

Band/Barrel Heaters

Band/Barrel Heaters	Sheath Materials	Max. Operating Temperatures		Typical Max. Watt Densities		Page
		°F	°C	W/in ²	W/cm ²	
Mineral Insulated (MI)	Stainless steel	1400	760	100	15.5	529



Band/Barrel Heaters



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Mineral Insulated (MI) Band Heaters

The MI band heater from Watlow® is a high-performance heater. Its performance and name are derived from Watlow's exclusive mineral insulation—a material with much higher thermal conductivity than mica and hard ceramic insulators used in conventional heaters.

A thin layer of the “high” thermal conductive MI material is used to electrically insulate 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 more efficient heat transfer, which lowers element wire temperatures and increases heater life.

Performance Capabilities

- Heater operating temperatures to 1400°F (760°C)
- Watt densities to 100 W/in² (15.5 W/cm²) available on large diameter barrel bands
- Maximum voltage to 480V

Features and Benefits

High thermal conductivity of MI and low mass construction

- Gives 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)

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

Higher watt densities

- Contributes to faster heat-up and throughput for increased productivity

Stainless steel cover and side fold design

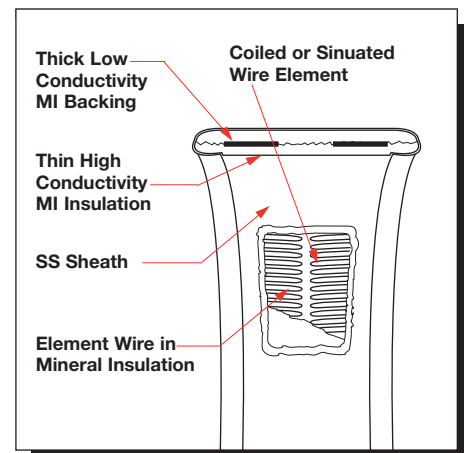
- Resists contamination from overflow of plastic or other free-flowing materials

Attached clamp bars

- Eliminates cumbersome clamping straps, making installation easier

Typical Applications

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



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Applications and Technical Data

The *Physical Limitations of Variations* table shows the availability of widths, inside diameters and terminations for Watlow's MI band and barrel heaters. To make sure the available terminations will meet the applications needs, refer to the illustrations of termination variations in this section.

If the application requires a heater exceeding the limitations shown, contact your Watlow representative.

Physical Limitations of Variations

Width in. (mm)	I.D. Available — in. (mm)								Available Terminations
	1 pc. Construction Min. (mm) Max. (mm)		Expandable Min. (mm) Max. (mm)		2 pc. Construction Min. (mm) Max. (mm)				
1 (25.0)	1 (25)	6 (152)	3 (76)	12 (305)	3 (76)	12 (305)			All
1½ (34.9)	1 (25)	3 (76)	3 (76)	6 (152)	3 (76)	6 (152)			All - Except SLE
1½ (38.0)	1 (25)	14 (356)	3 (76)	14 (356)	3 (76)	28 (711)			All
2 (51.0)	1½ (32)	14 (356)	3 (76)	14 (356)	3 (76)	28 (711)			All
2½ (64.0)	1½ (32)	14 (356)	3 (76)	14 (356)	3 (76)	28 (711)			All
3 (76.0)	1½ (38)	14 (356)	3 (76)	14 (356)	3 (76)	28 (711)			All
3½ (89.0)	1½ (45)	14 (356)	3 (76)	14 (356)	3 (76)	28 (711)			All - Except 90° "B" Leads
4 (102.0)	2 (51)	14 (356)	3 (76)	14 (356)	3 (76)	28 (711)			All
4½ (114.0)	2½ (57)	14 (356)	3 (76)	14 (356)	3 (76)	28 (711)			All
5 (127.0)	2½ (64)	14 (356)	3 (76)	14 (356)	4 (102)	28 (711)			All - Except 90° "B" Leads
5½ (140.0)	2½ (70)	14 (356)	3 (76)	14 (356)	4 (102)	28 (711)			Post Terminals, SLE only
6 (152.0)	3 (76)	14 (356)	3 (76)	14 (356)	4 (102)	28 (711)			All
7 (178.0)			4 (102)	14 (356)					Post Terminals, SLE only

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: 6¾ in. (174.6 mm)

Gaps

- ≤ 3 in. = ½ 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 ± ¼ in.

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Mineral Insulated (MI) Band Heaters

Applications and Technical Data (Continued)

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.

$$\text{Watt Density} = \frac{\text{Total Watts}}{\text{Heated Area}}$$

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

$$\text{Heated Area} = \text{Total Contact Area} - \text{No-Heat Area}$$

To calculate the heated area:

1. Locate the **no-heat factor** from the chart below that corresponds to the type of heater being considered.

Type	Factor in.
1 pc. lead unit Type B, C, H, E or 90°B	1.37
1 pc. post terminal	1.60
1 pc. expandable post term	3.18
1 pc. expandable lead unit	3.00
True 2 pc. post term	3.20
True 2 pc. leads	2.74
SLE	3.68

2. To use the formula below, insert the no-heat factors, diameter and width (in inches).

$$\text{Heated Area} = (3.14 \times \text{Diameter} - \text{No-Heat Factor}) \times \text{Width}$$

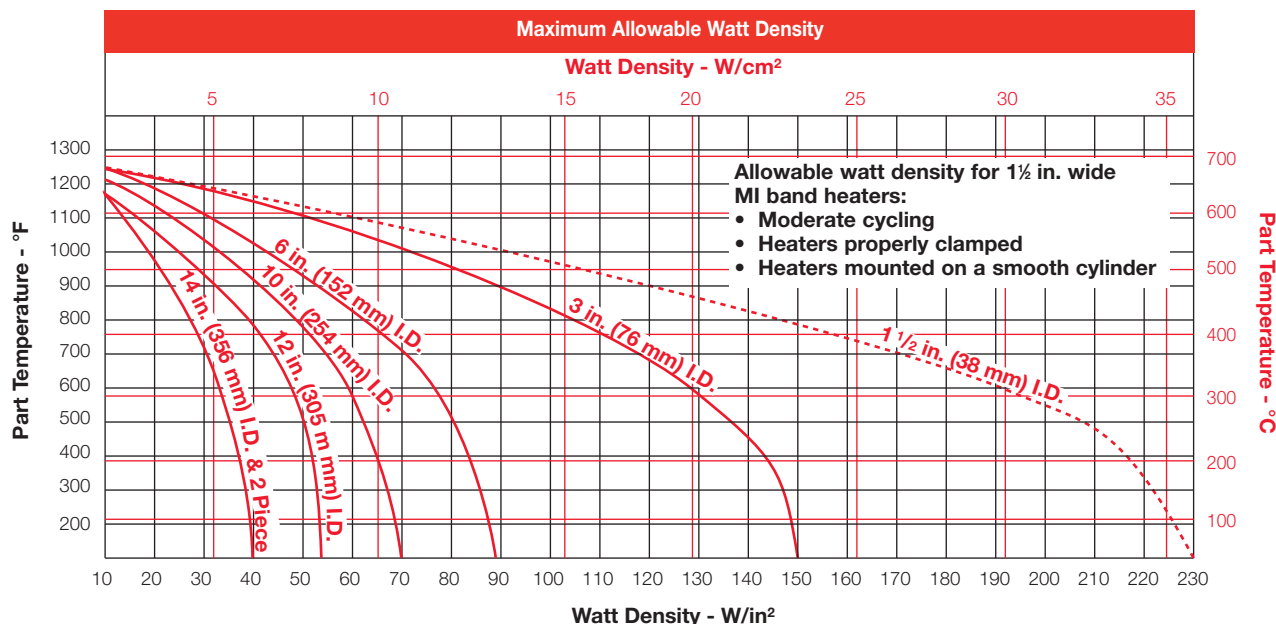
Maximum Allowable Watt Density

The following derating factors apply to the *Maximum Allowable Watt Density* chart, which are shown in both inches and millimeters. Please review these factors and the chart to determine the correct watt density curve for the application.

Derating Factors:

- For units over 2 in. (51 mm) in width, multiply watt density by 0.80.

- In applications where unusual operating conditions are present, such as irregular mounting surfaces, contact your Watlow representative for watt density limitations.
- For two-piece units used in vertical applications, refer to *Clamping Matrix Application Guide* on page 532.
- For applications where insulating blankets are used, multiply watt density by 0.75.



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Applications and Technical Data (Continued)

- Review the *Watt Density* chart to ensure the application does not exceed the maximum watt density at operating temperature after applying derating factors.
- Locate clamping guideline for unit diameter, width and watt density.
- Description of guideline letters are at the bottom of the *MI Band Clamping Matrix Application Guide*.
- Note:** Upward arrows are up to and not including specified watt density. Downward arrows are greater than or equal to specified watt density.

MI Band Clamping Matrix Application Guide

Watt Density—W/in ²	8 ≥ 10	10 ≥ 12		12 ≥ 14		14 ≥ 16		16 ≥ 18		18 ≥ 20		20 ≥ 22		22 ≥ 24		24 ≥ 26		26 ≥ 28		
	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"	1 ½" to 4"	4 ½" to 7"
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20																				
15																				
10																				
0																				

Above Recommended Watt Densities
Contact your Watlow Representative

- A = Clamp bars, expandable or one piece construction
- B = Spring clamps, expandable or one piece construction
- C = Spring clamps, at one gap, welded barrel nuts at other gap
- D = Spring clamps, spring clamps at both gaps

Width	Clamp Points at Each Gap
≥ 5 in. (127 mm)	3
≥ 3 in. (76 mm)	2
< 3 in. (76 mm)	1

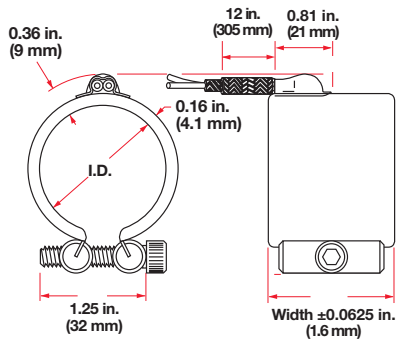
Note: 1 in. (25 mm) wide heaters use welded barrel nuts rather than clamp bars.

Band/Barrel Heaters

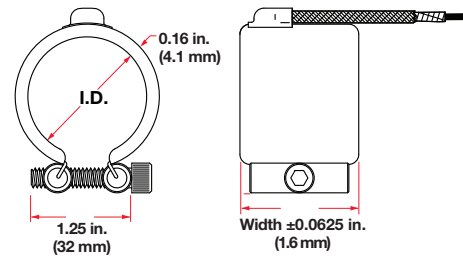
Mineral Insulated (MI) Band Heaters

Termination Variations

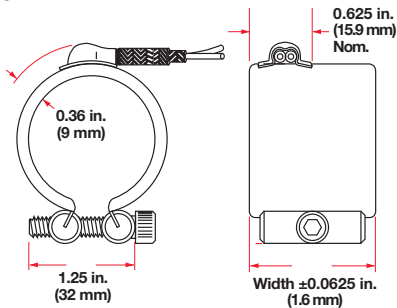
Type B Stock



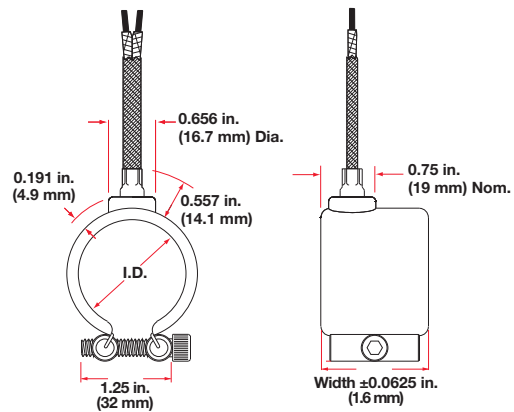
Type B - 180° Rotation Stock



Type B - 90° Rotation Non-Stock

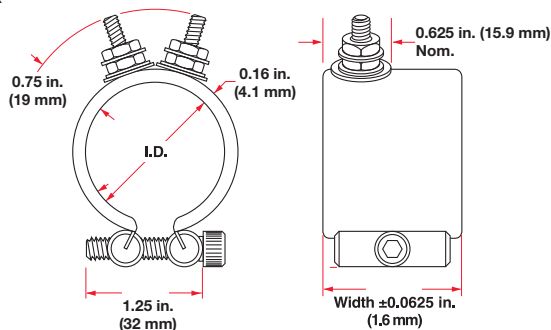


Type C Stock



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 for good abrasion protection, lead flexibility and wiring convenience. Leads are 2 in. (51 mm) longer than braid. Shipped with 12 in. (305 mm) leads, unless longer length is specified. To order, specify **type** and **length**.

Post Terminals Stock



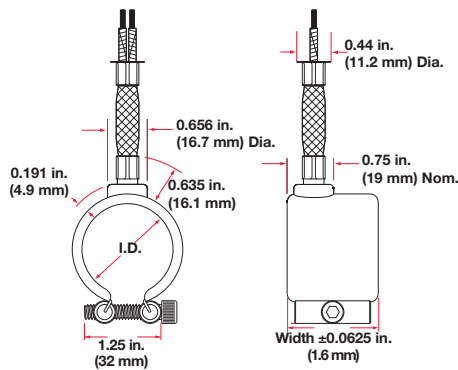
Post terminals provide optimum connections. Screw thread is 10-24. To order, specify **post terminals** (metric threads available).

Band/Barrel Heaters

Mineral Insulated (MI) Band Heaters

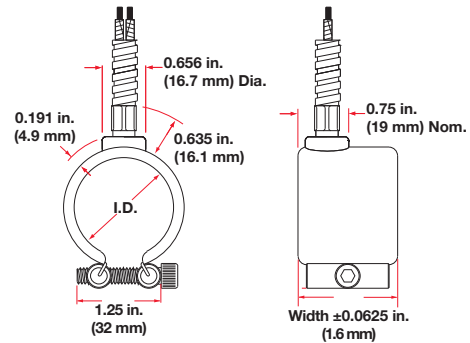
Termination Variations (Continued)

Type E Stock



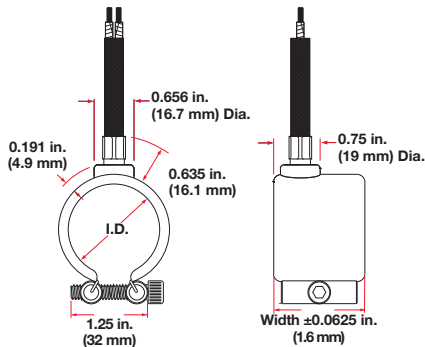
Type E: Loose metal braid encloses two fiberglass leads for good abrasion protection, lead flexibility and wiring convenience. Leads are 2 in. (51 mm) longer than braid. Shipped with 12 in. (305 mm) leads, unless longer length is specified. To order, specify **Type E** and **length**.

Type H Stock



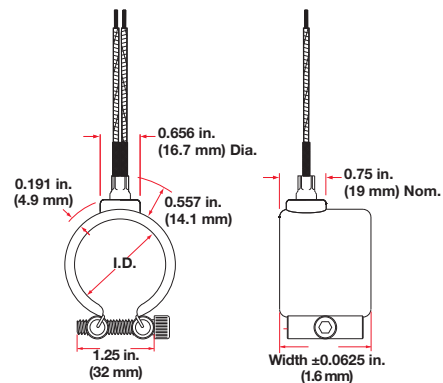
Type H: A flexible steel hose encloses the leads for maximum abrasion protection. Leads are 2 in. (51 mm) longer than hose. Shipped with 12 in. (305 mm) leads, unless longer length is specified. To order, specify **Type H** and **length**.

Type F Stock



Type F: 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 K Stock



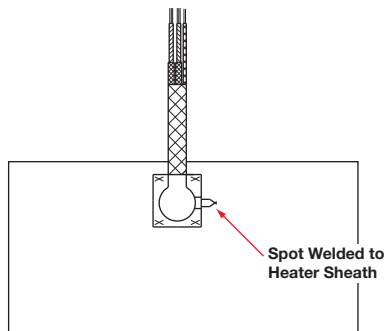
Type K: Flexible lead wires exit vertically from the heater. These leads can be bent adjacent to the heater for a quick and easy connection. To order, specify **Type K** and **length**.

Band/Barrel Heaters

Mineral Insulated (MI) Band Heaters

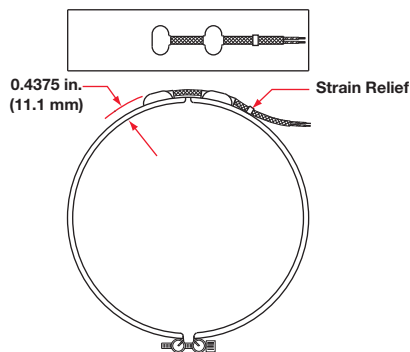
Variations

Thermocouple



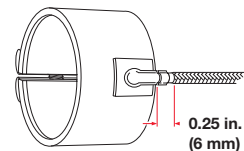
ASTM Type J or K thermocouples are available on lead Type B with loose braid and fiberglass sleeving. They are also available on E, F and H leads. The thermocouple junction, spot-welded to the heater sheath, provides a signal for measuring relative heater temperature. A separate thermocouple is available.

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

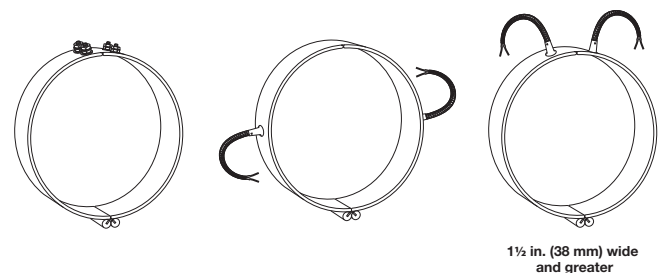


Heavy duty strain relief is recommended for applications where there is great stress or continued flexing of the leads. The strain relief is available on Type B, Type B - 90° and Type B - 180° leads only. To order, specify **heavy-duty strain relief**. **Note:** not available with loose braid or fiberglass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

Ground Wire

Insulated ground wire is available, contact your Watlow representative.

Expandable Heaters With Post Terminals or Leads



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

MI band heaters 1½ in. (38 mm) wide or greater will have post terminals 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 required.

On 1 in. (25 mm) wide MI band heaters, post terminals will be 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.

Band/Barrel Heaters

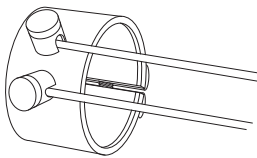
Mineral Insulated (MI) Band Heaters

Variations (Continued)

Lead Wire

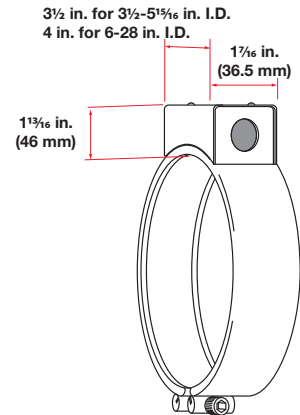
Heaters rated at less than 250VAC use UL® approved lead insulation for operations to 480°F (250°C) as standard. Lead insulation UL® rated for operation to 840°F (450°C) is available for high-temperature applications where the leads are shrouded or enclosed with the heater. These leads are available in any of the Type B with loose braid as well as 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**.

Ceramic Terminal Cover



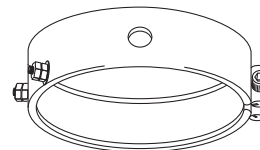
Ceramic covers, with openings for leads, are screwed on to post terminals, providing a convenient, economical insulator. To order, specify code number **Z-4918** and **quantity**. Ceramic terminal covers are also available in metric, specify thread. **Note:** Ceramic terminal covers will not fit on some stock expandable MI bands. Contact your 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, which attach directly to the heater, act as a safety feature by covering the terminals. 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**.

MI Band Heater with Holes



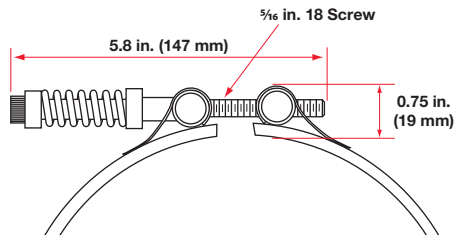
MI band heaters with holes are available on all widths except 1 in. (25 mm) wide. Contact your Watlow representative for hole sizes and location constraints. To order, specify **hole size** and **location**. There is a 3 in. (76 mm) inside diameter minimum.

Band/Barrel Heaters

Mineral Insulated (MI) Band Heaters

Clamping Variations

Tig-Welded Barrel Nuts with Spring Loaded Clamping

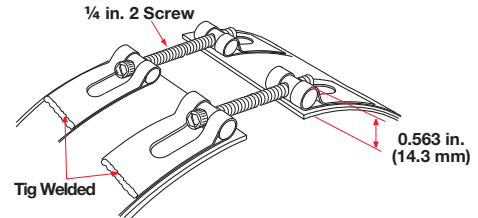


Welded barrel nuts with spring loaded clamping are used during start-up to maintain a tight heater fit on large barrels. This clamping variation for all MI band heaters greater than 14 in. (356 mm) in diameter and 1½ in. (38 mm) or greater in width. Refer to *MI Band Clamping Matrix Application Guide*.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

Low-Profile Tig-Welded Barrel Nuts

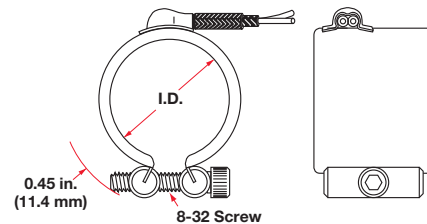
Low-profile barrel nuts are available on all widths. Low-profile barrel nuts have a clearance of 0.406 in. (10.3 mm), this will vary with heater diameter. To order, specify **low-profile tig-welded barrel nuts**.

Tig-Welded Barrel Nuts



An ideal way to provide access for instrumentation is to specify 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

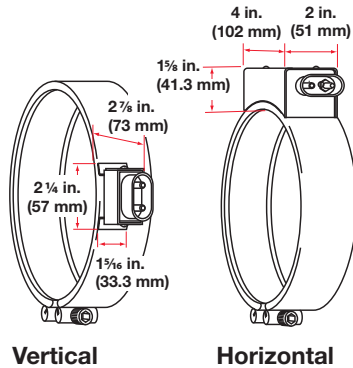


Low-profile clamp bars are available on both 1 in. (25 mm) and 1½ in. (38 mm) wide heaters, for wider widths contact your Watlow representative. Watlow recommends not using low-profile clamping on diameters and widths greater than 3 in. (76 mm) The bars are 1/4 in. (6 mm) diameter with an 8-32 screw. To order, specify **low-profile clamp bars**.

Extended Capabilities For Mineral Insulated (MI) Band Heaters

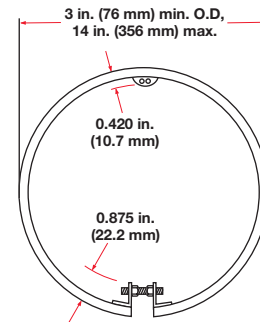
Variations

High Temperature “Quick Disconnect” European Style Plugs



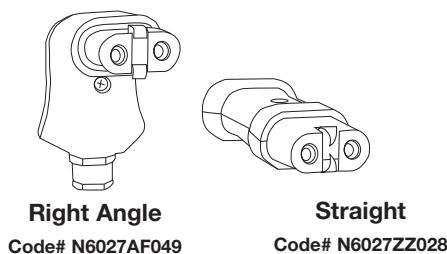
They provide the simplest and safest way to apply power to band heaters. The combination of high-temperature male and female “quick disconnect” plug assemblies eliminates all live exposed terminals and electrical wiring that can be a potential hazard to employees or machine. Maximum 15 amperes at 240VAC, maximum 240V. To order, specify **vertical** or **horizontal** European plug.

Outside Diameter Heater



Two fiberglass-insulated lead wires rated to 840°F (450°C) exit a metal braid 180° opposite from gap, Type B outside diameter designed and constructed to mate with inside diameter of cylinders. Maximum width for outside diameter heaters is 6 in. (152 mm). To order, specify **outside diameter and width** of heater.

High Temperature “Quick Disconnect” European Style Female Adapters



Available as an accessory item that must be used in conjunction with high-temperature “quick disconnect” European style plugs. To order, specify code number **N6027AF049** or **N6027ZZ028** and quantity.

Band/Barrel Heaters

Mineral Insulated (MI) Band Heaters

Heater Code Numbers

I.D. in. (mm)	Width in. (mm)	Construction	Volts	Watts	Watt Density		Termination	Approx. Net Wt.		Delivery	Code Number
					W/in ²	(W/cm ²)		lbs	(kg)		
1 (25.0)	1 (25.0)	1 pc	120	150	92	(14.2)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1A1AN1
	1 (25.0)	1 pc	120	100	61	(9.4)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1A1AN2
	1 (25.0)	1 pc	120	200	122	(18.9)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1A1AN3
	1 (25.0)	1 pc	240	200	122	(18.9)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1A1AN4
	1½ (38.0)	1 pc	240	300	106	(16.4)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1A1JN1
	1½ (38.0)	1 pc	120	300	106	(16.4)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1A1JN2
	1½ (38.0)	1 pc	240	200	70	(10.8)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1A1JN3
	1½ (38.0)	1 pc	120	200	70	(10.8)	Type B,C,E, F or H	0.1	(0.05)	Standard	MB1A1JN4
	1½ (38.0)	1 pc	240	400	141	(21.8)	Type B,C,E, F or H	0.1	(0.05)	Standard	MB1A1JN5
	1¼ (32.0)	1 (25.0)	1 pc	240	250	104	(16.1)	Type B,C,E, F or H	0.1	(0.05)	Stock
1 (25.0)		1 pc	120	250	104	(16.1)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1E1AN2
1 (25.0)		1 pc	240	300	124	(19.2)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1E1AN3
1½ (38.0)		1 pc	240	350	87	(13.5)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1E1JN1
1½ (38.0)		1 pc	120	350	87	(13.5)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1E1JN2
1½ (38.0)		1 pc	240	450	112	(17.3)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1E1JN3
1½ (38.0)	1 (25.0)	1 pc	240	300	93	(14.4)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1J1AN1
	1 (25.0)	1 pc	120	300	93	(14.4)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1J1AN2
	1 (25.0)	1 pc	240	200	62	(9.6)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1J1AN3
	1 (25.0)	1 pc	120	200	62	(9.6)	Type B,C,E, F or H	0.1	(0.05)	Standard	MB1J1AN4
	1 (25.0)	1 pc	240	400	125	(19.3)	Type B,C,E, F or H	0.1	(0.05)	Stock	MB1J1AN5
	1½ (38.0)	1 pc	120	300	62	(9.6)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1J1JN1
	1½ (38.0)	1 pc	240	450	87	(13.5)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1J1JN2
	1½ (38.0)	1 pc	240	300	62	(9.6)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1J1JN3
	1½ (38.0)	1 pc	240	600	116	(17.9)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1J1JN4
	1½ (38.0)	1 pc	240	300	62	(9.6)	Post	0.2	(0.09)	Standard	MB1J1JP4
	1½ (38.0)	1 pc	240	450	96	(14.8)	Post	0.2	(0.09)	Stock	MB1J1JP6
	2 (51.0)	1 pc	240	450	57	(8.8)	Type B,C,E, F or H	0.3	(0.14)	Stock	MB1J2AN1
	2 (51.0)	1 pc	240	300	42	(6.5)	Type B,C,E, F or H	0.3	(0.14)	Stock	MB1J2AN2
	2 (51.0)	1 pc	240	900	125	(19.3)	Type B,C,E, F or H	0.3	(0.14)	Stock	MB1J2AN3
	3 (76.0)	1 pc	240	500	45	(7.0)	Type B,C,E, F or H	0.4	(0.18)	Stock	MB1J3AN1
	3 (76.0)	1 pc	240	350	31	(4.8)	Type B,C,E, F or H	0.4	(0.18)	Stock	MB1J3AN2
3 (76.0)	1 pc	240	1000	104	(16.1)	Type B,C,E, F or H	0.4	(0.18)	Standard	MB1J3AN3	
1% (45.0)	1% (34.9)	1 pc	240	450	83	(12.9)	36 in. 90° Type B braid w/HD strain relief	0.2	(0.09)	Stock	MB1N1GX3A
	1½ (38.0)	1 pc	240	300	47	(7.3)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1N1JN1
	1½ (38.0)	1 pc	120	300	50	(7.7)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1N1JN2
	1½ (38.0)	1 pc	240	700	110	(17.0)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB1N1JN3
	2 (51.0)	1 pc	240	750	86	(13.3)	Type B,C,E, F or H	0.3	(0.14)	Stock	MB1N2AN1
2 (51.0)	1 (25.0)	1 pc	240	350	73	(11.3)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB2A1AN1
	1 (25.0)	1 pc	120	350	73	(11.3)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB2A1AN2
	1 (25.0)	1 pc	240	450	94	(14.5)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB2A1AN3
	1 (25.0)	1 pc	240	350	73	(10.3)	36 in. 90° Type B braid w/HD strain relief	0.2	(0.09)	Stock	MB2A1AX6B

CONTINUED

- Stock delivery, same day
- Standard delivery, 10 working days

Band/Barrel Heaters

Mineral Insulated (MI) Band Heaters

Heater Code Numbers (Continued)

I.D. in. (mm)	Width in. (mm)	Construction	Volts	Watts	Watt Density		Termination	Approx. Net Wt.		Delivery	Code Number
					W/in ²	(W/cm ²)		lbs	(kg)		
2 (51.0)	1½ (38.0)	1pc	240	400	53	(8.2)	Type B,C,E, F or H	0.3	(0.14)	Stock	MB2A1JN1
	1½ (38.0)	1pc	240	1000	132	(20.4)	Type B,C,E, F or H	0.3	(0.14)	Standard	MB2A1JN2
	2 (51.0)	1pc	240	750	75	(11.6)	Type B,C,E, F or H	0.4	(0.18)	Stock	MB2A2AN1
	2 (51.0)	1pc	240	1200	125	(19.3)	Type B,C,E, F or H	0.4	(0.18)	Stock	MB2A2AN2
	2 (51.0)	1pc	240	750	75	(11.6)	36 in. 90° Type B braid w/HD strain relief	0.2	(0.09)	Stock	MB2A2AX2A
2½ (57.0)	2 (51.0)	1pc	240	750	63	(9.7)	120 in. 180° Type B braid w/HD strain relief	0.2	(0.09)	Stock	MB2E2AX7
	2½ (64.0)	1 pc	240	1000	72	(11.2)	Type B,C,E, F or H	0.5	(0.23)	Stock	MB2E2JN1
2½ (64.0)	1 (25.0)	1 pc	240	400	63	(9.7)	Type B,C,E, F or H	0.2	(0.09)	Stock	MB2J1AN1
	1½ (38.0)	1 pc	240	500	50	(7.7)	Type B,C,E, F or H	0.4	(0.18)	Stock	MB2J1JN1
3 (76.0)	1 (25.0)	1 pc	240	400	54	(8.4)	Post	0.3	(0.14)	Stock	MB3A1AP1
	1½ (38.0)	1 pc	240	500	40	(6.2)	Post	0.4	(0.18)	Stock	MB3A1JP1
	1½ (38.0)	2 pc exp	230/460	525	53	(8.2)	Post	0.4	(0.18)	Stock	ME3A1JP10
3½ (89.0)	2 (51.0)	1 pc	240	800	42	(6.5)	Post	0.7	(0.32)	Stock	MB3J2AP2
3% (92.1)	1½ (38.0)	2 pc exp	230/460	650	51	(7.9)	Post	0.5	(0.23)	Stock	ME3L1JP5
4 (102.0)	1 (25.0)	1 pc	240	700	62	(9.6)	Post	0.4	(0.18)	Stock	MB4A1AP1
	1½ (38.0)	1 pc	240	800	48	(7.4)	Post	0.6	(0.27)	Stock	MB4A1JP2
	1½ (38.0)	2 pc exp	230/460	625	43	(6.7)	Post	0.6	(0.27)	Stock	ME4A1JP11
	1½ (38.0)	2 pc exp	230/460	725	50	(7.8)	Post	0.6	(0.27)	Stock	ME4A1JP12
4½ (114.0)	2½ (64.0)	1pc	240	1250	40	(6.2)	Post	1.0	(0.45)	Stock	MB4J2JP1
5 (127.0)	1½ (38.0)	2 pc exp	240/480	1000	52	(8.1)	Post	0.8	(0.36)	Stock	ME5A1JP8
5½ (133.0)	1½ (38.0)	2 pc exp	240/480	1000	48	(7.4)	Post	0.8	(0.36)	Standard	ME5E1JP1
	1½ (38.0)	2 pc exp	230/460	600	29	(4.5)	Post	0.7	(0.32)	Stock	ME5E1JP9
	3 (76.0)	2 pc exp	230/460	1700	40	(6.2)	Post	1.5	(0.68)	Stock	ME5E3AP5
	4½ (114.0)	2 pc exp	230/460	2400	38	(5.9)	Post	2.2	(1.00)	Stock	ME5E4JP2
	4½ (114.0)	2 pc exp	230/460	2700	43	(6.6)	Post	2.2	(1.00)	Standard	ME5E4JP3
5½ (140.0)	1½ (38.0)	2 pc exp	240/480	1000	46	(7.1)	Post	0.9	(0.40)	Stock	ME5J1JP1
6 (152.0)	1½ (38.0)	2 pc exp	240/480	1000	41	(6.4)	Post	0.9	(0.40)	Stock	ME6A1JP2
6% (165.0)	1½ (38.0)	2 pc exp	240/480	1250	47	(7.3)	Post	1.0	(0.45)	Stock	ME6J1JP5
6% (171.0)	1½ (38.0)	2 pc exp	230/460	815	29	(4.5)	Post	0.9	(0.40)	Standard	ME6N1JP6
	1½ (38.0)	2 pc exp	230/460	1000	36	(5.6)	Post	0.9	(0.40)	Standard	ME6N1JP7
	4 (102.0)	2 pc exp	230/460	2600	35	(5.4)	Post	2.5	(1.10)	Stock	ME6N4AP2
	5 (127.0)	2 pc exp	230/460	3700	40	(6.2)	Post	3.2	(1.50)	Standard	ME6N5AP3
	6 (152.0)	2 pc exp	230/460	3750	33	(5.1)	Post	3.8	(1.70)	Standard	ME6N6AP5
7 (178.0)	1½ (38.0)	2 pc exp	240/480	1250	43	(6.6)	Post	1.1	(0.50)	Standard	ME7A1JP4
7½ (191.0)	1½ (38.0)	2 pc exp	240/480	1500	47	(7.3)	Post	1.1	(0.50)	Stock	ME7J1JP4
7% (193.7)	3 (76.0)	2 pc exp	230/460	1800	28	(4.3)	Post	2.2	(1.00)	Standard	ME7L3AP1
8 (203.0)	1½ (38.0)	2 pc exp	240/480	1250	37	(5.7)	Post	1.2	(0.54)	Stock	ME8A1JP4
9 (229.0)	1½ (38.0)	2 pc exp	240/480	1500	39	(6.0)	Post	1.4	(0.64)	Stock	ME9A1JP1
9% (241.0)	3 (76.0)	2 pc exp	230/460	3000	37	(5.7)	Post	2.6	(1.20)	Stock	ME9J3AP2
11% (286.0)	3 (76.0)	2 pc exp	230/460	2400	24	(3.7)	Post	3.2	(1.50)	Standard	ME11E3AP2
	5 (127.0)	2 pc exp	230/460	5100	31	(4.8)	Post	5.2	(2.40)	Stock	ME11E5AP1

- Stock delivery, same day
- Standard delivery, 10 working days

Notes:

All lead units are available with any length Type B, C, E, F or Type H leads.
Type B 90° rotation not available from stock.