INNOVATIVE HEATING SOLUTIONS
TABLE OF CONTENTS

01 OUR COMPANY

02 HEATING ELEMENTS
  02 CARTRIDGE HEATER
  05 IMMERSION HEATER
  06 TUBULAR HEATER
  08 FLEXIBLE HEATER
  10 BAND HEATER
  12 PTC HEATER

14 TEMPERATURE SENSOR
  14 NTC THERMISTOR
  15 DS18B20
  16 PT100/PT1000

17 PRODUCT LIST
OUR COMPANY

Vsec designs and manufactures industrial heating elements, temperature sensors, as well as assemblies – all of the components of a thermal system. The company partners with its customers to optimize thermal performance, decrease design time and improve efficiency of their products and applications.

Vsec brings its experience to numerous industries, including semiconductor processing, environmental chambers, energy processes, diesel emissions, medical and food service equipment.

Since 2008, Vsec has grown in product capability, market experience and global reach. The company holds more than 50 patents and employs 300 employees working in two manufacturing facilities in Guangdong, China. The company has passed and strictly implemented the ISO9001, ISO14001 standard management systems. The main products have obtained UL, TUV, CE,ROHS and CQC product safety certifications. The company’s products have been exported to more than 50 countries abroad. The company continues to grow, while the commitment remains the same – to provide its customers with superior products and services for their individual needs.
Cartridge heaters provide excellent heat transfer and long life. Cartridge heaters are designed for push fit into holes of nominal diameters and are manufactured from the highest quality materials. Cartridge heaters are used for heating solids such as Dies, Molds, Platens and various other applications demanding localized heating and are suitable for temperatures up to 800 deg C. They are generally not suitable for liquids but the nipple design can be used which provides a water-tight seal, low wattage should be selected.

Cartridge heaters are available in metric and imperial sizes 6.5mm(1/4") to 40mm(1.5") diameters and up to 2m in length.

They are supplied with high watt densities as standard for the most demanding of applications, medium and low are also offered on request.

Below you can see a few selections of terminations we offer, others also can also be easily made.

**Material Specification**

- Welded watertight base (Tig) to withstand pressure up to 60 kg/cm².
- Calibrated stainless steel AISI 304/316/321/ INCOLOY.
- Disc ceramic insulator.
- Pure granulometric magnesium oxide.
- Nickel-chromium 80/20 heater wire. Melting point 1400° C.
- Ceramic core.
- Hard ceramic head.
- Conductor lead.
- Hard refracting paste.
- Conductor without connections.
Customized

Cartridge heaters are designed for push fit into holes of nominal diameters. Cartridge heaters are used for heating Dies, Molds, Platens and various other applications demanding localized heating.

Cartridge heaters are available in metric and imperial sizes 6.5mm(1/4") to 40mm(1.5") diameters, Low, Medium, and High watt density.

End termination type options
### Standard stock sizes

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Length</th>
<th>Wattage</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>1&quot;-5&quot;</td>
<td>20w-400w</td>
<td>120v-240v</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>1.5&quot;-6&quot;</td>
<td>100w-500w</td>
<td>120v-240v</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>2&quot;-8&quot;</td>
<td>120w-630w</td>
<td>120v-240v</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>2&quot;-8&quot;</td>
<td>250w-750w</td>
<td>240v</td>
</tr>
</tbody>
</table>

### Questions we require for correct Cartridge Heater selection/sizing

- Maximum temperature? (type of heater)
- Are they fitted into a moving tool? (lead selection)
- Termination option? (straight or right angle)
- Time required to get up to temperature? (watt density)
- Any vibration or jerks? (watt density selection)
- Ambient temperature and humidity? (insulation and sealing type)
- Required to be hot at specific positions? (heat zonning)

### Use conversion formulae

Ohms formula can be used when two of three variables are known. The relation between resistance, current and voltage can be written in different ways. To remember this, the Ohm triangle calculator might be helpful. Two examples below will show the use of the triangle calculator.

- $I = \text{the current in amperes}$
- $V = \text{the voltage in volts}$
- $R = \text{the resistance in ohms}$
- $P = \text{Power in watts}$
Immersion heaters are used for heating liquids of many kinds, they are very efficient as they transfer all their heat to the heating medium. They are supplied with several different flange and threaded connection joints and immersion depths to suit the tank size.

**Commercial**

Construction: Copper sheathed heating element, brazed to a Brass flange provided with cap for protection of terminals, Nickel-plated.

Application: Light Duty (intermittent) boilers, washing machines, geysers, sterilizers and other commercial purposes.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Immersion depth</th>
<th>Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000KW/230V</td>
<td>220mm</td>
<td>1.1/4” BSPT</td>
</tr>
<tr>
<td>1500KW/230V</td>
<td>230mm</td>
<td>1.1/4” BSPT</td>
</tr>
<tr>
<td>2000KW/230V</td>
<td>325mm</td>
<td>1.1/4” BSPT</td>
</tr>
<tr>
<td>3000KW/230V</td>
<td>425mm</td>
<td>1.1/4” BSPT</td>
</tr>
</tbody>
</table>

**Industrial**

Construction: Two/Three Copper sheathed heating elements, brazed to a Brass flange provided with metallic cap for protection of terminals, Nickel plated.

Application: Heavy-duty industrial hot water baths water jacketed apparatus, side arm circulating process tanks etc.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Immersion depth</th>
<th>Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000KW/230V</td>
<td>220mm</td>
<td>1.1/2” BSPT</td>
</tr>
<tr>
<td>2000KW/230V</td>
<td>220mm</td>
<td>1.1/2” BSPT</td>
</tr>
<tr>
<td>3000KW/230V</td>
<td>280mm</td>
<td>1.1/4” BSPT</td>
</tr>
<tr>
<td>3000KW/230V/400V</td>
<td>220mm</td>
<td>1.1/2” BSPT</td>
</tr>
</tbody>
</table>
Tubular heater

Stainless steel or steel sheath materials are available, as well as a large selection of termination styles. Magnesium oxide (MgO) insulation ensures superior heat transfer, and the resistance wire is precision-wound for long heater life.

Applications

Tubular heaters can be used in almost any application. Straight Tubulars can be clamped to metal surfaces or inserted in machined grooves for conductive heat transfer. Or use a formed Tubular to provide consistent heat in any type of special application.

Features

- Custom-formed to meet specific requirements
- Stainless steel, steel or copper sheath materials available
- Precision wound resistance wire for long heater life
- Superior heat transfer
- Available in .315" and .430" diameters
- Variety of lengths available
- USA or global manufacture.
Termination styles

Plain Pins
Customer can finish termination to suit their application. 5/16" (7.9 mm) pin length is standard.

Flag Terminals
With #10-32 screw. Specify direction.

Spade Terminals
Specify direction of spade terminals.

Screw Terminal
Easy to wire screw terminal with mica washer insulation.

Bulkhead Fitting
Brazed to heater. For quick feed-through mounting. Specify round or hex head, stainless steel or brass.

Leads
High-temperature 250° F (121° C) lead wire brazed onto the heater terminals. Insulated with fiberglass sleeving and covered with shrink tubing. Specify length of leads.

Armor
Stainless steel armor to prevent abrasion and wear of leads (Type A). Also available with leak-proof bellows. Specify length of leads and armor.
Flexible heating elements also called silicone heaters, etched foil heaters and thin film heaters were developed in order to solve specific problems in advanced market sectors such as the space, aviation, chemical and food fields.

These applications require coverage over uneven surfaces where it would be impossible to use other types of heating elements.

These flexible heating elements have characteristics that solve problems such as limited space, uneven surfaces heating and relatively low tooling cost compared to alternatives heating elements.

They are best suited to applications where it is not possible to heat from the inside or if surfaces are curved or shaped with intricate angles. They can be supplied in various shaped and with holes to suit specific surfaces and are supplied with or without adhesive backed.

Although these heaters are not waterproof they will withstand the odd liquid splashes. The silicone mat heaters have a operating temperature up to 180°C and can be made with watt densities up to 0.8W/cm².

Installation of these heaters are very simple, and in the case of adhesive backing only require the back to be peeled off. The bonding surface should be kept smooth, clean and dry to ensure proper bonding and heat transfer.

For temperature control we fit the heaters with various options such as sensor pocket, in-built sensor or thermostat.
Features

- Can be set to vary heat concentrations to optimize distribution.
- Can be made to any shape or profile.
- Heat’s right to edges.
- Thermostats and limiters can be moulded on.
- Easy fitting.
- Up to 3m long.
- Overall economical in many applications.
- Minimum weight and thickness.
- Can be made to fit around pipework and valves.
- Flexibility.
- Made to suit any voltage requirements.
- Working temperatures up to 230°C for short periods, 180°C normally.

Typical applications

- Storage Tanks
- Process Vats and Dip Tanks
- Heat Tracing Systems
- Low Temperature Ovens
- Water and Feed Troughs
- Conveyors
Band heater

Ceramic band heater

Ceramic band heaters are medium-to-high temperature heaters that have 600°C as a maximum working temperature. They provide long life and use less wattage (because of insulation) in plastics extrusion and injection molding applications. Ceramic band heaters are available with different terminal styles, are fully flexible, and can accommodate holes and cut-outs.

Mica band heater

Made of mica insulation, nickel chrome heating wire and stainless steel sheath, Mica band heaters are the ideal solution for high watt densities and high operating temperature applications, especially for the plastics industry.
Ceramic band heater features

- Inner insulation to minimize unwanted changes in temperature.
- Flexible design for easy installation and removal.
- Reduces heat loss and conserves energy.
- Customized to your requirements.
- Heats through radiation and conduction.
- Reduced overall operating costs and ensure maximum comfort of the operator.
- Number of bands can also be used with a simplified wiring.

Mica band heater features

- Efficient heat transfer without any difficult in operations.
- Design variations for heater protection and convenience.
- Low-mass design for a quick response and heat-up.
- High-quality mica used in the manufacturing of the band heater.
- Excellent strength to withstand even the toughest conditions.
- Variety of applications ranging from injecting mold machines to extrusion line.

Standard stock sizes

<table>
<thead>
<tr>
<th></th>
<th>Power Source</th>
<th>Power</th>
<th>Voltage</th>
<th>Available Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic</td>
<td>Electric</td>
<td>200-2000W</td>
<td>230 To 440 V</td>
<td>MS, Brass and SS Sheathing</td>
</tr>
<tr>
<td>Mica</td>
<td>Electric</td>
<td>900W</td>
<td>220V</td>
<td>SS Sheathing</td>
</tr>
</tbody>
</table>

Advantages

- Reduced power consumption
- Heat conservation
- Flexibility
- Uniform heat distribution
- Several termination options

Applications

- Injection molding
- Blow-molding
- Plastic extrusion
- Container, pipe, or tank heating
- Pharmaceutical applications
- Applications in the food industry
PTC heater

Characteristics

- The PTC heating component is installed with safety protection device. When it is used abnormally, current will automatically cut off to maintain safety.

- The heating components are integrated together, consist of average heating effect. When used for heaters, it can independently control single PTC (500W, 800W) double PTC (1000W, 1500W) or triple PTC (1500W, 2000W) heating components, effectively saves electricity cost and increases product life.

- The pole and terminal are connected by point welding, preventing electrode loosen causing resistant and temperature to increase when heated, cold contraction or heat inflation.

- The outer edge of the PTC heating component is designed with single and double insulation. When in contact with metal will not cause electric shock or short circuit.

- The heating component is airtight/ tightly sealed, electrode is unexposed. Most suitable for application in bathroom or high humidity locations.

- It is installed with double insulation heating device, can be used underwater, without causing electricity leakage or short circuit. When heated dry, it will not crack or burn down the container.

- No smell, no radiation and will not oxidize or cause oxygen shortage when used for a long time.

- Fast thermal respond time, low inrush current. Will not cause fire sparks or flame by instant/sudden power supply or when in contact with flammable objects such as matches, cotton, paper.

- Temperature control devices are not required for various temperature selections. Static heating, lowers product cost and saves electricity effectively.

- The heating component not only can be used in heater fans, its individual components can also be used for general house ware electricity appliances.
**Typical Applications**

DC can be used on automobile or for warm air, dehumidifying, temperature increasing, temperature maintenance etc. where DC power is supplied.

AC can be used for general house electronic appliances for hand drying, dress drying, coverlet drying, shoes drying, bowl drying, humidifying, dehumidifying, air condition, ironing, electronic spoon etc.

<table>
<thead>
<tr>
<th>Applications</th>
<th>PTCR Thermistor Elements</th>
<th>PTC Heat Conductor</th>
<th>PTC Water Heater</th>
<th>PTC Heater Fan</th>
<th>PTC Heater Frame</th>
<th>Integrate with Far Infrared</th>
<th>Technical Details</th>
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<tbody>
<tr>
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<td>Oval</td>
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<td>Air Conditioner</td>
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<td>Air Dryer</td>
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<td>Cabinet Dryer</td>
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<td>Dish Dryer</td>
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<td>Shoe Dryer</td>
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<td>Hand Dryer</td>
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<td>Cloth Dryer</td>
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<td>Toilet Seat Heater</td>
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<td>Facial Steamer</td>
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<td>Laminator</td>
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<td>Thermostat Cabinet</td>
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<td>Mosquito Repellent</td>
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<td>Coffee Pot</td>
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<td>Surveillance Camera</td>
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<td>IC-Use Thermostat</td>
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<td>PTC Heated Glue Gun</td>
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<td>PC Board Protection</td>
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NTC thermistor

NTC is an acronym for Negative Temperature Coefficient. Vsec is a leading designer and manufacturer of high precision discrete NTC thermistors, probes, and assemblies. An NTC thermistor is a temperature sensor that uses the resistance properties of ceramic/metal composites to measure the temperature. Our NTC sensors offer many advantages in temperature sensing including miniature size, excellent long-term stability, high accuracy and precision.

Applications

NTC thermistors are used in a wide variety of applications. The medical industry relies on NTC’s in various applications including catheters, dialysis equipment, and patient monitoring. Appliances from dryers to coffee makers use NTC thermistors to accurately measure temperature. HVAC and refrigeration equipment use NTC sensors to measure temperature in building controls and processes, resulting in increased efficiency and control. Automotive and aerospace industries use NTC thermistors for test and measurement as well as production applications.

Probes
DS18B20

The DS18B20 is a 1-wire programmable Temperature sensor from Maxim integrated. It is widely used to measure temperature in hard environments like in chemical solutions, mines or soil etc. The construction of the sensor is rugged and also can be purchased with a waterproof option making the mounting process easy. It can measure a wide range of temperature from -55°C to +125°C with a decent accuracy of ±0.5°C. Each sensor has a unique address and requires only one pin of the MCU to transfer data so it a very good choice for measuring temperature at multiple points without compromising much of your digital pins on the microcontroller.

<table>
<thead>
<tr>
<th><strong>Power Supply</strong></th>
<th>3V to 5.5V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Consumption</strong></td>
<td>1mA</td>
</tr>
<tr>
<td><strong>Temperature Range</strong></td>
<td>-55 to 125°C</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±0.5°C</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>9 to 12 bit (selectable)</td>
</tr>
<tr>
<td><strong>Conversion Time</strong></td>
<td>&lt; 750ms</td>
</tr>
</tbody>
</table>

**Wire & Connector**

- Metal braided wire
- PVC/PTFE wire
- Teflon wire
- Silicone wire
- Audio jack connector
- RJ45 connector
- Molex connector
- Waterproof DC connector
A Pt100 or Pt1000 is a Platinum RTD (Resistance Temperature Detector) with a resistance of 100Ω at 0°C which changes with temperature. They are suitable for applications in the temperature range of -200°C to 600°C but are more commonly used in the range -50°C to +250°C. These temperature sensors are reliable and can offer a higher degree of accuracy.

The number relates to the resistance value at 0°C. So a Pt100 probe will have a resistance of 100Ω at 0°C, and it follows that a Pt1000 RTD will be 1000Ω at 0°C.

**Custom Built sensors**

- Plain Stem c/w Pot seal and cable
- Mineral Insulated c/w either pot seal / cable, connector or head
- Plastics RTD’s
- Surface RTD’s
- Fixed Process Thread RTD’s
- Bearing RTD’s
- HVAC & Air Temperature Sensors
- Autoclave RTD’s
TUBULAR HEATER
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