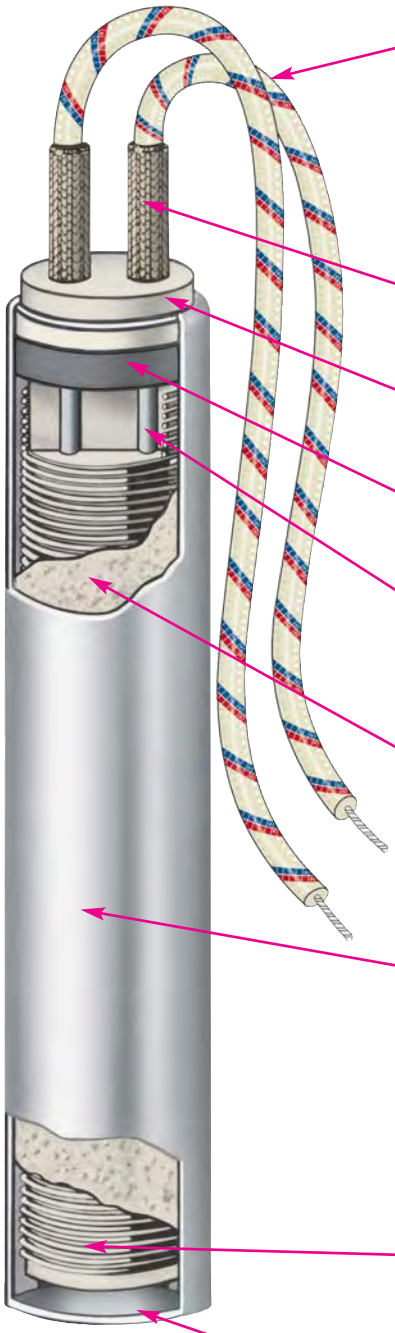
HI-Density CARTRIDGE HEATER FEATURES



A The standard termination for Hi-Density Cartridge Heaters is Type N, consisting of 10" (254 mm) externally connected leads to 1-1/4"(32 mm) solid nickel conductors. The lead wires with nickel conductors have fiberglass composite insulation and are UL approved for temperatures up to 482°F (250°C). Mica insulated UL approved wires for temperatures up to 842°F (450°C) are optional.

Note: To meet the requirements of your application we offer over 40 standard termination styles to select from that will solve many of the most common application problems. See pages 2-37 through 2-49.

B Double-wall thickness high temperature fiberglass sleeve provides maximum electrical insulation to the connector used to splice the nickel conductors to the flexible leads.

C Ceramic end cap prevents nickel conductors from shorting out against sheath when sharp bending of the leads is required.

D Ceramic end cap and swaged-in lava plug protect the internal cartridge from outer contamination. Other types of seals can also be provided.

E The largest possible diameter solid nickel conductors are used to insure a good electrical connection between the nickel conductors and the resistance wire, thereby providing maximum current carrying capacity.

F Specially selected grain size high purity Magnesium Oxide (MgO) is used to fill all remaining space inside the sheath. Heater is then swaged, which compacts the magnesium oxide grains into a solid mass, thereby increasing thermal conductivity and dielectric strength.

G Standard Alloy 321 Stainless Steel is used to provide high temperature strength, up to 1200°F (650°C), good thermal conductivity, resistance to corrosion and scaling. Alloy 321 is a Nickel-Chromium Stainless Steel modified with the addition of Titanium. For higher operating temperatures or corrosive immersion heating applications optional Incoloy® 800, up to 1400°F (760°C), and Alloy 316 Stainless Steel are available. Other alloy sheaths are available. Consult Tempco with your requirements.

H Grade "A" Nickel-Chrome resistance wire is precisely wound on a high purity magnesium oxide core, placing the resistance wire as close to the inside of the sheath as possible while maintaining dielectric strength. This provides excellent heat transfer, and results in the highest possible watt densities and longer heater life.

I Heli-arc welded end disc made from same material as the sheath provides a positive seal against moisture and other contaminants. Pennybottom™ heaters have a flat copper end disc.

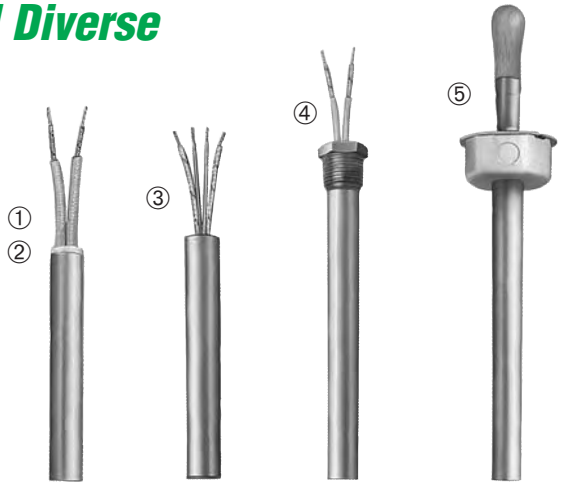
Agency Approvals

Hi-Density Cartridge Heaters are UL recognized and CSA certified in many design variations under UL File Number E65652 and CSA File Number LR43099-4.

If you require UL and/or CSA Agency Approval, please specify when ordering.

Product Inventory Available for Viewing and Selection @ www.tempco.com

TEMPCO *Offers the Most Comprehensive and Diverse Selection in Hi-Density Cartridge Heaters*



Since Their Introduction in 1972, Hi-Density Cartridge Heaters Have Evolved and Today Offer a Multitude of Diverse Product Options:

1. (HDC) A Hi-Density cartridge heater in US sizes (see page 2-4).
2. (HDM) A Hi-Density cartridge heater in Metric sizes (see page 2-26).
3. (HDP) Pennybottom™, A Hi-Density cartridge heater with a Built-in Thermocouple and Flat Copper end disc designed for Plastic Runnerless Molding Bushings (see page 2-22).
4. (HDL) A Hi-Density cartridge heater designed with NPT Fittings for Immersion heating (see page 2-54).
5. (HDB) Bolt Heaters A Hi-Density cartridge heater designed for assisting in the assembly of large machinery (see page 2-58).

Hi-Density Cartridge Heaters provide maximum processing temperature capability

- Higher watt densities permit smaller heaters to be used without sacrificing life expectancy. This results in up-front as well as long-term cost savings.
- Swaged construction provides maximum support for the resistance wire and excellent heat transfer characteristics, improving the overall life expectancy of the cartridge heater.
- Termination styles and special features allow customization to any application.
- Applications up to 1400°F (760°C)

Typical Applications

- *Plastic Extruders*
- *Hot Runner Molds*
- *Hot Stamping*
- *Medical Equipment*
- *Packaging Equipment*
- *Molds*
- *Aerospace*
- *Sealing Bags*
- *Semi-Conductor*
- *Plastic Molding*
- *Shoe Machinery*
- *Food Processing*
- *Heating Gases and Liquids*
- *Glue Guns*
- *Laminating Presses*
- *Platens*
- *Scientific Equipment*
- *Food Service Equipment*

Hi-Density Cartridge Heaters are Classified in Two Distinct Categories

Multi-Purpose Use

The Multi-Purpose Use Cartridge Heaters represent Tempco's commitment to value-added customer service as we maintain in Stock over 65,000 Semi-Finished Hi-Density Cartridge Heater Substrates offering a combination of over 1000 sizes in industry standard diameters and lengths ranging from 1" (25.4 mm) to 36" (914.4 mm) in a complete spectrum of wattages and operating voltages. Multi-Purpose Use Cartridge Heaters are the solution for a multitude of original equipment manufacturers (OEMs) or maintenance (MRO) applications.

Available through the Terminator Program for same-day or next-day shipment. Complete details are found on pages 2-10 through 2-20.

Highly Engineered Specific Purpose Use

Tempco has been at the forefront of addressing the challenges of Original Equipment Manufacturers (OEMs) in a broad segment of diversified industries. As a company we are uniquely qualified and committed to providing value-added expertise in engineering and manufacturing capabilities that span over three decades of acquired knowledge, assisting customers in developing highly engineered specific use cartridge heaters for dependable and reliable performance. Let us provide the optimal solution to your thermal loop system and cartridge heater design challenges. Engineering assistance can be found on pages 2-2 through 2-7.

Consult Us With Your Requirements.
We Welcome Your Inquiries.

Ordering Information

Custom Engineered/Manufactured Heaters

Understanding that an electric heater can be very application specific, for sizes and ratings not listed, **TEMPCO** will design and manufacture a Hi-Density Cartridge Heater to meet your requirements. ***Standard lead time is 3 weeks.***

Please Specify the following:

- ❑ Diameter
- ❑ Length
- ❑ Wattage
- ❑ Voltage
- ❑ Termination types (see pages 2-37 through 2-49)
- ❑ Lead Length
- ❑ Cable/Braid length
- ❑ Special Features

Hi-Density Cartridge Heater Specifications

DIMENSIONAL SPECIFICATIONS

Nominal Diameter	1/8 in (mm)	1/4 in (mm)	5/16 in (mm)	3/8 in (mm)	1/2 in (mm)	5/8 in (mm)	3/4 in (mm)	1 in (mm)
Actual Diameter	.122 (3.10)	.246 (6.25)	.308 (7.82)	.371 (9.42)	.496 (12.60)	.621 (15.77)	.746 (18.95)	.996 (25.30)
Diameter Tolerance	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.002 (.051)	±.003 (.076)	±.003 (.076)
Minimum Length	1.25 (31.8)	1 (25.40)	1 (25.40)	1 (25.40)	1 (25.40)	1 (25.40)	1-1/4 (31.75)	1-3/4 (44.45)
Maximum Length	12 (305)	36 (914)	36 (914)	48 (1219)	60 (1524)	72 (1829)	72 (1829)	72 (1829)
Length Tolerance Heaters up to 5" (127 mm) long	±3/32 (2.4)	±3/32 (2.4)	±3/32 (2.4)	±3/32 (2.4)	±3/32 (2.4)	±3/32 (2.4)	±1/8 (3.2)	±1/8 (3.2)
Length Tolerance Heaters over 5" (127 mm) long		±2% of Sheath Length						
Camber Tolerance Heaters to 12" (305 mm) long		010"(.254 mm) per foot of length						
Camber Tolerance Heaters over 12" (305 mm) long		020"(.508 mm) per foot of length						

A certain amount of Camber is unavoidable. With a slight force, Hi-Density Cartridge Heaters will flex enough to fit into a straight reamed hole.

ELECTRICAL SPECIFICATIONS

Nominal Diameter	1/8	1/4	5/16	3/8	1/2	5/8	3/4	1
Maximum Voltage	240	240	240	240	240	480*	480*	480*
Maximum Amperage (see next line for exceptions)	3.1	4.4	4.5	6.7	10.5	23	23	23
†Maximum Amperage for Types F, F1, W, W3, M3, S1 and S2 Terminations	—	3.0	3.0	5.5	7.6	9.7	9.7	9.7
Minimum Wattage at 120V on a 1" long Heater	—	50	45	45	50	50	—	—
Minimum Wattage at 120V on a 2" long Heater	5	20	20	20	20	20	20	20
Maximum Wattage at 120V	360	525	540	800	1260	2760	2760	2760
Maximum Wattage at 240V	525	1050	1080	1600	2520	5520	5520	5520
Maximum Wattage at 480V	—	—	—	—	—	11,000	11,000	11,000
Wattage Tolerance	+10,-15%	Plus 5%, Minus 10%						
Resistance Tolerance	+15,-10%	Plus 10%, Minus 5%						

*480V when applicable. Consult Tempco.

†Current carrying capacities are for ambient temperatures up to 482°F (250°C) with mica insulated lead wires.

LENGTH TOLERANCE FOR LEAD WIRES WIRE BRAID LEADS ARMOR CABLE LEADS

Up to 36": -1/2", +1" (-12.7mm, +25.4 mm)
36" to 72": -1", +2" (25.4mm, +50.8 mm)
Above 72": ±4" (101.6 mm)

Note: Specifications detailed on this page are standard. Consult Tempco if your application requires tighter tolerances or has other special requirements.

TEMPERATURE COEFFICIENT OF RESISTANCE

The electrical resistance (ohms) of the heater resistance wire increases with temperature rise.

Tempco standard Hi-Density Cartridge Heaters are manufactured with ohms (cold ohms) 3.3% lower than the actual calculated ohms (hot ohms) to compensate for this increase.

AVAILABLE ELECTRICAL FEATURES

Diameter	Dual Volts	3-Phase	Dual Circuits	Multiple Heat Zones (maximum 3 zones)
1/8"	No	No	No	No
1/4"	No	No	No	No
5/16"	No	No	No	No
3/8"	Yes*	No	No	Yes*
1/2"	Yes*	No	Yes	Yes*
5/8"	Yes	Yes	Yes	Yes
3/4"	Yes	Yes	Yes	Yes
1"	Yes	Yes	Yes	Yes

Consult factory for maximum wattages and voltages

* Heaters may require a larger diameter transition area at lead end.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Recommendations for Improving the Life of Hi-Density Cartridge Heaters

Tempco Hi-Density Cartridge Heaters have been widely used in many demanding and diverse applications for over 30 years. The commonly used basic applications are platen, plastic mold and die heating, liquid immersion and air heating.

Note: Selection of the wrong termination for a particular application is the primary reason for all heater failures. However, failure to consider other important criteria can also have a negative effect on the life of the heater. To get the best performance and assure long life, it is important to carefully evaluate the following factors.

Operating Temperature

Operating temperature of a heater is a major factor in determining the life expectancy of a heating element. The heater life depends on the actual temperature of the resistance wire within the heater and not on the process operating temperature. The graph in Fig. 1 demonstrates the proper relationship between operating temperature and watt density; the higher the operating temperature, the lower the maximum recommended watt density.

Heater Watt Density

Cartridge heater watt density is defined as the wattage dissipated per square inch of the heated sheath surface. For a particular application a heater's watt density governs internal resistance wire temperature, which determines the outer sheath temperature. These factors are critical to the proper heating of the application and to the life expectancy of the heater. Special construction features that promote excellent heat transfer permit Hi-Density Cartridge Heaters to operate at higher watt densities while maintaining the lowest possible resistance wire temperatures of any style cartridge heater.

Heater watt density (w/in^2) is calculated using the following formula:

$$\textbf{Watt Density} = \frac{\text{Heater wattage}}{\text{Heated length} \times \text{Heater diameter} \times 3.1416}$$

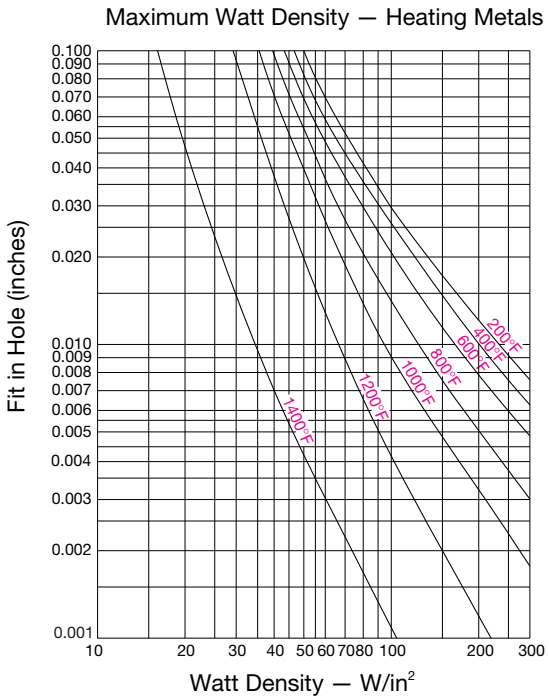
Heated length is the overall length of the heater minus any unheated (cold) sections. Standard Type N, Hi-Density cartridge heaters have 3/8" at the lead end and 1/4" at the disc end unheated. This would mean a 6" long heater would have 5-3/8" effective heated length. Unheated sections vary with type of heater termination. For descriptions of terminations and options, see pages 2-37 through 2-53.

The graph in Fig. 1 shows the maximum recommended watt density for Hi-Density Cartridge Heaters when used in a steel platen. Watt density limitations for various materials are given in the engineering section of this catalog. For liquid immersion heaters the maximum watt density depends on the type of liquid being heated. The more viscous, or thicker the liquid, the lower the maximum watt density. Higher watt density can cause the liquid to carbonize and accumulate on the heater sheath, which will cause premature heater failure. It is advisable to use heaters that have watt densities below the maximum recommended watt density to get the longest heater life. If the actual heater watt density is close to the maximum recommended watt density, you can correct the problem by:

1. Increasing the number, diameter and length of heaters.
2. Lowering the total wattage; however, this may increase the heat-up time.
3. Obtaining tighter fit (see Fig. 2 — Determining Fit).

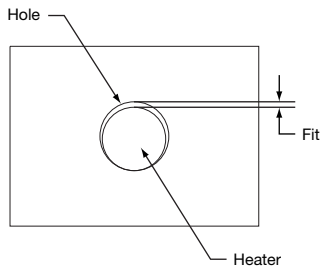
A Hi-Density cartridge heater designed at the maximum recommended watt density allows the smallest heater to be used to obtain the required wattage with good service life. All things being equal, using a lower watt density heater will typically provide optimized service life.

Fig. 1 Recommended Watt Density for Heating Metal Parts



The graph shows the recommended maximum watt density for Tempco Hi-Density cartridge heaters at different operating temperatures and fit, when the heater is installed in an oxidized mild steel block. The thermocouple is located 1/2" from the heater. When heating other materials, the data needs to be extrapolated based on the thermal conductivity of the material. Consult Tempco with your requirements.

Fig. 2 Determining Fit



CONTINUED

Recommendations for Improving the Life of Hi-Density Cartridge Heaters

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Determining Fit

When heating a platen, mold, die or hot runner probe with Hi-Density Cartridge Heaters inserted into drilled holes, fit is an important factor in determining the life expectancy of the heater. Fit is the difference between the minimum diameter of the cartridge heater and the maximum diameter of the hole. Unheated sections on a Hi-Density cartridge may be smaller in diameter due to swaging. To determine fit, use the smallest diameter on the heated length only.

Example: A 3/8" nominal OD Hi-Density cartridge heater has an actual diameter of .371" ±.002, which translates to a minimum diameter of .369". If used in a .375" ±.003 hole, the fit would be .009" (.378" – .369" = .009").

When medium watt density heaters (less than 60 watts per square inch) are used in low temperature applications (less than 600°F [315°C]) general purpose drills are commonly used to drill holes. The typical hole size may be .003" to .008" over the drill size. For higher watt density and/or higher temperature applications, we recommend that the holes are drilled and reamed for the tightest possible fit. In applications where precise temperature control and heat transfer properties are required, Hi-Density cartridge heaters can be centerless ground to ±.0005".

Although a tighter fit is desirable to efficiently transfer heat and to get long heater life, a looser fit will aid in installing and removing heaters, especially long heaters. We recommend that you apply Tempco's BNS anti-seize cartridge heater coating as it will improve heat transfer and will make the removal of heaters easier.

The graph in Fig 1. (page 2-5) shows the effect of fit in determining the maximum recommended watt density on a steel platen. As it is indicated in the graph, the tighter the fit, the higher the maximum recommended watt density.

Temperature Control and Location of Temperature Sensing Device

In order to better control the heater temperature and hence the resistance wire temperature, use of an appropriate temperature control and the proximity of the heater to the sensor is very important. The graph in Fig. 1 (page 2-5) shows the effect of operating temperature in determining the maximum recommended watt density on a steel platen where the sensor is located 1/2" from the heater. Higher watt density heaters can generate heat faster than the surrounding area's ability to dissipate heat. This creates a thermal lag between the heater and the sensor. The closer the sensor to the heater, the better you can control the heater temperature. By keeping the sensor further from the heater, temperature gradients of several hundred degrees can be observed in many applications, especially during initial start-up and heavy thermal cycling. Although the set operating temperature may be low, the heater may be running at a very high temperature. This is a common cause of heater failure. This can be minimized using time proportional and PID functions of the temperature controllers. See Section 13 for temperature controllers and Section 14 for thermocouples and sensors.

Power Control

Power control methods affect the life expectancy of heating elements. In general, although economical, on-off controls increase thermal fatigue and oxidation rate on heating elements by causing wide temperature swings of the internal heating element. Silicon Controlled Rectifiers (SCRs), Mercury Relays and Solid State Power Controls can increase the life expectancy of heating elements by reducing the temperature swings of the internal heating element. See Section 13 for power controls.

Common Causes of Cartridge Heater Failures

Contamination

Contamination is a major cause of heater failure. Moisture, hydraulic oils, and melted plastic are the most common contaminants that are seen on failed heaters. Since the magnesium oxide insulation in a Hi-Density heater is hygroscopic in nature, moisture is easily absorbed into the heater and typically results in premature heater failure. Moisture absorption during machine washdown or cleanup also is a frequent problem. These contaminants, which are electrically conductive, will short out the heater. Most probably, the failures will be at the lead end of the heater and in some cases can split or blow a hole on the heater sheath. The disc end of a Hi-Density cartridge heater is welded shut with a stainless steel disc.

Generally contaminants enter the heater through the lead end of the heater. The high temperature lead wires used on Hi-Density heaters have fiberglass or mica insulation. Oil and moisture can wick through the insulation on the lead wire into the heater. Tempco offers a wide variety of terminations to avoid this problem, including epoxy seals, Teflon® seals, convoluted cables, welded end discs and Teflon® insulated lead wires. However, there are temperature limitations on many of these terminations.

Note: If you should encounter premature cartridge heater failure, consult Tempco. Our team of professionals will have the solution to your problem.

Excessive Flexing of Leads

Tempco Hi-Density heaters use flexible grade A nickel stranded lead wires with fiberglass or mica insulation. On certain terminations the lead wires are connected externally to solid nickel conductor pins. In applications where there is excessive movement or vibration, the solid pins could break due to fatigue. A simple solution is to give enough slack on the leads to minimize the stress on the solid pins or provide an internal lead wire connection within the heater. Tempco also offers strain relief brackets and springs to prevent this problem.

Where heater leads can wear out by abrasion due to excessive flexing of the leads, Tempco offers several abrasion resistant terminations. See pages 2-37 through 2-49.

Lack of Heat Sink

Hi-Density heaters are designed with minimum unheated (cold) sections. If the heated sections project from the platen or mold, these sections will get extremely hot due to lack of heat transfer. This will lead to premature heater failure. Tempco can manufacture heaters with cold sections anywhere along the length of the heater to prevent overheating of the heater sheath.

When a Hi-Density heater is used as a liquid immersion heater, make sure the heater's sheath length is completely immersed in the liquid. The heater lead end should not be immersed in liquid, since most of the lead end seals are only moisture resistant, not moisture proof.

Recommendations for Improving the Life of Hi-Density Cartridge Heaters

High Operating Temperature

Tempco Hi-Density heaters are designed to operate at sheath temperatures up to 1400°F (760°C). When process temperatures approach the maximum heater sheath temperature, make sure the sheath temperature doesn't exceed its limitations. Location of the thermocouple and the type of temperature and power controls are factors that affect sheath temperature and potential overshoot conditions.

Although the heater is designed to run at temperatures up to 1400°F (760°C), heater lead wires and terminations are rated for much lower temperatures. Care should be taken to make sure that the heater lead end temperatures do not exceed their limitations. Heaters can be made longer with unheated sections at the lead end to bring the lead end out of the high temperature area. Tempco can also provide you with a high temperature wiring harness, which can withstand temperatures up to 1400°F (760°C). See page 15-3 in the accessories section for details.

High Wattage Rating

Heaters with very high wattage ratings can create temperature overshoots, uneven temperature distribution and high heater sheath temperatures, causing premature heater failure.

For liquid immersion heaters, maximum watt density depends on the type of liquid being heated. The heavier or thicker the liquid, the lower the maximum watt density. Higher watt density can cause the liquid to carbonize and accumulate on the heater sheath, which will cause premature heater failure.

Scale and Sludge Buildup

In liquid immersion applications, periodic cleaning of the heater sheath is necessary to remove any scale buildup on the sheath. Scale can accumulate on the sheath and cause the heater to overheat and fail. When used to heat liquid in a tank, be sure to clean any sludge from the bottom of the tank. A heater sheath covered with sludge will overheat and fail.

Note: As explained in the above paragraphs, the single major cause for cartridge heater failure is the selection of the wrong type of heater lead end termination for the specific application. To assist you in selecting the right termination type, pages 2-37 through 2-49 give detailed descriptions of over 40 terminations designed to solve many of the common application problems. If you need further assistance, consult Tempco.

Important Installation Considerations

1. For closest fit and best heat transfer, use reamed holes.
2. When possible, drill holes through the object being heated. This will make heater removal easier.
3. When using an anti-seize coating like Tempco's BNS spray or paste, **do not apply** over lead wires or any other current carrying conductors.
4. When using insulated tape or sleeving, check to make sure they are rated for the temperature of the application. Lower temperature rated materials can contain an adhesive or binder that can carbonize and become electrically conductive.
5. When using heaters near their maximum recommended watt density, it is recommended that the temperature sensing probes be at least 1/2" from the heater sheath.
6. Lead wires should not be located in the hole containing the cartridge heater during operation. This may cause the lead wires to be exposed to temperatures above their rated temperature.
7. When used in a vacuum application, make sure the lead end of the heater is outside the vacuum. If the lead has to be in the vacuum, consult Tempco for specific recommendations.
8. Many applications will subject a heater's electrical terminations to one or more of the following potentially damaging conditions:
   - Moisture
   - Oil and other contaminants
   - Flexing
   - Abrasion
   - High temperature

Note: To protect the heater from damage in these harsh environments, Tempco has a wide selection of terminations and options available. See pages 2-37 through 2-53 for details.

BNS Anti-Seize Cartridge Heater Coating

This high temperature, electrically insulating and thermally conductive coating will minimize oxidation and improve heat transfer from heater to the object being heated.

Brush a thin layer of paste or spray lightly over the cartridge heater prior to inserting the heater into a hole.

CAUTION

Do not apply over lead wires or other bare current carrying conductors, since the water in the paste and spray can cause an electrical short circuit.

13 oz.
Aerosol spray can
Part Number:
CML00010

- Temperature Range 1562°F (850°C)
- High Heat Transfer

4 oz.
Paste w/brush applicator top
Part Number: CML00020

- Temperature Range 1562°F (850°C)
- High Heat Transfer

Note: Formulated to assist in the removal of cartridge heaters.

All Items Available from Stock

Highly Engineered Custom Manufactured Specific Use Cartridge Heaters

Meeting the Challenges of Original Equipment Manufacturers with Custom Engineering

Tempco has been at the forefront of addressing the challenges of original equipment manufacturers (OEMs) in diversified industries, when dependable and reliable performance of custom engineered cartridge heaters is crucial to the overall operating efficiency and quality of their equipment and machinery.

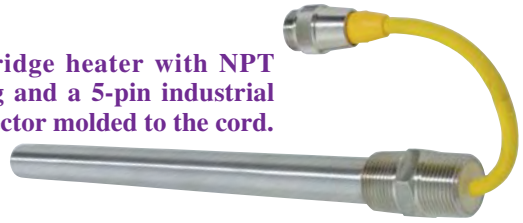
Tempco is a company uniquely qualified and committed to providing value added expertise in engineering and manufacturing that spans over three decades of acquired knowledge, assisting customers in developing highly engineered specific use cartridge heaters for equipment and/or machinery systems.

Complete a New Project on Time Improved Efficiencies and Reduce Cost

Consult Tempco, your strategic partner, in the early stages of a new project requiring cartridge heaters, or to improve a troublesome existing application. By doing so you allow Tempco to place at your disposal our team of professionals, offering you our vast knowledge in product design and manufacturing expertise. We can provide you with the optimal solution to your thermal loop system and cartridge heater design challenges.

Tempco offers you the perfect balance in quality and service with value-added technology. These pictures depict a small sampling of the cartridge heaters we have developed for special applications. Put our knowledge and experience to work for you.

Our capabilities are limited only by your imagination. Consult us with your requirements. We welcome your inquiries.



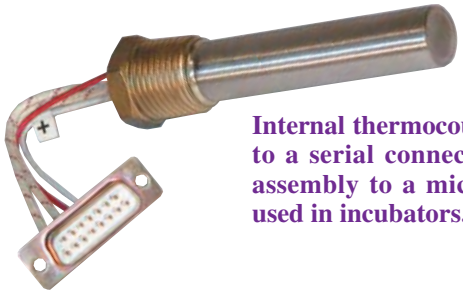
Cartridge heater with NPT fitting and a 5-pin industrial connector molded to the cord.

Cartridge heater for continuous air heating application with Incoloy sheath, custom machined fitting and silicone rubber moisture barrier

Cartridge heater with built-in thermal fuse and ground wire for X-Ray processing equipment.

Cartridge heater with built-in thermostat, pipe fitting and ground leads for oil heating in waste handling equipment.

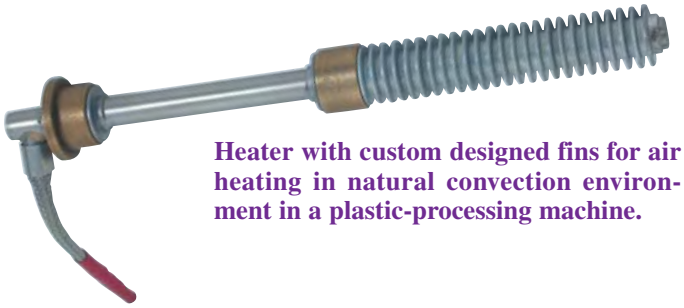
Finned Cartridge Oil Immersion Heater with a liquid tight electrical termination.



Internal thermocouple is wired to a serial connector for easy assembly to a microprocessor used in incubators.

Incoloy® fitting and seamless Incoloy® 800 sheath material is used in aviation application.

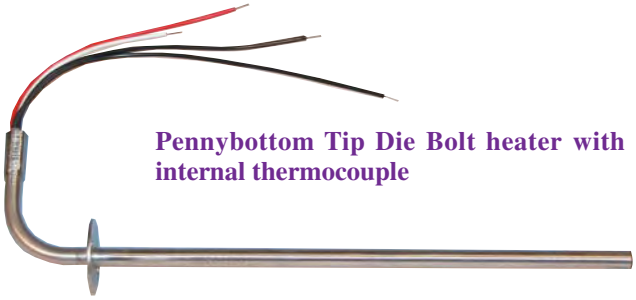
Straight armor cable and adjustable bayonet cap for easy assembly



Heater with custom designed fins for air heating in natural convection environment in a plastic-processing machine.

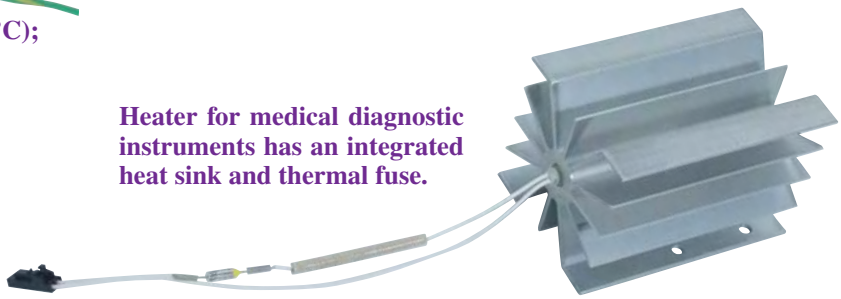
Highly Engineered Custom Manufactured Specific Purpose Use Cartridge Heaters

The heater has a header cap as an integral part of the NPT fitting. Leads exit through small holes that are sealed with RTV for moisture protection.



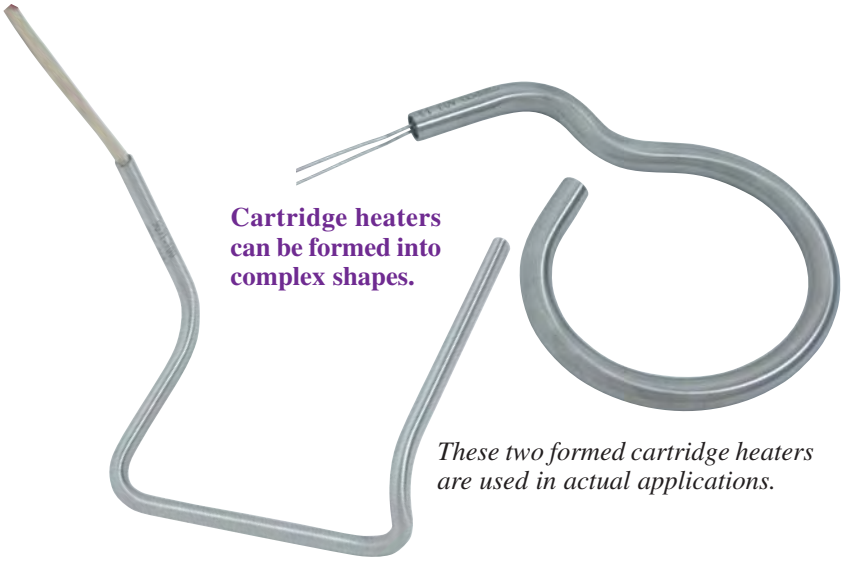
Pennybottom Tip Die Bolt heater with internal thermocouple

Heater designed to run continuously at 1202°F (650°C); built-in isolated thermocouple and ground wire



Heater for medical diagnostic instruments has an integrated heat sink and thermal fuse.

SJO cord and molded plug for automotive air conditioning recharging units



Cartridge heaters can be formed into complex shapes.

These two formed cartridge heaters are used in actual applications.

Optional Inspection Services and Test Reports

Die Penetrant Test

This non-destructive testing can detect imperfections in weld joints. For critical applications, each individual heater's weld joints by end cap and fittings can be tested. Certified test reports will be sent with each shipment. Consult Tempco for details.

Hydrostatic Pressure Test

Cartridge heaters with attached pipe fittings can be pressure tested to your specifications at Tempco. Our in-house testing capabilities can ensure that your products meet your exact specifications. Contact Tempco with your requirements.

Electrical Tests

Our state of the art test meter can perform AC/DC dielectric withstand test (Hypot) up to 5000 volts while measuring leakage current in micro amps. It can also measure Insulation resistance (IR) and heater element resistance. Heaters can be serialized and test reports can be sent with each shipment if required.

Consult Tempco with Your Requirements.
We Welcome Your Inquiries.

Custom Terminated Multi-Purpose Use Cartridge Heaters ON DEMAND!

Tempco's Ongoing Commitment to Value-Added Customer Service is the Key to the Terminator Lead Conversion Program

Tempco maintains over 65,000 Semi-Finished Hi-Density Cartridge Heater Substrates In Stock, offering a combination of over 1000 Sizes. Tempco's high quality and reliable line of Hi-Density cartridge heaters is available in a complete range of Industry Standard Diameters and Lengths Ranging from 1" (25.4 mm) to 36" (914.4 mm) in a full spectrum of Wattages and Operating Voltages.

These cartridge heater substrates are Semi-Finished, offering you the option to finish them by choosing from 22 available Lead End Terminations. Cartridge heaters will be ready for shipment within the Same or Next Day, depending on the termination.

Cartridge Heater Terminations can be Elusive to Define and Often Overlooked

Improper selection of the Termination for a Specific Application will compromise the operating reliability and functional life of the cartridge heater, resulting in costly operating machine downtime and a loss of productivity.

When Time is of the Essence and You Need the Right Specifications on a Cartridge Heater NOW!

Don't settle for long deliveries on custom terminated cartridge heaters. The Terminator lead conversion process provides you with up to 22 available lead end terminations to select from. Suited for applications requiring protection against Contamination, Abrasion, Flexing conditions and Moisture Resistance.

The synergy between the cartridge heater termination and the application will result in reducing cost, increasing productivity, optimizing performance and improving customer satisfaction.

Tempco offers the solution to your special cartridge heater needs for original equipment (OEMs) or maintenance requirements (MRO) applications with guaranteed Same or Next Day Shipping.

Don't Compromise When You Can Have It All — Service and Quality at Competitive Prices

Added value is the key to The TERMINATOR® Lead Conversion Program

Ordering Information — Follow These Simple Steps

1. View and select available cartridge heater substrates. Refer to pages 2-13 through 2-20. Specify cartridge heater substrate part number(s).
2. View, identify and select the cartridge heater termination best suited to your application. Refer to the terminations Quick Reference Chart on pages 2-11 and 2-12. Specify termination type by the letter and number designation.

   The standard lead end termination for the Terminator program is type "N" with 10" long externally connected plain leads (for details refer to page 2-37). It is the most commonly applied termination, and it will be supplied if no other termination is specified.

   When applicable to the termination the standard lengths for Plain Leads, Wire Braid Leads and Armor Cable Leads will be supplied on your order.
3. Specify your lead requirements in the event that the standard lengths for Plain Leads, Braid, or Armor Cable are not suited for your application.
4. Specify the quantity

Note: At the time of order a new permanent part number will be assigned to the specific cartridge heater you selected. **Exception:** when the termination you order is type N (with 10" long leads) the heater part number will be the same as the substrate part number.

Purchase Your Multi-Purpose Use Cartridge Heaters through the Terminator Program. Enjoy the Benefits and Start Saving Today.

Custom Manufactured

Custom Engineered/Manufactured Hi-Density Cartridge Heaters

(Refer to pages 2-2 through 2-9)

Understanding that cartridge heaters can be very application specific, consult Tempco with your special requirements. For sizes, electrical ratings and any other design features required but not listed in the catalog, Tempco will custom engineer and manufacture to your specifications.

Consult Us with Your Requirements. We Welcome Your Inquiries.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Quick Termination Reference Chart

These Terminations for Stock Cartridge Heater Substrates will ship same or next day.

Type	Description	Page Number
P	Quick Disconnect Plugs	2-49
C1	Straight Armor Cable	2-41
SA	Sealed Armor Cable	2-38
N	Standard Leads	2-37
C2	Right Angle Armor Cable with Copper Elbow	2-42
R1	Right-Angle Leads with Copper Elbow	2-42

Type	Description	Page Number
T2	Screw Terminals	2-44
E1	General Purpose Box	2-48
MFR	Mounting Flange Round	2-47
MFH	Mounting Flange Hex	2-47
B	Ceramic Bead Insulation	2-49

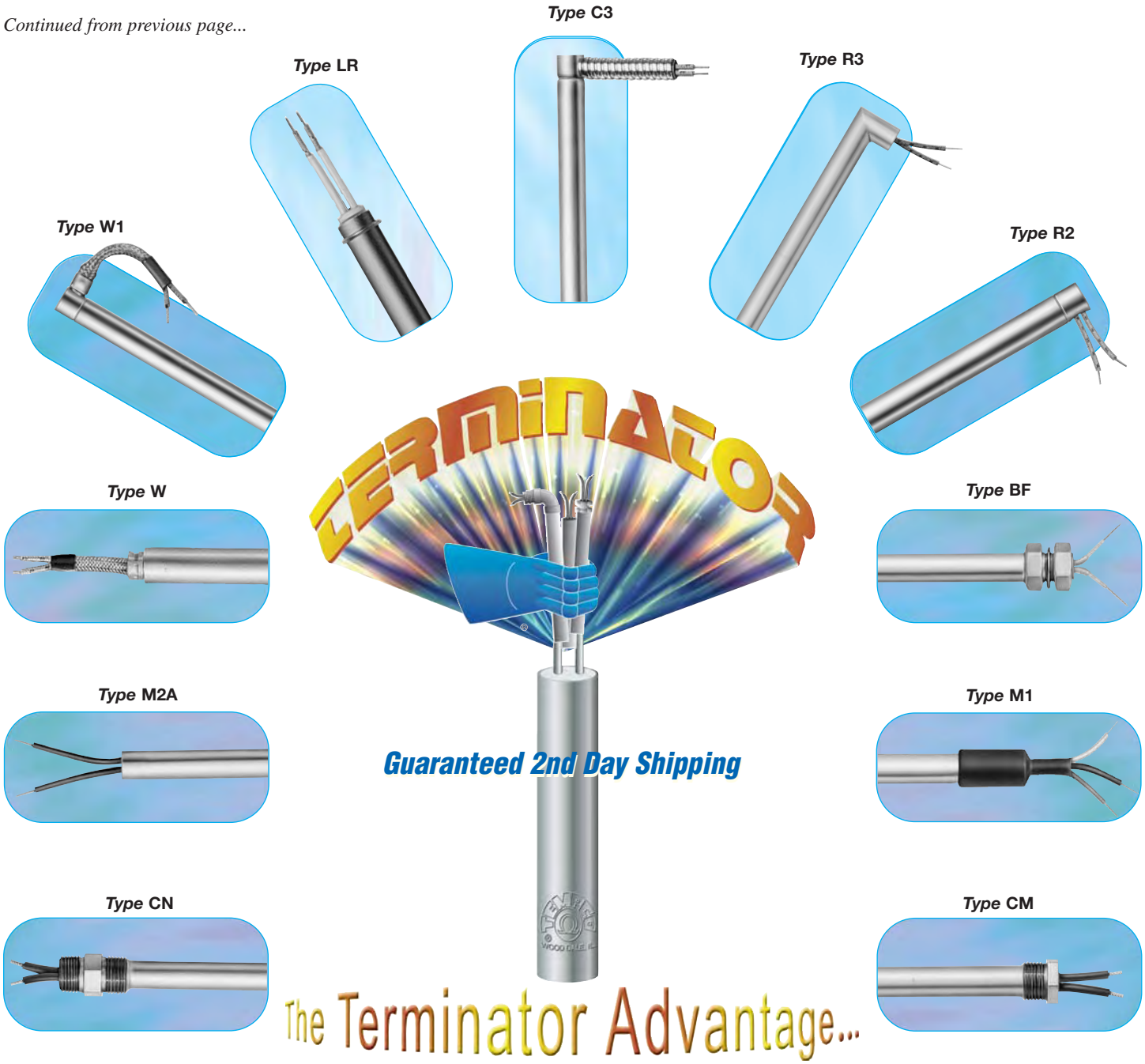
Look for this icon —

Complete specifications and details on these terminations can be found on the corresponding page numbers listed above.

CONTINUED

Quick Termination Reference Chart

Continued from previous page...



These Terminations for Stock Cartridge Heater Substrates will ship 2nd day.

Type	Description	Page Number
CN	Double Threaded Fitting	2-46
M2A	Potted Lead End Seal (Cement Only)	2-38
W	Straight Wire Braided Leads	2-40
W1	Right-Angle Wire Braided Leads	2-43
LR	Locating Ring	2-47
C3	Right-Angle Armor Cable	2-43

Type	Description	Page Number
R3	Angled Sheath Extension	2-44
R2	Right-Angle Leads	2-43
BF	Bulkhead Fitting	2-46
M1	Polyefin Liquid Barrier	2-38
CM	Single Threaded Fitting	2-46

Look for this icon —

Complete specifications and details on these terminations can be found on the corresponding page numbers listed above.

Product Inventory Available for Viewing and Selection @ www.tempco.com

STOCK — *Immediate Delivery through the TERMINATOR® Lead Conversion Program*

1/8" Diameter Actual .122" (3.10 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
1¼	31.8	25	90	14	HDC19100	—
1¼	31.8	35	126	20	HDC19101	—
1¼	31.8	50	180	28	HDC19102	—
1½	38.1	30	80	12	HDC19103	—
1½	38.1	60	160	25	HDC19104	—
2	50.8	40	70	11	HDC19105	—
2	50.8	50	87	13	HDC19106	HDC19112
2	50.8	100	175	27	HDC19107	HDC19113
2½	63.5	50	68	11	HDC19108	—
3	76.2	60	64	10	HDC19109	—
3½	88.9	70	62	10	HDC19110	—
4	101.6	80	60	9	HDC19111	HDC19114

1/4" Diameter Actual .246" (6.25 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
1	25.4	50	127	20	HDC00001	—
1	25.4	80	204	32	HDC00002	—
1	25.4	100	255	40	HDC00003	HDC00004
1	25.4	150	382	59	HDC00005	—
1⅛	28.6	100	204	32	HDC00006	—
1¼	31.8	50	85	13	HDC00007	—
1¼	31.8	75	127	20	HDC00008	—
1¼	31.8	100	170	26	HDC00009	—
1¼	31.8	125	212	33	HDC00010	—
1¼	31.8	150	255	40	HDC00011	HDC00012
1¼	31.8	200	340	53	—	HDC00013
1¼	31.8	225	382	59	—	HDC00014
1½	38.1	50	64	10	HDC00015	—
1½	38.1	100	127	20	HDC00016	HDC00017
1½	38.1	150	191	30	HDC00018	HDC00019
1½	38.1	175	223	35	HDC00020	HDC00021
1½	38.1	200	255	40	HDC00022	HDC00023
1½	38.1	250	318	49	—	HDC00024
1¾	44.5	75	76	12	HDC00025	—
1¾	44.5	150	153	24	HDC00026	—
1¾	44.5	300	306	47	—	HDC00027
2	50.8	50	42	7	HDC00028	—
2	50.8	80	68	11	HDC00029	—
2	50.8	100	85	13	HDC00030	HDC00031
2	50.8	125	106	17	HDC00032	HDC00033
2	50.8	150	127	20	HDC00034	HDC00035
2	50.8	200	170	26	HDC00036	HDC00037
2	50.8	250	212	33	HDC00038	HDC00039
2	50.8	300	255	40	—	HDC00040
2¼	57.2	200	146	23	—	HDC00041
2½	63.5	150	95	15	—	HDC00042
2½	63.5	200	127	20	HDC00043	HDC00044
2½	63.5	250	159	25	HDC00045	HDC00046
2½	63.5	350	223	35	—	HDC00047
2¾	69.9	200	113	18	—	HDC00048
3	76.2	75	38	6	HDC00049	—
3	76.2	100	51	8	HDC00050	HDC00051
3	76.2	125	64	10	—	HDC00052
3	76.2	150	76	12	HDC00053	HDC00054
3	76.2	200	102	16	HDC00055	HDC00056
3	76.2	250	127	20	HDC00057	HDC00058
3	76.2	300	153	24	HDC00059	HDC00060
3	76.2	350	178	28	—	HDC00061
3½	88.9	200	85	13	—	HDC00062
3½	88.9	300	127	20	HDC00063	HDC00064
3¾	95.3	300	118	18	—	HDC00065
4	101.6	100	36	6	HDC00066	—
4	101.6	150	55	9	HDC00067	—
4	101.6	175	64	10	HDC00068	HDC00069
4	101.6	200	73	11	HDC00070	HDC00071
4	101.6	250	91	14	HDC00072	HDC00073
4	101.6	300	109	17	HDC00074	HDC00075
4	101.6	400	146	23	—	HDC00076
4½	114.3	125	40	6	HDC00077	—
4½	114.3	200	64	10	HDC00078	—
4½	114.3	500	159	25	—	HDC00079
5	127.0	200	57	9	—	HDC00080
5	127.0	250	71	11	—	HDC00081
5	127.0	350	99	15	HDC00082	HDC00083
5	127.0	400	113	18	HDC00084	HDC00085
5¾	146.1	350	85	13	HDC00086	HDC00087
6	152.4	150	35	5	HDC00088	—
6	152.4	200	46	7	—	HDC00089
6	152.4	300	69	11	HDC00090	HDC00091
6	152.4	400	93	14	HDC00092	HDC00093
6	152.4	450	104	16	HDC00094	HDC00095
6	152.4	600	139	22	—	HDC00096
6½	165.1	500	106	17	HDC00097	HDC00098
7	177.8	600	118	18	—	HDC00099
7½	190.5	525	95	15	HDC00100	—
8	203.2	300	51	8	HDC00101	—
8	203.2	600	102	16	—	HDC00102
9	228.6	675	101	16	—	HDC00103
9½	241.3	525	74	12	HDC00104	—
10	254.0	750	101	16	—	HDC00105
11	279.4	600	73	11	—	HDC00106
13	330.2	725	74	12	—	HDC00107

Ordering Information

Substrate—A semi-finished Cartridge Heater ready to be completed by adding the best suited termination for a specific application; can ship same or next day. Complete details, ordering information and Termination Quick Reference Charts are on pages 2-10 through 2-12.

Custom Engineered/Manufactured

Cartridge Heaters can be application specific, therefore for sizes, electrical ratings, terminations and any other design features not listed in this catalog **TEMPCO** will custom manufacture to your specifications. Consult us with your requirements.

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

Available Hi-Density Substrates

STOCK — *Immediate Delivery through the TERMINATOR® Lead Conversion Program*

5/16" Diameter Actual .308" (7.82 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
2	50.8	150	102	16	HDC00108	—
2½	63.5	150	76	12	HDC00109	—
2½	63.5	200	102	16	HDC00110	HDC00111
3	76.2	225	92	14	HDC00112	HDC00113
3⅜	85.7	160	57	9	HDC00114	—
3½	88.9	250	85	13	HDC00115	HDC00116

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
4	101.6	275	80	12	HDC00117	HDC00118
5	127.0	350	79	12	HDC00119	HDC00120
5½	139.7	250	51	8	HDC00121	—
6	152.4	450	83	13	HDC00122	HDC00123
7½	190.5	600	87	14	—	HDC00124

3/8" Diameter Actual .371" (9.42 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
1	25.4	50	85	13	HDC00125	—
1	25.4	100	170	26	HDC00127	—
1	25.4	150	255	40	HDC00128	HDC00129
1	25.4	200	340	53	—	HDC00130
1¼	31.8	50	57	9	HDC00131	—
1¼	31.8	100	113	18	HDC00133	—
1¼	31.8	150	170	26	HDC00135	HDC00136
1¼	31.8	200	226	35	HDC00137	HDC00138
1 5/16	33.3	100	104	16	HDC00139	HDC00140
1 5/16	33.3	150	157	24	HDC00141	—
1⅜	34.9	150	146	23	HDC00142	HDC00143
1 7/16	36.5	100	91	14	HDC00144	HDC00145
1½	38.1	30	25	4	HDC00146	—
1½	38.1	50	42	7	HDC00147	HDC00148
1½	38.1	75	64	10	HDC00149	—
1½	38.1	100	85	13	HDC00150	HDC00151
1½	38.1	125	106	17	—	HDC00152
1½	38.1	150	127	20	HDC00153	HDC00154
1½	38.1	200	170	26	HDC00155	HDC00156
1½	38.1	250	212	33	HDC00157	HDC00158
1¾	44.5	150	102	16	HDC00160	HDC00161
1¾	44.5	200	136	21	—	HDC00163
1¾	44.5	250	170	26	HDC00164	HDC00165
1 13/16	46.0	150	97	15	—	HDC00166
1 13/16	46.0	200	129	20	HDC00167	—
1⅞	47.6	250	154	24	HDC00169	—
2	50.8	50	28	4	HDC00170	—
2	50.8	75	42	7	HDC00171	—
2	50.8	100	57	9	HDC00172	HDC00173
2	50.8	125	71	11	HDC00174	—
2	50.8	150	85	13	HDC00175	HDC00176
2	50.8	200	113	18	HDC00177	HDC00178
2	50.8	250	141	22	HDC00179	HDC00180
2	50.8	300	170	26	HDC00181	HDC00182
2	50.8	350	198	31	—	HDC00183
2	50.8	400	226	35	HDC00184	HDC00185
2	50.8	500	283	44	HDC00186	HDC00187
2⅛	54.0	200	104	16	—	HDC00188
2¼	57.2	75	36	6	HDC00189	—
2¼	57.2	100	49	8	HDC00190	—
2¼	57.2	125	61	9	HDC00191	HDC00192
2¼	57.2	150	73	11	—	HDC00193
2¼	57.2	175	85	13	HDC00194	HDC00195
2¼	57.2	200	97	15	—	HDC00196
2¼	57.2	300	146	23	HDC00199	HDC00200
2¼	57.2	350	170	26	HDC00201	HDC00202

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
2¼	57.2	400	194	30	—	HDC00204
2¼	57.2	500	243	38	—	HDC00205
2⅜	60.3	75	34	5	HDC00206	—
2⅜	60.3	165	75	12	—	HDC00207
2⅜	60.3	300	136	21	—	HDC00210
2⅜	60.3	400	181	28	HDC00211	—
2½	63.5	50	21	3	HDC00212	—
2½	63.5	100	42	7	HDC00213	HDC00214
2½	63.5	125	53	8	HDC00215	—
2½	63.5	150	64	10	—	HDC00216
2½	63.5	200	85	13	HDC00217	HDC00218
2½	63.5	250	106	17	HDC00219	HDC00220
2½	63.5	300	127	20	HDC00221	HDC00222
2½	63.5	350	149	23	—	HDC00223
2½	63.5	500	212	33	HDC00227	HDC00228
2¾	69.9	100	38	6	HDC00229	—
2¾	69.9	125	47	7	HDC00230	—
2¾	69.9	400	151	23	—	HDC00231
2 13/16	71.4	300	110	17	—	HDC00235
3	76.2	100	34	5	HDC00236	HDC00237
3	76.2	125	42	7	HDC00238	—
3	76.2	150	51	8	HDC00239	—
3	76.2	200	68	11	HDC00240	HDC00241
3	76.2	250	85	13	HDC00242	HDC00243
3	76.2	300	102	16	HDC00244	HDC00245
3	76.2	375	127	20	HDC00247	HDC00248
3	76.2	400	136	21	HDC00249	HDC00250
3	76.2	500	170	26	HDC00251	HDC00252
3	76.2	600	204	32	—	HDC00253
3	76.2	750	255	40	—	HDC00254
3 5/16	84.1	500	151	23	HDC00255	—
3½	88.9	125	35	6	HDC00256	—
3½	88.9	200	57	9	—	HDC00257
3½	88.9	225	64	10	—	HDC00258
3½	88.9	250	71	11	HDC00259	HDC00260
3½	88.9	300	85	13	HDC00261	HDC00262
3½	88.9	350	99	15	HDC00263	HDC00264
3½	88.9	400	113	18	—	HDC00265
3½	88.9	500	141	22	HDC00266	HDC00267
3¾	95.3	300	78	12	—	HDC00268
3 13/16	96.8	150	38	6	HDC00269	—
3 13/16	96.8	500	128	20	—	HDC00270
4	101.6	100	24	4	HDC00272	—
4	101.6	125	30	5	HDC00273	HDC00274
4	101.6	150	36	6	HDC00275	—
4	101.6	175	42	7	HDC00276	—

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

Product Inventory Available for Viewing and Selection @ www.tempco.com

STOCK — *Immediate Delivery through the TERMINATOR® Lead Conversion Program*

3/8" Diameter Actual .371" (9.42 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
4	101.6	200	49	8	HDC00277	HDC00278
4	101.6	250	61	9	HDC00279	HDC00280
4	101.6	300	73	11	HDC00281	HDC00282
4	101.6	350	85	13	HDC00283	HDC00284
4	101.6	400	97	15	HDC00285	HDC00286
4	101.6	450	109	17	HDC00287	HDC00288
4	101.6	500	121	19	HDC00289	HDC00290
4	101.6	600	146	23	—	HDC00292
4	101.6	700	170	26	—	HDC00293
4	101.6	750	182	28	—	HDC00294
4¼	108.0	300	68	11	—	HDC00295
4¼	108.0	750	170	26	—	HDC00296
4½	114.3	250	53	8	—	HDC00297
4½	114.3	300	64	10	HDC00298	HDC00299
4½	114.3	350	74	12	—	HDC00300
4½	114.3	425	90	14	—	HDC00301
4½	114.3	450	95	15	HDC00302	HDC00303
4½	114.3	500	106	17	HDC00304	HDC00305
4¾	120.7	300	60	9	HDC00306	HDC00307
4 13/16	122.2	300	59	9	—	HDC00308
4 13/16	122.2	500	98	15	—	HDC00309
5	127.0	130	25	4	HDC00310	HDC00311
5	127.0	150	28	4	HDC00312	HDC00313
5	127.0	200	38	6	HDC00314	HDC00315
5	127.0	250	47	7	HDC00316	—
5	127.0	300	57	9	HDC00317	HDC00318
5	127.0	350	66	10	—	HDC00319
5	127.0	400	75	12	HDC00320	HDC00321
5	127.0	500	94	15	HDC00323	HDC00324
5	127.0	600	113	18	—	HDC00327
5	127.0	700	132	21	—	HDC00328
5	127.0	750	141	22	—	HDC00329
5	127.0	800	151	23	—	HDC00330
5	127.0	1000	189	29	—	HDC00331
5¼	133.3	200	36	6	—	HDC00332
5½	139.7	200	34	5	—	HDC00333
5½	139.7	250	42	7	HDC00334	HDC00335
5½	139.7	400	68	11	—	HDC00337
5½	139.7	550	93	15	—	HDC00338
5½	139.7	600	102	16	—	HDC00339
5½	139.7	1000	170	26	—	HDC00340
5¾	146.1	400	65	10	—	HDC00341
5¾	146.1	600	97	15	HDC00342	HDC00343
6	152.4	200	31	5	HDC00344	—
6	152.4	250	39	6	HDC00345	HDC00346
6	152.4	300	46	7	HDC00347	HDC00348
6	152.4	400	62	10	HDC00349	HDC00350
6	152.4	500	77	12	HDC00351	HDC00352
6	152.4	600	93	14	HDC00353	HDC00354
6	152.4	675	104	16	—	HDC00355
6	152.4	750	116	18	HDC00356	HDC00357
6	152.4	800	123	19	—	HDC00358
6	152.4	900	139	22	—	HDC00359

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
6	152.4	1000	154	24	—	HDC00360
6½	165.1	600	85	13	—	HDC00361
6½	165.1	1000	141	22	—	HDC00362
6¾	171.5	300	41	6	—	HDC00363
7	177.8	250	33	5	HDC00365	HDC00366
7	177.8	350	46	7	—	HDC00367
7	177.8	400	52	8	HDC00368	—
7	177.8	500	65	10	—	HDC00369
7	177.8	600	78	12	HDC00370	HDC00371
7	177.8	675	88	14	—	HDC00372
7	177.8	750	98	15	—	HDC00373
7	177.8	775	101	16	—	HDC00374
7	177.8	1000	131	20	—	HDC00375
7¼	184.2	300	38	6	—	HDC00376
7½	190.5	600	73	11	—	HDC00377
7½	190.5	725	88	14	—	HDC00378
7½	190.5	850	103	16	—	HDC00379
7½	190.5	1000	121	19	—	HDC00380
7 13/16	198.4	750	87	14	—	HDC00381
8	203.2	300	34	5	HDC00382	HDC00383
8	203.2	400	45	7	HDC00384	—
8	203.2	450	51	8	HDC00385	—
8	203.2	500	57	9	HDC00386	HDC00387
8	203.2	600	68	11	HDC00388	HDC00389
8	203.2	700	79	12	—	HDC00390
8	203.2	750	85	13	—	HDC00391
8	203.2	900	102	16	—	HDC00392
8	203.2	1000	113	18	—	HDC00393
8½	215.9	350	37	6	—	HDC00394
8⅝	219.1	500	52	8	—	HDC00395
9	228.6	200	20	3	HDC00396	HDC00397
9	228.6	500	50	8	—	HDC00398
9	228.6	885	88	14	—	HDC00399
9	228.6	1000	100	16	—	HDC00400
9½	241.3	200	19	3	HDC00401	—
9½	241.3	600	57	9	—	HDC00402
9½	241.3	1000	94	15	—	HDC00403
9¾	247.7	600	55	9	—	HDC00404
10	254.0	400	36	5	HDC00405	—
10	254.0	500	45	7	HDC00406	HDC00407
10	254.0	600	54	8	HDC00408	HDC00409
10	254.0	700	63	10	—	HDC00410
10	254.0	750	67	10	—	HDC00411
10	254.0	1000	89	14	—	HDC00413
10	254.0	1500	134	21	—	HDC00415
10 13/16	274.6	375	31	5	—	HDC00416
12	304.8	400	30	5	HDC00417	—
12	304.8	500	37	6	—	HDC00418
12	304.8	600	44	7	HDC00419	HDC00420
12	304.8	1000	74	11	—	HDC00421
12 13/16	325.4	1000	69	11	—	HDC00422
14	355.6	750	47	7	—	HDC00423
16	406.4	1200	66	10	—	HDC00424

Ordering Information

Substrate—A semi-finished Cartridge Heater ready to be completed by adding the best suited termination for a specific application; can ship same or next day. Complete details, ordering information and Termination Quick Reference Charts are on pages 2-10 through 2-12.

Custom Engineered/Manufactured

Cartridge Heaters can be application specific, therefore for sizes, electrical ratings, terminations and any other design features not listed in this catalog **TEMPCO** will custom manufacture to your specifications. Consult us with your requirements.

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

Available Hi-Density Substrates

STOCK — Immediate Delivery through the TERMINATOR® Lead Conversion Program

1/2" Diameter Actual .496" (12.60 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
1	25.4	50	64	10	HDC00426	—
1	25.4	150	191	30	HDC00427	—
1	25.4	200	255	40	—	HDC00428
1¼	31.8	50	42	7	HDC00429	—
1¼	31.8	125	106	17	HDC00430	HDC00431
1¼	31.8	180	153	24	—	HDC00432
1¼	31.8	200	170	26	—	HDC00433
1¼	31.8	250	212	33	—	HDC00434
1½	38.1	50	32	5	HDC00435	—
1½	38.1	150	95	15	HDC00436	HDC00437
1½	38.1	200	127	20	HDC00438	HDC00439
1¾	44.5	100	51	8	HDC00440	—
1¾	44.5	200	102	16	—	HDC00441
1¾	44.5	250	127	20	HDC00442	—
1¾	44.5	400	204	32	—	HDC00443
2	50.8	75	32	5	HDC00444	—
2	50.8	150	64	10	HDC00445	—
2	50.8	175	74	12	HDC00446	—
2	50.8	200	85	13	HDC00447	HDC00448
2	50.8	250	106	17	HDC00449	HDC00450
2	50.8	300	127	20	HDC00451	HDC00452
2	50.8	400	170	26	HDC00453	HDC00454
2	50.8	500	212	33	HDC00455	—
2	50.8	600	255	40	—	HDC00456
2	50.8	700	297	46	—	HDC00457
2¼	57.2	75	27	4	HDC00458	—
2¼	57.2	100	36	6	HDC00459	—
2¼	57.2	125	45	7	HDC00460	—
2¼	57.2	150	55	9	HDC00461	—
2¼	57.2	250	91	14	HDC00462	HDC00463
2¼	57.2	300	109	17	—	HDC00464
2¼	57.2	400	146	23	HDC00465	HDC00466
2¼	57.2	500	182	28	HDC00467	HDC00468
2¼	57.2	600	218	34	—	HDC00469
2⅜	60.3	100	34	5	HDC00470	HDC00471
2⅜	60.3	125	42	7	HDC00472	—
2⅜	60.3	250	85	13	HDC00473	HDC00474
2⅜	60.3	400	136	21	—	HDC00475
2⅜	60.3	500	170	26	HDC00476	HDC00477
2½	63.5	100	32	5	HDC00478	HDC00479
2½	63.5	125	40	6	HDC00480	—
2½	63.5	150	48	7	—	HDC00481
2½	63.5	200	64	10	HDC00482	HDC00483
2½	63.5	250	80	12	HDC00484	HDC00485
2½	63.5	300	95	15	HDC00486	HDC00487
2½	63.5	350	111	17	—	HDC00488
2½	63.5	400	127	20	HDC00489	HDC00490
2½	63.5	500	159	25	HDC00491	HDC00492
2 9/16	65.1	300	93	14	—	HDC00493
2 9/16	65.1	350	108	17	HDC00494	—
2¾	69.9	250	71	11	HDC00495	—
2¾	69.9	400	113	18	HDC00496	HDC00497
3	76.2	125	32	5	HDC00498	HDC00499
3	76.2	150	38	6	HDC00500	HDC00501
3	76.2	200	51	8	—	HDC00502
3	76.2	250	64	10	HDC00503	HDC00504
3	76.2	300	76	12	HDC00505	HDC00506
3	76.2	350	89	14	HDC00507	—
3	76.2	400	102	16	HDC00508	HDC00509
3	76.2	500	127	20	HDC00510	HDC00511
3	76.2	600	153	24	HDC00512	HDC00513
3	76.2	750	191	30	HDC00514	HDC00515
3	76.2	1000	255	40	HDC00516	—
3½	88.9	250	53	8	HDC00517	HDC00518
3½	88.9	300	64	10	—	HDC00519
3½	88.9	350	74	12	—	HDC00520
3½	88.9	420	89	14	—	HDC00521
3½	88.9	500	106	17	HDC00522	HDC00523
3½	88.9	750	159	25	—	HDC00524
3½	88.9	1000	212	33	—	HDC00525
3¾	95.3	500	98	15	—	HDC00526
3 13/16	96.8	250	48	8	—	HDC00527
3 13/16	96.8	500	96	15	HDC00528	—
4	101.6	150	27	4	HDC00529	HDC00530
4	101.6	250	45	7	HDC00531	HDC00532
4	101.6	300	55	9	HDC00533	HDC00534
4	101.6	325	59	9	HDC00535	—
4	101.6	350	64	10	HDC00536	HDC00537
4	101.6	400	73	11	HDC00538	HDC00539
4	101.6	500	91	14	HDC00540	HDC00541
4	101.6	550	100	16	HDC00542	HDC00543
4	101.6	600	109	17	—	HDC00544
4	101.6	750	136	21	HDC00545	HDC00546
4	101.6	1000	182	28	—	HDC00547
4	101.6	1200	218	34	—	HDC00548
4	101.6	1300	236	37	—	HDC00549
4 5/16	109.5	550	92	14	HDC00550	—
4½	114.3	250	40	6	HDC00551	—
4½	114.3	350	56	9	—	HDC00552
4½	114.3	500	80	12	HDC00553	HDC00554
4½	114.3	650	103	16	HDC00555	HDC00556
4½	114.3	750	119	19	HDC00557	HDC00558
4½	114.3	1000	159	25	—	HDC00559
4¾	120.7	200	30	5	—	HDC00560
4 13/16	122.2	250	37	6	HDC00561	—
4 13/16	122.2	300	44	7	—	HDC00562
4 13/16	122.2	1000	148	23	—	HDC00563
5	127.0	150	21	3	HDC00564	—
5	127.0	200	28	4	HDC00565	HDC00566
5	127.0	250	35	6	HDC00567	—
5	127.0	300	42	7	—	HDC00568
5	127.0	350	50	8	HDC00569	HDC00570
5	127.0	400	57	9	HDC00571	HDC00572
5	127.0	500	71	11	HDC00573	HDC00574
5	127.0	550	78	12	—	HDC00575
5	127.0	600	85	13	—	HDC00576
5	127.0	625	88	14	—	HDC00577
5	127.0	750	106	17	HDC00578	HDC00579
5	127.0	800	113	18	—	HDC00580
5	127.0	1000	141	22	—	HDC00581
5¼	133.4	250	34	5	HDC00582	HDC00583
5¼	133.4	1000	134	21	—	HDC00584
5½	139.7	200	25	4	—	HDC00585
5½	139.7	500	64	10	HDC00586	HDC00587
5½	139.7	650	83	13	—	HDC00588
5½	139.7	750	95	15	HDC00589	HDC00590

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

Product Inventory Available for Viewing and Selection @ www.tempco.com

STOCK — *Immediate Delivery through the TERMINATOR® Lead Conversion Program*

1/2" Diameter Actual .496" (12.60 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
5¾	146.1	350	42	7	—	HDC00591
5¾	146.1	700	85	13	HDC00592	HDC00593
5 13/16	147.6	300	36	6	—	HDC00594
6	152.4	200	23	4	—	HDC00595
6	152.4	250	29	5	HDC00596	HDC00597
6	152.4	300	35	5	HDC00598	HDC00599
6	152.4	350	41	6	HDC00600	HDC00601
6	152.4	450	52	8	—	HDC00602
6	152.4	500	58	9	HDC00603	HDC00604
6	152.4	600	69	11	—	HDC00605
6	152.4	750	87	14	HDC00606	HDC00607
6	152.4	800	93	14	HDC00608	—
6	152.4	850	98	15	HDC00609	HDC00610
6	152.4	875	101	16	—	HDC00611
6	152.4	1000	116	18	HDC00612	HDC00613
6	152.4	1200	139	22	—	HDC00614
6⅜	161.9	1000	108	17	—	HDC00615
6½	165.1	500	53	8	HDC00616	HDC00617
6½	165.1	1000	106	17	—	HDC00618
6¾	171.5	500	51	8	HDC00619	HDC00620
7	177.8	250	24	4	HDC00621	—
7	177.8	340	33	5	—	HDC00622
7	177.8	400	39	6	—	HDC00623
7	177.8	500	49	8	HDC00624	HDC00625
7	177.8	600	59	9	HDC00626	HDC00627
7	177.8	700	69	11	—	HDC00628
7	177.8	750	73	11	HDC00629	HDC00630
7	177.8	1000	98	15	HDC00631	HDC00632
7	177.8	1500	147	23	—	HDC00633
7½	190.5	500	45	7	HDC00634	HDC00635
7½	190.5	1000	91	14	—	HDC00636
7¾	196.9	1000	88	14	—	HDC00637
7¾	196.9	1500	132	20	—	HDC00638
8	203.2	200	17	3	—	HDC00639
8	203.2	300	25	4	HDC00640	HDC00641
8	203.2	500	42	7	HDC00642	HDC00643
8	203.2	600	51	8	—	HDC00644
8	203.2	750	64	10	HDC00645	HDC00646
8	203.2	800	68	11	HDC00647	HDC00648
8	203.2	900	76	12	—	HDC00649
8	203.2	1000	85	13	HDC00650	HDC00651
8	203.2	1175	100	16	—	HDC00652
8	203.2	1200	102	16	—	HDC00653
8	203.2	1500	127	20	—	HDC00654
8	203.2	2000	170	26	—	HDC00655
8½	215.9	300	24	4	—	HDC00656
8½	215.9	500	40	6	—	HDC00657
8½	215.9	1000	80	12	HDC00658	HDC00659

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
8¾	222.3	1000	77	12	—	HDC00660
9	228.6	500	37	6	—	HDC00661
9	228.6	750	56	9	—	HDC00662
9	228.6	1000	75	12	HDC00663	HDC00664
9	228.6	1325	99	15	—	HDC00665
9	228.6	1500	112	17	—	HDC00666
9½	241.3	500	35	6	—	HDC00667
9½	241.3	800	57	9	—	HDC00668
9½	241.3	1000	71	11	—	HDC00669
10	254.0	500	34	5	HDC00670	HDC00671
10	254.0	750	50	8	—	HDC00672
10	254.0	800	54	8	—	HDC00673
10	254.0	1000	67	10	HDC00674	HDC00675
10	254.0	1100	74	11	—	HDC00676
10	254.0	1250	84	13	—	HDC00677
10	254.0	1500	101	16	—	HDC00678
10	254.0	2000	134	21	—	HDC00679
10½	266.7	1500	95	15	—	HDC00680
11	279.4	500	30	5	HDC00681	—
11	279.4	1000	61	9	—	HDC00682
11	279.4	1500	91	14	—	HDC00683
11	279.4	2000	121	19	—	HDC00684
11½	292.1	1525	88	14	—	HDC00685
12	304.8	500	28	4	HDC00686	HDC00687
12	304.8	600	33	5	HDC00688	HDC00689
12	304.8	1000	55	9	HDC00690	HDC00691
12	304.8	1100	61	9	—	HDC00692
12	304.8	1500	83	13	—	HDC00693
12	304.8	2000	111	17	—	HDC00694
12½	317.5	1675	89	14	—	HDC00695
13½	342.9	500	24	4	—	HDC00696
14	355.6	1000	47	7	—	HDC00697
14	355.6	1700	80	12	—	HDC00698
14	355.6	2300	108	17	—	HDC00699
15	381.0	800	35	5	—	HDC00700
15	381.0	1000	44	7	—	HDC00701
15	381.0	1500	66	10	—	HDC00702
15	381.0	2000	88	14	—	HDC00703
16	406.4	800	33	5	—	HDC00704
16	406.4	1000	41	6	—	HDC00705
16½	419.1	2200	88	14	—	HDC00706
17	431.8	1000	39	6	—	HDC00707
18	457.2	750	27	4	—	HDC00708
18	457.2	1000	36	6	—	HDC00709
18	457.2	1500	55	9	—	HDC00710
18	457.2	1700	62	10	—	HDC00711
18	457.2	2000	73	11	—	HDC00712

Ordering Information

Substrate—A semi-finished Cartridge Heater ready to be completed by adding the best suited termination for a specific application; can ship same or next day. Complete details, ordering information and Termination Quick Reference Charts are on pages 2-10 through 2-12.

Custom Engineered/Manufactured

Cartridge Heaters can be application specific, therefore for sizes, electrical ratings, terminations and any other design features not listed in this catalog **TEMPCO** will custom manufacture to your specifications. Consult us with your requirements.

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

Available Hi-Density Substrates

STOCK — *Immediate Delivery through the TERMINATOR® Lead Conversion Program*

5/8" Diameter Actual .621" (15.77 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
1¼	31.8	50	34	5	HDC00713	—
1¼	31.8	200	136	21	HDC00714	HDC00715
1¼	31.8	250	170	26	HDC00716	HDC00717
1½	38.1	250	127	20	HDC00719	HDC00720
2	50.8	100	34	5	HDC00721	—
2	50.8	125	42	7	HDC00722	—
2	50.8	200	68	11	HDC00723	HDC00724
2	50.8	250	85	13	HDC00725	HDC00726
2	50.8	300	102	16	—	HDC00727
2	50.8	400	136	21	—	HDC00728
2	50.8	500	170	26	—	HDC00729
2	50.8	750	255	40	—	HDC00730
2¼	57.2	100	29	5	HDC00731	—
2¼	57.2	125	36	6	HDC00732	—
2¼	57.2	250	73	11	HDC00733	HDC00734
2¼	57.2	350	102	16	HDC00735	HDC00736
2¼	57.2	400	116	18	—	HDC00737
2¼	57.2	500	146	23	—	HDC00738
2⅜	60.3	280	76	12	HDC00739	HDC00740
2⅜	60.3	350	95	15	HDC00741	—
2½	63.5	180	46	7	HDC00742	—
2½	63.5	275	70	11	HDC00743	HDC00744
2½	63.5	400	102	16	HDC00745	HDC00746
2½	63.5	720	183	28	—	HDC00747
3	76.2	150	31	5	HDC00748	—
3	76.2	180	37	6	HDC00749	—
3	76.2	250	51	8	HDC00750	HDC00751
3	76.2	350	71	11	HDC00752	HDC00753
3	76.2	400	81	13	HDC00754	—
3	76.2	500	102	16	HDC00755	HDC00756
3	76.2	600	122	19	—	HDC00757
3	76.2	720	147	23	—	HDC00758
3	76.2	750	153	24	—	HDC00759
3¼	82.6	200	37	6	HDC00760	—
3¼	82.6	800	148	23	—	HDC00761
3½	88.9	525	89	14	—	HDC00762
3¾	95.3	525	82	13	HDC00763	HDC00764
3¾	95.3	750	118	18	—	HDC00765
4	101.6	250	36	6	HDC00766	HDC00767
4	101.6	300	44	7	—	HDC00768
4	101.6	350	51	8	HDC00769	—
4	101.6	400	58	9	—	HDC00770
4	101.6	500	73	11	HDC00771	HDC00772
4	101.6	550	80	12	—	HDC00773
4	101.6	600	87	14	—	HDC00774
4	101.6	750	109	17	HDC00775	HDC00776
4	101.6	1000	146	23	—	HDC00777
4½	114.3	250	32	5	—	HDC00778
4½	114.3	300	38	6	—	HDC00779
4½	114.3	500	64	10	—	HDC00780
4½	114.3	700	89	14	HDC00781	HDC00782
4½	114.3	750	95	15	HDC00783	HDC00784
4½	114.3	1000	127	20	—	HDC00785
4¾	120.7	250	30	5	—	HDC00786
4¾	120.7	750	90	14	—	HDC00787

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
5	127.0	250	28	4	HDC00788	HDC00789
5	127.0	500	57	9	—	HDC00790
5	127.0	750	85	13	HDC00791	HDC00792
5	127.0	875	99	15	—	HDC00793
5	127.0	1000	113	18	HDC00794	HDC00795
5⅜	136.5	800	84	13	HDC00796	HDC00797
5½	139.7	350	36	6	—	HDC00798
5½	139.7	800	81	13	HDC00799	HDC00800
5¾	146.1	500	49	8	—	HDC00801
5¾	146.1	1500	146	23	—	HDC00802
6	152.4	150	14	2	—	HDC00803
6	152.4	300	28	4	HDC00804	HDC00805
6	152.4	500	46	7	HDC00806	HDC00807
6	152.4	750	69	11	—	HDC00808
6	152.4	1000	93	14	HDC00809	HDC00810
6	152.4	1200	111	17	—	HDC00811
6	152.4	1500	139	22	HDC00812	HDC00813
6½	165.1	350	30	5	HDC00814	HDC00815
6½	165.1	500	42	7	HDC00816	HDC00817
6½	165.1	900	76	12	—	HDC00818
6½	165.1	1400	119	18	—	HDC00819
6¾	171.5	500	41	6	—	HDC00820
6¾	171.5	1000	81	13	—	HDC00821
7	177.8	500	39	6	HDC00822	HDC00823
7	177.8	750	59	9	—	HDC00824
7	177.8	1000	78	12	HDC00825	HDC00826
7	177.8	1500	118	18	—	HDC00827
7½	190.5	325	24	4	HDC00828	—
7½	190.5	1300	95	15	—	HDC00829
7¾	196.9	400	28	4	—	HDC00830
7¾	196.9	1000	70	11	—	HDC00831
8	203.2	400	27	4	—	HDC00832
8	203.2	500	34	5	HDC00833	HDC00834
8	203.2	750	51	8	—	HDC00835
8	203.2	850	58	9	—	HDC00836
8	203.2	1000	68	11	HDC00837	HDC00838
8	203.2	1200	81	13	HDC00839	HDC00840
8	203.2	1500	102	16	HDC00841	HDC00842
8	203.2	2000	136	21	—	HDC00843
8½	215.9	875	56	9	—	HDC00844
8¾	222.3	450	28	4	HDC00845	—
8¾	222.3	1800	111	17	—	HDC00846
9	228.6	500	30	5	—	HDC00847
9	228.6	750	45	7	—	HDC00848
9	228.6	1000	60	9	—	HDC00849
9	228.6	1500	90	14	—	HDC00850
9½	241.3	975	55	9	—	HDC00851
10	254.0	500	27	4	HDC00852	HDC00853
10	254.0	600	32	5	HDC00854	—
10	254.0	650	35	5	HDC00855	—
10	254.0	750	40	6	—	HDC00856
10	254.0	800	43	7	—	HDC00857
10	254.0	1000	54	8	HDC00858	HDC00859
10	254.0	1500	80	13	HDC00860	HDC00861
10	254.0	2000	107	17	—	HDC00862
11	279.4	1000	49	8	—	HDC00863

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

Product Inventory Available for Viewing and Selection @ www.tempco.com

STOCK — Immediate Delivery through the TERMINATOR® Lead Conversion Program

5/8" Diameter Actual .621" (15.77 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
11	279.4	1400	68	11	—	HDC00864
11	279.4	2000	97	15	—	HDC00865
12	304.8	500	22	3	HDC00866	HDC00867
12	304.8	600	27	4	HDC00868	—
12	304.8	775	34	5	—	HDC00869
12	304.8	900	40	6	—	HDC00870
12	304.8	1000	44	7	HDC00871	HDC00872
12	304.8	1500	66	10	HDC00873	HDC00874
12	304.8	2000	89	14	—	HDC00875
13	330.2	1000	41	6	—	HDC00876
13	330.2	1500	61	10	—	HDC00877
14	355.6	925	35	5	HDC00878	—
14	355.6	1000	38	6	—	HDC00879
14	355.6	1500	57	9	—	HDC00880
14	355.6	3700	140	22	—	HDC00881
15	381.0	750	26	4	—	HDC00882
15	381.0	1000	35	5	—	HDC00883
15	381.0	2400	84	13	—	HDC00884
15	381.0	4000	140	22	—	HDC00885
16	406.4	1000	33	5	—	HDC00886

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
16	406.4	2500	82	13	—	HDC00887
16	406.4	4500	148	23	—	HDC00888
17	431.8	1000	31	5	—	HDC00889
18	457.2	900	26	4	—	HDC00890
18	457.2	1000	29	5	—	HDC00891
18	457.2	1500	44	7	—	HDC00892
18	457.2	3000	87	14	—	HDC00893
18	457.2	4700	137	21	—	HDC00894
19	482.6	1000	28	4	—	HDC00895
20	508.0	1000	26	4	—	HDC00896
20	508.0	1500	39	6	—	HDC00897
20	508.0	3500	91	14	—	HDC00898
20	508.0	4700	123	19	—	HDC00899
24	609.6	1000	22	3	—	HDC00900
24	609.6	2000	43	7	—	HDC00901
24	609.6	4700	102	16	—	HDC00902
25¼	641.4	1500	31	5	—	HDC00903
30	762.0	2800	48	8	—	HDC00904
36	914.4	3000	43	7	—	HDC00905

3/4" Diameter Actual .746" (18.95 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
2	50.8	200	57	9	HDC00906	—
2	50.8	800	226	35	—	HDC00907
2¼	57.2	200	49	8	HDC00908	—
2¼	57.2	800	194	30	—	HDC00909
3	76.2	250	42	7	HDC00910	—
3	76.2	500	85	13	HDC00911	HDC00912
3	76.2	600	102	16	HDC00913	HDC00914
3	76.2	1000	170	26	—	HDC00915
3½	88.9	250	35	6	HDC00916	HDC00917
3½	88.9	350	50	8	—	HDC00918
3½	88.9	500	71	11	HDC00919	—
3½	88.9	1000	141	22	—	HDC00920
3¾	95.3	250	33	5	HDC00921	—
3¾	95.3	500	65	10	—	HDC00922
3¾	95.3	1000	131	20	—	HDC00923
4	101.6	250	30	5	HDC00924	HDC00925
4	101.6	500	61	9	HDC00926	HDC00927
4	101.6	750	91	14	—	HDC00928
4	101.6	1000	121	19	HDC00929	HDC00930
4½	114.3	350	37	6	HDC00931	—

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
4½	114.3	875	93	14	HDC00932	HDC00933
4½	114.3	1400	149	23	—	HDC00934
4¾	120.7	750	75	12	—	HDC00935
5	127.0	300	28	4	HDC00936	HDC00937
5	127.0	500	47	7	—	HDC00938
5	127.0	750	71	11	—	HDC00939
5	127.0	1000	94	15	HDC00940	HDC00941
5	127.0	1200	113	18	—	HDC00942
5¾	146.1	1000	81	13	—	HDC00943
6	152.4	500	39	6	HDC00944	HDC00945
6	152.4	750	58	9	—	HDC00946
6	152.4	1000	77	12	HDC00947	HDC00948
6	152.4	1200	93	14	—	HDC00949
6	152.4	1500	116	18	—	HDC00950
6	152.4	2000	154	24	—	HDC00951
7	177.8	500	33	5	HDC00952	HDC00953
7	177.8	1000	65	10	HDC00954	HDC00955
7	177.8	1500	98	15	HDC00956	HDC00957
7	177.8	2000	131	20	—	HDC00958
7⅝	193.7	450	27	4	—	HDC00959

Ordering Information

Substrate—A semi-finished Cartridge Heater ready to be completed by adding the best suited termination for a specific application; can ship same or next day. Complete details, ordering information and Termination Quick Reference Charts are on pages 2-10 through 2-12.

Custom Engineered/Manufactured

Cartridge Heaters can be application specific, therefore for sizes, electrical ratings, terminations and any other design features not listed in this catalog **TEMPCO** will custom manufacture to your specifications. Consult us with your requirements.

3/4" DIA. CONTINUED

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

STOCK — Immediate Delivery through the TERMINATOR® Lead Conversion Program

Continued from previous page...

3/4" Diameter Actual .746" (18.95 mm) Hi-Density Cartridge Heater Substrates

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
7¾	196.9	1350	79	12	—	HDC00960
8	203.2	350	20	3	—	HDC00961
8	203.2	500	28	4	HDC00962	HDC00963
8	203.2	700	40	6	—	HDC00964
8	203.2	1000	57	9	—	HDC00965
8	203.2	1350	76	12	—	HDC00966
8	203.2	2000	113	18	HDC00967	HDC00968
9	228.6	350	17	3	—	HDC00969
9	228.6	500	25	4	—	HDC00970
9	228.6	1200	60	9	—	HDC00971
9	228.6	1800	90	14	HDC00972	HDC00973
9¾	247.7	2000	92	14	—	HDC00974
10	254.0	600	27	4	—	HDC00975
10	254.0	1000	45	7	—	HDC00976
10	254.0	1200	54	8	—	HDC00977
10	254.0	2000	89	14	HDC00978	HDC00979
10½	266.7	550	23	4	—	HDC00980
11	279.4	1000	40	6	—	HDC00981
11¾	298.5	1000	38	6	—	HDC00982
11¾	298.5	2000	75	12	—	HDC00983
12	304.8	800	30	5	—	HDC00984
12	304.8	1000	37	6	—	HDC00985
12	304.8	1200	44	7	—	HDC00986
12	304.8	1500	55	9	—	HDC00987
12	304.8	2000	74	11	HDC00988	HDC00989
12	304.8	2500	92	14	—	HDC00990
12	304.8	4000	148	23	—	HDC00991
13	330.2	1000	34	5	—	HDC00992
14	355.6	800	25	4	—	HDC00993
14	355.6	1000	31	5	—	HDC00994
14	355.6	1125	35	6	HDC00995	—
14	355.6	1250	39	6	—	HDC00996

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Substrate Part Number 120V	Substrate Part Number 240V
14	355.6	1400	44	7	—	HDC00997
14	355.6	2500	79	12	—	HDC00998
14	355.6	4500	141	22	—	HDC00999
14¾	374.7	1500	45	7	—	HDC01000
15	381.0	1000	29	5	—	HDC01001
15	381.0	1500	44	7	—	HDC01002
16	406.4	1000	27	4	—	HDC01003
16	406.4	1175	32	5	HDC01004	—
16	406.4	1500	41	6	—	HDC01005
16	406.4	1800	49	8	—	HDC01006
16	406.4	3000	82	13	—	HDC01007
16	406.4	4700	129	20	—	HDC01008
17	431.8	1000	26	4	—	HDC01009
17¾	450.9	850	21	3	—	HDC01010
18	457.2	1000	24	4	—	HDC01011
18	457.2	1250	30	5	HDC01012	—
18	457.2	1450	35	6	—	HDC01013
18	457.2	2000	49	8	—	HDC01014
18	457.2	3250	79	12	—	HDC01015
18	457.2	5000	121	19	—	HDC01016
19	482.6	1000	23	4	—	HDC01017
20	508.0	1000	22	4	—	HDC01018
20	508.0	1150	25	4	—	HDC01019
20	508.0	2050	45	7	—	HDC01020
20	508.0	2250	49	8	—	HDC01021
20	508.0	5250	114	18	—	HDC01022
24	609.6	1000	18	3	—	HDC01023
24	609.6	1375	25	4	—	HDC01024
24	609.6	2000	36	6	—	HDC01025
24	609.6	2750	50	8	—	HDC01026
24	609.6	5500	99	15	—	HDC01027
36	914.4	2500	30	5	—	HDC01028

Termination Selection Chart for Cartridge Heater Substrates is on pages 2-11 and 2-12.

Ordering Information

Substrate—A semi-finished Cartridge Heater ready to be completed by adding the best suited termination for a specific application; can ship same or next day. Complete details, ordering information and Termination Quick Reference Charts are on pages 2-10 through 2-12.

Custom Engineered/Manufactured

Cartridge Heaters can be application specific, therefore for sizes, electrical ratings, terminations and any other design features not listed in this catalog **TEMPCO** will custom manufacture to your specifications. Consult us with your requirements.

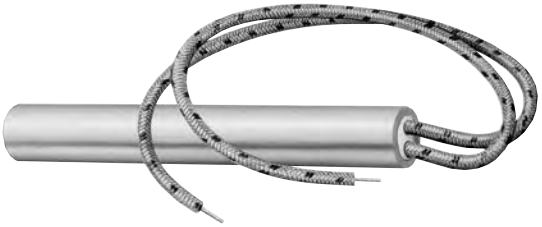
1" Dia. Actual .996" (25.30 mm) Hi-Density Cartridge Heaters with Type N termination 10" leads

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Part Number 120V	Part Number 240V
3	76.2	750	101	16	—	HDC02662
3½	88.9	565	63	10	—	HDC02663
5	127.0	1000	73	11	—	HDC02664
7⅞	200.0	500	22	3	HDC02665	HDC02666
8	203.2	1500	65	10	—	HDC02667
8¾	222.3	875	34	5	—	HDC02668
11½	292.1	1000	29	5	HDC02669	—
13	330.2	1000	26	4	HDC02670	—
14	355.6	2700	64	10	—	HDC02671
15	381.0	1000	22	3	HDC02672	—

Sheath Length in	Sheath Length mm	Watts	Watt Density W/in²	Watt Density W/cm²	Part Number 120V	Part Number 240V
16	406.4	1800	37	6	—	HDC02673
17⅜	441.3	2400	46	7	—	HDC02674
20	508.0	1000	16	3	—	HDC02675
20	508.0	2800	46	7	—	HDC02676
25	635.0	1725	23	3	HDC02677	HDC02678
40	1016.0	4400	36	6	—	HDC02679
49	1244.6	3725	25	4	—	HDC02680
50½	1282.7	945	6	1	—	HDC02681
57	1447.8	2800	16	3	—	HDC02682
60	1524.0	1500	8	1	—	HDC02683

Note: 1" Dia. Hi-Density Cartridge Heaters are made-to-order only.
Refer to ordering information on page 2-3.
Standard lead time is 3 weeks.

STOCK Cartridge Heaters with Type F Flexible Lead Termination



Type F Internally Connected Flexible Leads 10" Long

This lead termination provides flexibility; the lead wires are internally connected to the terminal pins. The lead wires can be sharply bent as they exit the ceramic insulating cap without exposing the bare wire or breaking the solid terminal pins.

1/4" Diameter Actual .246" (6.25 mm)

Sheath Length in	Sheath Length mm	Watts	Volts	Watt Density W/in²	Watt Density W/cm²	Part Number
1	25.4	80	120	204	32	HDC05603
1½	38.1	50	120	64	10	HDC06151
1½	38.1	200	120	255	40	HDC10869
2	50.8	200	240	170	26	HDC01989
2	50.8	250	240	212	33	HDC05179
2	50.8	300	240	255	40	HDC04556
2½	63.5	300	240	191	30	HDC07119
3	76.2	75	120	38	6	HDC10412
3	76.2	300	240	153	24	HDC04490
4	101.6	400	240	146	23	HDC04200
5¾	146.1	350	120	94	15	HDC04732

3/8" Diameter Actual .371" (9.42 mm)

Sheath Length in	Sheath Length mm	Watts	Volts	Watt Density W/in²	Watt Density W/cm²	Part Number
1¼	31.8	150	240	170	26	HDC06254
1¼	31.8	200	240	226	35	HDC04349
1½	31.8	250	120	212	33	HDC04402
2	50.8	250	240	141	22	HDC04291
2	50.8	350	240	198	31	HDC11345
2½	63.5	250	240	106	16	HDC07496
2½	63.5	350	240	149	23	HDC04759
2½	63.5	500	240	212	33	HDC05359
3	76.2	300	240	102	16	HDC02094
3	76.2	375	240	127	20	HDC06779
3½	88.9	350	240	99	15	HDC04861
4	101.6	400	120	97	15	HDC04560
4	101.6	500	240	121	19	HDC04552
5½	139.7	1000	240	170	26	HDC05431
7	177.8	350	240	46	7	HDC05303
12	304.8	1000	240	74	11	HDC05833

1/2" Diameter Actual .496" (12.60 mm)

Sheath Length in	Sheath Length mm	Watts	Volts	Watt Density W/in²	Watt Density W/cm²	Part Number
2	50.8	300	240	127	20	HDC03872
3⅛	79.4	500	240	121	19	HDC11162
3 13/16	96.8	250	240	48	7	HDC10330
4	101.6	500	240	91	14	HDC04676
4	101.6	600	240	109	17	HDC03878
5	127	500	240	71	11	HDC04701
6	152.4	500	240	58	9	HDC04677
6	152.4	750	240	87	14	HDC04352
6	152.4	1000	240	116	18	HDC03887
7	177.8	750	240	73	11	HDC03893
8	203.2	500	240	42	7	HDC02265
8	203.2	1000	240	85	13	HDC02263
10	254	1000	240	67	10	HDC04220

5/8" Diameter Actual .621" (15.77 mm)

Sheath Length in	Sheath Length mm	Watts	Volts	Watt Density W/in²	Watt Density W/cm²	Part Number
3	76.2	750	240	153	24	HDC04483
6	152.4	600	240	56	9	HDC11240
6	152.4	1000	240	93	14	HDC07353

Available from Stock

For same day shipping when ORDERED BY 2 PM CST

Note: Custom Engineered/Manufactured Hi-Density Cartridge Heaters with Type F Flexible Lead Termination

Refer to ordering information on page 2-3.

Cartridge Heater Moisture Resistant Terminations

Available through the Terminator Program for 2nd Day Delivery

Type M1 ☐ Polyolefin Liquid Barrier

Available on HDC, HDM, and LDC cartridge heaters

A liquid barrier used for low temperature applications in primarily refrigeration or food service applications. The seal bonds to both the heater and the leads.

M1A Teflon® insulated lead wires.

M1B Three conductor SJO type cord.

- A minimum of 1-1/2" of cold section at the lead end is required. Temperature at the lead end is not to exceed 220°F (105°C).
- **Standard** 10" (254 mm) leads. Specify longer leads.

M2A only is available through the Terminator Program for 2nd Day Delivery

Type M2 ☐ Potted End Seal

Available on HDC, HDM and LDC cartridge heaters

Potted end seals help to protect the heater from moisture or contamination from plastic material, cleaning solvents, or oils. The bottom end disc seal is welded in.

M2A Cement potting with silicone varnish. 1000°F (538°C). Fiberglass lead wires externally connected.

M2B Silicone rubber potting. 450°F (232°C). Silicone rubber lead wires internally connected.

M2C High temperature epoxy potting. 450°F (232°C). Teflon® lead wires internally connected.

M2D Low temperature epoxy potting. 266°F (130°C) Teflon® lead wires internally connected.

- A minimum of 1" cold section at the lead end is required.
- **Standard** 10" (254 mm) leads. Specify longer leads.

Type M3 Teflon® End Plug Seal

Available on HDC and HDM cartridge heaters

A moisture resistant Teflon® seal that is swaged in during the manufacturing process with Teflon® insulated lead wire.

Minimum 3/8" up to 1" cold section at the lead end is required.

- Temperature at the lead end not to exceed 350°F (176°C)
- **Standard** 10" (254 mm) leads. Specify longer leads.

Available through the Terminator Program for 2nd Day Delivery

Type SA Sealed Armor Cable

Available on HDC, HDM and LDC cartridge heaters

A liquid-proof stainless steel corrugated metal hose is silver brazed to the end of the cartridge heater. The end disc of the heater is also welded or brazed. This termination provides a positive seal against moisture and contamination entering the heater.

- **Standard** 10" (254 mm) cable over 12" (305 mm) leads. Specify longer leads or cable.

Available through the ***Terminator*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

Cartridge Heater Flexing Resistant Terminations

Type S1 ☐ Straight Spring

Available on HDC, HDM, and LDC cartridge heaters.

The leads are reinforced with a steel spring for applications with extreme flexing. The spring is mechanically fastened or silver brazed.

S1A Mechanically fastened spring.

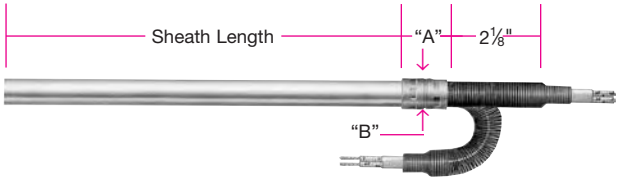
S1B Silver brazed spring.

➤ **Standard** 10" (254 mm) leads. Specify longer leads.

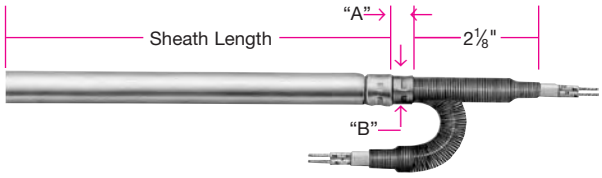
➤ Temperature at the lead end not to exceed 350°F (176°C).

	Diameter in	Diameter mm	Fig.	"A" Dim. in	"A" Dim. mm	"B" Dim. in	"B" Dim. mm
Hi-Density Cartridge Heaters	1/4	6.35	1	11/16	17.46	5/16	7.94
	5/16	7.94	1	11/16	17.46	7/16	11.11
	3/8	9.53	1	11/16	17.46	7/16	11.11
	1/2	12.70	1	13/16	20.64	9/16	14.29
	5/8	15.88	1	1	25.40	3/4	19.05
	3/4	19.05	1	1-1/4	31.75	7/8	22.23
	1	25.40	2	5/8	15.88	5/8	15.88
Low-Density Cartridge Heaters	3/16	4.76	—	—	—	—	—
	1/4	6.35	1	11/16	17.46	5/16	7.94
	3/8	9.53	1	11/16	17.46	7/16	11.11
	1/2	12.70	1	13/16	20.64	9/16	14.29
	5/8	15.88	2	7/16	11.11	9/16	14.29
	3/4	19.05	2	1/2	12.70	9/16	14.29
	7/8	22.23	2	5/8	15.88	9/16	14.29
	15/16	23.81	2	5/8	15.88	5/8	15.88
	1	25.40	2	5/8	15.88	5/8	15.88
	1-1/4	31.75	2	5/8	15.88	5/8	15.88

TYPE **S1** Fig. 1



TYPE **S1** Fig. 2



Type S2 ☐ Right-Angle Spring

Available on HDC, HDM, and LDC cartridge heaters

The leads are reinforced with a steel spring for applications with extreme flexing. The spring is mechanically fastened or silver brazed.

S2A Mechanically fastened spring

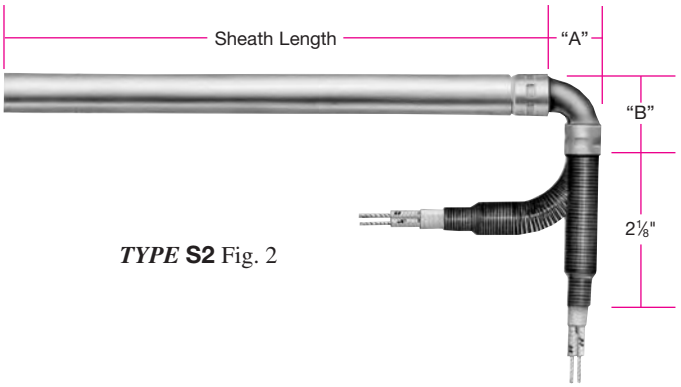
S2B Silver brazed spring

➤ **Standard** 10" (254 mm) leads. Specify longer leads.

➤ Temperature at the lead end not to exceed 482°F (250°C).

	Diameter in	Diameter mm	Fig.	"A" Dim. in	"A" Dim. mm	"B" Dim. in	"B" Dim. mm
Hi-Density Cartridge Heaters	1/4	6.35	1	3/4	19.05	3/4	19.05
	5/16	7.94	1	15/16	23.81	15/16	23.81
	3/8	9.53	1	15/16	23.81	15/16	23.81
	1/2	12.70	1	1-1/4	31.75	1-1/4	31.75
	5/8	15.88	1	1-1/4	31.75	1-1/4	31.75
	3/4	19.05	1	1-3/4	44.45	1-1/4	31.75
	1	25.40	2	1-1/8	28.58	1-3/8	34.93
Low-Density Cartridge Heaters	3/16	4.76	—	—	—	—	—
	1/4	6.35	1	3/4	19.05	3/4	19.05
	3/8	9.53	1	15/16	23.81	15/16	23.81
	1/2	12.70	1	1-1/4	31.75	1-1/4	31.75
	5/8	15.88	2	11/16	17.46	1-1/4	31.75
	3/4	19.05	2	3/4	19.05	1-1/4	31.75
	7/8	22.23	2	3/4	19.05	1-3/8	34.93
	15/16	23.81	2	1-1/8	28.58	1-3/8	34.93
	1	25.40	2	1-1/8	28.58	1-3/8	34.93
	1-1/4	31.75	2	1-1/8	28.58	1-3/8	34.93

TYPE **S2** Fig. 1



TYPE **S2** Fig. 2

Cartridge Heater Lead Wire with Strain Relief Terminations

Type S3 Lead Wire Strain Relief

Available on HDC, HDM, and LDC cartridge heaters

Strain relief clip for leads subject to tension and stress. A "T" type strain relief is silver brazed to the sheath.

- **Standard** 10" (254 mm) leads. Specify longer leads.
- Temperature at the lead end not to exceed 482°F (250°C).

Type S4 Right-Angle Lead Wire Strain Relief

Available on HDC, HDM, and LDC cartridge heaters

Strain relief clip for leads subject to tension and stress. A "T" type strain relief is silver brazed to the sheath and bent at a 90° angle.

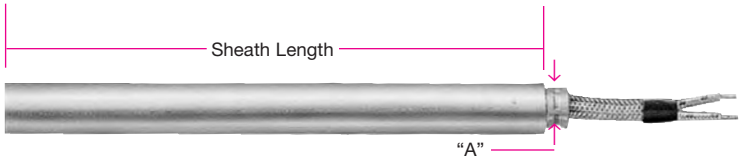
- **Standard** 10" (254 mm) leads. Specify longer leads.
- Temperature at the lead end not to exceed 482°F (250°C).

Cartridge Heater Abrasive Resistant Terminations

***TYPE* W** Fig. 1

Available through the Terminator Program for 2nd Day Delivery

***TYPE* W** Fig. 2



Type W Wire Braided Leads

Available on HDC, HDM, and LDC cartridge heaters

Stainless steel braid over fiberglass leads offers sharp bending not possible with armor cable, as well as abrasion protection.

- Minimum 3/8" up to 1" cold section at the lead end is required. Temperature at the lead end is not to exceed 482°F (250°C). For higher temperature applications, special gauge lead wires can be used—consult Tempco with your requirements.
- **Standard** 10" (254 mm) braid over 12" (305 mm) leads. Specify longer braid/leads.

Diameter			"A" Dim./HD		"A" Dim./LD	
in	mm	Fig.	in	mm	in	mm
3/16	4.76	1	—	—	1/4	6.35
1/4	6.35	1	5/16	7.94	5/16	7.94
5/16	7.94	1	3/8	9.53	—	—
3/8	9.53	2	3/8	9.53	3/8	9.53
1/2	12.70	2	7/16	11.11	7/16	11.11
5/8	15.88	2	9/16	14.29	9/16	14.29
3/4	19.05	2	9/16	14.29	9/16	14.29
7/8	22.23	2	—	—	9/16	14.29
15/16	23.81	2	—	—	9/16	14.29
1	25.40	2	9/16	14.29	9/16	14.29
1-1/4	31.75	2	—	—	9/16	14.29

Type W3 Swaged-In Wire Braided Leads

Available on HDC and HDM cartridge heaters

Stainless steel braid over fiberglass leads offers sharp bending not possible with armor cable, as well as abrasion protection. In addition, Type W3 offers moisture resistance due to the Teflon® seal required for holding the wire braid.

- Minimum 3/8" up to 1" cold section at the lead end is required.
- Temperature at the lead end not to exceed 350°F (176°C).
- **Standard** 10" (254 mm) braid over 12" (305 mm) leads. Specify longer braid/leads.

Cartridge Heater Abrasion Resistant Terminations

Type CS ☐ Silver Brazed Cable to Sheath

Available on HDC, HDM, and LDC cartridge heaters

The armor cable is silver brazed directly to the cartridge heater, eliminating the coupling, to maintain an overall diameter equal to or smaller than the cartridge diameter.

CSA Galvanized armor cable

CSB Stainless steel armor cable

➤ **Standard** 10" (254 mm) cable over 12" (305 mm) leads. Specify longer leads or cable.

➤ Temperature at lead end not to exceed 482°F (250°C).

Type C1 ☐ Straight Armor Cable

Available on HDC, HDM, or LDC cartridge heaters

Armor cable provides the maximum in protection for abrasive, jagged environments. The coupling between the cartridge and the armor cable is mechanically fastened or silver brazed.

C1A Galvanized armor cable, mechanically fastened

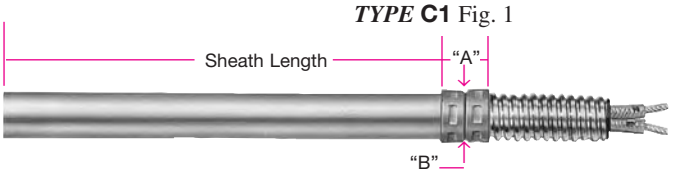
C1B Stainless steel armor cable, mechanically fastened

C1C Galvanized armor cable, silver brazed

C1D Stainless steel armor cable, silver brazed

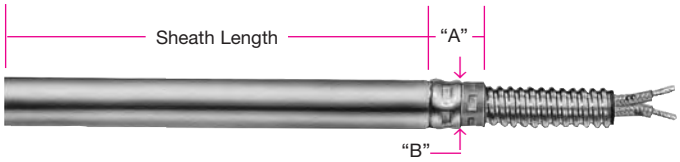
➤ **Standard** 10" (254 mm) cable over 12" (305 mm) leads. Specify longer leads or cable.

***TYPE* C1** Fig. 1



Available through the Terminator Program for Same or Next Day Delivery

***TYPE* C1** Fig. 2

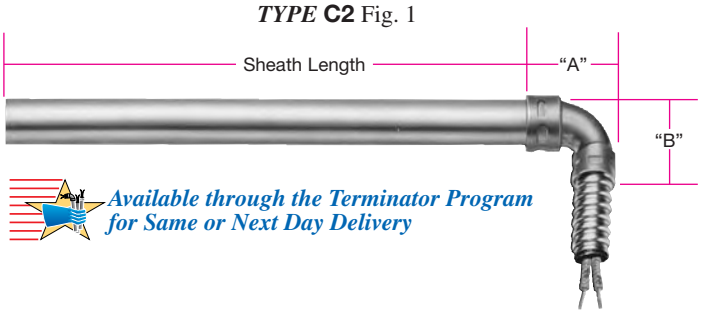


	Diameter in	Diameter mm	Fig.	"A" Dim. in	"A" Dim. mm	"B" Dim. in	"B" Dim. mm	Cable Dia.
Hi-Density Cartridge Heaters	1/4	6.35	1	11/16	17.46	5/16	7.94	1/4
	5/16	7.94	1	11/16	17.46	7/16	11.11	1/4
	3/8	9.53	1	11/16	17.46	7/16	11.11	3/8
	1/2	12.70	1	13/16	20.64	9/16	14.29	1/2
	5/8	15.88	1	1	25.40	3/4	19.05	1/2
	3/4	19.05	1	1-1/4	31.75	7/8	22.23	1/2
	1	25.40	2	5/8	15.88	5/8	15.88	1/2
Low-Density Cartridge Heaters	3/16	4.76	—	—	—	—	—	—
	1/4	6.35	1	11/16	17.46	5/16	7.94	1/4
	3/8	9.53	1	11/16	17.46	7/16	11.11	3/8
	1/2	12.70	1	13/16	20.64	9/16	14.29	1/2
	5/8	15.88	2	7/16	11.11	9/16	14.29	1/2
	3/4	19.05	2	1/2	12.70	9/16	14.29	1/2
	7/8	22.23	2	5/8	15.88	9/16	14.29	1/2
	15/16	23.81	2	5/8	15.88	5/8	15.88	1/2
	1	25.40	2	5/8	15.88	5/8	15.88	1/2
	1-1/4	31.75	2	5/8	15.88	5/8	15.88	1/2

Available through the ***Terminator*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

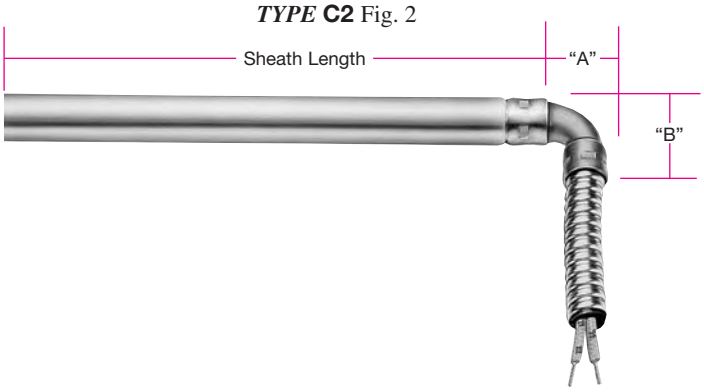
Cartridge Heater Right-Angle Terminations

TYPE **C2** Fig. 1

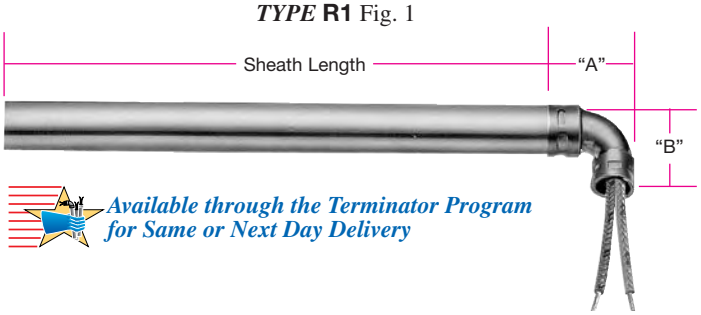


Available through the Terminator Program for Same or Next Day Delivery

TYPE **C2** Fig. 2

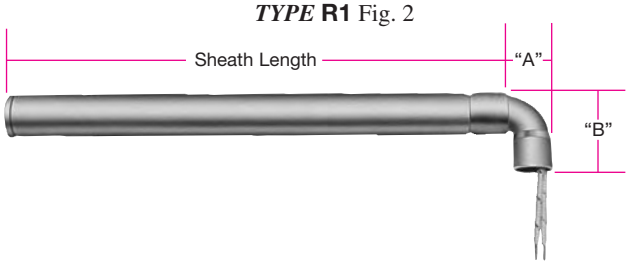


TYPE **R1** Fig. 1



Available through the Terminator Program for Same or Next Day Delivery

TYPE **R1** Fig. 2



Type C2 ☐ Right-Angle Armor Cable with Copper Elbow

Available on HDC, HDM, and LDC cartridge heaters

Armor cable provides the maximum in protection for abrasive, jagged environments. The copper elbow between the cartridge and the armor cable is mechanically fastened or silver brazed.

C2A Galvanized armor cable, mechanically fastened

C2B Stainless steel armor cable, mechanically fastened

C2C Galvanized armor cable, silver brazed

C2D Stainless steel armor cable, silver brazed

➤ **Standard** 10" (254 mm) cable over 12" (305 mm) leads. Specify longer cable or leads.

Dimensions for Types C2 and R1

	Diameter in	Diameter mm	Fig.	"A" Dim. in	"A" Dim. mm	"B" Dim. in	"B" Dim. mm	Cable Dia.
Hi-Density Cartridge Heater	1/4	6.35	1	3/4	19.05	3/4	19.05	1/4
	5/16	7.94	1	15/16	23.81	15/16	23.81	1/4
	3/8	9.53	1	15/16	23.81	15/16	23.81	3/8
	1/2	12.70	1	1-1/4	31.75	1-1/4	31.75	1/2
	5/8	15.88	1	1-1/4	31.75	1-1/4	31.75	1/2
	3/4	19.05	1	1-3/4	44.45	1-1/4	31.75	1/2
	1	25.40	2	1-1/8	28.58	1-3/8	34.93	1/2
Low Density Cartridge Heater	3/16	4.76	—	—	—	—	—	—
	1/4	6.35	1	3/4	19.05	3/4	19.05	1/4
	3/8	9.53	1	15/16	23.81	15/16	23.81	3/8
	1/2	12.70	1	1-1/4	31.75	1-1/4	31.75	1/2
	5/8	15.88	2	11/16	17.46	1-1/4	31.75	1/2
	3/4	19.05	2	3/4	19.05	1-1/4	31.75	1/2
	7/8	22.23	2	3/4	19.05	1-3/8	34.93	1/2
	15/16	23.81	2	1-1/8	28.58	1-3/8	34.93	1/2
	1	25.40	2	1-1/8	29.58	1-3/8	34.93	1/2
	1-1/4	31.75	2	1-1/8	29.58	1-3/8	34.93	1/2

Type R1 ☐ Right-Angle Leads with Copper Elbow

Available on HDC, HDM, and LDC cartridge heaters

This termination is used when space is limited. The copper elbow is mechanically fastened or silver brazed.

R1A Mechanically fastened

R1B Silver brazed

➤ **Standard** 10" (254 mm) leads. Specify longer leads.

Cartridge Heater Right-Angle Terminations

Type C3 ☐ Right-Angle Armor Cable

Available on HDC, HDM, and LDC cartridge heaters

Use this termination when space is limited and maximum protection is required. The armor cable is silver brazed to the cartridge sheath at 90°. The sheath extension is potted with cement. Various lead end finishes are available as listed below.

C3A Cement potting and silicone varnish, with galvanized cable

C3B Cement potting and silicone varnish, with stainless steel cable

C3C Welded lead end disc, with galvanized cable

C3D Welded lead end disc, with stainless steel cable

➤ **Standard** 10" (254 mm) armor cable over 12" (305 mm) leads. Specify longer cable or leads.

Type W1 ☐ Right-Angle Wire Braided Leads

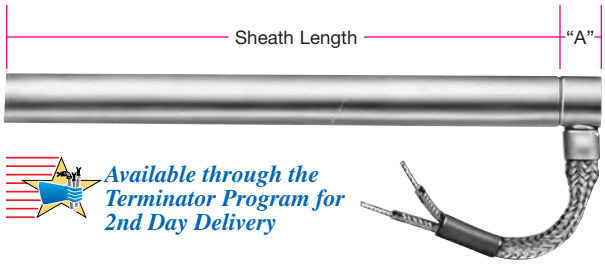
Available on HDC, HDM, and LDC cartridge heaters

Stainless steel braid over fiberglass leads for abrasion protection, mechanically crimped to the cartridge sheath at 90°. Wire braid offers extreme flexibility not possible with armor cable. Various lead end finishes are available as listed below.

W1A Cement potting and silicone varnish

W1B Welded lead end disc

➤ **Standard** 10" (254 mm) braid over 12" (305 mm) leads. Specify longer braid or leads.



Type R2 ☐ Right-Angle Leads

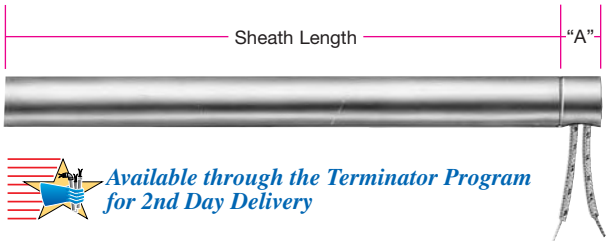
Available on HDC, HDM, and LDC cartridge heaters

This termination is used when space is limited. Not suitable for abrasive environments. Same as C3 and W1 except plain fiberglass leads. The sheath extension is potted with cement. Various lead end finishes are available as listed below.

R2A Cement potting and silicone varnish

R2B Welded lead end disc

➤ **Standard** 10" (254 mm) leads. Specify longer leads.



Dimensions for types C3, W1 and R2

Diameter in	Diameter mm	Availability HD	Availability LD	"A" Dim. in	"A" Dim. mm	Armor Cable in	Armor Cable mm
3/16	4.76	No	No	—	—	—	—
1/4	6.35	Yes	Yes	5/16	7.94	1/4	6.35
5/16	7.94	Yes	No	5/16	7.94	1/4	6.35
3/8	9.53	Yes	Yes	7/16	11.11	3/8	9.53
1/2	12.70	Yes	Yes	9/16	14.29	1/2	12.70
5/8	15.88	Yes	Yes	9/16	14.29	1/2	12.70
3/4	19.05	Yes	Yes	9/16	14.29	1/2	12.70
7/8	22.23	No	Yes	5/8	15.88	1/2	12.70
15/16	23.81	No	Yes	5/8	15.88	1/2	12.70
1	25.40	Yes	Yes	5/8	15.88	1/2	12.70
1-1/4	31.75	No	Yes	5/8	15.88	1/2	12.70

Available through the ***Terminator*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

Cartridge Heater Other Angle Terminations

Available through the Terminator Program for 2nd Day Delivery

Type R3 ☐ Angled Sheath Extension

Available on HDC, HDM, and LDC cartridge heaters

The sheath extension is silver brazed to the cartridge at a 90° angle and cement potted. The leads are internally connected. The standard sheath extension is 3/8" long. Specify when ordering if a longer sheath is required. If abrasion resistance is required, armor cable or stainless steel wire braid can be attached to the sheath extension.

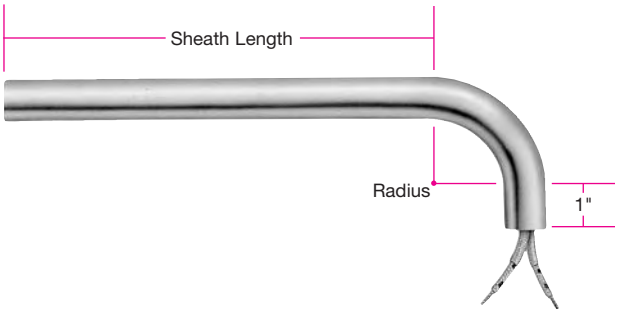
R3A Plain leads 10" (254 mm) long

R3B 10" galvanized armor cable over 12" leads

R3C 10" stainless steel armor cable over 12" leads

R3D 10" stainless steel braid over 12" leads

➤ Specify if longer cable/leads are required.



Type R4 ☐ Bent Cartridge

Available on HDC and HDM cartridge heaters

The heater sheath itself is bent to 90°. The bend is through a required cold section. The leads are internally connected. The standard sheath extension past the bend is 1". Specify when ordering if a longer sheath is required.

R4A Plain leads 10" (254 mm) long

R4B 10" galvanized armor cable over 12" leads

R4C 10" stainless steel armor cable over 12" leads

R4D 10" stainless steel braid over 12" leads

➤ Specify if longer cable/leads are required.

Cartridge Dia.	**in**	1/4	3/8	1/2	5/8	3/4	1
	mm	6.35	9.53	12.70	15.88	19.05	25.40
Bend Radius	**in**	1/2	1/2	3/4	1	1-1/4	1-1/2
	mm	12.70	12.70	19.05	25.40	31.75	38.10

Cartridge Heater Standard Screw Terminations

Type T1 Screw Terminals

Available on LD type cartridge heaters only

For use with leads, crimp terminals, or bus bars. Includes high temperature washers and nuts. Diameters available: 3/4", 7/8", 15/16", 1", and 1-1/4".

➤ **Standard:** screw #6-32 × 3/4" long

Diameter	**in**	3/4	7/8	15/16	1	1-1/4
	mm	19.05	22.23	23.81	25.40	31.75
"A" Dimension	**in**	3/8	7/16	7/16	1/2	1/2
	mm	9.53	11.11	11.11	12.70	12.70

Available through the Terminator Program for Same or Next Day Delivery

Type T2 Screw Terminals

Available on HDC and HDM type cartridge heaters only

For use with leads, crimp terminals, or bus bars. Includes high temperature washers and nuts.

Diameters available: HD — 5/8", 3/4", 1"
HDM — 16 and 20 mm

➤ **Standard:** screw #8-32

Cartridge Heater Double End Terminations

Type T4 ☐ Double End Terminal Pin

Available on HDC, HDM, and LDC cartridge heaters

For those applications in which wiring from both ends is an advantage. Standard terminal pin length is 2". A minimum of 1" cold section at each end is required. Various seals are available:

T4A Cement potting seal with silicone varnish — 1000°F (537°C)
T4B High temp. moisture resistant epoxy seal — 450°F (232°C)
T4C Low temp. moisture resistant epoxy seal — 266°F (130°C)

Type F1 ☐ Double End Flexible Leads

Available on HDC, HDM, and LDC cartridge heaters

For applications in which it is an advantage to wire from both ends. The leads are internally connected and can be bent sharply as they exit the potted ends. Various seals are available:

F1A Cement potting seal with silicone varnish — 1000°F (532°C)
F1B High temp. moisture resistant epoxy seal — 450°F (232°C)
F1C Low temp. moisture resistant epoxy seal — 266°F (130°C)

Note: A minimum of 1" cold section at each end is required.

➤ **Standard** 10" leads are standard. Specify longer leads.

Type T3 Double End Screw Terminal Leads

Available on HDC, HDM, and LDC cartridge heaters from 1/2" to 1-1/4" diameter

A double ended heater with quick change wiring screw terminals. Includes high temperature washers and nuts.

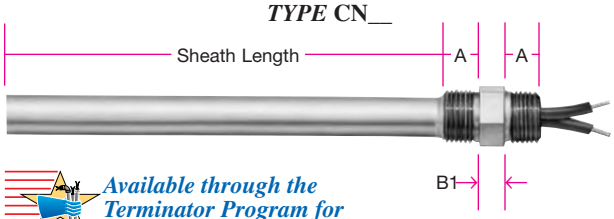
Standard screw sizes:

➤ 1/2" diameter — #8-32 × 3/4" screws
➤ 5/8" to 1-1/4" diameter — #10-32 × 3/4" screws

Available through the ***Terminator*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

Cartridge Heater with National Pipe Thread (NPT) and Bulkhead Fittings

TYPE CN__

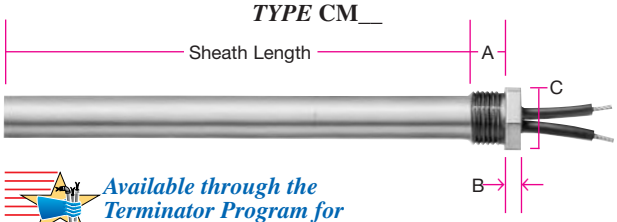


Available through the Terminator Program for 2nd Day Delivery

Type Codes for Double Threaded Fittings

Potting Seal Type	Bushing Material Brass	Bushing Material Stn.Stl.
Low Temp Epoxy	CNA	CNN
Hi Temp Cement	CNB	CNP
Silicone Rubber	CNC	CNQ
Hi Temp Epoxy	CND	CNR
Teflon® End Plug Seal	CNE	CNS
Empty Cavity	CNF	CNT

TYPE CM__



Available through the Terminator Program for 2nd Day Delivery

Type Codes for Single Threaded Fittings

Potting Seal Type	Bushing Material Brass	Bushing Material Stn.Stl.
Low Temp Epoxy	CMA	CMN
Hi Temp Cement	CMB	CMP
Silicone Rubber	CMC	CMQ
Hi Temp Epoxy	CMD	CMR
Teflon® End Plug Seal	CME	CMS
Empty Cavity	CMF	CMT

Type CN ☐ Double Threaded Fitting
Type CM ☐ Single Threaded Fitting

Note: Teflon® end plug seals are not available through the Terminator program. Stainless steel fittings are available through the Terminator program only on heaters 1/2" diameter and bigger.

Available on HDC, HDM and LDC cartridge heaters

A double threaded or single threaded pipe fitting is attached to the end of a cartridge heater to allow for installation into a threaded hole. The brass or steel fitting is silver brazed. The stainless steel fitting is heli-arc welded.

The bushing cavity can be sealed with various materials such as:

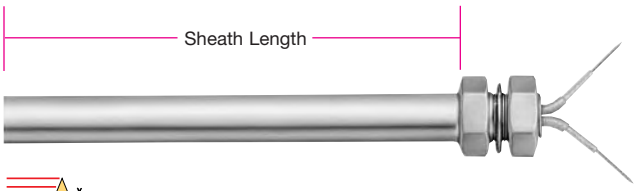
- Low temperature epoxy potting — 266°F (130°C) Teflon® leads, internally connected.
- High temperature epoxy potting — 450°F (232°C) Teflon® leads, internally connected.
- Silicone rubber potting — 450°F (232°C) Silicone rubber leads, internally connected.
- Cement potting with silicone varnish — 1000°F (538°C) Stainless steel fitting, with fiberglass leads externally connected.
- Swaged-in Teflon® end plug seal — 350°F (176°C) Teflon® leads, internally connected (available on HDC and HDM cartridge heaters only). Bushing to be offset up to 1".

➤ A minimum of 1/4" cold section behind the bushing is required.

➤ **Standard** 10" (254 mm) leads. Specify longer leads.

Standard NPT Bushing Dimensions

Heater Diameter (in)	NPT Size	"A"	"B"	"B1"	"C"
1/4	⅛-27	3/8	3/16	1/4	7/16
3/8	¼-18	1/2	3/16	1/4	9/16
1/2	⅜-18	9/16	1/4	1/4	11/16
5/8	½-14	5/8	1/4	5/16	7/8
3/4	¾-14	3/4	1/4	3/8	1-1/8
7/8	1-11½	3/4	1/4	3/8	1-3/8
1	1-11½	3/4	1/4	3/8	1-3/8
1-1/4	1¼-11½	7/8	5/16	1/2	1-3/4



Available through the Terminator Program for 2nd Day Delivery

Warning: Epoxy potting on Cartridge Heaters with fittings type CN, CM, and BF; the operating temperature of the application cannot exceed 266°F (130°C) for Low Temperature Epoxy and 450°F (232°C) for High Temperature Epoxy.
Failure to comply will result in premature heater burn-out.

Type BF ☐ Bulkhead Fitting

Available on HDC and LDC 1/2" and 5/8" cartridge heaters

A 5/8-18 UNF brass fitting is silver brazed to the cartridge for mounting the heater to the wall of a tank or enclosure. Includes a copper washer and jam nut. The lead wires are internally connected. To prevent moisture or contamination, the bushing cavity can be filled with various materials. Optional stainless steel fittings are available—specify.

BFA Low temperature epoxy potting—266°F (130°C)

BFB Silicone rubber potting—450°F (232°C)

BFC High temperature epoxy potting—450°F (232°C)

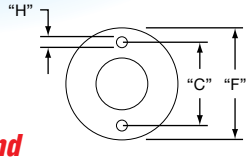
➤ A minimum 1/4" cold section below the bulkhead fitting is required.

➤ **Standard** 10" (254 mm) leads. Specify longer leads.

(For a Complete Selection of Standard Cartridge Immersion Heaters See Pages 2-54 and 2-55)

Cartridge Heater Mounting Flanges

Available through the Terminator Program for Same or Next Day Delivery



Type MFR Mounting Flange — Round

Available on HDC, HDM, and LDC cartridge heaters

Recommended for applications where excessive vibration exists and may cause the heater to back out of its mounting hole. The flange is used as a means of securing the cartridge heater in place.

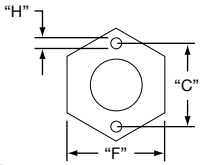
➤ **Standard** 10" externally connected leads. Specify longer leads.

Standard Round Mounting Flanges

Heater Diameter in (mm)	"F" in	"F" mm	"C" in	"C" mm	"H" in	"H" mm
1/4 (6.35), 5/16 (7.94), 3/8 (9.53), 1/2 (12.70), 5/8 (15.88), 3/4 (19.05)	1-1/2	38.10	1-1/8	28.57	.156	3.97
7/8 (22.23), 1 (25.40), 1-1/4 (31.80)	2	50.80	1-5/8	41.28	.203	5.16

Note: 5/16" dia. cartridge heater can only be HDC; 7/8" and 1-1/4" can only be LDC.

Available through the Terminator Program for Same or Next Day Delivery



Type MFH Mounting Flange — Hex

Available on HDC, HDM, and LDC cartridge heaters

A hex shape to allow the possibility of using a wrench when removal is tight. The flange is used as a means of securing the cartridge heater in place.

➤ **Standard** 10" externally connected leads. Specify longer leads.

Standard Hex Mounting Flanges

Heater Diameter in	Heater Diameter mm	"F" in	"F" mm	"C" in	"C" mm	"H" in	"H" mm
1/4	6.35	1	25.40	3/4	19.05	.144	3.66
5/16	7.94	1	25.40	3/4	19.05	.144	3.66
3/8	9.53	1	25.40	3/4	19.05	.144	3.66
1/2	12.70	1-3/8	34.93	1-5/32	29.37	.187	4.76
5/8	15.88	1-3/8	34.93	1-5/32	29.37	.187	4.76
3/4	19.05	1-3/8	34.93	1-5/32	29.37	.187	4.76
7/8	22.26	1-7/8	47.63	1-9/16	39.69	.203	5.16
1	25.40	1-7/8	47.63	1-9/16	39.69	.203	5.16
1-1/4	31.80	1-7/8	47.63	1-11/16	42.86	.203	5.16

Cartridge Heater Locating Ring

Available through the Terminator Program for Same or Next Day Delivery

Type LR Locating Ring

Available on HDC, HDM, and LDC cartridge heaters

A locating ring can be attached to the heater to aid in positioning the heater for the application. The default position of the ring is 1/4" from the lead end. Specify the position of the ring when ordering.

➤ **Standard** 10" externally connected leads. Specify longer leads.

Cartridge Heater Pull Strap

Available through the Terminator Program for Same or Next Day Delivery

Type PS Pull Strap

Available on HDC, HDM, and LDC cartridge heaters

A stainless steel wire rope is silver brazed to the lead end of the cartridge heater sheath to assist in removing the heater.

➤ **Standard** 10" externally connected leads. Specify longer leads.

Available through the ***Terminator*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

Cartridge Heater Terminal Boxes

Available through the Terminator Program For 2nd Day Delivery

Type E1 ☐ General Purpose Terminal Box

Available on HDC, HDM, and LDC cartridge heaters

General purpose NEMA 1 electrical enclosure designed to provide protection from electrical shock. The boxes have 5/8" conduit knock-outs and are silver brazed to the cartridge sheath.

E1A Terminal box with 10" (254 mm) fiberglass leads

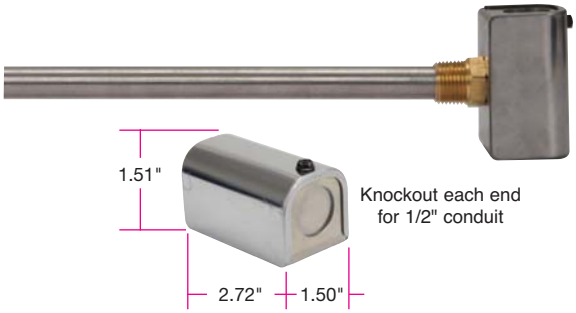
E1B Terminal box w/galvanized armor cable and fiberglass leads

E1C Terminal box w/stn. stl. armor cable and fiberglass leads

E1D Terminal box w/stn. stl. wire braid and fiberglass leads

E1E Terminal box w/screw terminals

➤ **Standard** E1B, E1C and E1D — 10" (254 mm) cable/braid over 12" (305 mm) leads. Specify longer cable/leads.



Type E4 ☐ General Purpose Terminal Box *(mailbox style)*

Available on HDC, HDM, and LDC cartridge heaters

General purpose NEMA 1 electrical enclosure designed to provide protection from electrical shock.

E4A Terminal box with 10" (254 mm) fiberglass leads

E4B Terminal box w/galvanized armor cable and fiberglass leads

E4C Terminal box w/stn. stl. armor cable and fiberglass leads

E4D Terminal box w/stn. stl. wire braid and fiberglass leads

E4E Terminal box w/screw terminals

➤ **Standard** E4B, E4C and E4D — 10" (254 mm) cable/braid over 12" (305 mm) leads. Specify longer cable/leads.

Type E2 ☐ Moisture Proof Terminal Box

Available on HDC, HDM, and LDC cartridge heaters

NEMA 4 PVC electrical enclosures provide protection from splashing or hose directed water, external condensation and water seepage. The box is mechanically attached to the cartridge sheath and the heater is sealed with moisture resistant epoxy.

E2A Terminal box with 10" (254 mm) Teflon® leads

E2B Terminal box w/galvanized armor cable and Teflon® leads

E2C Terminal box w/stn. stl. armor cable and Teflon® leads

E2D Terminal box w/stn. stl. wire braid and Teflon® leads

E2E Terminal box w/screw terminals

➤ A minimum of 1" cold section at the lead end is required.

➤ **Standard** E2B, E2C and E2D — 10" (254 mm) cable/braid over 12" (305 mm) leads. Specify longer cable/leads.

Type E3 ☐ Explosion Resistant Terminal Box

Available on HDC 5/8", 3/4" and 1" cartridge heaters

NEMA 4/7 electrical enclosures provide protection from contaminants, moisture, and hazardous conditions. These housings are screwed onto a heater with a single or double ended SS fitting.

➤ **Standard** 10" (254 mm) leads with Type M2C (see page 2-38) Moisture Seal. Specify longer leads. Screw Terminals Optional.

CAUTION

Explosion resistant terminal housings are intended to provide containment of an explosion in the enclosure only. No portion of the heater assembly outside the enclosure is covered under this NEMA rating. Abnormal use of a heater which results in excessive temperature can create hazardous conditions such as a fire. Never perform any type of service nor remove the housing cover prior to disconnecting all electrical power to the heater.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Cartridge Heater High Temperature Termination

Type B Heat Resistant Ceramic Bead Insulation

Available on HDC, HDM, and LDC cartridge heaters.

The ultimate in high temperature lead protection. Allows for the attachment of flexible leads to the heater away from the high heat area.

- Temperature range: up to 1200°F (650°C)
- **Standard** 10" (254 mm) solid nickel pins insulated with ball and socket construction type ceramic beads

Available through the Terminator Program for Same or Next Day Delivery

Cartridge Heater Options — Lead End Connections

Type RT Ring Terminal

Type ST Spade Terminal

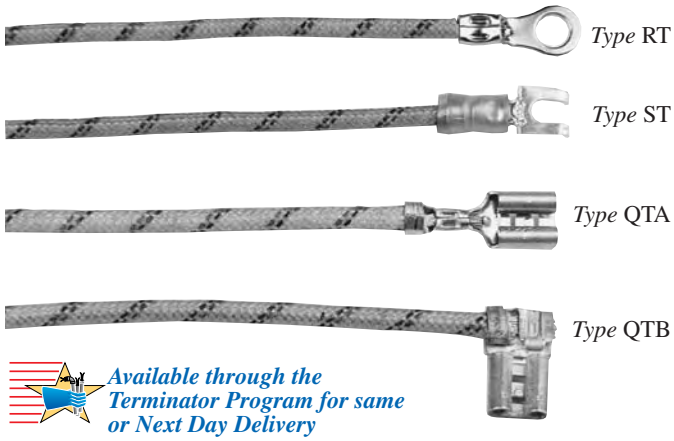
Type QTA 1/4" Female Straight Quick Disconnect

Type QTB 1/4" Female Right-Angle Quick Disconnect

Available on HDC, HDM and LDC cartridge heaters

Various types of crimp terminals can be attached to the heater leads to make wiring into applications quick and easy. Non-insulated and insulated with nylon (221°F/105°C) or PVC (194°F/90°C).

Note: Specify insulation type and ring size (#6, #8, or #10) when ordering. Standard is a non-insulated #10 terminal. Consult Tempco with your requirements.



Available through the Terminator Program for same or Next Day Delivery

Type P ☐ Quick Disconnect Plugs

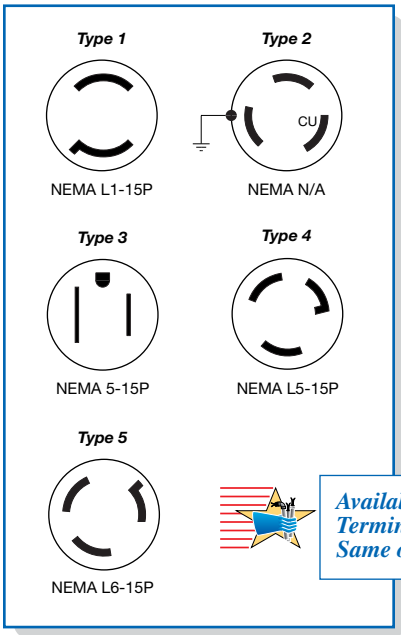
Available on HDC, HDM, and LDC cartridge heaters

Allows for the quick and easy replacement of the heater. The plug can be attached to galvanized armor cable, stainless steel armor cable, or wire braid.

Plug Type	*Description*
1	2-pole/2-wire twist locking plug 15 amp 125 volt, NEMA L1-15P
2	2-pole/3-wire twist locking plug 15 amp 125 volt or 10 amp 250 volt, NEMA N/A. (This plug is not listed by UL, and is recommended for replacement use only.)
3	2-pole/3-wire straight blade plug 15 amp 125 volt, NEMA 5-15P
4	2-pole/3-wire twist locking plug 15 amp 125 volt, NEMA L5-15P
5	2-pole/3-wire twist locking plug 15 amp 250 volt, NEMA L6-15P

Note: For other types of plugs, consult Tempco or specify the manufacturer's part number when ordering.

Caution! Voltage and Amperage ratings of heater and plug must match.



Available through the Terminator Program for Same or Next Day Delivery

Available through the ***Terminator*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

Cartridge Heater With Built-In Internal Thermocouples

Built-in Internal Thermocouples are available on all HDC, HDM, and LDC cartridge heater diameters except for 3/16", 5/16" and 8 mm.

Note: Type TJ4 and TK4 are not available on 1/4" and 6.5 mm diameter cartridges.

Minimum sheath length: 3" for 1/4", 3/8" and 1/2" diameter.
4" for 5/8" and 3/4" diameter.

10" leads are standard for both heater and thermocouple. Leads are internally connected. Specify longer leads.

ANSI Code	Conductor Characteristics Positive	Negative	Temperature Range °F	°C
J	Iron (Magnetic)	Constantan (Non-Magnetic)	0 to 1400	–17 to 760
K	Chromel (Non-Magnetic)	Alumel (Magnetic)	0 to 2300	–17 to 1260

For other thermocouple types consult Tempco.

Type **TJ1 and TK1**

Type TJ1 and TK1 Grounded at Disc End

The thermocouple junction is grounded to the sheath at the disc end and packed with MgO. The concave end disc is filled with silver solder and ground flat. When inserted into a flat end blind hole, it will provide fast responsive temperature readings. Widely used in Hot Runner mold probes.

TJ1 Type J thermocouple; **TK1** Type K thermocouple

Type **TJ2 and TK2**

Type TJ2 and TK2 Ungrounded at Disc End

The thermocouple junction is ungrounded, located at the end of the heater section, 1/8" behind the end disc and packed with MgO. Only provides reference temperature reading of the part being heated – slower response.

TJ2 Type J thermocouple; **TK2** Type K thermocouple

Type **TJ3 and TK3**

Type TJ3 and TK3 Ungrounded at Center

The thermocouple junction is ungrounded and is located in the center of the length and diameter of the cartridge heater. It provides internal temperature readings of the heater core. Generally used for research applications and is not recommended for controlling process temperatures.

TJ3 Type J thermocouple; **TK3** Type K thermocouple

Type **TJ4 and TK4**

Type TJ4 and TK4 Grounded at Center

The thermocouple junction is grounded to the sheath in a 1/2" unheated section located in the center of the cartridge length unless otherwise specified. It provides good temperature readings with quick response.

TJ4 Type J thermocouple; **TK4** Type K thermocouple

Type **TJ5 and TK5**

Type TJ5 and TK5 Grounded at Lead End

The thermocouple junction is grounded to the sheath at the lead end. A minimum of 3/8" of cold section is required. It provides good temperature readings with quick response.

TJ5 Type J thermocouple; **TK5** Type K thermocouple

Available through the Terminator Program for 2nd Day Delivery

Note: For a complete selection of standard Hi-Density Pennybottom™ Cartridge Heaters, with built-in Type J thermocouple for Hot Runner plastic molds, see pages 2-22 through 2-24.
Available from stock.

Available through the ***"Terminator"*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Cartridge Heater Internal Sensor and Control Options

Type TF Thermal Fuses

Available on HDC, HDM, and LDC cartridge heaters 1/2" diameter and larger

Thermal fuses can be built into cartridge heaters to act as a high limit for the heater in applications where the temperature must be limited to avoid dangerous situations. When the trigger point is reached, the thermal fuse will open, cutting the electrical current to the cartridge heater. Once the thermal fuse opens, it cannot be reset. Many different trigger temperatures are available.

Type TS Thermostat

Available on HDC, HDM, and LDC cartridge heaters 1/2" diameter or larger

Cartridge heaters with built-in thermostats are very efficient and economical for heating and controlling temperatures. Available with NPT or special type mounting fittings, they provide a self-contained heater mainly recommended for immersion applications. They can also be used as over-temperature safety devices. The thermostats are factory preset for the trip temperature; therefore, prototyping and testing is required to determine the exact fixed setpoint. Maximum temperature—302°F(150°C). Maximum Amps—8@120 Volts.

A minimum 2-1/2" cold section is required to house the thermostat. Consult Tempco with your requirements.

Type TM Thermistor
Type RD RTD Temperature Sensors

Available on HDC, HDM, and LDC cartridge heaters

Tempco has the ability to custom design cartridge heaters with built-in temperature sensors such as thermistors and RTDs. For specific applications that have a limited or single set point range, thermistors or RTDs in conjunction with simple electronic controllers can be an economical choice.

Type **TS**

Cartridge Heater Lead Wire Options

Type MIL High Temperature Lead Wire

Available on HDC, HDM and LDC cartridge heaters

When required, high temperature lead wire can be used on most cartridge heaters. The stranded nickel conductor wire is insulated with mica tapes and then a treated fiberglass overbraid.

Maximum temperature rating: 450°C (842°F)

Consult Tempco with your requirements.

Type HA Heat Shrink Covered Armor Cables

Available on HDC, HDM and LDC cartridge heaters

Either the galvanized or stainless steel armor cable can be covered with moisture proof heat shrink PVC tubing.

Type SR □ Silicone Rubber Coated Fiberglass Sleeving

Available on HDC, HDM and LDC cartridge heaters

For added protection, strength, and resistance to various chemicals, the lead wires can be covered with silicone rubber sleeving.

SRA Silicone rubber coated fiberglass sleeving on each lead separately

SRB Silicone rubber coated fiberglass sleeving on both leads together

Specify length when ordering.

Type TL Teflon® Leads

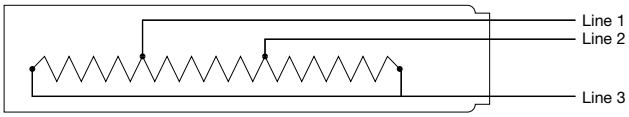
Available on HDC and HDM cartridge heaters

Cartridge Heater With Internal Power Variations

Type DW Distributed Wattage

Available on HDC and HDM cartridge heaters

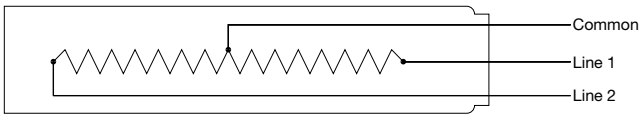
Cartridge heaters can be designed to vary the wattage along the length of the heater. Specify number of zones and the required watts and length per zone starting from the disk end. Leads can be connected externally or internally. Picture shows a heater with Type N externally connected leads. Heaters with other terminations may require a longer cold section at the lead end.



Type 3PH Three Phase

Available on HDC, HDM, and LDC cartridge heaters

In order to minimize the gauge of the wiring on high wattage cartridge heaters, 3-phase elements can be designed.



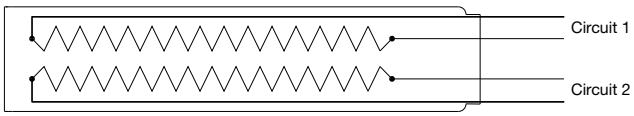
Type DV__ Dual Voltage

Available on HDC, HDM, and LDC cartridge heaters

Cartridge heaters can be designed using 3-wire series/parallel circuits for dual voltage applications. Whether the heater is run on the high or low voltage, the wattage will be the same.

DV1 120/240 volts

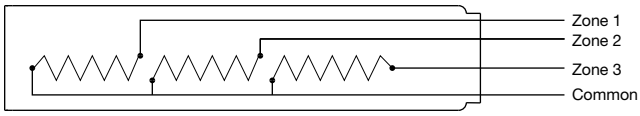
DV2 240/480 volts



Type DWV Dual Circuits

Available on HDC, HDM, and LDC cartridge heaters

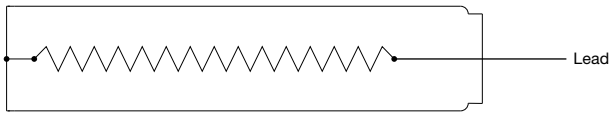
Independent resistance elements can be designed in a single cartridge heater for added versatility.



Type MHZ Multiple Heat Zones

Available on HDC and HDM cartridge heaters

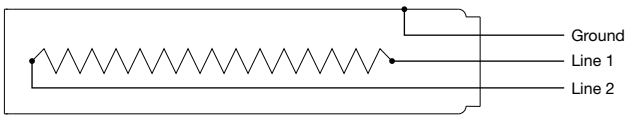
Multiple independently operated sections of the heater with a common wiring connection can be designed for increased flexibility.



Type GJ Grounded Element Winding

Available on HDC, HDM, and LDC cartridge heaters

For DC applications where the electrical circuit is negative grounded, the cartridge heater can be designed with one side of the element winding grounded to the sheath and a single lead wire exiting the cartridge heater.



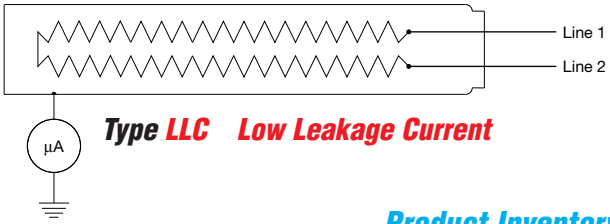
Type GL Ground Lead/Sheath

Available on HDC, HDM, and LDC cartridge heaters

For those applications requiring a separate ground lead attached to the cartridge heater sheath.

Standard ground lead wire is 10" long non-insulated stranded conductor. Optional insulated and color coded leads are available.

Available through the Terminator Program for 2nd Day Delivery



Type LLC Low Leakage Current

Available on HDC, HDM, and LDC cartridge heaters

Low leakage current construction is available for those applications such as medical products that require strict conformity to the requirements of regulatory agencies.

Available through the ***Terminator*** Program.
Note: Applies only to Hi-Density Cartridge Heaters.

Cartridge Heater Sheath Surface Options and Materials

Type PAS Passivation

Available on HDC, HDM, and LDC cartridge heaters.

Passivating is a chemical process accomplished by dipping the heater in a solution of nitric acid. The process removes surface contamination, usually iron, so that the optimum corrosion resistance of the stainless steel is maintained.

Type ELP Electro-Polish

Available on HDC, HDM, and LDC cartridge heaters.

Electro-Polishing is an electro-chemical process that removes surface imperfections and contaminants, enhancing the corrosion resisting ability of the heater sheath.

Type CG Centerless Grinding

Available on HDC and HDM cartridge heaters.

For applications requiring high precision fit and tolerance, the sheath can be centerless ground.

Tolerance: ±0.0005 inches (0.013 mm)

Specify diameter when ordering.

Type DSM Optional Sheath Material

Standard sheath material is 321 stainless steel for Hi-Density Cartridge Heaters except 1" diameter, and 304 stainless steel for 1" diameter Hi-Density and all Low-Density Cartridge Heaters.

If your application requires a specific alloy sheath material, consult Tempco with your requirements.

To assist you in selecting the proper sheath material, corrosion resistant ratings and chemical properties of various heater sheath materials are given in Section 16, Engineering Data, in the back of this catalog.

Type SDA End Disc Seals Silver Brazed
Type SDB End Disc Seals Heli-Arc Welded

Available on LDC cartridge heaters.

End discs on HDC and HDM cartridge heaters are heli-arc welded as standard.

The normally mechanically attached end discs on LD cartridge heaters can be silver brazed or heli-arc welded if desired.

Optional Inspection Services and Test Reports

Die Penetrant Test

This non-destructive testing can detect imperfections in weld joints. For critical applications, each individual heater's weld joints by end cap and fittings can be tested. Certified test reports will be sent with each shipment. Consult Tempco for details.

Hydrostatic Pressure Test

Cartridge heaters with attached pipe fittings can be pressure tested to your specifications at Tempco. Our in-house testing capabilities can ensure that your products meet your exact specifications. Contact Tempco with your requirements.

Electrical Tests

Our state of the art test meter can perform AC/DC dielectric withstand test (Hypot) up to 5000 volts while measuring leakage current in micro amps. It can also measure Insulation resistance (IR) and heater element resistance. Heaters can be serialized and test reports can be sent with each shipment if required. Contact Tempco with your requirements.

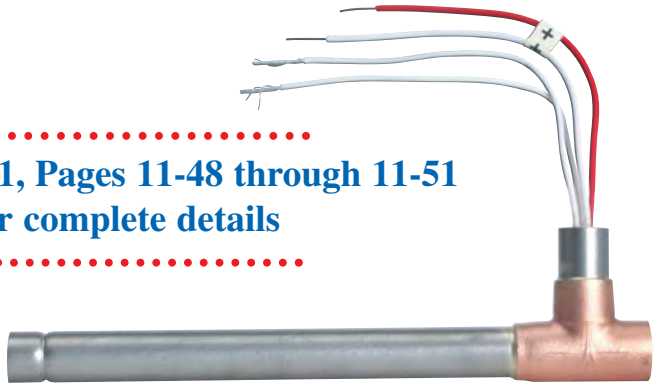
Consult Tempco with your requirements.
We Welcome Your Inquiries.

LDA and HAC Forced Air In-Line Process Cartridge Heaters

TEMPCO manufactures a variety of Air Process Cartridge Heaters. They can be standard units or designed to the customer's specifications. The following diameter sizes are available: 3/8", 1/2", 5/8" and 3/4".

These diameters can be adapted with various types of fittings and made into any practical length.

See Section 11, Pages 11-48 through 11-51 for complete details



Tempco can Design/Manufacture a heater to fit any application! Consult us with your requirements.