

## High Temperature Ceramic Knuckle Heaters Offer High-Performance Heating Option

Ceramic knuckle band heaters are designed to provide high-performance heating at temperatures up to 760°C (1400°F). This level of performance is achieved from the ceramic knuckles that provide excellent insulation and long heater life.

The construction of the ceramic knuckle heater includes interlocking ceramic blocks with resistance wires threaded through holes within the ceramic. This method provides superior heat distribution across the band, resulting in a perfectly heated surface. Ceramic knuckle heaters are specifically engineered and manufactured with three layers:

- **Aluminized steel sheath layer** improves mechanical protection to heater and resists corrosion.
- **Ceramic fiber layer** provides thermal insulation, energy conservation and minimizes heat loss.
- **Ceramic knuckle layer** provides mechanical protection and electrical insulation to the resistance element, which increases heater life and conducts or radiates the heat to the surface.

### Performance Capabilities

- 760°C (1400°F) maximum operational temperatures
- Watt densities up to 45 W/in<sup>2</sup>

### Applications

- Injection molding
- Extruders
- Blown film



### Features and Benefits

#### Ceramic insulator

- Allows for high temperature operation
- Provides longer heater life
- Accurate heating

#### Aluminized steel cover

- Provides excellent protection from abrasion

#### Radiation or conduction heat transfer

- Ensures dependable heat transfer method

### Standard Construction

- Aluminized sheath
- Clamp tabs
- Post terminals



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STL-CKH-0603



## Specifications

### Electrical

Resistance tolerance: -10 percent (+5 percent)

Wattage tolerance: +10 percent (-5 percent)

Maximum watt density: 45 W/in<sup>2</sup>

Maximum operating temperature: 760°C (1400°F)

### Mechanical

Overall thickness: ½ inch

Minimum width: 1½ inch

Maximum width: 9<sup>1</sup>/<sub>16</sub> inches

Minimum I.D.: 2 inches

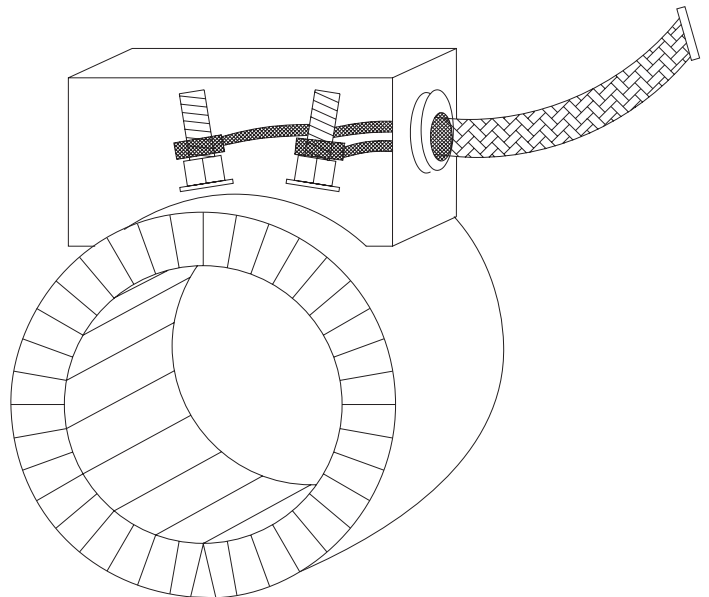
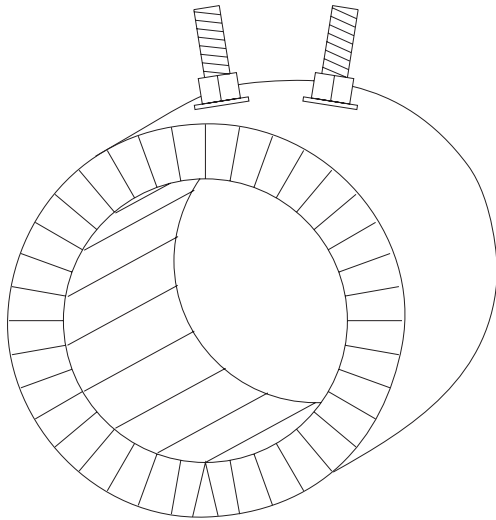
Maximum I.D.: 15 inches\*

Width tolerance: ±½ inch

Standard gap: ¼ inch

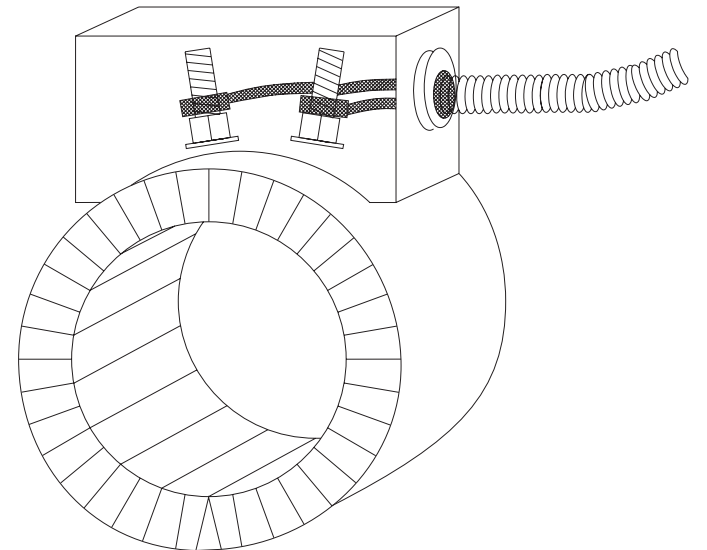
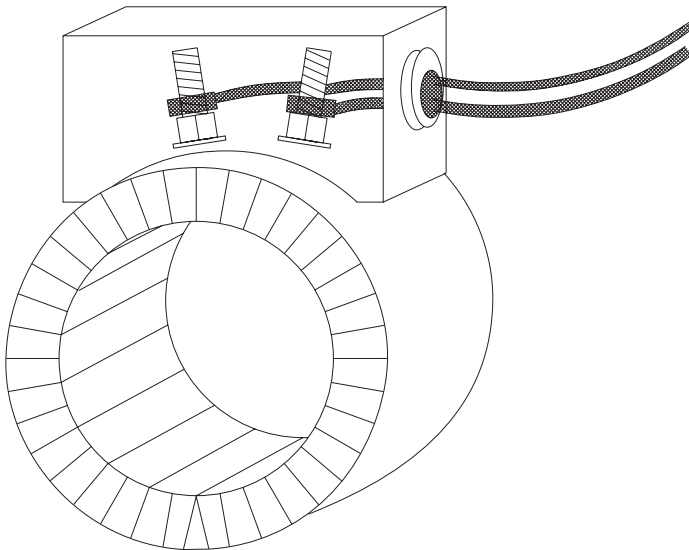
\*one piece construction

## Termination Options



**Post Terminals** are the standard termination, providing quick connection with ring or fork connectors or buss strips, ¼ - 20 inch thread, and includes double nuts and washers. Standard terminal location is 180° from gap.

**SS Braid** method includes a loose metal braid that is welded to the terminal box with a coupler. This provides excellent abrasion protection and flexibility. Leads are attached to posts with a ring connectors.

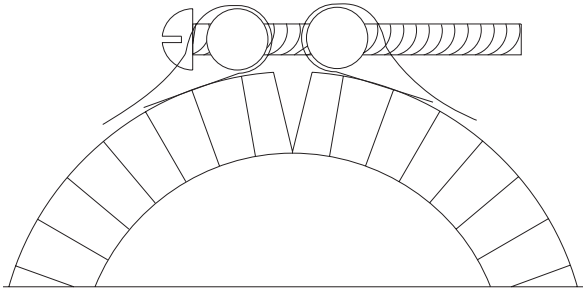


**Flexible Lead Wire** exits tangential to heater and includes leads connected to the post terminals with ring connectors. This termination method requires a terminal box.

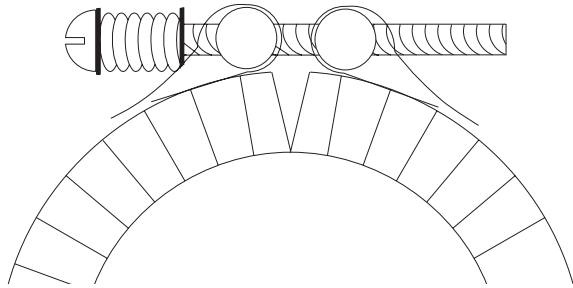
**Flexible SS Hose** is welded to the terminal box with a coupler. This terminal option provides superior mechanical protection where lead abrasion is a problem. Leads are attached to posts with a ring connectors.

Note: These are all standard termination options, for special constructions please consult factory.

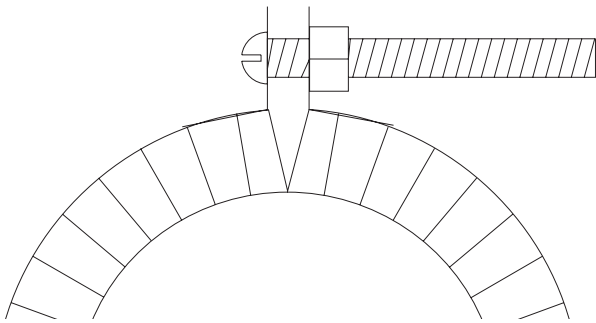
## Clamping Options



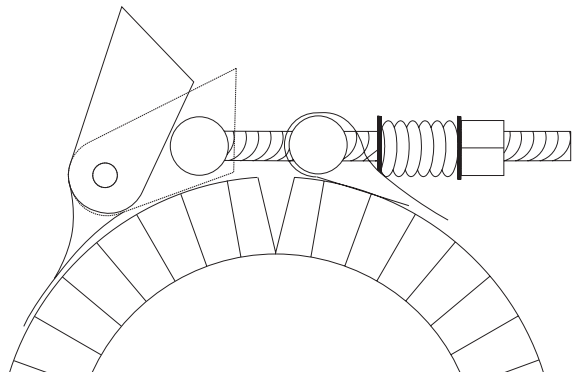
**Barrel Clamps** are used in applications where access for instrumentation is required. Includes an oversized gap.



**Spring Loaded Barrel Clamps** help to compensate for the thermal expansion of metals.



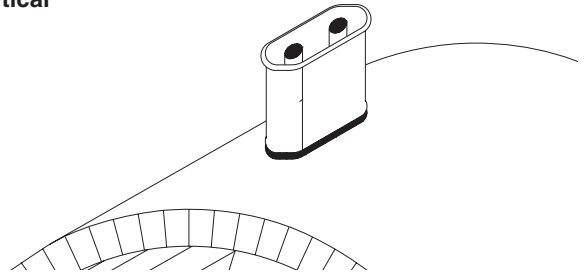
**Clamp Tabs** are a standard clamping option that offer a uniform clamping force across the heater width.



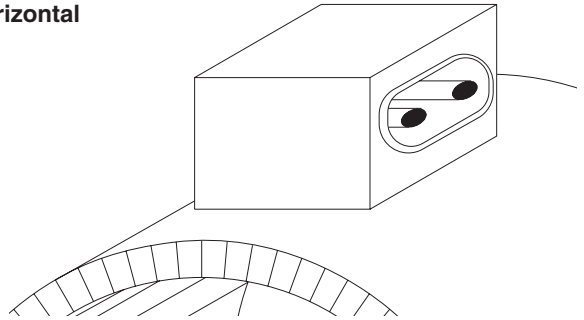
**Latch And Trunion Clamps** provide a quick clamp option. Clamping force is similar to barrel clamps and a spring is included to allow for thermal expansion of metals.

**European Style Plugs** provide a simple and safe way to apply power. The combination of high temperature male and female quick disconnect plug assemblies eliminate all live exposed terminals and electrical wiring. When ordering, specify vertical or horizontal European plug.

### Vertical



### Horizontal



## Physical Limitations

Options	I.D. (inches)		Width (inches)		Terminals	Clamp
	Min.	Max.	Min.	Max.		
One piece	2½	15	1½	10	—	—
Partial coverage	7	—	1½	9¾	—	Except clamp tabs
Clamp tabs	2½	15	1½	10	—	
Barrel nuts	4	—	1½	10	—	
Spring loaded barrel nuts	4	—	1½	10	—	
Latch and trunion clamps	3	—	1½	10	—	
Stud terminals	—	—	—	10		—
Flexible leads	2½	—	2½	10		—
SS hose leads	2½	—	2½	10		—
SS braided leads	2½	—	2½	10		—
Terminal box	2½	—	2½	10	—	—
Holes and notches	2½	—	2½	10	—	—
Ceramic cover	2	—	1½	10	Post	—
Terminal clamp	3	—	2½	9¾	Post with terminal box	—
European plug both vertical and horizontal	2½	—	2	10		—

— No restrictions.

Note: These are all standard clamping options, for special constructions please consult factory.

## Options

**Terminal box** provides protection for electrical connections in hazardous environments.

**Partial coverage** helps heating of large pipes and covers large diameters with two or more sections, dimensional drawing required when ordering.

**T/C bracket ¾ NPT** necessary for instrumentation.

A dimensional drawing is required when ordering.

**Holes and notches** necessary for instrument access, etc.

Heater must be 2.5 inches minimum width and 2.5 inches minimum I.D., dimensional drawing required when ordering.

**Ceramic terminal covers** provide easy installation and protect electrical connections on each individual terminal.

## Other Options:

- Dual voltage (factory approval required)
- Stainless steel sheath
- Ground stud
- Ground lead
- Three-phase voltage (factory approval required)

## Ceramic Band Heater Check List:

- The surface where a heater will be mounted must be clean and the heater maintained free of all contaminants that might cause a short circuit in the heater (typically conductive liquids).
- To prevent overheating, Watlow recommends installing an appropriate temperature controller and checking the correct performance of the thermocouple.
- Do not use in environments containing combustible gases or vapors.
- Keep all electrical connections properly protected to avoid electrical hazards to machine operators.
- Do not over tighten clamps to the point where serrated side folds begin to collapse. Ceramic band heaters utilize radiation heating and excessive force may break ceramic insulators.

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