

Cartridge Heaters

FIREROD®

The Watlow FIREROD® revolutionized the heating element industry in 1954 when it was patented as the first swaged cartridge heater. With premium materials and tight manufacturing controls, the FIREROD heater continues to provide superior heat transfer, uniform temperatures and resistance to oxidation and corrosion even at high temperatures.

FIREROD offers many delivery programs to meet your needs: same day shipment, Ship-to-Stock or Just-in-Time. And our experience in customized engineering is reflected in over 250,000 FIREROD cartridge heater designs. Stock or made-to-order, the Watlow FIREROD delivers heat in a hurry.

Performance Capabilities

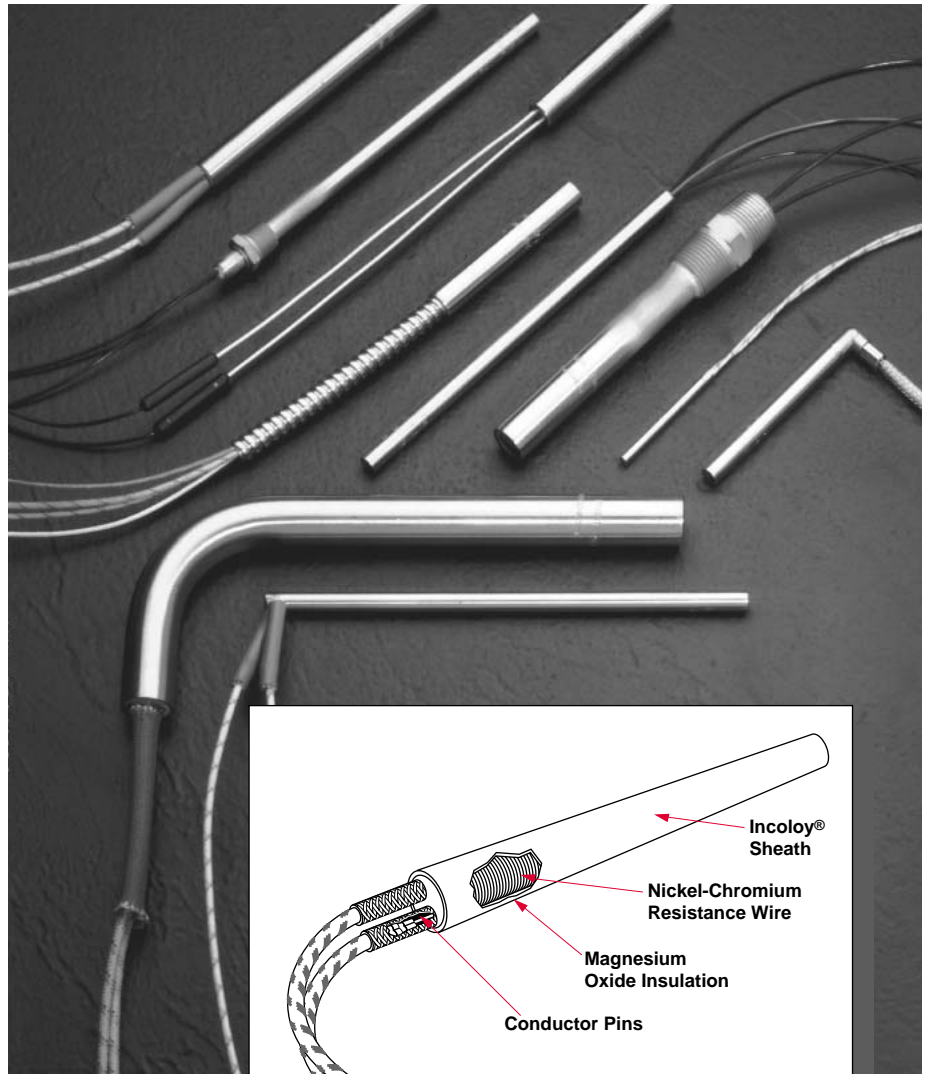
- Part temperatures to 1400°F (760°C) on Incoloy® sheath
- Part temperatures to 1000°F (540°C) on optional stainless steel sheath
- Watt densities to 400 W/in² (62 W/cm²)

Features and Benefits

- **Nickel-chromium resistance wire**, precisely wound and centered in the unit, assures even, efficient distribution of heat to the sheath.
- **Conductor pins** metallurgically bonded to the resistance wire ensure trouble-free electrical continuity.
- **Magnesium oxide insulation of specific grain and purity**, swaged to the proper density, results in high dielectric strength and contributes to faster heat-up.
- **Incoloy® sheath** resists oxidation and corrosion from many chemicals, heat and atmospheres.

Incoloy® is a registered trademark of Special Metals Corporation.

UL® is a registered trademark of Underwriter's Laboratories, Inc.



- **Minimal spacing between the element wire and sheath** results in lower internal temperature, giving you the ability to design with fewer or smaller heaters that operate at higher watt densities.
- **UL® and CSA approved flexible stranded wires**, with silicone-fiberglass oversleeve, insulate the wires to temperatures of 480°F (250°C).
- **Patented Lead Adaptor (LA) method** allows same day shipment on more than 150,000 configurations of stock FIREROD heaters and lead combinations.

Applications

- Molds
- Dies
- Platens
- Hot plates
- Sealings
- Fluid heating
- Life sciences
- Aerospace
- Semiconductor
- Foodservice equipment

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Applications and Technical Data

Tolerances

Diameter:

1 inch units: ±0.003 inches (±0.076 mm)

All other units: ±0.002 inches (±0.0508 mm)

Length:

All units to 4½ inches (115 mm) long: ±¾ inch (±2.4 mm)

½ inch diameter units over 4½ inches (75 mm) long: ±3 percent

All other units over 4½ inches (115 mm) long: ±2 percent

Wattage:

½ inch units: +10 percent, -15 percent

All other units: +5 percent, -10 percent

Resistance:

½ inch units: +15 percent, -10 percent

All other units: +10 percent, -5 percent

Resistance changes with temperature. There are three circumstances under which resistance can be measured:

1. Room temperature (before use): nominal ohms are 90 percent of ohm's law calculation.
2. Room temperature (after use): nominal ohms are 95 percent of ohm's law calculation.
3. At temperature (during use): depending on application nominal ohms are approximately 100 percent of ohm's law.

Camber:

Units to 12 inches long: 0.005 inch per six inch length. Standard camber tolerance varies as the square of the length, in feet, is multiplied by 0.020 inches. For example, a 36 inch FIREROD has a camber tolerance of 0.020 inches X (3)² = 0.180 inches. Normally, slight camber does not present a problem since the heater will flex enough to fit into a straight, close fit hole.

Component Recognition

File Numbers

UL® component rated to 240V~(ac) (file number E52951)

CSA component rated to 240V~(ac) (file number LR7392)

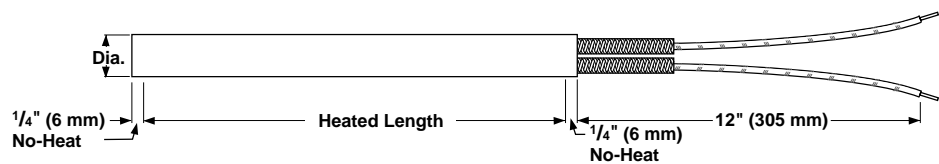
VDE component rated to 240V~(ac) (file number 10062-4911-0006)

Note: Not all options are covered.

Electrical Data

The *Electrical Data* table will assist you in selecting the correct FIREROD heater for your application, according to available voltage, amperage and wattage.

Please note, some combinations of minimum and maximum wattages are not available on the same heater diameter. Also, if you need to exceed limitations shown, contact your Watlow sales engineer or authorized distributor.



Number Of Circuits ^⑤		
Diameter inches	1-phase	3-phase
¾	3	1
1	5	2

FIREROD Diameter inches	Volts Max.	Amp Max. ^①	Minimum Watts@120V ^② Heater Length			Maximum Watts				
			1 in (25 mm)	1 ½ in (38 mm)	2 in (50 mm)	120V 1-phase	240V 1-phase	480V 1-phase	240V 3-phase	480V 3-phase
½	240	3.1	—	8	5	360	720	—	—	—
¼	240	4.4 ^⑥	100	55	40	525	1050	—	—	—
¾	240	6.7	65	35	25	800	1600	—	④	—
½	240	9.7	40	25	20	1,160	2,320	—	④	—
⅝	480	23.0	35	20	15	2,760	5,520	11,000	④	—
¾	480	23.0	30	15	10	2,760 ^③	5,520	11,000	9,550	19,100
1	480	23.0	—	15	10	2,760 ^③	5,520	11,000	9,550 ^③	19,100 ^③

① Determined by the current carrying capacity of internal parts and standard lead wire.

② Determined by the limitation of space for resistance winding. For minimum wattage of 240V~(ac) multiply value by four.

③ Higher wattages are available using more than one set of power leads. Multiply the wattage from the table by the applicable factor.

④ Consult the Watlow factory in St. Louis, Missouri, for data.

⑤ On ¾ inch diameter units, either three single-phase circuits or one three-phase Delta or Wye circuit is available. On one inch diameter units, either five single-phase or two three-phase Delta circuits are available.

⑥ For ¼ inch units with thermocouple maximum amperage is 3.1.

Cartridge Heaters

FIREROD

Maximum Allowable Watt Density



For metric watt density conversion see Metric FIREROD Cartridge, pages 119 and 120.

The following four charts detail maximum allowable watt densities for applications involving metal heating or steam, air and gas heating. Please review these respective charts and applicable data to determine the correct watt density for your application.

Correction Factors:

Also note, these graphs depict FIRERODs used in steel parts. Therefore, for either stainless steel or aluminum and brass, refer to applicable correction factors:

- ① For stainless steel, enter the graph with a fit 0.0015 inch (0.04 mm) larger than actual.
- ② For aluminum and brass, enter the graph with a temperature 100°F (38°C) above actual temperature.

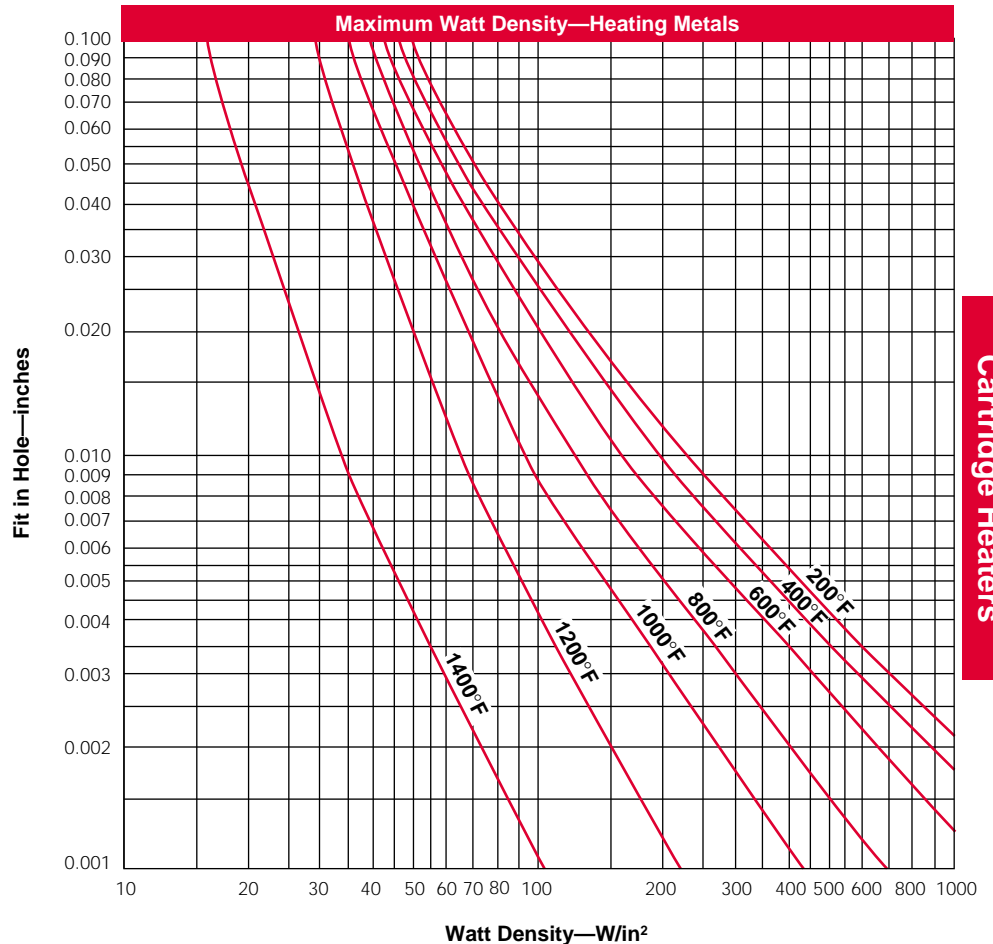
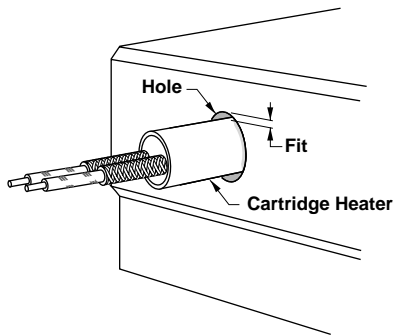
Heating Metals

The *Maximum Watt Density—Heating Metals* chart will tell you either the maximum hole fit or recommended watt density of the heater. Enter the chart with either known variable, part fit in hole dimension or W/in². Then find the

application temperature by reading up or over on the chart.

If the fit of the heater in the hole dimension is not known, it is easily determined. Subtract the minimum diameter of the FIREROD (nominal diameter minus tolerance) from the maximum hole diameter. For

example, take a hole diameter of 0.500 minus a heater diameter of 0.496 ±0.002 inch. The hole fit would be 0.006 inch. For FIREROD heaters in square holes or grooves, contact your Watlow sales engineer or authorized distributor for the fit in hole dimension.



Cartridge Heaters

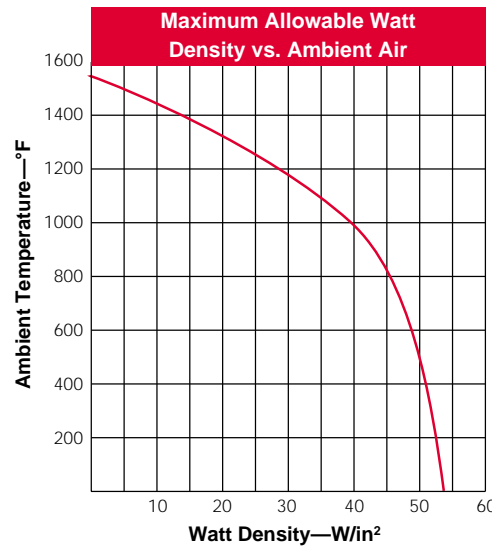
Cartridge Heaters

FIREROD

Maximum Allowable Watt Density

Continued

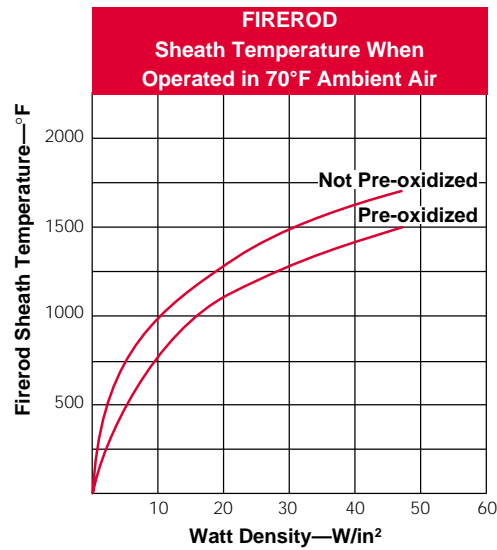
Heating Steam, Air and Gases



Watt Density vs Ambient Air Temperature

The *Watt Density vs Ambient Air Temperature* graph shows the maximum allowable watt density when one FIREROD is operated in air or similar gas.

For FIRERODs grouped in a single row, with no less than one diameter between elements, multiply value from graph by 0.95. When a reflector is placed behind the heaters, multiply the maximum allowable watt density value from the graph by 0.85.

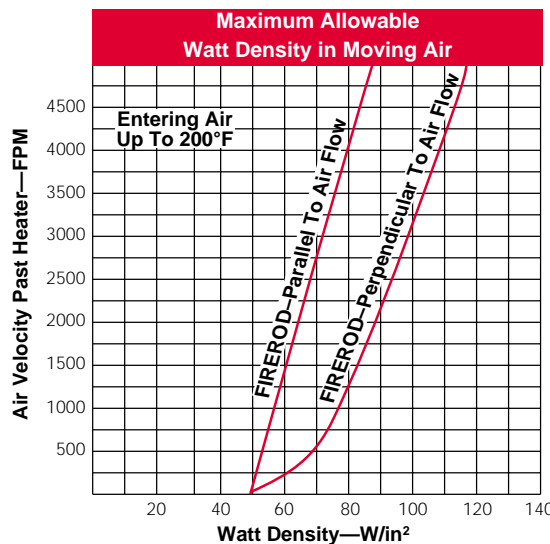


Sheath Temperature in Ambient Air

The *Sheath Temperature in Ambient Air* graph indicates the watt density required to bring a pre-oxidized FIREROD to a given sheath temperature when operated in 70° F (20° C) ambient air.

At 44 W/in² (6.8 W/cm²), the sheath temperature would be 1450° F (790° C). At this temperature, one year life would be expected, provided that cycling is not too frequent.

Higher temperatures would result in reduced heater life.



Watt Density in Moving Air

The *Watt Density in Moving Air* graph gives the maximum allowable watt density of a FIREROD in moving air.

The air movement is expressed in feet per minute (FPM). If the air flow is known in cubic feet per minute (CFM), divide the CFM by the net free area around the heater (ft²). The net free area is the total area of the enclosure minus the area occupied by the heater.

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Lead Specifications

Lead and Diameter Information

Heater Diameter inches	Standard Lead Gauge Fiberglass	Lead Wire Size Tolerance Fiberglass	Standard Lead Gauge Teflon®	Lead Wire Size Tolerance Teflon®	Standard Stainless Steel Hose I.D.	Standard Stainless Steel Braid I.D.
¹ / ₈	24	0.044 - 0.058	24 solid	0.036 - 0.044	¹ / ₈	¹ / ₈
¹ / ₄	22	0.079 - 0.093	22	0.046 - 0.054	¹ / ₈	¹ / ₈
³ / ₈	22	0.079 - 0.093	20	0.054 - 0.062	⁷ / ₃₂	¹ / ₄
¹ / ₂	18	0.095 - 0.109	20	0.054 - 0.062	⁹ / ₃₂	¹ / ₄
⁵ / ₈	18	0.095 - 0.109	18	0.064 - 0.074	³ / ₈	¹ / ₄
³ / ₄	18	0.095 - 0.109	14	0.087 - 0.101	¹ / ₂	³ / ₈
1	18	0.095 - 0.109	14	0.087 - 0.101	N/A	N/A

Lead length tolerances: 1 inch to 36 inches = -¹/₂ inch, +¹/₂ inches; > 36 inches to 72 inches = -1, +3 inches; > 72 inches = ±4 inches.

Stainless steel hose and braid tolerances: same as lead wire.

Units constructed with 480 volts require MGT leads. If connecting heaters in series above 300 volts, MGT leads are also required.

Ratings: GGS, 300V, 480°F (250°C)
 MGT, 600V, 840°F (450°C)
 Teflon®, 600V, 400°F (205°C)
 Silicone Rubber, 600V, 300°F (150°C)

Lead Gauge	Nickel Ampacity	N.C.C. Ampacity	SPC/NPC
26	2.5	4.2	6.0
24 stranded	3.1	5.2	7.5
24 solid	3.1	5.2	7.5
22	4.4	7.2	10.5
20	N/A	N/A	14.0
18	7.6	12.6	18.0
16	9.7	16.1	23.0
14	12.5	21.0	30.0
12	16.8	28.0	40.0
10	23.0	38.5	55.0

Dimensional Data

The *Dimensional Data* table gives minimum/maximum lengths for available FIREROD diameters.

FIREROD Diameter		Length	
Nominal inches	Actual inches (mm)	Minimum inches (mm)	Maximum inches (mm)
¹ / ₈	0.122 (3.10)	1 ¹ / ₄ (32)	12 (305)
¹ / ₄	0.246 (6.25)	⁷ / ₈ (22)	36 (915)
³ / ₈	0.371 (9.42)	⁷ / ₈ (22)	48 (1,220)
¹ / ₂	0.496 (12.60)	⁷ / ₈ (22)	60 (1,520)
⁵ / ₈	0.621 (15.77)	1 (25)	72 (1,830)
³ / ₄	0.746 (18.95)	1 (25)	72 (1,830)
1	0.996 (25.30)	1 ¹ / ₄ (32)	72 (1,830)

Indicates **recommended** maximum length; however longer lengths are available.

Cartridge Heaters

FIREROD

Non LA Stock

Modification Coding

Watlow offers heaters in various diameters, lengths and volt-wattage combinations that are ready for shipping. Stock heaters are listed on **pages 97-107**. Any stock heaters can have basic modifications made and shipped the same day. These

modifications include flanges, threaded fittings, locating rings, elbows, couplers, ceramic beads and leads. The following is a list of all available non LA modifications and their code numbers.

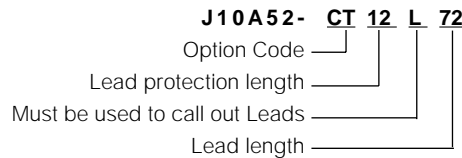
Mounting Option Codes

- BA Small flange FS (available on $\frac{1}{4}$ " , $\frac{3}{8}$ " , $\frac{1}{2}$ ")
- BB Medium flange FM (available on $\frac{1}{4}$ " , $\frac{3}{8}$ " , $\frac{1}{2}$ " , $\frac{5}{8}$ " , $\frac{3}{4}$ ")
- BC Large flange FL (available on $\frac{5}{8}$ " , $\frac{3}{4}$ ")
- BD Locating ring (available on $\frac{1}{4}$ " , $\frac{3}{8}$ " , $\frac{1}{2}$ " , $\frac{5}{8}$ " , $\frac{3}{4}$ ")
- BE Single brass fitting
- BF Double brass fitting
- BG Single stainless steel fitting
- BH Double stainless steel fitting
- BY Stainless steel reversed
- BZ Brass reversed

Lead Protection Option Codes

- CC Straight coupler - BX
- CD Right angle elbow - BX
- CE Straight coupler - stainless steel hose
- CF Right angle elbow - stainless steel hose
- CJ Straight coupler - BX - solder coupler to heater
- CK Straight coupler - BX - solder coupler to BX
- CL Straight coupler - BX - solder coupler to BX and heater
- CM Right angle elbow - BX - solder elbow to heater
- CN Right angle elbow - BX - solder elbow to BX
- CP Right angle elbow - BX - solder elbow to BX and heater
- CR Straight coupler - stainless steel hose - solder coupler to heater
- CS Straight coupler - stainless steel hose - solder coupler to hose
- CT Straight coupler - stainless steel hose - solder coupler to hose and heater
- CU Right angle elbow - stainless steel hose - solder elbow to heater
- CV Right angle elbow - stainless steel hose - solder elbow to hose
- CW Right angle elbow - stainless steel hose - solder elbow to hose and heater
- CX Straight coupler - stainless steel braid - $\frac{1}{8}$ " diameter only
- CY Straight coupler - stainless steel hose - $\frac{1}{8}$ " diameter only

Example:



Pin Option Codes

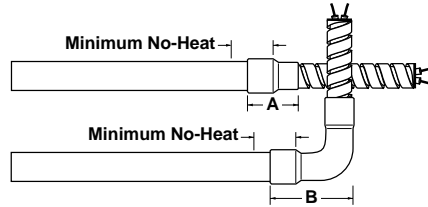
- AA Short pins $\frac{5}{16}$ "
- AB Medium pins $\frac{5}{8}$ "
- AC Long pins $1\frac{3}{4}$ "
- AD Stagger pins
- AE Ceramic beads $\frac{1}{2}$ "
- AF Ceramic beads $\frac{3}{4}$ "
- AG Ceramic beads 1"
- AH Ceramic beads $1\frac{1}{4}$ "
- AJ Ceramic beads $1\frac{1}{2}$ "

Note: Mounting options are located on the last $\frac{1}{4}$ inch of all non-LA stock units

Cartridge Heaters

FIREROD Non LA Stock Termination Options

Modified Stock Straight and Right Angle Galvanized BX Conduit



Galvanized BX conduit equals stainless steel hose in its abrasion protection. The conduit is attached with either a crimped-on straight or 90 degree elbow copper coupling which overlaps the heater sheath.

The 1/4-inch diameter FIRERODs use stainless steel hose instead of conduit. On one-inch (25 mm) diameter FIRERODs, only flexible galvanized hose is used.

Modified Stock units may be ordered either with copper coupler/elbow and BX conduit or stainless steel hose. To order, specify **BX conduit** or **stainless steel hose** as well as straight or right angle coupler, conduit/hose length and lead lengths.

Unless specified, 12-inch (305 mm) hose or conduit is supplied. Leads are two inches (51 mm) longer than hose.

BX Conduit

Coupler utilizes BX conduit or SS hose.

Heater Diameter inches	Straight A Dimension inches (mm)	Right Angle B Dimension inches (mm)	BX O.D. inches (mm)	Hose O.D. inches (mm)
1/4	7/8 (22)	1 1/16 (27)	- ① -	3/8 (10)
3/8	1 (25)	1 3/8 (35)	1/2 (13)	3/8 (10)
1/2	1 3/16 (30)	1 5/8 (41)	9/16 (14)	1/2 (13)
5/8	1 1/4 (32)	2 1/16 (52)	9/16 (14)	5/8 (16)
3/4	1 1/2 (38)	2 1/8 (54)	9/16 (14)	5/8 (16)

① 1/4 inch diameter unit uses SS hose only.

Galvanized BX conduit is available on Modified Stock units. It is also available on Stock/Standard FIRERODs in combination with LA swaged-in flexible leads, as well as LA Teflon® and silicone rubber seals and leads.

On Modified Stock, insert length = overall length of heater - 1/4 inch.

Note: If the heater diameter you need is not shown on the chart, Watlow will manufacture to your specifications.

Cartridge Heaters

FIREROD

LA Stock

Termination Options

Patented LA—or Lead Adaptor—Modification Method



1000°F maximum on LA cap

Watlow has developed a patented Lead Adaptor (LA) program for customers in need of heaters quickly. The LA program takes a stock heater

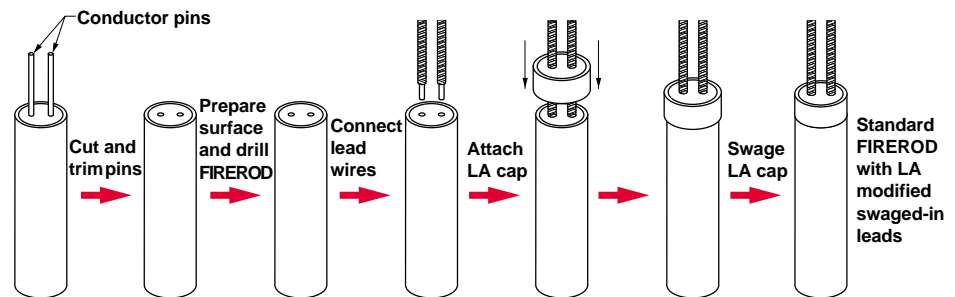
adds leads and lead protection, if requested. The LA adder has a standard 12 inches (305 mm) of protection and 14 inches (356 mm) of leads, but additional length can be added. The leads and protection can also be attached in a right angle configuration for applications with restricted space.

LA configurations are permanently attached to the heater. Most configurations can be ordered with no-heat extensions. These can also have mounting options including flanges, threaded fittings or locating rings.

LA adders can be used on either stock heaters or made-to-order heaters. The LA adders usually take one to three days to ship.

To configure a FIREROD with swaged-in leads, Watlow:

- Cuts the pins off flush with the end piece and prepares the surface for drilling.
- Drills the heater.
- Connects the lead wires, and then places an LA cap over the lead end of the heater.
- Swages the heater to produce a rugged unit with swaged-in leads.



LA options available on 3/8 inch to 3/4 inch diameters.

Note: Limited LA options available on 1/4 inch diameter.

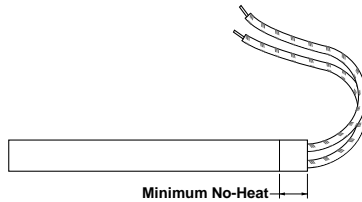
Maximum temperature of LA cap is 1000°F (538°C) except for MI leads option.

Cartridge Heaters

FIREROD

LA Stock

Termination Options

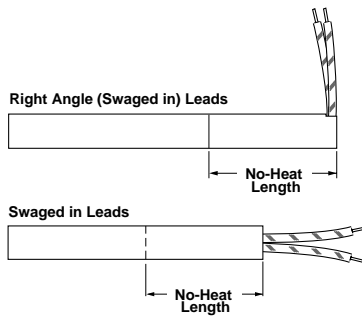


LA Swaged-in Flexible Leads

LA swaged-in flexible leads are used in applications where a high degree of flexing exists or the leads must be bent sharply adjacent to the heater without exposing or breaking the conductor. The stranded wire leads are connected internally and exit through the lead end. The overall length of the heater is extended by $\frac{3}{16}$ inch (5 mm).

To order, specify **length adder code D** bringing the total disk end no-heat to $\frac{7}{16}$ inch.

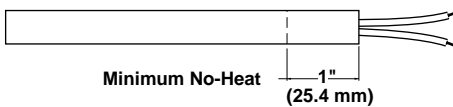
This LA option is not available on $\frac{1}{8}$ inch (3 mm) diameter. On $\frac{1}{8}$ inch (3 mm) diameter FIRERODs, leads are connected externally using a solid conductor lead wire. If stranded wire is desired on $\frac{1}{8}$ inch (3 mm) diameter units, consult factory.



No-Heat Extensions

No-heat extensions are recommended in applications where leads may be exposed to excessive heat, thus requiring a cooler lead end. Also used when heat is not required along the entire length of the FIREROD.

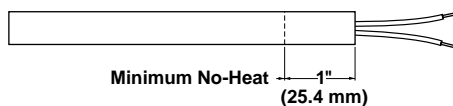
No-heat extensions are available for most LA stock options in diameters of $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ inch (9, 13, 16 and 19 mm). These extensions are designed to provide a total no-heat length of 1, 1½, 2 or 2½ inches (25, 38, 51 or 65 mm) at the lead end of stock FIRERODs only. Consult factory for available LA options.



LA Teflon® Seal and Leads

LA Teflon® seal and leads protect the heater against moisture/contamination from lubricating oil, cleaning solvents, plastic material or fumes and organic tapes. This seal is effective to 400°F (205°C) under continuous operation.

Please note when ordering this option, that a minimum no-heat section is required to allow for construction. Additional no-heat may be required to keep the seal below effective temperatures. The minimum lead end no-heat is one inch. The LA cap adds $\frac{3}{4}$ inch (19 mm) to the overall length of the heater. To order, specify **option code T**.



LA Silicone Rubber Seal and Leads

LA silicone rubber seal and leads protect the heater against moisture/contamination from lubricating oil, cleaning solvents, plastic material or fumes and organic tapes. This seal is effective to 450°F (230°C) under continuous operation.

Please note when ordering this option, that a minimum no-heat section is required to allow for construction. Additional no-heat may be required to keep the seal below effective temperatures. The minimum lead end no-heat is one inch. The LA cap adds $\frac{3}{4}$ inch (19 mm) to the overall length. To order, specify **option code P**.

Cartridge Heaters

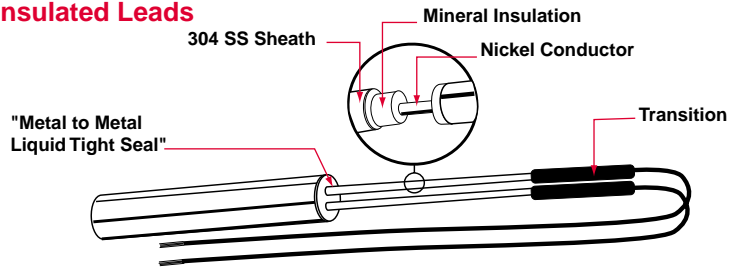
FIREROD

LA Stock

Termination Options

Continued

Mineral Insulated Leads



MI leads handle both high temperatures and contamination, and resist other problems like abrasion and excessive vibration. The metal seal and swaged-in, formable MI cable leads are capable of handling temperatures up to 1500° F (815° C). In addition, the lead end seal resists moisture and other forms of contamination, including gases, oils, plastic drool, solvents and water.

Features and Benefits

- **Increased heater life.**
- **Less down time.**
- **No need for a soft start** due to moisture penetration.
- **Ability to use a cartridge heater where not possible before.**
- **Abrasion and vibration resistant.**
- **Able to be formed or bent** to fit the contours of wiring raceways.
- **No additional insulation of lead wires is needed** to protect against high temperatures.
- **Lead cables and seal will not out-gas** in vacuum environments.

The Watlow FIREROD with the patented MI lead and seal option is covered by a two-year limited warranty. This extended warranty for

this product only applies to manufacturing defects or failures due to over-temperature or product failure due to contamination.

This LA option is also available as a manufactured item. Specify MI leads and seal, as well as volts, watts, cable length, lead length and type. Six inches of MI cable and 12 inches (305 mm) of Teflon® leads will be supplied unless otherwise specified. To order, specify **option code J**.

Applications

- Vacuum forming
- Plastic molding
- Medical instrument manufacturing
- Food handling equipment
- Zinc die-casting

Heater Diameter inches	Maximum Current amps	Conductor Diameter inches	Cable Diameter inches	Transition Diameter inches	Cable Length min max inches	Minimum Bend Radius	Maximum Voltage inches	Length Adder
³ / ₈	7.0	0.044	0.108	0.230	6 72	0.225	240	G(³ / ₈)
¹ / ₂	7.0	0.044	0.108	0.230	6 72	0.225	240	K(⁹ / ₁₆)
⁵ / ₈	9.7	0.062	0.138	0.250	6 72	0.280	240	L(⁵ / ₈)
³ / ₄	9.7	0.062	0.138	0.250	6 72	0.280	240	L(⁵ / ₈)

The above information pertains to standard FIREROD heaters. However, variations in these parameters may be accommodated to suit specific customer needs.

Technical Data

Max. temp. of cable: 1500° F
 Max. temp. of cable to lead transition: 300° F
(where flexible leads attach to cable)
 Cable sheath material: 304 SS
 Conductor material: Nickel
 Maximum voltage: 240V

Lead Types

Teflon® (400° F/205° C) - T
 Silicone Rubber (300° F/150° C) - S
 GGS (480° F/250° C) - No code
 MGT (840° F/450° C) - H

Cartridge Heaters

FIREROD

LA Stock

Straight Protection Options

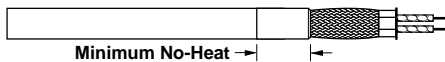


LA Straight Stainless Steel Hose

LA 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-inch (305 mm) hose is supplied. Leads are two inches (51 mm) longer than hose.

Minimum lead end no-heat required is $\frac{5}{8}$ inch (16 mm). Option adds $\frac{3}{8}$ inch (9 mm) to overall length on stock units.

To order, specify **option code H**.

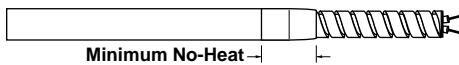


LA Straight Stainless Steel Braid

LA straight stainless steel braid is designed to protect leads from abrasion against sharp edges. It is the most flexible of Watlow's protective lead arrangements. Unless specified a 12-inch (305 mm) braid is supplied. Leads are two inches (51 mm) longer than braid.

Minimum lead end no-heat required is $\frac{5}{8}$ inch (16 mm). Option adds $\frac{3}{8}$ inch (9 mm) to overall length on stock units.

To order, specify **option code C**.



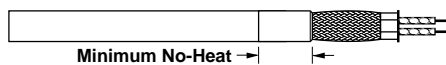
LA Straight Stainless Steel Hose with Teflon® Leads and Seal

LA straight stainless steel hose with Teflon® leads and seal provides the ultimate combination of abrasion protection and a moisture resistant seal. Unless specified a standard 12-inch (305 mm) hose is supplied.

Leads are two inches (51 mm) longer than hose.

Minimum lead end no-heat required is $\frac{3}{4}$ inch (19 mm). Option adds $\frac{1}{2}$ inch (13 mm) to overall length on stock units.

To order, specify **option code G**.



LA Straight Stainless Steel Braid with Teflon® Leads and Seal

LA straight stainless steel braid with Teflon® leads and seal provides Watlow's most flexible lead protection with a moisture resistant seal. Unless specified a 12-inch (305 mm) braid is supplied. Leads

are two inches (51 mm) longer than the braid.

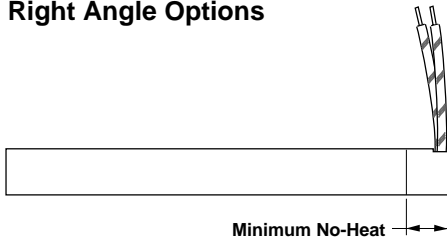
Minimum lead end no-heat required is $\frac{3}{4}$ inch (19 mm). Option adds $\frac{1}{2}$ inch (13 mm) to overall length on stock units.

To order, specify **option code F**.

Cartridge Heaters

FIREROD

LA Stock Right Angle Options



LA Right Angle Leads

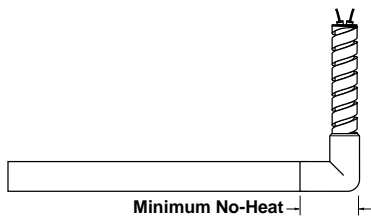
LA right angle leads are used in applications with a high degree of flexing and when space limitations are critical. Stranded lead wires are connected internally (swaged-in) and exit at a 90 degree angle at the end of the heater.

To order, specify **option code R**.

To order right angle leads with Teflon® leads and seals, specify **option code B**.

Minimum No-Heat Required inches					
Dia.	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Inches	$\frac{11}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{11}{16}$

Note: Option is not available on $\frac{1}{4}$ inch (6 mm) diameter.



LA Right Angle Stainless Steel Hose

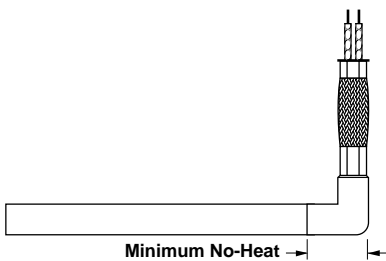
LA right angle stainless steel hose is provided for wiring convenience. Like the LA straight stainless steel hose, it protects leads from abrasion against sharp edges. Unless specified, 12-inch (305 mm) hose is supplied. Leads are two inches

(51 mm) longer than hose.

To order, specify **option code W**.

Minimum No-Heat Required inches					
Dia.	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Inches	N/A	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{16}$	1

Note: Option is not available on $\frac{1}{4}$ inch (6 mm) diameter.



LA Right Angle Stainless Steel Braid

LA right angle stainless steel braid is provided for wiring convenience. Like the LA straight braid, it protects leads from abrasion against sharp edges.

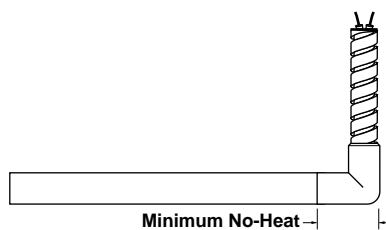
Unless specified, 12-inch (305 mm) braid is supplied. Leads are two

inches (51 mm) longer than braid.

To order, specify **option code Y**.

Minimum No-Heat Required inches					
Dia.	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Inches	N/A	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{13}{16}$	1

Note: Option is not available on $\frac{1}{4}$ inch (6 mm) diameter.



LA Right Angle Stainless Steel Hose with Teflon® Leads and Seal

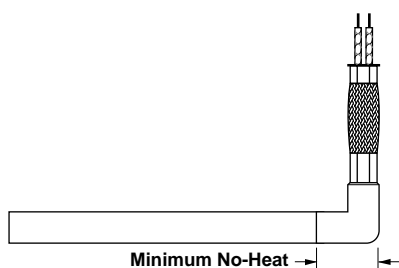
LA right angle stainless steel hose with Teflon® leads and seal provides the ultimate combination of abrasion protection and a moisture resistant seal with wiring convenience. Unless specified, a 12-inch (305 mm) hose is supplied. Leads are two inches

(51 mm) longer than hose.

Minimum lead end no-heat required is $1\frac{1}{2}$ inch (38 mm). Option adds $1\frac{1}{4}$ inch (32 mm) to overall length on stock units.

To order, specify **option code M**.

Note: Option is not available on $\frac{1}{4}$ inch (6 mm) diameter.



LA Right Angle Stainless Steel Braid with Teflon® Leads and Seal

LA right angle stainless steel braid with Teflon® leads and seal provides Waltow's most flexible lead protection and moisture resistant Teflon® seal with wiring convenience. Unless specified a 12-inch (305 mm) braid is supplied.

Leads are two inches (51 mm) longer than the braid.

Minimum lead end no-heat required is $1\frac{1}{2}$ inch (38 mm). Option adds $1\frac{1}{4}$ inch (32 mm) to overall length on stock units.

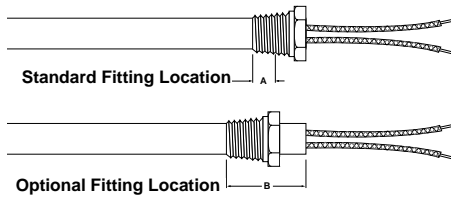
To order, specify **option code A**.

Note: Option is not available on $\frac{1}{4}$ inch (6 mm) diameter.

Cartridge Heaters

FIREROD

LA Stock Mounting Options



Fitting overlaps the unheated section and is soldered to the sheath.

LA Stock Threaded Fittings

Threaded fittings allow for fast, water-tight installation of the heater into a threaded hole. These fittings can be ordered in either brass or 304 stainless steel. Other stainless steel alloys are available upon

Lead Arrangement	STD Fitting ① Location Dimension A	
	inches	(mm)
Crimped Leads	$\frac{1}{4}$	(6)
Swaged in Leads	$\frac{5}{16}$ ②④	(8)
STR SS Hose	$\frac{1}{2}$ ③	(13)
STR SS Braid	$\frac{1}{2}$	(13)
Teflon® Seal & LDS	$\frac{7}{8}$	(22)
Silicone Seal & LDS	$\frac{7}{8}$	(22)

request. Double threaded fittings are also available.

To order, specify either **brass** or **stainless steel threaded fittings**.

On LA stock give location of fittings, if no-heat extension option is requested. Specify location from disc end to bottom of threads.

① The location of the threaded fitting from thread end of fitting to the lead end of heater.

All optional fitting locations are available only with LA Stock no-heat extensions. Consult the Watlow factory in St. Louis, Missouri, for details.

② On $\frac{1}{4}$ inch diameter FIREROD only "A" dimension is $\frac{7}{16}$ inch (11 mm).

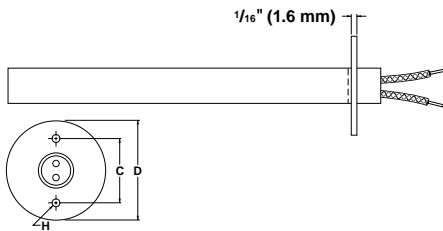
③ On $\frac{1}{4}$ inch diameter FIREROD only "A" dimension is $\frac{5}{8}$ inch (16 mm).

④ On $\frac{5}{8}$ inch and $\frac{3}{4}$ inch the fitting is located at $\frac{7}{8}$ inch from lead end using a $\frac{3}{4}$ no-heat extension. In order to locate at $\frac{5}{16}$ inch the fitting must be epoxied.

Flanges

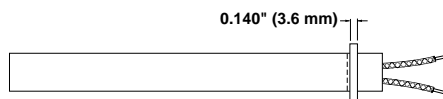
Stainless steel flanges are a convenient mounting method as well as a way to position a heater within an application. The standard flange is staked on and located $\frac{1}{4}$ (6 mm) inch from the LE. The flange can be located up to $2\frac{1}{4}$ inches (57 mm) from the LE as long as it is over a no-heat section. Use this option in combination with most LA configurations.

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



Flange Specifications

FIREROD Diameter inches	Flange Size	inches		
		D	C	H
$\frac{1}{4}, \frac{3}{8}, \frac{1}{2}$	FS	1	$\frac{3}{4}$	0.144
$\frac{1}{4}, \frac{3}{8}, \frac{1}{2}$ $\frac{5}{8}, \frac{3}{4}$	FM	$1\frac{1}{2}$	$1\frac{1}{8}$	0.156
$\frac{5}{8}, \frac{3}{4}, 1$	FL	2	$1\frac{1}{2}$	0.201



Locating Ring

A stainless steel locating ring can be used as a retaining collar to position a FIREROD if mounting requirements are not critical.

On LA Stock, give location if the no-heat extension option is requested. On in-stock FIRERODs without an LA option, location will be on the last $\frac{1}{4}$ inch (6 mm). To order, specify **locating ring**.

Locating Ring Specifications

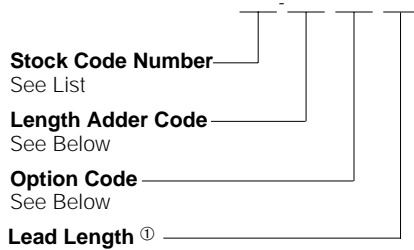
	Minimum No-Heat Required inches			
	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Diameter	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
Ring O.D.	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1

Cartridge Heaters

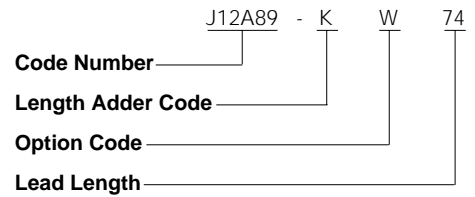
FIREROD

LA Stock

LA Build-a-Code Number



Example:



① Lead length will be two inches (51 mm) longer than braid or hose unless otherwise specified on the order.

Option	Minimum Length Adders Per Diameter Per Option					Option Code
	inches					
Heater Diameter	¹ / ₄	³ / ₈	¹ / ₂	⁵ / ₈	³ / ₄	
Swaged-in Leads	D (³ / ₁₆)	D (³ / ₁₆)	D (³ / ₁₆)	D (³ / ₁₆)	D (³ / ₁₆)	None
Right Angle Leads	H (⁷ / ₁₆)	G (³ / ₈)	H (⁷ / ₁₆)	H (⁷ / ₁₆)	H (⁷ / ₁₆)	R
Teflon® Seal and Leads	- -	N (³ / ₄)	N (³ / ₄)	N (³ / ₄)	N (³ / ₄)	T
Right Angle Teflon® Seal and Leads	- -	1E (¹ / ₄)	1E (¹ / ₄)	1E (¹ / ₄)	1E (¹ / ₄)	B
Silicone Seal and Leads	- -	N (³ / ₄)	N (³ / ₄)	N (³ / ₄)	N (³ / ₄)	P
Straight Hose	G (³ / ₈)	G (³ / ₈)	G (³ / ₈)	G (³ / ₈)	G (³ / ₈)	H
Right Angle Hose	- -	J (¹ / ₂)	K (⁹ / ₁₆)	K (⁹ / ₁₆)	N (³ / ₄)	W
Straight Hose with Teflon® Seal and Leads	- -	J (¹ / ₂)	J (¹ / ₂)	J (¹ / ₂)	J (¹ / ₂)	G
Straight Braid	G (³ / ₈)	G (³ / ₈)	G (³ / ₈)	G (³ / ₈)	G (³ / ₈)	C
Right Angle Braid	- -	J (¹ / ₂)	K (⁹ / ₁₆)	K (⁹ / ₁₆)	N (³ / ₈)	Y
Right Angle Braid with Teflon® Seal and Leads	- -	M (¹ / ₁₆)	N (³ / ₄)	P (¹³ / ₁₆)	R (⁷ / ₈)	A
SJO Cord	- -	- -	N (³ / ₄)	N (³ / ₄)	- -	S

LA options are available on all stock FIRERODs, except ¹/₈ inch diameter. To order any of these options, please build the order number by specifying Watlow code number, length adder code, option code and lead length.

Ordering Example: The order number **J12A89-K72W74** indicates you have ordered a 12 inch (305 mm) FIREROD with 72 inch (1830 mm) right angle stainless steel hose and 74 inch (1880 mm) leads. The overall heater length equals 12 ⁹/₁₆ inches (320 mm).

Note: No-heat extensions are available for most LA options in diameters of ³/₈, ¹/₂, ⁵/₈ and ³/₄ inch. Consult factory for available LA options. No-heat length extensions are available in the following dimensions.

No-Heat Length Adder Codes

No-Heat Option		Length Adder Code
inches	(mm)	
³ / ₄	(10)	N
1 ¹ / ₄	(32)	1E
1 ³ / ₄	(44)	1N
2 ¹ / ₄	(56)	2E

To order any of these dimensions, please specify the applicable length adder code shown. No-heat extensions on all termination options are shipped within two to three days.

How to Order

To order Stock FIREROD cartridge heaters, specify:

- Watlow code number
- Quantity
- Options
- Lead length: If not specified, 12-inch (305 mm) crimped on leads will be shipped.

For **made-to-order** FIRERODs, please specify:

- Diameter
- Overall length
- Volts
- Watts
- Lead option and length or terminal configuration

- Lead end no-heat if different from standard
- Optional accessories, finishing, internal construction, sensors/controls and mounting

Availability

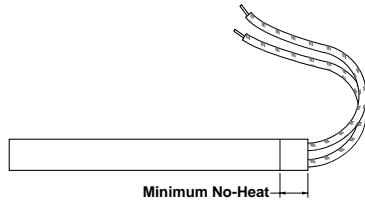
Stock: Same day shipment on many FIREROD stock options

Made-to-Order: Consult factory

Cartridge Heaters

FIREROD

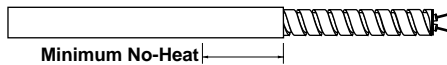
Made-to-Order Straight Options



Swaged-in Flexible Leads

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

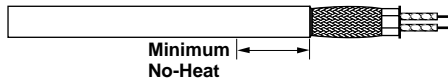
Minimum lead end no-heat required is 1 inches (24.5 mm). For heaters over 10 inches (250 mm) the minimum no-heat is 12 percent of overall length plus $\frac{1}{4}$ inch (6 mm). To order please contact the factory.



Made-to-Order Straight Stainless Steel Hose

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-inch (305 mm) hose is supplied. Leads are two inches (51 mm) longer than hose.

Minimum lead end no-heat required is $1\frac{1}{2}$ inches (38 mm). For heaters over 10 inches (250 mm) the minimum no-heat is 12 percent of overall length plus $\frac{1}{4}$ inch (6 mm). To order, specify **straight hose units 10 inches (250 mm) and under**.

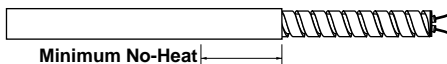


Made-to-Order Straight Stainless Steel Braid

Stainless steel braid is designed to protect leads from abrasion against sharp edges. It is the most flexible of Watlow's protective lead arrangements.

Leads are two inches (51 mm) longer than braid. Minimum lead end no-heat required is $1\frac{1}{2}$ inches (38 mm). For heaters over 10 inches (250 mm) the minimum no-heat is 12 percent of overall length plus $\frac{1}{4}$ inch (6 mm). To order, specify **straight stainless steel braid**.

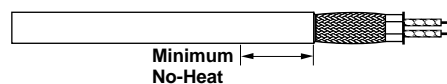
Unless specified a 12-inch (305 mm) braid is supplied. Leads are two



Made-to-Order Straight Stainless Steel Hose with Teflon® Leads and Seal

Straight stainless steel hose with Teflon® leads and seal for FIRERODs greater than 10 inches (250 mm) long with straight hose will

have a minimum lead end no-heat required is $1\frac{1}{2}$ inch (35 mm). To order, specify **straight stainless steel hose**.



Made-to-Order Straight Stainless Steel Braid with Teflon® Leads and Seal

Straight stainless steel braid with Teflon® leads and seal for FIRERODs greater than 10 inches (250 mm) long with straight braid will

have a minimum lead end no-heat required is $1\frac{1}{2}$ inch (35 mm). To order, specify **straight stainless steel braid with Teflon® leads and seal**.

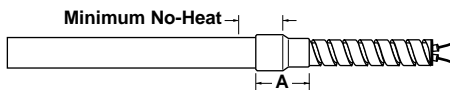
Cartridge Heaters

FIREROD

Made-to-Order

Straight Options

Continued



Made-to-Order Straight Galvanized BX Conduit

Galvanized BX conduit equals stainless steel hose in its abrasion protection. The conduit is attached with a crimped-on straight copper coupling which overlaps the heater sheath.

The 1/4-inch (6 mm) diameter FIRERODs use stainless steel hose instead of conduit. On one-inch (25 mm) diameter FIRERODs, one

inch O.D. flexible galvanized hose is used.

To order, specify **straight galvanized BX conduit**.

Dia. inches	No-Heat	Dim. inches	BX O.D.
1/4	1/2	7/8	—
3/8	5/8	1	1/2
1/2	5/8	1 1/8	5/8
5/8	3/4	1 1/4	5/8
3/4	7/8	1 1/2	5/8
1	1	1 5/8	—

Right Angle Options



Made-to-Order Right Angle Leads

Made-to-order right angle leads are used when space is limited or a high degree of flexing occurs. However, these leads are externally connected (crimped) and insulated with fiberglass sleeving.

To order, specify **right angle leads** and **lead length**.

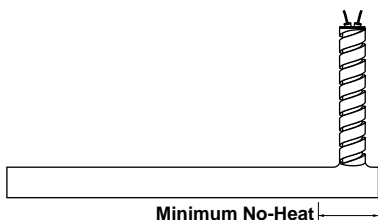
Dia. inches	Lead End Minimum No-Heat inches	(mm)
1/4	7/16	(11)
3/8	1/2	(13)
1/2	5/8	(16)
5/8	3/4	(19)
3/4	7/8	(22)

Made-to-Order Right Angle Stainless Steel Hose

Made-to-order right angle stainless steel hose, connected at a 90 degree angle, is provided for wiring convenience. Like the LA straight stainless steel hose, it protects leads from abrasion against sharp edges.

Unless specified, 12-inch (305 mm) hose is supplied. Leads are two inches (51 mm) longer than hose.

Option is also available with Teflon® leads and seal. To order, specify **right angle stainless steel hose**.



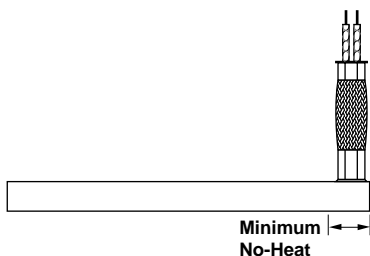
Dia. inches	Lead End Minimum No-Heat inches	(mm)
3/8	5/8	(16)
1/2	3/4	(21)
5/8	7/8	(22)
3/4	1 1/8	(29)

Made-to-Order Right Angle Stainless Steel Braid

Made-to-order right angle stainless steel braid, connected at a 90 degree angle, is provided for wiring convenience. Like the LA straight stainless steel braid, it protects leads from abrasion against sharp edges.

Unless specified, 12-inch (305 mm) braid is supplied. Leads are two

inches (51 mm) longer than braid. Option is also available with Teflon® leads and seal. To order, specify **right angle stainless steel braid**.

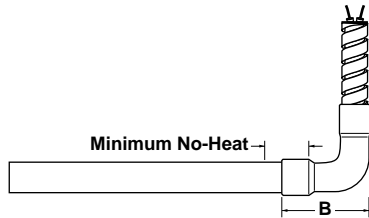


Dia. inches	Lead End Minimum No-Heat inches	(mm)
3/8	5/8	(16)
1/2	3/4	(17)
5/8	7/8	(22)
3/4	1 1/8	(29)

Cartridge Heaters

FIREROD

Made-to-Order Right Angle Options
Continued



Made-to-Order Right Angle Galvanized BX Conduit

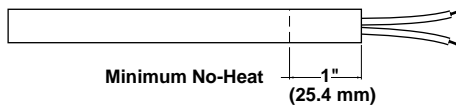
Galvanized BX conduit equals stainless steel hose in its abrasion protection. The conduit is attached with a crimped-on 90 degree elbow copper coupling which overlaps the heater sheath.

The 1/4-inch diameter FIRERODs use stainless steel hose instead of

conduit. On one-inch (25 mm) diameter FIRERODs, one inch O.D. flexible galvanized hose is used.

Dia. inches	No-Heat	Dim. inches	BX O.D.
1/4	1/2	1 1/6	—
3/8	5/8	1 3/8	1/2
1/2	5/8	1 3/8	5/8
5/8	3/4	2 1/6	5/8
3/4	7/8	2 1/2	5/8
1	1	2 1/2	—

Moisture Resistant Seals

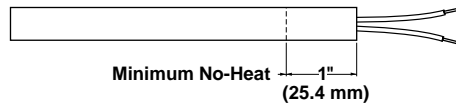


Teflon® Seal and Leads

Made-to-order Teflon® seal and leads protect the heater against moisture/ contamination from lubricating oil, cleaning solvents, plastic material or fumes and organic tapes. This seal is effective to 400°F (205°C) under continuous operation.

Teflon® seal and leads for made-to-order FIRERODs greater than 10 inches (250 mm) long will have a minimum unheated section of approximately 12 percent of the overall length. Longer no-heat sections are available if required.

Additional no-heat may be required to keep the seal below its maximum operating temperature.



Silicone Rubber Seal and Leads

Made-to-order silicone rubber seal and leads protect the heater against moisture/ contamination from lubricating oil, cleaning solvents, plastic material or fumes and organic tapes. This seal is effective to 450°F (230°C) under continuous operation.

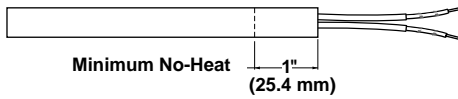
Silicone rubber seal and leads for made-to-order units greater than 10 inches (250 mm) long will have a minimum unheated section of approximately 12 percent of the overall length. Longer no-heat sections are available if required.

Cartridge Heaters

FIREROD

Made-to-Order

Termination Options

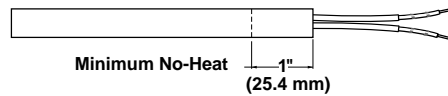


Epoxy Seal

Epoxy seals help protect the heater against moisture/contamination from lubricating oil, cleaning solvents, plastic material or fumes and organic tapes. These seals are effective to 500°F (260°C) under continuous operation.

Epoxy seals can be ordered only on units greater than 1/8 inch (3 mm) diameter with crimped on leads. Minimum unheated section at the lead end is one inch (25 mm). Longer unheated sections are available upon request.

To order, specify **epoxy seal**.



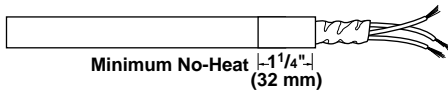
Hermetic Seal

Hermetic seals protect the heater against moisture/contamination from lubricating oil, cleaning solvents, plastic material or fumes and organic tapes. These seals are effective to 650°F (345°C) under continuous operation. Hermetic seals are supplied in units of 1/4, 3/8 and 1/2 inch

(6, 9 and 13 mm) diameter with 12 inch (305 mm) crimped on leads. The overall heater length is limited to nine inches (230 mm).

Minimum unheated section at lead end is one inch (25 mm). Longer unheated sections are available upon request.

To order, specify **hermetic seal**.



SJO Cord

SJO cord is used in low temperature applications where lead wires require protection against moisture or when UL® listed plugs are needed. This cord is limited to 140°F (60°C) under continuous operation.

FIRERODs greater than 10 inches (250 mm) long will have a minimum no-heat section of approximately 12 percent + 1/4 inch (6 mm) of the overall length.

To order, specify either **two conductor or three conductor** as well as **overall length**.

Passivation

During the manufacturing and handling of stainless steel, particles of iron or tool steel may be embedded in the sheath. If not removed, these particles may corrode and produce

rust spots. In critical sheath contact applications, like the medical industry, passivation will remove free iron from the sheath. To order, specify **316L stainless steel sheath** and **passivation**.

Cartridge Heaters

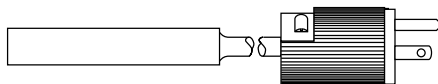
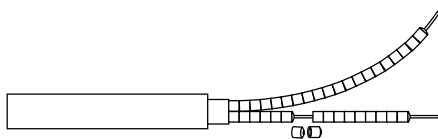
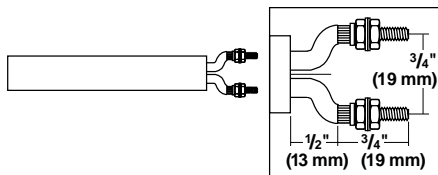
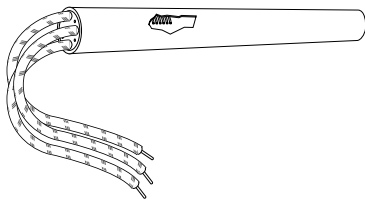
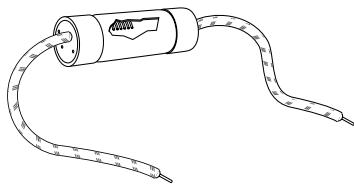
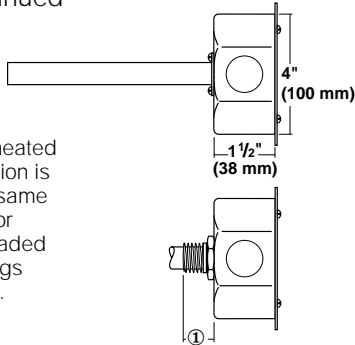
FIREROD

Made-to-Order

Termination Options

Continued

① Unheated section is the same as for threaded fittings only.



Twist-Lock® is a registered trademark of Hubbell Incorporated.

Terminal Box

A four inch (100 mm) NEMA 1 octagonal terminal box is mounted on a flange or a threaded fitting. Boxes have 1/2 inch (13 mm) conduit knockouts for electrical connection. Hazardous location (NEMA 4 and NEMA 7) terminal boxes are also available. Consult your Watlow sales

engineer or authorized distributor for details. Terminal boxes are available on 1/2 inch (13 mm) through one inch (25 mm) diameter FIRERODs. To order, specify **terminal box** and **NEMA type**.

Lead Out Each End

One power lead exiting out each end is used in applications with special wiring requirements.

This configuration is not available on all options. Consult the Watlow factory in St. Louis, Missouri, for additional information.

Ground Lead

Ground leads are a safety feature to protect both workers and equipment. This configuration is not available on

all options. Consult the Watlow factory in St. Louis, Missouri, for additional information. To order, specify **ground lead**.

Post Terminals

Post terminals provide a quick, secure connection with ring or fork connectors, or bus bars. Threaded 6-32 studs are soldered to the solid power pins. Nuts and washers are provided.

Post terminals are available on FIRERODs of 1/2, 5/8, 3/4 and one inch (13, 16, 19 and 25 mm) diameter. On one inch (25 mm) diameters, pins are straight. To order, specify **post terminals**.

Ceramic Bead Insulation

Ceramic bead insulation protects the leads from high ambient temperatures above 840°F (450°C). The beads fit over solid conductors that are extended long enough to reach a cooler area where flexible wires can be attached.

This option is not available on 3/8 inch (9.5 mm) diameter. The maximum available length on stock FIRERODs is 1 1/2 inches (38 mm). To order, specify **ceramic beads** and length, and additional lead length.

UL® Listed Plugs

UL® listed plugs are a safe, convenient method of installation, especially when frequent connection or disconnection is required. These plugs have a nylon dead front, a

molded-in cord grip and either straight or Twist-Lock® blades with or without ground. Use UL® listed plugs with stainless steel hose, conduit, braid or lead wires with sleeving. To order, specify **UL® listed plugs**.

Cartridge Heaters

FIREROD

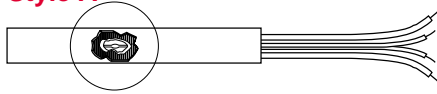
Made-to-Order Options

Thermocouple Types

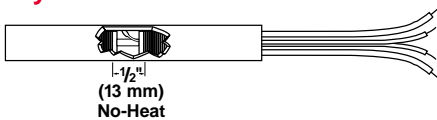
ASTM Code	Conductor Characteristics		Temperature Range °F (°C)
	Positive	Negative	
J	Iron (Magnetic) (White)	Constantan (Non-Magnetic) (Red)	0 to 1400 (-20 to 760)
K	Chromel® (Non-Magnetic) (Yellow)	Alumel® (Magnetic) (Red)	0 to 2300 (-20 to 1260)

For other ISA types, contact the Watlow factory in St. Louis, Missouri.

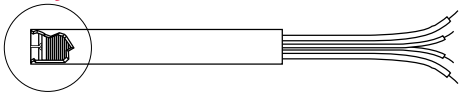
Style A



Style B



Style C



Internal Thermocouple

A Style A internal thermocouple can be used to evaluate heat transfer efficiency of an application ... a measure that enables you to cut energy costs and increase heater life. This junction is located in the heater core to monitor the internal temperature of the heater.

The Style B internal thermocouple gives a good approximation of part temperature and can be located anywhere along the length of the heater. 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 inch (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 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 inch (305 mm) power and thermocouple leads are supplied.

Availability

All styles are available on all diameters with the exception of 1/8 inch (3 mm) diameter, which is available only with Style C.

Low Electrical Leakage

This construction technique minimizes current leakage of the heating element. It is especially useful in critical applications, like the medical field where low set point ground fault interrupts are used.

Low electrical leakage is available on 3/8, 1/2, 5/8 and 3/4 inch (9, 13, 16 and 19 mm) diameter FIRERODs. To order, specify **low electrical leakage**.

Cartridge Heaters

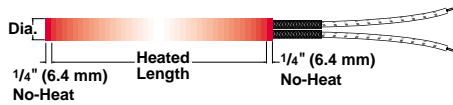
FIREROD

Made-to-Order

Options

Continued

Internal Construction



Distributed Wattage

Distributed wattage varies the watt density along the length of the heater. This construction technique is used to compensate for heat losses along the edges of heated parts. This is ideal for seal bar applications.

To order, specify **distributed wattage** and give the length and wattage for each section.

Individually Controlled Heat Zones

Individually controlled heat zones give the flexibility of controlling temperature by zones, along the length of the FIREROD. This is an advantage for heating requirements of certain applications, like sealing

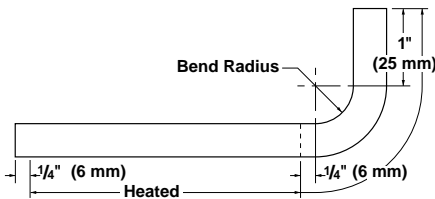
bars. This internal construction can be ordered on 5/8, 3/4 and one inch (16, 19 and 25 mm) diameter FIRERODs. To order, specify **individually controlled heat zones** as well as wattage and length per zone.

Dual Voltage

When the FIREROD requires the flexibility of operating on two voltages, use this internal construction. Dual voltage is not

compatible for all lead options. Consult the Watlow factory in St. Louis, Missouri, for availability. To order, specify **dual voltage** and voltage requirements.

Bent FIREROD



FIREROD Diameter in	Minimum Required No-Heat Length in (mm)	Bend Radius in (mm)
1/4	2 1/4 (56)	1/2 (13)
3/8	2 3/8 (60)	1/2 (13)
1/2	2 7/8 (72)	3/4 (19)
5/8	3 5/8 (83)	1 (25)
3/4	3 13/16 (98)	1 1/4 (32)

In applications where the leads must exit at an angle, a bend can be made in the unheated section only. Heated sections may be on either

side of the bend. It is recommended that the heater be bent at the Watlow factory.

A 304 stainless steel sheath is used on bent FIRERODs. If the sheath temperature exceeds 1000°F (540°C), consult your Watlow sales engineer or authorized distributor.

See dimensions noted on the chart, or contact the Watlow factory in St. Louis, Missouri, if you need to exceed limitations shown.

Centerless Grinding

FIREROD Diameter inches	Actual Precision Diameter inches
1/4	0.241 ± 0.0005
3/8	0.363 ± 0.0005
1/2	0.488 ± 0.0005
5/8	0.613 ± 0.0005
3/4	0.738 ± 0.0005
1	0.984 ± 0.0005

Centerless grinding can be used to furnish precision diameters, thus permitting closer heater-to-part fit.

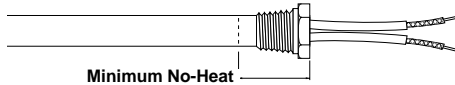
Therefore, higher watt densities can be used.

For centerless ground heaters, the heater must either have Teflon® leads and seal (maximum 12 inch lead length) or have crimped on leads. Longer lead lengths are available, but require external connection. The length of a FIREROD available for centerless grinding is dependent on the construction, please consult factory for assistance. To order, specify **centerless grinding**.

Cartridge Heaters

FIREROD

Made-to-Order Mounting Options



Mounted at lead end, unless otherwise specified and welded or silver soldered, depending upon construction.

Threaded Fittings

Threaded fittings allow for fast, water-tight installation of the heater into a threaded hole. These fittings can be ordered in either brass or 304 stainless steel. Other stainless steel alloys are available upon request. Double threaded fittings are also available.

To order, specify either brass or stainless steel **threaded fittings**.

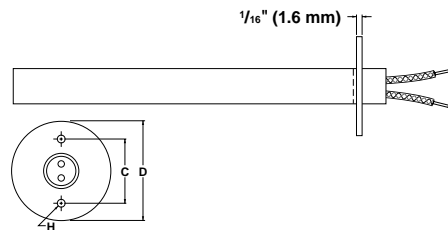
Made-to-order, specify location from disc end to bottom of threads.

Made-to-Order Availability

FIREROD Diameter inches	Minimum No-Heat inches (mm)
1/4	3/4 (19)
3/8	1 (25)
1/2	1 (25)
5/8	1 (25)
3/4	1 1/4 (32)
1	1 1/4 (32)

Threaded Fittings Specifications

FIREROD Diameter inches	Pipe Thread Size NPTF	Fitting Length inches (mm)
1/4	1/8	1/2 (13)
3/8	1/4	11/16 (17)
1/2	3/8	3/4 (19)
5/8	1/2	7/8 (22)
3/4	3/4	1 (23)
1	1	1 (25)



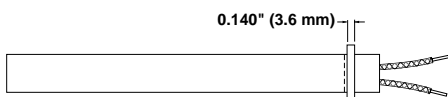
Flanges

Stainless steel flanges are a convenient mounting method as well as a way to position a heater within an application. Standard location is 1/4 inch (6 mm) from lead end, however a specific location may be requested any place on the unheated section. Flanges can be staked, soldered or welded.

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

Flange Specifications

FIREROD Diameter inches	Flange Size	inches		
		D	C	H
1/4, 3/8, 1/2	FS	1	3/4	0.144
1/4, 3/8, 1/2 5/8, 3/4	FM	1 1/2	1 1/8	0.156
5/8, 3/4, 1	FL	2	1 1/2	0.201



Locating Ring

A stainless steel locating ring can be used as a retaining collar to position

a FIREROD if mounting requirements are not critical.

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

Diameter inches:	3/8	1/2	5/8	3/4
Ring O.D. inches:	5/8	3/4	7/8	1

Cartridge Heaters

F.O.B.: St. Louis, Missouri

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
1/8	1 1/4	(31.8)	120	25	87	(13)	0.02	(0.009)	Stock	C1E14
	1 1/4	(31.8)	120	50	174	(18)	0.02	(0.009)	Stock	C1E13
	1 1/4	(31.8)	240	35	113	(27)	0.02	(0.009)	Stock	C1E42
	1 1/2	(38.1)	120	30	78	(12)	0.02	(0.009)	Stock	C1J5
	1 1/2	(38.1)	120	60	156	(24)	0.02	(0.009)	Stock	C1J6
	2	(50.8)	120	50	87	(13)	0.02	(0.009)	Stock	C2A4
	2	(50.8)	120	100	174	(27)	0.02	(0.009)	Stock	C2A5
1/4	1	(25.4)	120	80	208	(32)	0.02	(0.009)	Stock	E1A51
	1	(25.4)	120	100	260	(40)	0.02	(0.009)	Stock	E1A52
	1	(25.4)	120	150	390	(60)	0.02	(0.009)	Stock	E1A53
	1	(25.4)	240	100	250	(39)	0.02	(0.009)	Stock	E1A66
	1 1/4	(31.8)	120	75	130	(20)	0.02	(0.009)	Stock	E1E41
	1 1/4	(31.8)	120	100	173	(27)	0.02	(0.009)	Stock	E1E42
	1 1/4	(31.8)	120	150	260	(40)	0.02	(0.009)	Stock	E1E43
	1 1/4	(31.8)	240	225	390	(60)	0.02	(0.009)	Stock	E1E61
	1 1/2	(38.1)	120	50	65	(10)	0.02	(0.009)	Stock	E1J39
	1 1/2	(38.1)	120	100	130	(20)	0.02	(0.009)	Stock	E1J40
	1 1/2	(38.1)	120	150	195	(30)	0.02	(0.009)	Stock	E1J41
	1 1/2	(38.1)	240	175	228	(35)	0.02	(0.009)	Stock	E1J49
	1 1/2	(38.1)	120	200	260	(40)	0.02	(0.009)	Stock	E1J42
	1 1/2	(38.1)	240	200	260	(40)	0.02	(0.009)	Stock	E1J52
	1 1/2	(38.1)	240	250	325	(50)	0.02	(0.009)	Stock	E1J35
	2	(50.8)	120	80	68	(11)	0.03	(0.014)	Stock	E2A136
	2	(50.8)	120	100	87	(13)	0.03	(0.014)	Stock	E2A55
	2	(50.8)	240	125	108	(17)	0.03	(0.014)	Stock	E2A82
	2	(50.8)	120	150	130	(20)	0.03	(0.014)	Stock	E2A56
	2	(50.8)	240	150	130	(20)	0.03	(0.014)	Stock	E2A77
	2	(50.8)	120	200	173	(27)	0.03	(0.014)	Stock	E2A57
	2	(50.8)	240	200	173	(27)	0.03	(0.014)	Stock	E2A50
	2	(50.8)	120	250	217	(33)	0.03	(0.014)	Stock	E2A72
	2	(50.8)	240	250	215	(33)	0.03	(0.014)	Stock	E2A76
	2	(50.8)	240	300	260	(40)	0.03	(0.014)	Stock	E2A83
	2 1/2	(63.5)	120	250	159	(25)	0.03	(0.014)	Stock	E2J80
	2 1/2	(63.5)	240	250	159	(25)	0.03	(0.014)	Stock	E2J49
	3	(76.2)	120	100	52	(8)	0.04	(0.018)	Stock	E3A48
	3	(76.2)	120	200	104	(16)	0.04	(0.018)	Stock	E3A49
	3	(76.2)	240	200	104	(16)	0.04	(0.018)	Stock	E3A60
	3	(76.2)	240	250	128	(20)	0.04	(0.018)	Stock	E3A124
	3	(76.2)	120	300	156	(24)	0.04	(0.018)	Stock	E3A50
	3	(76.2)	240	300	156	(24)	0.04	(0.018)	Stock	E3A51
	4	(101.6)	120	100	37	(6)	0.04	(0.018)	Stock	E4A28
	4	(101.6)	120	200	74	(11)	0.04	(0.018)	Stock	E4A29
	4	(101.6)	240	200	74	(11)	0.04	(0.018)	Stock	E4A32
4	(101.6)	120	300	111	(17)	0.04	(0.018)	Stock	E4A30	
4	(101.6)	240	300	111	(17)	0.04	(0.018)	Stock	E4A6	
4 1/2	(114.3)	120	200	64	(10)	0.05	(0.023)	Stock	E4J30	
5	(127)	240	350	101	(16)	0.05	(0.023)	Stock	E5A45	
5	(127)	120	400	113	(18)	0.05	(0.023)	Stock	E5A57	
5	(127)	240	400	113	(18)	0.05	(0.023)	Stock	E5A34	
6	(152.4)	240	400	94	(14)	0.06	(0.027)	Stock	E6A46	
8	(203.2)	240	800	136	(21)	0.08	(0.036)	Stock	E8A76	

Cartridge Heaters

CONTINUED

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
5/8	1	(25.4)	120	55	95	(15)	0.03	(0.014)	Stock	G1A71
	1	(25.4)	120	100	172	(26)	0.03	(0.014)	Stock	G1A29 ①
	1	(25.4)	120	150	259	(40)	0.03	(0.014)	Stock	G1A38 ①
	1	(25.4)	240	200	344	(53)	0.03	(0.014)	Stock	G1A83
1 1/4	1 1/4	(31.8)	120	100	115	(18)	0.03	(0.014)	Stock	G1E91
	1 1/4	(31.8)	120	125	144	(22)	0.03	(0.014)	Stock	G1E74
	1 1/4	(31.8)	120	150	172	(27)	0.03	(0.014)	Stock	G1E92 ①
	1 1/4	(31.8)	240	150	172	(27)	0.03	(0.014)	Stock	G1E93
	1 1/4	(31.8)	120	200	230	(35)	0.03	(0.014)	Stock	G1E94
	1 1/4	(31.8)	240	200	230	(36)	0.03	(0.014)	Stock	G1E95
	1 1/4	(31.8)	120	400	426	(66)	0.03	(0.014)	Stock	G1E99
	1 5/16	(33.3)	120	100	104	(16)	0.03	(0.014)	Stock	G1F13
	1 5/16	(33.3)	240	100	104	(16)	0.03	(0.014)	Stock	G1F15
	1 5/16	(33.3)	120	150	160	(25)	0.03	(0.014)	Stock	G1F17
	1 3/8	(34.9)	240	160	151	(23)	0.03	(0.014)	Stock	G1G23
	1 7/16	(36.5)	120	100	94	(15)	0.03	(0.014)	Stock	G1H6
1 1/2	1 1/2	(38.1)	120	50	43	(7)	0.04	(0.018)	Stock	G1J25
	1 1/2	(38.1)	120	75	65	(10)	0.04	(0.018)	Stock	G1J70
	1 1/2	(38.1)	120	80	68	(11)	0.04	(0.018)	Stock	G1J66
	1 1/2	(38.1)	120	100	86	(13)	0.04	(0.018)	Stock	G1J59
	1 1/2	(38.1)	240	100	86	(13)	0.04	(0.018)	Stock	G1J110
	1 1/2	(38.1)	240	125	106	(16)	0.04	(0.018)	Stock	G1J182
	1 1/2	(38.1)	120	150	129	(20)	0.04	(0.018)	Stock	G1J31
	1 1/2	(38.1)	240	150	129	(20)	0.04	(0.018)	Stock	G1J39 ①
	1 1/2	(38.1)	120	200	173	(27)	0.04	(0.018)	Stock	G1J85
	1 1/2	(38.1)	240	200	173	(27)	0.04	(0.018)	Stock	G1J73
	1 1/2	(38.1)	120	250	216	(33)	0.04	(0.018)	Stock	G1J86
	1 1/2	(38.1)	240	250	216	(33)	0.04	(0.018)	Stock	G1J54
1 3/4	1 3/4	(44.5)	120	125	86	(13)	0.05	(0.023)	Stock	G1N45
	1 3/4	(44.5)	120	175	122	(19)	0.05	(0.023)	Stock	G1N46
	1 3/4	(44.5)	120	250	172	(27)	0.05	(0.023)	Stock	G1N43
	1 3/4	(44.5)	240	250	172	(27)	0.05	(0.023)	Stock	G1N32
1 13/16	1 13/16	(46)	240	150	98	(15)	0.05	(0.023)	Stock	G1P14
	1 13/16	(46)	120	200	129	(20)	0.05	(0.023)	Stock	G1P15
	1 13/16	(46)	240	250	161	(25)	0.05	(0.023)	Stock	G1P11
1 7/8	(47.6)	120	250	152	(24)	0.05	(0.023)	Stock	G1R14	
2	2	(50.8)	120	50	29	(5)	0.06	(0.027)	Stock	G2A53
	2	(50.8)	120	75	42	(7)	0.06	(0.027)	Stock	G2A192
	2	(50.8)	120	100	57	(9)	0.06	(0.027)	Stock	G2A84
	2	(50.8)	240	100	57	(9)	0.06	(0.027)	Stock	G2A76
	2	(50.8)	120	150	86	(13)	0.06	(0.027)	Stock	G2A56 ①
	2	(50.8)	240	150	86	(13)	0.06	(0.027)	Stock	G2A81 ①
	2	(50.8)	120	200	115	(18)	0.06	(0.027)	Stock	G2A127 ①
	2	(50.8)	240	200	115	(18)	0.06	(0.027)	Stock	G2A37 ①
	2	(50.8)	120	250	144	(22)	0.06	(0.027)	Stock	G2A47
	2	(50.8)	240	250	144	(22)	0.06	(0.027)	Stock	G2A73
	2	(50.8)	120	300	172	(27)	0.06	(0.027)	Stock	G2A139
	2	(50.8)	240	300	172	(27)	0.06	(0.027)	Stock	G2A98 ①
2	(50.8)	120	400	230	(36)	0.06	(0.027)	Stock	G2A153	
2	(50.8)	240	400	230	(36)	0.06	(0.027)	Stock	G2A146	
2	(50.8)	120	500	282	(44)	0.06	(0.027)	Stock	G2A95	

CONTINUED 

① MI leads available from stock. Add "Z" after Code No. to order. ex: GIJ39Z

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
3/8	2	(50.8)	240	500	282	(44)	0.06	(0.027)	Stock	G2A97
	2 1/8	(54)	240	200	106	(16)	0.06	(0.027)	Stock	G2C13
	2 1/4	(57.2)	120	75	37	(6)	0.07	(0.032)	Stock	G2E88
	2 1/4	(57.2)	120	125	62	(10)	0.07	(0.032)	Stock	G2E89
	2 1/4	(57.2)	240	125	62	(10)	0.07	(0.032)	Stock	G2E138
	2 1/4	(57.2)	240	150	73	(11)	0.07	(0.032)	Stock	G2E68
	2 1/4	(57.2)	120	175	86	(13)	0.07	(0.032)	Stock	G2E90
	2 1/4	(57.2)	120	250	123	(19)	0.07	(0.032)	Stock	G2E2
	2 1/4	(57.2)	240	250	123	(19)	0.07	(0.032)	Stock	G2E78
	2 1/4	(57.2)	120	300	148	(23)	0.07	(0.032)	Stock	G2E108
	2 1/4	(57.2)	240	300	148	(23)	0.07	(0.032)	Stock	G2E12
	2 1/4	(57.2)	120	350	173	(27)	0.07	(0.032)	Stock	G2E91
	2 1/4	(57.2)	240	350	173	(27)	0.07	(0.032)	Stock	G2E75
	2 1/2	(63.5)	120	200	87	(13)	0.07	(0.032)	Stock	G2J110
	2 1/2	(63.5)	240	200	87	(13)	0.07	(0.032)	Stock	G2J81
	2 1/2	(63.5)	120	250	108	(17)	0.07	(0.032)	Stock	G2J46
	2 1/2	(63.5)	240	250	108	(17)	0.07	(0.032)	Stock	G2J80
	2 1/2	(63.5)	120	300	130	(20)	0.07	(0.032)	Stock	G2J118
	2 1/2	(63.5)	240	300	130	(20)	0.07	(0.032)	Stock	G2J119
	2 1/2	(63.5)	120	400	174	(27)	0.07	(0.032)	Stock	G2J26
	2 1/2	(63.5)	240	400	174	(27)	0.07	(0.032)	Stock	G2J146
	2 1/2	(63.5)	120	500	216	(33)	0.07	(0.032)	Stock	G2J109
	2 1/2	(63.5)	240	500	216	(33)	0.07	(0.032)	Stock	G2J52
	2 13/16	(71.4)	120	60	22	(3)	0.08	(0.036)	Stock	G2P9
	2 13/16	(71.4)	120	250	92	(14)	0.08	(0.036)	Stock	G2P3
	2 13/16	(71.4)	240	300	110	(17)	0.08	(0.036)	Stock	G2P5
	3	(76.2)	120	100	34	(5)	0.08	(0.036)	Stock	G3A55
	3	(76.2)	240	100	34	(5)	0.08	(0.036)	Stock	G3A137
	3	(76.2)	120	150	52	(8)	0.08	(0.036)	Stock	G3A121
	3	(76.2)	120	200	69	(11)	0.08	(0.036)	Stock	G3A61
	3	(76.2)	240	200	69	(11)	0.08	(0.036)	Stock	G3A39 ①
	3	(76.2)	120	250	86	(13)	0.08	(0.036)	Stock	G3A52
	3	(76.2)	240	250	86	(13)	0.08	(0.036)	Stock	G3A54
	3	(76.2)	120	300	104	(16)	0.08	(0.036)	Stock	G3A73 ①
	3	(76.2)	240	300	104	(16)	0.08	(0.036)	Stock	G3A92
	3	(76.2)	120	400	138	(21)	0.08	(0.036)	Stock	G3A44
	3	(76.2)	240	400	138	(21)	0.08	(0.036)	Stock	G3A65
	3	(76.2)	120	500	173	(27)	0.08	(0.036)	Stock	G3A119 ①
	3	(76.2)	240	500	173	(27)	0.08	(0.036)	Stock	G3A120
	3	(76.2)	240	600	208	(32)	0.08	(0.036)	Stock	G3A133
	3 5/16	(84.2)	120	500	152	(24)	0.08	(0.036)	Stock	G3F24
	3 1/2	(88.9)	120	250	72	(11)	0.09	(0.041)	Stock	G3J77
3 1/2	(88.9)	240	250	72	(11)	0.09	(0.041)	Stock	G3J65	
3 1/2	(88.9)	120	300	87	(13)	0.09	(0.041)	Stock	G3J87	
3 1/2	(88.9)	240	300	87	(13)	0.09	(0.041)	Stock	G3J68	
3 1/2	(88.9)	120	500	144	(22)	0.09	(0.041)	Stock	G3J22	
3 1/2	(88.9)	240	500	144	(22)	0.09	(0.041)	Stock	G3J63	
3 13/16	(96.8)	120	150	38	(6)	0.09	(0.041)	Stock	G3P8	
3 13/16	(96.8)	240	500	128	(20)	0.09	(0.041)	Stock	G3P3	
4	(101.6)	120	125	31	(5)	0.09	(0.041)	Stock	G4A54	
4	(101.6)	240	125	31	(5)	0.09	(0.041)	Stock	G4A163	

Cartridge Heaters

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① MI leads available from stock. Add "Z" after Code No. to order.

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
3/8	4	(101.6)	120	150	37	(6)	0.09	(0.041)	Stock	G4A78
	4	(101.6)	120	175	43	(7)	0.09	(0.041)	Stock	G4A191
	4	(101.6)	120	250	62	(10)	0.09	(0.041)	Stock	G4A40
	4	(101.6)	240	250	62	(10)	0.09	(0.041)	Stock	G4A87
	4	(101.6)	120	300	74	(11)	0.09	(0.041)	Stock	G4A94
	4	(101.6)	240	300	74	(11)	0.09	(0.041)	Stock	G4A95
	4	(101.6)	120	400	99	(15)	0.09	(0.041)	Stock	G4A48
	4	(101.6)	240	400	99	(15)	0.09	(0.041)	Stock	G4A44
	4	(101.6)	240	450	109	(17)	0.09	(0.041)	Stock	G4A64
	4	(101.6)	120	500	123	(19)	0.09	(0.041)	Stock	G4A96
	4	(101.6)	240	500	123	(19)	0.09	(0.041)	Stock	G4A92 ①
	4	(101.6)	120	550	134	(21)	0.09	(0.041)	Stock	G4A200
	4 1/4	(108)	240	300	67	(10)	0.09	(0.041)	Stock	G4E25
	4 1/4	(108)	240	750	167	(26)	0.09	(0.041)	Stock	G4E15
	4 1/2	(114.3)	120	300	65	(10)	0.10	(0.045)	Stock	G4J54
	4 1/2	(114.3)	240	300	65	(10)	0.10	(0.045)	Stock	G4J33
	4 1/2	(114.3)	120	500	108	(17)	0.10	(0.045)	Stock	G4J55
	4 1/2	(114.3)	240	500	108	(17)	0.10	(0.045)	Stock	G4J37
	4 13/16	(122.2)	240	300	59	(9)	0.11	(0.050)	Stock	G4P11
	4 13/16	(122.2)	240	500	98	(15)	0.11	(0.050)	Stock	G4P3
5	5	(127)	120	150	29	(4)	0.11	(0.050)	Stock	G5A68
	5	(127)	240	150	29	(4)	0.11	(0.050)	Stock	G5A56
	5	(127)	120	300	58	(9)	0.11	(0.050)	Stock	G5A69
	5	(127)	240	300	58	(9)	0.11	(0.050)	Stock	G5A70 ①
	5	(127)	120	500	96	(15)	0.11	(0.050)	Stock	G5A38
	5	(127)	240	500	96	(15)	0.11	(0.050)	Stock	G5A71 ①
	5	(127)	240	750	144	(22)	0.11	(0.050)	Stock	G5A67
	5	(127)	240	1000	192	(30)	0.11	(0.050)	Stock	G5A115
	5 1/4	(133.4)	240	200	45	(7)	0.12	(0.054)	Stock	G5E16
	5 1/2	(139.7)	240	600	104	(16)	0.12	(0.054)	Stock	G5J36
	5 1/2	(139.7)	240	1000	173	(27)	0.12	(0.054)	Stock	G5J45
	6	6	(152.4)	120	200	31	(5)	0.13	(0.059)	Stock
6		(152.4)	120	250	39	(6)	0.13	(0.059)	Stock	G6A40 ①
6		(152.4)	240	250	39	(6)	0.13	(0.059)	Stock	G6A92
6		(152.4)	120	400	63	(10)	0.13	(0.059)	Stock	G6A81
6		(152.4)	240	400	63	(10)	0.13	(0.059)	Stock	G6A82
6		(152.4)	120	500	79	(12)	0.13	(0.059)	Stock	G6A125
6		(152.4)	240	500	79	(12)	0.13	(0.059)	Stock	G6A59
6		(152.4)	120	600	94	(15)	0.13	(0.059)	Stock	G6A56
6		(152.4)	240	600	94	(15)	0.13	(0.059)	Stock	G6A51
6		(152.4)	240	750	117	(18)	0.13	(0.059)	Stock	G6A46
6		(152.4)	240	1000	157	(24)	0.13	(0.059)	Stock	G6A83
6 1/2		(165.1)	240	600	86	(13)	0.14	(0.064)	Stock	G6J23
6 1/2	(165.1)	240	1000	144	(22)	0.14	(0.064)	Stock	G6J33	
7	7	(177.8)	120	250	33	(5)	0.14	(0.064)	Stock	G7A40
	7	(177.8)	240	250	33	(5)	0.14	(0.064)	Stock	G7A32
	7	(177.8)	240	500	65	(10)	0.14	(0.064)	Stock	G7A30
	7	(177.8)	120	600	80	(12)	0.14	(0.064)	Stock	G7A41
	7	(177.8)	240	600	80	(12)	0.14	(0.064)	Stock	G7A42 ①
	7	(177.8)	240	1000	133	(21)	0.14	(0.064)	Stock	G7A43 ①
	7 1/2	(190.5)	240	600	74	(11)	0.15	(0.068)	Stock	G7J27 ①

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① MI leads available from stock. Add "Z" after Code No. to order.

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.	
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)			
3/8	7 1/2	(190.5)	240	1000	124	(19)	0.15	(0.068)	Stock	G7J28	
	7 13/16	(198.5)	240	750	87	(13)	0.15	(0.068)	Stock	G7P5	
	8	(203.2)	120	300	34	(5)	0.16	(0.073)	Stock	G8A54	
	8	(203.2)	240	300	34	(5)	0.16	(0.073)	Stock	G8A47	
	8	(203.2)	120	400	45	(7)	0.16	(0.073)	Stock	G8A109	
	8	(203.2)	120	500	58	(9)	0.16	(0.073)	Stock	G8A81	
	8	(203.2)	240	500	58	(9)	0.16	(0.073)	Stock	G8A32	
	8	(203.2)	120	600	69	(11)	0.16	(0.073)	Stock	G8A53	
	8	(203.2)	240	600	69	(11)	0.16	(0.073)	Stock	G8A37	
	8	(203.2)	240	700	79	(12)	0.16	(0.073)	Stock	G8A98	
	8	(203.2)	240	1000	115	(18)	0.16	(0.073)	Stock	G8A45 ①	
	8 5/8	(219)	240	500	52	(8)	0.17	(0.077)	Stock	G8L3	
	9	(228.6)	240	1000	100	(16)	0.18	(0.082)	Stock	G9A37	
	9 1/2	(241.3)	240	600	57	(9)	0.19	(0.086)	Stock	G9J20	
	9 1/2	(241.3)	240	1000	96	(15)	0.19	(0.086)	Stock	G9J12	
	10	(254)	120	400	36	(6)	0.19	(0.086)	Stock	G10A48	
	10	(254)	120	600	54	(8)	0.19	(0.086)	Stock	G10A35	
	10	(254)	240	600	54	(8)	0.19	(0.086)	Stock	G10A31 ①	
	10	(254)	240	1000	91	(14)	0.19	(0.086)	Stock	G10A32	
	10 13/16	(274.7)	240	375	31	(5)	0.20	(0.091)	Stock	G10P5	
	12	(304.8)	120	400	30	(5)	0.22	(0.100)	Stock	G12A45	
	12	(304.8)	120	600	45	(7)	0.22	(0.100)	Stock	G12A29	
	12	(304.8)	240	600	45	(7)	0.22	(0.100)	Stock	G12A46	
	12	(304.8)	240	1000	75	(12)	0.22	(0.100)	Stock	G12A47 ①	
	12 13/16	(325.5)	240	1000	69	(11)	0.23	(0.104)	Stock	G12P3	
	1/2	1	(25.4)	120	50	65	(10)	0.06	(0.027)	Stock	J1A30
		1	(25.4)	120	150	193	(30)	0.06	(0.027)	Stock	J1A31
		1 1/4	(31.8)	120	50	43	(7)	0.07	(0.032)	Stock	J1E50
1 1/4		(31.8)	120	125	107	(17)	0.07	(0.032)	Stock	J1E51	
1 1/4		(31.8)	240	125	107	(17)	0.07	(0.032)	Stock	J1E58	
1 1/4		(31.8)	240	200	172	(27)	0.07	(0.032)	Stock	J1E52	
1 1/4		(31.8)	240	250	212	(33)	0.07	(0.032)	Stock	J1E88	
1 1/2		(38.1)	120	50	32	(3)	0.08	(0.036)	Stock	J1J47	
1 1/2		(38.1)	120	150	97	(15)	0.08	(0.036)	Stock	J1J48	
1 1/2		(38.1)	240	150	97	(15)	0.08	(0.036)	Stock	J1J96	
1 1/2		(38.1)	120	200	128	(20)	0.08	(0.036)	Stock	J1J59	
1 1/2		(38.1)	240	200	128	(20)	0.08	(0.036)	Stock	J1J38	
2		(50.8)	120	75	32	(5)	0.09	(0.041)	Stock	J2A80	
2		(50.8)	120	200	86	(13)	0.09	(0.041)	Stock	J2A49	
2		(50.8)	240	200	86	(13)	0.09	(0.041)	Stock	J2A75	
2		(50.8)	120	250	108	(17)	0.09	(0.041)	Stock	J2A85	
2		(50.8)	240	250	108	(17)	0.09	(0.041)	Stock	J2A71 ①	
2		(50.8)	120	300	128	(20)	0.09	(0.041)	Stock	J2A95	
2		(50.8)	240	300	128	(20)	0.09	(0.041)	Stock	J2A96	
2		(50.8)	120	400	171	(27)	0.09	(0.041)	Stock	J2A81	
2		(50.8)	240	400	171	(27)	0.09	(0.041)	Stock	J2A82	
2 1/4		(57.2)	120	75	28	(4)	0.10	(0.045)	Stock	J2E86	
2 1/4		(57.2)	120	125	46	(7)	0.10	(0.045)	Stock	J2E87	
2 1/4		(57.2)	120	250	92	(14)	0.10	(0.045)	Stock	J2E56	
2 1/4		(57.2)	240	250	92	(14)	0.10	(0.045)	Stock	J2E69	
2 1/4		(57.2)	120	400	147	(22)	0.10	(0.045)	Stock	J2E114	

Cartridge Heaters

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① MI leads available from stock. Add "Z" after Code No. to order.

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
½	2 ¼	(57.2)	240	400	147	(22)	0.10	(0.045)	Stock	J2E115
	2 ¼	(57.2)	120	500	184	(29)	0.10	(0.045)	Stock	J2E64
	2 ¼	(57.2)	240	500	184	(29)	0.10	(0.045)	Stock	J2E88
	2 ⅜	(60.3)	120	100	34	(5)	0.10	(0.045)	Stock	J2G35
	2 ⅜	(60.3)	240	100	34	(5)	0.10	(0.045)	Stock	J2G28
	2 ⅜	(60.3)	120	250	86	(13)	0.10	(0.045)	Stock	J2G34
	2 ⅜	(60.3)	240	250	86	(13)	0.10	(0.045)	Stock	J2G37
	2 ⅜	(60.3)	120	500	172	(27)	0.10	(0.045)	Stock	J2G36
	2 ⅜	(60.3)	240	500	172	(27)	0.10	(0.045)	Stock	J2G38
	2 ½	(63.5)	120	100	32	(5)	0.11	(0.050)	Stock	J2J67
	2 ½	(63.5)	240	100	32	(5)	0.11	(0.050)	Stock	J2J57
	2 ½	(63.5)	120	250	81	(13)	0.11	(0.050)	Stock	J2J68
	2 ½	(63.5)	240	250	81	(13)	0.11	(0.050)	Stock	J2J69
	2 ½	(63.5)	120	300	96	(15)	0.11	(0.050)	Stock	J2J109
	2 ½	(63.5)	240	300	96	(15)	0.11	(0.050)	Stock	J2J110
	2 ½	(63.5)	120	400	128	(20)	0.11	(0.050)	Stock	J2J81
	2 ½	(63.5)	240	400	128	(20)	0.11	(0.050)	Stock	J2J82
	2 ½	(63.5)	120	500	161	(24)	0.11	(0.050)	Stock	J2J66
	2 ½	(63.5)	240	500	161	(24)	0.11	(0.050)	Stock	J2J70
	2 ⅝	(65.1)	120	350	108	(17)	0.11	(0.050)	Stock	J2K6
2 ⅝	(65.1)	240	300	93	(14)	0.11	(0.050)	Stock	J2K3	
2 ¾	(69.9)	240	400	115	(18)	0.11	(0.050)	Stock	J2N43	
2 ¾	(69.9)	120	400	115	(18)	0.11	(0.050)	Stock	J2N45	
3	(76.2)	120	125	32	(5)	0.12	(0.054)	Stock	J3A108	
3	(76.2)	240	125	32	(5)	0.12	(0.054)	Stock	J3A109	
3	(76.2)	120	250	64	(10)	0.12	(0.054)	Stock	J3A107	
3	(76.2)	240	250	64	(10)	0.12	(0.054)	Stock	J3A89	
3	(76.2)	120	300	78	(12)	0.12	(0.054)	Stock	J3A65	
3	(76.2)	120	350	89	(14)	0.12	(0.054)	Stock	J3A173	
3	(76.2)	240	300	78	(12)	0.12	(0.054)	Stock	J3A73	
3	(76.2)	120	400	104	(16)	0.12	(0.054)	Stock	J3A132	
3	(76.2)	240	400	104	(16)	0.12	(0.054)	Stock	J3A29	
3	(76.2)	120	500	129	(20)	0.12	(0.054)	Stock	J3A110	
3	(76.2)	240	500	129	(20)	0.12	(0.054)	Stock	J3A111	
3	(76.2)	120	600	154	(24)	0.12	(0.054)	Stock	J3A51	
3	(76.2)	240	600	154	(24)	0.12	(0.054)	Stock	J3A127	
3	(76.2)	120	750	193	(30)	0.12	(0.054)	Stock	J3A137	
3	(76.2)	240	750	193	(30)	0.12	(0.054)	Stock	J3A112	
3	(76.2)	120	1000	254	(39)	0.12	(0.054)	Stock	J3A79	
3 ½	(88.9)	120	250	54	(8)	0.14	(0.064)	Stock	J3J44	
3 ½	(88.9)	240	250	54	(8)	0.14	(0.064)	Stock	J3J64	
3 ½	(88.9)	240	350	75	(12)	0.14	(0.064)	Stock	J3J65	
3 ½	(88.9)	120	500	107	(17)	0.14	(0.064)	Stock	J3J45	
3 ½	(88.9)	240	500	107	(17)	0.14	(0.064)	Stock	J3J46	
3 ½	(88.9)	240	750	162	(25)	0.14	(0.064)	Stock	J3J63	
3 ⅜	(96.8)	120	500	96	(15)	0.15	(0.068)	Stock	J3P9	
3 ⅜	(96.8)	240	250	48	(7)	0.15	(0.068)	Stock	J3P2	
4	(101.6)	120	150	28	(4)	0.15	(0.068)	Stock	J4A117	
4	(101.6)	240	150	28	(4)	0.15	(0.068)	Stock	J4A122	
4	(101.6)	120	250	46	(7)	0.15	(0.068)	Stock	J4A118	
4	(101.6)	240	250	46	(7)	0.15	(0.068)	Stock	J4A90 ①	

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Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
½	4	(101.6)	120	300	56	(9)	0.15	(0.068)	Stock	J4A63
	4	(101.6)	240	300	56	(9)	0.15	(0.068)	Stock	J4A26
	4	(101.6)	120	350	65	(10)	0.15	(0.068)	Stock	J4A1
	4	(101.6)	240	350	65	(10)	0.15	(0.068)	Stock	J4A103
	4	(101.6)	120	400	74	(11)	0.15	(0.068)	Stock	J4A139
	4	(101.6)	240	400	74	(11)	0.15	(0.068)	Stock	J4A68
	4	(101.6)	120	500	92	(14)	0.15	(0.068)	Stock	J4A16
	4	(101.6)	120	550	100	(16)	0.15	(0.068)	Stock	J4A242
	4	(101.6)	240	500	92	(14)	0.15	(0.068)	Stock	J4A92
	4	(101.6)	120	750	138	(21)	0.15	(0.068)	Stock	J4A198
	4	(101.6)	240	750	138	(21)	0.15	(0.068)	Stock	J4A119
	4	(101.6)	240	1000	184	(28)	0.15	(0.068)	Stock	J4A73
	4 ½	(114.3)	120	500	80	(12)	0.17	(0.077)	Stock	J4J69
	4 ½	(114.3)	240	500	80	(12)	0.17	(0.077)	Stock	J4J57
	4 ½	(114.3)	120	750	120	(19)	0.17	(0.077)	Stock	J4J70
	4 ½	(114.3)	240	750	120	(19)	0.17	(0.077)	Stock	J4J32
	4 ⅜	(122.2)	240	300	44	(7)	0.19	(0.086)	Stock	J4P3
	4 ⅜	(122.2)	240	1000	148	(23)	0.19	(0.086)	Stock	J4P6
	5	(127)	120	200	29	(4)	0.19	(0.086)	Stock	J5A85
	5	(127)	240	200	29	(4)	0.19	(0.086)	Stock	J5A74
5	(127)	120	350	50	(8)	0.19	(0.086)	Stock	J5A86	
5	(127)	240	350	50	(8)	0.19	(0.086)	Stock	J5A63	
5	(127)	120	400	58	(9)	0.19	(0.086)	Stock	J5A98	
5	(127)	240	400	58	(9)	0.19	(0.086)	Stock	J5A46	
5	(127)	120	500	72	(11)	0.19	(0.086)	Stock	J5A52	
5	(127)	240	500	72	(11)	0.19	(0.086)	Stock	J5A45 ①	
5	(127)	120	750	108	(17)	0.19	(0.086)	Stock	J5A121	
5	(127)	240	750	108	(17)	0.19	(0.086)	Stock	J5A72	
5	(127)	240	1000	143	(22)	0.19	(0.086)	Stock	J5A87	
5 ½	(139.7)	240	200	25	(4)	0.20	(0.091)	Stock	J5J3	
5 ½	(139.7)	120	500	64	(10)	0.20	(0.091)	Stock	J5J43	
5 ½	(139.7)	240	500	64	(10)	0.20	(0.091)	Stock	J5J33	
5 ½	(139.7)	240	650	83	(13)	0.20	(0.091)	Stock	J5J69	
5 ½	(139.7)	120	750	97	(15)	0.20	(0.091)	Stock	J5J44	
5 ½	(139.7)	240	750	97	(15)	0.20	(0.091)	Stock	J5J45	
5 ¾	(146)	120	700	86	(13)	0.20	(0.091)	Stock	J5N6	
5 ¾	(146)	240	700	86	(13)	0.20	(0.091)	Stock	J5N8	
5 ⅜	(147.6)	240	300	36	(6)	0.21	(0.095)	Stock	J5P10	
6	(152.4)	120	250	29	(4)	0.21	(0.095)	Stock	J6A114	
6	(152.4)	240	250	29	(4)	0.21	(0.095)	Stock	J6A171	
6	(152.4)	240	300	35	(6)	0.21	(0.095)	Stock	J6A66	
6	(152.4)	240	350	41	(7)	0.21	(0.095)	Stock	J6A119	
6	(152.4)	120	500	59	(9)	0.21	(0.095)	Stock	J6A115	
6	(152.4)	240	500	59	(9)	0.21	(0.095)	Stock	J6A94 ①	
6	(152.4)	480	500	59	(9)	0.21	(0.095)	Stock	J6A301 ②	
6	(152.4)	120	750	88	(14)	0.21	(0.095)	Stock	J6A99	
6	(152.4)	240	750	88	(14)	0.21	(0.095)	Stock	J6A90	
6	(152.4)	120	1000	117	(18)	0.21	(0.095)	Stock	J6A53	
6	(152.4)	240	1000	117	(18)	0.21	(0.095)	Stock	J6A36 ①	
6 ½	(165.1)	240	500	54	(8)	0.23	(0.104)	Stock	J6J45	
6 ½	(165.1)	240	1000	108	(17)	0.23	(0.104)	Stock	J6J27 ①	

Cartridge Heaters

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① MI leads available from stock. Add "Z" after Code No. to order.
 ② Units with 480 volts cannot be supplied with LA lead terminations.

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
½	7	(177.8)	120	250	25	(4)	0.24	(0.109)	Stock	J7A79
	7	(177.8)	120	500	50	(8)	0.24	(0.109)	Stock	J7A80
	7	(177.8)	240	500	50	(8)	0.24	(0.109)	Stock	J7A57
	7	(177.8)	120	600	60	(9)	0.24	(0.109)	Stock	J7A50
	7	(177.8)	240	600	60	(9)	0.24	(0.109)	Stock	J7A95
	7	(177.8)	240	1000	99	(15)	0.24	(0.109)	Stock	J7A81
	7 ½	(190.5)	240	500	46	(7)	0.26	(0.118)	Stock	J7J25
	7 ½	(190.5)	240	1000	92	(14)	0.26	(0.118)	Stock	J7J26
	8	(203.2)	120	300	26	(4)	0.28	(0.127)	Stock	J8A71
	8	(203.2)	240	300	26	(4)	0.28	(0.127)	Stock	J8A111
	8	(203.2)	120	500	43	(7)	0.28	(0.127)	Stock	J8A64
	8	(203.2)	240	500	43	(7)	0.28	(0.127)	Stock	J8A66
	8	(203.2)	120	1000	86	(13)	0.28	(0.127)	Stock	J8A84
	8	(203.2)	240	1000	86	(13)	0.28	(0.127)	Stock	J8A60
	8	(203.2)	480	1000	86	(13)	0.28	(0.127)	Stock	J8A35 ②
	8	(203.2)	240	1500	129	(20)	0.28	(0.127)	Stock	J8A100
	8	(203.2)	240	2000	172	(27)	0.28	(0.127)	Stock	J8A101 ①
	8 ½	(215.9)	240	300	24	(4)	0.29	(0.132)	Stock	J8J39
	8 ½	(215.9)	240	500	40	(6)	0.29	(0.132)	Stock	J8J30
	8 ½	(215.9)	240	1000	80	(12)	0.29	(0.132)	Stock	J8J28
	9	(228.6)	240	500	38	(6)	0.30	(0.136)	Stock	J9A35
	9	(228.6)	240	1000	76	(12)	0.30	(0.136)	Stock	J9A58
	9 ½	(241.3)	240	500	36	(6)	0.32	(0.145)	Stock	J9J14
	9 ½	(241.3)	240	1000	72	(11)	0.32	(0.145)	Stock	J9J12 ①
	10	(254)	120	500	34	(5)	0.33	(0.150)	Stock	J10A61
	10	(254)	240	500	34	(5)	0.33	(0.150)	Stock	J10A62
	10	(254)	120	1000	68	(11)	0.33	(0.150)	Stock	J10A63
	10	(254)	240	1000	68	(11)	0.33	(0.150)	Stock	J10A42
	10	(254)	240	1500	102	(16)	0.33	(0.150)	Stock	J10A33
	10	(254)	240	2000	136	(21)	0.33	(0.150)	Stock	J10A64 ①
	11	(279.4)	240	1000	61	(9)	0.36	(0.163)	Stock	J11A60
	12	(304.8)	120	500	28	(4)	0.40	(0.181)	Stock	J12A63
	12	(304.8)	240	500	28	(4)	0.40	(0.181)	Stock	J12A76
	12	(304.8)	120	1000	56	(9)	0.40	(0.181)	Stock	J12A40
	12	(304.8)	240	1000	56	(9)	0.40	(0.181)	Stock	J12A49
	12	(304.8)	480	1200	66	(10)	0.40	(0.181)	Stock	J12A215 ②
12	(304.8)	240	1500	84	(13)	0.40	(0.181)	Stock	J12A37	
12	(304.8)	240	2000	112	(17)	0.40	(0.181)	Stock	J12A89	
14	(355.6)	240	1000	48	(7)	0.48	(0.218)	Stock	J14A41	
14	(355.6)	240	2300	110	(17)	0.48	(0.218)	Stock	J14A39	
15	(381)	240	1500	66	(10)	0.50	(0.227)	Stock	J15A19	
16	(406.4)	240	1000	41	(7)	0.52	(0.236)	Stock	J16A12	
18	(457.2)	240	1500	55	(9)	0.57	(0.259)	Stock	J18A19	
18	(457.2)	240	1700	62	(9)	0.57	(0.259)	Stock	J18A23	
¾	1 ¼	(31.8)	120	50	34	(5)	0.10	(0.045)	Stock	L1E26
	1 ¼	(31.8)	120	200	137	(21)	0.10	(0.045)	Stock	L1E24
	1 ¼	(31.8)	120	250	171	(27)	0.10	(0.045)	Stock	L1E27
	1 ½	(38.1)	120	250	128	(20)	0.11	(0.050)	Stock	L1J23
	1 ½	(38.1)	240	250	128	(20)	0.11	(0.050)	Stock	L1J24
	2	(50.8)	120	100	34	(5)	0.13	(0.059)	Stock	L2A48

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① MI leads available from stock. Add "Z" after Code No. to order.

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Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
5/8	2	(50.8)	120	200	68	(11)	0.13	(0.059)	Stock	L2A49
	2	(50.8)	240	500	170	(26)	0.13	(0.059)	Stock	L2A54
2 1/4	2 1/4	(57.2)	120	100	29	(4)	0.14	(0.064)	Stock	L2E49
	2 1/4	(57.2)	120	250	73	(11)	0.14	(0.064)	Stock	L2E50
2 1/4	2 1/4	(57.2)	240	250	73	(11)	0.14	(0.064)	Stock	L2E12
	2 1/4	(57.2)	120	350	103	(16)	0.14	(0.064)	Stock	L2E40
2 1/4	2 1/4	(57.2)	240	350	103	(16)	0.14	(0.064)	Stock	L2E51
	2 3/8	(60.3)	120	280	77	(12)	0.16	(0.073)	Stock	L2G18
2 3/8	2 3/8	(60.3)	240	280	77	(12)	0.16	(0.073)	Stock	L2G19
	3	(76.2)	120	150	31	(5)	0.20	(0.091)	Stock	L3A81
3	3	(76.2)	120	250	51	(8)	0.20	(0.091)	Stock	L3A82
	3	(76.2)	240	250	51	(8)	0.20	(0.091)	Stock	L3A9
3	3	(76.2)	120	400	81	(13)	0.20	(0.091)	Stock	L3A94
	3	(76.2)	120	500	102	(16)	0.20	(0.091)	Stock	L3A113
3	3	(76.2)	240	500	103	(16)	0.20	(0.091)	Stock	L3A33
	3	(76.2)	240	750	154	(24)	0.20	(0.091)	Stock	L3A71
3 3/4	3 3/4	(95.3)	120	525	82	(13)	0.24	(0.109)	Stock	L3N12
	3 3/4	(95.3)	240	525	82	(13)	0.24	(0.109)	Stock	L3N1
4	4	(101.6)	120	250	37	(6)	0.26	(0.118)	Stock	L4A99
	4	(101.6)	240	250	37	(6)	0.26	(0.118)	Stock	L4A104
4	4	(101.6)	240	400	58	(9)	0.26	(0.118)	Stock	L4A47
	4	(101.6)	240	500	73	(11)	0.26	(0.118)	Stock	L4A53
4	4	(101.6)	240	600	88	(14)	0.26	(0.118)	Stock	L4A44
	4	(101.6)	240	750	110	(17)	0.26	(0.118)	Stock	L4A100
4	4	(101.6)	240	1000	146	(23)	0.26	(0.118)	Stock	L4A71
	5	(127)	120	250	28	(4)	0.29	(0.132)	Stock	L5A76
5	5	(127)	240	250	28	(4)	0.29	(0.132)	Stock	L5A107
	5	(127)	240	500	57	(9)	0.29	(0.132)	Stock	L5A24
5	5	(127)	240	750	86	(13)	0.29	(0.132)	Stock	L5A31
	5	(127)	240	1000	114	(18)	0.29	(0.132)	Stock	L5A77
5 3/8	5 3/8	(85.7)	120	800	84	(13)	0.30	(0.136)	Stock	L5G3
	5 3/8	(85.7)	240	800	84	(13)	0.30	(0.136)	Stock	L5G1
6	6	(152.4)	120	300	28	(4)	0.34	(0.154)	Stock	L6A28
	6	(152.4)	240	300	28	(4)	0.34	(0.154)	Stock	L6A64
6	6	(152.4)	240	500	47	(7)	0.34	(0.154)	Stock	L6A73 ①
	6	(152.4)	240	750	70	(11)	0.34	(0.154)	Stock	L6A70
6	6	(152.4)	240	1000	93	(14)	0.34	(0.154)	Stock	L6A71 ①
	6	(152.4)	120	1500	139	(22)	0.34	(0.154)	Stock	L6A163
6	6	(152.4)	240	1500	140	(22)	0.34	(0.154)	Stock	L6A94 ①
	6 1/2	(165.1)	120	500	43	(7)	0.38	(0.172)	Stock	L6J43
6 1/2	6 1/2	(165.1)	240	500	43	(7)	0.38	(0.172)	Stock	L6J55
	7	(177.8)	120	500	39	(6)	0.40	(0.181)	Stock	L7A42
7	7	(177.8)	240	500	39	(6)	0.40	(0.181)	Stock	L7A15 ①
	7	(177.8)	240	1000	79	(12)	0.40	(0.181)	Stock	L7A37 ①
7	7	(177.8)	240	1500	118	(18)	0.40	(0.181)	Stock	L7A12 ①
	8	(203.2)	120	500	34	(5)	0.47	(0.213)	Stock	L8A96 ①
8	8	(203.2)	240	500	34	(5)	0.47	(0.213)	Stock	L8A46 ①
	8	(203.2)	240	850	58	(9)	0.47	(0.213)	Stock	L8A115 ①
8	8	(203.2)	240	1000	68	(10)	0.47	(0.213)	Stock	L8A10 ①
	8	(203.2)	240	1500	102	(16)	0.47	(0.213)	Stock	L8A37 ①
8	8	(203.2)	240	2000	137	(21)	0.47	(0.213)	Stock	L8A80 ①

Cartridge Heaters

CONTINUED

① MI leads available from stock. Add "Z" after Code No. to order.

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.	
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)			
5/8	10	(254)	120	500	27	(4)	0.53	(0.240)	Stock	L10A51	
	10	(254)	240	500	27	(4)	0.53	(0.240)	Stock	L10A40 ①	
	10	(254)	240	750	40	(6)	0.53	(0.240)	Stock	L10A69	
	10	(254)	240	1000	54	(8)	0.53	(0.240)	Stock	L10A52 ①	
	10	(254)	480	1000	54	(8)	0.53	(0.240)	Stock	L10A193 ②	
	10	(254)	240	1500	81	(13)	0.53	(0.240)	Stock	L10A8 ①	
	10	(254)	240	2000	108	(17)	0.53	(0.240)	Stock	L10A50 ①	
	12	(304.8)	120	500	22	(3)	0.66	(0.300)	Stock	L12A81 ①	
	12	(304.8)	240	500	22	(3)	0.66	(0.300)	Stock	L12A80 ①	
	12	(304.8)	240	900	40	(6)	0.66	(0.300)	Stock	L12A102	
	12	(304.8)	120	1000	45	(7)	0.66	(0.300)	Stock	L12A82 ①	
	12	(304.8)	240	1000	45	(7)	0.66	(0.300)	Stock	L12A34 ①	
	12	(304.8)	120	1500	66	(10)	0.66	(0.300)	Stock	L12A147	
	12	(304.8)	240	1500	67	(10)	0.66	(0.300)	Stock	L12A39 ①	
	12	(304.8)	240	2000	89	(14)	0.66	(0.300)	Stock	L12A63 ①	
	14	(355.6)	240	3700	140	(22)	0.79	(0.358)	Stock	L14A21	
	15	(381)	240	750	27	(4)	0.84	(0.381)	Stock	L15A35 ①	
	15	(381)	240	2400	84	(13)	0.84	(0.381)	Stock	L15A20	
	15	(381)	480	2500	88	(14)	0.84	(0.381)	Stock	L15A88 ②	
	15	(381)	240	4000	141	(22)	0.84	(0.381)	Stock	L15A41	
	16	(406.4)	240	2500	82	(13)	0.91	(0.412)	Stock	L16A33	
	16	(406.4)	240	4500	148	(23)	0.91	(0.412)	Stock	L16A40	
	18	(457.2)	240	1500	44	(7)	1.03	(0.467)	Stock	L18A32	
	18	(457.2)	240	3000	87	(13)	1.03	(0.467)	Stock	L18A34	
	18	(457.2)	240	4700	137	(21)	1.03	(0.467)	Stock	L18A36	
	20	(508)	240	1500	40	(6)	1.25	(0.567)	Stock	L20A19 ①	
	20	(508)	240	3500	92	(14)	1.25	(0.567)	Stock	L20A13	
	20	(508)	480	3500	92	(14)	1.25	(0.567)	Stock	L20A96 ②	
	20	(508)	240	4700	123	(19)	1.25	(0.567)	Stock	L20A14	
	24	(609.6)	240	2000	44	(7)	1.47	(0.667)	Stock	L24A19 ①	
	24	(609.6)	240	4700	102	(15)	1.47	(0.667)	Stock	L24A14	
	36	(914.4)	240	3000	43	(7)	2.30	(1.04)	Stock	L36A8	
	3/4	2 1/4	(57.2)	120	200	49	(8)	0.19	(0.086)	Stock	N2E8
		3	(76.2)	120	250	43	(7)	0.24	(0.109)	Stock	N3A11
		3	(76.2)	240	500	85	(13)	0.24	(0.109)	Stock	N3A12 ①
		4	(101.6)	120	250	31	(5)	0.31	(0.141)	Stock	N4A16 ①
4		(101.6)	240	500	61	(9)	0.31	(0.141)	Stock	N4A17 ①	
4		(101.6)	240	1000	122	(19)	0.31	(0.141)	Stock	N4A15	
5		(127)	120	300	28	(4)	0.38	(0.172)	Stock	N5A19	
5		(127)	240	500	47	(7)	0.38	(0.172)	Stock	N5A12 ①	
5		(127)	240	1000	95	(15)	0.38	(0.172)	Stock	N5A20 ①	
6		(152.4)	120	500	39	(6)	0.44	(0.200)	Stock	N6A19	
6		(152.4)	240	500	39	(6)	0.44	(0.200)	Stock	N6A20 ①	
6		(152.4)	240	1000	78	(12)	0.44	(0.200)	Stock	N6A21 ①	
6		(154.4)	480	1000	78	(12)	0.44	(0.200)	Stock	N6A225 ②	
6		(152.4)	240	1500	116	(18)	0.44	(0.200)	Stock	N6A82	
6		(152.4)	240	2000	155	(24)	0.44	(0.200)	Stock	N6A22 ①	
7		(177.8)	120	500	33	(5)	0.51	(0.231)	Stock	N7A15	
7		(177.8)	240	500	33	(5)	0.51	(0.231)	Stock	N7A1 ①	
7		(177.8)	240	1000	66	(10)	0.51	(0.231)	Stock	N7A16 ①	
8	(203.2)	120	500	28	(4)	0.58	(0.263)	Stock	N8A19		

CONTINUED 

① MI leads available from stock. Add "Z" after Code No. to order.

② Units with 480 volts cannot be supplied with LA lead terminations.

Cartridge Heaters

FIREROD

Diameter inches	Sheath Length		Volts	Watts	Watt Density		Approx. Net Wt.		Availability	Code No.
	inches	(mm)			W/in ²	(W/cm ²)	lbs	(kg)		
¾	8	(203.2)	240	500	28	(4)	0.58	(0.263)	Stock	N8A20 ①
	8	(203.2)	240	1000	57	(9)	0.58	(0.263)	Stock	N8A21 ①
	8	(203.2)	240	2000	114	(17)	0.58	(0.263)	Stock	N8A22 ①
	10	(254)	240	1000	45	(7)	0.72	(0.327)	Stock	N10A15 ①
	10	(254)	240	2000	90	(14)	0.72	(0.327)	Stock	N10A14 ①
	12	(304.8)	240	1000	37	(6)	0.84	(0.381)	Stock	N12A15 ①
	12	(304.8)	240	2000	74	(11)	0.84	(0.381)	Stock	N12A24
	12	(304.8)	480	2000	74	(11)	0.84	(0.381)	Stock	N12A198 ②
	12	(304.8)	240	4000	148	(23)	0.84	(0.381)	Stock	N12A25
	13	(304.8)	240	1000	34	(5)	0.93	(0.422)	Stock	N13A26 ①
	14	(355.6)	240	1250	40	(6)	1.03	(0.467)	Stock	N14A22 ①
	14	(355.6)	240	2500	79	(12)	1.03	(0.467)	Stock	N14A20
	14	(355.6)	240	4500	142	(22)	1.03	(0.467)	Stock	N14A21
	15	(381)	240	1500	44	(22)	1.09	(0.494)	Stock	N15A26 ①
	16	(406.4)	240	1800	49	(8)	1.14	(0.517)	Stock	N16A26 ①
	16	(406.4)	240	4700	129	(20)	1.14	(0.517)	Stock	N16A18
	18	(457.2)	240	2000	49	(8)	1.25	(0.567)	Stock	N18A13
	18	(457.2)	240	5000	122	(19)	1.25	(0.567)	Stock	N18A15
	20	(508)	240	1150	25	(4)	1.40	(0.635)	Stock	N20A21 ①
	20	(508)	240	2250	49	(8)	1.40	(0.635)	Stock	N20A22 ①
	20	(508)	240	5250	115	(18)	1.40	(0.635)	Stock	N20A10
	24	(609.6)	240	1375	25	(4)	1.80	(0.816)	Stock	N24A24
	24	(609.6)	240	2750	50	(8)	1.80	(0.816)	Stock	N24A23
	24	(609.6)	480	2750	50	(8)	1.80	(0.816)	Stock	N24A78 ②
24	(609.6)	240	5500	100	(16)	1.80	(0.816)	Stock	N24A13	
36	(914.4)	240	2500	30	(6)	2.50	(1.13)	Stock	N36A4	

① MI leads available from stock. Add "Z" after Code No. to order.

② Units with 480 volts cannot be supplied with LA lead terminations.