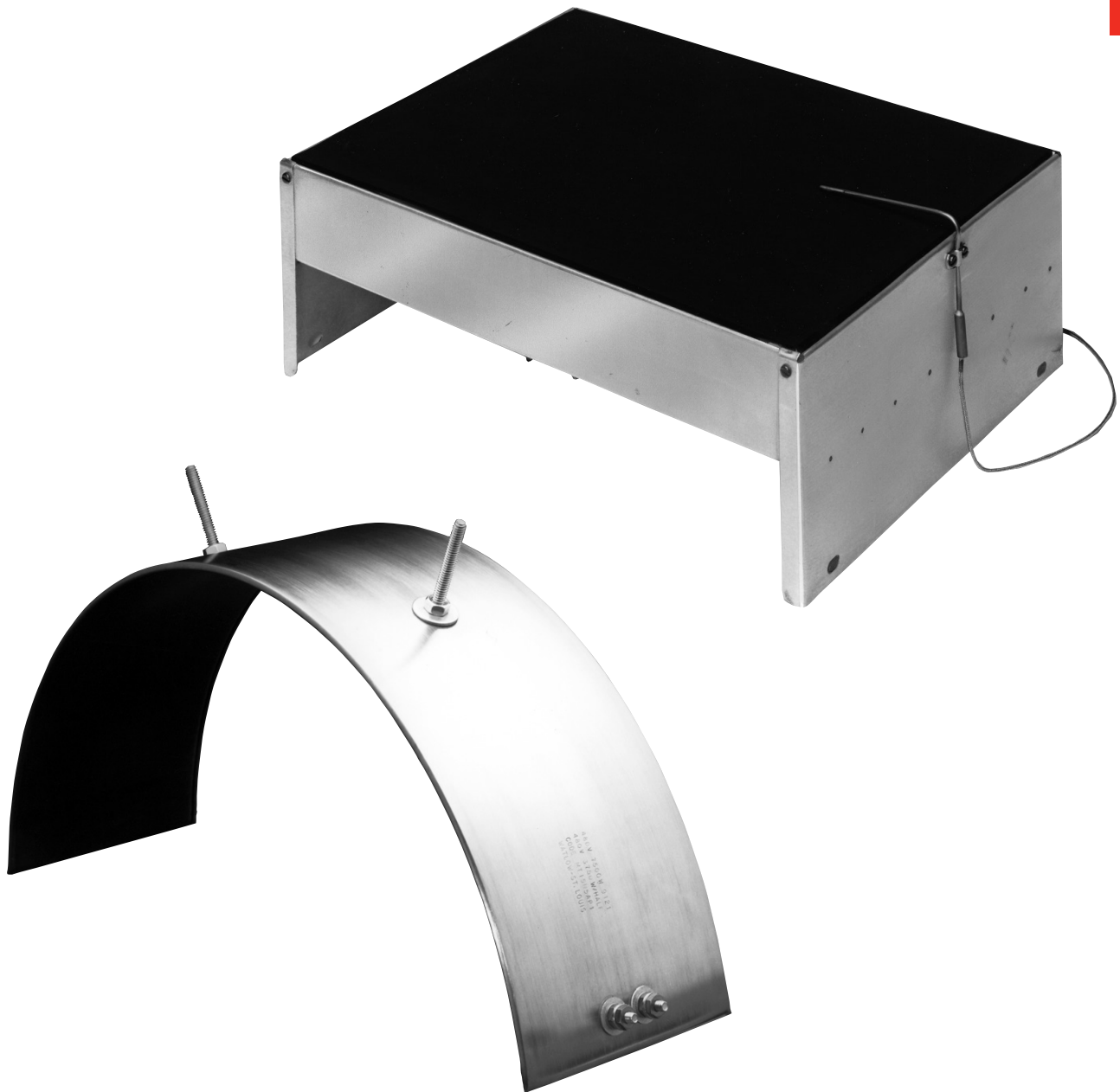


# Radiant Heaters

Radiant Heaters	Sheath Materials	Max. Operating Temperatures		Typical Max. Watt Densities		Page
		°F	°C	W/in <sup>2</sup>	W/cm <sup>2</sup>	
<b>RAYMAX® Panel</b>	Stainless steel/ Alumized steel	2000	1095	30	4.7	<b>513</b>
<b>Mineral Insulated (MI) Band and Strip Emitters</b>	Stainless steel	1300	700	30	4.7	<b>520</b>





# Radiant Heaters

## RAYMAX® Panel Heaters

The RAYMAX® radiant panel heater product line from Watlow® solves virtually any application requiring radiant heat from contamination-resistant surfaces to fast responding high-temperature panels.

Watlow's engineering staff has the training and expertise required to meet the most complicated application requirements. Technical support includes calculating watt density and temperature requirements and recommending system components such as sensors and controllers.

### Performance Capabilities

- Maximum face temperature up to 2000°F (1095°C)
- Maximum watt densities up to 30 W/in<sup>2</sup> (4.7 W/cm<sup>2</sup>)

### Features and Benefits

#### Variety of styles

- Match the ideal temperature and watt density requirements of the application

#### Watlow engineering and application support

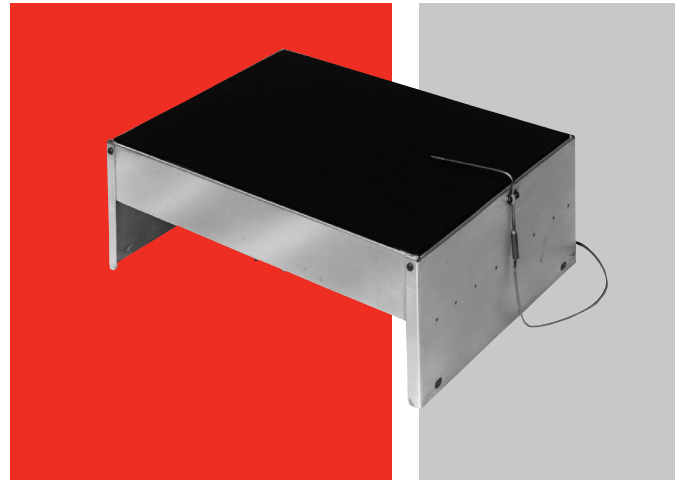
- Assures projects run smoothly

#### Custom designs

- Adapts to specific needs

#### Watlow sensors and controllers are compatible with RAYMAX heaters

- Offers a single-source thermal system that is reliable and designed for your application



### Typical Applications

- Thermoforming
- Food warming
- Paint and epoxy curing
- Heat treating
- High-temperature furnaces
- Tempering and annealing processes



#### **Caution: Fire Hazard**

Radiant heaters must not be operated in the presence of flammable vapors, gases or combustible materials without proper ventilation and safety precautions. Radiant heaters must be properly wired and controlled to comply with all applicable electrical codes.

# Radiant Heaters

## RAYMAX Panel Heaters

### RAYMAX 1220 and 2030

Easy to install and capable of high surface temperatures, the RAYMAX 1220 and 2030 panel heaters are ideal for many process heating applications requiring “hot-face” temperatures above 1000°F (540°C).

Each unit consists of a ceramic fiber heater mounted in a 2½ in. (64 mm) deep sheet metal case providing thermal insulation. The case includes post terminals for electrical connections and a mounting system that can be used with virtually any flat ceramic fiber unit. Since any flat unit heating element configuration can be used—exposed sinuated, embedded coil or foil elements—watt density and temperature capabilities can be tailored to meet a specific radiant application.

### Performance Capabilities

- RAYMAX 2030 (uses sinuated or coil elements): temperatures up to 2000°F (1095°C); watt densities up to 30 W/in<sup>2</sup> (4.7 W/cm<sup>2</sup>)
- RAYMAX 1220 (uses an etched foil element): temperatures up to 1200°F (650°C); watt densities up to 20 W/in<sup>2</sup> (3 W/cm<sup>2</sup>)
- Maximum voltage up to 600V

### Features and Benefits

#### Lightweight, low mass design

- Allows fast response to controllers

#### Self insulation with 2½ in. (64 mm) thick mounting case

- Provides high efficiency

#### Thermocouple mounting clamp

- Makes process system control easier

#### Aluminized steel case

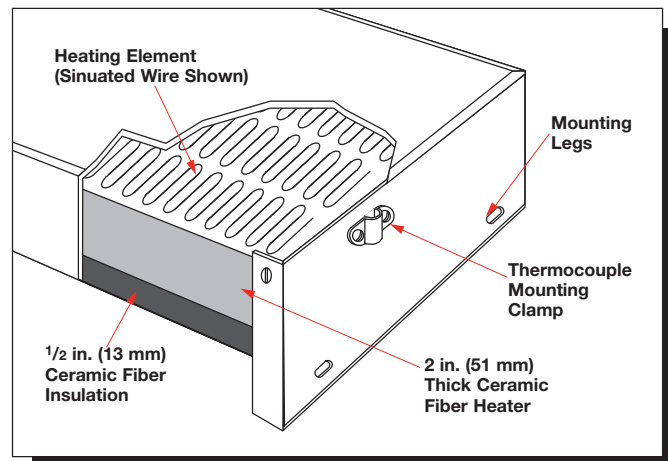
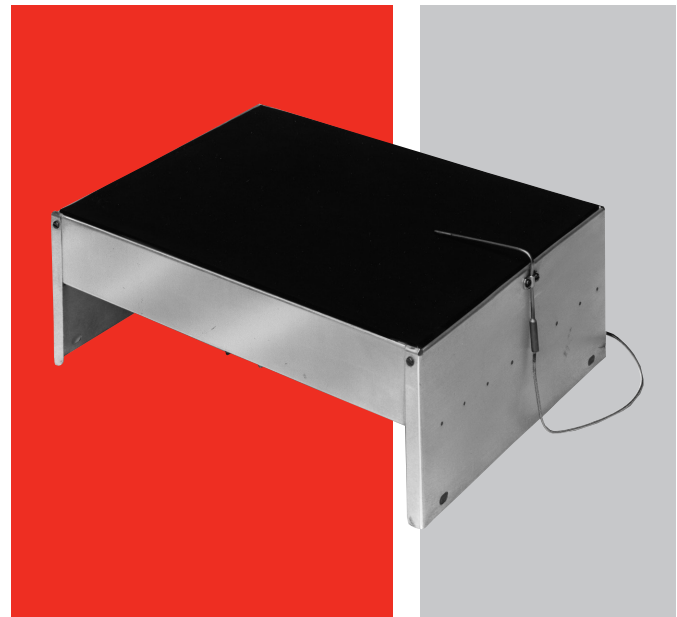
- Handles temperatures up to 1100°F (595°C)

#### Special hot-face heating patterns

- Provides a design made specifically for an application using an etched foil RAYMAX 1220

### Typical Applications

- Conveyor furnaces
- High-temperature vessel heating
- Tempering and annealing processes for glass, wire, ceramics and metals
- Coating, curing and drying of inks, paints, plastics and films



# Radiant Heaters

## RAYMAX Panel Heaters

### RAYMAX 1220 and 2030

#### Applications and Technical Data

#### Application Hints

A thermocouple mounting clamp is provided on one end of the case, with holes on both ends for alternate locations. The clamp can be used with  $\frac{1}{8}$  in. (3.2 mm) outside diameter sheath thermocouples. The clamp is  $\frac{3}{16}$  in. (4.8 mm) high, but can be removed for flush mounting\*.

The heater's maximum recommended surface temperature is based on the rating of the ceramic fiber heater module. This can vary from 2000°F (1095°C) at lower watt densities, to higher watt densities at reduced surface temperatures.

**Note:** Maximum wattages cannot be achieved at the maximum temperatures simultaneously.

\*  $\frac{13}{16}$  in. (4.8 mm) and  $\frac{1}{4}$  in. (6 mm) are available upon request.

#### Specifications

**Weight:** Under 6.5 lbs/ft<sup>2</sup> (31.75 kg/m<sup>2</sup>)

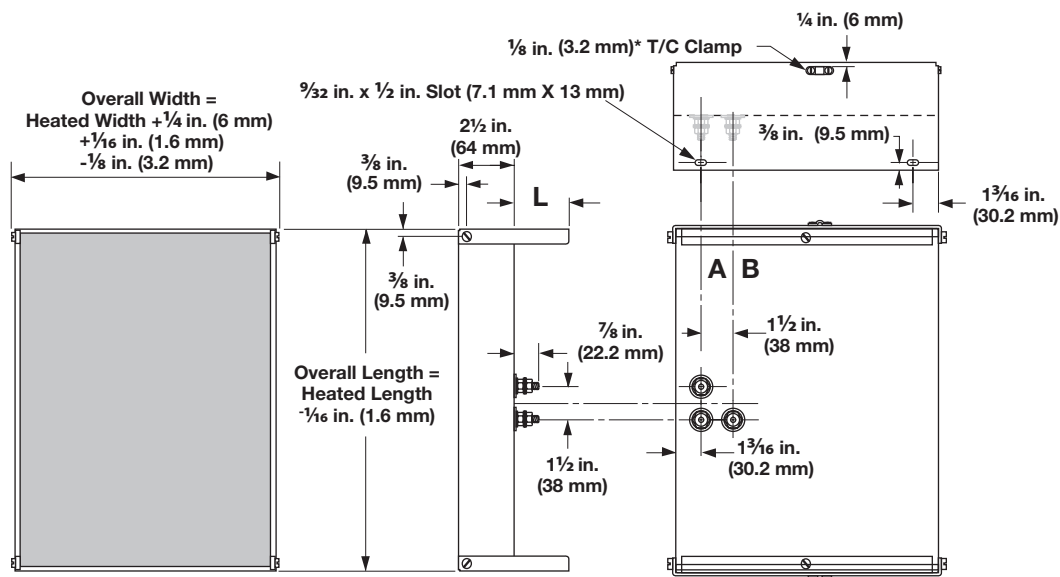
**Voltage and Wattage:** Ratings are based on the ceramic fiber heater module mounted inside of the case. Up to 600VAC is possible.

**Terminals:** Terminals are  $\frac{1}{4}$ -20 threaded studs. Two terminals plus ground for single-phase, and three terminals plus ground for 3-phase. These are located on the center line of the length unless otherwise specified. Terminals can be located anywhere along lines A and B (see illustration below), but not closer than 2 in. (51 mm) to the case ends.

**Mounting Legs:** Mounting legs are available in either 1 in. (25 mm) or 3 in. (76 mm) length options. For made-to-order units, mounting legs can be supplied in any incremental length **L** from  $\frac{1}{2}$  in. (13 mm) to 3 in. (76 mm). Slots are not provided in legs less than 1 in. (25 mm) long.

Heater Dimensions	Min.	Max.	Increments
Width: in. (mm)	2 (51)	30 (762)	Any
Length: in. (mm)	6 (152)	52 (1320)	Any

**Note:** Units are  $\frac{1}{4}$  in. (6 mm) wider than the nominal size of the ceramic fiber heater. Overall length is equal to heater length, but a thermocouple clamp is not included in the length.



#### Options

Several options are available with RAYMAX 1220 and 2030 models. Contact your Watlow representative for more information on options.

- Single-phase, non-standard location power terminals
- Terminal box
- Zoning

- Mounting studs and legs
- 3-phase construction
- Thermocouple mounting tubes
- Alternate case materials

# Radiant Heaters

## RAYMAX Panel Heaters

### RAYMAX 1220

#### Ceramic Fiber with Foil Element

Panel Overall Size ±1/16 in. (1.5 mm)		Panel Nominal Heated Size in. (mm)		Volts	Watts	Watt Density		Approx. Net Wt.		Delivery	Part Number
Width	Length	Width	Length			W/in <sup>2</sup>	(W/cm <sup>2</sup> )	lbs	(kg)		
4 1/4 (108)	12 (305)	4 (102)	12 (305)	120	950	19.8	(3.1)	2.8	(1.3)	M	VP504A12F
4 1/4 (108)	24 (610)	4 (102)	24 (610)	240	1900	19.8	(3.1)	4.8	(2.2)	M	VP504A24F
8 1/4 (210)	12 (305)	8 (203)	12 (305)	240	1900	19.8	(3.1)	4.5	(2.1)	M	VP508A12F <sup>①</sup>
8 1/4 (210)	24 (610)	8 (203)	24 (610)	240	3800	19.8	(3.1)	7.7	(3.5)	M	VP508A24F

• M - Manufacturing lead times

All units in this table are suitable for use up to 1200°F (650°C) maximum surface temperature.

<sup>①</sup> Thermocouple clasp is not included in the length.

### RAYMAX 2030

#### Ceramic Fiber with Sinuated Element

Nominal Heated Width in. (mm)	Nominal Heated Length in. (mm)	Volts	Watts	Watt Density		Approx. Net Wt.		Delivery	Part Number
				W/in <sup>2</sup>	(W/cm <sup>2</sup> )	lbs	(kg)		
4 (102)	6 (152)	30	500	20.8	(3.2)	1.9	(0.9)	M	VP504A06T
	12 (305)	120	925	19.3	(3.0)	3.1	(1.4)	M	VP504A12T <sup>①</sup>
	18 (457)	120	1400	19.4	(3.0)	4.1	(1.9)	M	VP504A18T <sup>①</sup>
	24 (610)	240	1850	19.5	(3.0)	5.2	(2.4)	M	VP504A24T <sup>①</sup>
	30 (762)	240	2250	19.6	(3.1)	6.3	(2.9)	M	VP504A30T <sup>①</sup>
	36 (914)	240	3200	22.2	(3.4)	7.4	(3.3)	M	VP504A36T <sup>①</sup>
6 (152)	6 (152)	60	650	18.1	(2.8)	2.4	(1.1)	M	VP506A06T <sup>①</sup>
	12 (305)	120	1250	17.4	(2.7)	4.1	(1.9)	M	VP506A12T
	18 (457)	240	2000	18.5	(2.9)	5.8	(2.6)	M	VP506A18T
	24 (610)	120	2500	17.4	(2.7)	7.4	(3.3)	M	VP506A24T
	24 (610)	240	2500	17.4	(2.7)	7.4	(3.3)	M	VP506A24U
	30 (762)	240	3400	18.9	(2.9)	9.0	(4.1)	M	VP506A30T
8 (203)	36 (914)	240	4000	18.5	(2.9)	10.6	(4.8)	M	VP506A36T
	12 (305)	120	1800	18.8	(2.9)	4.7	(2.4)	M	VP508A12T
	18 (457)	240	3000	20.8	(3.2)	7.4	(3.3)	M	VP508A18U <sup>①</sup>
	24 (610)	240	3600	18.8	(2.9)	9.5	(4.3)	M	VP508A24T
	30 (762)	240	5000	20.8	(3.2)	11.7	(5.3)	M	VP508A30T
	36 (914)	240	6000	20.8	(3.2)	13.9	(6.3)	M	VP508A36T
10 (254)	12 (305)	120	2000	16.7	(2.6)	6.3	(2.9)	M	VP510A12T
	18 (457)	120	3600	20.0	(3.1)	9.0	(4.1)	M	VP510A18T
	24 (610)	240	4500	17.9	(2.8)	11.7	(5.3)	M	VP510A24T
	30 (762)	240	6000	20.0	(3.1)	14.4	(6.5)	M	VP510A30T
	36 (914)	240	7200	19.4	(3.0)	17.1	(7.8)	M	VP510A36T

CONTINUED

• M - Manufacturing lead times

All units in this table are suitable for use up to 1800°F (982°C) maximum surface temperature.

<sup>①</sup>Vee sinuated

# Radiant Heaters

## RAYMAX Panel Heaters

RAYMAX 2030 (Continued)

### Ceramic Fiber with Sinuated Element

Nominal Heated Width		Nominal Heated Length		Volts	Watts	Watt Density		Approx. Net Wt.		Delivery	Part Number
in.	(mm)	in.	(mm)			W/in <sup>2</sup>	(W/cm <sup>2</sup> )	lbs	(kg)		
12	(305)	12	(305)	120	2500	17.4	(2.7)	7.4	(3.3)	M	VP512A12T
		12	(305)	240	2500	17.4	(2.7)	7.4	(3.3)	M	VP512A12U <sup>①</sup>
		18	(457)	240	4000	18.5	(2.9)	10.6	(4.8)	M	VP512A18T
		24	(610)	240	6000	20.8	(3.2)	13.9	(6.3)	M	VP512A24T
		30	(762)	240	7200	20.0	(3.1)	17.1	(7.8)	M	VP512A30T
		36	(914)	240	8400	19.4	(3.0)	20.3	(9.2)	M	VP512A36T <sup>①</sup>
14	(356)	12	(305)	240	3500	20.8	(3.2)	8.5	(3.8)	M	VP514A12T
		18	(457)	240	4900	19.4	(3.0)	12.2	(5.5)	M	VP514A18T
		24	(610)	240	7000	20.8	(3.2)	16.0	(7.3)	M	VP514A24T
		30	(762)	240	8400	20.0	(3.1)	19.8	(9.0)	M	VP514A30T <sup>①</sup>
		36	(914)	240/240	9800	19.4	(3.0)	23.6	(10.7)	M	VP514A36T
16	(406)	12	(305)	240	3600	18.8	(2.9)	9.5	(4.3)	M	VP516A12T
		18	(457)	240	5700	19.8	(3.1)	13.9	(6.3)	M	VP516A18T
		24	(610)	240	7100	18.5	(2.9)	18.2	(8.2)	M	VP516A24T
		30	(762)	240/240	9600	20.0	(3.1)	22.5	(10.2)	M	VP516A30T
		36	(914)	240/240	11500	20.0	(3.1)	26.8	(12.2)	M	VP516A36T

• M - Manufacturing lead times

All units in this table are suitable for use up to 1800°F (982°C) maximum surface temperature.

<sup>①</sup>Vee sinuated

### Part Number

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
V	P	5	0	8	A	1	2	T	Modification Options	0	0	0	0

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ Base Part Number													
VP508A12T													
⑩ Modification Options													
1 =	3 in. (76 mm) leg height and terminal box												
4 =	1/4 / 20 mounting studs												
5 =	1/4 / 20 mounting studs and terminal box												
M =	1 in. (25 mm) leg height												
R =	1 in. (25 mm) leg height and terminal box												
W =	Terminal box in standard location												
Y =	3 in. (76 mm) leg height												

# Radiant Heaters

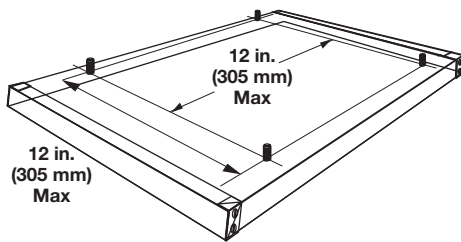
## RAYMAX Panel Heaters

### Mounting Accessories

#### Mounting Studs

Standard  $1/4$ -20 x  $1\frac{1}{2}$  in. (38 mm) or (M6-1 x 40) steel studs are welded to the case. For best support, studs should be approximately located on 12 in. (305 mm) centers. Contact your Watlow representative for exact locations on specific heaters.

Available with RAYMAX 1220 and 2030.

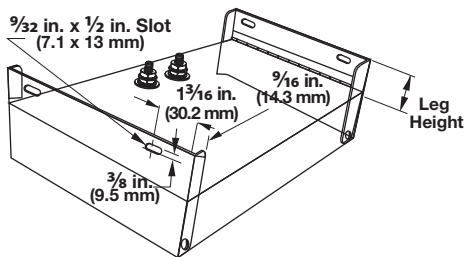


#### Mounting Legs

Mounting legs are extensions of the steel end caps with mounting slots for bolting directly to field support members. There is no extra charge for legs. They can be supplied in half inch increments from 0.5 in. (13 mm) to 3 in. (76 mm). Slots are not provided in legs less than 1 in. (25 mm) long.

For panels over 24 in. (610 mm) long, mounting studs are recommended for the best panel support.

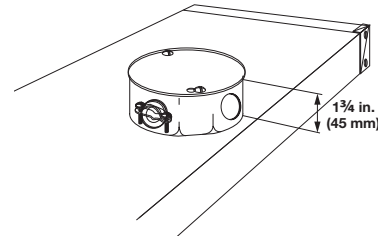
Available with RAYMAX 1220 and 2030



**Application note:** Allow for some thermal expansion of the heater case during operation. An expansion of up to one percent can occur when the case reaches its normal maximum limit of 1100°F (595°C). If the equipment has mounting screws to connect to the slots in the mounting legs, allow for a small amount of extra length. If mounting holes are used to interface with the mounting studs on the back of the RAYMAX case, make sure that the holes are oversized. Use washers and avoid overtightening the screws.

### Terminal Accessories

#### Terminal Box

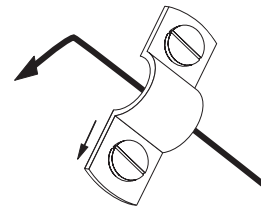


To protect electrical connections, a standard NEMA octagon terminal box is available. The standard size is  $3\frac{9}{16}$  x  $3\frac{9}{16}$  x  $1\frac{1}{2}$  in. (90.5 x 90.5 x 38 mm) with knockouts for  $1/2$  in. (13 mm) conduit. Other NEMA sizes are available as an extended capability.

Care should be taken to use lead wire capable of withstanding the ambient temperatures.

Available with RAYMAX 1220 and 2030.

#### Thermocouple Clamps



A thermocouple mounting clamp can be provided on the end of the heater case. The clamp is suitable for  $1/8$  in. (3.2 mm) and  $1/4$  in. (6 mm) outside diameter sheath thermocouples bent to 90° so that the sensing tip is just above and lightly touching the hot face at an element location.

Available with RAYMAX 1220 and 2030.

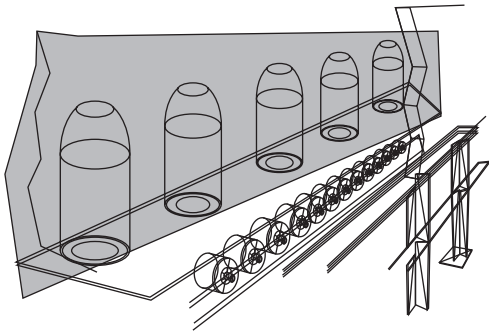


# Radiant Heaters

**EXTENDED  
CAPABILITY**

## Extended Capability For RAYMAX Panel Heaters

### Zoning

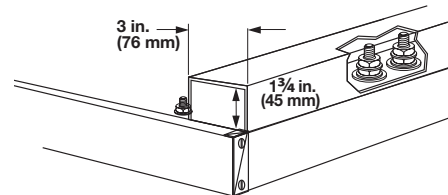


Watt densities can be varied across the entire width of RAYMAX heaters. If desired, each zone can have an individually controlled power supply.

Zoning can be very valuable when part of the product requires more heat, or when it must compensate for heat losses at the edges. Separately turning off part of the heated width enables the heater to adjust for various widths of material.

**Available as an extended capability for RAYMAX 1220 and 2030.**

### Wiring Raceway



A steel raceway provides electrical and physical protection for all terminal connections. This can be particularly useful for multi-zone panels.

**Available as an extended capability for RAYMAX 1220 and 2030.**

# Radiant Heaters

EXTENDED  
CAPABILITY

## Extended Capabilities For Mineral Insulated (MI) Band and Strip Emitters

These heaters are constructed using Watlow's exclusive mineral insulation, which features high thermal conductivity. The band and strip emitters are constructed of rugged stainless steel sheath and a high emissivity coating.

### Performance Capabilities

- Maximum operating temperature up to 1300°F (704°C)
- Maximum watt densities up to 30 W/in<sup>2</sup> (4.7 W/cm<sup>2</sup>)

### Sizes

#### Strip Emitters

Width: 2 in. (51 mm), 3 in. (76 mm)  
Length: 6 in. (152 mm) minimum,  
31 in. (787 mm) maximum

#### Band Emitters

Width: 1 in. (25 mm), 2 in. (51 mm),  
3 in. (76 mm) maximum

- Segment length: 6 in. (152 mm) minimum to 42 in. (1067 mm) maximum
- Contact your Watlow representative for partial arcs up to full 360° coverage
- High emissivity coating on inside is standard. For high emissivity coating on the outside, contact your Watlow representative.
- Post terminals are standard. High-temperature leads are available on bands only.

### Options

- Mounting studs
- Mounting clips for 3 in. (76 mm) wide emitter strips, part #MM6063
- Thermocouple welded to sheath
- Thermocouple pocket welded to sheath

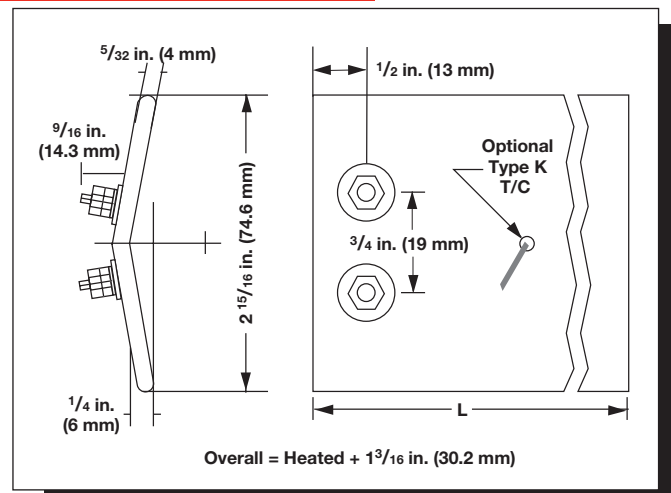
### Features and Benefits

#### Exclusive mineral insulation

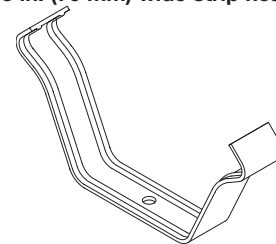
- Combines dielectric strength and superior thermal conductivity
- Transfers heat rapidly to the sheath

#### High thermal conductivity of MI

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



Mounting Clip (Part # MM6063)  
(For 3 in. (76 mm) wide strip heater)



### Typical Applications

- Heating rotating drums and rollers
- Tube ovens
- Small spot heating
- Heat shrinking and curing wire coatings
- Heat laminating wheels