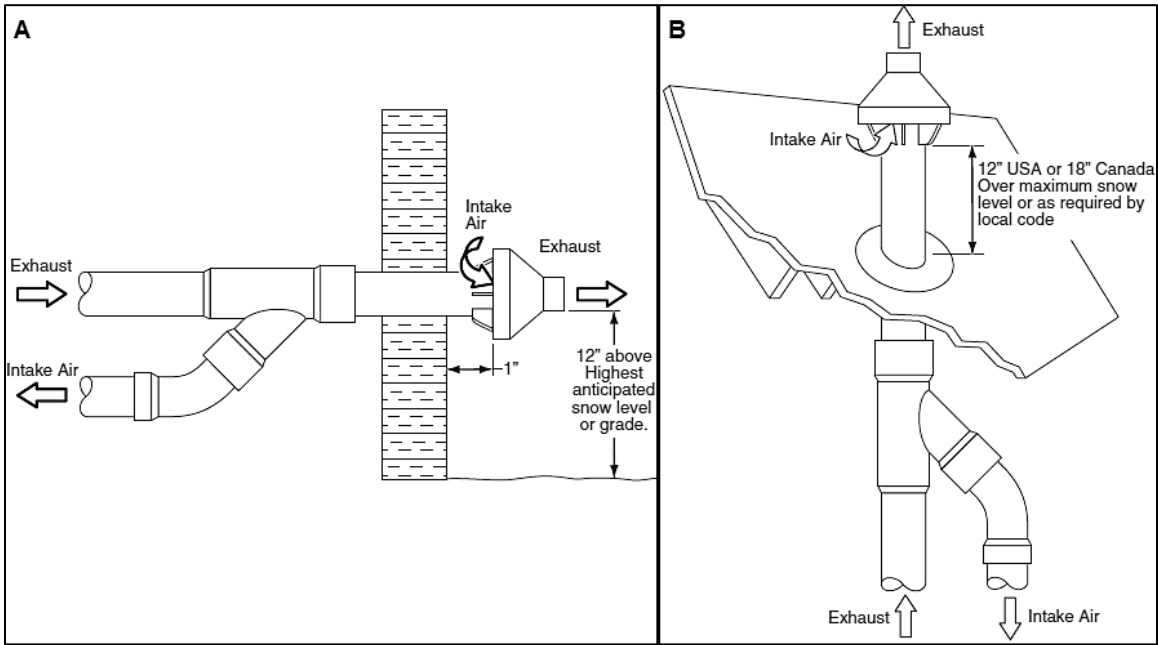


Figure 16 – A, Sidewall, and B, Roof Concentric Vent Terminations

4. CONCENTRIC VENTING TERMINATIONS – MULTIPLE UNITS

In order to conform to some codes, when two or more water heaters are installed they must be individually vented. When two or more units are vented near each other, each vent termination must be installed as shown to avoid the recirculation of flue gases. A minimum distance of 18 inches must be maintained between each vent termination.

Follow all installation instructions included with the concentric vent kit when installing this type of vent system. For sidewall applications, terminate the outlet on the exterior wall at least 12" above the ground, or as required by local building codes. In areas of high snowfall, protect the vent terminations from blockage by installing at least 12" above the maximum anticipated snowfall accumulation.

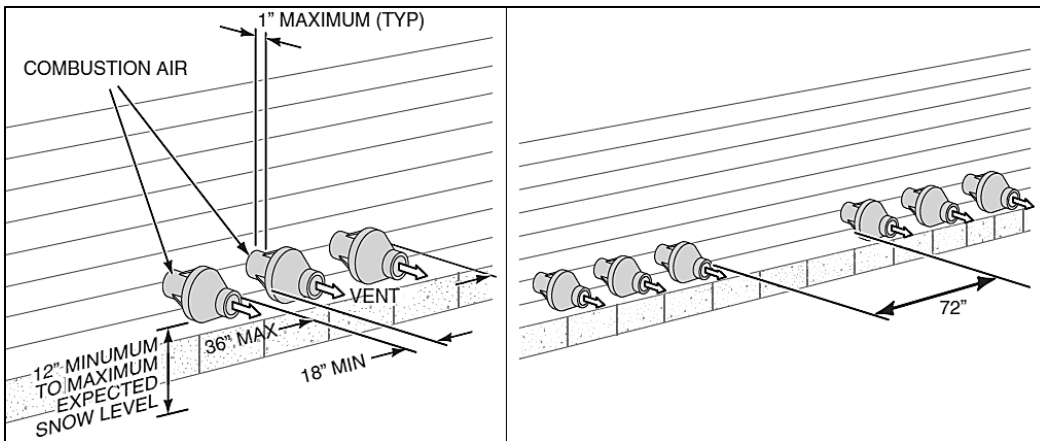


Figure 17 – Multiple Water Heaters – Sidewall Concentric Vent Terminations

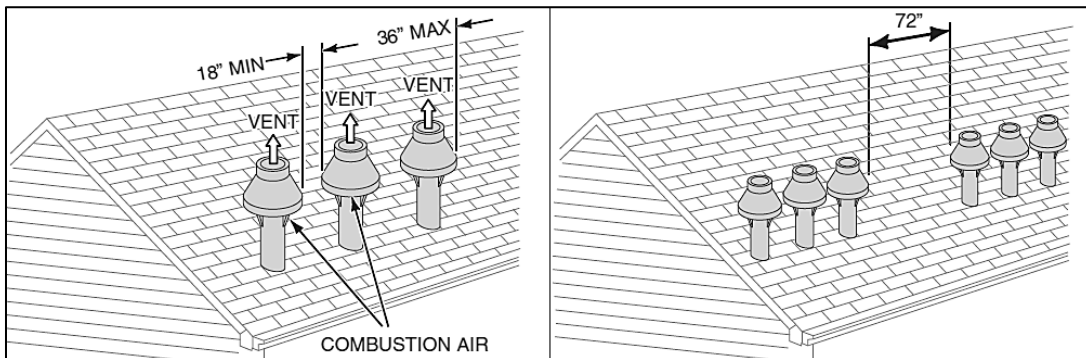


Figure 18 - Multiple Water Heaters – Roof Concentric Vent Terminations

G. COMMON VENTING FOR MULTIPLE WATER HEATERS

Connecting several water heaters together requires proper sizing of the intake and exhaust pipes. Up to ten water heaters can be connected (cascading) together.

1. VENT DIAMETER SIZING AND LENGTHS

The water heaters are designed for 3 inch exhaust vent and intake pipes. The following charts outline the maximum length of venting allowable for each model. A vent system's length is calculated by adding the length of all straight pieces used (both horizontal and vertical) and then adding the equivalent lengths of each fitting used in the system. A vent system's length must not exceed the maximum length outlined in the charts below.

MAXIMUM VENT LENGTH (IN FT.) FOR DIRECT VENT (2 PIPE)						
NUMBER OF WATER HEATERS COMMON VENTED TOGETHER	DUCT SIZE					
	3"	4"	6"	8"		
1	65	65	N/A	N/A		
2	N/A	65				
3		30	65			
4		N/A	N/A		65	
5					65	
6					65	
7					45	
8					30	65
9					N/A	N/A
10		65				

NOTE: Reduce the maximum equivalent length above by 5 feet per 90° elbow used and by 2 feet per 45° elbow used. DO NOT exceed the above set limits.

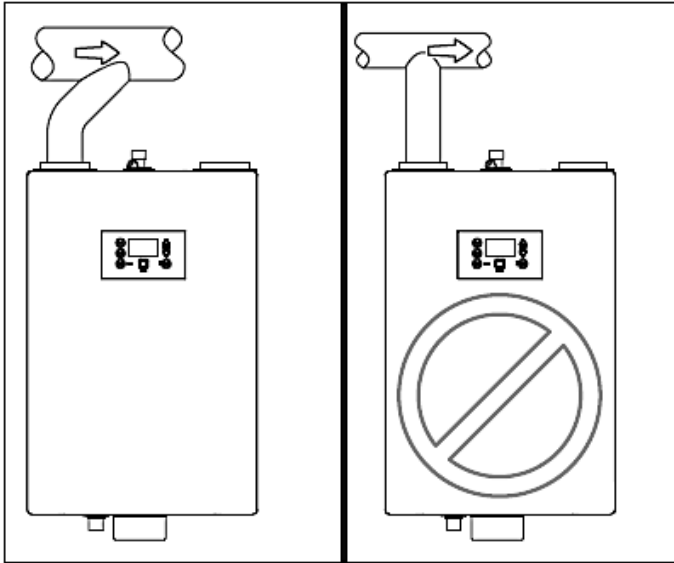
Table 14 – Maximum Common Vent Length for Direct Vent (2 Pipe)

MAXIMUM VENT LENGTH (IN FT.) FOR POWER VENT (1 PIPE)						
NUMBER OF WATER HEATERS COMMON VENTED TOGETHER	DUCT SIZE					
	3"	4"	6"	8"		
1	130	130	N/A	N/A		
2	N/A	130				
3		30	130			
4		N/A	N/A		130	
5					130	
6					130	
7					45	
8					45	130
9					N/A	N/A
10		130				

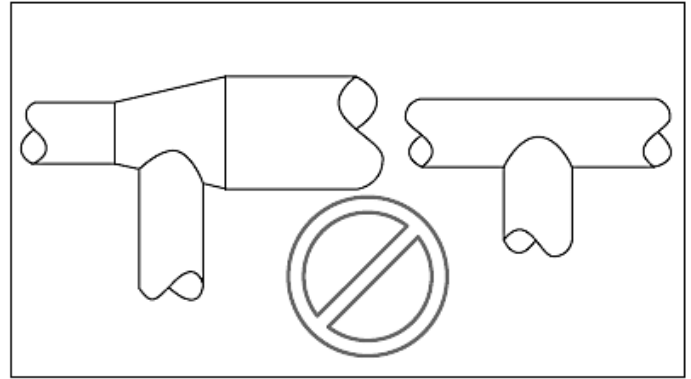
NOTE: Reduce the maximum equivalent length above by 5 feet per 90° elbow used and by 2 feet per 45° elbow used. DO NOT exceed the above set limits.

Table 15 – Maximum Common Vent Length for Power Vent (1 Pipe)

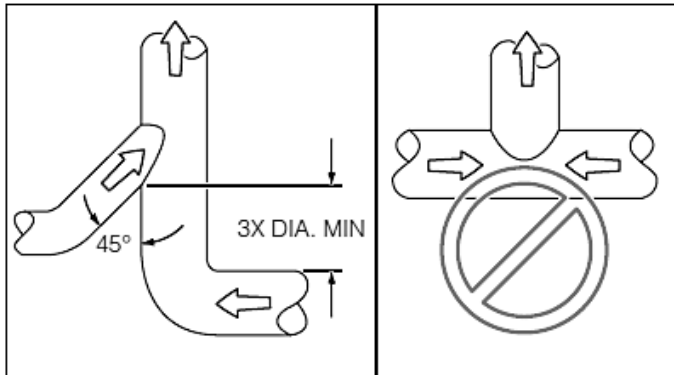
2. RECOMMENDED EXHAUST PIPE TRANSITIONS



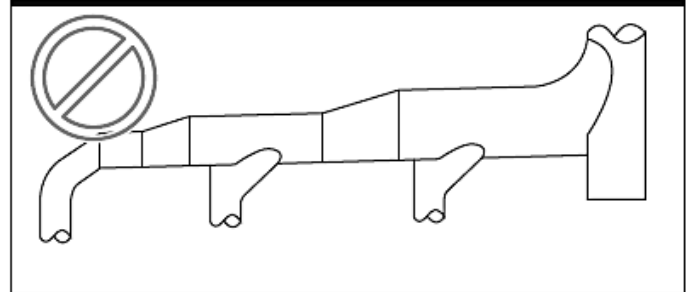
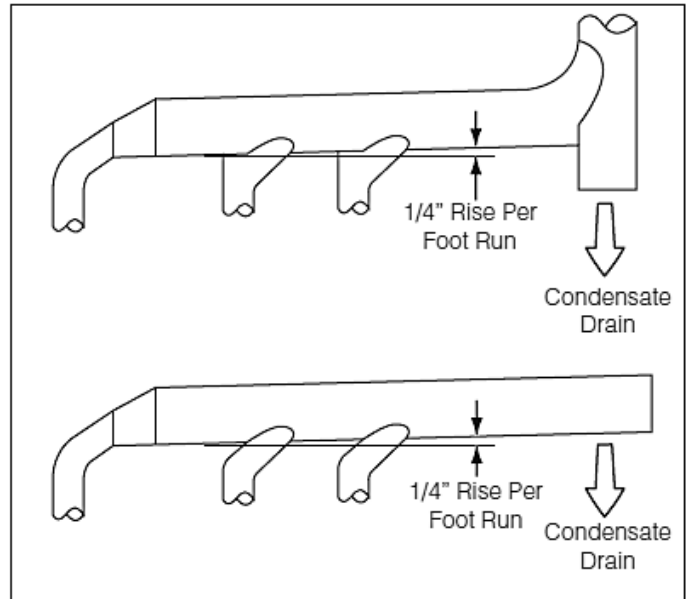
Do not use a 90 degree t-fitting for the gas exhaust.



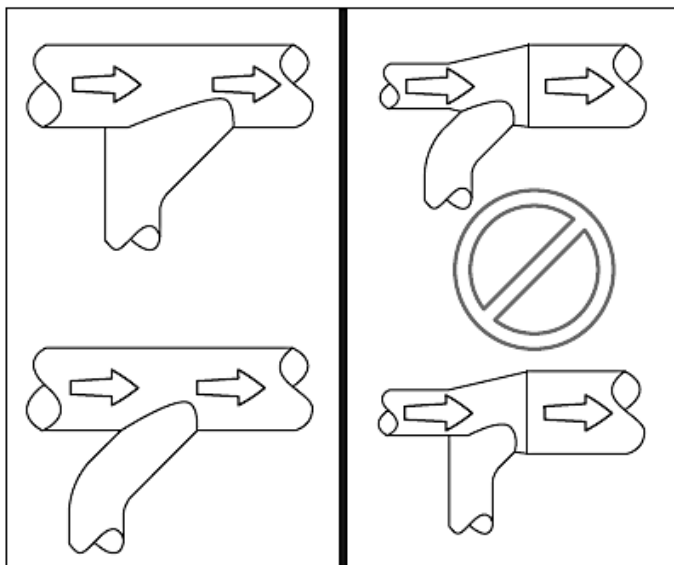
Do not use 90 degree transition into a reducer or a straight pipe.



Do not direct gas exhaust from opposite directions. Use a 45 degree transition as shown.



Do not use reducers in a straight run of pipe.



Do not transition into a reducer or use a t-fitting. Transitions should always be directed into a straight run of pipe.

Figure 20 – Recommended Exhaust Pipe Transitions

3. TWO PIPE VENT SYSTEM (DIRECT VENT)

The water heater can be direct vented without any modification using a 3 inch diameter pipe. The following diagrams represent some typical direct venting configurations and are included to assist in designing the vent system. Possible configurations are not limited to the following diagrams. See Table 14 for trunk line sizing when common venting multiple heaters.

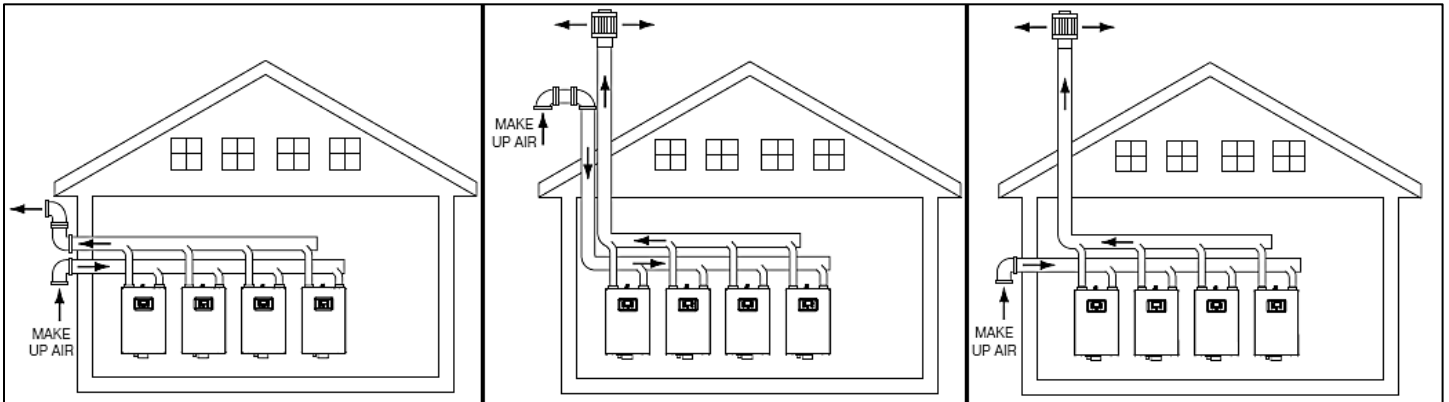


Figure 21 – Common Vented Direct Vent Configurations

NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes. For sidewall applications, terminate the outlet on the exterior wall at least 12” above the ground, or as required by local building codes. In areas of high snowfall, protect both sidewall and roof vent terminations from blockage by installing at least 12” above the maximum anticipated snowfall accumulation.

4. SINGLE PIPE VENT SYSTEM (POWER VENT)

The water heater can be power vented without any modification using a 3 inch diameter pipe. The following diagrams represent some typical power venting configurations and are included to assist in designing the vent system. Possible configurations are not limited to the following diagrams. See Table 12 for air opening sizes required for power venting the water heater. Adjust accordingly for total BTUs of common vented units. See Table 15 for trunk line sizing when common power venting multiple heaters.

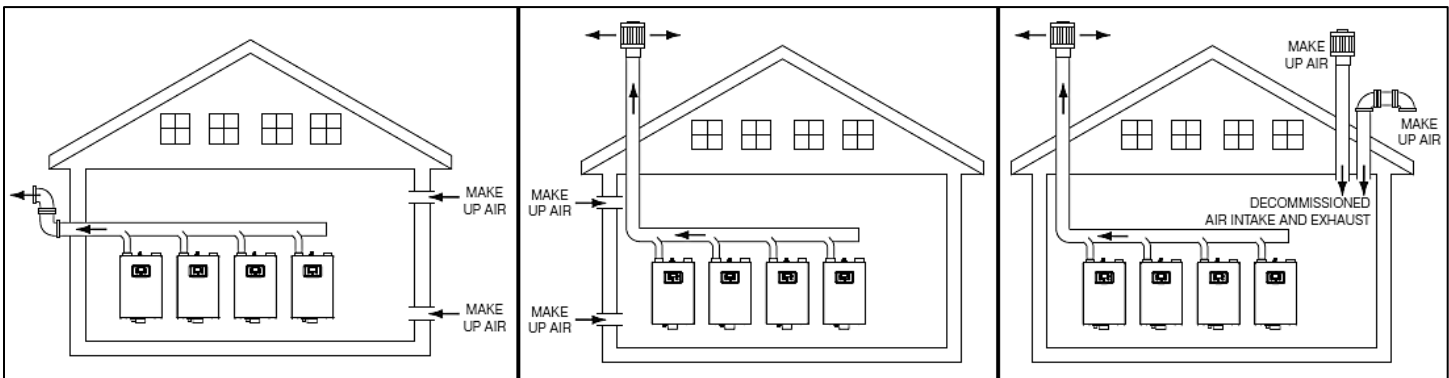


Figure 22 – Common Vented Power Vent Configurations

NOTE: These drawings are meant to demonstrate system venting only. The installer is responsible for all equipment and detailing required by local codes. For sidewall applications, terminate the outlet on the exterior wall at least 12” above the ground, or as required by local building codes. In areas of high snowfall, protect both sidewall and roof vent terminations from blockage by installing at least 12” above the maximum anticipated snowfall accumulation.

PART 8 – INSTALL THE CONDENSATE LINE

Due to its efficient design, the water heater produces condensate (water) as a normal by-product of heating the water. This condensate is acidic, with a pH level between 3 and 4. Local building codes may require an in-line neutralizer to be installed (not included) to treat the condensate. See Figure 23 for condensate drain location.

1. Connect the included 3/4” ID flexible drain line (#2) to the condensate nipple located on the bottom of the water heater (#1). Tighten hose clamp.

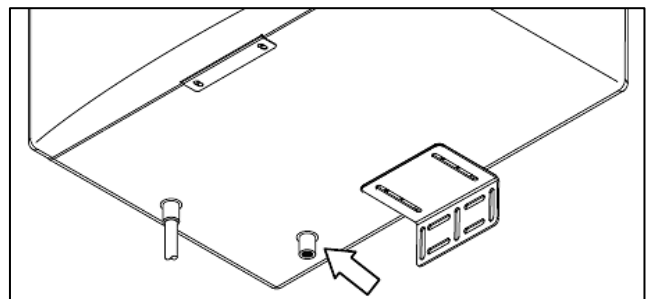


Figure 23 – Condensate Drain Location

2. Follow applicable local codes. If required, install an in-line neutralizer (#3) (available from HTP, Part # 7450P-212) to treat the acidic condensate. Follow all the installation instructions included with the neutralizer.

3. Route the drain line to a nearby condensate pump (#4), floor drain (#5), or laundry tub (#6).

NOTE: If a condensate pump is being used, the water heater may need to be raised off the floor to accommodate the height of the pump.

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

NOTE: Ensure that the flexible drain line is not pinched or throttled. The tube should freely drain and not slope upward, and the tube termination should not be immersed in water. Doing so will result in an air lock and error condition.

⚠ WARNING

The drain line is shipped from the factory with a loop held together with plastic ties. **DO NOT** remove the ties and/or straighten the loop. This loop prevents carbon monoxide from exiting the water heater through the drain line. Improper installation of the drain line can result in excessive levels of carbon monoxide, and could result in property damage, serious personal injury, or death.

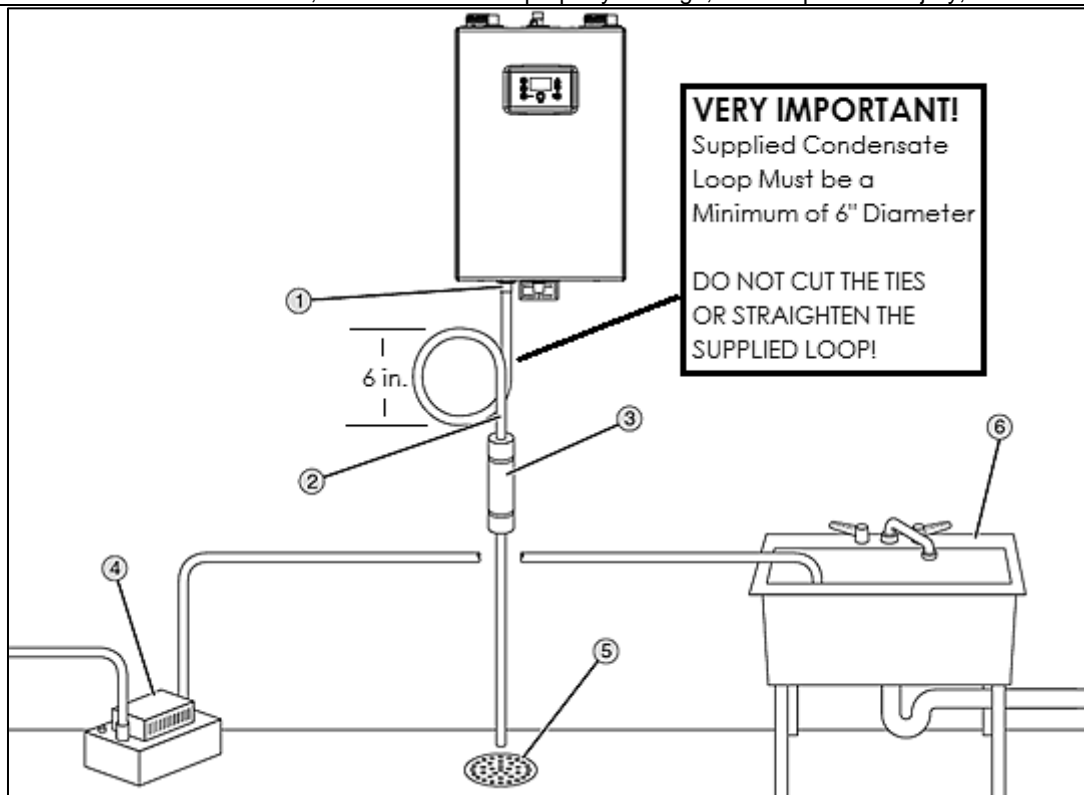


Figure 24 – Condensate Line Installation

PART 9 – WATER PIPING

A. WATER LINE CONNECTION GUIDELINES

NOTE: Ensure the water flow rate does not change faster than 1 GPM every 5 seconds. Flow rate changes faster than this cause the water heater to malfunction and result in an E7 Error Code.

When making the water-side connections, please follow these guidelines:

- Since each installation is different, it is up to the installer to route the water lines in the most efficient manner.
- Keeping the hot water system piping as short as possible will help ensure hot water is delivered to the fixtures quickly and efficiently.

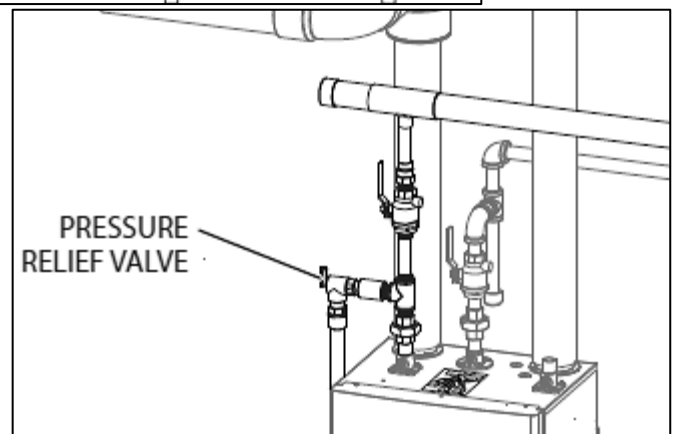


Figure 25 – Installing the Hot Water Outlet and Pressure Relief Valve

- Only components (pipes, fittings, valves, solder, etc.) that are approved for use in potable water systems should be used.
- When tightening any fittings on to the connections on the water heater, care should be exercised to not over-tighten these joints and damage the water heater.
- Unions and manual shut-off valves on the cold water inlet and hot water outlet are recommended.
- Isolation valve kits can be used if water side service is anticipated due to hardness levels or heavy usage of the water heater.
- To conserve energy, insulate all hot water piping. Do not insulate the drain or pressure relief valve line.
- When water heater is installed in a closed loop recirculation system, and if the cold water supply line has a backflow preventer, an expansion tank should be installed to allow for water expansion.
- After installation, test the water heater for proper flow and inspect for leaks.
- Run water for a few minutes and then clean the inlet water strainer located on the cold water inlet fitting. This strainer must be cleaned periodically to maintain proper water flow.
- If the incoming water is known to have a high mineral content or hardness (>15 ppm), treatment is recommended upstream from the water heater.

B. WATER QUALITY

Proper maintenance of the water heater is required to ensure that the water meets EPA quality standards. The following table shows the maximum contaminant levels allowed based on the EPA National Secondary Drinking Water Regulations (40 CFR Part 143.3). If you suspect that your water is contaminated in any way or water heater errors occur, discontinue use of the water heater and contact an authorized technician or licensed professional.

Contaminant	Maximum Allowable Level
Aluminum	0.05 to 0.2 mg/l
Chloride	250 mg/l
Copper	1 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
pH	6.5-8.5
Sulfate	205 mg/l
Total Dissolved Solids (TDS)	500 mg/l
Zinc	205 mg/l

C. CIRCULATOR SIZING

The heat exchanger has a pressure drop that must be considered in your system design. Refer to Table 16 for pressure drop through the heat exchanger.

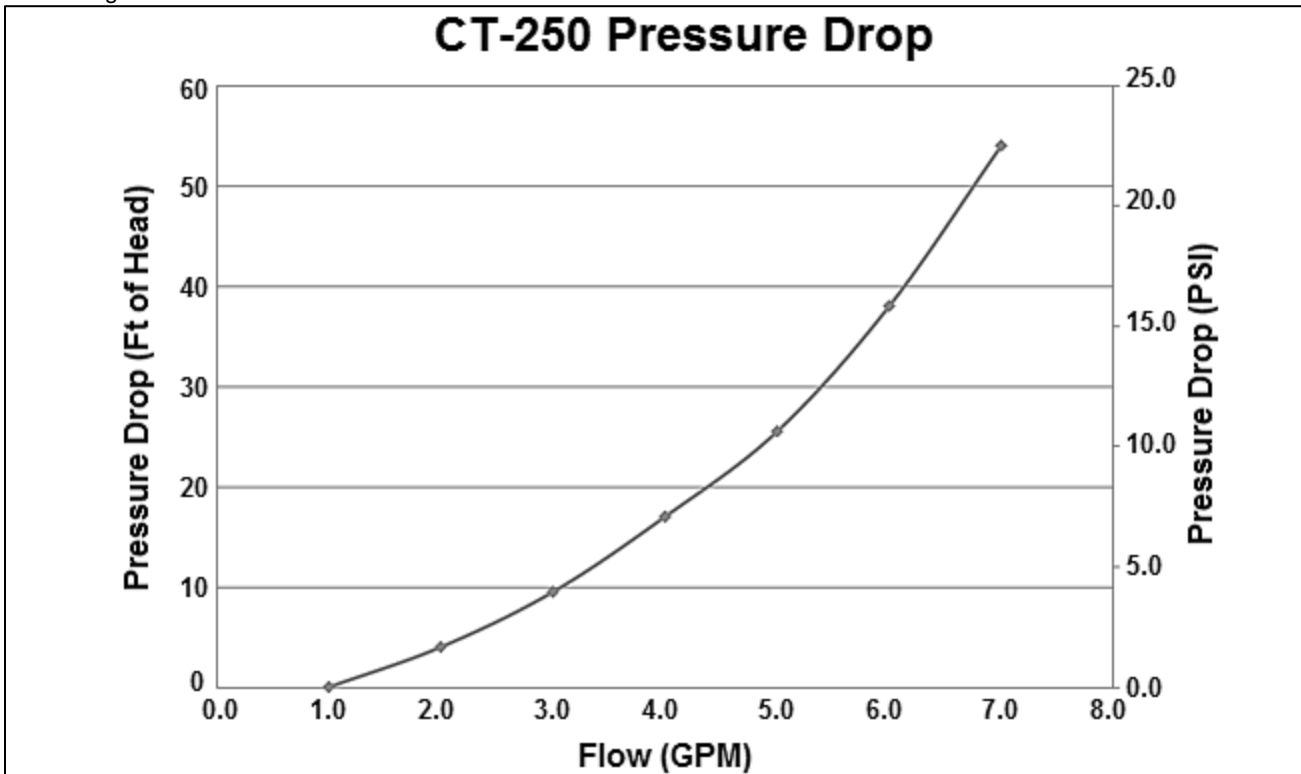


Table 16 – CT-250 Pressure Drop

D. HOT WATER OUTLET INSTALLATION INSTRUCTIONS

1. Connect a ¾" NPT coupler to the water heater's hot water outlet connection.
2. Install a ¾" union connection.
3. Following local building codes, install a manual shut-off valve using ¾" NPT fittings.

See Figure 25 for details.

E. PRESSURE RELIEF VALVE INSTALLATION

1. Install a field-supplied ¾" 150 psi maximum pressure relief valve on the hot water outlet line
2. Install the pressure relief valve as close as possible to the outlet on the water heater.

NOTICE

The pressure relief valve must be rated at 150 psi, the maximum btu/h input of the water heater, and comply with all local building codes and standards. Do not install any restrictions or other valves in the pressure relief line.

NOTE: The water heater is designed with an internal high temperature shut-off switch and therefore only a pressure relief valve is required for these water heaters.

F. COLD WATER INLET INSTALLATION INSTRUCTIONS

1. Connect a ¾" NPT coupler to the water heater's cold water inlet connection.
2. Install a ¾" union connection.
3. Following local codes, install a manual shut-off valve using ¾" NPT fittings.
4. Connect the water heater to the existing cold water lines. If the existing plumbing is ½" pipe, adapters may be used to transition from ¾" pipe.
5. Leak test the water piping before placing the water heater in operation.

See Figure 26 for details.

G. PIPING MULTIPLE UNITS

These water heaters are designed to connect multiple units together. See Figure 27 for details. Multiple units increase the volume of hot water and also ensure that hot water is always available, even if one unit is shut down due to maintenance.

Connecting several units together requires proper sizing of water and gas piping, as well as increased sizing of the exhaust vent and intake pipes.

Up to ten water heaters can be connected (cascaded) together. Use the steps in this section along with the basic installation procedure for installing a single unit.

The water heaters will communicate during normal operation via the cable provided with the water heater.

- When demand for hot water is low, fewer units will operate.
- If one unit has an error code, the others will continue to operate.
- Changing the settings (temperature, time, etc.) on one unit changes settings on all the units.
- It is possible to shut one unit down for maintenance while the others continue to operate.

1. Connect all the units to a gas supply pipe. Make sure the pipe is properly sized in accordance with the BTU draw and number of units being operated.

2. Install the exhaust vent and combustion (fresh) air intake pipes. Make sure the pipes are properly sized in accordance with the number of units being operated.

NOTE: Each unit can be single vented or joined together in a common vent.

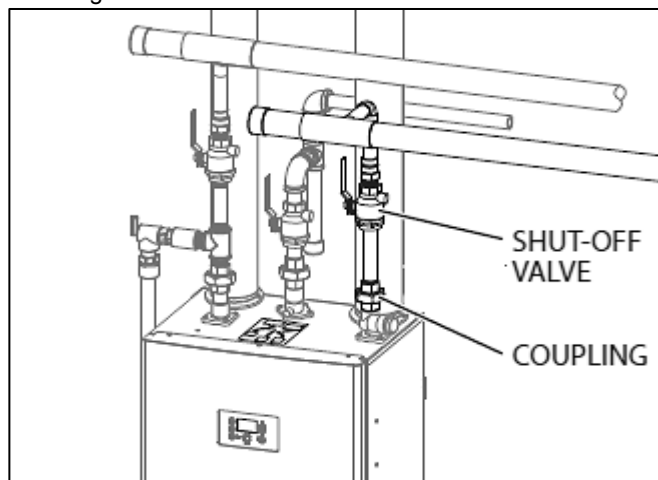


Figure 26 – Installing the Cold Water Inlet

- a. Connect the 3" ID air intake from the unit to a properly sized (large) common trunk line using suitable adapters, wye fittings, and elbows.
- b. Connect the 3" ID exhaust outlet from the unit to a properly sized (large) common trunk line using suitable adapters, wye fittings, and elbows.
- c. For proper flow, always use 90° tee-fittings on the common trunk line that have a sweeping intersection. Also make sure the fittings are installed so the air flow will flow past the intersection and not into it.

3. Install and connect the hot water lines. If an optional hot water storage tank is required, connect the hot water lines to this tank. Make sure the pipe is properly sized in accordance with the number of units being operated.

4. Install and connect the cold water lines. Make sure the pipe is properly sized in accordance with the number of units being operated.

5. Connect the condensate drain lines.

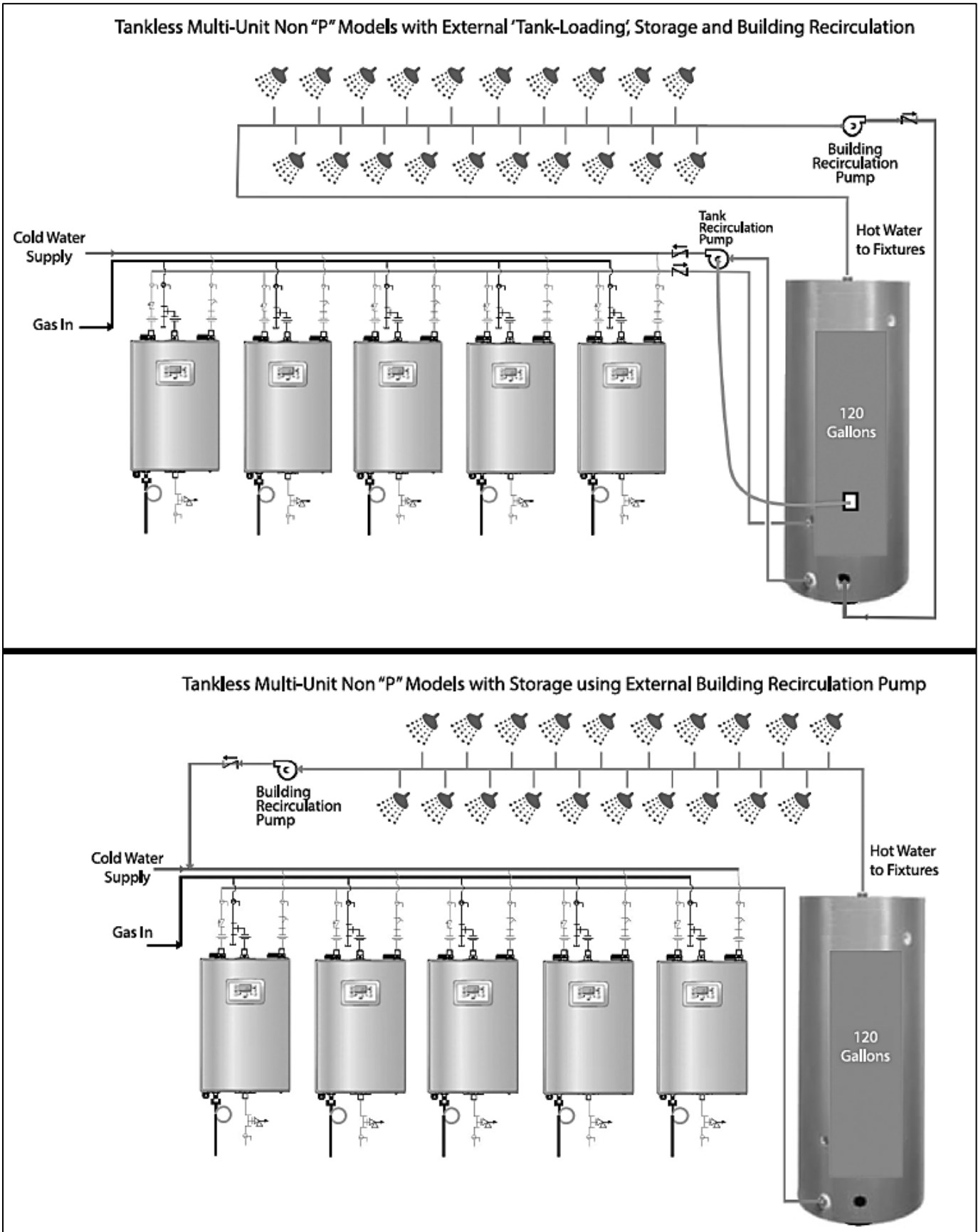


Figure 27 – Various Commercial Piping Options – NOTE: These drawings are meant to demonstrate system piping concept only. Piping Shown is Reverse Return

PART 10 – ELECTRICAL

⚠ WARNING

To avoid serious injury or even death, follow all applicable local, state, and national regulations, mandates, and building supply codes for guidelines to install the electrical power supply.

A. ELECTRICAL CODE REQUIREMENTS

Electrical code requirements are different in the USA and Canada. Refer to and follow the local building codes, the latest edition of the National Electrical Code (NFPA 70) in the USA, or the CGA C22.1 Canadian Electrical Code – Part 1.

Depending on the number of water heaters being installed, the circuit breaker(s) should be at least 15 amps for each water heater. If more than one water heater is being installed, then a larger circuit breaker or separate 15 amp circuits is required. See Figure 28.

NOTE: For an electrical wiring schematic, refer to Figure 29.

B. ELECTRICAL CONNECTION AND POLARITY

On single water heater installations, make sure the electrical outlet being used is wired with at least 12 gauge wire and grounded. Only one water heater should be plugged into an outlet with 12 gauge wire. It should also be connected to at least a 15 amp circuit breaker. The electrical power required for the water heater is 120V AC at 60 Hz.

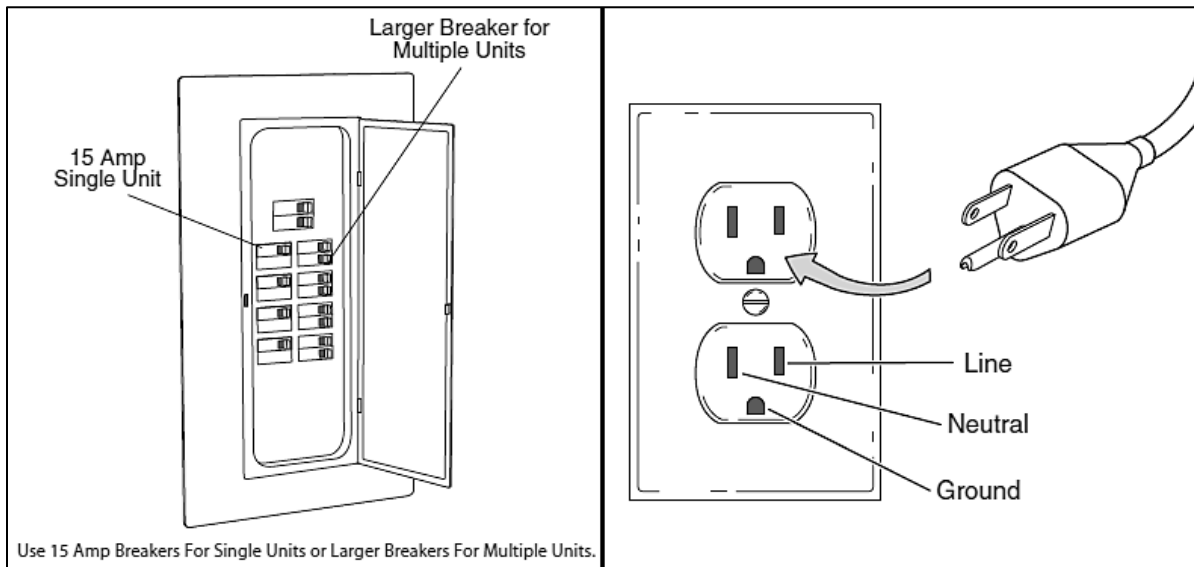


Figure 28 – Electrical Details

NOTICE

POLARITY – The plug provided with the water heater is polarity sensitive. Ensure that the line and neutral are at the correct locations in the wall socket. If polarity is reversed it may cause the water heater to malfunction. See Figure 28 for socket polarity detail.

SAFETY INSTRUCTIONS

If multiple water heaters are being installed, the gauge of wire must be increased to meet the additional electrical load. Consult electrical codes for the correct wire size.

If desired, the water heater can be wired into the electrical system by removing the power cord and replacing it with an electrical cable. If this method is used, a separate ON/OFF switch must be installed to remove power from the water heater.

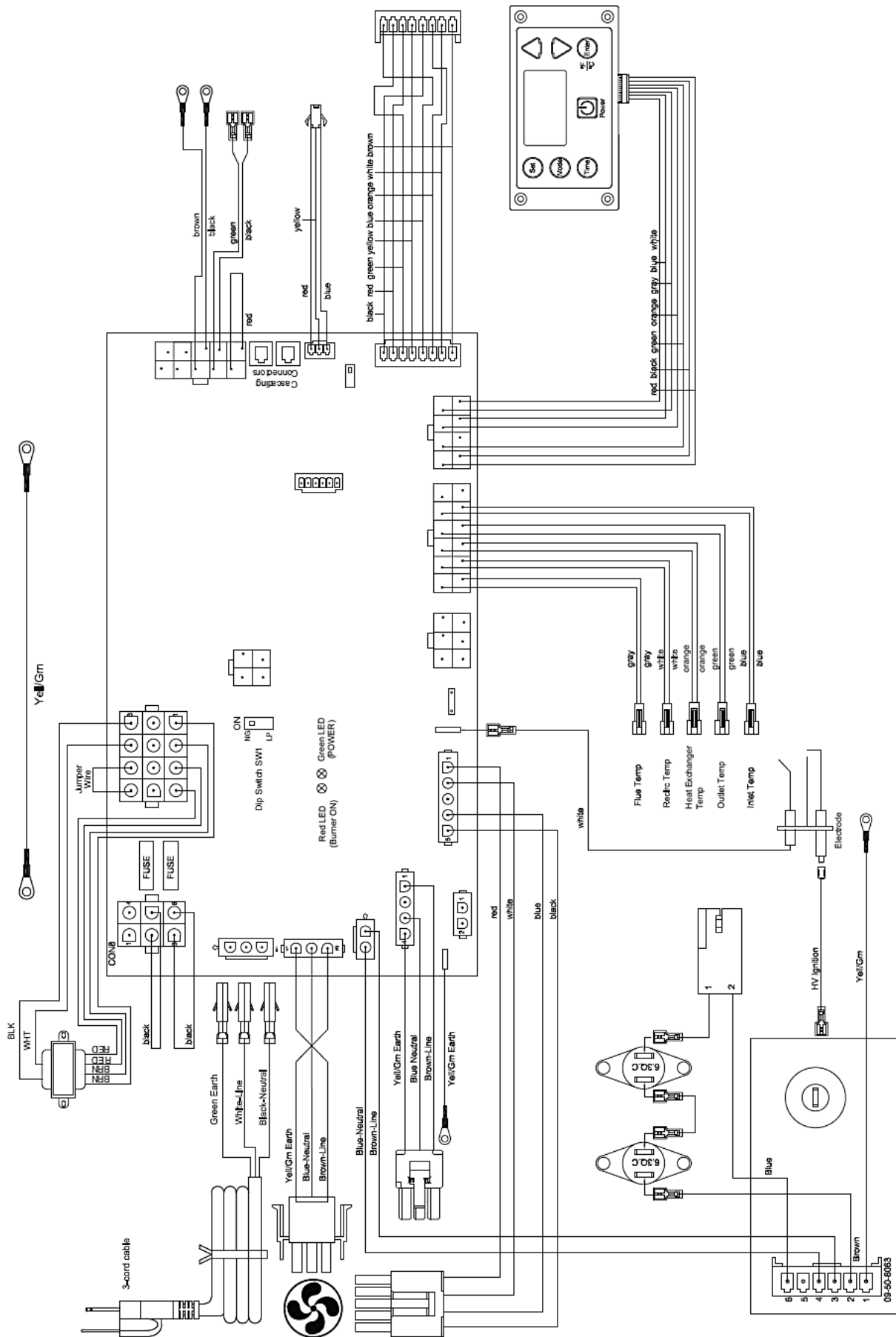


Figure 29 – Internal Wiring Diagram

PART 11 – PROPANE (LPG) CONVERSION

SAFETY INSTRUCTIONS

IMPORTANT – A qualified service technician **MUST** make the required changes to convert the water heater from Natural Gas to LP Gas.

A. GENERAL INFORMATION

Refer to the Measuring Gas Pressure section of this manual for the procedure to confirm that there is LP gas inlet pressure of between 8.0" and 13.0" WC. Record the gas pressure here.

STATIC LP GAS PRESSURE _____ **WC**

DATE _____

B. PROCEDURE

1. Make sure all hot water faucets are OFF.
2. Press the **Power** button to turn off the water heater. Disconnect the power.
3. Shut OFF the gas supply inlet valve closest to the water heater.
4. Remove the water heater front cover and locate the main circuit board.
5. Locate DIP Switch 1 on the circuit board and change it to the PROPANE position. See Figure 30.
6. Reconnect the power and wait for the main screen to appear.

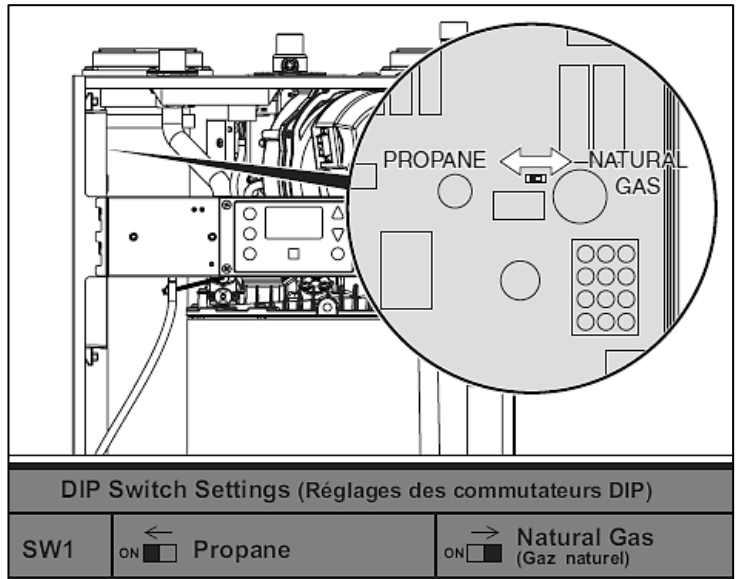
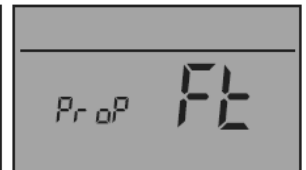
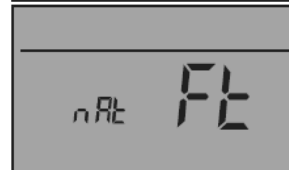
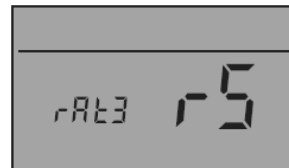


Figure 30 – Location of DIP Switch

7. Press and hold the **Mode** button until the rS screen appears on the display.
8. Press the **Mode** button again until the Ft screen appears on the display. This is the current Fuel Type. Either nAt or ProP will be displayed, indicating the position of the DIP switch.
9. Press and hold the **Enter** button to return to the home screen.
10. Refer to Adjusting the CO2 Level section in this manual or instructions on connecting a calibrated CO2 analyzer to the gas valve.



PART 12 – ADJUSTING THE CO2 LEVEL

This procedure is required only during installation in a high-altitude location, when converting the water heater from natural gas to propane, or when troubleshooting combustion problems. This procedure should only be done by a qualified technician or installer.

⚠ DANGER

A concentration of carbon monoxide as small as 0.04% (400 parts per million) in the air can be fatal. When making high fire and/or low fire adjustments, CO levels must be monitored using a flue gas analyzer so that the level of no more than 400 ppm of CO is exceeded at any time during the operation.


Adjusting the “low fire offset” of the “main flow restrictor” in small increments can result in a significant increase in CO concentration. To avoid serious injury or death, DO NOT make any adjustments to the gas valve without monitoring the exhaust gases with a fully functional and calibrated flue gas analyzer.

	Natural Gas CO ₂ Range (%)	LP CO ₂ Range (%)	Max. CO Level (ppm)
High Fire	8.8 – 9.1%	8.8 – 10%	< 200 ppm
Low Fire	8.6 – 8.9%	8.6 – 9.8%	< 60 ppm

Table 17 – CO₂ and CO Standards

⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Do not operate heater if flood damaged.
- Install vent system in accordance with local codes and manufacturers installation instructions.
- Do not obstruct heater air intake or exhaust. Support all vent piping per manufacturers installation instructions.
- Do not place chemical vapor emitting products near unit.
- According to NFPA 720, carbon monoxide detectors should be installed outside each sleeping area.
- Never operate the heater unless it is vented to the outdoors.
- Analyze the entire vent system to make sure that condensate will not become trapped in a section of vent pipe and therefore reduce the open cross sectional area of the vent.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

LP-304 4/28/09

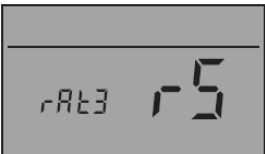
NOTICE


IMPORTANT – Values above are for nominal conditions. Variables such as gas pressure, heating value of gas, and the humidity and temperature of combustion air can all impact CO and CO₂ values. Changes in these variables can result in different CO and CO₂ values on the same water heater.

The service technician must confirm Static inlet gas pressures before setting High Fire and Low Fire CO and CO₂ values. It is recommended that before any adjustments are made the gas pressure to the water heater be as follows: NG – 8” WC, LP – 11” WC.


Once the inlet gas pressures are confirmed, a qualified service technician must use a calibrated CO₂ analyzer to adjust the gas valve to achieve the desired CO and CO₂ values.

1. Locate the gas valve.
2. Use the CO₂ analyzer to analyze the exhaust vent gas at a location in the exhaust vent pipe one to four feet from the water heater.
3. Press and hold the **Mode** button for more than 5 seconds to access the rS screen on the display.


4. Press and release the **Mode** button multiple times until the CO screen appears on the display.



Hi will be displayed, indicating the water heater will fire at its highest firing rate when a hot water faucet is opened.
5. Open several hot water faucets to allow at least 5 gpm of water flow. The water heater will begin operating.
6. When the water heater is operating at high fire, the shower, blower, and flame icons will be displayed.


7. Record the values in Table 18, “Hi” column. If the CO₂ values are within range, proceed to step 9. Otherwise, continue to step 8.

- Use a small flat head screwdriver to adjust the gas valve high fire screw to achieve the desired CO₂ values. See Figure 31.

NOTE: Turn clockwise to **decrease** CO₂, and counterclockwise for **increase** CO₂. Make adjustments by ¼ turn increments. Wait three minutes for reading to stabilize.

Once the desired values are achieved, record the combustion analyzer values for CO₂ and CO in Table 18, “Adjusted Hi” column.

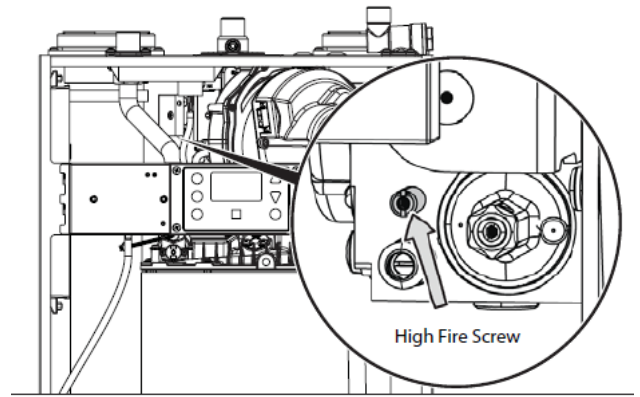


Figure 31 – High Fire Adjustment Screw Location

CO AND CO ₂ RECORDED VALUES				
	Hi	Adjusted Hi	Lo	Adjusted Lo
CO ₂ Value %				
Max CO ppm				
Date				

Table 18 – CO and CO₂ Recorded Values

- Press the **Down** arrow key to put the water heater into low fire operation. Lo will appear on the display.



- Record the values in Table 18, “Lo” column. If the CO₂ values are within range, proceed to step 12. Otherwise, continue to step 11.

⚠ WARNING

The Low Fire offset screw should not be adjusted unless absolutely necessary, and should only be adjusted by a qualified service technician. Adjusting the low fire screw will affect boiler operation and, if not performed correctly, could greatly increase CO values. Unnecessary Low Fire offset screw adjustment could result in property damage, personal injury, or death.

- If necessary, adjust the Low Fire offset screw while the burner operates at low fire with a 2 mm hex wrench. See Figure 32.

NOTE: Turn clockwise to increase CO₂, and counterclockwise to decrease CO₂. Make adjustments by ¼ turn increments. Wait three minutes for reading to stabilize.

Once the desired values are achieved, record the combustion analyzer values for CO₂ and CO in Table 18, “Adjusted Lo” column.

- Remove the combustion analyzer.
- Close the hot water faucets.
- Press and hold the **Enter** button to return to the home screen and resume operation.

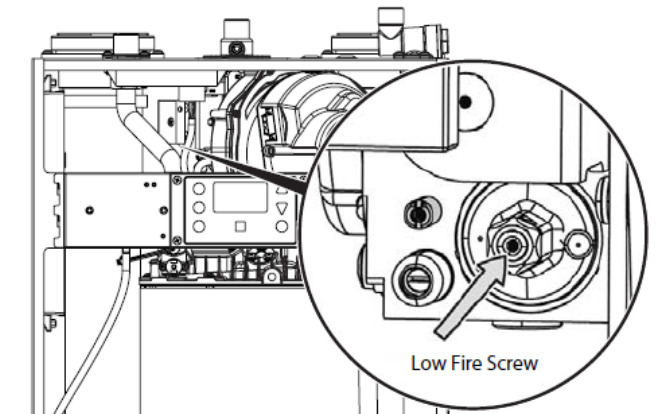


Figure 32 – Low Fire Offset Adjustment Location

PART 13 – OPERATION

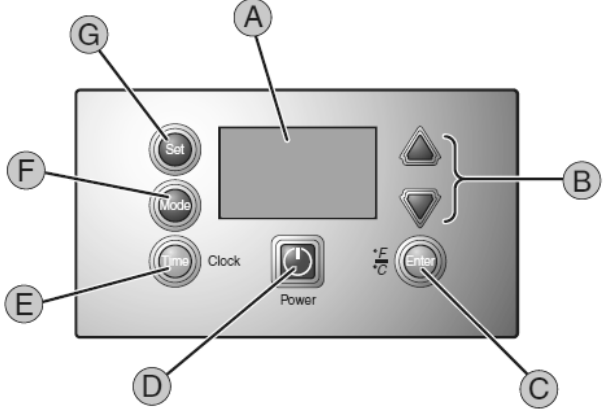
A. CONTROL PANEL			
A	LCD Display	The LCD display screen shows all information about the operating functions of the water heater.	
B	Arrow Keys	Press the UP or DOWN arrows to adjust the value of a selected feature, such as time or water temperature.	
C	Enter Button	Use this button to return to the Home screen.	
D	Power / Reset Button	When the water heater is initially connected to an electrical power supply, the water heater will automatically turn ON and the display panel should light up. To turn the water heater OFF, press and hold the POWER button and the water heater will go through a shutdown process. The water heater can be turned ON again once the blower finishes its purge cycle (10 seconds) by pressing and holding the POWER button. Pressing the POWER button will also RESET the water heater after it has encountered an error.	
E	Time Button	Press this button to set the hours and minutes of the clock.	
F	Mode Button	Press this button to access various Modes of Operation.	
G	Set Button	Used to view real time flow and temperature readings.	

Table 19 – Control Panel


B. DISPLAY ICONS		
H	Indicates the current time in AM or PM	
I	CODE Displays the CODE icon and the most recent digital error code.	
J	INLET Displays the INLET icon and the actual inlet water temperature in degrees Fahrenheit or Celsius.	
K	ERROR Indicates an error has been detected and a trouble code may be shown next to the CODE icon.	
L	Indicates water flow (open faucet).	
M	Indicates blower is ON.	
N	Indicates burner is ON.	
O	Gas Consumption Indicates the level of energy usage. There are four “bar” indicators. Each represents 25% of gas usage.	
P	Indicates the outlet water temperature.	
R	Cascading The CASCADING icon appears when multiple water heaters are daisy-chained and programmed.	

Table 20 – Display Icons

C. POWERING THE WATER HEATER ON AND OFF

- To turn the water heater ON press the **Power** button. The home screen will automatically display when the water heater is ready to use.
- To turn the water heater OFF press and hold the **Power** button for three seconds. The display screen will turn off when the power is OFF.

D. RESETTING (CLEARING) ERROR CODES

To reset the water heater and clear all error codes, press and release the **Power** button.

E. SETTING THE TIME

1. Press the **Time** button. The minute section of the time display will flash.
2. Press the **Up/Down** arrows to set the correct minute.
3. Press the **Time** button again. The hour section of the time display will flash.
4. Press the **Up/Down** arrows to set the correct hour. When setting the hour, make sure you have correctly advanced the time to either the AM or PM hour setting.
5. Press the **Time** button again. The colon (:) between the hours and minutes should not be flashing, indicating the time has been properly set.



F. ADJUSTING THE WATER TEMPERATURE

1. GENERAL INFORMATION

These commercial water heaters are capable of heating water to 190°F (87.7°C).

NOTE: The outlet water temperature is factory preset to 120°F (49°C).

⚠ DANGER



Hot water temperature over 120°F (49°C) can cause severe burns instantly or death from scalding. Children, the disabled, and the elderly are at the highest risk of being scalded. Do not leave children or the infirm unsupervised. Check temperature of hot water before taking a shower or bath. To control water temperature from a particular faucet, temperature limiting valves can be installed by your service professional.

All water faucets must be closed before changing the temperature setting. The blower in the water heater must be OFF and the water heater must not be operating (no flame).

2. ADJUSTMENT PROCEDURE

1. Press the **Up/Down** arrows to set the desired temperature. The temperature range for residential applications is adjustable between 100 and 140°F (38 and 60°C) in one degree increments.



⚠ WARNING

When the Flue Pipe Selection is set for CPVC, flue temperatures can reach 190°F. PVC pipe will lose integrity at temperatures above 149°F. If setting water temperature above 140°F, it is required to pipe the vent with CPVC, PP, or stainless steel vent materials for the exhaust, and to change the Flue Pipe Selection setting to CPVC. Make sure FP setting and the type of material being used for the flue are compatible. Failure to do so could result in property damage, serious injury, or death.

- To set the temperature **above** 140°F, press and continue to hold the **Set** button while pressing the **Up** arrow. Continue pressing the **Up** arrow until the desired temperature is reached.

NOTE: After setting temperature above 140°F, ensure the exhaust vent is piped in CPVC, PP, or stainless steel AND that the Flue Pipe (FP) type in Advanced Modes is CPVC. The water heater will lock out if the FP setting is not changed to CPVC.



When the **Set** button is released, the home screen will appear. Once the desired temperature is selected, the water heater will heat water to that temperature.

G. REAL TIME TEMPERATURE AND SYSTEM FLOW

- Press and hold the **Set** button.
- The flow screen Flo indicates gallons per minute (gpm). This screen alternates between Flo and the actual gpm. The first two digits are gallons and the second two digits are a portion of one gallon. For example, 3:05 is 3.05 gpm.

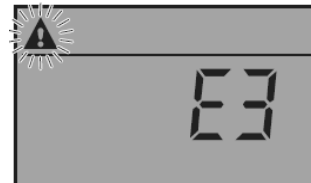


NOTE: The actual real time water temperature will also be displayed (in this example, 116°F).

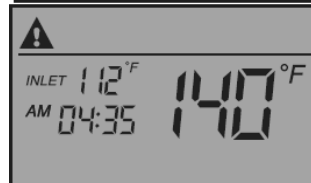
Release the **Set** button to return to the home screen.

H. ERROR SCREEN

If an error occurs, the display will indicate an error code (in this example, E3). The safety alert symbol ⚠ will also flash.



If the safety alert symbol is visible BUT NOT flashing, the communication between cascaded water heaters was interrupted, but has since been reestablished.



PART 14 – PROGRAMMING

A. MODES OF OPERATION

The Modes of Operation screens provide set up screens and additional information on the water heater. There are five (5) Mode of Operation screens used by the service technician during installation or maintenance of the water heater.

1. STANDARD MODES

- Press and release the **Mode** button until the desired screen appears on the display.
dC – Daisy Chain (Cascade)
FC – Flow Control
PH – Performance History
dE – Diagnostic Error
- Follow the instructions in the specific section to enter the desired settings.



2. ADVANCED MODES

- Press and hold the **Mode** button for five seconds until the rS screen appears. Now press and release the **Mode** button multiple times until the desired screen appears on the display.
rS – Burner Rate Ramp Setting
Ft – Fuel Type
CE – Common Exhaust
FP – Flue Pipe Type
CO – Adjust CO2 Level
- Follow the instructions in the specific section to enter the desired settings.



B. VIEWING AND SETTING STANDARD MODES OF OPERATION

1. DAISY CHAIN (CASCADE)

- Press and release the **Mode** button until the dC screen appears.
- The current selection will be displayed.

NOTE: The default is OFF.



DAISY CHAIN (CASCADE) SETUP PROCEDURE

- If necessary, press the **Power** button to turn OFF each water heater in the system.

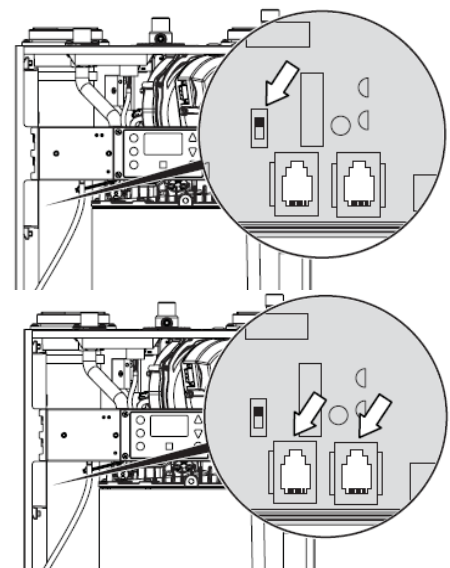
⚠ WARNING

SHOCK HAZARD – Before making any adjustments or connections inside the water heater cabinet, make sure the power is disconnected. Unplug the water heater and/or turn the circuit breaker OFF. Failure to do so could result in property damage, serious personal injury, or death due to electric shock.

- Disconnect power from all the water heaters in the system.
- Remove the front covers and locate the main circuit boards on the **first** and **last** water heaters in the system.
- IF SETTING UP A SYSTEM WITH TWO WATER HEATERS: Skip this step and continue to Step 5.

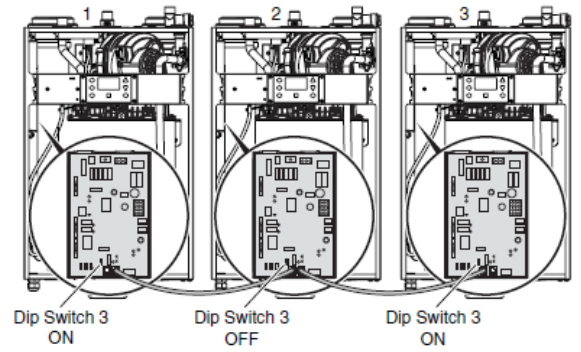
IF SETTING UP A SYSTEM WITH THREE (3) OR MORE WATER HEATERS: Locate DIP switch 3 (see arrow) on the electronic boards of the **first** and **last** water heaters in the daisy chain (cascaded system), and position the dip switch in the ON position. On the **middle** water heaters, position the switch in the OFF position.

- Using the supplied communication cable (one included with each water heater), connect one end of a cable into the open jack receptacle located on the right of the circuit board (see arrows).



6. Pass the cable through the grommet located at the bottom of the cabinet, and connect the other end of the cable to the open jack receptacle located on the left of the circuit board of the next daisy chained (cascaded) water heater.

When finished, the **first** and **last** water heaters should have open jack receptacles, while the **middle** water heaters should have no open receptacles.



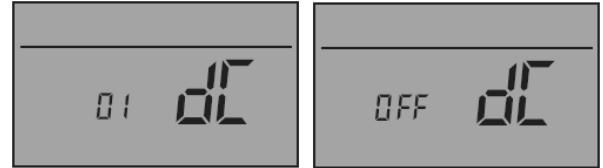
7. Secure connected cables with zip ties.
8. Replace the front covers.

SETTING WATER HEATER NUMBER

1. Reconnect the power and wait for the home screen to appear.
2. Press and release the **Mode** button until the dC screen appears.

NOTE: The default dC setting is OFF, regardless of Dip Switch position.

3. Press the **Up/Down** arrow keys to select the desired address for the particular water heater. Change the selection from OFF to one of the ten possible selections (01 through 10). The **Up/Down** keys scroll from OFF to 01 through 10 and then return to OFF.



4. Once the desired number is selected, press and hold the **Enter** button for 3 seconds to save this setting and return to the home screen.
5. Repeat the steps and set each water heater to a different number. For example, if the first water heater was addressed 01, the next two water heaters would be 02 and 03, respectively.

2. FLOW CONTROL

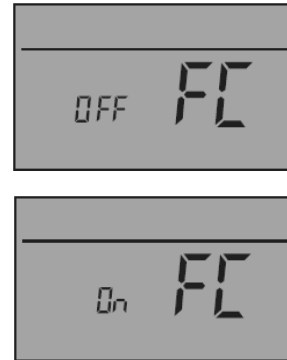
- a. Press and release the **Mode** button until the FC screen appears. The current flow control setting will be displayed.

NOTE: The default flow control setting is OFF.

NOTE: The water heater setpoint MUST BE BELOW 160°F to change the Flow Control setting.

- b. The water control valve is set to ON for temperature priority and OFF for maximum flow.

Press the **Up/Down** arrows to select either ON or OFF.



- c. Press and hold the **Enter** button for 3 seconds to save settings and return to the home screen.

NOTE: If the **Enter** button is not pressed within 60 seconds of activity, any changes WILL be saved and the display will automatically return to the home screen.

3. PERFORMANCE HISTORY

Performance History allows the technician to view ignition cycles, the number of ON times, and cumulative water flow. The displayed results are for all the water heater modules combined within the system.

NOTE: Water heater has to be operating for one (1) hour before it will record values.

- a. Press the **Mode** button multiple times until the PH screen appears.

The Flow-On Hours (FH), Firing Counts (FC), and Cumulative Flow

(CF) will now begin to display for 1.5 seconds each. The display will continue to cycle for 60 seconds and then return to the home screen. Examples and descriptions are shown below.

In this example, Diagnostic Code FH (Flow-on Hours) shows one hour of flame. (To obtain the total hours, multiply the number by 10.

In this example, Diagnostic Code FC (Firing Count) shows a flame count of 40,000. To obtain the total number of ignitions, multiply the number by 1,000.

In this example, Diagnostic Code CF (Cumulative Flow) shows 38,000 gallons of water. To obtain the usage in gallons, multiply the number by 1,000.



- b. Press the **Enter** button to return to the main screen.

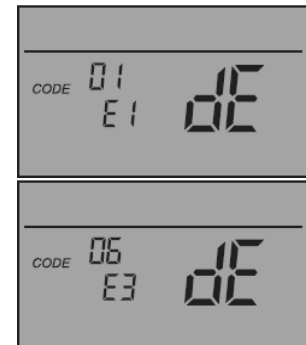
NOTE: If the **Enter** button is not pressed within 60 seconds of inactivity, the display will return to the home screen.

4. DIAGNOSTIC CODE AND ERROR LOG SELECTION

The dE screen provides the technician with the Diagnostic Codes and Errors recorded as the water heater operates. These codes are used in conjunction with the Performance History Codes to troubleshoot water heater operation.

See Troubleshooting for a list of Error Codes and possible remedies.

- a. Press and release the **Mode** button multiple times until the dE screen appears.
Press the **Up/Down** keys to scroll through the screens. The number of the event and the diagnostic codes will display from 01 to 10. The 01 screen is the most recent code, while the 10 screen is the last viewable code. Refer to the examples below for further clarification. Example of most recent diagnostic code, Error Code E1: Blower Speed Fault.



Example of sixth most recent Error Code E3: Blocked Flue Fault.

- c. Press and hold the **Enter** button for three seconds to return to the home screen or the system will automatically return after 60 seconds.

C. VIEWING AND SETTING ADVANCED MODES OF OPERATION

1. BLOWER RAMP SELECTION

When exhaust harmonics are observed, i.e. resonance at low fire, adjust the water heater using the blower ramp setting (default is rat3). Increase the rate number until the resonance is no longer observed. The Blower Ramp Selection has five different settings, and range is rat1 – rat5.

- a. Press and hold the **Mode** button for more than 5 seconds to access the rS screen on the display. The current Blower Ramp setting will be displayed.

- b. Press the **Up/Down** arrows to change the Blower Ramp Selection (rat1 – rat5). Select a ramp rate at which the harmonics disappear during operation.

- c. Press and hold the **Enter** button for three seconds to save the settings and return to the home screen.

NOTE: If the **Enter** button is not pressed within 60 seconds of inactivity, changes WILL be saved and the display will return to the home screen.

2. FUEL TYPE VERIFICATION

The Fuel Type screen displays the selected fuel type: Natural Gas (factory preset) or Propane. Fuel Type changes CANNOT Be made at this screen. Refer to the Propane (LPG) Conversion section, this manual, for additional setup information.

- a. Press and hold the **Mode** button for more than 5 seconds to access the rS screen on the display.
- b. Press and release the **Mode** button until the Ft screen appears on the display. The current Fuel Type setting will appear (nAt or PrOP) to indicate the position of DIP switch 3 on the circuit boards. Fuel type cannot be changed from the screen.

To change fuel type from factory set natural gas to propane, follow the Propane Conversion procedure in this manual.

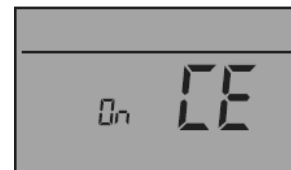
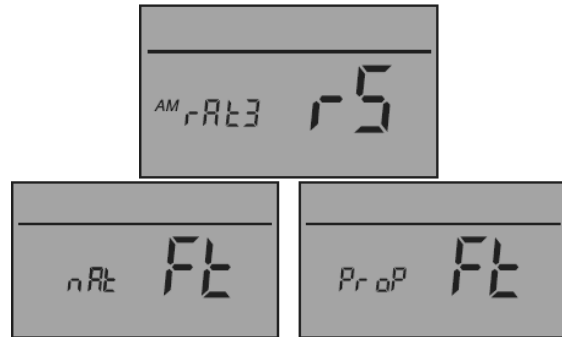
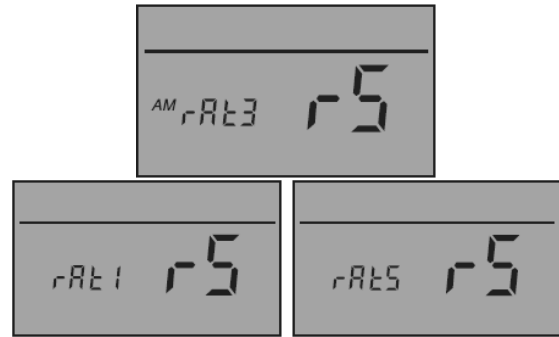
- c. Press and hold the **Enter** button for three seconds to return to the home screen or the system will automatically return after 60 seconds.

3. COMMON EXHAUST VENTING

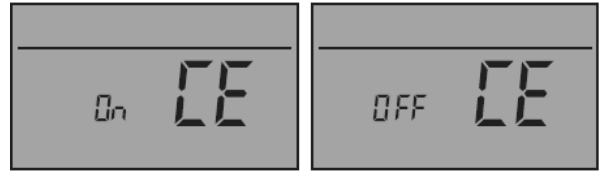
This mode is applicable when multiple water heaters are connected together. Turning the CE mode ON allows multiple water heaters to be vented in a common vent. Refer to the Common Venting instruction guidelines, this manual, for piping details.

NOTE: The default setting for this mode is ON. This setting can only be changed when the water heater is not firing. Ensure there are no calls for hot water while attempting to change this setting.

- a. Press and hold the **Mode** button for more than 5 seconds to access the rS screen on the display.
- b. Press and release the **Mode** button until the CE screen appears on the display. The current CE setting will be displayed.



- c. Press the **Up/Down** arrows to select either ON or OFF.



- d. Press and hold the **Enter** button to save the settings and return to the home screen.

NOTE: If the **Enter** button is not pressed within 60 seconds of inactivity, changes **WILL** be saved and the display will return to the home screen.

4. FLUE PIPE SELECTION (PVC OR CPVC)

This mode is used to select the vent pipe used in the installation. Choosing PVC vent material limits exhaust vent temperatures to 149°F. Choosing CPVC vent material limits exhaust vent temperatures to 190°F.

NOTE: The default setting for this mode is PVC. This setting can only be changed when the water heater is not firing. Ensure there are no calls for hot water while attempting to change this setting.

⚠ WARNING

When the Flue Pipe Selection is set for CPVC, flue temperatures can reach 190°F. PVC pipe will lose integrity at temperatures above 149°F. If setting water temperature above 140°F, it is required to pipe the vent with CPVC, PP, or stainless steel vent materials for the exhaust, and to change the Flue Pipe Selection setting to CPVC. Make sure FP setting and the type of material being used for the flue are compatible. Failure to do so could result in property damage, serious injury, or death.

- a. Press and hold the **Mode** button for more than 5 seconds to access the rS screen on the display.
- b. Press the **Mode** button multiple times until the FP screen appears. The current setting will be displayed.
- c. Press the **Up/Down** arrows to select the desired setting of either PUC or CPUC.

NOTE: The temperature rating for flue materials is limited to 149°F for PVC and 190°F for CPVC flue materials.



- d. Press and hold the **Enter** button to save the settings and return to the home screen.

NOTE: If the **Enter** button is not pressed within 60 seconds of inactivity, changes **WILL** be saved and the display will return to the home screen.

5. ADJUSTING CO₂ LEVELS SELECTION

For further information, refer to the Adjusting the CO₂ Level section of this manual.

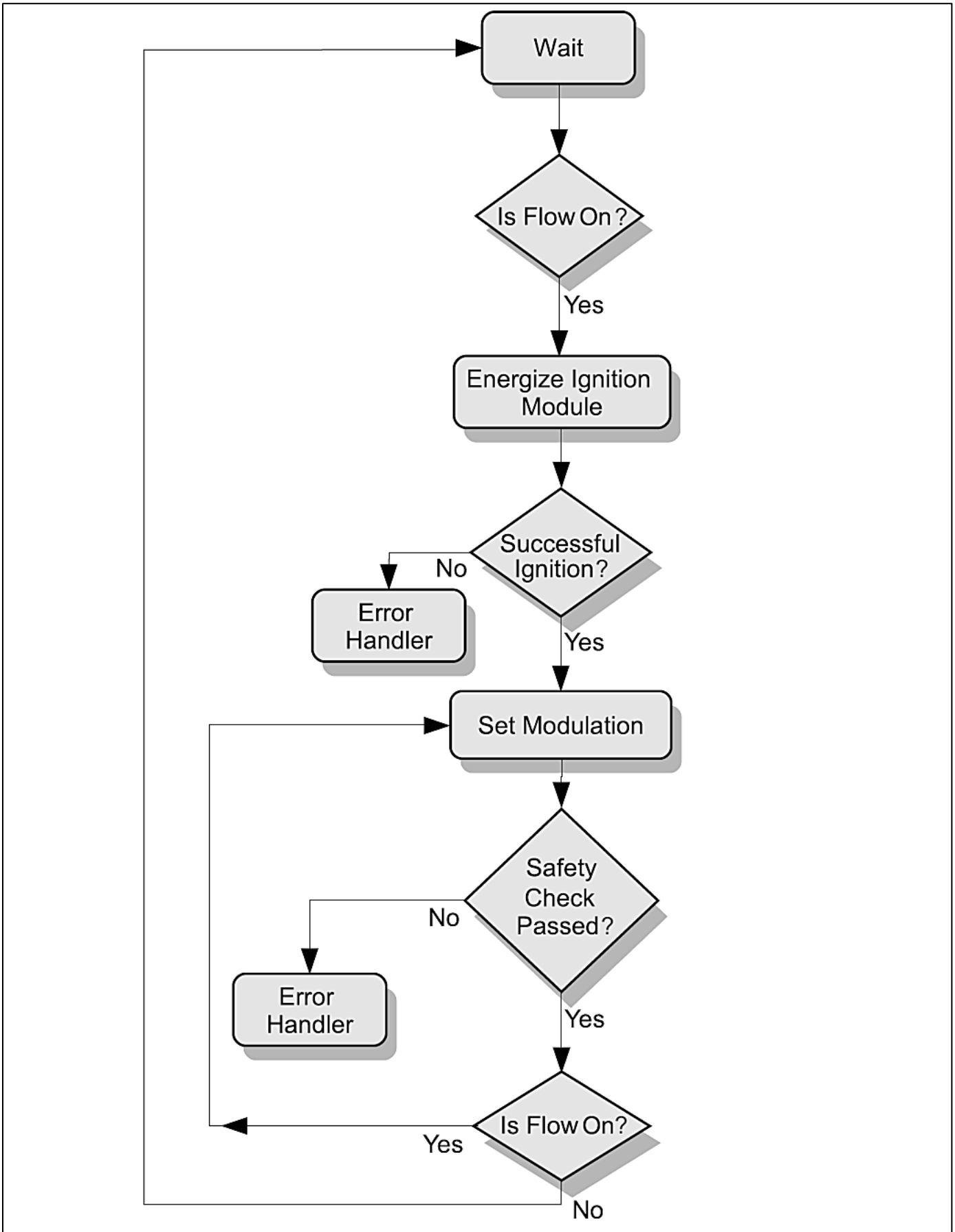


Figure 33 – Operational Diagram

PART 15 – MAINTENANCE

A. CLEANING THE INLET WATER STRAINER

All water heaters are equipped with a sediment strainer on the inlet water connection. Initially, this strainer should be cleaned every three months to establish a cleaning schedule.

1. Turn off the power and gas to the water heater.
2. Locate the inlet water strainer. See Figure 34-A.
3. Position a container under the strainer on the water inlet piping. See Figure 34-B.
4. Close the water inlet and outlet valves (arrows) and remove the strainer cover plug. Allow the water to drain from the pipe into the container. See Figure 34-B.

NOTE: If a shut-off valve was not installed near the water heater on the cold water inlet, shut off the water at the main water supply valve.

5. Remove the strainer screen, clean it, and reinstall it in the housing. See Figure 34-C.
4. Replace the strainer cover plug. Open the water inlet valve. Refill the water heater and system. Restore power and gas to the water heater.

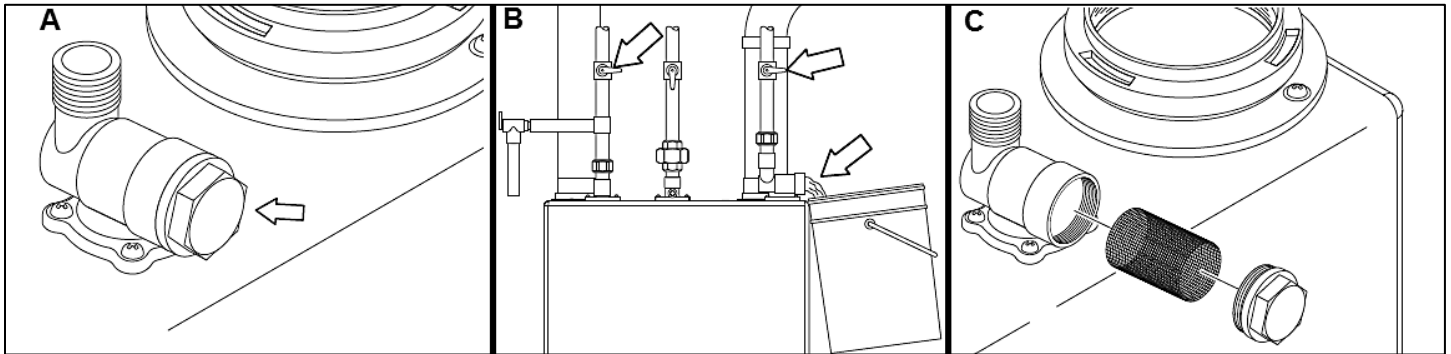


Figure 34 – Inlet Water Strainer Cleaning Detail

B. DRAINING THE WATER HEATER

⚠ WARNING

The water heater is factory set to 120°F (49°C). Water temperatures over 120°F (49°C) can cause severe burns. To avoid burns, make sure the water heater is OFF and the power supply is disconnected. The water heater will remain hot for some time. Wait until the water heater has completely cooled before draining the water heater or performing any other maintenance.

1. Press the **Power** button and turn OFF the water heater. Disconnect the power.
2. Close the water supply inlet and outlet valves. The valve is closed typically when the handle is perpendicular to the pipe, as shown in Figure 35-A.

NOTE: If a shut-off valve was not installed near the water heater on the cold water inlet, shut off the water at the main water supply valve.

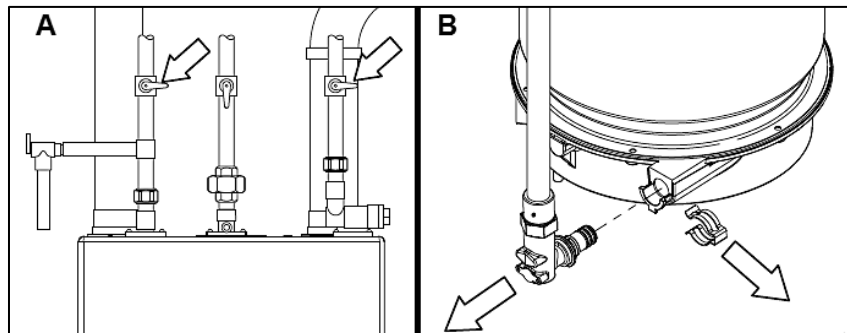


Figure 35 – Draining the Water Heater

3. Remove the front panel. Position a bucket or other container under the heat exchanger inlet.
4. Remove the clip holding the inlet line to the heat exchanger. Pull the inlet fitting from the heat exchanger. Allow water to drain from the heat exchanger. See Figure 35-B.
6. When all water has drained from the heat exchanger, replace the inlet fitting and clip.


C. FILLING THE WATER HEATER

1. Open the water outlet supply valve. Slowly open the water inlet supply valve.
2. Open the hot water faucet that is located furthest away from the water heater. Once a steady stream of water flows and all air is purged from the system, close the hot water faucet.
3. Connect the water heater to the power supply.
4. Open a hot water faucet. The water heater should operate normally.

D. DESCALING THE WATER HEATER

Depending on quality of the water supply, the heat exchanger may require descaling to provide efficient heating of water. It is recommended that the water heater be descaled every other year, or sooner.

PART 16 – TROUBLESHOOTING

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE	REMEDY
E1	Blower Speed Fault	<ul style="list-style-type: none"> • Blower Noisy, Impeller Jammed • Disconnected Signal Wire • Wiring Faulty 	<ul style="list-style-type: none"> • Inspect Blower / Impeller. Clean and Remove Obstructions • Check PWN Signal, Check for Loose Wires, Pins, and Repair • If the problem persists, turn control panel OFF, shut the gas valve, unplug the water heater, and contact an authorized service technician.
E3	Blocked Flue Fault	<ul style="list-style-type: none"> • Exhaust Blocked • Backed up Condensate • Wiring Loose (Switch Open) 	<ul style="list-style-type: none"> • Check exhaust termination, Check exhaust connection at WH, Install Screens • Check slope of drain, check for double loops, air locks, debris in loop • Check wiring.
E7	Ignition Failure	<ul style="list-style-type: none"> • Water Overheat Switch Tripped • Faulty DSI , Faulty Igniter Wire, Faulty Ignition Connection, Faulty PCB, Bad Igniter • Low Gas Pressure 	<ul style="list-style-type: none"> • Check Water Overheat Switch located on the hot water outlet. Press the Reset button on the switch to reset it. This switch is wired in series with the gas valve. • Check pump, Check cross over solenoid, electrical noise (dsi) • Replace faulty part • Adjust gas pressure at regulator, check/upsized gas line, check for gas line blockage • If the problem persists, turn control panel OFF, shut gas valve, unplug water heater, and contact an authorized service technician.
E9	Temperature Sensor Short 	<ul style="list-style-type: none"> • Faulty Sensor Wiring • Faulty Sensor • HE – Heat exchanger water outlet sensor • FL – Flue temperature sensor • IN – Inlet water temperature sensor • Faulty Controller 	<ul style="list-style-type: none"> • Check for nicked or broken sensor wiring or connectors. Also check for corroded or wet connectors. • Measure resistance of sensor at connector (18 Kohm at 50°F, 10 Kohm at 77°F, 3 Kohm at 140°F) • Replace controller

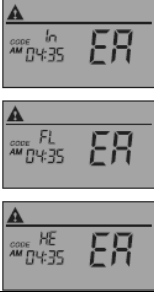

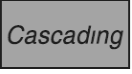
ERROR CODE	DESCRIPTION	POSSIBLE CAUSE	REMEDY
EA	Temperature Sensor Open Circuit 	<ul style="list-style-type: none"> Unplugged connectors Faulty Sensor wiring Faulty Sensor HE – Heat exchanger water outlet sensor FL – Flue temperature sensor IN – Inlet water temperature sensor Faulty Controller 	<ul style="list-style-type: none"> Check connectors and ensure they are securely connected. Check for nicked or broken sensor wiring or connectors. Also check for corroded or wet connectors. Measure resistance of sensor at connector (18 Kohm at 50°F, 10 Kohm at 77°F, 3 Kohm at 140°F) Replace controller
EC	Flue Temperature Exceeded Set Limit	<ul style="list-style-type: none"> Incorrect vent set up High inlet temperature Faulty Sensor wiring Faulty Sensor Faulty Controller 	<ul style="list-style-type: none"> If vent pipe is CPVC, PP, or stainless steel, ensure that CPVC is selected in the FP (Flue Pipe) mode. Ensure inlet temperature is lower than 150°F if vent pipe material is PVC or lower than 190°F if vent pipe material is CPVC, PP, or Stainless Steel. Check for nicked or broken sensor wiring or connectors. Also check for corroded or wet connectors. Measure resistance of sensor at connector (18 Kohm at 50°F, 10 Kohm at 77°F, 3 Kohm at 140°F) Replace controller
Ed	Heat Exchanger Outlet Temperature Exceeded Set Limit	<ul style="list-style-type: none"> Flow rate changes excessive Faulty Sensor wiring Faulty Sensor Faulty Controller 	<ul style="list-style-type: none"> Ensure the water flow rate does not change faster than 2 GPM every 5 seconds. Check for nicked or broken sensor wiring or connectors. Also check for corroded or wet connectors. Measure resistance of sensor at connector (18 Kohm at 50°F, 10 Kohm at 77°F, 3 Kohm at 140°F) Replace controller
	Flashing Warning Icon	<ul style="list-style-type: none"> Indicates an Error Code and the water heater is locked out 	<ul style="list-style-type: none"> Refer to the indicated error code in this table (E1, E2, etc.) for resolution
	Flashing Cascade Icon	<ul style="list-style-type: none"> Communication is Lost between Cascaded Units 	<ul style="list-style-type: none"> Check for broken or nicked communication cables or loose connections. Ensure that the communication cables are not bundled or tied to any high voltage lines. Ensure dip switch (SW3) is ON in first and last units and OFF in all others. Ensure each unit has been given a unique number under the dC mode.

Table 21 – Error Codes and Remedies

TROUBLESHOOTING CHART		
PROBLEM	POSSIBLE CAUSES	POSSIBLE REMEDIES
No electrical power to the water heater	<ol style="list-style-type: none"> Is the plug on the power supply cord unplugged from the electrical outlet? Is electrical panel's 10 Amp circuit breaker tripped? Is the fuse on the circuit board good? Is there a power outage to the home? 	<ol style="list-style-type: none"> Plug in the water heater. Reset the circuit breaker. If the display panel is blank, unplug the water heater or contact an authorized service technician. Contact the power company.
No water available when a faucet is opened	<ol style="list-style-type: none"> Is the water supply valve shut off at the meter (do cold water faucets work)? Is the water supply valve near the water heater open? Is the water pipe frozen? 	<ol style="list-style-type: none"> Open the closed supply valve. Open the water supply valve. Turn OFF the water heater, close all water valves and the gas valve. Contact an authorized service technician.
Hot water is not available when the faucet is opened.	<ol style="list-style-type: none"> Does the water heater have power (plugged in)? Is the water heater turned ON? Is an error code flashing on the display panel? Is the gas supply valve open or shut off at the meter (do other gas devices work)? 	<ol style="list-style-type: none"> Restore electrical power to the water heater. Press and hold the Power button to turn the water heater ON. Refer to the Diagnostic and Error Codes section in this manual. Open the gas supply valve.

PROBLEM	POSSIBLE CAUSES	POSSIBLE REMEDIES
The water temperature is not hot enough or turns cold during use.	<ol style="list-style-type: none"> 1. Is the faucet open enough to draw at least 0.6 gallons (2.3L) per minute through the water heater? 2. Is an error code flashing on the display panel? 3. Is the outlet water temperature set too low? 	<ol style="list-style-type: none"> 1. Open the faucet to allow more water flow. 2. Refer to the Diagnostic and Error Codes section in this manual. 3. Adjust the outlet water temperature (refer to the procedure in this manual).
It takes a long time before hot water flows from the faucet.	Is the faucet some distance from the water heater?	<ol style="list-style-type: none"> 1. Allow time for the cold water already in the pipes to flow from the faucet. 2. Have recirculation valves and/or plumbing return line(s) installed and program the water heater for recirculation mode.
The water is not hot enough.	Is the water temperature set too low?	Adjust the temperature setting.
The water at the faucet is too hot.	Is the water temperature set too high?	Adjust the temperature setting.
A fan can be heard even when the water heater is not operating.	The blower continues to operate after the burner shuts off to clear the exhaust vent of combustion gases.	This is normal operation – no action is required.
White “smoke” can be seen coming out of the exterior exhaust gas vent.	Depending on the outside temperature, water vapor can be produced as the exhaust is vented.	This is normal operation – no action is required.
Water heater makes excessive noise / vibration	<ol style="list-style-type: none"> 1. Vent length is too short 2. Gas pressure 3. Blocked gas line 4. Improper air-fuel ratio 	<ol style="list-style-type: none"> 1. Increase effective length by adding an elbow or reducer. 2. Check static and dynamic gas pressure. 3. Check the gas line for blockage. 4. Adjust air-fuel ratio by turning high fire screw, check CO.
Exhaust connection leaking condensate at flue connection	Incorrect exhaust connection, jammed seals, crooked pipe	Repair.
Exhaust connection dripping condensate	Connection not sealed properly	Check and/or replace seal.
Water heater not firing, but shows flow icon	<ol style="list-style-type: none"> 1. Condensate dripping on sensor wires and sending false readings. Corroded pigtailed, wet connections 2. Excessive temperatures 	<ol style="list-style-type: none"> 1. Repair. 2. Allow heat exchanger to cool by turning power off and running cooler water.
Water heater not firing, water is flowing, but no flow icon	Jammed flow sensor	Check for debris in flow sensor. Ensure flow sensor spins by blowing air from inlet side. Install / clean inlet strainer.
Firing intermittently	<ol style="list-style-type: none"> 1. Polarity of wall socket is reversed 2. Inlet temperature within 10°F of set water temperature 	<ol style="list-style-type: none"> 1. Check for polarity of wall socket. Correct if flipped. 2. Lower inlet water temperature or raise outlet water pressure.

Table 22 – Troubleshooting Chart

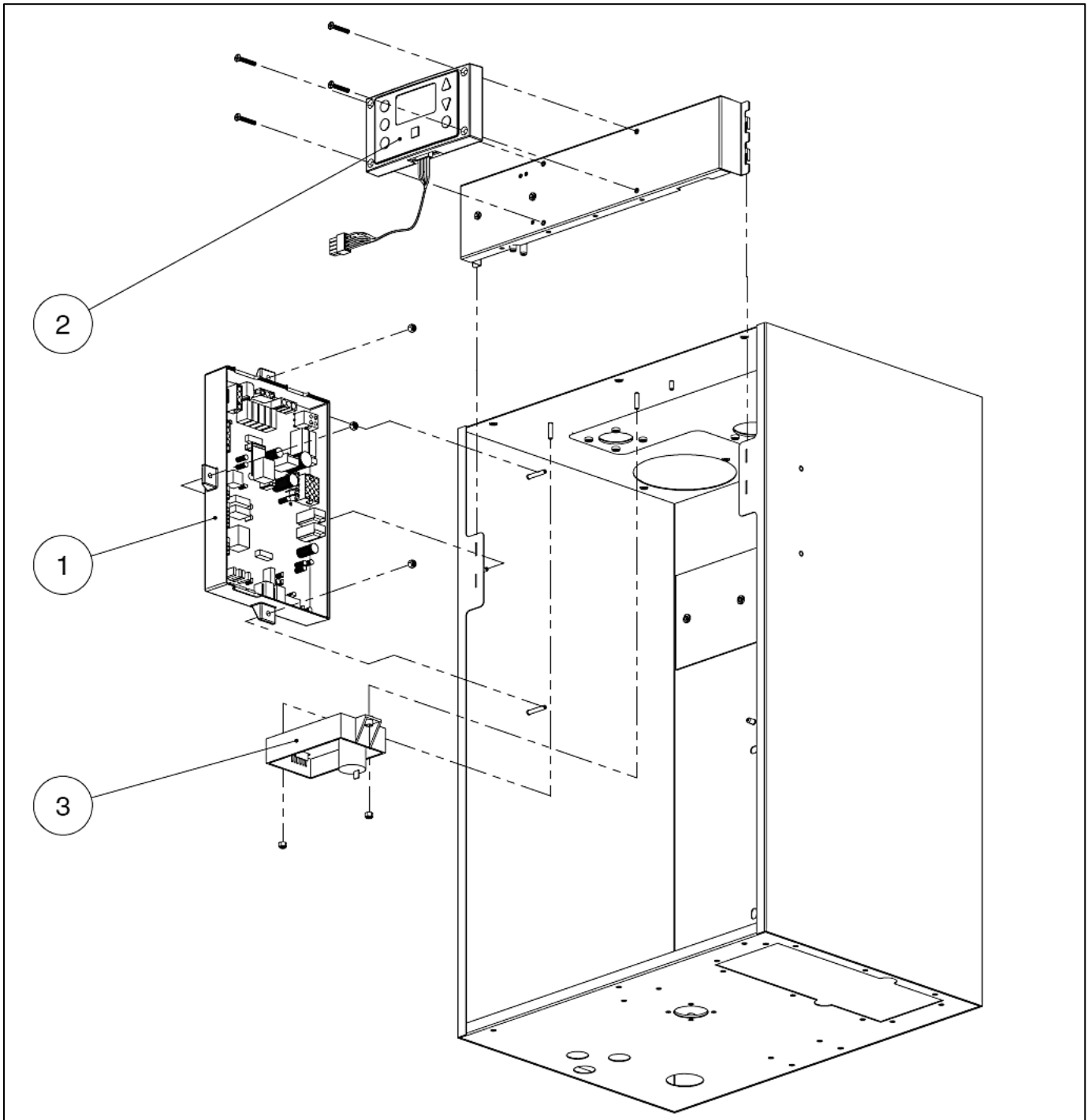


Figure 36 – Electrical Components

ITEM	DESCRIPTION	PART NUMBER
1	CONTROLLER	7800P-002
2	DISPLAY	7800P-004
3	IGNITER MODULE	7800P-005

Table 23 – Electrical Components

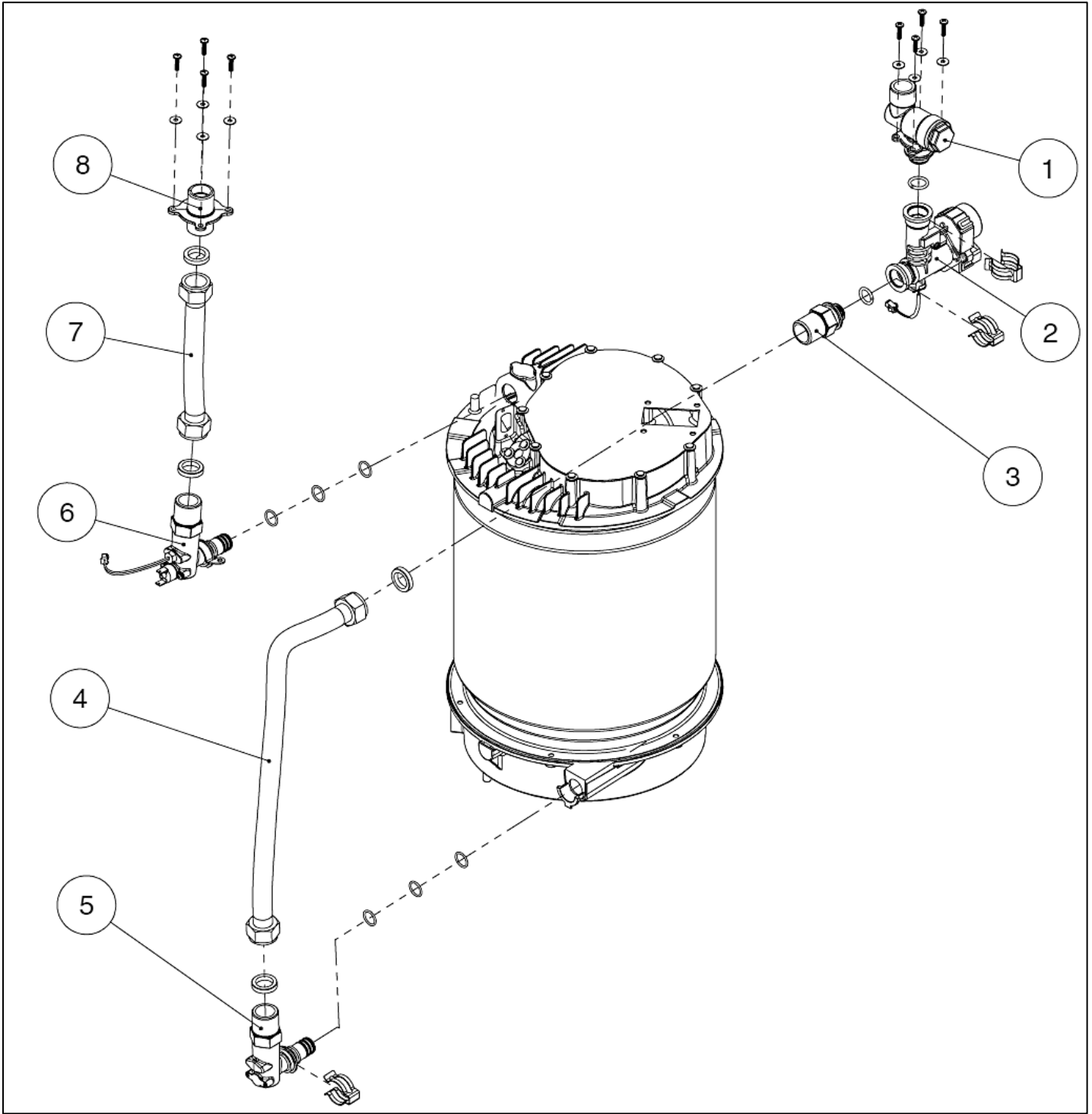


Figure 37 – Water Lines and Fittings

ITEM	DESCRIPTION	PART NUMBER
1	WATER INLET FITTING (3/4" NPT)	7800P-001
2	FLOW SENSOR ASSEMBLY	7800P-003
3	FLOW SENSOR OUTLET FITTING	7800P-007
4	HEAT EXCHANGER INLET LINE (SS)	7800P-009
5	HEAT EXCHANGER INLET FITTING	7800P-010
6	HEAT EXCHANGER OUTLET FITTING	7800P-012
7	HEAT EXCHANGER OUTLET LINE	7800P-013
8	WATER OUTLET FITTING (3/4" NPT)	7800P-014

Table 24 – Water Lines and Fittings

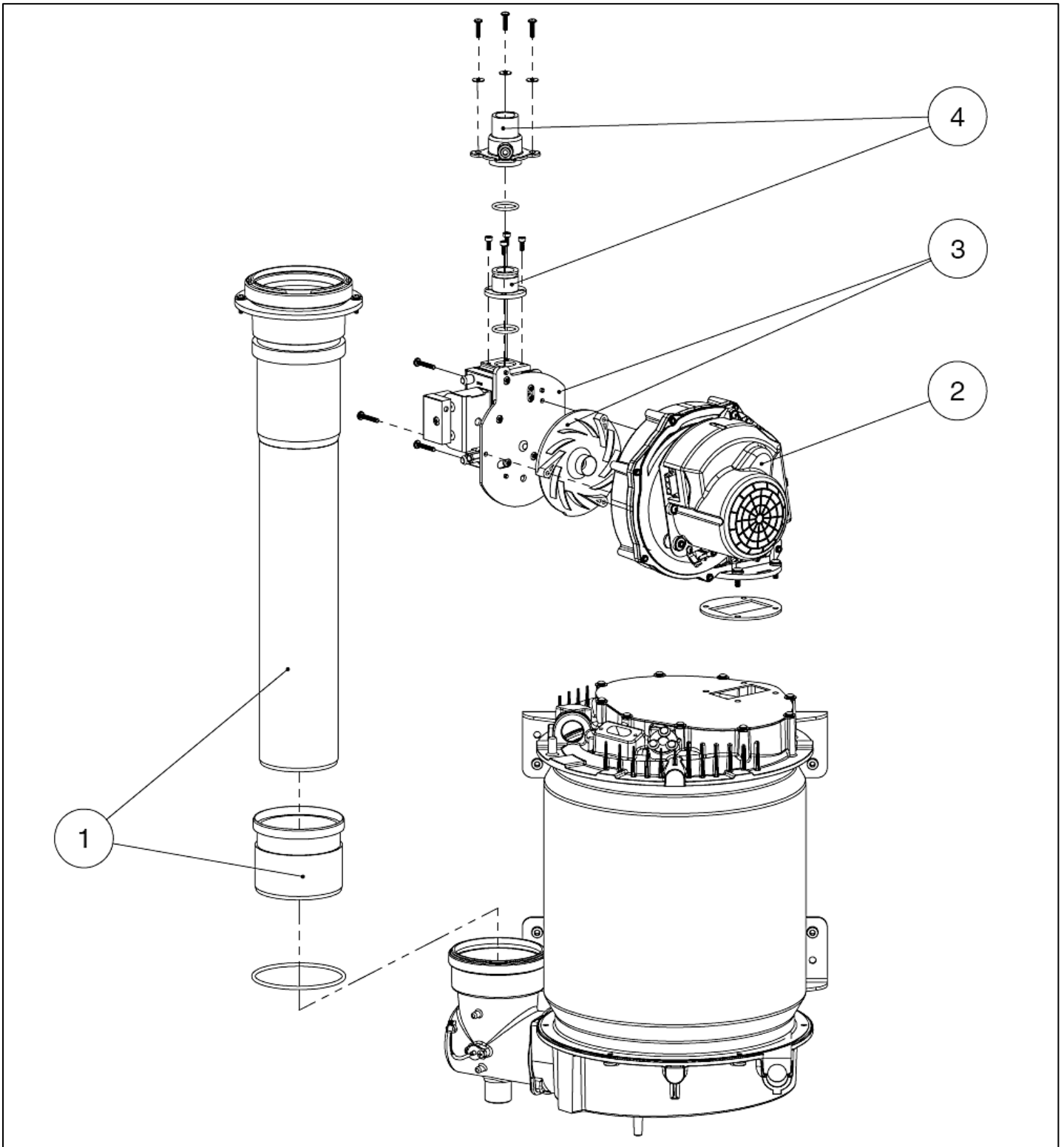


Figure 38 – Blower, Gas Valve, Exhaust Components

ITEM	DESCRIPTION	PART NUMBER
1	FLUE PIPE ASSEMBLY (PP)	7800P-017
2	BLOWER ASSEMBLY	7800P-008
3	GAS VALVE ASSEMBLY	7800P-011
4	GAS INLET ASSEMBLY	7800P-016

Table 25 – Blower, Gas Valve, and Exhaust Components

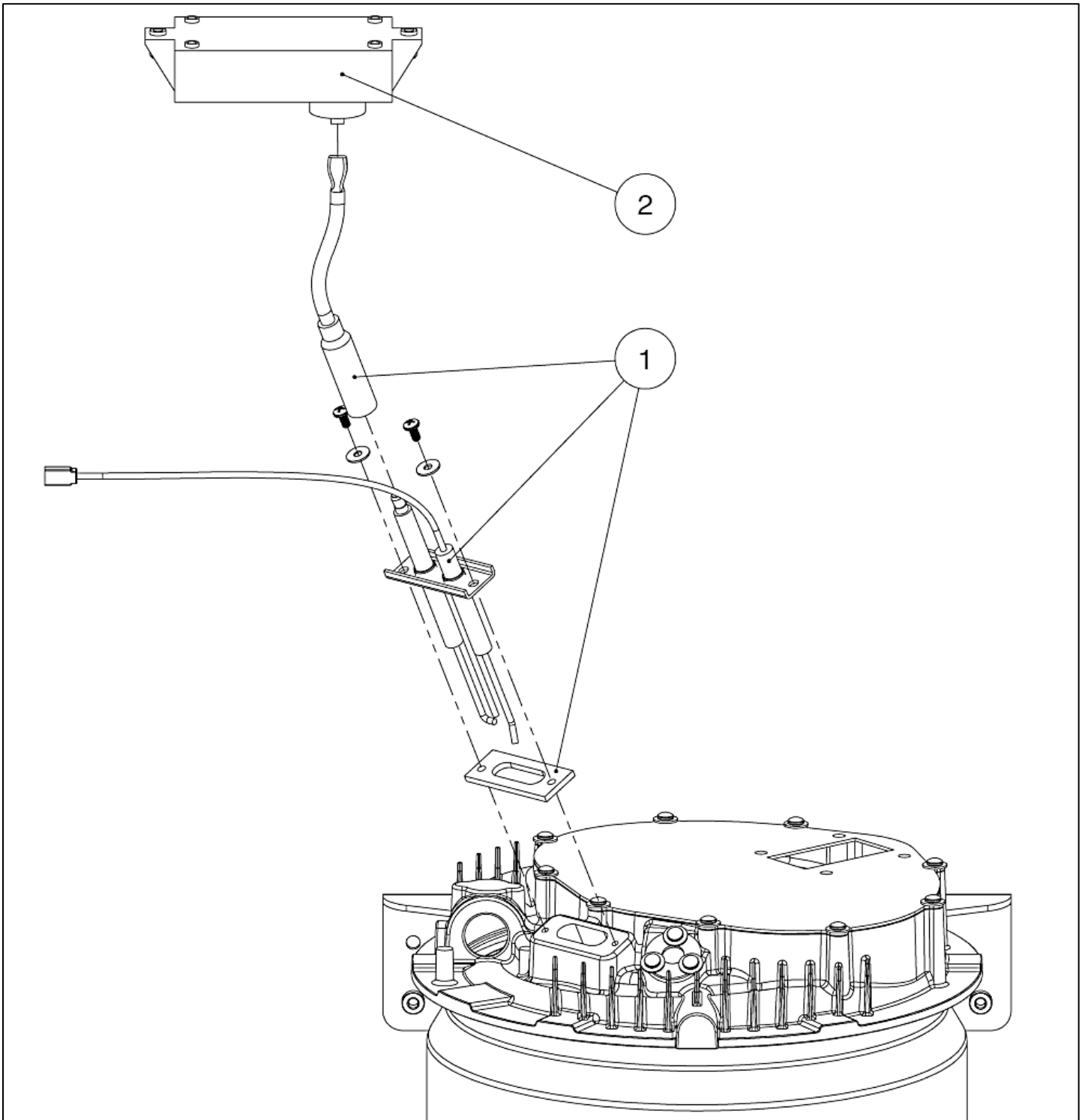


Figure 39 – Ignition Components

ITEM	DESCRIPTION	PART NUMBER
1	ELECTRODE KIT	7800P-006
2	IGNITER MODULE	7800P-005

Table 26 – Ignition Components

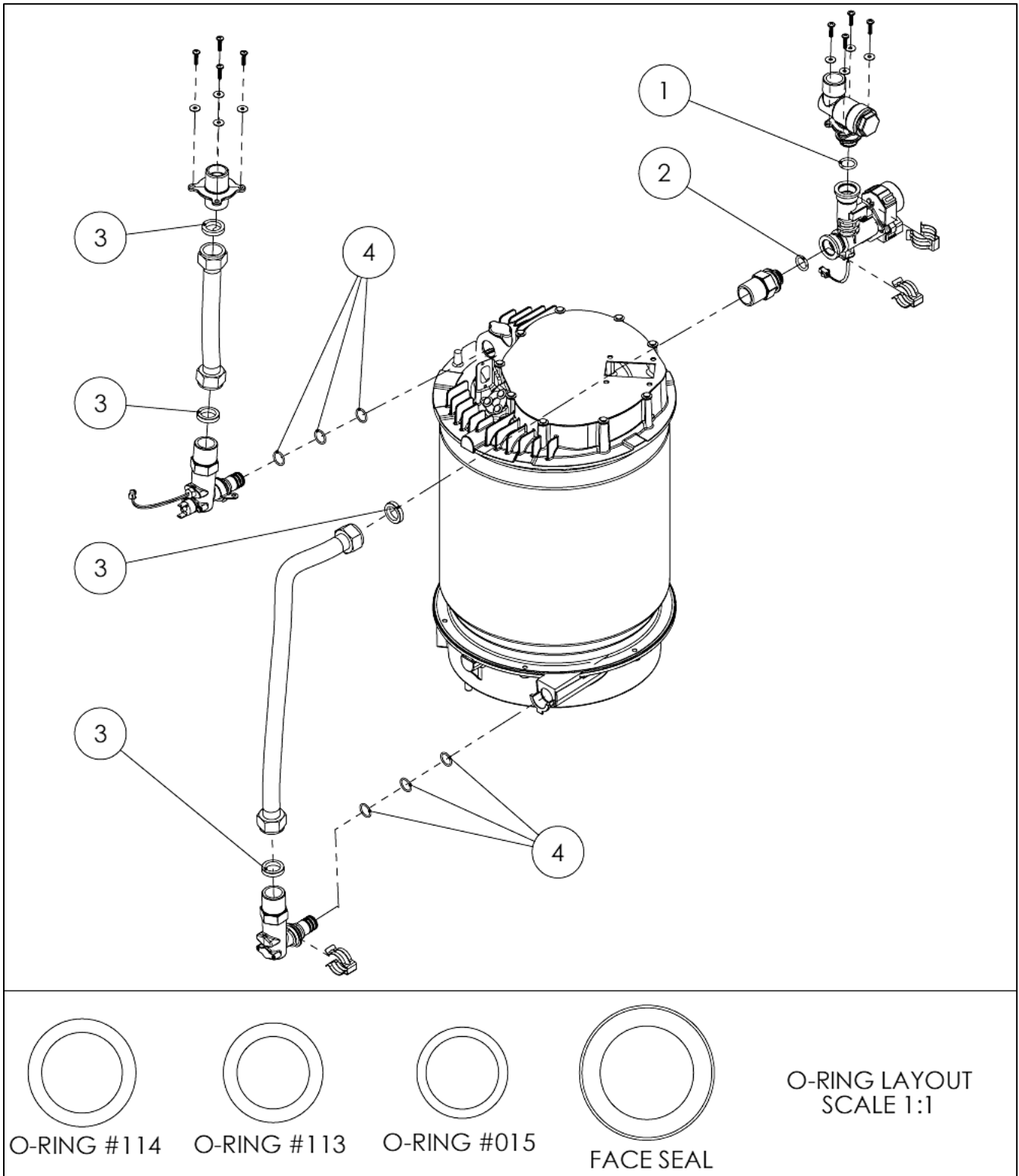


Figure 40 – Water Side Seals

ITEM	DESCRIPTION	QUANTITY	PART NUMBER
1	O-RING #114	1	7800P-015
2	O-RING #113	1	
3	FACE SEAL	4	
4	O-RING #015	6	

Table 27 – Water Side Seals



Advanced Heating and Hot Water Systems

P.O. Box 429 · 120 Braley Road · East Freetown, MA 02717 · 508-763-8071 · Fax: 508-763-3769

Limited Warranty for Hydra Smart Commercial Water Heaters 6 years – Heat Exchanger, 1 year – Parts

HTP warrants each instantaneous water heater and its parts to be free from defects in materials and workmanship according to the following terms, conditions, and time periods. The replacement water heater will be warranted for the unexpired portion of the applicable warranty period of the original water heater. The number of replacement water heaters is limited to one (1) per original water heater purchased. Replacement parts will be warranted for 90 days. **UNLESS OTHERWISE NOTED THESE WARRANTIES COMMENCE ON THE DATE OF INSTALLATION.** This limited warranty is only available to the **original owner** of this water heater, and is non-transferable.

COVERAGE

- A. Should a defect or malfunction result in a leakage of water within the above-stated warranty periods due to defective material or workmanship, malfunction, or failure to comply with the above warranty, HTP will replace the defective or malfunctioning water heater or part(s) with a replacement of the nearest comparable model available at the time of replacement.
- B. If HTP is unable to repair or replace the water heater or part(s) so as to conform to this warranty after a reasonable number of attempts, HTP will then provide, at its option, a replacement water heater. These remedies are the purchaser's exclusive remedies for breach of warranty.
- C. If government regulations, industry certification, or similar standards require the replacement water heater or part(s) to have features not found in the defective water heater or part(s), the owner will be charged the difference in price represented by those required features. If the owner pays the price difference for those required features and/or to upgrade the size and/or other features available on a new replacement water heater or part(s), the owner will also receive a complete new limited warranty for that replacement water heater or part(s).
- D. If at the time of a request for service the owner cannot provide a copy of the original sales receipt or the warranty registration, the warranty period for the water heater shall then be deemed to have commenced thirty (30) days after the date of manufacture of the water heater and **NOT** the date of installation of the water heater.
- E. This warranty extends only to water heaters utilized in heating applications that have been properly installed by qualified professionals based upon the manufacturer's installation instructions.

OWNER RESPONSIBILITIES

To avoid the exclusion list in this warranty, the owner or installer must:

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

WARRANTY EXCLUSIONS

This limited warranty will not cover:

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

15. Damages, malfunctions, or failures caused by operating the water heater with an empty or partially empty tank ("dry firing"), or failures caused by operating the water heater when it is not supplied with potable water, free to circulate at all times.

16. Failure of the heater due to the accumulation of solid materials and lime deposits.

17. Any damage or failure resulting from improper water chemistry, or heating anything other than potable water. DEFINITION OF POTABLE WATER - Potable water is defined as drinkable water supplied from utility or well water in compliance with EPA secondary maximum contaminant levels (40 CFR Part 143.3) as shown in the table. HTP, Inc. will warrant the heat exchanger coil for hardness up to 15 Grains per gallon.

18. Components of the water heater that are not defective, but must be replaced during the warranty period as a result of reasonable wear and tear.

19. Damages, malfunctions, or failures caused by subjecting the water heater to pressures or firing rates greater than those shown on the rating label.

20. Damages, malfunctions, or failures resulting from the use of any attachment(s) not supplied by HTP.

21. Water heaters moved from the original installation location.

22. Water heaters that have had their rating labels removed.

EPA DEFINITION OF POTABLE WATER	
Contaminant	Level
Aluminum	0.05 to 0.2 mg/l
Chloride	250 mg/l
Color	15 color units
Copper	1.0 mg/l
Corrosivity	Non-corrosive
Fluoride	2.0 mg/l
Foaming Agents	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	3 threshold odor number
pH	6.5 – 8.5
Silver	0.1 mg/l
Sulfate	250 mg/l
Total Dissolved Solids (TDS)	500 mg/l
Zinc	5 mg/l

PROCEDURES FOR WARRANTY SERVICE REQUESTS

Any claim for warranty assistance must be made promptly. Determine if the water heater is "in-warranty" (that is, within the applicable warranty period) by reviewing a copy of the original sales receipt or warranty registration. The owner must present a copy of the original sales receipt or warranty registration for a warranty service request.

If the water heater is "in-warranty", contact the distributor from whom the water heater was purchased (or the installer) for assistance. Be prepared to provide the retailer or installer with a copy of the original receipt, complete model and serial numbers, and the date of installation of the water heater, in addition to explanation of the water heater problem.

Warranty coverage is subject to validation of "in-warranty" coverage by HTP claims department personnel. All alleged defective or malfunctioning parts must be returned to HTP via the **local distribution channels** where original purchase was made. **NOTE: Any parts or heaters returned to HTP for warranty analysis will become the property of HTP and will not be returned, even if credit is denied.** If all warranty conditions are satisfied, HTP will provide replacement parts to the retailer.

For questions about the coverage of this warranty, please contact HTP at the address or phone number stated below:

HTP

P.O. Box 429

120 Braley Road

East Freetown, MA

02717

Attention: Warranty Service Department

1(800) 323-9651

SERVICE, LABOR AND SHIPPING COSTS

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

LIMITATIONS OF YOUR HTP WARRANTY AND REMEDIES

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

NO OTHER WARRANTIES

This HTP Warranty gives you specific legal rights, and you may also have other rights that vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages so this limitation or exclusion may not apply to you.

These are the only written warranties applicable to the commercial water heater manufactured and sold by HTP. HTP neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said commercial water heaters. HTP reserves the right to change specifications or discontinue models without notice.

WATER HEATER START-UP REPORT

LIGHT OFF ACTIVITIES		DATE COMPLETED			
1) Fill the system	Check all piping and gas connections, verify all are tight				
	Verify near water heater piping is properly supported				
2) Check gas pipe	Leak test using locally approved methods (consult jurisdictional code book)				
	Check incoming gas pressure (3.5" to 14" W.C.)	___ in w.c.	Static		
	What is the "drop" on light off (No more than 1" W.C.)?	___ in w.c.	Dynamic		
3) Check combustion	Check and adjust (if necessary) carbon dioxide content	___% CO2	High Fire	___% CO2	Low Fire
	Check and adjust (if necessary) carbon monoxide content	___ppm CO	High Fire	___ppm CO	Low Fire
4) Verify system operation	Turn on water heater to verify operation.				
5) Convert the water heater	If necessary, convert the water heater to the proper gas type				
	Verify combustion settings after gas conversion, Carbon Dioxide	___% CO2	High Fire	___% CO2	Low Fire
	Verify combustion settings after gas conversion, Carbon Monoxide	___ppm CO	High Fire	___ppm CO	Low Fire
6) Record system settings	Record all system settings for future reference				
Notes:					

Table 28

MAINTENANCE REPORT

CAUTION

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

⚠ WARNING

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

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

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

INSPECTION ACTIVITIES		DATE LAST COMPLETED			
PIPING		1 st YEAR	2 nd YEAR	3 rd YEAR	4 th YEAR*
Near water heater piping	Check water heater and system piping for any sign of leakage. Leaking pipes could cause property damage. Make sure all piping is properly supported.				
Vent	Check condition of all vent pipes and joints. Ensure all vent piping is properly supported. Check for obstructions at exhaust and intake termination points.				
Gas	Check Gas piping, test for leaks and signs of aging. Make sure all pipes are properly supported.				

SYSTEM					
Visual	Do a full visual inspection of all system components.				
Functional	Test all functions of the system (Heat, Safeties)				
Temperatures	Verify safe settings on water heater or Anti-Scald Valve				
Temperatures	Verify programmed temperature settings				
ELECTRICAL					
Connections	Check wire connections. Make sure they are tight.				
Smoke and CO detector	Verify devices are installed and working properly. Change batteries if necessary.				
Circuit Breakers	Check to see that the circuit breaker is clearly labeled. Exercise circuit breaker.				
Switch and Plug	Verify ON/OFF switch and convenience plug are both functional				
CHAMBER/BURNER					
Combustion Chamber	Check burner tube and combustion chamber. Vacuum combustion chamber.				
Spark Electrode	Clean. Set gap at 1/10".				
Flame Probe	Clean. Check ionization in uA (d7 on status menu in Start-up Procedures). Record high fire and low fire.				
CONDENSATE					
Neutralizer	Check condensate neutralizer. Replace if necessary.				
Condensate hose	Disconnect condensate hose. Clean out dirt and re-install. (NOTE: Verify the flow of condensate, making sure that the hose is properly connected during final inspection.)				
GAS					
Pressure	Measure incoming gas pressure (3.5" to 14" W.C.)				
Pressure Drop	Measure drop in pressure on light off (no more than 1" W.C.)				
Check gas pipe for leaks	Check piping for leaks. Verify that all are properly supported.				
COMBUSTION					
CO/CO2 Levels	Check CO and CO2 levels in Exhaust. Record at high and low fire.				
SAFETIES					
ECO (Energy Cut Out)	Check continuity on Flue and Water ECO. Replace if corroded.				
FINAL INSPECTION					
Check list	Verify that you have completed entire check list. WARNING: FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH.				
Homeowner	Review what you have done with the homeowner.				
TECH SIGN OFF					

Table 29 - *Continue annual maintenance beyond the 4th year as required.

ADDITIONAL INSTALLATION REQUIREMENTS FOR THE COMMONWEALTH OF MASSACHUSETTS

In the Commonwealth of Massachusetts, the installer or service agent shall be a plumber or gas fitter licensed by the Commonwealth.

When installed in the Commonwealth of Massachusetts or where applicable state codes may apply; the unit shall be installed with a CO detector per the requirements listed below.

5.08: Modifications to NFPA-54, Chapter 10

(1) Revise NFPA-54 section 10.5.4.2 by adding a second exception as follows:

Existing chimneys shall be permitted to have their use continued when a gas conversion burner is installed, and shall be equipped with a manually reset device that will automatically shut off the gas to the burner in the event of a sustained back-draft.

(2) Revise 10.8.3 by adding the following additional requirements:

(a) For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. INSTALLATION OF CARBON MONOXIDE DETECTORS. At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the service of qualified licensed professionals for the installation of hard wired carbon monoxide detectors

a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "GAS VENT DIRECTLY BELOW, KEEP CLEAR OF ALL OBSTRUCTIONS".

4. INSPECTION. The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08 (2)(a) 1 through 4.

(b) EXEMPTIONS: the following equipment is exempt from 248 CMR 5.08 (2)(a) 1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required to be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(c) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED. When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components; and
2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED. When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer:

1. The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and
2. The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

(e) A copy of all installation instructions for all Product Approval side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

HTP CUSTOMER INSTALLATION RECORD FORM

The following form should be completed by the installer for you to keep as a record of the installation in case of a warranty claim. After reading the important notes at the bottom of the page, please also sign this document.

Customer's Name:	
Installation Address:	
Date of Installation:	
Installer's Code/Name:	
Product Serial Number(s):	
Combustion Setting at Time of Installation:	
Comments:	
Installer's Phone Number:	
Signed by Installer:	
Signed by Customer:	

IMPORTANT NOTES:

Customer: Please only sign after the installer has reviewed the installation, safety, proper operation and maintenance of the system. In the case that the system has any problems, please call the installer. If you are unable to make contact, please contact your HTP Sales Representative.

Distributor/Dealer: Please insert contact details.