

MODEL NO. \_\_\_\_\_

SERIAL NO. \_\_\_\_\_

**GENERAL INSTRUCTIONS  
for the  
INSTALLATION,  
OPERATION, AND MAINTENANCE  
of  
DURAWATT® CL  
ELECTRIC WATER HEATERS**



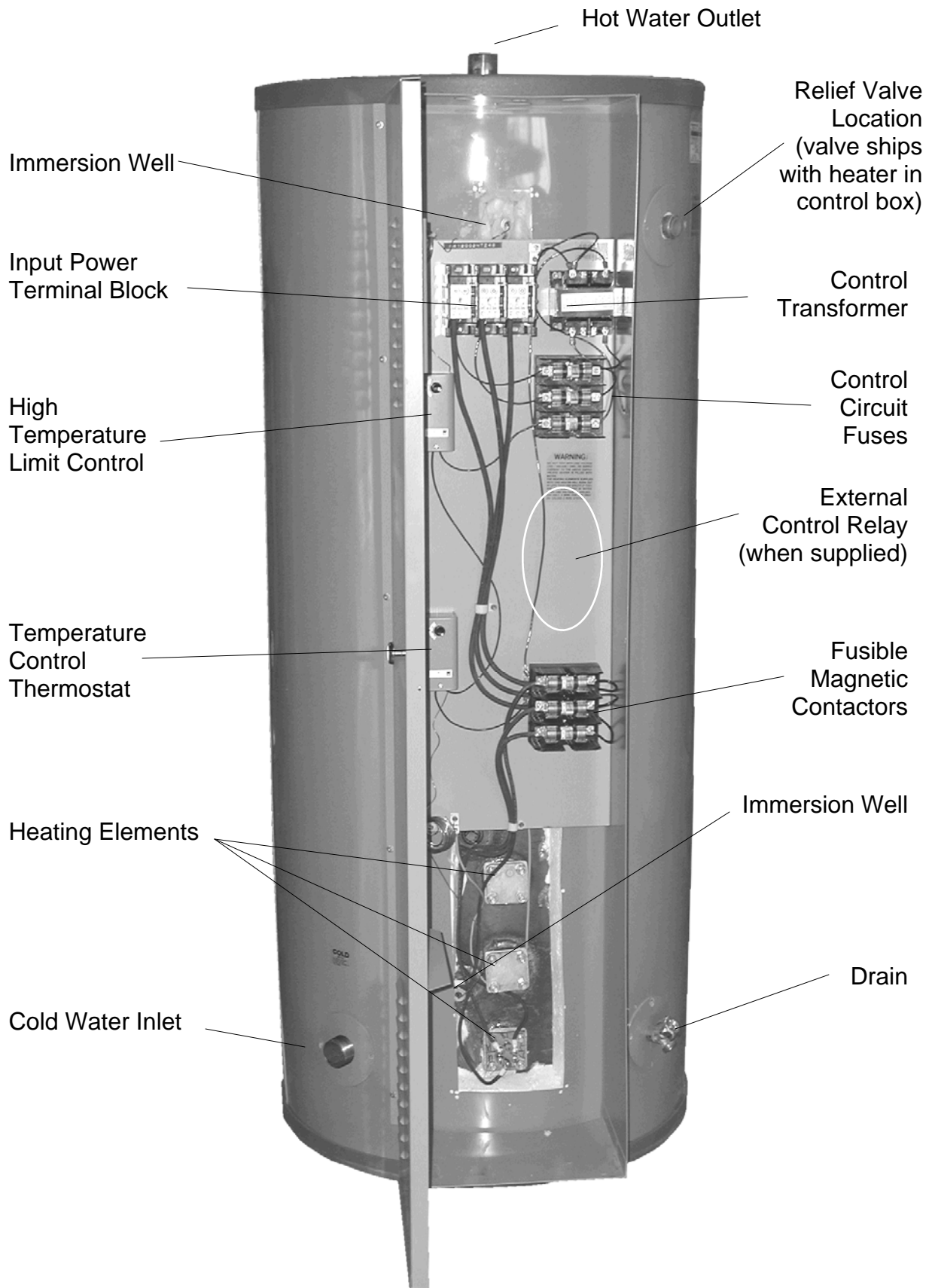
**PVI INDUSTRIES, LLC  
FT. WORTH, TEXAS**

**Warning:**

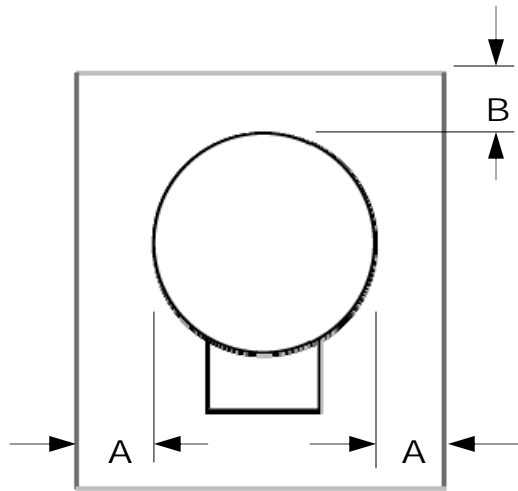
**Water temperature above 130°F increases the risk of scald injury. Thermostatically controlled mixing valves limiting temperature to 110°F should be used on potable water systems that supply shower and bathing loads.**

For warranty and service information, contact PVI at 800-433-5654.  
Please have model number and serial number of your heater when you call.

# STANDARD COMPONENTS (fig. 1)

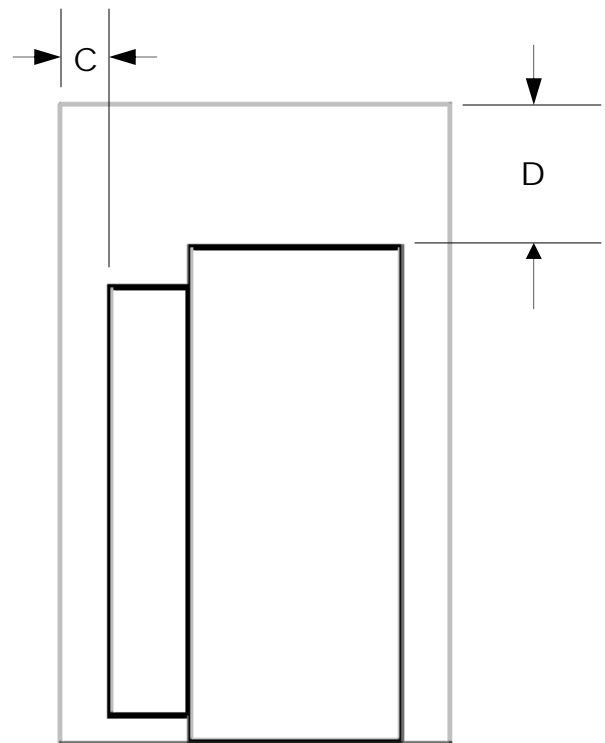
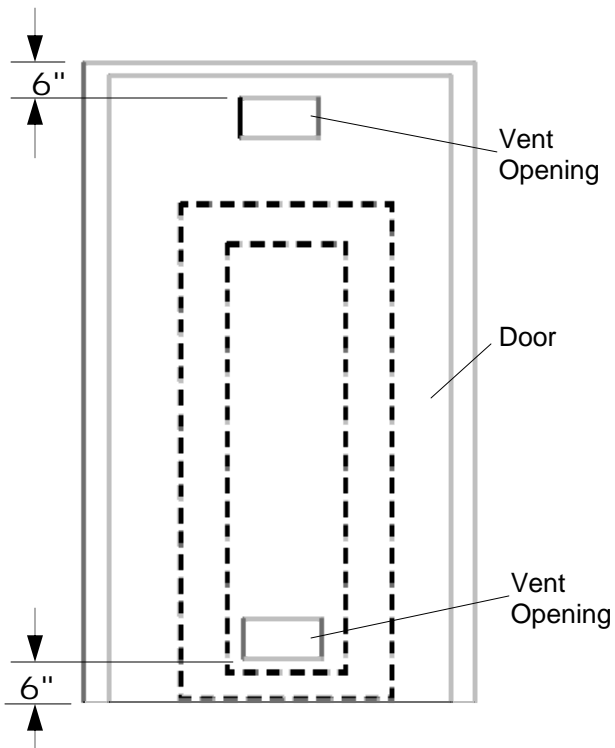


## Clearances for Closet or Alcove Installations (fig. 2)



**Required Clearance in Inches**

	TANK SIZE (gallons)			
	50	80	100	120
A	10	10	10	9
B	8	8	8	7
C	6	6	6	6
D	26	26	17	17



**NOTES:**

1. Vent openings must be at least 50 square inches open area regardless of the type of louver or grill.
2. Combustible floor acceptable.

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

1.0 INSTALLATION AND OPERATING INSTRUCTIONS

1.1 GENERAL

These may be general instructions for all models of PVI electric water heaters and may include information not pertinent to your particular unit. Underwriters Laboratories, Inc. Spec. 834 indicates that these water heaters are not to be used for space heating applications.

Since these heaters are designed to deliver large quantities of hot water, the electrical power input is sufficiently high to require contactors to deliver the current to the heating elements. Also, immersion-type thermostats and high-limit cut-offs are generally used to accurately and quickly sense water temperature changes to properly control the power to the heating elements. These control components are located in the control box shown in Figure 1.

1.2 DETAILED PROCEDURE

1.2.1 Remove the heater from its shipping crate and remove the black iron shipping nipple from the top of the heater.

1.2.2 Locate the water heater as near as possible to the point of most frequent use of hot water and set it on a solid foundation or floor. The floor may be made of wood or other combustible materials without danger. Place heater so that the control box faces in a direction which allows two feet of space to permit servicing. See Figure 2 for closet restrictions.

1.2.3 ENCLOSURE LIMITATIONS- If this heater is to be placed in an enclosed area, such as under a stairway, in an alcove, or in a closet, minimum distances from walls and partitions must be maintained according to figure 2. Note that the closet installation must have ventilation openings for keeping the closet cool. These openings may be protected by screens or grids providing the total open area is not decreased. These PVI electric water heaters are designed to be installed on any type of standard floor structure, combustible or otherwise.

1.2.4 The cold water inlet is located on the side near the bottom. Figure 1. The hot water outlet is located on or near the top of the tank. A drain is located on the side near the bottom and its valve should be closed. An opening is provided near the top for installation of a temperature and pressure relief valve. Follow special instructions provided by the T & P valve manufacturer.

1.2.41 For servicing the water heater, unions should be used in the inlet and outlet piping immediately adjacent to the water heater. A water supply shutoff valve should also be included in the cold water piping prior to the heater and upstream of the union.

1.2.42 A thermal expansion control valve or an expansion tank should be plumbed into the cold water piping entering the water heater. The water heater should be situated in a room with a floor drain suitable for discharge of high-temperature water. The temperature and pressure relief valve, the water heater's drain valve, and the thermal expansion control valve should be piped to this floor drain.

### 1.2.5 **Temperature and Pressure Valve**

The Temperature/Pressure Valve manufacturer has the following installation instructions on the tag attached to their valve:

#### **IMPORTANT INSTRUCTIONS**

For installing Watts Pressure and Temperature Relief Valves in accordance with American National Std Z21.22

Combination pressure and temperature relief valves with extension thermostats must be installed so that the temperature-sensing element is immersed in the water within the top 6" of the tank. They must be installed either in the hot outlet service line or directly in a tank tapping. Combination pressure and temperature relief valves that do not have extension elements must be mounted directly in a tank tapping located within the top 6" of the tank.

To avoid water damage or scalding due to valve operation, drain pipe must be connected to valve outlet and run to a safe place of disposal. Drain pipe must be same size as the valve discharge connection throughout its entire length and must pitch downward from the valve. No shut-off valve shall be installed between the relief valve and tank or in the drain line.

**WATTS REGULATOR COMPANY**  
Lawrence, Massachusetts U.S.A.

Follow these instructions and any other instructions on the temperature / pressure relief valves or its package. Proper tank openings are provided as shown in Figure 2.

1.2. 6 All hot water pipes should be properly insulated to prevent heat loss.

1.2.7 **DO NOT APPLY ELECTRICAL ENERGY TO THE HEATER BEFORE FILLING THE TANK WITH WATER.**

1.2.8 To ensure the tank is completely filled with water, open the nearest hot water faucet to purge all air from the system. Continue filling the tank until water runs from the open hot water faucet. Check for leaks at all tank connections and heating elements.

- 1.2.9 Check to verify that the temperature control thermostat has been adjusted at the factory to maintain a water temperature of 120°F. To change the water temperature, turn off the electrical power to the water heater, and, with a screwdriver, reset the appropriate thermostat to the desired temperature. **Warning: Water temperature above 130°F increases the risk of scald injury. Thermostatically controlled mixing valves should be used in potable water systems that will provide for shower and bathing loads.**
- 1.2.10 Check all electrical connections for tightness before applying power to the water heater, again after 30 minutes of operation, and again after turning the power off. After the tank has been filled with cold water and the control box door closed, electrical energy may be applied to the heater. The contactors will close, applying power to the heating elements. When the water has reached the temperature demanded by the thermostat setting, the contactors will open and remain open until such time as the water temperature drops sufficiently to reactivate the thermostat(s) and contactors.
- 1.2.11 This heater must be operated only at the voltage specified on the nameplate.

## 2.0 MAINTENANCE INSTRUCTIONS

### 2.1 General

**Please refer to a qualified service contractor or electrician when trouble-shooting and servicing components of this heater.**

### 2.2 Troubleshooting Procedure

- 2.2.1 Troubleshooting any type of problem begins with a thorough visual inspection of the control box components and wiring. **The electric service switch for the heater should be turned off and the control box door opened to allow visual inspection.**
- 2.2.2 The reset button on the high temperature limit control should be depressed by hand to ensure that it is not in its tripped position.
- 2.2.3 All components and wiring connections should be checked for evidence of welding, arcing, or burning.
- 2.2.4 All screws and nuts should be checked with a screwdriver or wrench to be certain that they are tight.
- 2.2.5 Temperature control dial should be checked to ensure that they are set at the desired water temperature.
- 2.2.6 Temperature control bulbs should be checked to make sure that they are seated at the bottom of their wells.

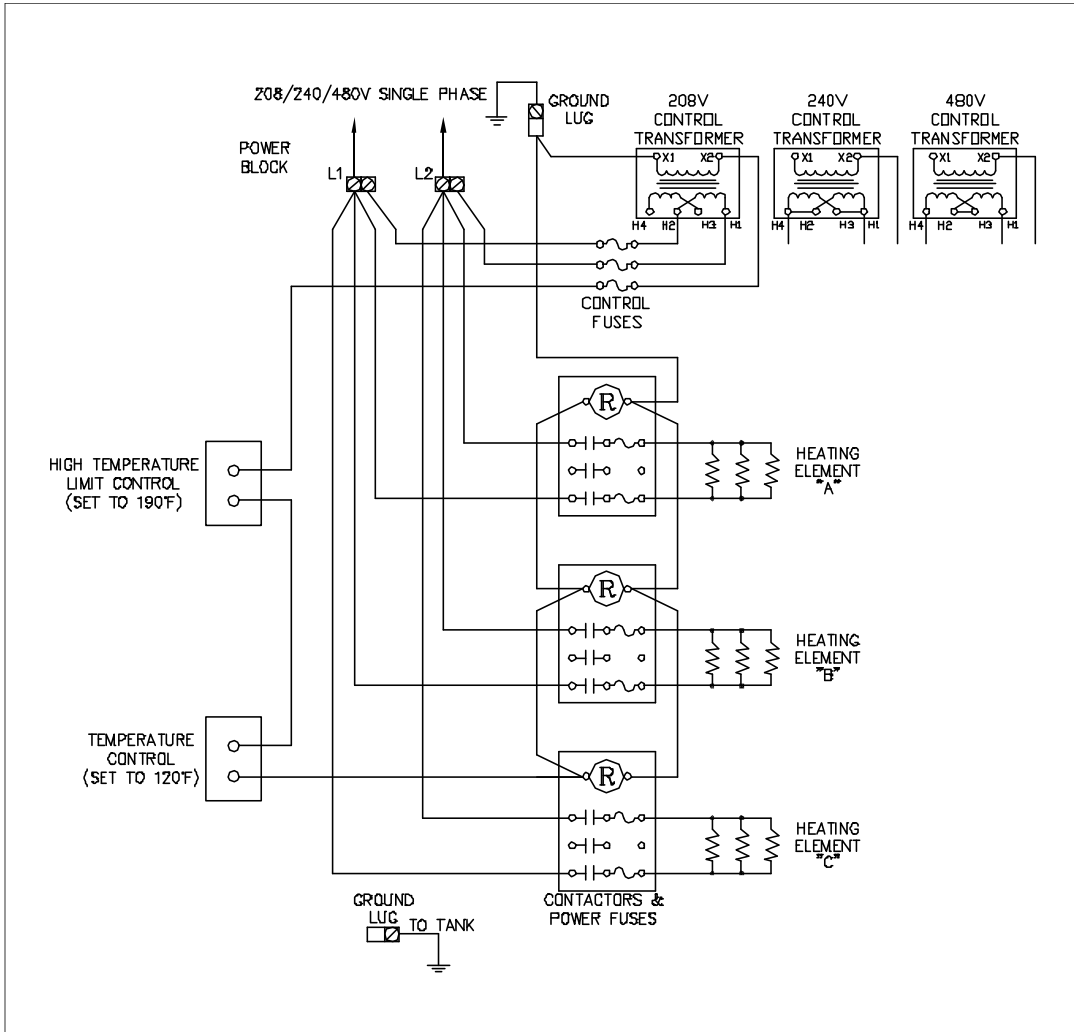
- 2.3 After completion of the previous procedure, while the control box door is still open, the electric service switch for the heater should be turned on.
- 2.3.1 If the water temperature is below the temperature set on the thermostat, the contactors should become energized to deliver power to the heating elements.
- 2.3.2 If the contactors do not operate upon application of power to the heater, the thermostat may be set to a higher temperature with a screwdriver to demand power to the heating elements.
- 2.3.3 Some of PVI's commercial electric water heaters are furnished with a control relay to allow external control of power to one or more of the heating elements during certain periods of the day. (Figure 1)
- 2.3.4 If the control relay appears to be energized, it should be de-energized by turning off the electric service switch, removing one external wire from the external control terminal block (Figure 1) and turning the electric service switch back on to repeat the above checkout procedure.
- 2.3.5 If this procedure fails to operate the contactors, additional troubleshooting, requiring either an a-c voltmeter or clip-on ammeter is necessary.
- 2.3.6 With the electric service switch on, measure the voltage across each phase of the input power terminal block at the top of the control box ( see Figure 1 ). It should be equal to that specified on the heater nameplate. If it is not, something is wrong with the electric service to the heater.
- 2.3.7 If it is correct, the temperature control thermostat should be set to 120° F and the voltage at the contactor coils should be measured. If the high temperature limit control and the temperature control thermostat are operating properly, a voltage of 110V should appear on the contactor coil terminals.
- 2.3.8 If this voltage is not present, there is a problem with either the high temperature limit control or the temperature control thermostat. If this is the case, an experienced electrician can remove the covers of the high limit control and thermostat and measure the voltage between each terminal of these control components and the low side of the control circuit (refer to the wiring schematic located inside the control cabinet).
- 2.3.9 Lack of a 110V reading at any point indicates that a previous contact (high limit cut-off or thermostat) is inoperative and that control component should be replaced.

- 2.4 TO REPLACE THE TEMPERATURE CONTROL THERMOSTAT OR HIGH LIMIT CONTROL, turn off the electric service switch, remove the thermostat or high limit cut-off covers and disconnect the wires. Remove the thermostat bulb from its submersion well by unscrewing the retaining bolt from the clip on the well. and removing the bulb and clip from the well. Unscrew the thermostat from the control panel as well as the clamps which secure the thermostat capillary tubing to the panel. Remove the complete thermostat assembly from the panel and replace it with a new unit taking care to ensure that the wires are reconnected, the bulb is bottomed in the well, the clip is secured in place and capillary tubing clamps are replaced on the panel. Cover the bulb with silicone grease before inserting in the well to assure good thermal contact between the surfaces.
- 2.4.1 Set the operating and high-limit thermostats to desired temperatures, close the control box door and turn on the electric service switch. If the thermostat or high limit cut-off which has just been replaced was faulty, the heater should operate properly. **Warning: Water temperature above 130° F increases the risk of scald injury.**
- 2.4.2 If proper voltage appears at the contactor coils terminals and the contactor(s) do not operate, their coils are probably burned out and the contactor(s) should be replaced.
- 2.4.3 If the contactors are all working and proper voltages are measured at the heating elements and no hot water is generated by the elements, they may be burned out.
- 2.4.4 The electric service switch should be turned off and the resistance at each phase of each heating element should be measured with an ohmmeter without removing any connections. This resistance should be between six ohms and fourteen ohms depending on the element power rating and each phase of a particular three phase element should have equal resistance readings. If the elements are open or shorted, they should be replaced.
- 2.5 TO REPLACE THE ELEMENTS, turn off the electric service switch, shut off the cold water supply to the heater and open any hot water faucet. Open the heater drain cock at the bottom of the heater and drain the tank completely.
- 2.5.1 Remove the electrical connections from the heating element and remove the flange nuts taking care not to lose the flange bolts. The heating element may now be removed. Replace the element being careful to observe that the gasket is in good condition ( a new gasket is recommended whenever an element is replaced ). Tighten the flange nuts and replace the electrical connections exactly as they were removed.
- 2.5.2 The tank must be refilled with water before turning on the electric service switch.
- 2.5.3 DO NOT APPLY ELECTRICAL ENERGY TO THE HEATER BEFORE FILLING THE TANK WITH WATER.
- 2.6 TO FILL THE TANK, close the drain, turn on the cold water supply to the heater and wait until water runs from the previously opened hot water faucet which indicates that the tank is full of water and all air is out of the system.
- 2.6.1 Turn off the hot water faucet, replace the control cabinet cover and turn on the electric service switch. The heater should now be in operation.



# Wiring Diagram

## SINGLE PHASE 208V and 240V

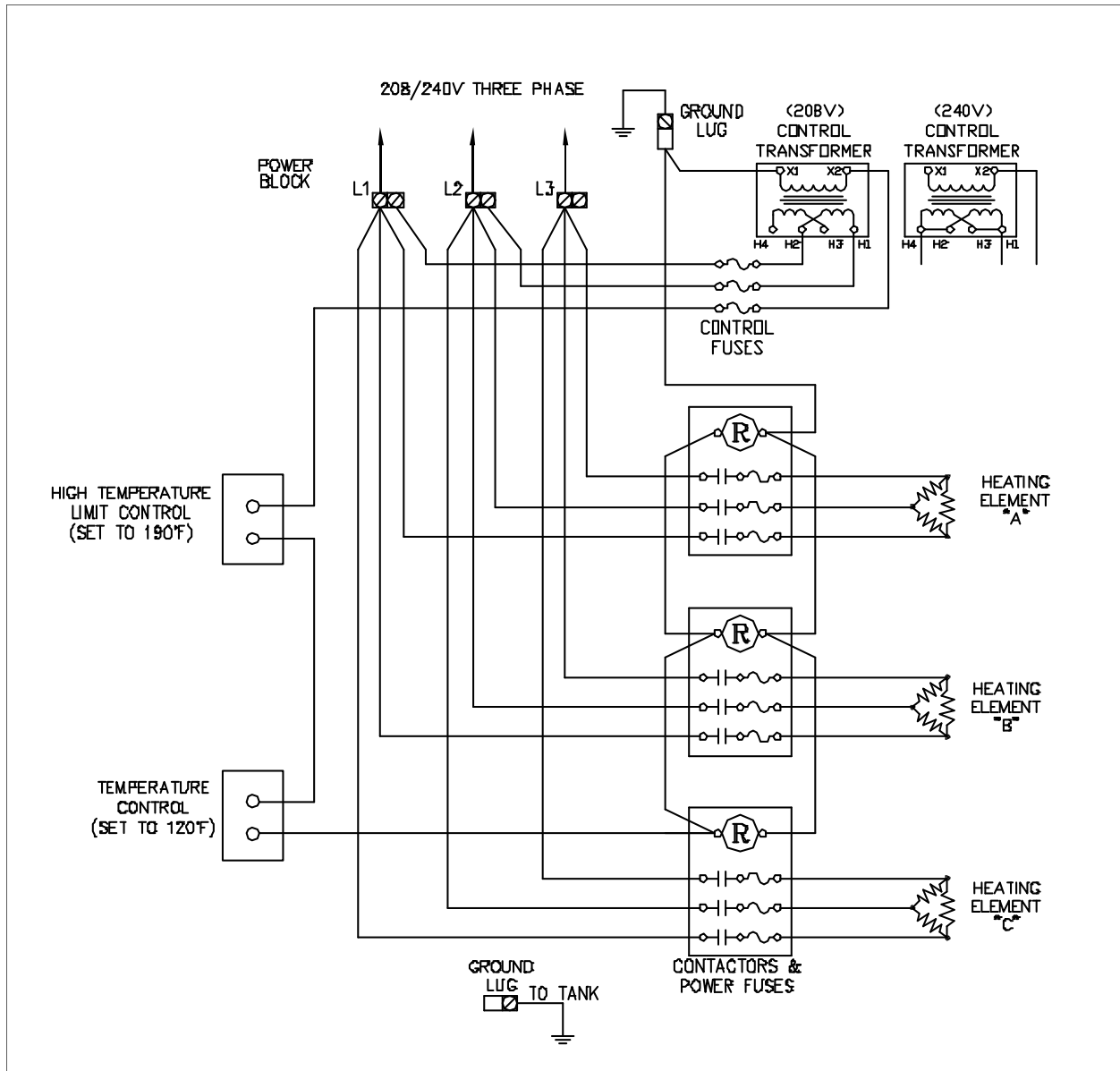


208 Volt Single Phase							
Model No. Prefix	Input (kW)	Line Amps	Fuse Amps	Contactor Amps	Element (kW)		
					"A"	"B"	"C"
45	9	44	60	50	9		
60	12	58	40	40	6	6	
90	18	87	60	50	9	9	
120	24	115	60	50	9	9	6
150	30	144	60	50	10	10	10

240 Volt Single Phase							
Model No. Prefix	Input (kW)	Line Amps	Fuse Amps	Contactor Amps	Element (kW)		
					"A"	"B"	"C"
45	9	38	45	40	9		
60	13.2	55	35	40	6.6	6.6	
90	18	75	45	40	9	9	
120	24	100	40	40	8	8	8
150	27	113	45	40	9	9	9

For single phase 480V, consult factory.  
For three phase 480V, see page 11.

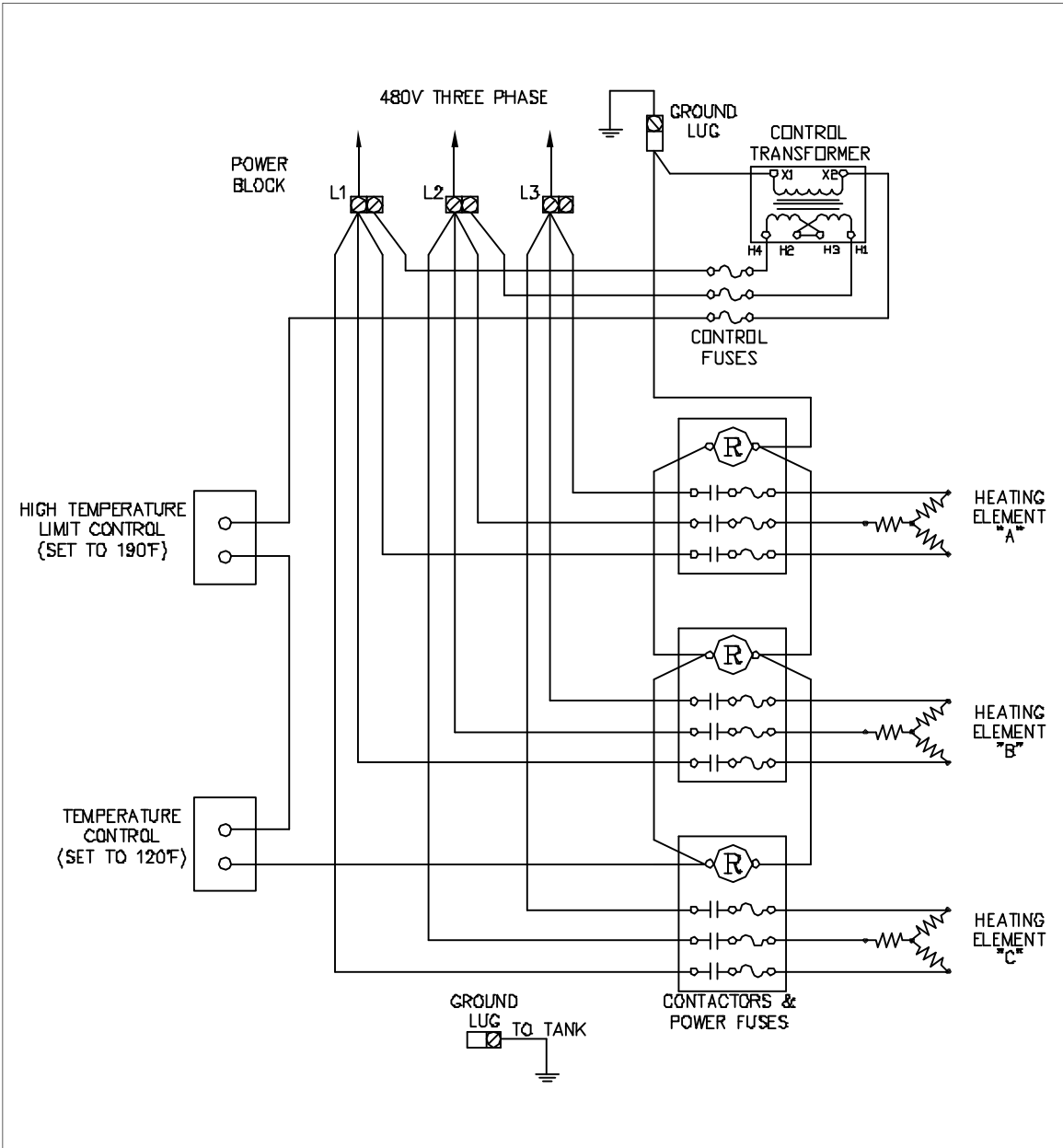
# Wiring Diagram THREE PHASE 208V and 240V



208 Volt Three Phase							
Model No. Prefix	Input kW	Line Amps	Fuse Amps	Contactor Amps	Element (kW)		
					"A"	"B"	"C"
45	9	25	30	30	9		
60	12	34	40	40	12		
90	18	48	35	40	9	9	
120	24	67	40	40	12	12	
150	30	83	50	50	15	15	
180	36	100	50	40	12	12	12
230	48	133	60	50	17	17	15
280	52	144	60	50	17	17	17

240 Volt Three Phase							
Model No. Prefix	Input kW	Line Amps	Fuse Amps	Contactor Amps	Element (kW)		
					"A"	"B"	"C"
45	9	22	25	30	9		
60	12	29	35	40	12		
90	18	44	25	30	9	9	
120	24	58	40	40	12	12	
150	30	77	50	50	15	15	
180	36	88	40	40	12	12	12
230	48	116	50	50	16	16	16
280	52	125	60	50	18	18	16

# Wiring Diagram THREE PHASE 480V



480 Volt Three Phase							
Model No. Prefix	Input (kW)	Line Amps	Fuse Amps	Contactor Amps	Element Wattage (kW)		
					"A"	"B"	"C"
45	8	10	15	30	8		
60	12	15	20	30	12		
90	18.6	23	20	30	10.6	8	
120	24	29	20	30	12	12	
150	31.8	39	20	30	10.6	10.6	10.6
180	36	44	20	30	12	12	12
230	48	58	25	30	16	16	16
280	52	63	35	40	16	16	20