Radiant Heaters

The RAYMAX® Family

Watlow's diverse RAYMAX® heater line allows you to solve virtually any application that requires radiant heat. Our capabilities cover a wide range of needs, from contamination-resistant surfaces, to fast responding high temperature panels, to replaceable tubular elements.

Applying radiant heaters can be complicated. Watlow's engineering staff has the level of training and expertise required to help meet your application requirements, providing a high degree of technical support such as conducting testing for your application at our facility, calculating your watt density and temperature requirements, and recommending system components such as sensors and controllers. With our experience in a wide range of industries, chances are Watlow has already helped someone handle a radiant heating application like yours.

Features and Benefits

Variety of styles

- Matches the ideal temperature and watt density requirements of your application

Watlow engineering and application support

- Helps projects run smoothly

Custom designs

- Can be quickly adapted for particular needs such as special wattage zoning

Watlow sensors and controllers are completely compatible with RAYMAX heaters

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

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.

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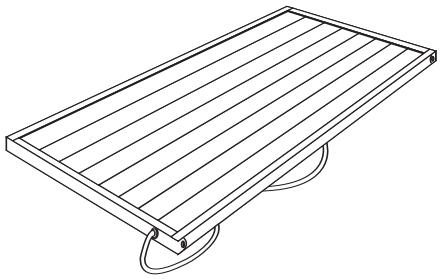
Panel Variations

Low Profile

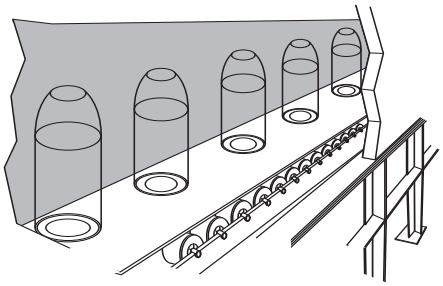


This design may be required where mounting space is limited, for example, when converting existing equipment or designs to radiant panels.

Available options may vary from the standard units when you specify a low profile design. Consult Watlow for further information.

Available with RAYMAX 1010, 1120, 1220 and 2030.

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 you must compensate for heat losses at the edges. By separately turning off part of the heated width, you can adjust for various widths of material.

Available with RAYMAX 1010, 1120, 1220, 1330, and 2030.

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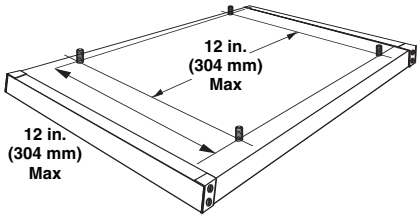
Mounting Accessories

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 your equipment has mounting screws to connect to the slots in the mounting legs, allow for a small amount of extra length. If you are using mounting holes to interface with the mounting studs on the back of the RAYMAX case, make sure your holes are oversized. Also, use washers and avoid overtightening.

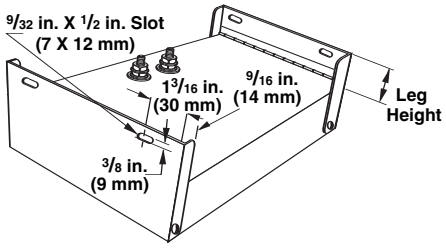
Mounting Studs



Standard ¼-20 X 1 ½ inch (M6-1 X 40) steel studs are welded to the case. For best support, studs should be approximately located on 12 inch centers. Consult Watlow for exact locations on specific heaters.

Available with RAYMAX 1010, 1120, 1220, 1330, 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 increment from 0.5 inch (12.5 mm) to three inches (76 mm). No slots are provided in legs less than one inch (25 mm) long.

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

Available with RAYMAX 1120, 1220, and 2030.

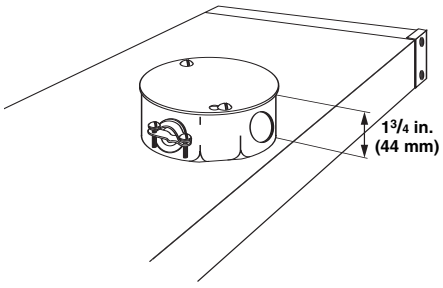
Terminal Accessories

Special Terminal Locations

If the standard terminal locations shown will not meet your needs special locations can be designed.

Available with RAYMAX 1010, 1120, 1220, 1330, and 2030.

Terminal Box

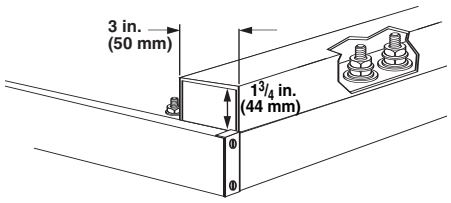


To protect electrical connections, a standard NEMA octagon terminal box is available. The standard size is 3 9/16 X 3 9/16 X 1 ½ inches (90.5 X 90.5 X 38.1 mm) with knockouts for ½ inch (12.5 mm) conduit. Other NEMA sizes are also available.

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

Available with RAYMAX 1010, 1120, 1220, 1330, and 2030.

Wiring Raceway



Custom designed to your specific requirements, a steel raceway provides electrical and physical protection for all terminal connections. This can be particularly useful for multi-zone panels.

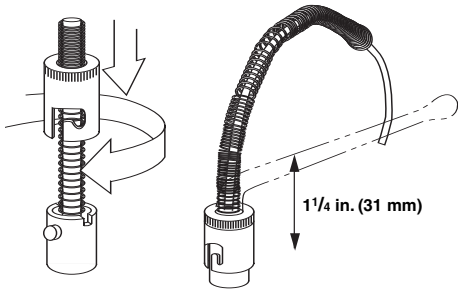
Available with RAYMAX 1010, 1120, 1220, 1330, and 2030.

Radiant Heaters

The RAYMAX Family

Temperature Control

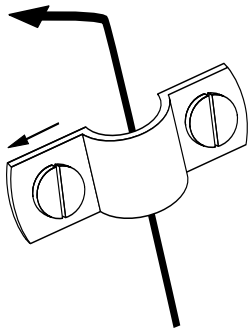
Thermowells



A thermowell allows you to use a thermocouple with a bayonet fitting to monitor heater temperature. The thermowell is located on the back of the panel to allow easy access for thermocouple replacement. Spring tension holds the tip of the thermocouple in contact for close control of the heater temperature. Thermocouple not included.

Available with RAYMAX 1010, 1120, and 1330.

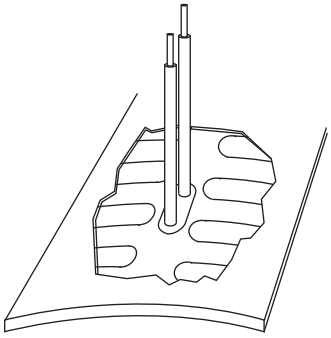
Thermocouple Clamps



A thermocouple mounting clamp can be provided on the end of the heater case. The clamp is suitable for use with ⅛ inch (3.175 mm) and ¼ inch (6.35 mm) O.D. sheath thermocouples, which should be bent 90° so that the sensing tip is just above and lightly touching the hot face at an element location.

Available with RAYMAX 1220, 1525 (⅛ only) , 1626 (⅛ only) and 2030.

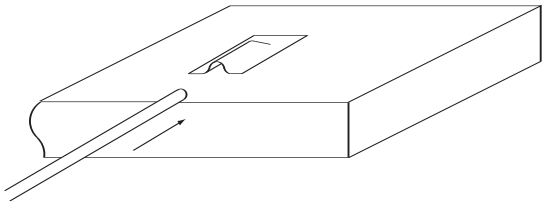
Welded Thermocouple



A thermocouple junction is welded to the emitting surface to provide optimum temperature sensing accuracy and responsiveness. This option permits the actual radiating face temperature to be precisely monitored and controlled. The standard length of the thermocouple wire is 12 inches (304.8 mm).

Available with RAYMAX 1010, 1120, and 1330.

Thermocouple Pocket



A thermocouple pocket is welded to the emitting surface. The pocket accepts a 0.063 inch (1.6 mm) diameter thermocouple (not included). This option provides accurate temperature sensing and easy thermocouple replacement.

Available with RAYMAX 1010, 1120, and 1330.

Radiant Heaters

RAYMAX® 1220 and 2030

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

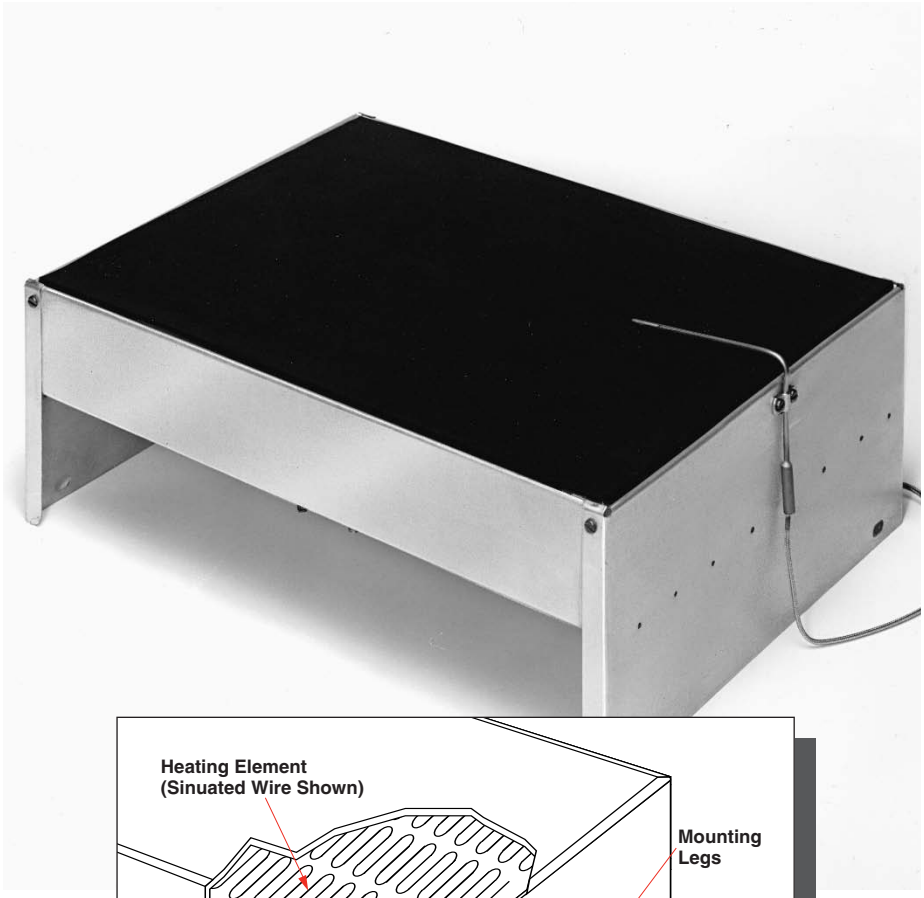
Each unit consists of a ceramic fiber heater mounted in a 2.5 inch (64 mm) deep sheet metal case that provides thermal insulation. The case includes post terminals for electrical connections and provides a mounting system that can be used with virtually any flat ceramic fiber unit, whether it is a stock, standard or custom size. Since any of the flat unit heating element configurations 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^2 (4.7 W/cm^2)
- RAYMAX 1220 (uses an etched foil element): temperatures up to 1200°F (650°C); watt densities up to 20 W/in^2 (3 W/cm^2)

Features and Benefits

- **Lightweight, low mass design** allows fast response to controls.
- **High efficiency** results from high degree of self insulation with 2.5 inch (64 mm) thick mounting case.
- **Adaptable** with any stock or standard sized flat ceramic fiber units.
- **Thermocouple mounting clamp** makes process system control easier.



- **Aluminized steel case** can handle temperatures up to 1100°F (595°C). Other case materials are available, depending on the expected exposure of the case to other operating conditions.
- **Special hot face** heating patterns can be designed specifically for an application using an etched foil RAYMAX 1220.

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 1220 and 2030

Applications and Technical Data

Specifications

Weight: Under 6.5 lbs/ft² (31.75 kg/m²)

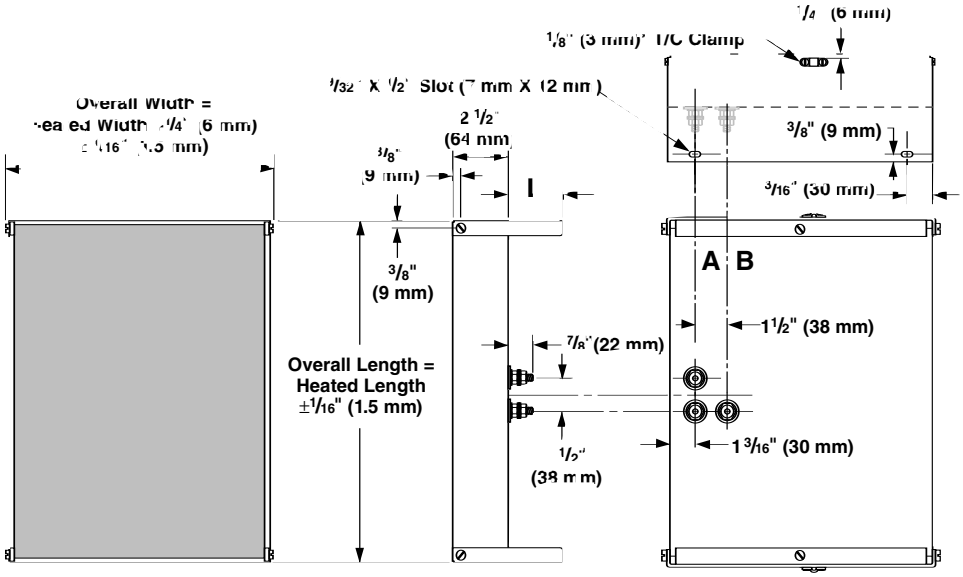
Voltage and Wattage: Ratings are based on the ceramic fiber heater module which is mounted in the case. Up to 600V~(ac) is possible.

Terminals: Terminals are ¼-20 threaded studs. Two terminals plus ground for single-phase, and three terminals plus ground for three-phase, are standard. These will be located on the center line of the length unless otherwise specified. Terminals can be located anywhere along lines A and B (see illustration to the right), but not closer than two inches (51 mm) to the case ends.

Mounting Legs: One inch (25 mm) standard; three inches (76 mm) optional from stock. For made-to-order units, mounting legs can be supplied in any incremental length **L** from ½ inch (13 mm) to three inches (76 mm). No slots are provided in legs less than one inch long.

Heater Dimensions	Min.	Max.	Increments
Width: inches (mm)	2 (51)	30 (760)	Any
Length: inches (mm)	6 (152)	52 (1320)	Any

Note: Units will be ¼ inch (6 mm) wider than the nominal size of the ceramic fiber heater. Overall length is equal to heater length, but thermocouple clamp not included in length.



Application Hints

A thermocouple mounting clamp will be provided on one end of the case, with holes on both ends for alternate locations. The standard clamp can be used with ⅛ inch (3 mm) O.D. sheath thermocouples. The standard clamp is 3/16 inch (4.8 mm) high, but can be removed for flush mounting*.

The maximum recommended surface temperature of the heater 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 that maximum wattages cannot be achieved at the maximum temperatures simultaneously.

* ⅛ inch (3 mm) is standard. 3/16 inch (4.8 mm) and ¼ inch (6 mm) are available upon request.

Options

Several options are available with RAYMAX 1220 and 2030 models. From the following list, the first four are illustrated on pages 204 to 205. Consult Watlow for more information on any of the options.

- Single-phase non-standard location power terminals
- Terminal box
- Zoning
- Mounting studs and legs
- Three-phase construction
- Thermocouple mounting tubes
- Alternate case materials

See ceramic fiber heaters, pages 155 and 158, for a complete listing of all the flat panel sizes available.

Radiant Heaters

F.O.B.: Columbia, Missouri

RAYMAX 1220

Ceramic Fiber, with Foil Element

Panel Overall Size ± 1/16 in (1.5mm)		Panel Nominal Heated Size in (mm)		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
Width	Length ①	Width	Length			W/in²	(W/cm²)	lbs	(kg)		
4 1/4 (110)	12 (305)	4 (102)	12 (305)	120	950	19.8	(3.1)	2.8	(1.3)	Stock	**VP504A12F**
4 1/4 (110)	24 (610)	4 (102)	24 (610)	240	1900	19.8	(3.1)	4.8	(2.2)	Stock	**VP504A24F**
8 1/4 (210)	12 (305)	8 (200)	12 (305)	240	1900	19.8	(3.1)	4.5	(2.1)	Stock	**VP508A12F**
8 1/4 (210)	24 (610)	8 (200)	24 (610)	240	3800	19.8	(3.1)	7.7	(3.5)	Standard	**VP508A24F**

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

① Thermocouple clasp is not included in the length.

RAYMAX 2030

Ceramic Fiber, with Sinuated Element

Nominal Heated Width		Nominal Heated Length		Volts	Watts	Watt Density		Approx Net Wt.		Availability	Code No.
in	(mm)	in	(mm)			W/in²	(W/cm²)	lbs	(kg)		
4	(102)	6	(152)	60	500	20.8	(3.2)	1.9	(0.9)	Standard	**VP504A06T**
		12	(305)	120	1050	21.9	(3.4)	3.1	(1.4)	Stock	**VP504A12T**
		18	(460)	120	1500	20.8	(3.2)	4.1	(1.9)	Standard	**VP504A18T**
		24	(610)	240	2100	21.9	(3.4)	5.2	(2.4)	Stock	**VP504A24T**
		30	(760)	240	2500	20.8	(3.2)	6.3	(2.9)	Standard	**VP504A30T**
		36	(915)	240	3000	20.8	(3.2)	7.4	(3.3)	Standard	**VP504A36T**
6	(152)	6	(152)	60	650	18.1	(2.8)	2.4	(1.1)	Standard	**VP506A06T**
		12	(305)	120	1250	17.4	(2.7)	4.1	(1.9)	Standard	**VP506A12T**
		18	(460)	240	2000	18.5	(2.9)	5.8	(2.6)	Standard	**VP506A18T**
		24	(610)	120② or 240②	2500	17.4	(2.7)	7.4	(3.3)	Assy. Stock②	**VP506A24T**②
		30	(760)	240	3400	18.9	(2.9)	9.0	(4.1)	Standard	**VP506A30T**
		36	(915)	240	4000	18.5	(2.9)	10.6	(4.8)	Standard	**VP506A36T**
8	(205)	12	(305)	120	1800	18.8	(2.9)	4.7	(2.4)	Stock	**VP508A12T**
		18	(460)	240	3000	20.8	(3.2)	7.4	(3.3)	Stock	**VP508A18U**
		24	(610)	240	3600	18.8	(2.9)	9.5	(4.3)	Stock	**VP508A24T**
		30	(760)	240	5000	20.8	(3.2)	11.7	(5.3)	Stock	**VP508A30T**
		36	(915)	240	6000	20.8	(3.2)	13.9	(6.3)	Standard	**VP508A36T**

CONTINUED

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

② Stocked ceramic fiber heaters can be used to make this RAYMAX 2030 heater panel. These are **assembly stock** units. For those units rated at 120V~(ac) (code numbers ending in ...T), an alternate 240V~(ac) unit (code numbers ending in ...U) is available as a standard design. Flat heaters on page 158 can be used in these RAYMAX cases.

Radiant Heaters

F.O.B: Columbia, Missouri

RAYMAX 2030

Nominal Heated Width in	(mm)	Nominal Heated Length in	(mm)	Volts	Watts	Watt Density W/in²	(W/cm²)	Approx Net Wt. lbs	(kg)	Availability	Code No.
10	(255)	12	(305)	120	2000	16.7	(2.6)	6.3	(2.9)	Standard	**VP510A12T**
		18	(460)	240	3600	20.0	(3.1)	9.0	(4.1)	Standard	**VP510A18T**
		24	(610)	240②	4500	17.9	(2.8)	11.7	(5.3)	Assy. Stock②	**VP510A24T②**
		30	(760)	240	6000	20.0	(3.1)	14.4	(6.5)	Standard	**VP510A30T**
		36	(915)	240	7000	19.4	(3.0)	17.1	(7.8)	Standard	**VP510A36T**
12	(305)	12	(305)	120② or 240②	2500	17.4	(2.7)	7.4	(3.3)	Assy. Stock②	**VP512A12T②**
		18	(460)	240	4000	18.5	(2.9)	10.6	(4.8)	Standard	**VP512A18T**
		24	(610)	240②	6000	20.8	(3.2)	13.9	(6.3)	Assy. Stock②	**VP512A24T②**
		30	(760)	240	7200	20.0	(3.1)	17.1	(7.8)	Standard	**VP512A30T**
		36	(915)	240	8400	19.4	(3.0)	20.3	(9.2)	Standard	**VP512A36T**
14	(355)	12	(305)	240	3500	20.8	(3.2)	8.5	(3.8)	Stock	**VP514A12T**
		18	(460)	240	4900	19.4	(3.0)	12.2	(5.5)	Standard	**VP514A18T**
		24	(610)	240	7000	20.8	(3.2)	16.0	(7.3)	Standard	**VP514A24T**
		30	(760)	240	8400	20.0	(3.1)	19.8	(9.0)	Standard	**VP514A30T**
		36	(915)	240/240③	9800	19.4	(3.0)	23.6	(10.7)	Standard	**VP514A36T**
16	(405)	12	(305)	240	3600	18.8	(2.9)	9.5	(4.3)	Standard	**VP516A12T**
		18	(460)	240	5700	19.8	(3.1)	13.9	(6.3)	Standard	**VP516A18T**
		24	(610)	240	7100	18.5	(2.9)	18.2	(8.2)	Standard	**VP516A24T**
		30	(760)	240/240③	9600	20.0	(3.1)	22.5	(10.2)	Standard	**VP516A30T**
		36	(915)	240/240③	11500	20.0	(3.1)	26.8	(12.2)	Standard	**VP516A36T**

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

② Stocked ceramic fiber heaters can be used to make this RAYMAX 2030 heater panel. These are **assembly stock** units. For those units rated at 120V~(ac) (code numbers ending in ...T), an alternate 240V~(ac) (code numbers ending in ...U) unit is available as a standard design.

③ Dual element unit. Four power terminals provided.

How to Order

To order a **stock, assembly stock,** or **standard** heater, specify:

- RAYMAX 1220 or 2030
- Quantity
- Watlow code number
- Mounting studs, if desired

Note: One-inch mounting legs are provided. Three-inch legs are available from stock upon request.

If stock or standard units do not meet application needs, Watlow can manufacture radiant heaters to fit special requirements.

For **made-to-order** units, please specify, in addition to previous information:

- Heated width and length, and overall size
- Total wattage
- Voltage, and phases or zones required
- Load temperature expectations
- Mounting studs, if desired
- Mounting legs and leg height, if desired (one inch is provided unless otherwise specified)
- Location of terminals
- Terminal box, if desired
- Thermowell (specify size and location if standard end clamp is not sufficient)

Availability

Stock: Shipment in one to two days

Assembly Stock: Shipment in two weeks

Standard: Shipment in three to four weeks

Made-to-Order: Consult Watlow