

Cartridge/Insertion Heaters

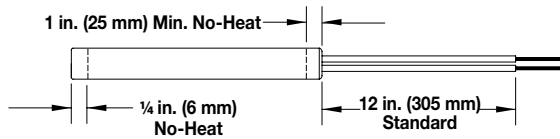


FIREROD Cartridge Heaters

Made-to-Order

Straight Options

Swaged-in Flexible Leads

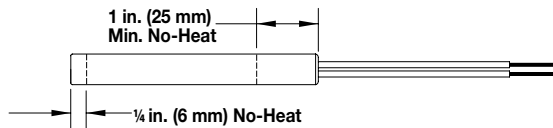


Swaged-in flexible leads are used in applications where a high degree of flexing exists or leads must be bent sharply adjacent to the heater without exposing or breaking the conductor. Stranded wire leads are connected internally and exit through the lead end.

Lead wire type is high temperature fiberglass. The maximum temperature of the standard fiberglass end piece is 842°F (450°C). Unless specified, 12 in. (305 mm) leads are supplied.

The minimum lead end for no-heat is 1 in. (25 mm) min. or 12 percent of overall heater length. Additional no-heat may be required to keep the end piece and leads below the maximum operating temperatures.

PTFE Seal and Leads

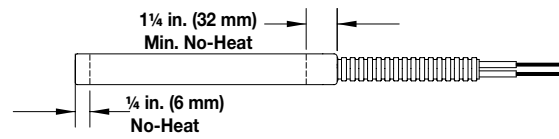


A PTFE seal and leads protect the heater against moisture and contamination from cleaning solvents, plastic material, fumes and organic tapes. This seal is effective up to 392°F (200°C) under continuous operation.

The PTFE seal and leads have a minimum lead end unheated section of 1 in. (25 mm). Additional no-heat may be required to keep the seal below its maximum operating temperature.

Note: If your application requires smaller no heat, contact your Watlow representative for details.

Straight Stainless Steel Hose

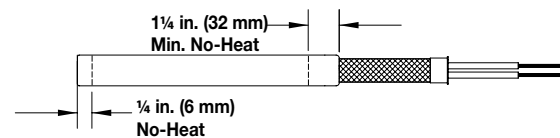


A straight stainless steel hose provides the best protection against abrasion from sharp edges. It also offers ease of handling and wiring in abrasive environments.

Unless specified, a 12 in. (305 mm) hose is supplied. Leads are 2 in. (51 mm) longer than the hose.

Note: This option is available with PTFE leads and seal. Minimum no-heats are longer. Contact your Watlow representative for details.

Straight Stainless Steel Braid



A straight stainless braid is designed to protect leads from abrasion against sharp edges and is Watlow's most flexible protective lead arrangement.

Unless specified, a 12 in. (305 mm) braid is supplied. Leads are 2 in. (51 mm) longer than the braid.

Note: This option is available with PTFE leads and seal. Minimum no-heats are longer. Contact your Watlow representative for details.

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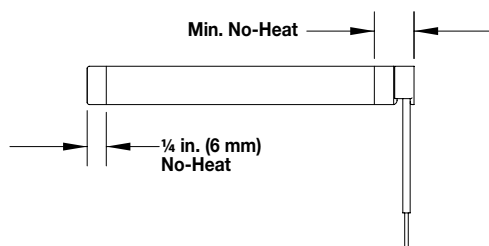


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Right Angle Options

Right Angle Leads

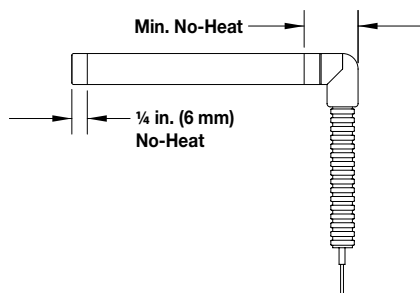


Right angle leads are used in applications with a high degree of flexing and when space limitations are critical. Standard lead wires are connected internally (swaged-in) and exit at a 90° angle at the end of the heater.

Diameter	1/4	3/8	1/2	5/8	3/4
Min. no-heat in. (mm)	1 1/4 (32)	1 1/4 (32)	1 5/16 (33)	1 7/16 (37)	1 7/16 (37)

Note: This option is available with PTFE leads and seal. Minimum no-heats are longer. Contact your Watlow representative for details.

Right Angle Stainless Steel Hose



The diameter of the right angle extension is equal to the nominal diameter of the heater.

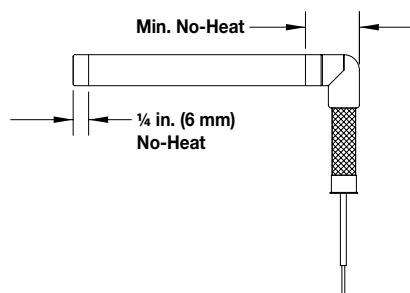
A right angle stainless steel hose is provided for wiring convenience. It protects leads from abrasion against sharp edges.

Unless specified, a 12 in. (305 mm) hose is supplied. Leads are 2 in. (51 mm) longer than the hose.

Diameter	1/4	3/8	1/2	5/8	3/4
Min. no-heat in. (mm)	1 5/16 (33)	1 3/8 (35)	1 9/16 (40)	1 11/16 (43)	1 13/16 (46)

Note: This option is available with PTFE leads and seal. Minimum no-heats are longer. Contact your Watlow representative for details.

Right Angle Stainless Steel Braid



The diameter of the right angle extension is equal to the nominal diameter of the heater.

A right angle stainless steel braid is provided for wiring convenience. It protects leads from abrasion against sharp edges.

Unless specified, a 12 in. (305 mm) braid is supplied. Leads are 2 in. (51 mm) longer than the braid.

Diameter	1/4	3/8	1/2	5/8	3/4
Min. no-heat in. (mm)	1 5/16 (33)	1 3/8 (35)	1 9/16 (40)	1 11/16 (43)	1 13/16 (46)

Note: This option is available with PTFE leads and seal. Minimum no-heats are longer. Contact your Watlow representative for details.

Cartridge/Insertion Heaters

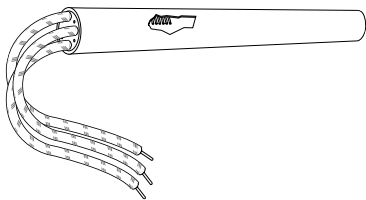


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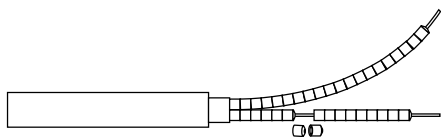
Termination Options

Ground Lead



Ground leads are a safety feature to protect both workers and equipment. This configuration is not available on all options. Contact your Watlow representative for additional information. To order, specify **ground lead**.

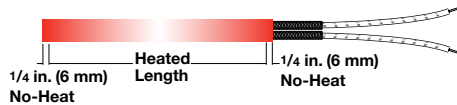
Ceramic Bead Insulation



Ceramic bead insulation protects the leads from high ambient temperatures above 842°F (450°C). The beads fit over solid conductors that extend to reach a cooler area where flexible wires can be attached. This option is not available on 1/8 in. (3 mm) diameter leads. The maximum available length on FIRERODs is 6 in. (152 mm). To order, specify **ceramic beads** and length, and additional lead length.

Options

Distributed Wattage



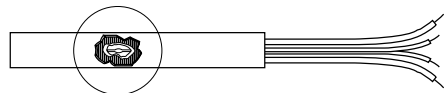
Distributed wattage varies the watt density along the length of the heater. This construction technique compensates for heat losses along the edges of heated parts and is ideal for seal bar applications. To order, specify **distributed wattage** and give the length and wattage for each section.

Thermocouple Types

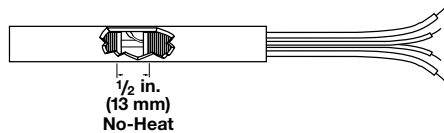
ASTM Code	Conductor Characteristics		Temperature Range °F (°C)
	Positive	Negative	
J	Iron (Magnetic) (White)	Constantan (Non-Magnetic) (Red)	0 to 1400 (-20 to 760)
K	Chromel® (Non Magnetic) (Yellow)	Alumel® (Magnetic) (Red)	0 to 2300 (-20 to 1260)

For other ISA types, contact your Watlow representative.

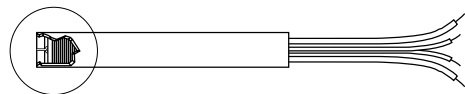
Style A



Style B



Style C



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Options

Internal Thermocouple

Style A internal thermocouples can be used to evaluate heat transfer efficiency of an application. This measurement can help to cut energy costs and increase heater life. The ungrounded junction is located in the heater core to monitor the internal temperature of the heater.

The Style B internal thermocouple provides a good approximation of part temperature and is located anywhere along the length of the heater. Due to variations in production, this style may be grounded or ungrounded.

This junction is located adjacent to the inside heater sheath in the center of the heated section unless otherwise specified. A 1/2 in. (13 mm) unheated section is required.

A Style C internal thermocouple is useful in applications where material flows past the end of the heater, as in plastic molding. This grounded junction is embedded in a special end disc. Unless requested, the disc end is not mechanically sealed.

To order, specify **internal thermocouple, Style A, B or C** and **thermocouple ASTM Type J or K**.

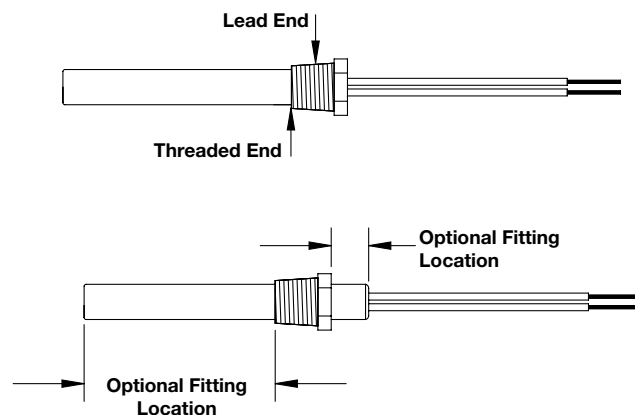
If not specified, 12 in. (305 mm) thermocouple leads are supplied.

Availability

All styles are available on all diameters with the exception of 1/8 in. (3.2 mm) diameter, which is available only with Style C, and 1 in. (25 mm) which is available only with Style A and B.

Mounting Options

Threaded Fittings



Threaded fittings allow fast, water-tight heater installation into a threaded hole. Standard fittings are 304 stainless steel and welded to the heater sheath. Other materials, including brass are available as an extended option. Double threaded fittings are also available.

Unless specified, the fitting hex is located flush with the lead end.

Threaded Fittings Specifications

Heater Diameter in.	Pipe Thread Size (NPTF) in. (mm)	Single Thread Fitting Length in. (mm)	Double Thread Fitting Length in. (mm)
1/4	1/8 (3)	1/2 (13)	7/8 (22)
3/8	1/4 (6)	5/8 (16)	15/16 (33)
1/2	3/8 (10)	3/4 (19)	13/8 (35)
5/8	1/2 (13)	7/8 (22)	113/16 (46)
3/4	3/4 (19)	1 (25)	113/16 (46)
1	1 (25)	1 (25)	11/2 (38)

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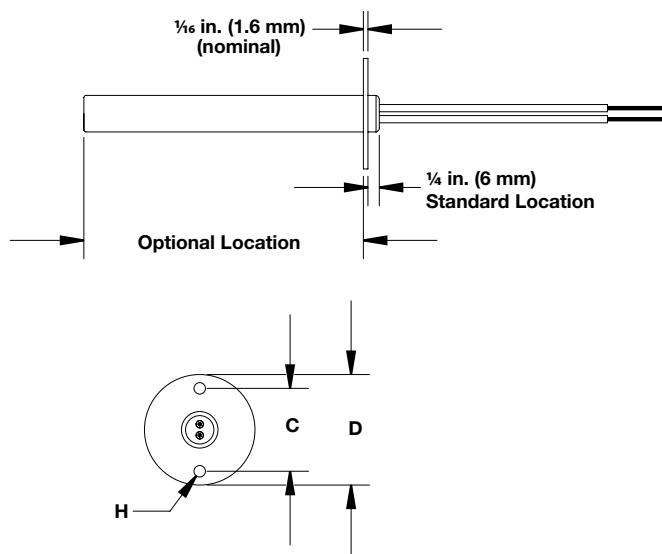


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Mounting Options *(Continued)*

Flanges



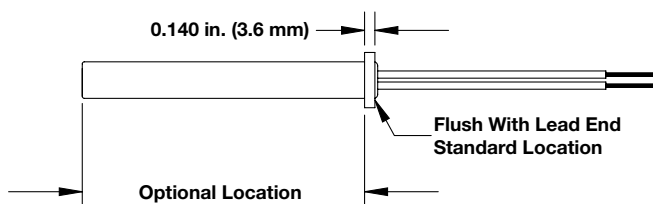
Stainless steel flanges are a convenient mounting method and can be used to position a heater within an application. The standard location is $\frac{1}{4}$ in. (6 mm) from the lead end. However, a specific location may be requested in any location along the no-heat section. Unless specified, flanges are staked to the sheath.

To order, specify **flange size** and location.

Flange Specifications

FIREROD Diameter in.	Flange Size	D in. (mm)	C in. (mm)	H in.
$\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$	FS	1 (25)	$\frac{3}{4}$ (19)	0.144
$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$	FM	1 $\frac{1}{2}$ (38)	1 $\frac{1}{8}$ (28)	0.156
$\frac{5}{8}$, $\frac{3}{4}$, 1	FL	2 (51)	1 $\frac{1}{2}$ (38)	0.201

Locating Rings



A stainless steel locating ring can be used as a retaining collar to position a FIREROD heater if mounting requirements are not critical. Standard locating rings are staked to the heater sheath.

To order, specify **locating ring** and location.

Locating Ring Specifications

Diameter	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Ring O.D. in. (mm)	$\frac{1}{2}$ (13)	$\frac{5}{8}$ (16)	$\frac{3}{4}$ (19)	$\frac{7}{8}$ (22)	1 (25)