

PVI TURBOPOWER® WATER HEATERS TYPICAL CONSTRUCTION

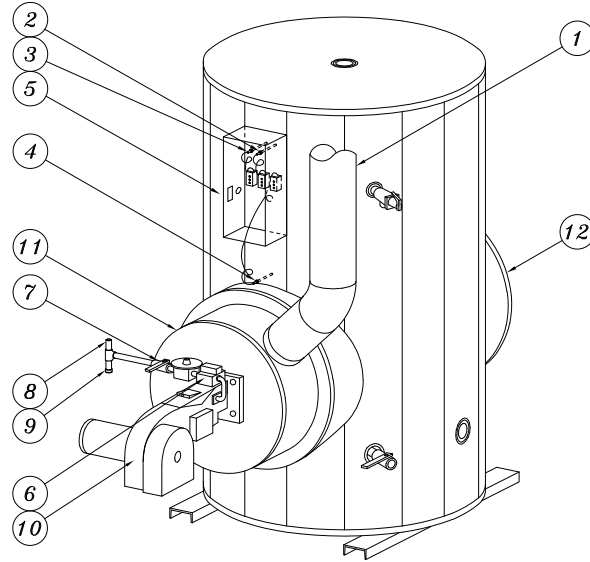


Figure 4-1

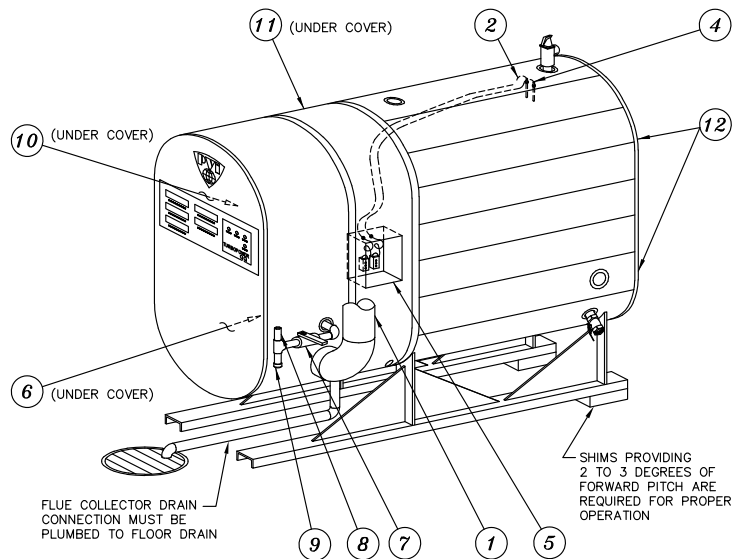


Figure 4-2

- | | |
|--|---------------------------------|
| 1. Flue stack * | 7. Gas inlet |
| 2. Temperature limiting device
(set at 200°F) | 8. Gas line * |
| 3. Upper operating thermostat
(set at 130°F) | 9. Drip leg * |
| 4. Operating thermostat
(set at 120°F) | 10. Burner |
| 5. Control switch(es) and fuse(s) | 11. Flue collector |
| 6. Gas valve | 12. Optional rear module access |
- (* Not furnished by PVI)

For connection points on oil pumps, see Section 10 or specific burner manufacturer's installation and maintenance instructions.

WARNING: WATER TEMPERATURES OVER 125°F CAN CAUSE SEVERE BURNS INSTANTLY OR DEATH FROM SCALDS.

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.

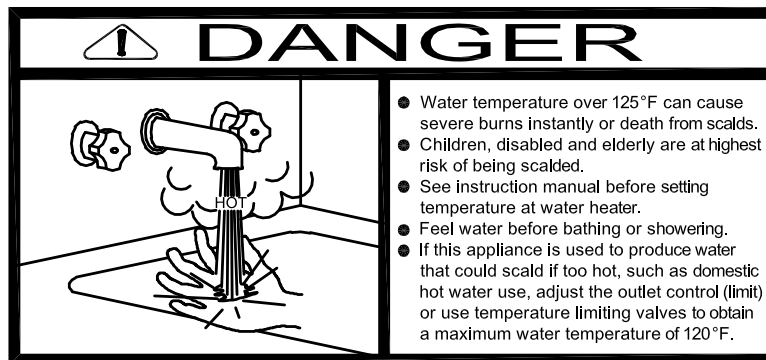
IMPORTANT SAFETY NOTE

It takes only 5 seconds of skin contact with 140°F water to cause a second degree burn! You must protect against high water temperatures at all lavatories, tubs, showers and other points of hot water contact.

Accidental scalding from high water temperatures is a greater risk in some types of installations. Some examples are:

**HOMES FOR THE MENTALLY HANDICAPPED
HOMES FOR THE PHYSICALLY HANDICAPPED
HOSPITALS AND NURSING HOMES
ELDER CARE FACILITIES AND REST HOMES
ORPHANAGES AND CHILD CARE FACILITIES**

OTHER INSTALLATIONS – WHERE RESPONSE TO CONTACT WITH HOT WATER MAY BE SLOWER OR WHERE THE DANGER OF HOT WATER CONTACT IS GREATER



Thermostatically controlled mixing valves must be used in the design of the potable hot water system.

Potable hot water should be tempered to no more than 110°F when used for bathing or other personal use.

Good engineering practice mandates the use of thermostatically controlled mixing valves set at 120°F to keep the delivered water temperature below scalding temperatures.

The semi-instantaneous units may be installed as a hanging or wall-mounted unit if desired. Eye bolts or threaded rods can be used suspending the units using

the pre-punched slots in the skid runners. See figures 4-3 and 4-4.

TYPICAL CEILING MOUNTED UNIT

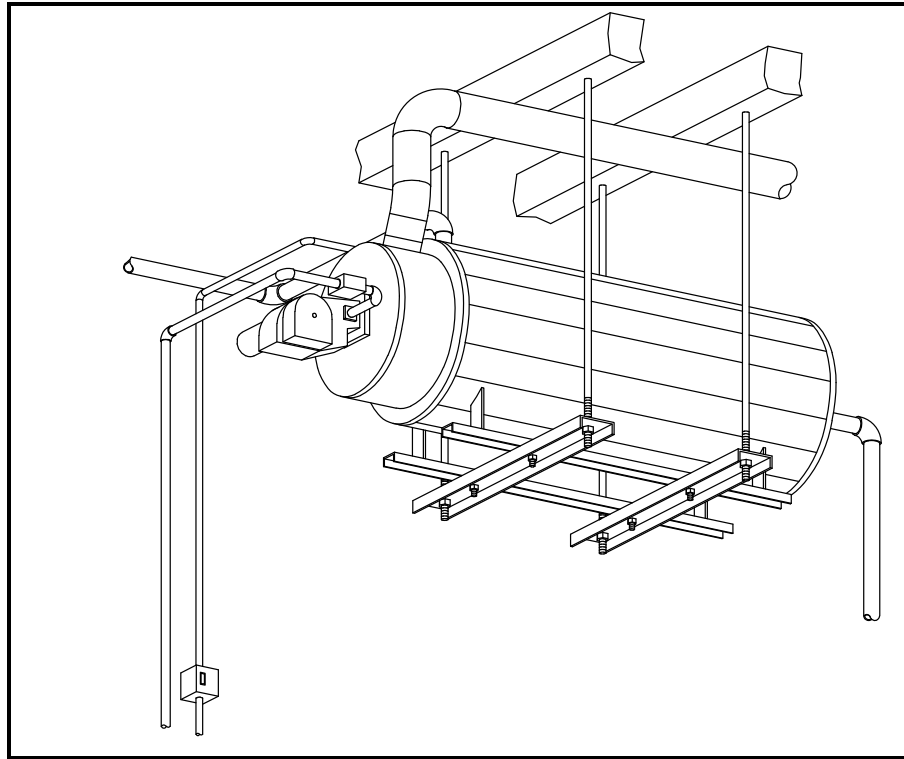


FIGURE 4-3

TYPICAL WALL MOUNTED UNIT

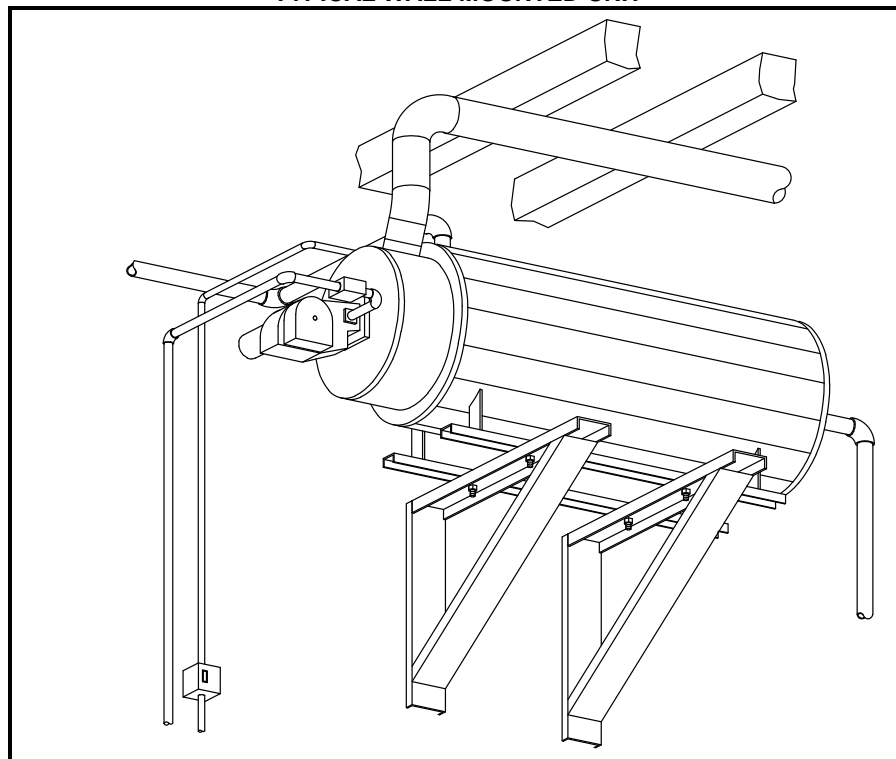


FIGURE 4-4

ELECTRICAL

1. Wiring to the unit should conform to the National Electrical Code or the code legally authorized in your locality. A fused disconnect switch should be used for water heater control. 120V 1 phase, 60 Hz service wiring connections are located in the enclosure on the water heater. Some models may additionally have high voltage connections located on the burner.
2. Be certain that high and low voltages are connected to the correct points; also, check rotation of motors on three phase models. The burners are shipped separately from the heaters and are provided with connecting wires in conduit to be connected after burner is in placed in combustion chamber. Wires and terminal block connections are marked for simplified hookup.

NOTE: Use only copper wire of proper sizing for incoming service. Damage resulting from use of aluminum wiring will be excluded from coverage under the warranty of this unit.

START-UP PROCEDURES AND OPERATION

CAUTION: DO NOT RELIGHT PILOT OR START BURNER WITH COMBUSTION CHAMBER FULL OF GAS OR OIL VAPOR, OR WITH VERY HOT COMBUSTION CHAMBER.

1. The burner manufacturer's installation and service manual start-up procedures for the individual burner on your water heater may be part of this manual or will be shipped with the burner. Study the information carefully and follow the burner manufacturer's recommendations.
2. Because of the many different burners and control systems, the instructions in this section are general information and refer to the water heater with either power gas, oil or combination gas/oil burner installed.
3. Fill the water heater tank with water. Open the relief valve or a nearby hot water faucet to allow air in the tank to escape. Be sure all connections into the tank are tight as leaks at tank fittings will damage the insulation.
4. The thermostats are labeled as to their function. The temperature limiting device is set at 200°F. The thermostats are set at the factory at 130°F on the upper operating thermostat. Adjustment may be made by turning the thermostat dial to the desired temperature.

WARNING: WATER TEMPERATURES OVER 125°F CAN CAUSE SEVERE BURNS INSTANTLY OR DEATH FROM SCALDS.

INITIAL FIRING AND ADJUSTING OF BURNER

1. The following procedure is the quickest and best means of starting and adjusting the burner for efficient operation.
2. The following test equipment is required:
 - a. Stack temperature gauge.
 - b. Manometer for checking gas pressure.
 - c. Draft gauge for determining draft in stack.
 - d. CO tester (gas only).
 - e. CO₂ tester.
 - f. AC/DC multimeter with a 20,000 ohm/volt DC rating.
 - g. Ammeter.
 - h. Oil pressure gauge (100-350 psi) (oil only).
 - i. Vacuum gauge (0-30" Hg.) (oil only).
 - j. Smoke spot tester (oil only).
3. Drill ¼" test hole in stack approximately 3" from the heater vent connection (before the draft regulator).
4. Refer to start-up instructions for the burner supplied with your appliance. They may be included as part of this manual or may be shipped with the burner.

NOTE: Emergency shutoff can be made by turning off the fuel inlet shutoff valve marked by installing contractor.

MAINTENANCE

1. A preventative maintenance program should be established to assure a long, trouble-free life of the water heater.
2. To control sediment and scale buildup in the water heater, the tank should be flushed at two- or three-month intervals depending on water conditions in your location. To flush, turn off electrical disconnect switch to prevent the burner from operating. Open the drain valve and allow water to flow through the tank until it runs clear. Close the drain valve and turn the electrical switch on. Between tank flushes, draining two or three gallons from the tank on a weekly basis will also help prevent the accumulation of sediment.
3. A scale of lime will normally form and accumulate in the heater during operation. The lime is formed from the natural chemicals in the water that precipitate out during the heating cycles. Some water supplies contain more of these chemicals than others, and the scale buildup will occur more rapidly. Other factors affecting the scale buildup are the amount of hot water used and the temperature of the water. The more hot water used, the more fresh water containing the scale-forming chemicals is brought into the tank. As the temperature of the water increases, the rate of scale deposited will be increased.
5. The tank has an opening suitable for inspection and cleaning use. (See Figures 4-1, 4-2 and 4-7.) The tank should be inspected for scale buildup through this opening. If scale is present, it can be loosened with a high-pressure stream of water. The smaller pieces can be flushed through the drain and the larger pieces removed by hand. The frequency of inspections will be determined by the rate of scale buildup. We recommend 30-60 day intervals.
6. Periodic inspections and check-out of the burner ignition system, control system and fuel valve operation (for tight close-off) should be made. Refer to the burner installation instructions for recommendations.

When oil burners are used, the flue tubes and flue baffles should be inspected periodically and cleaned if necessary. A maladjusted oil burner producing excessive smoke will result in soot collecting in the flue tubes. Once sooting starts, it accelerates rapidly and will eventually block air movement through the flue tubes.

Sediment and scale accumulations on heating surfaces will reduce the water heater's ability to transfer heat to the stored water. When the heating energy from the burner cannot be effectively transferred to the water in the tank, the metal will overheat. Overheating will cause the metal in the heating surfaces to overheat and lose structural strength. Over time, this will result in leakage.

SINCE PVI CANNOT CONTROL THE USE OF THE WATER HEATER, WATER CONDITIONS, OR MAINTENANCE, THE WARRANTY ON THE TURBOPOWER HEAT EXCHANGER DOES NOT COVER POOR PERFORMANCE, STRUCTURAL FAILURE, OR LEAKING DUE TO AN EXCESSIVE ACCUMULATION OF SCALE. (THE TANK WARRANTY IS NOT AFFECTED BY AN ACCUMULATION OF SCALE.)

4. Should a firetube leak for any reason, consult the factory for instructions.

NOTE: Condensate coming from the tubes on a cold start is normal and does not indicate a leaking tube. This condensate will appear at the fitting in the lower part of the flue collector.

7. Examine the venting system at least once each year for proper connections and alignment. Oil the blower motor and wipe oil and dust from the burner at regular intervals. The blower inlet will collect dust from the air during operation. Clean the blower wheel when necessary. The burner should be cleaned each year according to burner manufacturer's recommended procedures. Inspect all parts and make replacements when necessary. Check wiring for loose connections and burned wires.
8. The temperature and pressure relief valve should be checked at regular intervals to determine its condition for safe operation. The openings inside the valve may become inoperative. If the valve does not open and close properly when tested, it must be replaced. Replace relief valve with a like kind or one meeting the requirements stated on the rating decal located adjacent to the relief valve mounting location.

CAUTION: THE RELIEF VALVE IS A PRIMARY SAFETY DEVICE.

9. Extended shutdown of the appliance and restarting are as follows:
 - a. Turn off all power on fuel supplies.
 - b. Drain and flush tank as previously discussed.
 - c. Tag power switch(es) that fuel is off and tank is empty.
 - d. Refill tank with water and energize fuel and power switch(es) to restart. Reset all controls and conduct start-up of the appliance as discussed on page 4.

NOTE TO OPERATOR

This TURBOPOWER® unit may be equipped with an efficiency indicator which provides you with information pertaining to the efficiency and cleanliness of the TURBOPOWER® heating section. This unique dial indicator is located at the flue outlet of each module. A reading in the green "Efficient Operation" zone indicates that the unit is operating at peak efficiency and the heating surfaces are clean. A reading in the yellow "Marginal Operation" zone indicates the unit is operating at less than peak efficiency because of a build-up of precipitant on the heating surfaces. As a yellow reading occurs, the TURBOPOWER® module's heating surfaces should be cleaned to return the unit to its original level of efficiency. Should a reading in

the red "Inefficient Operation" zone occur, cleaning of the heating surfaces is mandatory to prevent damage to those heating surfaces. To offer an additional measure of protection, a stack temperature switch may also be installed to shut off the burner should the unit operate in the red zone (500°F) for a prolonged period of time.

CAUTION: BYPASSING OF THE STACK TEMPERATURE SWITCH WILL VOID ALL WARRANTIES.

Refer to Figure 4-7 for removing and cleaning the module.

INSTRUCTIONS FOR REMOVAL & CLEANING OF TURBOPOWER® MODULE

Refer to Figure 4-7

NOTE: On units equipped with rear module access, module cleaning can be accomplished through this opening without removing the module.

CAUTION: The TURBOPOWER® module is heavy. No attempt should be made to hold, lift or position module without proper equipment capable of handling the weight of the module.

1. Shut off fuel and electrical power supplies.
2. Drain the tank.
3. Disconnect wiring to burner and gas or oil line from burner at incoming union to burner.
4. Remove the four nuts that hold the burner assembly to the module and the bolts that hold the flue collector to the module. Disconnect the stack from the flue outlet on the collector.
5. Carefully remove burner and then flue collector assembly from the module. Pull burner straight out with a slight twisting motion to avoid damaging the combustion chamber refractory material.
6. Remove the bolts on the front tubesheet. Break the seal at the gasket or o-ring from the tank flange and pull the module from the tank. Use extreme caution in handling the module to avoid bending or distorting of the copper fire tubes.
7. The module can now be cleaned with a high pressure hose or an inhibited acid as recommended by your local chemical supplier for removal of scale from the copper.
8. Reinstall the module after it has been cleaned using a new o-ring or gasket.

IMPORTANT: The TURBOPOWER® module is equipped with special high quality 9/16"-12NC, grade 8 bolts, washers and nuts available only from your PVI representative or directly from PVI. Do not reuse or substitute these special fasteners with similar grade 8 bolts, washers and nuts. Install the flange bolts and nuts with a flat washer under each bolt head and nut. First, snug them in an alternating star pattern. Then, using a calibrated torque wrench, and in an alternating star pattern, tighten the bolts in 2 increments: 95 ft lbs and 145 ft lbs. Use a small amount of silicone RTV to hold the o-ring in place while positioning the module. Apply adhesive sparingly!

Contact PVI at 1-800-433-5654 for replacement Fastener Kits and O-Ring Replacement Instructions.

9. When the module is installed, fill the tank with water and check for leaks.
10. Check baffles in the fire tubes. (See Table 4-1.) Position end of baffle even with end of fire tube.
11. Check the insulating seal on the flue collector before replacing in module. The seal on the flue collector is on the edge of the outside diameter where contact is made with the front tubesheet. If damaged, it may be patched with any suitable 400°F insulation material.
12. Reassemble the unit in the same order it was disassembled and return to service.

REMOVAL & CLEANING OF TURBOPOWER® REMOVABLE MODULE

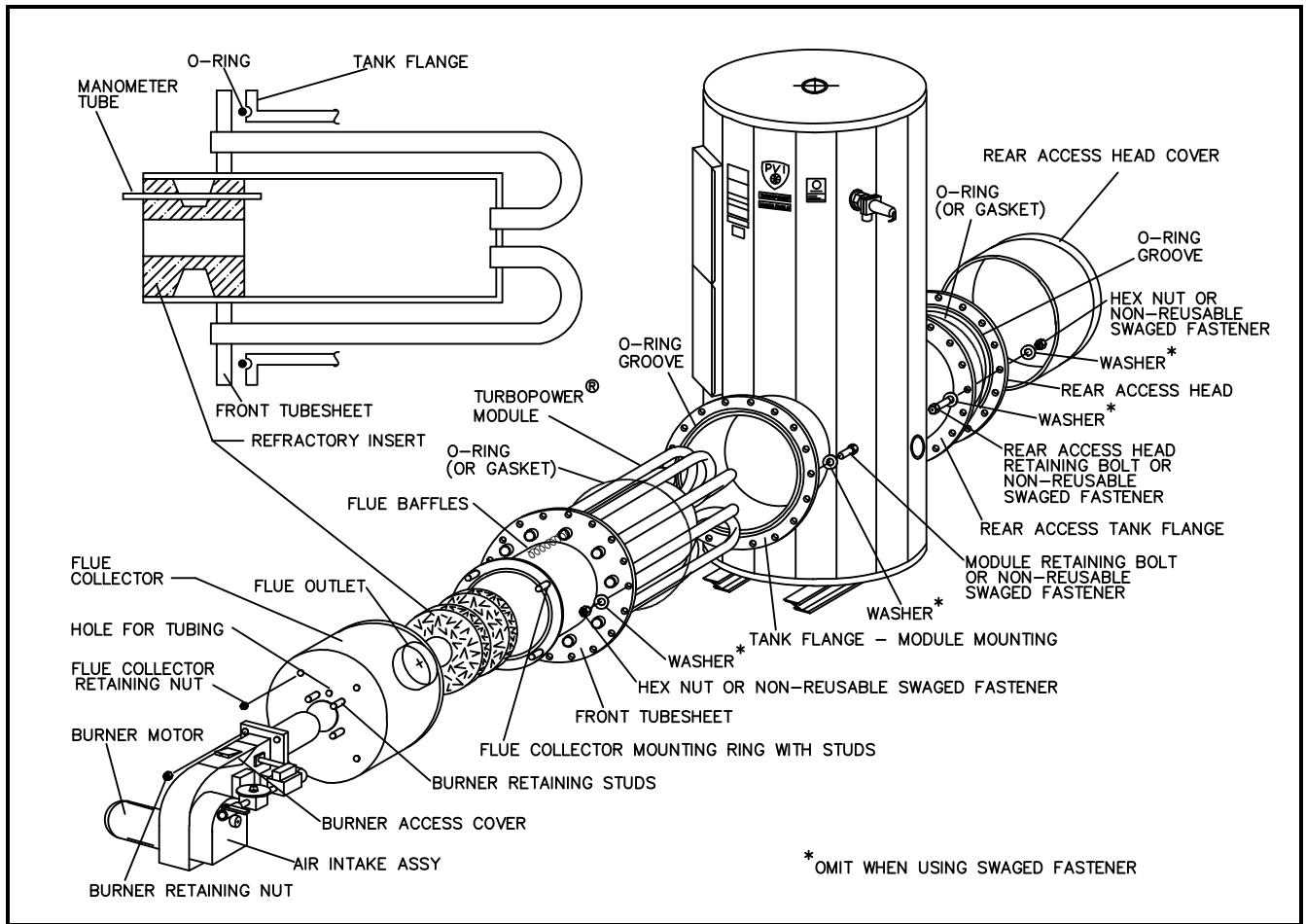


Figure 4-7

TURBOPOWER® WATER HEATER FLUE BAFFLE LENGTHS

INPUT MBtu/h	GPH Oil	FLUE BAFFLE QTY & LENGTH	
		GAS & GAS/OIL	OIL
200	1.4		
300	2.1		
400	2.8		
500	3.6		
600	4.3		
700	5.0		
800	5.7		
1000	7.2		
1200	8.6		
1600	11.4		
2000	14.3		
2400	17.1		
2800	20.0		
3200	22.8		

CONSULT FACTORY

Table 4-1