

# Mineral Insulated Band Heaters

## High Performance Heater—More Efficient Heat Transfer

The mineral insulated (MI) band heater from Watlow® is a high-performance heater that incorporates Watlow's exclusive mineral insulation. This material offers much higher thermal conductivity than mica and hard ceramic insulators that are used in conventional heaters.

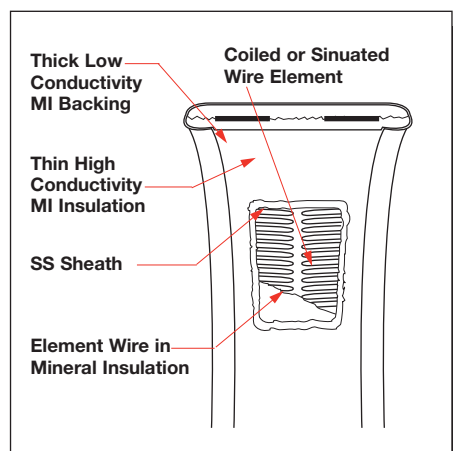
A thin layer of high thermal conductive MI material electrically insulates the element wire from the inside diameter of the heater sheath. A thicker, low thermal conductivity layer backs up the element wire directing the heat inward toward the part being heated. The result is efficient heat transfer, which lowers element wire temperatures and increases heater life.

### Performance Capabilities

- Heater operating temperatures up to 1400°F (760°C)
- Watt densities up to 100 W/in<sup>2</sup> (15.5 W/cm<sup>2</sup>) available on large diameter barrel bands
- Maximum voltage to 480V

### Typical Applications

- Extruders
- Blown film dies
- Injection molding machines
- Other cylinder heating applications



### Features and Benefits

#### High thermal conductivity of MI and low mass construction

- Provides an almost instant response to temperature control
- Eliminates thermal lag and temperature overshoot associated with ceramic knuckle heaters

#### Operating temperatures up to 1400°F (760°C)

- Allow safe melting of resins such as PEEK™, Teflon®, Ultem® and Zytel®

#### Higher watt densities

- Contribute to faster heat-up and throughput to increase productivity

#### Stainless steel cover and side fold design

- Resists contamination from overflow of plastic or other free-flowing materials

#### Attached clamp bars

- Eliminate cumbersome clamping straps to ease installation



STL-MIB-0611

## Applications and Technical Data

### General Limitations

- Maximum width of 1 in. (25 mm) diameter heater is 1½ in. (38 mm)
- Maximum heater width: 2x heater diameter
- Minimum I.D. for Type B, C, E and H leads: 1 in. (25 mm)
- Minimum I.D. for Type B—90° leads: 1½ in. (28.6 mm)
- Maximum lead amperes: 12.5A per pair
- SLE maximum: 17.0A
- Maximum amperes (post terminals): 30A per pair
- Minimum diameter and width for SLE: 4 in. x 1½ in. (102 mm x 38 mm) width

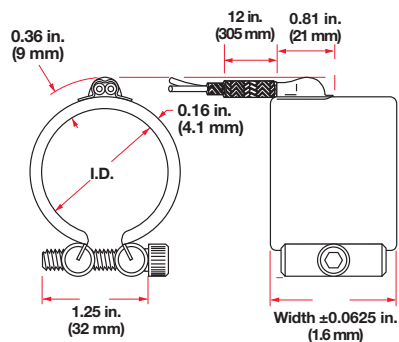
- 90° leads not available over 250VAC
- Minimum I.D. for post terminals: 1¼ in. (32 mm)
- Actual width for 7 in. (178 mm) wide heater: 6⅞ in. (174.6 mm)

### Gaps

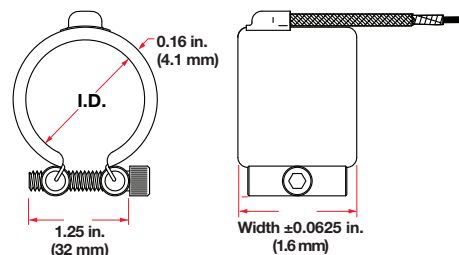
- ≤ 3 in. = ¼ in. nominal
- 3 in. ≤ 6 in. = ¼ in. nominal ± ½ in.
- 6 in. ≤ 14 in. = ⅜ in. nominal ± ½ in.
- >14 in. = ½ in. nominal ± ½ in.

## Termination Variations

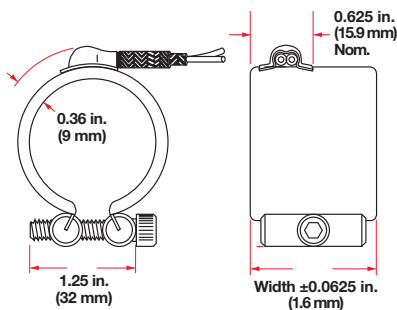
### Type B Stock



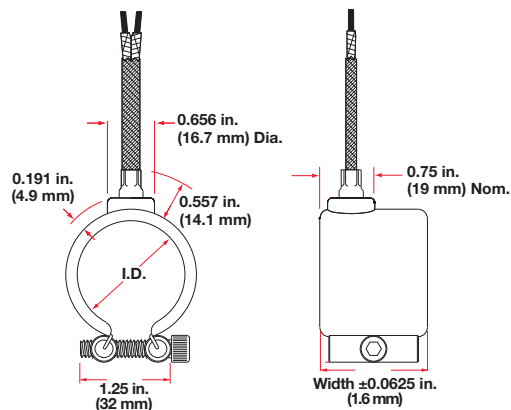
### Type B - 180° Rotation Stock



### Type B - 90° Rotation Non-Stock

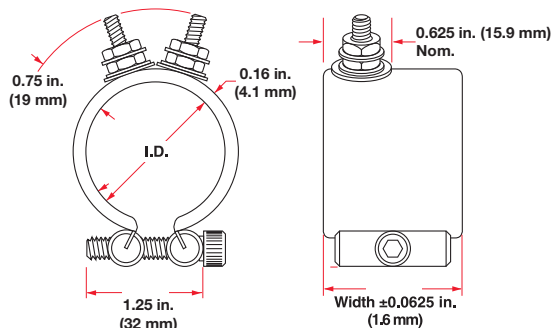


### Type C Stock



Leads Type B, Type B - 90° rotation, Type B - 180° rotation or Type C: Two fiberglass-insulated lead wires exit in a single metal braid providing good abrasion protection, lead flexibility and wiring convenience. Leads are 2 in. (51 mm) longer than the braid and are shipped with 12 in. (305 mm) leads, unless a longer length is specified. To order, specify **type** and **length**.

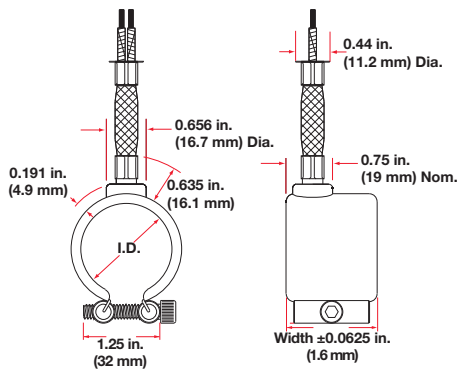
### Post Terminals Stock



Post terminals provide optimum connections. The screw thread is 10-24. To order, specify **post terminals** (metric threads available).

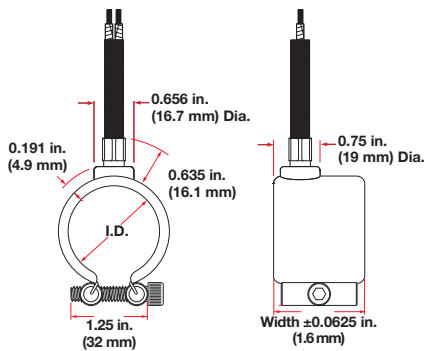
## Termination Variations (Continued)

### Type E Stock



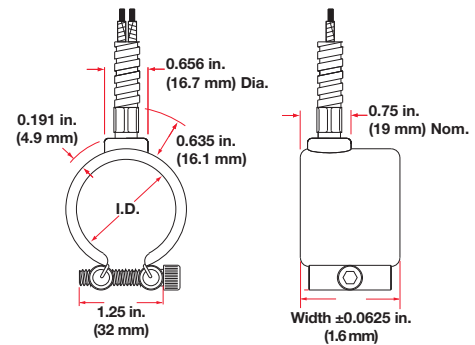
Type E: A loose metal braid encloses two fiberglass leads to provide good abrasion protection, lead flexibility and wiring convenience. Leads are 2 in. (51 mm) longer than the braid and are shipped with 12 in. (305 mm) leads, unless a longer length is specified. To order, specify **Type E** and **length**.

### Type F Stock



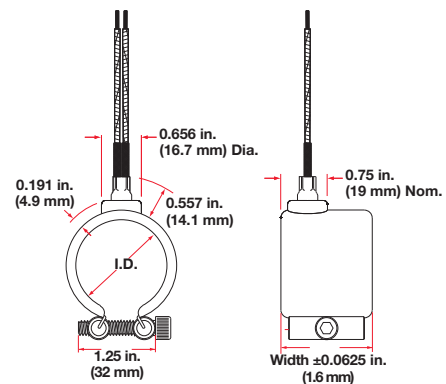
Type F: A loose fiberglass sleeving encloses two fiberglass leads for additional insulation protection where high temperature or minor abrasion is present. Leads are 2 in. (51 mm) longer than the sleeving. To order, specify **Type F** and **length**.

### Type H Stock



Type H: A flexible steel hose encloses the leads for maximum abrasion protection. Leads are 2 in. (51 mm) longer than the hose and are shipped with 12 in. (305 mm) leads, unless a longer length is specified. To order, specify **Type H** and **length**.

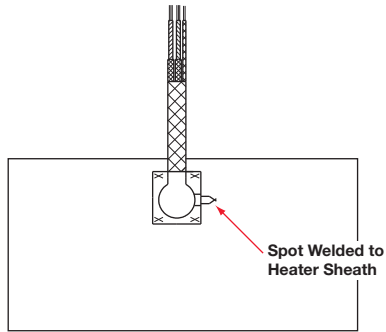
### Type K Stock



Type K: Flexible lead wires exit vertically from the heater. These leads can be bent adjacent to the heater for a quick and easy connection. To order, specify **Type K** and **length**.

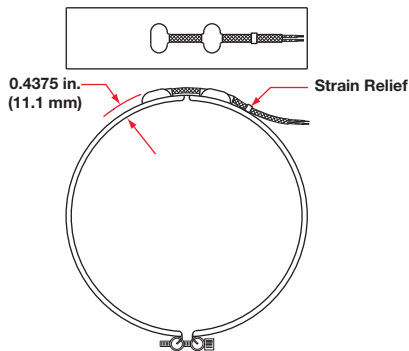
## Variations

### Thermocouple



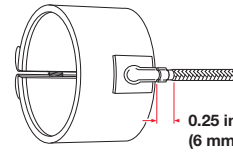
ASTM Type J or K thermocouples are available on lead Type B with loose braid and fiberglass sleeving. They are also available on E, F and H leads. The thermocouple junction, spot-welded to the heater sheath, provides a signal for measuring relative heater temperature. A separate thermocouple is available.

### Type SLE



Two fiberglass lead wires exit a single, tightly woven metal braid at a right angle on the expandable construction vs. two sets of leads. The minimum diameter capability is 4 in. (102 mm). Minimum width capability is 1½ in. (38 mm). To order, specify **Type SLE** and **length**.

### Heavy Duty Strain Relief

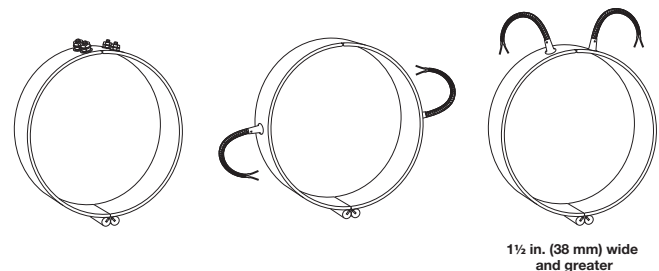


Heavy duty strain relief is recommended for applications where there is great stress or continued flexing of the leads. The strain relief is available on Type B, Type B - 90° and Type B - 180° leads only. To order, specify **heavy-duty strain relief**. **Note:** not available with loose braid or fiberglass sleeving.

### Ground Wire

Insulated ground wire is available. Contact a Watlow representative for ordering information.

### Expandable Heaters With Post Terminals or Leads



Expandable heaters are two-piece units with a common top metal that allow the heater to expand to the full diameter of the barrel. On expandable bands, each half will comprise one-half of the total wattage. On both expandable and two-piece bands, each half is rated at full operating voltage, unless otherwise specified.

**Post terminals for MI band heaters 1½ in. (38 mm) wide or greater** are located next to the expansion joint. Leads may be located anywhere along the circumference except near the gap and at the expansion joint. Two sets of leads are required.

**On 1 in. (25 mm) wide MI band heaters**, post terminals are located 90° from the expansion joint. Leads may be located anywhere along the circumference except near the gap and at the expansion joint. Two sets of leads are required. To order, specify **expandable**. Expandable heaters are designed to be opened for new installation only.

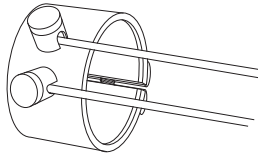
## Variations (Continued)

### Lead Wire

Heaters rated at less than 250VAC use UL® approved lead insulation for operations up to 480°F (250°C) as standard. Lead insulation UL® rated for operation to 840°F (450°C) is available for high-temperature applications where leads are shrouded or enclosed with the heater. These leads are available in any of the Type B variations with loose braid and Types E, F and H lead configurations. All heaters rated at more than 250VAC use this wire. When ordering, specify **850°F (450°C) wire**.

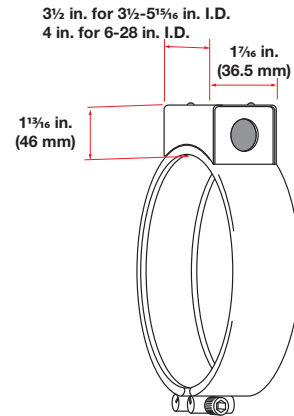
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### Ceramic Terminal Cover



Ceramic covers with openings for leads are screwed on to post terminals, providing a convenient, economical insulator. To order, specify code number **Z-4918** and **quantity**. For metric ceramic terminal covers, specify thread.  
**Note:** Ceramic terminal covers will not fit on some stock expandable MI bands. Contact a Watlow representative for more information

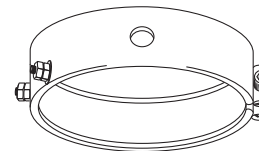
### Metallic Terminal Box



Metallic terminal boxes are available from stock on 3 1/2 in. inside diameter x 1 1/2 in. wide (89 mm x 38 mm) or larger heaters. Terminal boxes attach directly to the heater and act as a safety feature by covering the terminals. The conduit may be attached to the box through 7/8 in. (22.2 mm) diameter holes in the ends of the box. Two-piece heaters require two boxes. To order, specify **terminal box**.

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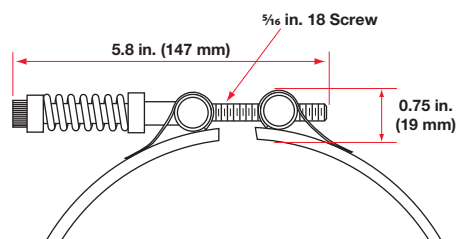
### MI Band Heater with Holes



MI band heaters with holes are available on all widths except 1 in. (25 mm) wide. Contact your Watlow representative for hole sizes and location constraints. To order, specify **hole size** and **location**. The inside diameter minimum is 3 in. (76 mm).

## Clamping Variations

### Tig-Welded Barrel Nuts with Spring Loaded Clamping

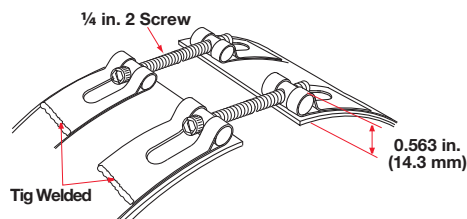


Welded barrel nuts with spring loaded clamping are used during start-up to maintain a tight heater fit on large barrels. This clamping variation is used for all MI band heaters greater than 14 in. (356 mm) in diameter and 1½ in. (38 mm) or greater in width. Refer to the MI Band Clamping Matrix Application Guide. For smaller diameter heaters, this is an option and must be ordered separately. To order, specify **spring loaded clamping**.

### Low-Profile Tig-Welded Barrel Nuts

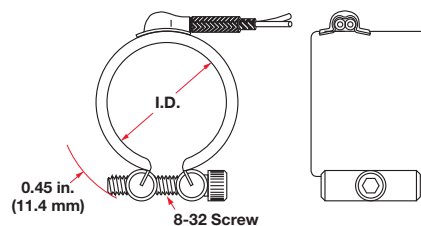
Low-profile barrel nuts are available on all widths and provide a clearance of 0.470 in. (12 mm). However, this value can be higher depending on how far the clamp screw extends past the barrel nut. To order, specify **low-profile tig-welded barrel nuts**.

### Tig-Welded Barrel Nuts



Provide access for instrumentation by specifying an oversized gap between the heater ends. If the clamp bar screw interferes with the positioning of the instrumentation device, welded barrel nuts are recommended (tig-welded barrel nuts are standard on 1 in. (25 mm) wide MI band heaters). To order, specify **tig-welded barrel nuts** and **gap dimension** when ordering.

## Low-Profile Clamp Bars



Low-profile clamp bars are available on both 1 in. (25 mm) and 1½ in. (38 mm) wide heaters. For wider widths, contact your Watlow representative. Watlow does not recommend using low-profile clamping on diameters and widths greater than 3 in. (76 mm). The bars are ¼ in. (6 mm) diameter with an 8-32 screw. To order, specify **low-profile clamp bars**.

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