

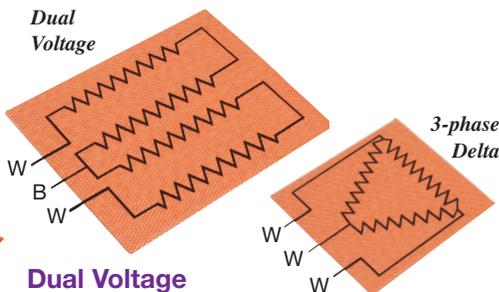
### Flexible Heater Optional Design Features



#### Internal Ground Screen Plane

Some applications may require the heater to be grounded. Due to the fact that the heater sheath is non-conductive, this can only be done artificially. A second layer of insulating material and a conductive grid can be added to the heater. A ground wire is attached to the grid.

A less expensive alternative for setting up a ground wire, especially for the required ground lead of a cordset, is to have a "flying ground lead" (6" long, green) exit the lead patch for attaching to the metal load surface, effectively grounding the process.

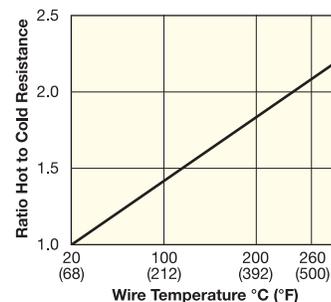


#### Dual Voltage

Due to the flexibility in circuit design for flexible heaters, heating circuits can be designed to accommodate dual voltage. On dual voltage heaters, three leads, including a common in a different color, are provided for wiring the heater in series for the higher voltage and parallel for the lower voltage. 120/240 Vac or 240/480 VAC can be specified (see page 16-11 for more information).

#### Three-Phase

Heaters can be designed with internal three-phase delta wiring. Three phase WYE wiring is also possible but less preferable in most cases. All 3-phase heaters will have three power leads coming out of the heater. Three phase heaters are typically larger heaters used in high current applications.



#### Self-Limiting/Self-Regulating Wire Wound Heater

The alloy used for this heater's resistance wire has a high positive temperature coefficient of resistance that allows the heater to reduce power as temperature increases. This self-regulating feature is ideal for many low temperature applications. This feature can also be beneficial when a fast start-up time is required before the heater power levels off to normal operating temperature. See Chart for Ratio of Hot to Cold Resistance of the Heater wire at various wire temperatures.



#### Thermal Sponge Insulation and Thermal Conductive Sponge

To increase heater efficiency, silicone sponge rubber insulation can be bonded to the top side of the heater. Available thicknesses are 1/16", 1/8", 1/4", 3/8" or 1/2".

Thermal Conductive Sponge can be used to transfer heat evenly to various surfaces. Available in 1/8" thickness.



#### Foil Backing

Aluminum foil can be added to the back of the heater to help dissipate the heat between element runs and eliminate hot spots. Due to the foil, higher watt densities and better temperature uniformity can be attained. The foil would be applied to the back of the heater, on the mounting surface.



#### Distributed Wattage

In order to compensate for heating losses around the edges or mounting holes, the heating circuit can be designed in a distributed wattage pattern. More wattage can be added to the high loss areas to compensate for the higher losses.



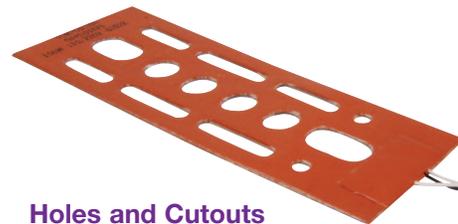
#### Lead Exit Tab

An unheated lead exit tab can be added to the heater for a variety of reasons such as maintaining a rectangular heater with no cold sections or when used in a compression application to remove the lead exit area from between the plates. (Standard size is 2" x 2".)



#### Multiple Zones

Multiple circuit areas can be zoned to compensate for various heating effects desired. In the picture above there are three zones with separate leads (A, B, & C).



#### Holes and Cutouts

Holes and cutouts in the surface of a silicone rubber or Kapton® heater can generally be placed anywhere in the heater assembly. Holes and cutouts can be used to allow space for bolts, nuts, temperature sensors, brackets, etc. For most holes and cutouts, a detailed drawing will be required for quoting or ordering.