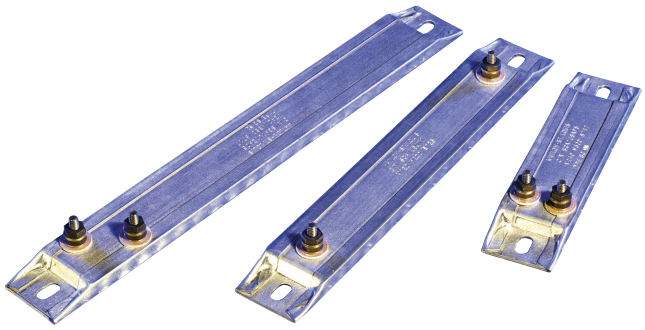
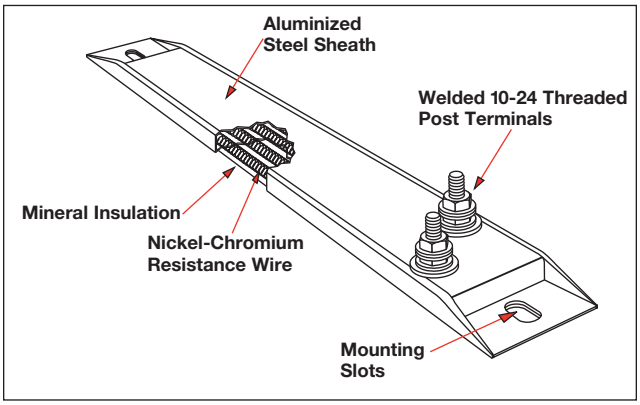
375 High-Temperature Strip Heaters

Rugged Heater Capable of High Temperatures and High Watt Densities





Named for its 0.375 in. (9.5 mm) thickness, the rugged Watlow® 375 strip heater is capable of both high temperatures and high watt densities.

Watlow begins construction by accurately placing a coiled, nickel-chromium element wire in the center of the heater. The element wire is then embedded in magnesium oxide (MgO)-based insulation compacted into a solid mass creating excellent heat conductivity and high dielectric strength. The heater is then enclosed in aluminized steel or 430 stainless steel sheathing.

Performance Capabilities

- Aluminized steel sheath temperatures up to 1100°F (595°C)
- 430 stainless steel sheath temperatures up to 1200°F (650°C)
- Watt densities up to 100 W/in^2 (15.5 W/cm^2)
- UL® approved up to 240VAC (File No. E52951)
- CSA approved up to 600VAC (File No. LR7392)

Features and Benefits

Nickel-chromium element wire is centered in the heater
- Assures uniform heat

Aluminized steel sheath
- Operates at higher temperatures and resists corrosion better than iron-sheathed heaters
- Minimizes heat-up time

Optional 430 stainless steel sheath
- Meets temperature requirements that reach up to 1200°F (650°C)

Post terminals, welded to the element wire
- Produces strong, trouble-free connections

Rigid $^3/_8$ in. (9.5 mm) thick design
- Enables the heater to fit into many existing applications

Over 100 in-stock models in popular sizes and ratings
- Allows next day shipment

Available dimensions are 1$^1/_2$ in. (38 mm) wide and 5$^1/_2$ to 48 in. (140 to 1219 mm) long
- Fits a variety of application needs

Typical Applications

- Food warming
- Freeze and moisture protection
- Tank and platen heating
- Packaging
- Dies and mold heating
- Autoclaves
- Ovens
- Telecom

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Specifications

Calculating Watt Density

Use the *Maximum Allowable Watt Density* graphs and formulas to ensure the allowable watt density for the heater does not exceed the specific application requirements.
Watt density is calculated for one side of the heater only.

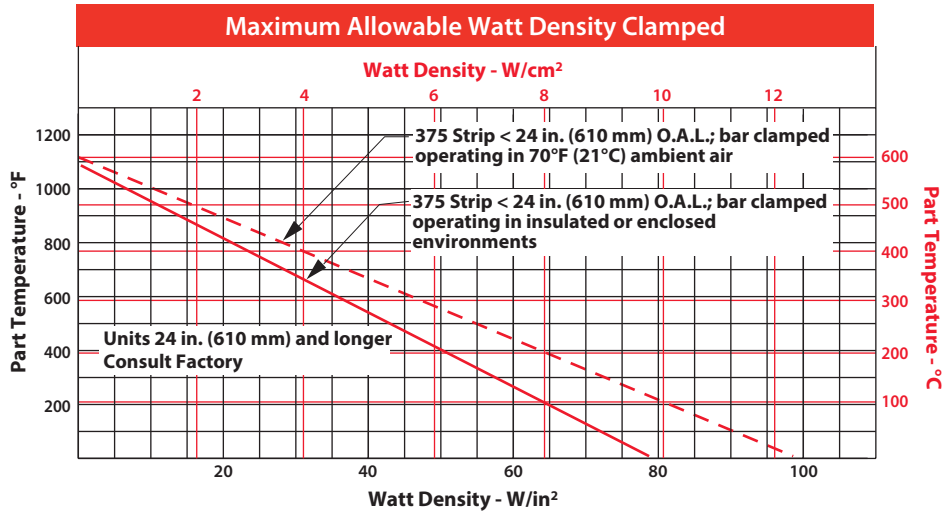
Formulas

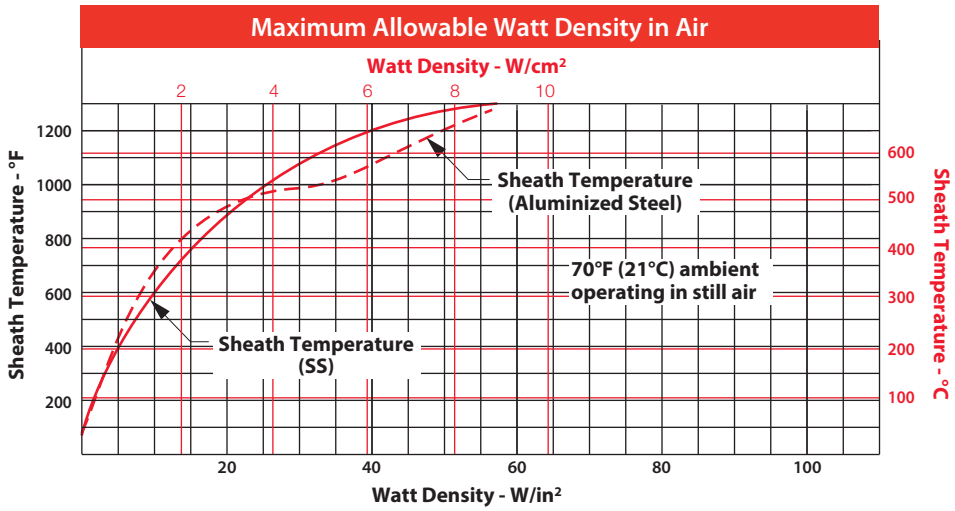
$$\text{Watt Density} = \frac{\text{Wattage}}{\text{Heated Area}}$$

Heated Area
(Offset Terminals) = [Overall Length (A) x 1.5 in.] - 6 in^2
= [Overall Length (A) x 38 mm] - 38.7 cm^2

Heated Area
(Parallel Terminals) = [Overall Length (A) x 1.5 in.] - 4.7 in^2
= [Overall Length (A) x 38 mm] - 30.3 cm^2

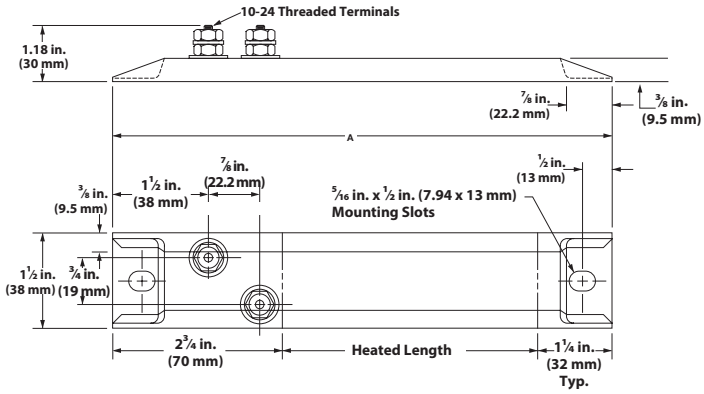
Heated Area
(One-on-One Terminals) = [Overall Length (A) x 1.5 in.] - 6 in^2
= [Overall Length (A) x 38 mm] - 38.7 cm^2





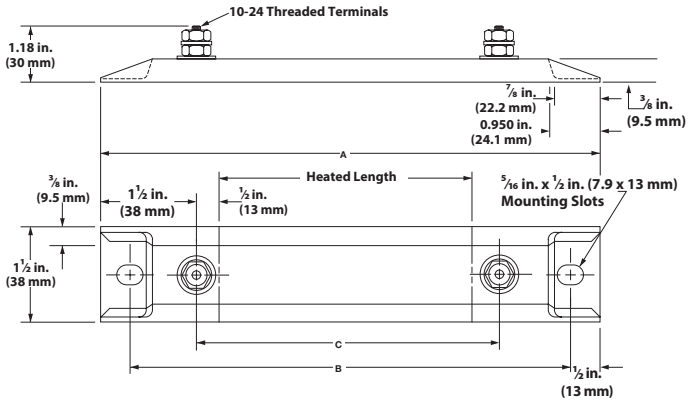
Termination Options

Offset Terminals



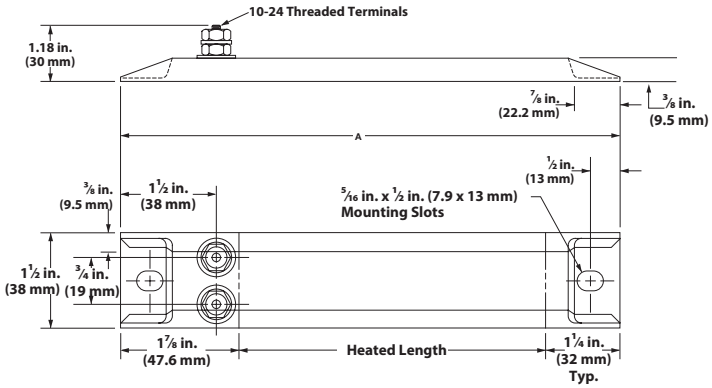
Two 10-24 threaded post terminals are offset from each other on the same end.

One-on-One Terminals



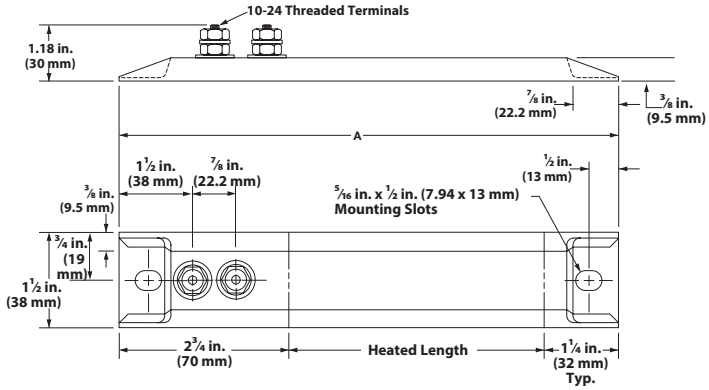
Two 10-24 threaded post terminals are placed one on each end.

Parallel Terminals



Two 10-24 threaded post terminals are used; both terminals on one end.

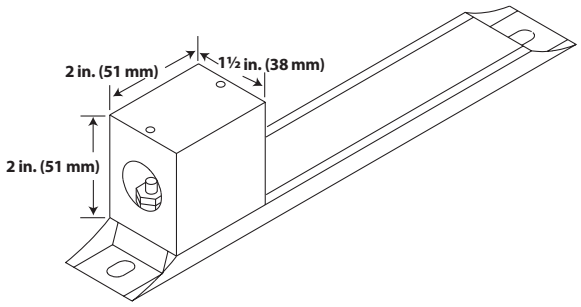
In-Line Terminals



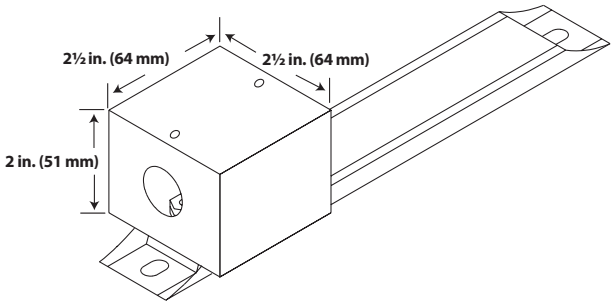
Two 10-24 threaded post terminals are in-line with each other on the same end.

Termination Options (Con't)

Metallic Terminal Boxes - Variations



Available on in-line terminals only.

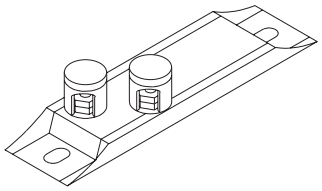


Available on offset terminals from stock and manufactured.

Metallic terminal boxes are available from stock on offset terminals. Terminal boxes act as a safety feature by covering the terminals. A conduit may be attached to the box through 7/8 in. (22.2 mm) diameter holes in the ends of the box. To order, specify **terminal box.**

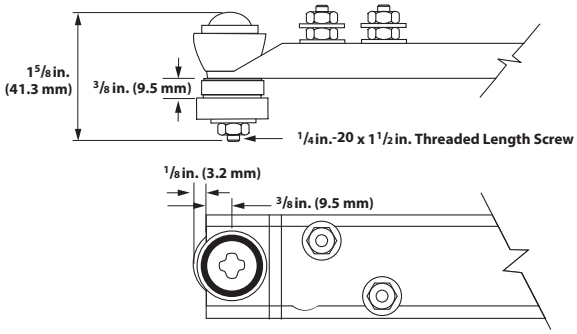
Accessories

Ceramic Terminal Covers



Ceramic terminal covers offer a convenient and economic method to insulate post terminals. They are sized for standard length posts with 10-24 screw thread size, supplied as an accessory item and shipped separately. Specify **Z-4918** and quantity.

Secondary Insulation Bushings



Insulators are suitable when air heating and/or voltage to ground is a concern. A secondary insulation bushing kit, part number **Z5230**, contains one set of bushings for one heater. To accommodate bushings, 17/32 x 11/16 inch diameter mounting holes **must** be specified when ordering the heater.

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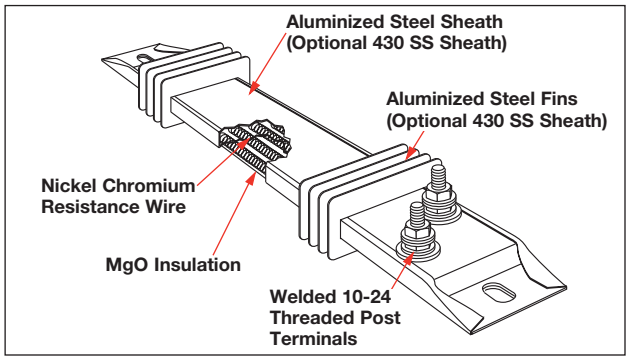
375 Finned Strip Heaters

Efficiently Conducts Heat From Nickel-Chrome Element Wire to the Sheath

The 375 finned strip heater from Watlow® is constructed of highly-compacted magnesium oxide (MgO) based insulation, which conducts heat efficiently from the nickel chromium element wire to the sheath. Two-inch wide (51 mm) nickel plated fins are attached to maximize surface contact allowing heat to transfer into the air faster. Lower sheath temperature and element life are maximized by this finned construction.



Performance Capabilities

- Aluminized steel sheath temperatures up to 1100°F (595°C)
- Watt densities up to 33 W/in^2 (5.1 W/cm^2)
- UL® approved up to 240VAC (File No. E52951)
- CSA approved up to 600VAC (File No. LR7392)

Features and Benefits

Nickel-chromium element wire is centered in the heater
- Ensures uniform heat

Aluminized steel sheath
- Operates at higher temperatures and resists corrosion better than iron-sheathed heaters

Optional 430 stainless steel sheath
- Provides a durable solution for highly-corrosive environments

Welded post terminals
- Produces strong, trouble-free connections

Available lengths from 5^1/$_2$ to 48 in. (140 to 1220 mm)
- Fits a variety of application needs

Typical Applications

- Enclosure heating
- Load bank resistors
- Shrink tunnels
- Duct heaters
- Space heaters
- Drying ovens
- Incubators
- Air heating
- Heat curing
- Ink drying
- Food warmers
- Moisture protection
- Dehumidifiers
- Stress relieving ovens

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Technical Information

Calculating Watt Density

Use the graph and formulas to ensure the maximum allowable watt density for the heater is not exceeded in the application.

Open air watt density is calculated for the total heated surface area.

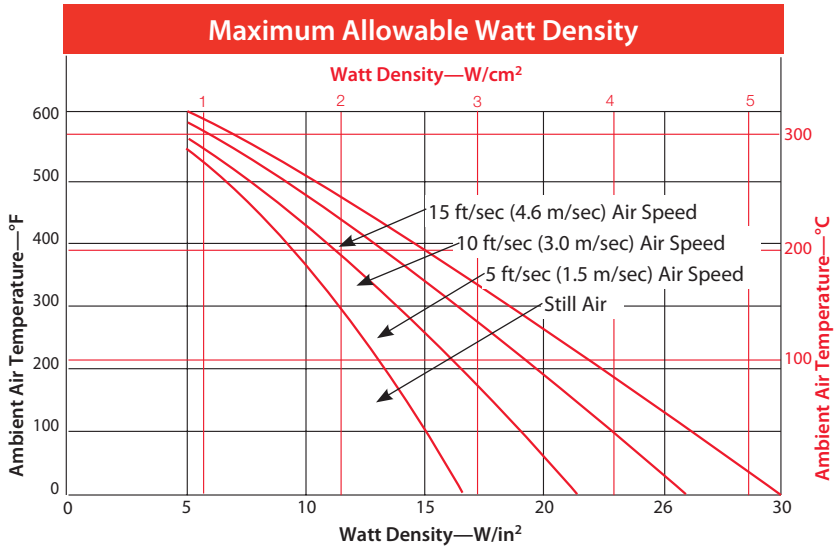
Formulas

$$\text{Watt Density} = \frac{\text{Wattage}}{\text{Heated Area}}$$

Heated Area (Offset Terminals) = [Overall Length (A) - 4 in.] x 3.75 in.
= [Overall Length (A) - 102 mm] x 95.3 mm

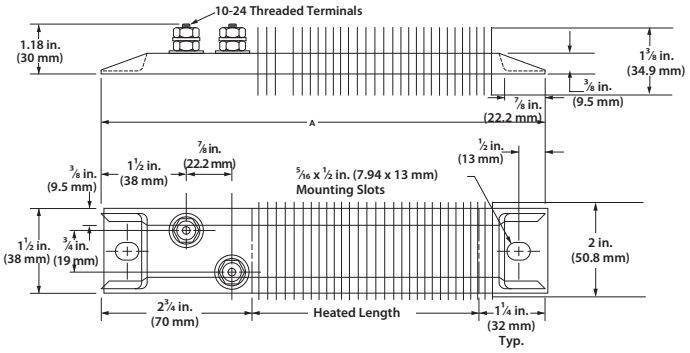
Heated Area (Parallel Terminals) = [Overall Length (A) - 3.12 in.] x 3.75 in.
= [Overall Length (A) - 79.3 mm] x 95.3 mm

Heated Area (One-on-One Terminals) = [Overall Length (A) - 4.25 in.] x 3.75 in.
= [Overall Length (A) - 108 mm] x 95.3 mm



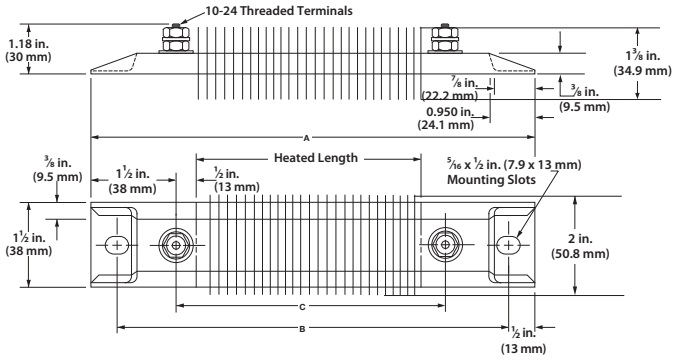
Termination Options

Offset Terminals



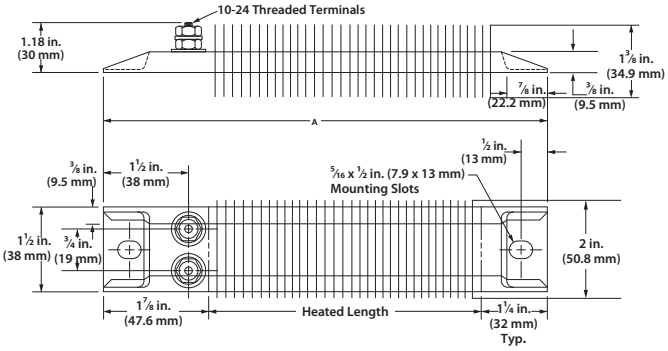
Two 10-24 threaded post terminals are offset from each other on the same end.

One-on-One Terminals



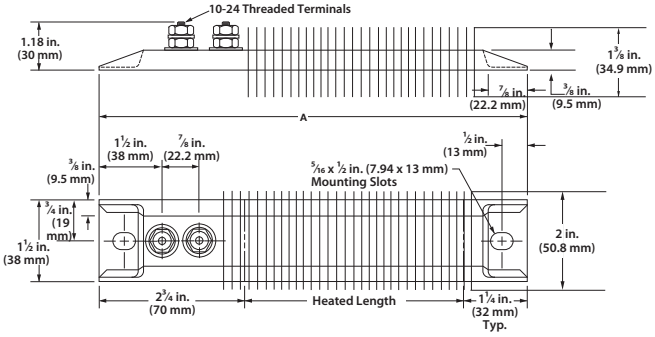
Two 10-24 threaded post terminals are placed one on each end.

Parallel Terminals



Two 10-24 threaded post terminals are used; both terminals on one end.

In-Line Terminals

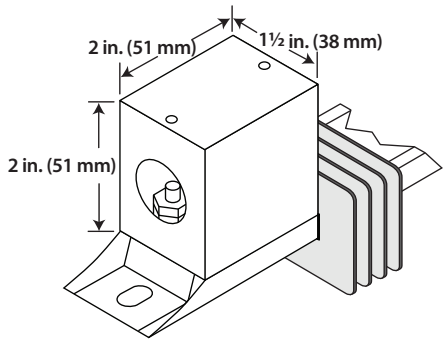


Two 10-24 threaded post terminals are in-line with each other on the same end.

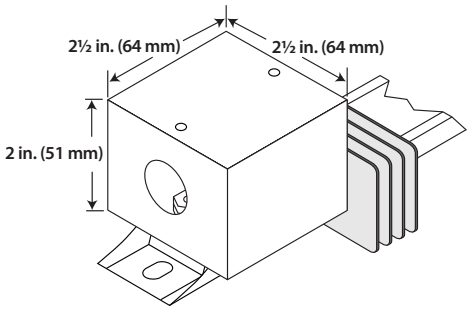
Termination Options (Con't)

Metallic Terminal Boxes - Variations

Metallic terminal boxes are available from stock on offset terminals. Terminal boxes act as a safety feature by covering the terminals. A conduit may be attached to the box through 7/8 in. (22.2 mm) diameter holes in the ends of the box. To order, specify **terminal box.**



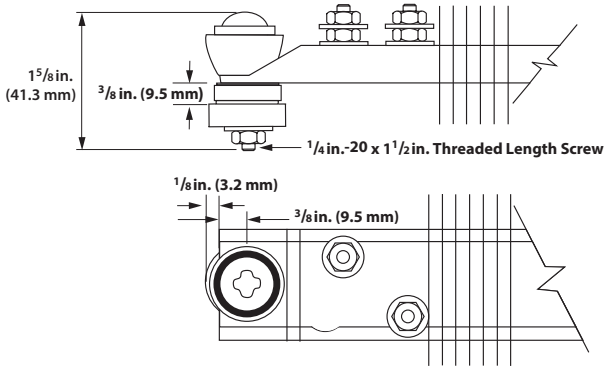
Available on in-line terminals only.



Available on offset terminals from stock and manufactured.

Accessories

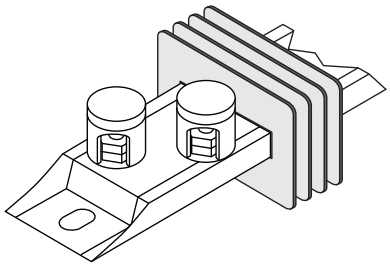
Secondary Insulation Bushings



Insulators are suitable when air heating and/or voltage to ground is a concern. A secondary insulation bushing kit, part number **Z-5230**, contains one set of bushings for one heater. To accommodate bushings, 17/32 x 11/16 inch diameter mounting holes must be specified when ordering.

Note: Number of fins are dependent on length of heater.

Ceramic Terminal Covers



Ceramic terminal covers offer a convenient and economical method to insulate post terminals. A 10-24 screw thread is sized for standard length posts and is supplied as an accessory item and shipped separately. Specify **Z-4918** and quantity.

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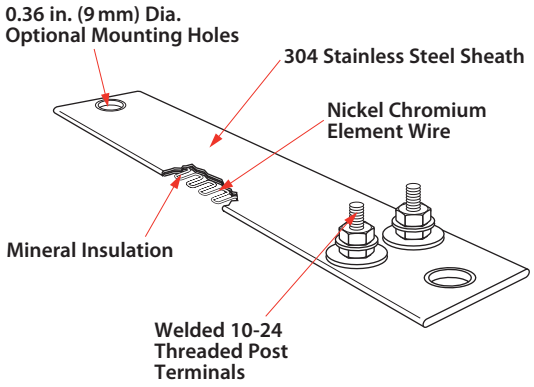
Mineral Insulated (MI) Strip Heaters

Thin, Responsive Heater Sets Standards for Performance and Durability

The MI strip heater is a thin, responsive heater that uses the most advanced heater construction techniques. A nickel-chromium element wire is embedded in Watlow's exclusive mineral insulation material, which has a much higher thermal conductivity than the mica and hard ceramic insulators used in conventional heaters. This thin layer of insulation brings the element wire closer to the heater sheath. The result is heat flows easily from the element wire to the sheath allowing the wire to run cooler than conventional heaters and increasing heater life.



Performance Capabilities

- Sheath temperatures up to 1400°F (760°C)
- Watt densities up to 140 W/in^2 (21.7 W/cm^2)
- Maximum voltage up to 480VAC
- UL® component recognition for most 240VAC or less designs (UL® File No. E52951)

Typical Applications

- Solder pins
- Zinc die-casting equipment
- Die and mold heating
- High-temperature resins
- Tank and platen heating
- Ovens
- Packaging equipment
- Semiconductor chamber heating

Features and Benefits

Higher watt densities than any other strip heater

- Provides faster heat up

Exclusive mineral insulation

- Combines dielectric strength and superior thermal conductivity
- Transfers heat rapidly to the sheath

304 stainless steel sheath

- Maintains the high compaction of mineral insulation
- Produces a rigid heater

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Calculating Watt Density

Watt density is the amount of wattage per square inch of heated area. To determine watt density, divide the total wattage by the heated area.

$$\text{Watt Density} = \frac{\text{Wattage}}{\text{Heated Area}}$$

To apply this equation, the heated area is the total contact surface of the heater less areas of no-heat found around terminals, mounting holes, etc.

Heated Area = Total Contact Area - No-Heat Area

To calculate the heated area:

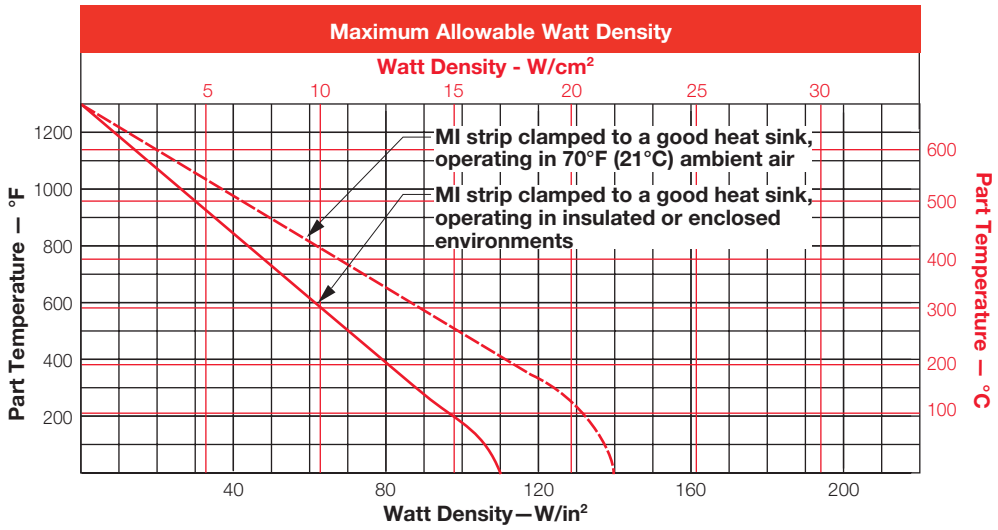
1. Using the chart below, locate the **no-heat factor** corresponding to the type of heater being considered.
2. To use the formula below, insert the no-heat factors, length and width (in inches).

Heated Area = (Overall Length - No-Heat Factor) x Width

Type	No-Heat Factor (in.)
1 in. Wide 1 in. wide post terminal 1 on 1	1.75
1 in. wide post terminal 1 on 1 with mounting holes	3.00
For all other widths 2 on 1 post terminal	1.18
2 on 1 with mounting holes	3.18

The drawings on the next page and the graph on this page will help in selecting the correct watt density for a particular application. First, refer to the drawings to determine the heated area of the heater. Then, use the watt density formula and graph to ensure that the maximum watt density of the heater does not exceed the specific application requirements.

$$\text{Watt Density} = \frac{\text{Wattage}}{\text{Heated Area}}$$



Specifications

Width

- 1, 1 1/2 and 2 in. (25, 38, 51 mm), tolerance ±1/32

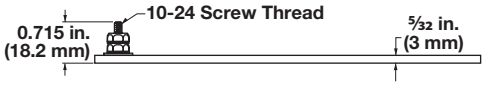
Length

- 8 to 30 in. (203 to 762 mm), tolerance ±1/8

Terminations

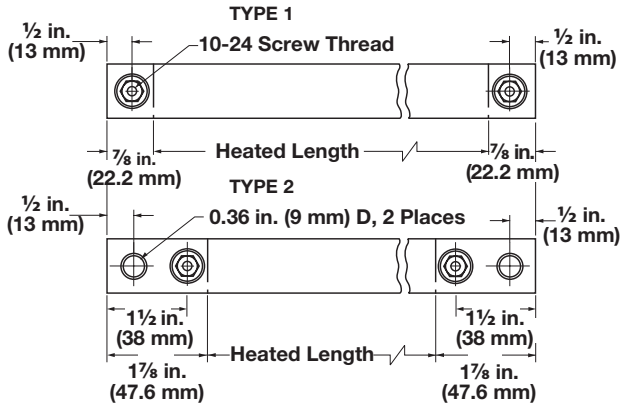
- 1 in. (25 mm) wide—post terminals one-on-one
  1 1/2 to 2 in. (38 to 51 mm)—post terminals two-on-one

All Widths

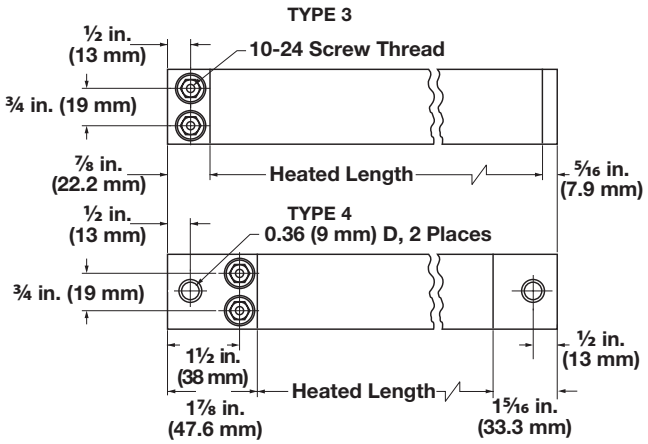


Note: In most applications, mounting holes alone do not provide adequate clamping. A clamp bar should be used for each 4 in. (102 mm) of heater length.

1 in. (25 mm) Wide

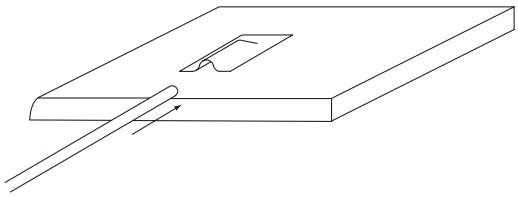


1 1/2 in. – 2 in. (38 – 51 mm) Wide



Options

Thermocouple Pocket

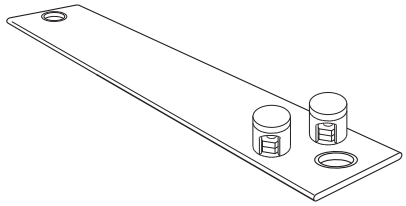


A thermocouple pocket welded to the back surface accepts a 0.063 in. (1.6 mm) diameter thermocouple.

This option provides accurate temperature sensing and easy thermocouple replacement. Thermocouple not included.

Accessories

Ceramic Terminal Covers



Ceramic terminal covers offer a convenient and economic method to insulate post terminals. They are sized for standard length posts with 10-24 screw thread size, supplied as an accessory item and shipped separately. Specify Z4918 and quantity.

Parallel Terminals Part Numbers—Type 3 and 4

Width in. (mm)	Length in. (mm)	Volts	Power (Watts)	Watt Density W/in² (W/cm²)	Approx. Net Wt. lbs. (kg)	Type	Part Number
1 1/2 (38)	8 (203)	240	500	50 (7.8)	0.3 (0.15)	3	**MS1J8AS3**
1 1/2 (38)	12 (305)	120	350	26 (4.0)	0.5 (0.2)	4	**MS1J12AV2**①
1 1/2 (38)	12 (305)	240	350	26 (4.0)	0.5 (0.2)	4	**MS1J12AV3**①
1 1/2 (38)	12 (305)	240	800	49 (7.6)	0.5 (0.2)	3	**MS1J12AS2**
1 1/2 (38)	18 (457)	120	1000	40 (6.2)	0.8 (0.3)	3	**MS1J18AS1**
1 1/2 (38)	18 (457)	240	1000	40 (6.2)	0.8 (0.3)	3	**MS1J18AS2**

① Denotes units with mounting holes. Mounting holes are 0.36 in. (9 mm) in diameter and are intended for use with 1/4 in. (6 mm) bolts.

Centers of mounting holes are located 1/2 in. (13 mm) from the ends of the heater.

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