

# Cartridge Heaters



## Hi-Density Miniature

### Hi-Density Miniature Cartridge Heaters

#### PERFORMANCE RATINGS

**Max. Temperature:** 1200°F (649°C)  
**Max. Watt Density:** 100-200 W/in<sup>2</sup> (15.5-31 W/cm<sup>2</sup>)  
 depending on operating temperature.

#### SHEATH MATERIAL

**Standard:** Type 304 Stainless Steel  
**Optional (1/8" Heaters Only):** Inconel 600

#### ELECTRICAL SPECIFICATIONS

Nominal Diameter	1/8"	5/32"	3/16"
Maximum Voltage		240	
Maximum Amperage		3.0	
Maximum Wattage at 120V		360	
Maximum Wattage at 240V		720	
Wattage Tolerance		+10,-15%	
Resistance Tolerance		+15,-10%	

**NOTE:** The maximum operating temperature and the life expectancy of a cartridge heater is dependent on two main factors:

1. The maximum recommended sheath temperature
  2. The maximum ambient temperature for the termination selected
- Consult Tempco if you require a recommendation for your application.

#### DIMENSIONAL SPECIFICATIONS

Nominal Diameter	1/8"		5/32"		3/16"	
	in	(mm)	in	(mm)	in	(mm)
Actual Diameter	0.122	(3.10)	0.153	3.89	0.184	4.67
Diameter Tolerance	±.002 (.051)					
Minimum Length	1.25 (31.8)					
Maximum Length	12 (305)					
Length Tolerance: Heaters up to 3.5" (89 mm) long	±3/32 (2.4)					
Length Tolerance: Heaters over 3.5" (89 mm) long	±3% of Sheath Length					

### Standard (Non-Stock) Hi-Density Miniature Cartridge Heaters

#### 1/8" Actual .122" (3.10 mm) Dia. Hi-Density Cartridge Heaters with Type M3 Termination (10" leads)

Sheath Length	in	mm	Voltage	Watts	Watt Density	W/in <sup>2</sup>	W/cm <sup>2</sup>	Part Number
1	25.4	24	15	78	12	HDC34987		
1	25.4	24	20	104	16	HDC34988		
1	25.4	24	25	130	20	HDC34989		
1	25.4	24	30	157	24	HDC34990		
1	25.4	48	20	104	16	HDC34991		
1	25.4	48	35	183	28	HDC34992		
1 1/4	31.8	120	25	87	13	HDC34993		
1 1/4	31.8	120	35	122	19	HDC34994		

Sheath Length	in	mm	Voltage	Watts	Watt Density	W/in <sup>2</sup>	W/cm <sup>2</sup>	Part Number
1 1/4	31.8	120	50	174	27	HDC34995		
1 1/2	38.1	120	30	78	12	HDC34996		
1 1/2	38.1	120	60	157	24	HDC34997		
2	50.8	120	50	87	13	HDC34998		
2	50.8	120	100	174	27	HDC34999		
2	50.8	240	50	87	13	HDC35000		
2	50.8	240	100	174	27	HDC35001		

#### 5/32" Actual .153" (3.89 mm) Dia. Hi-Density Cartridge Heaters with Type M3 Termination (10" leads)

Sheath Length	in	mm	Voltage	Watts	Watt Density	W/in <sup>2</sup>	W/cm <sup>2</sup>	Part Number
1 1/4	31.8	24	25	69	11	HDC35002		
1 1/4	31.8	48	25	69	11	HDC35003		
1 1/4	31.8	48	50	139	21	HDC35004		
1 1/4	31.8	120	30	83	13	HDC35005		
1 1/4	31.8	120	45	125	19	HDC35006		
1 1/4	31.8	120	60	166	26	HDC35007		
1 1/2	38.1	120	40	83	13	HDC35008		

Sheath Length	in	mm	Voltage	Watts	Watt Density	W/in <sup>2</sup>	W/cm <sup>2</sup>	Part Number
1 1/2	38.1	120	60	125	19	HDC35009		
2	50.8	120	50	69	11	HDC35010		
2	50.8	120	100	139	21	HDC35011		
2	50.8	240	50	69	11	HDC35012		
2	50.8	240	100	139	21	HDC35013		
3	76.2	120	150	125	19	HDC35014		
4	101.6	120	200	119	18	HDC35015		

#### 3/16" Actual .184" (4.67 mm) Dia. Hi-Density Cartridge Heaters with Type M3 Termination (10" leads)

Sheath Length	in	mm	Voltage	Watts	Watt Density	W/in <sup>2</sup>	W/cm <sup>2</sup>	Part Number
1 1/4	31.8	24	25	58	9	HDC35016		
1 1/4	31.8	48	25	58	9	HDC35017		
1 1/4	31.8	48	50	115	18	HDC35018		
1 1/4	31.8	120	30	69	11	HDC35019		
1 1/4	31.8	120	45	104	16	HDC35020		
1 1/4	31.8	120	60	138	21	HDC35021		
1 1/2	38.1	120	50	86	13	HDC35022		

Sheath Length	in	mm	Voltage	Watts	Watt Density	W/in <sup>2</sup>	W/cm <sup>2</sup>	Part Number
1 1/2	38.1	120	75	130	20	HDC35023		
2	50.8	120	50	58	9	HDC35024		
2	50.8	120	100	115	18	HDC35025		
2	50.8	240	50	58	9	HDC35026		
2	50.8	240	100	115	18	HDC35027		
3	76.2	120	150	104	16	HDC35028		
4	101.6	120	200	99	15	HDC35029		



**Note:** Miniature Hi-Density Cartridge Heaters are *made-to-order only*. **Standard lead time is 3 weeks.** Cartridge heaters can be very application specific. Consult Tempco with your special requirements. For sizes, ratings & design features required but not listed in the catalog, Tempco will custom engineer and manufacture to your specifications.

### Miniature Cartridge Heater Standard Termination

#### Type M3 Teflon® End Plug Seal with Teflon® Leads

##### Standard Termination for 1/8", 5/32" & 3/16" Diameters

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

- ▶ Minimum 1/2" unheated section at lead end is required
- ▶ 24 ga Teflon® insulated leads temperature rating: 392°F (200°C)
- ▶ Moisture resistant swaged Teflon® seal
- ▶ **Standard 10"** (254 mm) leads. Specify longer leads.

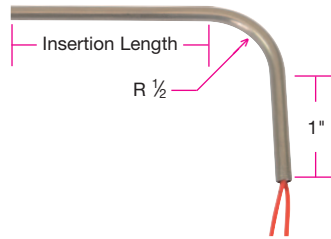


### Miniature Cartridge Heater Sheath Options

#### Type R4 Bent Cartridge

The heater sheath is bent up to 90°. The bend is through a required unheated section. The standard sheath extension past the bend is 1". Specify when ordering if a longer sheath is required.

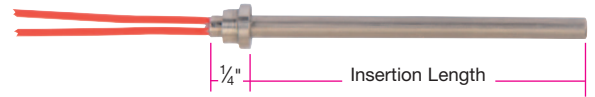
Contact Tempco for bend radius details.



#### Type LR Locating Ring

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.



### Additional Terminations for 1/8" Diameter Cartridge Heaters

#### Type N External Pins with Leads

Flexible stranded lead wires have fiberglass insulation and are connected to 1-1/4" (32 mm) long solid conductors. Silicone rubber coated fiberglass sleeving insulates the pin/lead wire connection.

- ▶ Minimum 1/4" unheated section at lead end is required
- ▶ 24 ga ultralead leads temperature rating: 482°F (250°C)
- ▶ Silicone rubber coated fiberglass sleeving temperature rating: 392°F (200°C)
- ▶ Leads externally crimped to nickel pins
- ▶ **Standard 10"** (254 mm) leads. Specify longer leads.



#### Type F Internally Connected Flexible Leads

The fiberglass lead wires are internally connected to the terminal pins. This lead termination provides flexibility, permitting the lead wires to be sharply bent as they exit the heater.

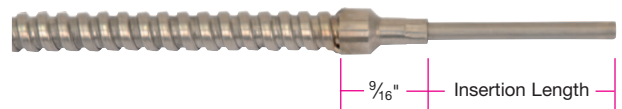
- ▶ Minimum 1/2" unheated section at lead end is required
- ▶ High temperature fiberglass leads temperature rating: 842°F (450°C)
- ▶ **Standard 10"** (254 mm) leads. Specify longer leads.



#### Type C1B Stainless Steel Armor Cable, Mechanically Fastened

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

- ▶ Minimum 1/4" unheated section is required
- ▶ Standard fiberglass lead wire temperature rating 482°F (250°C)
- ▶ **Standard 10"** (254 mm) cable over 12" (305 mm) leads. Specify longer leads or cable.



#### Type W SS Braid, Mechanically Fastened

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

- ▶ Minimum 1/4" unheated section is required
- ▶ Standard lead wire temperature rating: 842°F (450°C)
- ▶ **Standard 10"** (254 mm) cable over 12" (305 mm) leads. Specify longer leads or cable.

