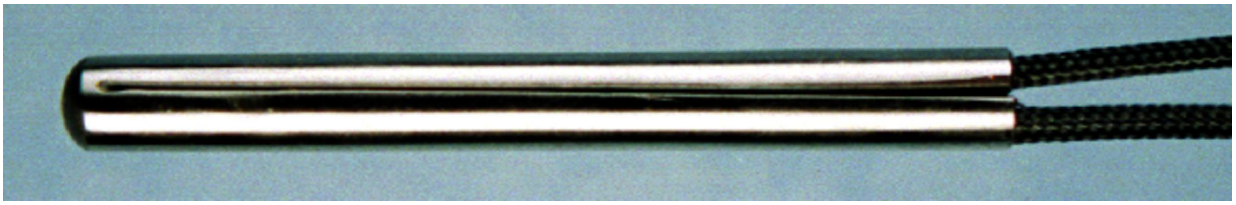
SunRod

Mini Cartridge Heaters

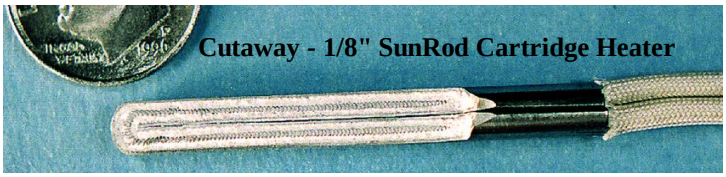


- Split-Sheath Design
- 1/8" and 4mm Diameters
- Lengths From ½ Inch to 6 Inches
- Uniform Heating
- Unique Hot Tip

Sun Electric Heater Company

45 Mason Street #4 Salem, MA 01970 Tel. (978) 744-2240 Fax. (978) 744-2243
sales@sunelectricheater.com www.sunelectricheater.com

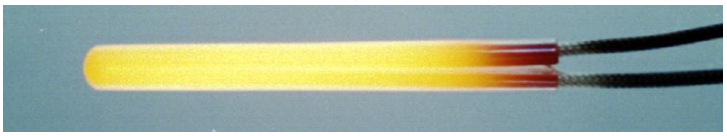
SunRod 1/8" and 4MM Mini Cartridge Heaters



Split Sheath Design

SunRod split sheath cartridge heaters feature a unique new construction that eliminates the failure points of conventional miniature heaters. A continuous resistor is packed into the highest density insulation and welded to the heater connections. Lead wires exit through continuous insulation rated to 900 Fahrenheit.

Uniform Heating

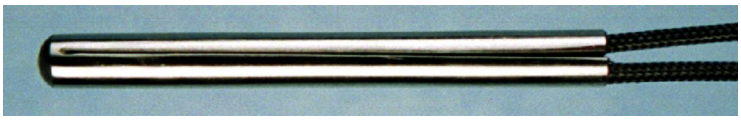


SunRods generate heat continuously for the full length of the heater, unlike conventional cartridge heaters, which have cold spots along their length and cold sections at each end. *SunRod's* even heat distribution means more uniform temperatures for your process.

Unique Hot Tip

SunRods feature a unique hot tip, allowing you reach into every place in your process that needs heat.

Unique Expansion

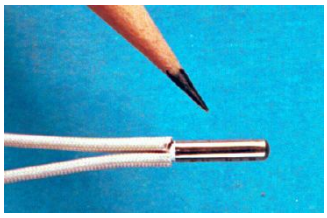


When energized, the action of SunRod's split sheath design forces its opposing legs to expand into contact with the surrounding bore for maximum heat transfer. The result is lower operating temperature and up to **five times longer life !**

Slide-Out Removal

When de-energized, SunRods contract, breaking contact with the bore for slide out removal**. SunRods are guaranteed never to seize!**

Lengths From ½ to 6 Inches



Now you can add heat wherever you need it! Just drill a small bore to the spot needing heat and slide in a Hot Tip **SunRod.**

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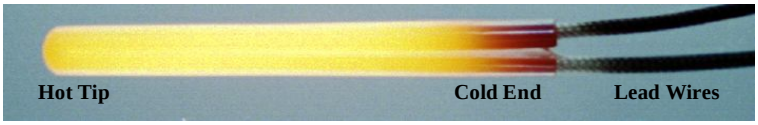
SunRod 1/8" and 4mm Mini Cartridge Heaters

Specifications & Ordering



Electrical Specifications

Voltage, Amperage, Wattage

Size	Max Volts	Max Amps	Wattage Tolerance
1/8" & 4mm	120	4 Amps	+/-10%

* Wattage Tolerance for heaters under 1" long is +/- 15%

Minimum / Maximum Wattages by length @ 24 volts*

@Length	1/2"	3/4"	1"	1 1/2"	2"
Min / Max Wattage*	4 / 100	3 / 100	2 / 100	1 / 100	½ / 100

* Minimum Wattages at Other Voltages
240 Volts: multiply by 100
120 Volts : multiply by 25
48 Volts: multiply by 4
12 Volts: multiply by .25
See "**SunRod Power Chart**" to determine max wattage at temperature

Mechanical Specifications

Diameter and Length

Size / Actual Diameter / Rec Bore ID	Min Length	Max Length
1/8" / .120" to .124" actual / .125"	1/2"	6"
4MM / .153" to .1565" actual / .1575	5/8"	6"

Length Tolerance: +/-3% of length, with a 3/64" minimum

Standard Features

Lead Configurations and Cold End Length

- **Standard Lead Wires (all insulations reated to 482 degrees F)**
  - 12" #24 gage stranded nickel, Fiberglas insulated
  - 12" #24 gage stranded nickel, Teflon insulated
  - 2 ½" #24 gage solid nickel, bare or silcon rubber insulated
- **Cold End Length**
  - .30" at lead exit end of heater

To Order *SunRod* Cartridge Heaters:

Specify:

- **Quantity**
- **Sheath Diameter**
- **Sheath Length**
- **Wattage**
- **Voltage**
- **Lead Length**
- **Lead Insulation**

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SunRod *Mini Cartridge Heaters*

Design Guide for Heating Metal Parts

Using the SunRod Power Chart

Use the *SunRod* Power Chart at right to determine the temperature / fit / watt-density parameters for your application.

1. Establish the desired temperature of the part to be heated.
2. Establish the fit of the heater in the part to be heated by subtracting the minimum heater diameter from the maximum possible bore diameter.
3. Enter the chart with two known parameters (typically, desired Part Temperature and Fit), to determine the third parameter (maximum watt-density).
4. Calculate the actual watt-density of your heater, based on heater size and actual wattage requirements of your application. (see "Formula for Calculating Watt-Density, below).
5. Read maximum allowable watt-density at the intersection of your application's temperature and fit. For example, the maximum watt-density of a SunRod operating at a Part Temperature of 300 degrees F with a fit of .004 inches is 525 watts-per square inch.
6. If your heater's calculated watt-density exceeds the maximum allowable from the chart, consider using more, longer or larger SunRods to reduce it.

SunRod Power Chart

Part Temp	***Fit in bore of metal part***						
(Deg F)	**.003**	**.004**	**.005**	**.006**	**.007**	**.008**	**.009**
200	700	525	425	365	320	275	250
300	660	475	400	340	300	260	225
400	590	440	360	310	270	235	190
500	550	390	325	275	240	225	180
600	460	360	280	245	215	190	160
700	380	320	250	225	190	160	140
800	300	240	210	175	160	145	130
900	250	210	175	160	140	130	115
1000	210	170	145	130	115	105	95
1100	175	145	125	110	95	90	82
1200	120	105	95	82	78	72	66
1300	92	105	78	72	60	55	52
1400	58	80	47	42	39	36	34
---------- Recommended Watt-Density ----------							

Chart Correction Factors

Aluminum or Brass Block: Assume .0015 larger fit
Stainless Steel Block: Assume 100F higher temperature
Cycling more than once a minute: Use 70% of watt-density
Cycling more than onece an hour: Use 80% of watt-density

Formula for Calculating Watt-Density

$$\text{Watt Density} = \frac{(\text{Sheath Length} - \text{Cold End(s)}) \times \text{Sheath Diameter} \times 3.14}{\text{Wattage}}$$

Cold End(s) = .300 at Conductor End

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