



**TURBOPOWER® Low NO_x
WATER HEATER**

**Post these instructions with
your Water Heating Product**

Model No. _____

Serial No. _____

TABLE OF CONTENTS

Introduction	2
Heater Illustration	3
Features	4 – 5
Installation Instructions	5
Locating the Heater	5 – 8
Controls & Switches	8
Gas Piping	9 – 11
System Connections	11 – 12
Operation	12 – 13
Operating Instructions	13
Adjustment Procedure (Initial Startup)	13 – 14
General Information	15
Maintenance	15 – 17
Troubleshooting	18 – 19
Warnings / Lighting & Operating Label Illustration	20
Burner Assembly Breakdown – Attachment A	21
Control Diagram – Attachment B	22
Plumbing Diagram – Attachment C	23

WARNING: If the information on the appliance and in the supplied manual(s) is not followed exactly, a fire, explosion or exposure to hazardous materials may result causing property damage, personal injury or loss of life.

FOR YOUR SAFETY

- 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 local 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.

This product contains, or may come to contain, materials that have been identified as carcinogenic, or possibly carcinogenic, to humans. Before installing, servicing or removing this product read and follow the supplied instructions.

PVI TURBOPOWER® Low NO_x WATER HEATERS

INTRODUCTION

This manual covers installation, operation and maintenance on all PVI commercial water heaters and storage tanks. Read all instructions thoroughly before attempting to start any unit.

CAUTION: Factory authorized start-up may be required on this equipment. Labeling on the unit will indicate this requirement.

City, state and national codes governing installation of commercial water heaters and storage tanks must be followed and take precedence over recommendations in this manual.

PRODUCT SAFETY INFORMATION REFRACTORY CERAMIC FIBER PRODUCT WITH CRYSTALLINE SILICA

WARNING: This product contains crystalline silica, which has been identified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans. This product also contains refractory ceramic fibers, which have been identified by the IARC as possibly carcinogenic to humans.

Avoid breathing fiber particulates and dust.

RISKS:

- Airborne fibrous insulation is a possible cancer hazard by inhalation.
- Airborne crystalline silica may cause silicosis (lung disease) by inhalation.
- May cause temporary irritation to eyes, skin, and respiratory tract.

PRECAUTIONARY MEASURES:

- Minimize airborne fibers with engineering controls.
- Use NIOSH/MSHA approved respirators as required (see MSDS).
- Wear long sleeved, loose-fitting clothing, eye protection, and gloves.

FIRST AID MEASURES:

Eyes: Flush with water.
Skin: Wash with soap and warm water.
Ingestion: Do not induce vomiting. Get medical attention if gastrointestinal symptoms develop.
Inhalation: Remove to fresh clean air.

If any of the above irritations persists, seek medical attention.

WARNING: If you are unfamiliar with the safe handling of Refractory Ceramic Fiber products, or if you wish additional information prior to beginning any disassembly of the water heater or boiler that might expose refractory ceramic fiber materials, contact: Unifrax Corporation, 2351 Whirlpool Street, Niagara Falls, NY 14305-2413, 1-800-322-2293.

IDENTIFICATION OF REFRACTORY CERAMIC FIBER MATERIALS (The RCF materials are located within the product and not generally exposed except during service, disassembly or assembly.)

- Insulation Insert: TURBOPOWER® water heaters and boilers.
- Flue Collector Insulation: TURBOPOWER® water heaters and boilers.
- Combustion Chamber Insulation and/or Tubesheet Insulation: Atmospheric and Power Gas, VENTURA®, MAXIM™, POWER VT™ water heaters & boilers.

CODES FOR WATER HEATER & BOILER INSTALLATIONS

ANSI Z223.1 National Fuel Gas Code
ANSI Z83.1 Installation of Gas Piping and Gas Equipment
on Industrial and Certain Other Premises
American Gas Association
NFPA No. 31 Installation of Oil Burning Equipment
ANSI Z95.1 National Fire Protection Association
60 Battery March St., Boston, MA 02210
AGA No. 54 Installation of Gas Appliances and Gas Piping

CGA B149

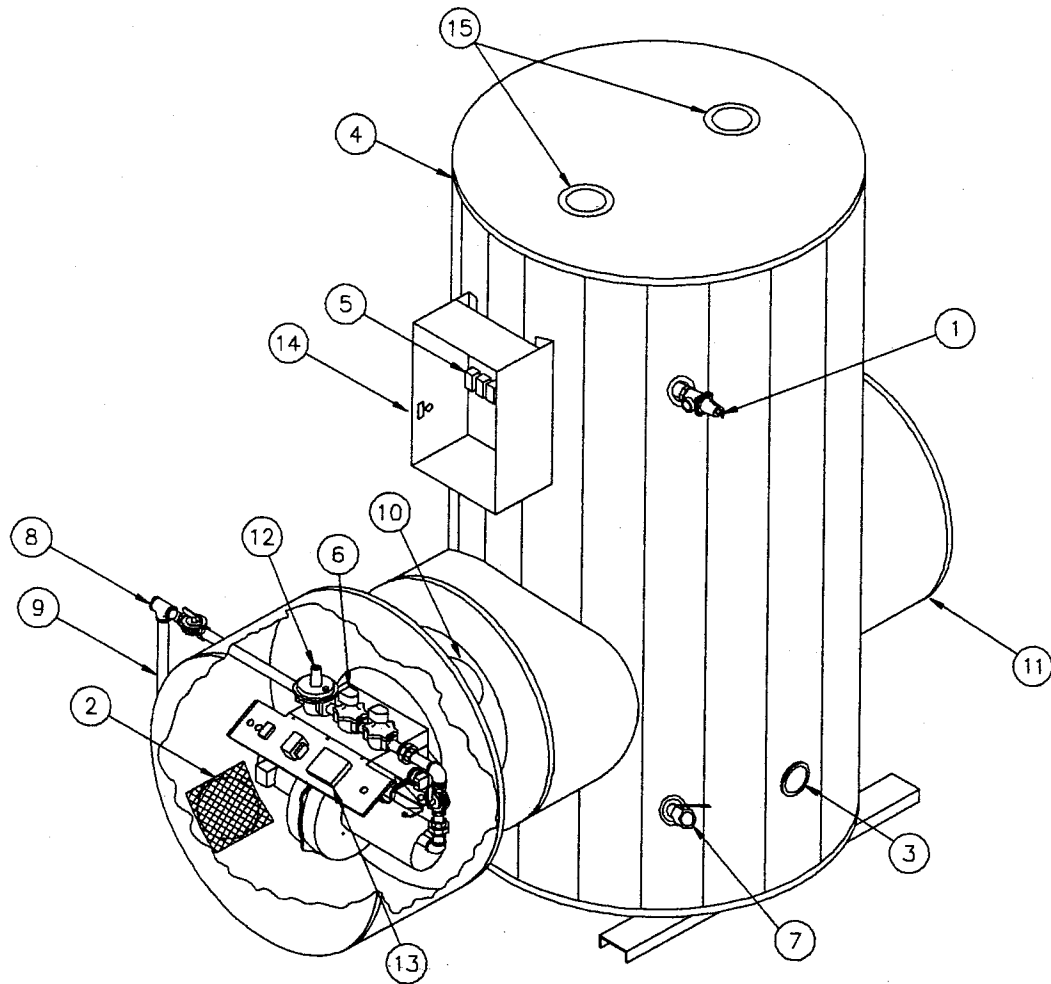
CGA B139

National Electrical Code

Canadian Electrical Code
All Provincial Ordinances
All State & Local Codes

Installation Code for Gas
Burning Appliances &
Equipment
Installation Code for Oil
Burning Equipment
National Fire Protection
Association
Part 1

PVI TURBOPOWER® Low NO_x WATER HEATERS



Typical Construction
Figure 1

- | | |
|--|------------------------------------|
| 1. Temperature and pressure relief valve | 8. Gas inlet |
| 2. Air inlet / screen | 9. Drip leg * |
| 3. Cold water inlet | 10. Flue collector and connection |
| 4. Hot water outlet | 11. Optional rear module access |
| 5. Thermostats | 12. Regulator / proportionator |
| 6. Safety valves | 13. Flame control |
| 7. Drain valve | 14. On/off switch and control fuse |
| | 15. Lifting lugs |

* Not furnished by PVI

CAUTION: Temperatures higher than 125°F increase the risk of scald injury!

IMPORTANT: Clearances to unprotected combustible material must be 6" minimum at top, sides and rear and 24" in front. Clearances for servicing and inspection must be 18" minimum at sides and rear and 24" minimum in front.

PVI TURBOPOWER® Low NO_x WATER HEATERS

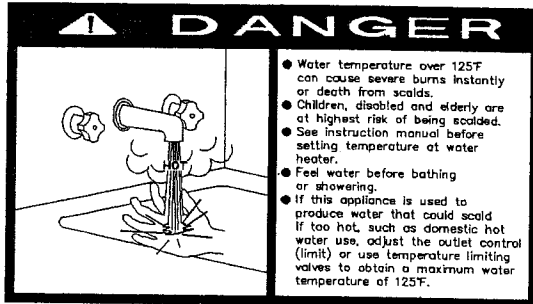
FEATURES

IMPORTANT

It is required that a qualified service technician perform the initial firing of the heater. At this time the user should not hesitate to ask the technician any questions which he may have in regard to the operation and maintenance of the unit.

A CHECKLIST AND SERVICE INFORMATION section is included at the back of this manual. By using this checklist the user may be able to make minor operational adjustments and save himself unnecessary service calls. However, the user should not attempt repairs that are not listed in this section.

WATER TEMPERATURE CONTROL



WARNING!

This water heater is equipped with an adjustable thermostat to control water temperature. Hot water temperatures required for automatic dishwasher and laundry use could cause scald burns resulting in serious personal injury and/or death. The temperature at which injury occurs varies with the person's age and time of exposure. The slower response time of disabled persons increases the hazards to them. Never allow small children to use a hot water tap or to draw their own bath water. Never leave a child of disabled person unattended in a bathtub or shower. Since the thermostat temperature setting could be set too high, adjust the thermostat temperature setting to 120°F or lower. Lower settings help reduce risk of scald injury. Remember, no water heater system will provide exact temperature at all times. Allow a few days of operation at this setting to determine the correct temperature setting consistent with your needs and remember, "Hotter water increases the risk of scald injury." Also, the water heater should be located in an area where the general public does not have access to set temperatures.

Figure 2 shows the approximate time-to-burn relationship for normal adult skin. Short repeated heating cycles caused by small hot water uses can cause temperatures at the point of use to exceed the thermostat setting by up to 20°F. If you experience this type of use, you should consider using lower temperature settings to reduce scald hazards.

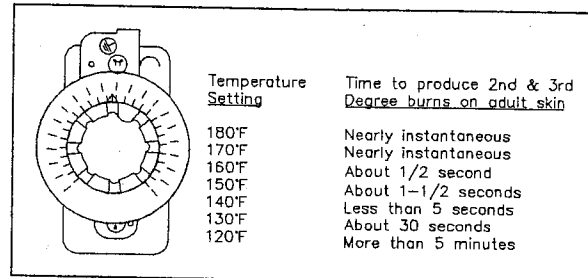


Figure 2

Valves for reducing point-of-use temperature by mixing cold and hot water are available. Also available are inexpensive devices that attach to faucets to limit hot water temperatures. Contact a licensed plumber or the local plumbing authority.

The water temperature is controlled using the operating thermostat located in the heater control enclosure (See Figure 2). This control utilizes a temperature probe to control the tank temperature. The operating thermostat probe in vertical storage tanks is usually directly above the TURBOPOWER® module and in horizontal tanks, behind the hot water outlet. In both cases, the probe penetrates the tank through a bronze control flange.

This water heater may have an additional operating thermostat called an upper operating thermostat. This thermostat is set 10 degrees higher than the operating thermostat and only functions in the event a failure occurs on the operating thermostat.

HIGH LIMIT THERMOSTAT

The high limit thermostat interrupts the main burner gas flow should the water temperature reach approximately 200°F.

Some water heaters are equipped with a manually reset high limit. Should the high limit thermostat activate, it may be manually reset by depressing the reset button on the body of the thermostat. The water temperature must drop below 180°F before the controller can be reset. (See Figure 3, page 5.)

PVI TURBOPOWER® Low NO_x WATER HEATERS

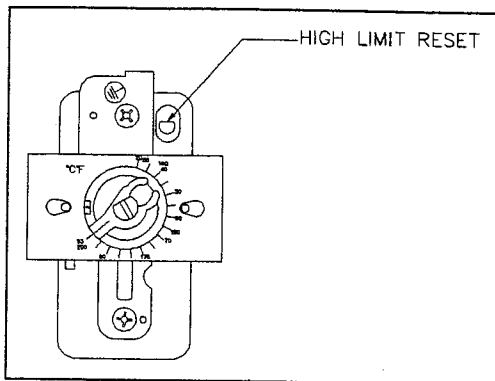


Figure 3

Continued manual resetting of high limit control, preceded by higher than usual water temperature, is evidence of high limit operation. The following are possible reasons for high limit operation.

- The application of an operating thermostat with an elevated set point may be applied when the PVI sanitizing option is employed. This might allow the

operating temperature to approach or exceed the setting of the high limit thermostat.

- A malfunction in the operating thermostat would allow the gas valve to remain open causing water temperature to exceed the operating thermostat setting. The water temperature would continue to rise until the high limit switches operate.
- It is possible that the water at the high limit thermostat could reach its maximum temperature before the water temperature at the thermostat reaches the dial setting, causing the high limit thermostat to activate.
- A system change associated with seasonal change could magnify the process described above to the point where high limit switch operation would occur.

Contact your PVI representative or service company if continued high limit switch operation occurs.

INSTALLATION INSTRUCTIONS

REQUIRED ABILITY

INSTALLATION OR SERVICE OF THIS WATER HEATER REQUIRES ABILITY EQUIVALENT TO THAT OF A LICENSED TRADESMAN IN THE FIELD INVOLVED. PLUMBING, AIR SUPPLY, VENTING, GAS SUPPLY AND ELECTRICAL WORK ARE REQUIRED.

WARNING!

Failure to follow these instructions can result in serious personal injury or death.

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

Verify proper operation after servicing.

LOCATING THE HEATER

WARNING!

There is a risk in using fuel burning appliances such as gas water heaters in rooms, garages, or other areas where gasoline, other flammable liquids or engine driven equipment or vehicles are stored, operated or repaired. Flammable vapors are heavy and travel along the floor and may be ignited by the heater's igniter or main burner flames causing fire or explosion.

The heater shall be located or protected so it is not subject to physical damage by a moving vehicle.

WARNING!

Flammable vapors may be ignited by the heater's ignitor or main burner flames causing fire or explosion. Flammable items, pressurized containers or any other potential fire hazardous article must never be placed on or adjacent to the heater. Open containers of flammable material should not be stored or used in the same room with the heater.

When installing the heater, consideration must be given to proper location. The location selected should be as close to the intake and exhaust termination points as practical, with adequate air supply and as centralized with the piping system as possible. Minimum clearance as defined on page 3 should be maintained for safe operation as well as ease of inspection and service. Minimum installation clearances are also marked on the appliance.

PVI TURBOPOWER® Low NO_x WATER HEATERS

THE HEATER MUST NOT BE LOCATED IN AN AREA WHERE IT WILL BE SUBJECT TO FREEZING. LOCATE NEAR A FLOOR DRAIN. THE HEATER SHOULD BE LOCATED IN AN AREA WHERE LEAKAGE FROM THE HEATER OR CONNECTIONS WILL NOT RESULT IN DAMAGE TO THE ADJACENT AREA 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 appliance.

CAUTION!

Do not use the plumbing connected to the appliance as a ground for welding or any other purpose.

WARNING!

Failure to follow these instructions can result in serious personal injury or death. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been under water.

HARD WATER

Where hard water conditions exist, water softening or the threshold type of water treatment is recommended. See MAINTENANCE section for details of tank cleanout procedure.

AIR REQUIREMENTS

KEEP APPLIANCE AREA CLEAR AND FREE OF COMBUSTIBLE MATERIALS, GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS.

DO NOT OBSTRUCT THE FLOW OF COMBUSTION AND VENTILATING AIR.

WARNING!

For safe operation provide adequate air for combustion and ventilation. An insufficient supply of air will cause recirculation of combustion products resulting in contamination that may be hazardous to life. Such a condition often will result in a yellow luminous burner flame, causing carboning or sooting of the combustion chamber, burners, and flue tubes and creates a risk of asphyxiation.

MECHANICAL EXHAUSTING OF ROOM AIR

Where an exhaust fan is installed in the same room with a heater, sufficient openings for air must be provided in the walls. UNDERSIZED OPENINGS WILL CAUSE AIR TO BE DRAWN INTO THE ROOM THROUGH THE HEATER'S VENTING SYSTEM, CAUSING POOR COMBUSTION. SOOTING MAY RESULT IN SERIOUS DAMAGE TO THE HEATER AND RISK OF FIRE OR EXPLOSION. IT CAN ALSO CREATE RISK OF ASPHYXIATION.

CHEMICAL VAPOR CORROSION

WARNING!

Corrosion of the flue ways, burner and vent system may occur if air for combustion contains certain chemical vapors. Such corrosion may result in failure and risk of asphyxiation. The resulting damage to the appliance will also void all warranties.

Spray can propellants, cleaning solvents, refrigerator or air conditioning refrigerants, calcium and sodium chloride, swimming pool chemicals, waxes, and process chemicals are typical compounds which are potentially corrosive.

PRODUCTS OF THIS SORT SHOULD NOT BE STORED NEAR THE HEATER. ALSO, AIR WHICH IS BROUGHT IN CONTACT WITH THE HEATER SHOULD NOT CONTAIN ANY OF THESE CHEMICALS. IF NECESSARY, UNCONTAMINATED AIR SHOULD BE OBTAINED FROM REMOTE OR OUTSIDE SOURCES.

VENTING

WARNING!

The instructions in this section on venting must be followed to avoid choked combustion or recirculation of flue gases. Such conditions cause sooting or risks of fire and asphyxiation.

Heater must be protected from freezing downdrafts during shutdown periods.

WARNING!

Never operate the heater unless it is vented to the outdoors and has adequate air supply to avoid risks of improper operation, fire explosion or asphyxiation.

VENT PIPE TERMINATION

NOTE: Before installing venting, determine place of vent pipe termination. See Figures 4, page 6 before proceeding.

IMPORTANT

The vent system must terminate so that proper clearances are maintained as cited in local codes or the latest edition of the National Fuel Gas Code, ANSI Z223.1.7.3.4e and 7.8a,b as follows:

1. The intake (optional, see Direct Vent Section, page 7) and the exhaust vent terminals of a mechanical vent system shall be not less than 7 feet above grade when located adjacent to public walkways.
2. The venting system shall terminate at least 3 feet above any forced air inlet located within 10 feet.

PVI TURBOPOWER® Low NO_x WATER HEATERS

3. The manufacturer also recommends the vent system terminations not be installed closer than 3 feet from an inside corner of an L-shaped structure, and not less than 1 foot above grade.
4. The vent shall terminate a minimum of 12 inches above expected snowfall level to prevent blockage of vent termination.

Plan the vent system layout so that proper clearances are maintained from plumbing and wiring.

WARNING!

Failure to follow these instructions can result in serious personal injury or death. Vent connections serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.

The vent connector must be the same size as the product flue outlet. The vent size must be determined by the Btu/h input of the product(s) and the vent design. The horizontal breaching of a vent must have at least 1/4" rise per linear foot not to exceed the length of horizontal vent.

CAUTION!

Do not weld or support breaching to product flue outlet. Adequate support of the venting system must be provided in compliance with local or other applicable codes.

Draft regulators (barometric dampers) may be incorporated in the vent for gas fan assisted products and are recommended. The double swing type should be used on gas fired products. Under normal venting conditions, the draft regulator should be the same size as the flue outlet of the product, never smaller. Draft regulators must be installed and adjusted in accordance with the manufacturer's instructions (See Figures 4).

IMPORTANT

A minimum of -.02" to -.06" W.C. draft is required.

DIRECT VENTING

This unit is equipped with a connection for direct venting. Do not exceed 100 equivalent feet of 10" singlewall galvanized or PVC vent material with a maximum of 5 elbows. Each elbow is equivalent to 5 feet.

The air intake connection on the unit contains a mesh screen (See Figure 5, page 8). Care should be taken to prevent large particles from blocking the inlet or entering the unit.

Typical Thru-Wall Venting

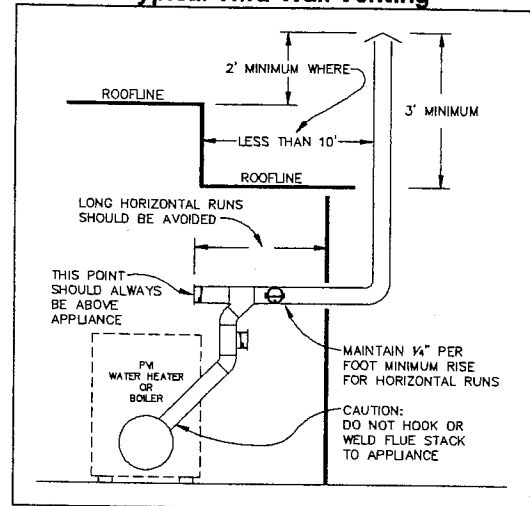


Figure 4a

Draft Regulator Single Module TURBOPOWER®

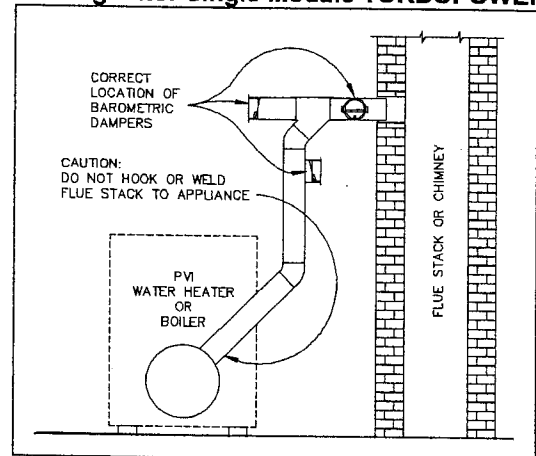


Figure 4b

Draft Regulator Dual Module TURBOPOWER®

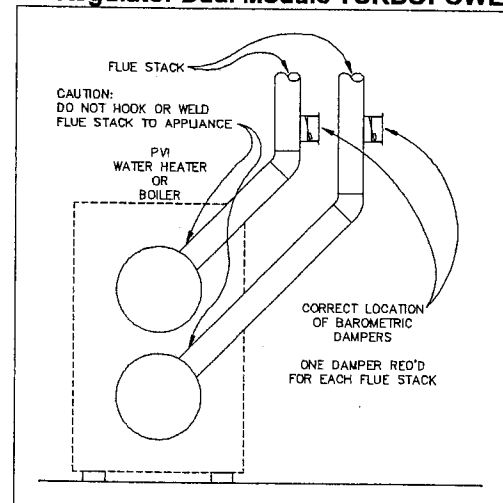


Figure 4c

PVI TURBOPOWER® Low NO_x WATER HEATERS

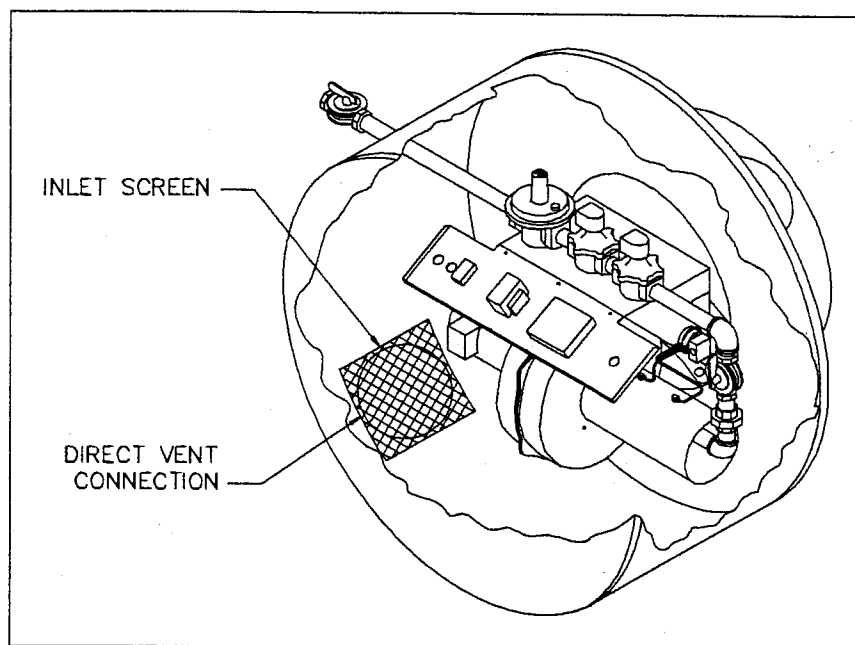


Figure 5

CONTROLS & SWITCHES

The TPL is provided with one differential pressure switch. This switch is essential to the safe and proper operation of the unit. The controller is set to shut the unit down whenever there is a failure of the switch. It is important to understand the purpose of this switch.

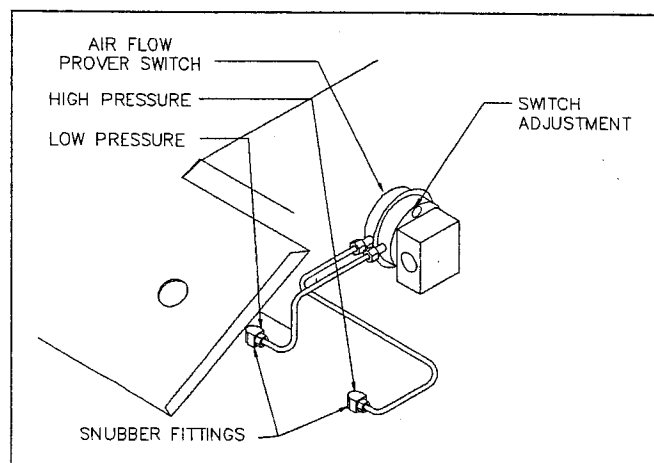


Figure 6

AIR FLOW PROVER SWITCH

The blower prover switch is provided on the heater to verify that the flow of air passing through the venturi inlet of the fan is adequate for safe and efficient combustion. The differential pressure switch electrical contacts are normally open. The controller requires that the electrical contact on this airflow switch be open before it will allow the blower to come on. The function of this safety device serves as protection for blower failure, blocked inlet, blocked outlet and blocked burner. When the differential pressure through the venturi reaches the minimum flow threshold, the pressure switch will allow the electrical contacts to close and the ignition sequence to begin. The pressure switch is connected to the burner tap by pieces of aluminum tubing. This tubing must be connected in order for the switch to change the electrical contacts. (See Figure 6.)

HOT SURFACE IGNITER

The hot surface igniter is a device that ignites the main burner by high temperature (>1800°F). The igniter is made of "silicon carbide" and when 120VAC is applied to the igniter, sufficient heat is generated to ignite the main burner. Care must be taken when handling to prevent breakage.

PVI TURBOPOWER® Low NO_x WATER HEATERS

GAS PIPING

Contact your local gas service company to ensure that adequate gas service is available and to review applicable installation codes for your area.

1. Before making gas hook-up, verify that the heater is being supplied with the same gas type as indicated on the data decal.
2. The maximum inlet gas pressure must not exceed the value specified. If delivery pressure is higher, a single suitable intermediate, lock-up type regulator must be installed ahead of the low-pressure regulator on the burner to reduce inlet pressure to acceptable limits. The regulator must have a flow regulating capacity suitable for the firing rate.
3. The gas supply line must be of sufficient size for length of run and pressure drop to furnish adequate gas pressure to allow the burner to develop its rated capacity. A drip leg should be installed ahead of the burner piping connection, if not supplied. (See Table 1)
4. External gas valves and gas regulators may contain bleed or vent ports. Local codes may require bleeds and vents to be vented to atmosphere outside the building. Consult local building codes for size and installation.

Equivalent feet from Meter	PIPE SIZE					
	Maximum Capacity for Natural Gas * MBtu/h based on 0.5" W.C. Pressure Drop *					
	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
25	860	1320	2475	3900	7000	-
40	660	990	1900	3000	5300	-
60	-	810	1520	2400	4300	-
80	-	690	1300	2050	3700	-
100	-	620	1150	1850	3250	6700
125	-	-	1020	1650	2950	6000
150	-	-	950	1500	2650	5500
175	-	-	850	1370	2450	5000
200	-	-	800	1280	2280	4600

Table 1

* Multiplier for Propane: 1.57

** Multiplier for alternate pressure drops: 0.3" W.C. 0.77; 1.2" W.C. 1.41; 2.0" W.C. 2.00; and 4.0 W.C. 2.82.

WARNING!

The heater is not intended for operation at higher than 10.5" water column supply gas pressure. Higher gas supply pressures require supplement reducing service regulation. Exposure to high gas supply pressure may cause damage to the gas controls, which could result in fire or explosion. If overpressure has occurred such as through improper testing of gas lines or emergency malfunction of the supply system, the gas valve must be checked for safe operation. Make sure the outside vents on the supply regulators and the safety vent valves are protected against blockage. These are parts of the gas supply system, not the heater. Vent blockage may occur during ice storms.

It is important to guard against gas valve fouling from contaminants in the gas ways. Such fouling may cause improper operation, fire or explosion.

If copper supply lines are used, they must be internally tinned and certified for gas service.

Before attaching the gas line, be sure that all gas pipe is clean on the inside.

To trap any dirt or foreign material in the gas supply line, a dirt leg (sometimes called a sediment trap or drip leg) must be incorporated in the piping (see figure 7). The dirt leg must be readily accessible and not subject to freezing conditions. Install in accordance with recommendations of servicing gas suppliers. Refer to the national fuel gas code.

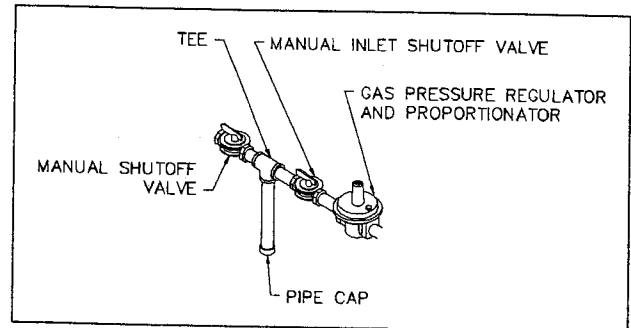


Figure 7

CONNECTION OF GAS PIPE

PERFORM THE GAS LEAK TEST ANY TIME WORK IS DONE ON A GAS SYSTEM TO AVOID THE POSSIBILITY OF FIRE OR EXPLOSION WITH PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

PVI TURBOPOWER® Low NO_x WATER HEATERS

The Gas Leak Test is performed as follows:

- Paint pipe connections upstream of gas control with a rich soap and water solution to test for leaks before operating main burner. Bubbles indicate gas leak. To stop leak, tighten pipe connections.
- After piping connections are checked, turn on main burner.
- With main burner in operation, paint pipe joints and control inlet and outlet with rich soap and water solution. Bubbles indicate gas leak. To stop leak, tighten flange screws, joints and pipe connections.
- Replace parts if leak cannot be stopped.

To prevent damage, care must be taken not to apply too much torque when attaching gas supply pipe to gas valve inlet.

Apply joint compounds (pipe dope) sparingly and only to the male threads of pipe joints. Do not apply compound to the first two threads. Use compounds resistant to action of liquefied petroleum gases.

DISCONNECT THE APPLIANCE AND ITS MANUAL GAS SHUTOFF VALVE FROM THE GAS SUPPLY PIPING SYSTEM DURING ANY SUPPLY PRESSURE TESTING EXCEEDING ½ PSIG. FOR TEST PRESSURES OF ½ PSIG OR LESS, THE APPLIANCE NEED NOT BE DISCONNECTED, BUT MUST BE ISOLATED FROM THE SUPPLY PRESSURE TEST BY CLOSING THE MANUAL GAS SHUTOFF VALVE.

BEFORE PLACING THE HEATER IN OPERATION, CHECK FOR GAS LEAKAGE. USE SOAP AND WATER SOLUTION OR OTHER MATERIAL ACCEPTABLE FOR THE PURPOSE OF LOCATING GAS LEAKS. DO NOT USE MATCHES, CANDLES, FLAME OR OTHER SOURCES OF IGNITION FOR THIS PURPOSE.

PURGING

Gas line purging is required with new piping or systems in which air has entered.

WARNING!

Purging should be performed by persons experienced in this type of gas service to avoid risk of fire or explosion. Purge discharge must not enter confined areas or spaces where ignition can occur. The area must be well ventilated and all sources of ignition must be inactivated or removed.

BURNER

This PVI TURBOPOWER® Low NO_x water heater uses a metal fiber matrix burner. It is constructed of material, which is rugged and resistant to impact. Care should be taken however when removing or servicing the burner to avoid unnecessary contact with the metal fiber material.

In the event that the burner is blocked due to high particulate content in the combustion air supply, this water heater is designed to safely shut down and lockout until the blockage is removed.

In order to clean the metal fiber matrix burner, the burner must first be removed from the water heater, (see Attachment A), and the following sequence of disassembly:

1. Turn off the heater's electrical disconnect switch.
2. Turn off the main gas supply to the water heater gas inlet and break the union between the shutoff and the manual inlet shutoff valve, (Item 18).
3. Remove the front pan and cowl shell, (Item 1 & 4).
4. Break union, (Item 25), and remove venturi nozzle, (Item 17).
5. Unbolt the gas train shelf (item 15), from the burner spool (Item 16), and disconnect the air switch tubing (Item 9), from the blower inlet cylinder (Item 8). Disconnect the hot surface ignitor wires (S1, S2) from the burner flame control module (Item 12) and swing the gas train shelf to the side.
6. Disconnect the wires from the blower motor (Item 5), and unbolt and remove the blower from the burner spool (Item 16).
7. Unbolt the burner spool (Item 16) from the bulkhead plate (Item 29) and remove.
8. The burner (Item 28) is now ready to be removed but first remove the hot surface ignitor (Item 26) to avoid breakage while removing the burner.
9. The burner (Item 28) can now be thoroughly flushed with water and a spray applied soap. Do not use scrub brush or abrasive material directly on the metal fiber material.
10. The water heater can now be reassembled in the reverse sequence of the previous steps. Be sure to include the fiber gaskets (Item 27) and the discharge flange gasket (Item 10) or replace with new.

PVI TURBOPOWER® Low NO_x WATER HEATERS

GAS TRAIN

Figure 8 shows the gas control train that is supplied on these heaters.

The gas control train on this PVI TURBOPOWER® Low NO_x water heater is designed to work in conjunction with the combustion air blower to provide precise fuel/air proportioning. The proportioning of the proper fuel/air mixture is important for safe and efficient operation of this unit.

By responding to changes in air flow, the proportionator will maintain optimum combustion, during conditions such as vent blockage, blocked air supply or reduced air delivery by the blower.

Do not vent the proportionator to the atmosphere outside the building. The proper function of the fuel/air ratio controls depends on the free communication of the proportionator with the inside of the burner cowling. (See Figure 5, page 8.)

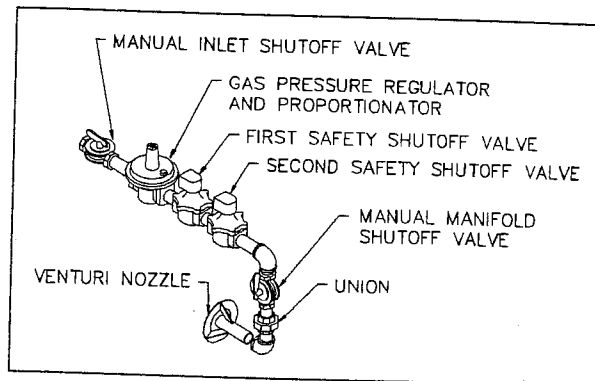


Figure 8

WARNING!

Failure to follow these instructions can result in serious personal injury or death. Should overheating occur or the gas supply fail to shut off, turn off the manual inlet shutoff valve to the appliance.

SYSTEM CONNECTIONS

The system installation must conform to these instructions and to the local code authority having jurisdiction. Good practice requires that all heavy piping be supported.

RELIEF VALVE

The water heater is equipped with a temperature and pressure relief valve with an ASME rating for the input

of the burner and the working pressure of the tank. The relief valve discharge should be piped to a suitable open drain. The drain pipe may not be smaller than the relief valve opening. No valves or restrictions should be placed in the drain line.

FOR SAFE OPERATION OF THE WATER HEATER THE RELIEF VALVE(S) MUST NOT BE REMOVED OR PLUGGED.

In addition to the appliance relief valve, each remote storage tank that may be used in conjunction with this appliance shall also be installed with a properly sized, rated and approved temperature (ANSI) and pressure (ASME) relief valve(s). This relief valve shall comply with the standard for relief valves and automatic gas shutoff devices for hot water supply systems. ANSI Z21.22.

Your local code authority may have other specific relief valve requirements.

WARNING!

Above all, do not plug the temperature and pressure relief valve. This is not a solution and can create a hazardous situation.

WARNING!

The purpose of a relief valve is to avoid excessive pressure or temperature into the steam range that may cause scalding at fixtures, tank explosion, system or heater damage. No valve is to be placed between the relief valve and the tank.

A drain line must be connected from the relief valve to a safe location to avoid scalding or water damage. This line must not be reduced from the size of the valve outlet and must not contain valves or restrictions nor should be located in freezing areas. Do not thread or cap the end of this line. Restricted or blocked discharge will defeat the purpose of the valve and is unsafe. The discharge line shall be installed to allow complete drainage of both the valve and line.

WATER LINE CONNECTIONS

Shutoff valves and dielectric unions should be installed so that the unit may be disconnected for servicing if necessary. Non-ferrous tank connections, where supplied, require special care when threading pipe nipples into them. Caution must be observed to prevent cross threading or over-tightening. Always use a backup wrench on tank nipple when tightening unions, valves, etc. For the water heaters and storage

PVI TURBOPOWER® Low NO_x WATER HEATERS

anks, do not use galvanized or other steel pipe
pples when making connections to the unit. Some
ank fittings will be attached to the tank wall with studs.
Check these type fittings for leaks after filling the tank

with water. Do not over-tighten the studded
connections as damage to the O-ring under the fitting
may occur. A maximum torque of 8 ft. lbs. (96 inch
lbs.) should be used on studded connections; tighten
only in alternating pattern. Hot water and return
circulation lines should be insulated. Cold water supply
lines should be insulated if subject to freezing during
shutdown periods. A thermal expansion valve should
be installed in the cold water line on water heaters
between the water heater and any check valves or
diaphragm type expansion tank suitable for potable
water installed in the system.

CLOSED SYSTEM

CAUTION!

*A closed system will exist if a check valve (without
bypass), pressure reducing valve (without
bypass), or a water meter (without bypass) is
installed in the cold water line between the water
heater and the street main (or well).*

Excessive pressure may develop causing premature
tank failure or intermittent relief valve operation. This
type of failure is not covered by the limited warranty.
An expansion tank or a similar device may be required

in the inlet supply line between the appliance and the
meter or valve to compensate for the thermal
expansion of water under supply pressure.

If a water heater is installed in a closed water system,
check local codes or contact the water supplier or local
plumbing inspector on how to control this situation.

THERMOMETER (Not Supplied)

Thermometers should be obtained and field installed
as shown in the installation diagrams.

Thermometers are installed in the system as a means
of detecting the temperature of the outlet water supply.

HEATER WIRING

The controller is wired to the heater as shown in
Attachment B. The model and rating plate provides the
electrical information needed to size the complete
heater branch supply.

All electrical work must be installed in accordance with
the National Electrical Code and local requirements.
When installed, the appliance must be electrically
grounded in accordance with local codes, or in the
absence of local codes, with the National Electrical
Code. ANSI/NFPA 70.

**DO NOT ENERGIZE THE BRANCH CIRCUIT BEFORE
THE HEATER TANK IS FILLED WITH WATER.**

OPERATION

SEQUENCE OF OPERATION

1. When the control switch is turned on, the high
temperature limit device and the electronic low
water cutoff (optional) are energized and their safe
condition is proved before the flame control is
energized.
2. When the flame control is energized, it will check
the operating thermostat for a call for heat
condition.
3. If the flame control determines there is a call for
heat condition, it will then check the airflow-
proving switch for the normally open condition,
which should exist before the blower is powered.
4. If the airflow-proving switch is not in the closed
position, the flame control will energize the blower
motor relay, which will power the blower.
5. If the airflow-proving switch does not close
following the blower being energized, the flame
control will lockout and require that the manual
reset be pushed. (See Attachment A, Item 37.)
6. When the airflow generated by the blower is
sufficient to cause the differential air switch to
close, the 15-second prepurge period will begin.
During this period any flue products or
combustible gases which may have settled in the
system are evacuated.
7. Following the prepurge, the 15-second interpurge
period will begin. During this period the hot surface
igniter will be energized.
8. At the conclusion of the interpurge period the
flame control will determine if the amperage being
drawn by the igniter meets the threshold proving
current.

PVI TURBOPOWER® Low NO_x WATER HEATERS

9. If the flame control determines the proving current meets the threshold, it will open the gas safety valves and the 4-second trial for ignition (TFI) period will begin.
10. During the TFI the flame control will monitor the flame using flame rectification through the surface of the igniter.
11. If the flame control senses the presence of flame before the end of the TFI period the igniter will be de-energized and the flame control will continue to monitor the flame until the operating thermostat ends the call for heat condition.
12. If the control does not sense the presence of flame during the TFI period the igniter and gas valve will be de-energized and the flame control will return to step 6. This will occur 3 times before the flame control will lockout and require that the manual reset button be pushed. (See Attachment A, Item 37.)
13. When the call for heat condition ends or flame failure occurs following the 3rd TFI period, a 30-second postpurge period will begin. This period of

blower operation will exhaust any remaining combustion products from the system.

14. The control will now enter the idle state while continuing to monitor the operating thermostat for a call for heat condition. If the water temperature in the tank drops below the set point of the operating thermostat, the control will automatically return to step 3 and repeat the entire operating cycle. If at any time during the operating sequence the control senses an improper operating state and locks out, the red status LED located on the control board will flash to indicate the condition, which exist. See Table 2 for status codes.

CODE	CONDITION
On	System OK No faults present
Off	Possible control fault Check power
2 Flashes	Flame No call for heat
3 Flashes	Ignition lockout
6 Flashes	Internal fault Replace control

Table 2

OPERATING INSTRUCTIONS

IMPORTANT

It is recommended that a qualified service technician perform the initial startup of the heater. At this time the user should ask the technician any questions in regard to the operation and maintenance of the unit.

CAUTION!

Before proceeding with the operation of the unit, make sure the heater and system are filled with water and all air is expelled from the heater and piping.

Do not use this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and to replace any part of the control system and any gas control that has been under water.

Startup the unit in accordance with the operating instruction label attached to this heater.

These instructions are repeated in the lighting and operating label illustration on page 20 in this manual.

ADJUSTMENT PROCEDURE (Initial Start-up)

A minimum gas supply pressure of 4.5" W.C. flow for natural gas is required before making any adjustment to the gas control pressure regulator. Attempts to adjust the regulator during periods of low gas supply pressure could result in overfiring of the heater when the gas supply pressure returns to normal.

1. Check gas line pressure with manometer.

2. Check manifold pressure (see heater data decal) with a pressure gauge (manometer) connected to the manifold pressure tap on the manual manifold shutoff valve. (See Figure 8, page 11.)

Using a small screwdriver, turn adjusting screw clockwise to increase or counterclockwise to decrease gas pressure to obtain the rated manifold pressure. The manifold pressure may be negative; this is normal.

PVI TURBOPOWER® Low NO_x WATER HEATERS

Check flue gases with an electronic flue analyzer to make final settings of gas pressure regulator.

- a) The readings need to be taken from a hole in the vent 12 inches from the vent connection.
- b) When water in the tank is above 120°F, insert analyzer for CO₂ testing in test opening; take CO₂ reading in percentage.
- c) Adjust manifold gas pressure at the main gas pressure regulator taking CO₂ reading at each adjustment of gas regulator until optimum CO₂% (7.7-8.0%) is reached. If CO₂% exceeds 8%, reduce the gas pressure to reading within the required range.
- d) Insert CO tester in test opening and take CO reading. CO should not exceed 200 ppm. A reading greater than 200 ppm may indicate either too much or not enough excess air. If it is not possible to operate appliance with less than 200 ppm, consult the factory.

WARNING!

Do not operate the appliance with carbon monoxide in excess of 200 ppm. Improper combustion may cause serious injury.

Recommends a seasonal or annual combustion test performed by a qualified service agency to ensure safe and efficient operation.

- e) If manifold pressure was changed during CO test, take a final CO₂ reading.
- f) Insert stack temperature gauge in test opening and read gross stack temperature; maximum gross stack is to be 400°F. If an excessively high gross stack temperature is recorded, consult the factory.
4. Insert draft gauge into the test opening in the stack. Draft in stack should read -.02" to -.06" W.C.

5. Check flame signal using a microammeter connected to the flame sense test control. The minimum flame signal for this flame control is 1.0uA. It is recommended however that any measurement less than 3.0uA be investigated.
6. Cycle the burner on and off several times to check its operation.
7. Check the operation of the limit and operating controls.
8. Check the vent system and barometric damper to ensure that there is no discharge of flue products into the room.

PRECAUTIONS

IF THE UNIT IS EXPOSED TO THE FOLLOWING, DO NOT OPERATE THE HEATER UNTIL ALL CORRECTIVE STEPS HAVE BEEN MADE BY A QUALIFIED SERVICEMAN.

1. FLOODING TO OR ABOVE THE LEVEL OF THE BURNER OR CONTROLS.
2. DAMAGE.
3. FIRING WITHOUT WATER.
4. SOOTING.

NEVER OPERATE THE HEATER WITHOUT FIRST BEING CERTAIN IT IS FILLED WITH WATER AND A TEMPERATURE AND PRESSURE RELIEF VALVE IS INSTALLED IN THE RELIEF VALVE OPENING OF THE HEATER.

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, TURN OFF THE MANUAL GAS CONTROL VALVE TO THE APPLIANCE.

PVI TURBOPOWER® Low NO_x WATER HEATERS

GENERAL INFORMATION

POWER BURNER

The initial startup procedure of the unit is provided on page 13.

The sequence of operation of the unit is provided beginning on page 12.

It is important to note that the flame controller has a reset button located on the back of the burner enclosure. (See Attachment A, Item 37.)

HIGH LIMIT

The high limit (not adjustable) is factory set to cut off at 200°F. The controller may have a manual reset which is located on the top of the control. If the water exceeds 200°F, it will be necessary to reset the control.

HIGH ALTITUDE INSTALLATIONS

Ratings specified by manufacturers for most appliances apply for elevations up to 2000 feet. For elevations above 2000 feet, ratings must be reduced at the rate of 4% for each 1000 feet above sea level. For example, if a heater is rated at 800,000 Btu/h at sea level, to rate the heater at 4000 feet, you subtract 4 (once for each thousand feet) x .04 (4% input reduction) x 800,000 (original rating) from the original rating. Therefore, to calculate the input rating at 4000 feet: $4 \times .04 \times 800,000 = 128,000 \text{ Btu/h}$; $800,000 - 128,000 = 672,000 \text{ Btu/h}$.

See ADJUSTMENT PROCEDURE in this manual (pages 13-14) for inlet and manifold pressure requirements.

Also, due to the input rating reduction required at high altitudes, the output rating of the appliance is also reduced and should be compensated for in the sizing of the equipment for applications.

MAINTENANCE

GENERAL

KEEP APPLIANCE AREA CLEAR AND FREE FROM COMBUSTIBLE MATERIALS, GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. (SEE WARNING ON PAGE 4, LOCATING THE HEATER.)

Water heater maintenance includes periodic tank flushing and cleaning, and removal of lime scale. The unit should be inspected and adjusted to maintain proper combustion. Refer to Table 3 below. A periodic inspection of the venting system should be made.

MAINTENANCE SCHEDULE

Below are instructions for performing some of the recommended maintenance. Unit inspection and adjustment should be performed by a competent technician.

COMPONENT	OPERATION	INTERVAL	REQUIRED
Tank	Sediment Removal	Every 3 Months	Flushing
	Lime Scale Removal	Semi-Annually	Delimer
Relief Valve	Inspect	Semi-Annually	
Vent System	Inspect	Semi-Annually	Should be Corrosion-Free

Table 3

FLUSHING

1. Turn off the heater electrical disconnect switch.
2. Open the drain valve and allow water to flow until it runs clean.
3. Close the drain valve when finished flushing.
4. Turn on the heater electrical disconnect switch.

DRAINING

The heater must be drained if it is to be shut down and exposed to freezing temperature. Maintenance and service procedures may also require draining the heater.

1. Turn off the heater electrical disconnect switch.
2. Close the cold water inlet and hot water outlet valve to heater.
3. Open a relief valve to vent the tank pressure.
4. Open the heater drain valve.

PVI TURBOPOWER® Low NO_x WATER HEATERS

5. If the heater is being drained for an extended shutdown, it is suggested the drain valve be left open during this period.

Follow FILLING instructions when restoring hot water service.

SEDIMENT REMOVAL

Waterborne impurities consist of the particles of soil and sand which settle out and form a layer of sediment on the bottom of the tank. For convenience, sediment removal and lime scale removal should be performed at the same time.

LIME SCALE REMOVAL

The amount of calcium carbonate (lime) released from water is in direct proportion to water temperature and usage. The higher the water temperature or water usage, the more lime deposits are dropped out of the water.

Lime accumulation not only reduces the life of the equipment but also reduces efficiency of the heater and increases fuel consumption.

The usage of water softening equipment greatly reduces the hardness of the water. However, this equipment does not always remove all the hardness (lime). For this reason it is recommended that a regular schedule for deliming be maintained.

Sediment and lime scale removal may be accomplished through the TURBOPOWER® module opening or the rear access opening, if applicable. The heater must be drained, (see DRAINING), before removing the module or the rear access head.

To dissolve and remove the more stubborn mineral deposits, a professional delimer should be used.

To clean heater through the rear access flange or the module opening if no rear access head is available, proceed as follows. (See Figure 9, page 17 for detailed head removal procedure.)

1. Turn off the water inlet and outlet valve, the heater electrical disconnect switch and open drain valve. It will be necessary to allow air to enter the tank during draining. The relief valve can be held open to accomplish this.
2. Remove the rear access cowl and the rear access head. If no rear access is available, remove the burner, (see burner disassembly sequence on page 10), flue collector and TURBOPOWER® module, being careful not to damage the burner or scar the tank lining while removing the module.
3. Remove lime, scale or sediment taking care to not damage the lining.
4. Inspect flange o-ring. If new o-ring is required, contact PVI Customer Service for replacement.
5. Replace the head or the TURBOPOWER® module. (See Figure 9, page 17.)
6. Close drain valve, open water inlet and outlet line and turn on the power burner electrical disconnect switch.
7. Check for water leakage.

PVI TURBOPOWER® Low NO_x WATER HEATERS

SUPERTANK™ BOLTED HEAD REMOVAL

SUPERTANK™ water heaters will have one or more removable TURBOPOWER® modules or bolted head for access to the tank. If a head or module is removed during the course of maintenance, and it becomes necessary to replace the fasteners, they must be replaced with a 9/16"-12 NC, grade 5 bolt, washer and nut. Lubricate the bolt and retorque to 100 ft. lbs. Retorque the bolts using an alternating star pattern to insure proper seating of the O-ring or gasket. A small

amount of silicon sealant or other suitable adhesive may be used to hold the O-ring or gasket in place while positioning a head or tank section. Apply adhesive sparingly. A new O-ring or gasket must be used when reinstalling energy modules.

IMPORTANT

Mark one hole on head and on tank flange for reference when removing head. Be certain to align these holes during reassembly to insure that original gasket or O-ring mating surfaces will be correctly positioned.

Typical Vertical SUPERTANK™
Bolted Head Attachment

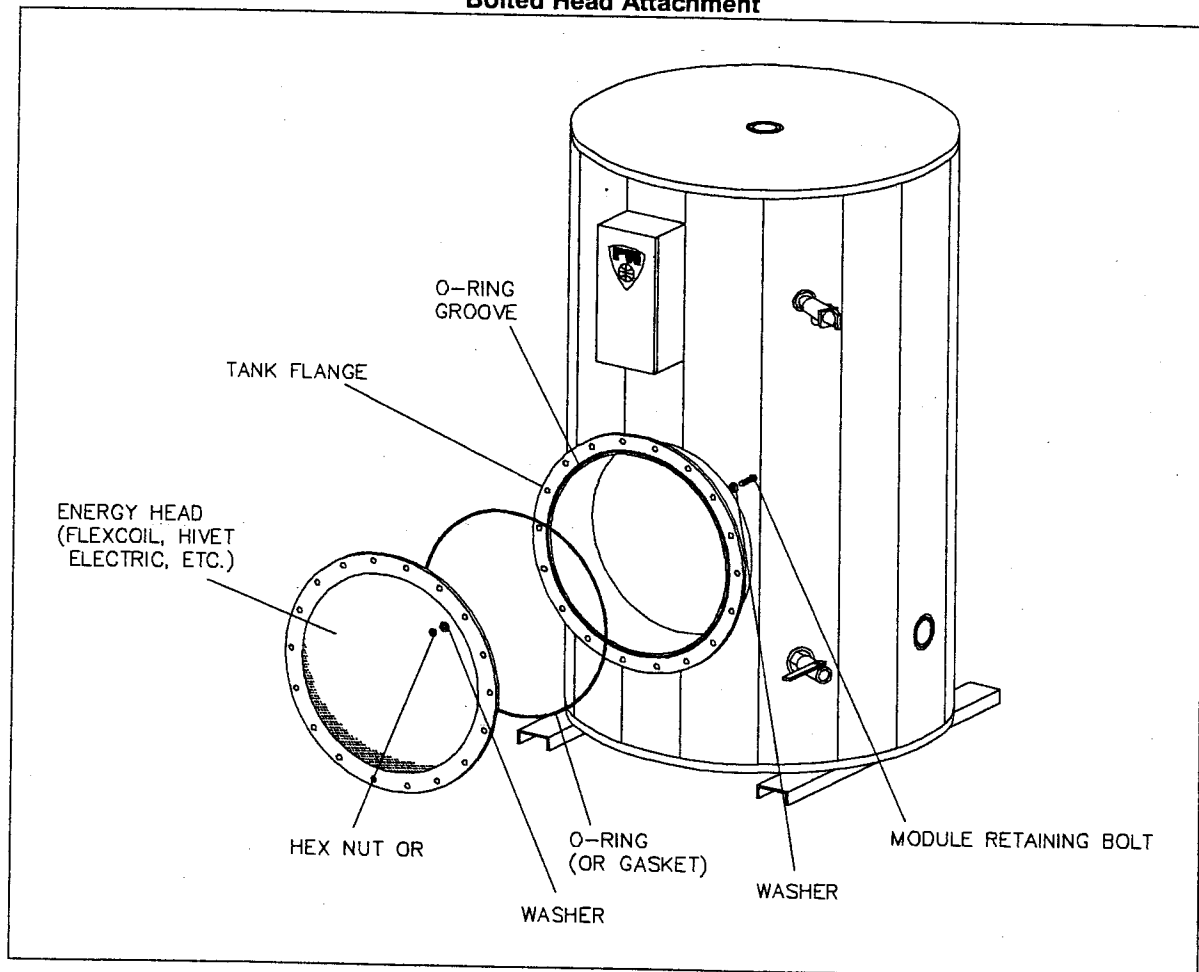


Figure 9

PVI TURBOPOWER® Low NO_x WATER HEATERS

TROUBLESHOOTING SUGGESTIONS GAS BURNER

1) BURNER FAILS TO START:

- a) **Defective on/off switch.** Replace switch.
- b) **Control circuit has open control contact.** Check limits, low water cutoff, and others as applicable.
- c) **Bad fuse or switch opens on incoming power source.** Correct as required.
- d) **Flame safeguard control safety switch tripped out.** Reset and determine cause of apparent flame failure.
- e) **Loose connections or faulty wiring.** Tighten all terminal screws and consult wiring diagram furnished with the heater.
- f) **Defective blower motor.** Check for free rotation of fan wheel. Repair or replace.
- g) **Air proving switch is defective.** Replace.

OCCASIONAL LOCKOUTS FOR NO APPARENT REASON:

- a) **Hot surface ignitor failure.** Ignitor maybe cracked or oxidized. Check flame signal reading at control to determine if flame signal is above minimum value.
- b) **Loose or broken wires.** Check all wire nut connections and tighten all terminal screw connections in panel and elsewhere as appropriate.
- c) **Improperly adjusted air flow proving switch.** Insure the when main flame lights, the air flow switch is not so critically set as to allow occasional momentary opening of the air switch contacts.
- d) **Occasional low supply voltage.** Contact local utility to correct. Make certain the burner control circuit transformer (if supplied) is correct for the voltage and power (AC) being supplied.
- e) **Occasional low gas supply pressure.** Contact local utility to correct.

3) BURNER MOTOR RUNS, BUT BURNER DOES NOT LIGHT:

- a) **Gas supply to burner shut off.** Make sure all manual gas supply valves are open. Automatic high-pressure valve at meter, such as "Sentry" type, tripped shut due to high gas pressure. Reset valve and correct cause for trip out.
- b) **Gas safety valve not opening.** Listen and feel for valve actuation. **Solenoid valve not being powered.** Check electrical circuitry. Replace coil or entire valve if coil is burned out.
- c) **Defective gas regulator / proportionator.** Air/fuel ratio will not hold adjustment. Replace.
- d) **Defective hot surface ignitor.** Replace
- e) **Defective flame safeguard control.** Replace as required.
- f) **Airflow switch not making circuit.** Check out electrically. **Defective air flow switch.** Replace. Air switch misadjusted. Readjust.

4) BURNER MOTOR RUNS AND BURNER LIGHTS, BUT IMMEDIATELY GOES OUT:

- a) **Flame signal reading too low to pull in flame relay.** Confirm proper combustion and firing rate.
- b) **Defective automatic main or auxiliary gas shutoff valves.** Check electrical circuitry to valves. Replace valves or correct circuitry as required.
- c) **Defective flame control or plug on board.** Check and replace as required.
- d) **Flame signal reading too low or nonexistent.** Hot surface ignitor is cracked or oxidized. Replace.
- e) **Defective gas pressure regulator.** Replace. **Misadjusted gas pressure regulator.** Readjust to meet required operational values.

PVI TURBOPOWER® Low NO_x WATER HEATERS

TROUBLESHOOTING SUGGESTIONS (con't)

5) CARBON MONOXIDE READINGS ON GAS FIRING:

- a) **Incorrect gas/air ratios.** Readjust burner to correct CO₂ / O₂ levels; eliminates all CO formation.

6) GAS HIGH FIRE INPUT CANNOT BE ACHIEVED:

- a) **Gas company pressure regulator or meter operating incorrectly, not allowing required gas pressure at burner train inlet.** Contact gas company to correct.
- b) **Gas cock upstream of train inlet not fully open.** Check and correct.
- c) **Gas line obstructed.** Check and correct.

- d) **Gas train main and/or lead test cocks not fully open.** Check and correct.

- e) **Gas supply line between gas company regulator and burner inlet too small.** Check supply pressure at meter, determine pressure drop and increase line size as required, or raise supply pressure to compensate for small line. Do not raise pressure so high that under static (no flow) conditions the pressure exceeds the maximum allowable pressure to the gas train components on the burner.

- f) **Automatic gas valve not opening fully due to defective operation.** Replace gas valve.

- g) **Defective gas pressure regulator.** Replace.

- h) **Normally open vent valve (if supplied) not closing when automatic gas valves open.** Replace vent valve, if not closing fully.

Additional troubleshooting information can be found in the Flame Control bulletin with the burner.

PVI TURBOPOWER® Low NO_x WATER HEATERS

FOR YOUR SAFETY READ BEFORE OPERATING



WARNING

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

A. This appliance does not have a pilot. It is equipped with an ignition device that automatically lights the burner. Do **not** try to light the burner by hand.

- Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

B. **BEFORE OPERATING**, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.



C. Use only your hand to turn the gas shutoff valve. **Never use tools.** If the 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.

"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.

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

OPERATING INSTRUCTIONS

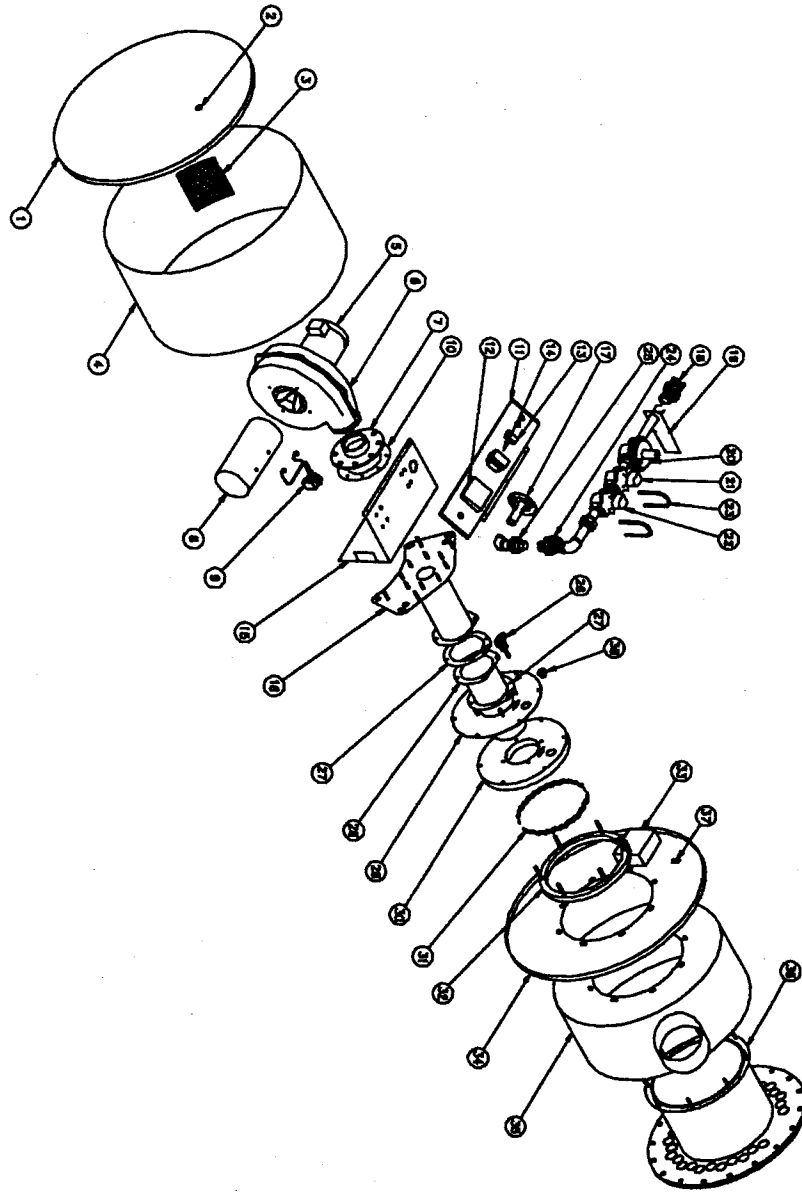
1. **STOP!** Read the safety information above on this label.
2. Set the thermostat to the lowest setting.
3. Turn off all electrical power to the appliance.
4. This appliance is equipped with an ignition device, which automatically lights the burner. Do **not** try to light the burner by hand.
5. Turn gas shutoff valve 90° counterclockwise to "OFF".

6. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
7. Turn gas shutoff valve 90° clockwise to "ON".

8. Turn on all electric power to the appliance.
9. Set the thermostat to desired setting.
10. If the appliance will not operate, follow the instructions to "Turn off Gas to Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
- Turn off all electric power to the appliance if service is to be performed.
3. Turn gas shutoff valve 90° counterclockwise to "OFF".


PVI TURBOPOWER® Low NO_x WATER HEATERS

BURNER ASSEMBLY BREAKDOWN



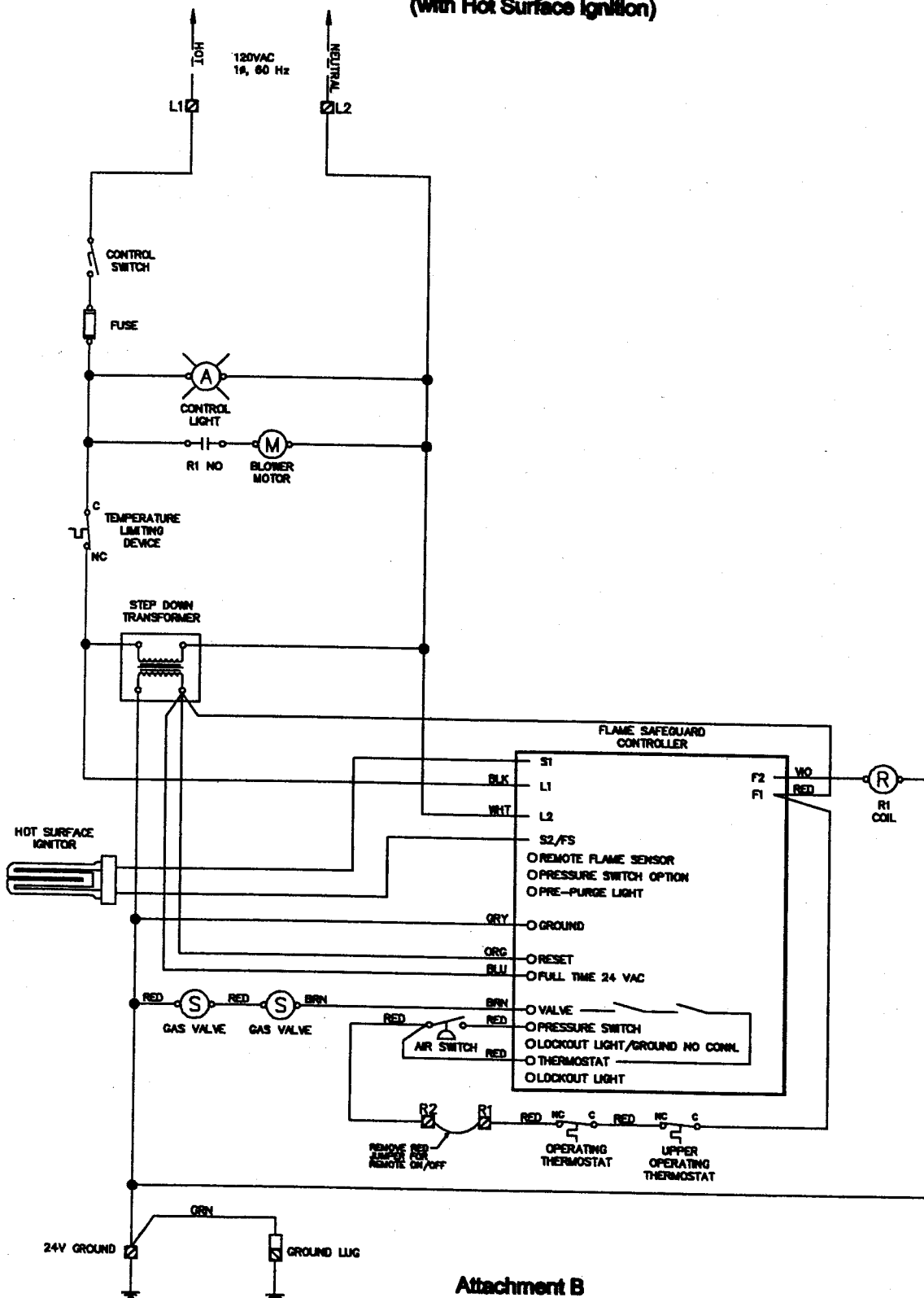
Attachment A

LIST OF MATERIALS	
ITEM	DESCRIPTION
1	FRONT PAN
2	SIGHT GLASS
3	DIRECT VENT CONN. WITH SCREEN
4	COMBUSTION SHELL
5	BLOWER MOTOR
6	BLOWER HOUSING AND IMPELLER
7	BLOWER DISCHARGE FLANGE
8	BLOWER INLET CYLINDER
9	AIR FLOW PROVING SWITCH
10	DISCHARGE FLANGE GASKET
11	BURNER CONTROL PANEL
12	BURNER FLAME CONTROL MODULE
13	BLOWER MOTOR RELAY
14	STEPDOWN CONTROL TRANSFORMER
15	GAS TRAIN SHELF
16	BURNER SPOOL
17	VENTURI NOZZLE
18	MANUAL INLET SHUTOFF VALVE
19	ESCUSION PLATE
20	REGULATOR/PROPORTIONATOR
21	FIRST GAS SAFETY VALVE
22	SECOND GAS SAFETY VALVE
23	U-BOLT
24	MANUAL MANIFOLD SHUTOFF VALVE
25	UNION
26	HOT SURFACE IGNITOR
27	FIBER GASKETS
28	BURNER
29	BULKHEAD PLATE
30	REFRACTOR DISK
31	TADPOLE GASKET
32	COMPRESSION RING
33	JUNCTION BOX
34	BACK PAN
35	FLUE COLLECTOR
36	TURBOPOWER MODULE
37	FLAME CONTROL RESET
38	OBSERVATION PORT




PVI TURBOPOWER® Low NO_x WATER HEATERS

CONTROL DIAGRAM

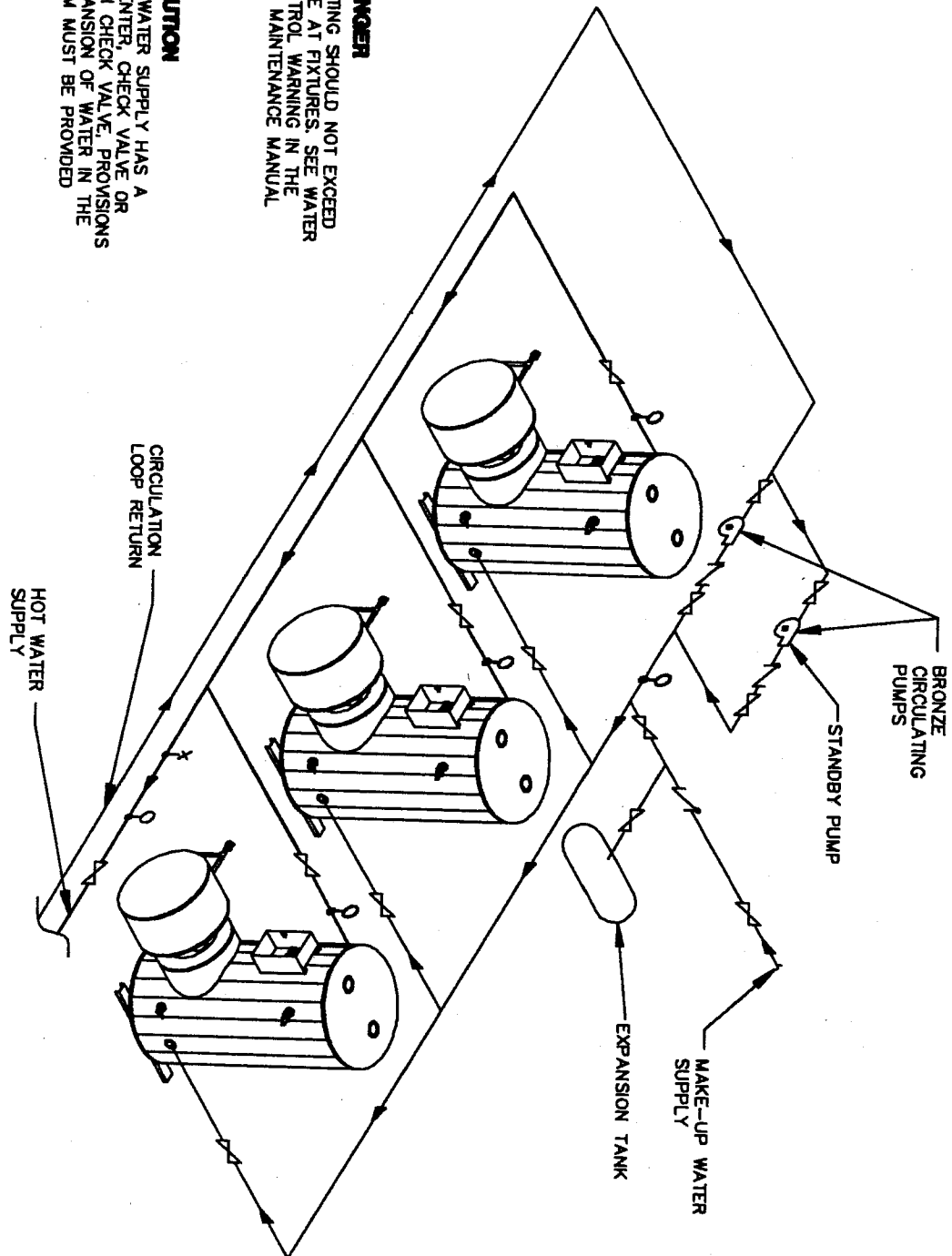
PVI TURBOPOWER® Low NOx Water Heater (with Hot Surface Ignition)



PVI TURBOPOWER® Low NO_x WATER HEATERS

-  STOP VALVE
-  CHECK VALVE
-  TEMPERATURE GAUGE

MULTIPLE WATER HEATER SYSTEM DESIGN



⚠ DANGER

TEMPERATURE SETTING SHOULD NOT EXCEED SAFE TEMPERATURE AT FIXTURES. SEE WATER TEMPERATURE CONTROL WARNING IN THE INSTRUCTIONS AND MAINTENANCE MANUAL.

⚠ CAUTION

IF BUILDING COLD WATER SUPPLY HAS A BACK-FLOW PREVENTER, CHECK VALVE OR WATER METER WITH CHECK VALVE. PROVISIONS FOR THERMAL EXPANSION OF WATER IN THE HOT WATER SYSTEM MUST BE PROVIDED.

NOTES:

1. PIPING AND SYSTEM DESIGN SHOULD CONFORM TO ALL LOCAL CODES.
2. PIPE RELIEF VALVE TO OPEN DRAIN
3. WATER HEATER INLET AND OUTLET ARE TWO INCH

Attachment C