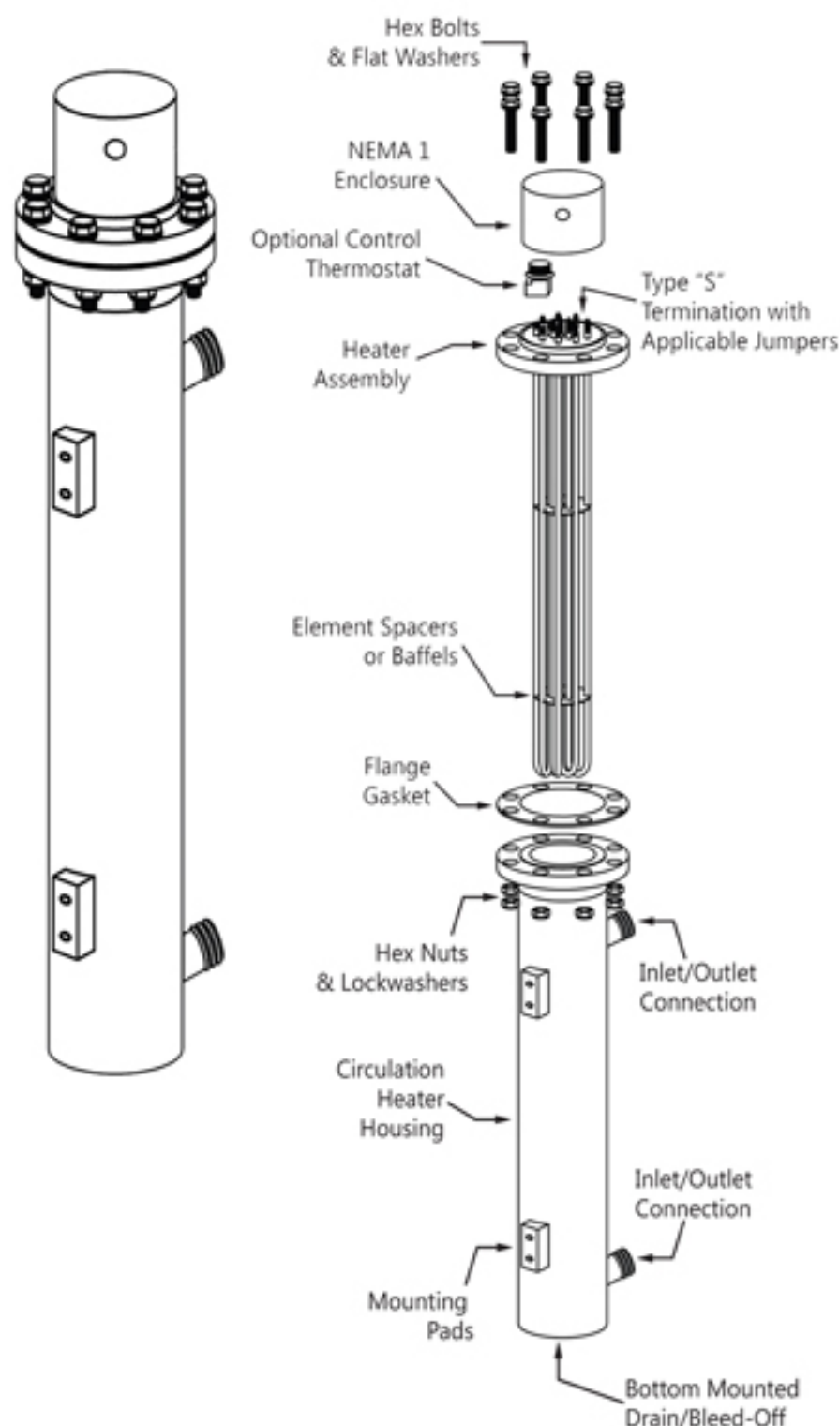


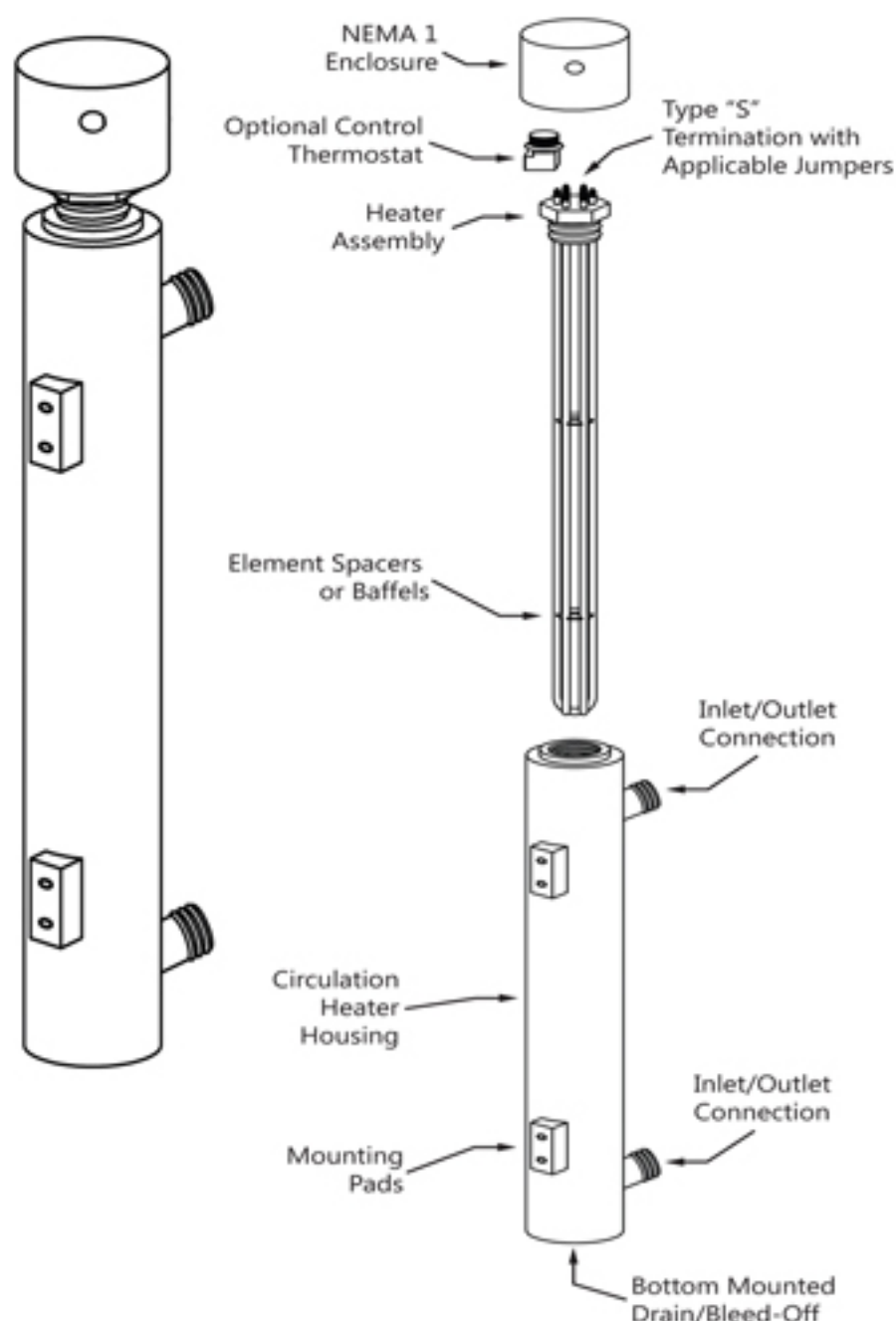


INSTALLATION AND OPERATION INSTRUCTIONS FOR DUREX CIRCULATION HEATERS

150 lb Flanged Circulation Heater



Screw Plug Circulation Heater



READ AND FOLLOW ALL INSTRUCTIONS

PARTS LIST

Enclosure - Heater Assembly - Hex Bolt and Hex Nut -
Gasket - Thermostat (optional) - Sheet Metal Jacket -
Insulation - Mounting Lug - Heating Chamber - Drain Plug

BEFORE INSTALLING:

1. Unpack the heater at the place of installation. Inspect the heater for shipping damage and report any claims to the carrier. **Do not operate damaged equipment.** Consult Durex for instructions if equipment appears to be damaged.
2. Check the heater nameplate listing the wattage and voltage against your supply voltage, capacitance and your installation requirements.

INSTALLATION INSTRUCTIONS

MOUNTING

1. Mounting lugs with tapped holes (1/2 - 13 x 1" deep) are located on the side of the vessel for bolting the heater to structural members or a customer fabricated support system. Heater should not be supported by the piping. Mounting bolts should be Grade 8 bolts and torqued in accordance with SAE specifications (see Figure 1).

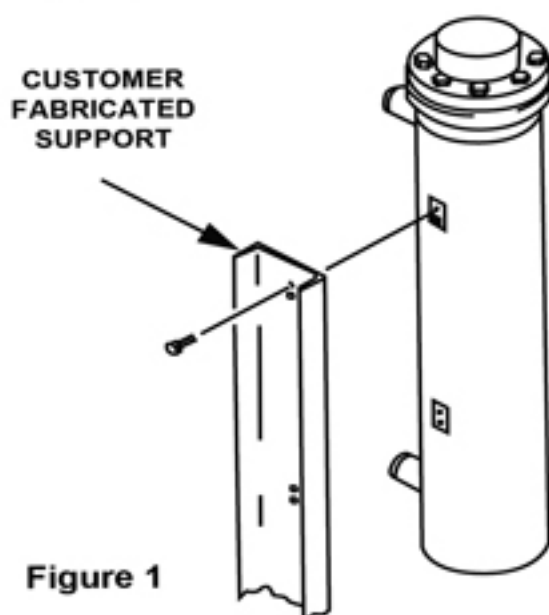


Figure 1

2. Circulation heaters may be mounted either horizontally or vertically (see figure 2). Note: When mounted in the horizontal position the inlet and outlet pipes must be up. If positioned in any other way, the chamber cannot be purged of air and damage to the elements may result. Allow adequate space for removing the element assembly for cleaning service.
3. When mounted in the vertical position for liquid heating, the lower pipe should be used as the inlet and the upper pipe used as the outlet. A drain plug is provided at the bottom of the heater. Be sure to allow space to periodically drain the heater for service.

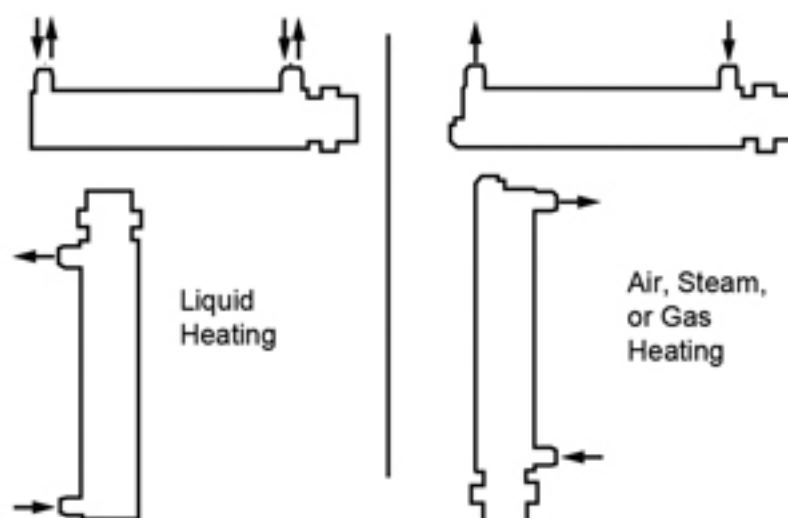


Figure 2

4. When mounted in the vertical position for air, steam, or gas heating, the lower pipe should be used for the inlet and the upper pipe as the outlet.

WIRING

1. All wiring should be done in accordance with the National Electric Code (NEC) and applicable local codes.
2. Refer to wiring diagram(s) included in the terminal enclosure for the proper method of connecting the heater.
3. Terminals should not be torqued above 20 in-lbs.
4. The current carrying capacity of the power supply leads should exceed the heater amperage by at least 25%. Be sure to consider the ambient operating temperature and apply the appropriate correction factor to the ampacity rating of the wire.
5. If the heater amperage exceeds the contact rating of the thermostat, the heater should be controlled by a magnetic contactor, with the thermostat wired for pilot duty.
6. A magnetic contactor must be used if the power source is 480V or when the heater is wired for a 3-phase power source.
7. In addition to the control thermostat, specific installations may require one or more of the following to be included in the control circuitry.
 - a. A flow switch: To prevent heater operation when flow rate is insufficient.
 - b. Over temperature protection for material being heated: When heating sensitive materials or when material temperature must be limited.
 - c. Over temperature protection for the elements: particularly important in air and gas heating applications where maximum element temperatures can easily be exceeded.

NOTE: BE SURE POWER IS DISCONNECTED BEFORE REMOVING ELEMENTS

BEFORE ENERGIZING

1. Check tightness of flange bolting and screw plug connections.
2. All mounting bolts should be torqued in accordance with SAE specifications.
3. Check that power supply connections are made according to the wiring diagram(s). Also check for positive connection of all bus bars/jumpers and power supply leads.
4. Terminals should not be torqued above 20 in-lbs.
5. The insulation material used in electric heaters may absorb moisture during shipping, while in storage or when subjected to a humid environment. Because this moisture can lead to eventual failure of the heater, it is recommended that the heater be subjected to a high potential test and/or checked with a megohmmeter before energizing. A test voltage of 1000 volts plus twice the rated voltage should be used for the hi-pot test. [example: heater voltage = 480V, test voltage = $1000V + (2 \times 480V) = 1960$ VAC, 2mA max.]. A reading of 50 megohms or greater can be considered acceptable if checking insulation resistance.
6. If moisture condition exists, energize the heater for 15 minutes at half-voltage and repeat test. Heating cycles may be repeated until satisfactory test results are obtained. This drying procedure should be performed with no material in the heating chamber.
6. If the heater is to be operated in the presence of explosive vapors or dust, explosion resistant housings must be provided for the terminals and thermostat.
7. Do not heat materials that are corrosive to the sheath material. Check with the supplier of the material or Durex Industries for a recommendation as to a sheath material.
8. The operating conditions should not exceed the "pressure-temperature" rating of the flange.
9. The heater assembly should be removed periodically to inspect and remove any deposits from the element sheath. Sludge in the heating chamber can be removed through the drain.

Special Requirements for Electric Heaters and Terminal Enclosures in Hazardous Locations:

Wiring - The proper use of NEMA 4 and NEMA 7 terminal enclosures on electric heaters located in hazardous areas requires that all electrical wiring comply with National Electrical Code (NEC) requirements for hazardous locations.

Maximum Temperatures - Safe operations in a hazardous location requires the maximum operating temperatures of all exposed surfaces of the heater including temperatures on the outside of the vessel, piping, flanges, screw plugs, enclosures and other heat conducting parts be limited. The flammable liquids, vapors or gases present determine the maximum surface temperature permitted in any hazardous location. The end user or purchaser of the electric heating equipment is responsible for determining the proper classification of an area and for providing Durex Industries with hazardous area specifications and requirements for proper equipment design. (NEC Articles 500 and 501 provide guidelines for evaluating and classifying hazardous locations).

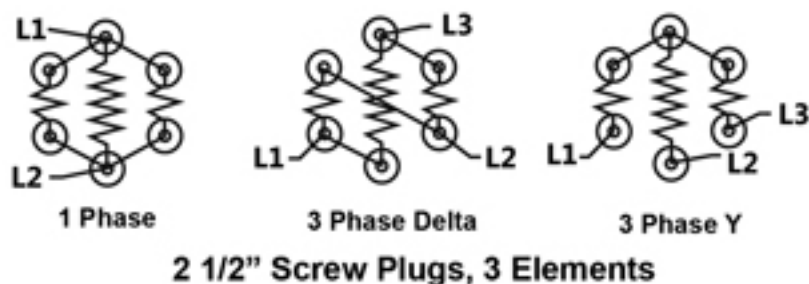
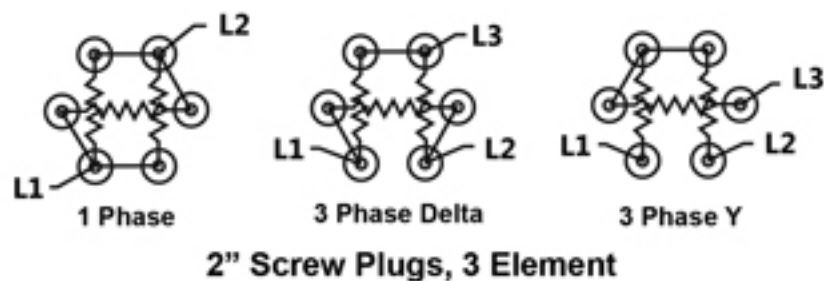
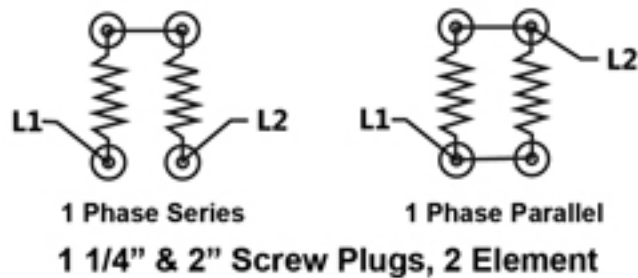
Safety Devices - Approved pressure and/or temperature limiting controls must be used on electric heaters and heating elements to ensure safe operation in the event of system malfunctions.

Note: Class 1, Division 2, Group B locations include hydrogen gas. These areas require additional conduit seals and thread engagement.

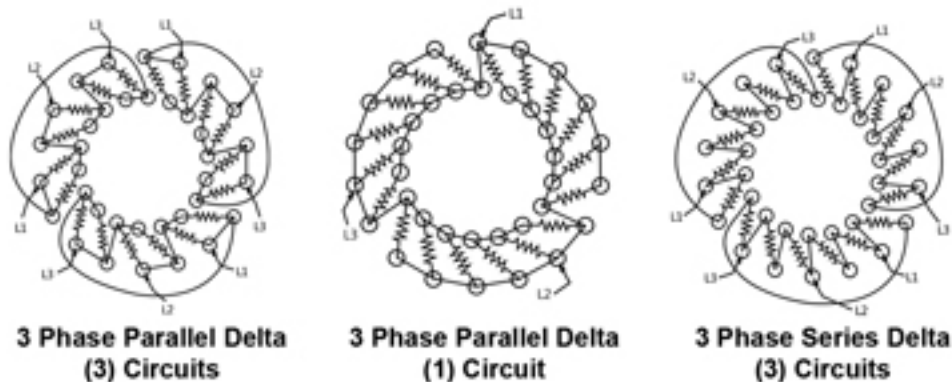
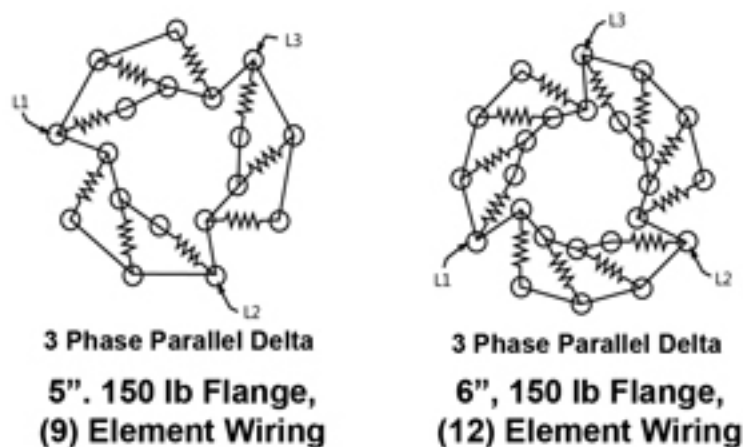
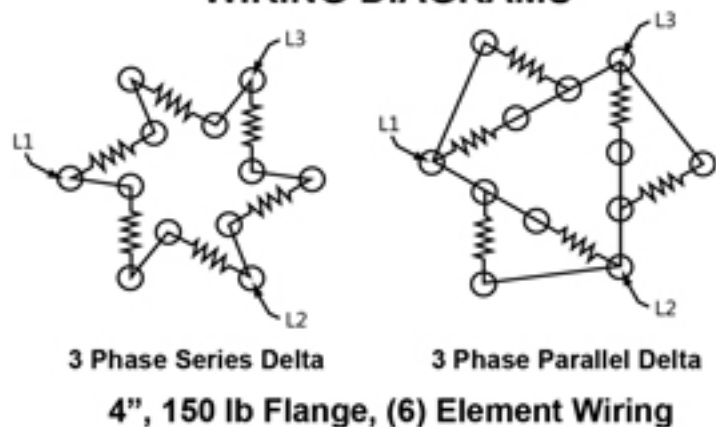
OPERATION AND MAINTENANCE

1. Do not use heaters designed for heating liquids to heat air or other gases.
2. If a pump or blower is used, it should be installed on the inlet side of the heater.
3. A suitable filter should be provided at the inlet to trap any foreign material in the fluid or gas stream.
4. Maintain the minimum rated flow of gas or liquid while the heater is energized. Do not energize the heater without gas or liquid flow or at reduced flow rate.
5. Protect the terminal end of the heater from spray, condensation, dripping and vapors. Protective enclosures should be used if the heater is to be subjected to these conditions.

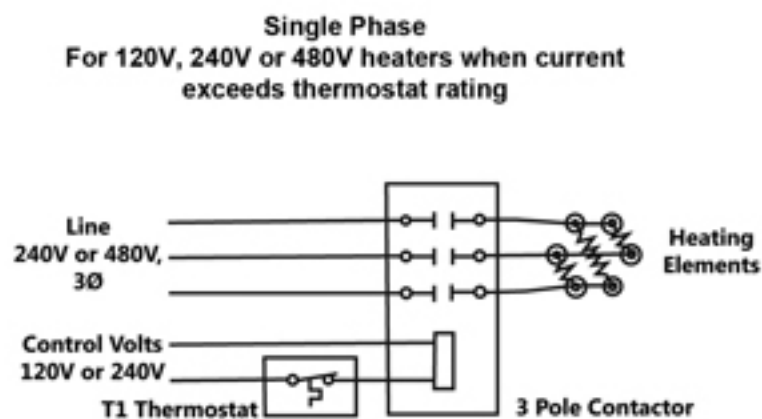
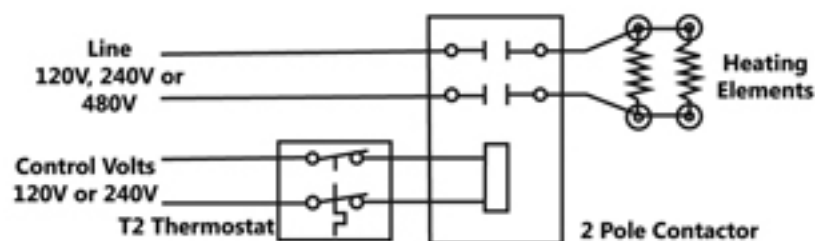
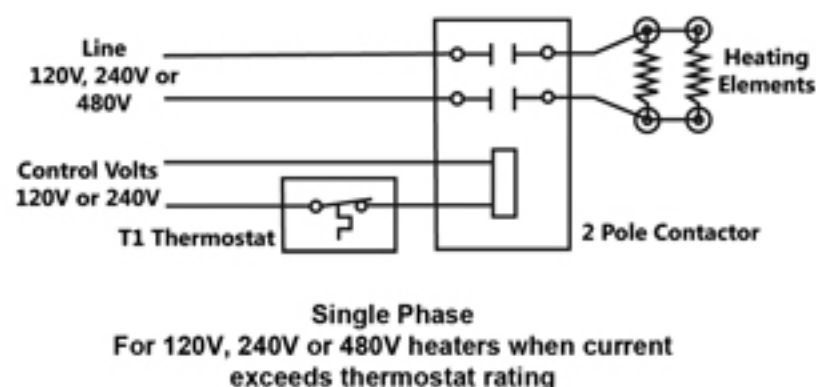
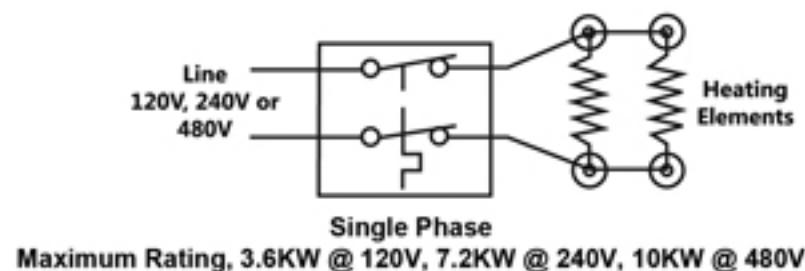
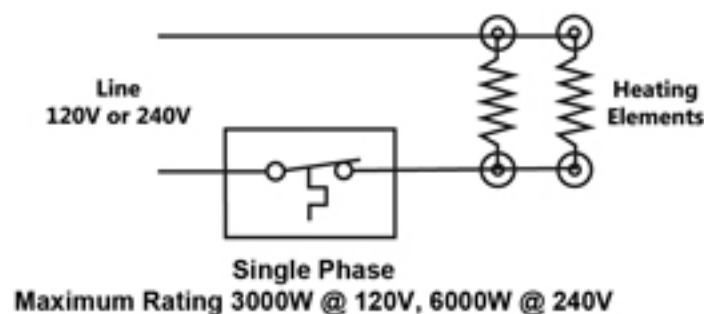
TYPICAL SCREW PLUG WIRING DIAGRAMS



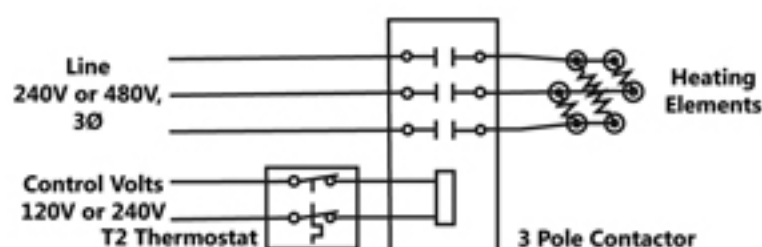
TYPICAL FLANGE IMMERSION HEATER WIRING DIAGRAMS



TYPICAL THERMOSTAT WIRING DIAGRAMS



All 3 Phase Heaters



All 3 Phase Heaters

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