PMJ
heaters manufacturing

SPECIFICATION SHEET

Cartridge Heater

Redefining the heater

The PMJ cartridge heater incorporates engineering excellence is supported by over 30 years of solid performance across a broad range of simple and complex applications. As the premier choice in heating swaged cartridge heating, thousands of industrial manufacturers continue to choose PMJ as their trusted thermal partner and certified cartridge heater supplier. Built using premium materials and tight manufacturing controls, the cartridge heater provides superior heat transfer, uniform temperatures, resistance to oxidation and corrosion and a long life even at high temperatures. Every system component that leaves our manufacturing facilities meets our strict quality assurance specifications, in addition to those set forth by leading standards and regulating
industries.

To meet our customer's individual needs, there are many delivery options available for cartridge heaters.

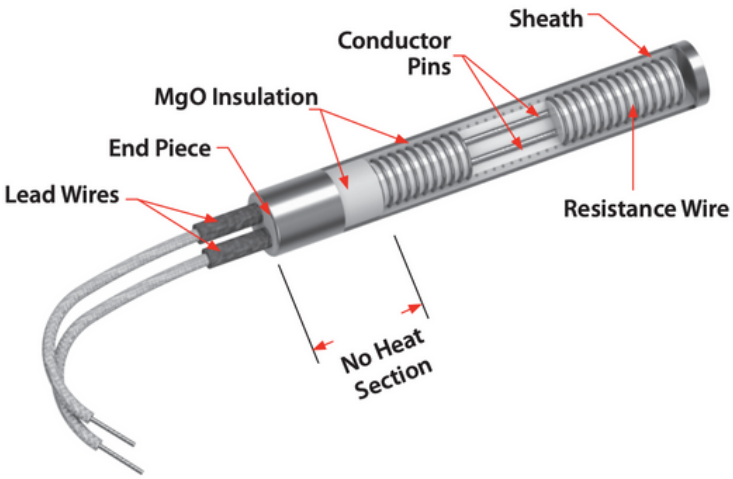


Fig 1. Cartridge Heater Construction

Features and Benefits

Nickel-chromium resistance wire
- Ensures even and efficient distribution of heat to the sheath

Metalurgially-bonded conductor pins
- Ensure a trouble-free electrical connection
  Magnesium oxide insulation of specific grain and purity

- Results in high dielectric strength and contributes to faster heat-up

SUS 304 Sheath
- Resists oxidation and corrosion from heat, many chemicals and atmospheres

Features and Benefits (cont.)

Minimal spacing between the element wire and sheath
- Results in lower internal temperature
- Accommodates a design with fewer or smaller heaters operating at higher watt densities

Typical Applications

- Semiconductor chamber heating
- Semiconductor wire and die bonding
- Freeze protection and deicing of equipment in cold climates or applications
- Humidity control
- Patient comfort heating used in medical devices
- Mold die and platen heating
- Seal bars used in packaging equipment
- Test sample heating in gas chromatography equipment
- High temperature glass forming equipment

Application and Technical Data

Tolerances

Diameter
- ±0.002 in. (±0.05 mm)

Sheath Length
- ±2%

Wattage
- +5%, -10%

Resistance
- +10%, -5%

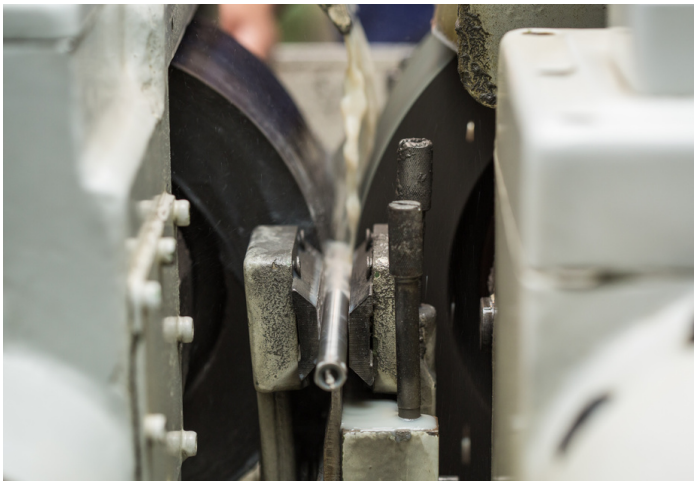
Resistance changes with temperature.
There are three circumstances under which resistance can be measured:

1. Room temperature (before use): nominal ohms are 90% of Ohm's law calculation.

2. Room temperature (after use): nominal ohms are 95% of Ohm's law calculation.

3. At temperature (during use): depending on application nominal ohms are approximately 100% of Ohm's law.

Note: Resistance and wattage values are approximate depending on application conditions.



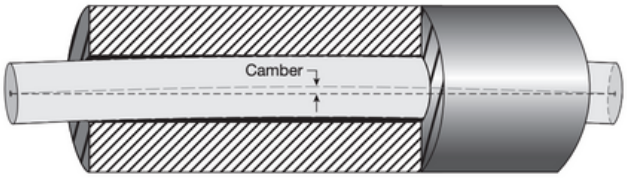
Centerless grinding process

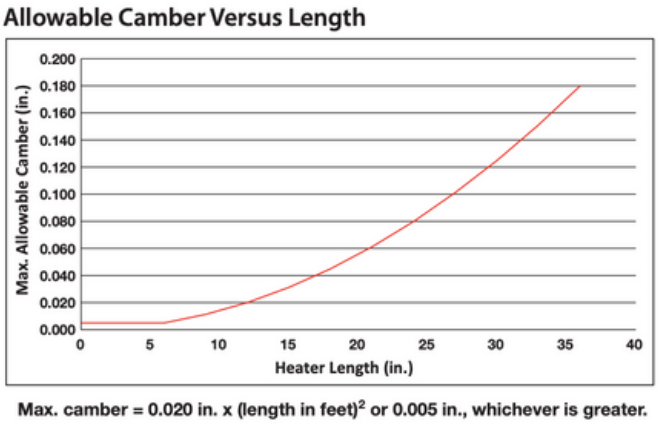
Cut-To-Length process

Camber

Camber is defined as the maximum deviation of the heater's center-line from straight. Standard camber within allowable tolerances is verified via passage through a cylindrical gauge of specified length and diameter. Normally, slight camber does not present a problem since the heater will flex enough to fit into a straight, close-fit hole.

Camber Measurement





Max. camber = 0.020 in. x (length in feet)^2 or 0.005 in., whichever is greater.

Built-In Thermocouple

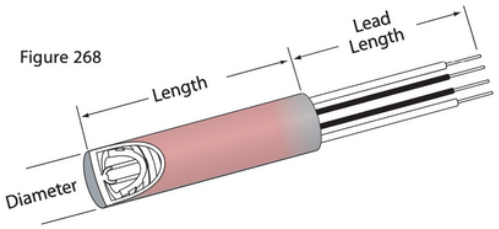
The Best Complement

PMJ cartridge heater can be made with built in thermocouple in order to monitor the internal or sheath temperatures. These are useful as high limit devices or in applications where space is at a premium. The power and sensor leads exit at sheath together and can be ordered with a vareity of lead protections. Not all thermocouples configuration are available on smaller diameter heaters.

Type J and K calibrations are standard for the shown constructions.

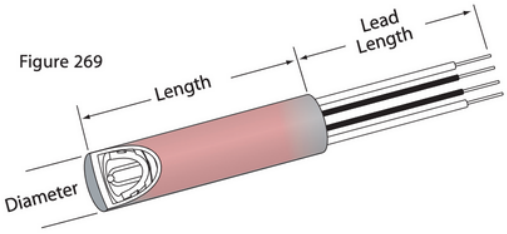
Type A - Grounded Bottom Type

The thermocouple junction is grounded to the disc end of the heater. This construction is commonly used in hot runner applications. The disc end can be filled with silver solder and ground flat. This will ensure good contact when inserted into a flat end blind hole.



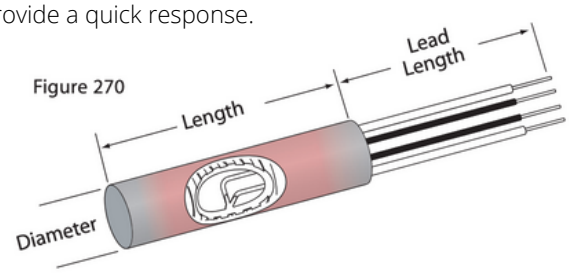
Type B - Ungrounded Bottom Type

The thermocouple junction is ungrounded and is located just behind the disc end. This will give a reference temperature of the part being heated.



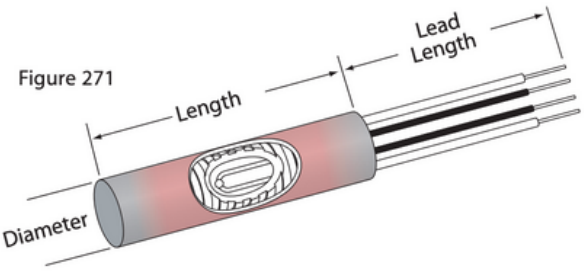
Type C - Grounded Center Type

The thermocouple junction is grounded to the sheath along the length of the heater. The standard location is at the center of the heater, but can be located anywhere along the length of the sheath. This construction will provide a quick response.



Type D - Ungrounded Bottom Type

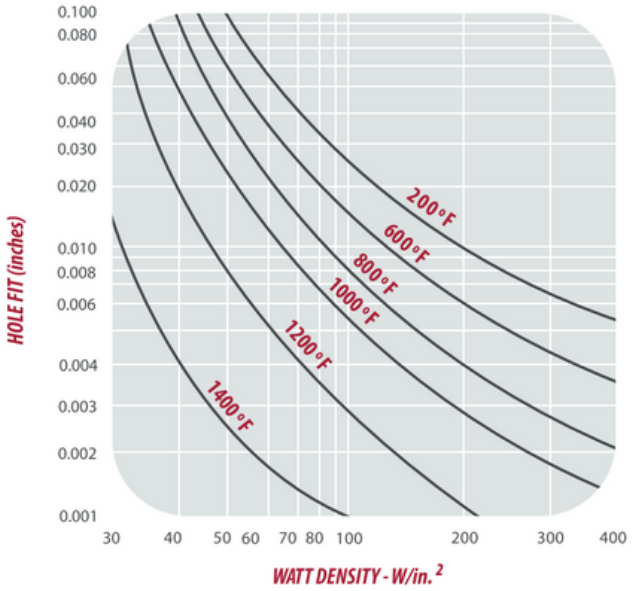
The thermocouple junction is ungrounded and is centered in the diameter of the sheath. The standard location is at the center of the heater, but can be located anywhere along the length of the sheath. Typically used as a high limit in air or vacuum applications.



How to Install Cartridge Heater

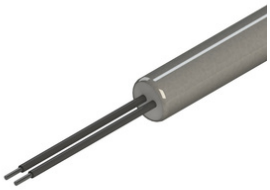
» Make a hole in the section that is to be heated (see Figure 2 to find out about proper hole diameter and tolerance).
» Ream a smooth hole for contact and for better heat transfer.
» Extend the hole through the section so that the unit can be driven out if you should need to remove it.
» If making a through hole is impossible, increase the size of the hole without exceeding the tolerances shown in Figure 2.
» Reduce the vibration and flexing of the lead wires to prolong service life.
» Prevent contamination from liquids by protecting the end of the heater.

FIG. 2 - WATT DENSITY VS. FIT TOLERANCE AND WORK TEMPERATURE

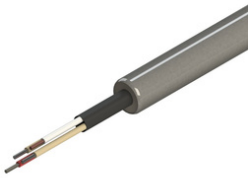


Cartridge Heater Options

Style 1. Crimped On Leads

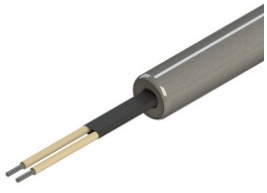


Style 2. Teflon Leads

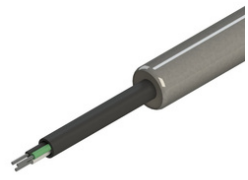


Style 3. Built-In Thermocouple

Style 4. Swaged S/S Braids



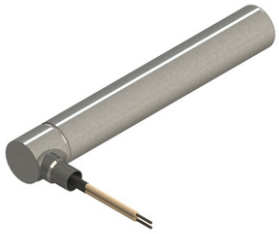
Style 5. Swaged-In Leads



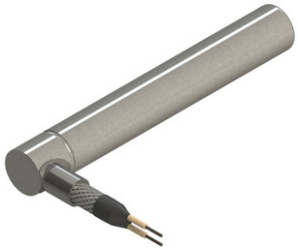
Style 6. Silicone Rubber Leads

Style 7. Swaged-In Conduit

Style 8. Built-In Spring



Style 9. Right Angle Leads



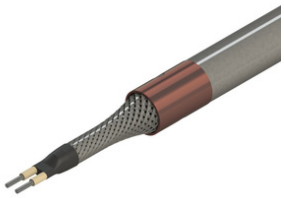
Style 10. Right Angle Braids

Style 11. Right Angle Conduit

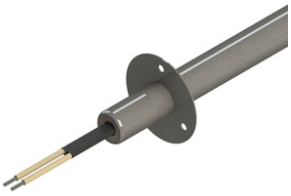
Style 12. Brass Fittings

Style 13. Ceramic Beads

Style 14. Copper Elbow



Style 15. Straight Copper



Style 16. Flanged

Style 17. 90 Degree Elbow

Style 18. Screw Termination Post