



# Hybrid Cartridge Heaters

## Improve heat transfer to the air.

*Hybrid cartridge heaters quickly disperse heat in closed environments.*

Speed heat up time by maximizing the heat transfer area with an integrated heat sink. Hybrid cartridge heaters are ideal for applications requiring fast heat dispersion using forced convection. The expanded surface area increases thermal transfer for rapid heat up, lower sheath temperature and longer life.

### Agency Approvals

Heatron offers an extensive UL option list and builds to UL 60601/IEC-60601.

**UL** E91597 (UL 499)

**CSA** LR66355-1 (CSA-C22.2)

**TUV\*** EN60335-1/A11 and EN61010-1A2

\*This approval gives Heatron the option of CE marking.

### DESIGN GUIDE

#### Construction Options:

See Design Guide on back page for common options

#### Performance Options:

- Low leakage current
- Dual voltage
- Dual wattage
- Ground wires
- Three phase power
- Centerless grinding
- Controlled heat profile
- Internal thermocouple
- Over temperature control
- Special marks

### APPLICATIONS

#### Medical and Life Science

- Molecular diagnostics
- Incubators

#### Industrial

- Forced air heating
- Land reclamation



## Construction Options

| Sheath               | Lead Exit    | Lead Wire     | Outer Jacket         | End Seal | Fittings                         |
|----------------------|--------------|---------------|----------------------|----------|----------------------------------|
| 304 Stainless Steel  | Straight     | Fiberglass    | SS Braid             | Mica     | Silicone Rubber Overmold         |
| 316L Stainless Steel | Right Angle  | Silicone      | SS Cable             | Epoxy    | Post Terminal (1/2", 5/8", 3/4") |
| Incoloy              | Elbow        | Teflon        | Strain Relief Spring | Ceramic  | UL Listed Plug                   |
|                      | Double Ended | Straight Pins | Silicone             | Silicone | Conduit Box                      |
|                      |              |               | Fiberglass           | Teflon   |                                  |
|                      |              |               | Ceramic Beads        |          |                                  |

**Lead Options:** Crimped On, Swaged In, No-Heat Extension

Insulation and heater materials available with UL, CSA or Mil Spec recognition.

## Design Guide

| Nominal Diameter | Maximum Amps* | Maximum Volts | Maximum Watts** |                 |                         |                 |                 | Minimum Watts (120V)*** |        |    |    |
|------------------|---------------|---------------|-----------------|-----------------|-------------------------|-----------------|-----------------|-------------------------|--------|----|----|
|                  |               |               | 120V<br>1 Phase | 240V<br>1 Phase | 480V<br>1 Phase         | 240V<br>3 Phase | 480V<br>3 Phase | Length                  |        |    |    |
|                  |               |               |                 |                 |                         |                 |                 | 1"                      | 1 1/2" | 2" |    |
| 1/4"             | 4.4           | 240           | 525             | 1,050           |                         |                 |                 |                         | 100    | 55 | 40 |
| 3/8"             | 7.2           | 480           | 800             | 1,600           |                         |                 |                 |                         | 65     | 35 | 25 |
| 1/2"             | 9.7           | 480           | 1,160           | 2,320           |                         |                 |                 |                         | 40     | 25 | 20 |
| 5/8"             | 23.0          | 480           | 2,760           | 5,520           | 11,000                  |                 |                 |                         | 35     | 20 | 15 |
| 3/4"             | 23.0          | 480           | 2,760           | 5,520           | 11,000                  | 9,550           | 19,100          |                         | 30     | 15 | 10 |
| Nominal Diameter | Maximum Amps* | Maximum Volts | Maximum Watts** |                 | Minimum Watts (220V)*** |                 |                 |                         |        |    |    |
|                  |               |               | 220V            | 380V            | 25.4 mm                 | 38.1 mm         | 50.8 mm         |                         |        |    |    |
| 8.0mm            | 4.4           | 240           | 965             |                 |                         |                 | 340             | 185                     | 135    |    |    |
| 10.0mm           | 7.2           | 480           | 1,580           |                 |                         |                 | 220             | 120                     | 85     |    |    |
| 12.5mm           | 9.7           | 480           | 2,130           |                 |                         |                 | 135             | 85                      | 70     |    |    |
| 16.0mm           | 23.0          | 480           | 5,060           | 8,740           |                         |                 | 120             | 70                      | 50     |    |    |
| 20.0mm           | 23.0          | 480           | 5,060           | 8,740           |                         |                 | 100             | 50                      | 35     |    |    |

\* Data determined by current capability or internal parts and lead wire. Consult Heatron for higher AMPS.

\*\* Higher wattages available with design additions. Consult Heatron for higher wattage requirements.

\*\*\* Data based on space limits for resistance windings internal to the heater. For minimums at 240 volts, multiply listed wattage by 4. Consult Heatron for lower wattage requirements.

## US Size Dimensions

| Diameter |        | Length  |          |
|----------|--------|---------|----------|
| Nominal  | Actual | Minimum | Maximum* |
|          | Inches | Inches  | Inches   |
| 1/4"     | .245   | 7/8     | 36       |
| 3/8"     | .371   | 7/8     | 48       |
| 1/2"     | .495   | 7/8     | 60       |
| 5/8"     | .621   | 1.0     | 72       |
| 3/4"     | .745   | 1.0     | 72       |

\* Recommended maximum length; longer lengths available.

## Metric Size Dimensions

| Diameter |        | Length  |          |
|----------|--------|---------|----------|
| Nominal  | Actual | Minimum | Maximum* |
|          | mm     | mm      | mm       |
| 8.0mm    | 6.2    | 22.2    | 915      |
| 10.0mm   | 9.42   | 22.2    | 1,220    |
| 12.5mm   | 12.57  | 22.2    | 1,520    |
| 16.0mm   | 15.77  | 25.4    | 1,830    |
| 20.0mm   | 18.92  | 25.4    | 1,830    |

## US Size Tolerances

|                   |  |
|-------------------|--|
| <b>Diameter*</b>  | ± 0.003 inches   |
| <b>Length*</b>    | ± 3%   |
| <b>Camber</b>     | ≤ 6 inches in length: 0.006 inches<br>> 6 inches in length: 0.02 inches per foot |
| <b>Wattage</b>    | +5%, -10% per NEMA Standard  |
| <b>Resistance</b> | +10%, -5% per NEMA Standard  |
| <b>No Heat</b>    | 1/4 inches on disc end<br>Minimum 1/4 inches on lead end                         |

## Metric Size Tolerances

|                   |  |
|-------------------|--|
| <b>Diameter*</b>  | ± 0.07 mm  |
| <b>Length*</b>    | ± 3%   |
| <b>Camber</b>     | ≤ 150mm length: 0.16mm<br>> 150mm length: 0.25mm per 300mm |
| <b>Wattage</b>    | +5%, -10% per NEMA Standard                                |
| <b>Resistance</b> | +10%, -5% per NEMA Standard                                |
| <b>No Heat</b>    | 6 mm on disc end<br>Minimum 6 mm on lead end               |

\* Tighter tolerances available.