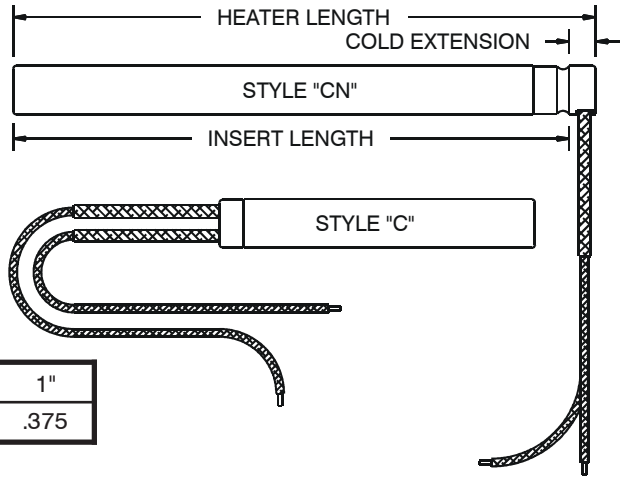
# Round Cartridge Lead Options

### Style “C” And “CN” Crimp Connected Leads

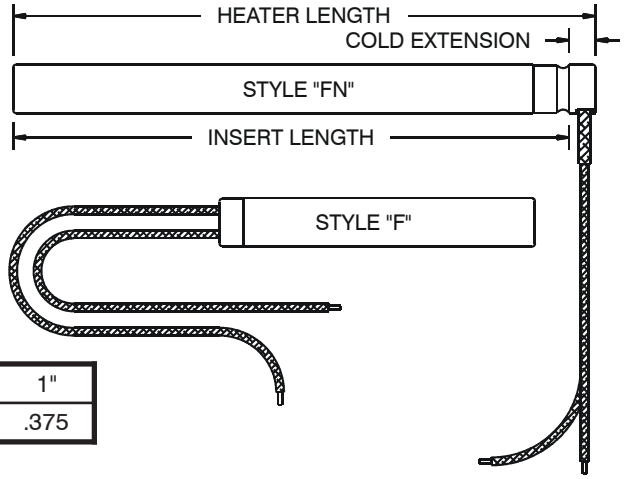
The “C” and “CN lead configurations consist of stranded lead wire externally crimp connected to the solid pins exiting the heater. Style “C” leads exit straight out the end of the cartridge while the leads of the style “CN” exit out the side of the sheath at 90 degrees. The lead end of the style “CN” is covered by a welded in end cap. The pin and connection area of both styles are sheathed in an insulating layer of silicone rubber coated fiberglass sleeving. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Both “C” and “CN” lead styles are best suited to applications where lead flexing is minimal. A lead length of 10 inches, including the solid pin extension, is standard. When ordering, specify “C” or “CN” leads and the desired lead length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .250 | .250 | .250 | .250 | .312 | .312 | .375 |

### Style “F” And “FN” Full Flexible Leads

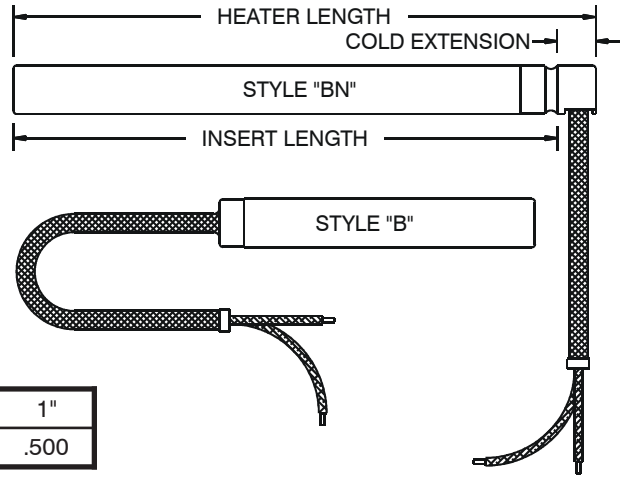
The “F” and “FN” style leads are internally connected to provide a fully flexible lead exit from the ceramic end cap. Style “F” leads exit straight out the lead end of the cartridge while the leads of the style “FN” exit out the side of the sheath at 90 degrees. The lead end of the style “FN” is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style “F” and “FN” leads can be bent sharply at the ceramic end cap without exposing or breaking the conductor and are popular in applications where the lead exit area is restricted. A lead length of 10 inches is standard. When ordering, specify “F” or “FN” leads and the desired lead length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .250 | .250 | .250 | .250 | .312 | .312 | .375 |

### Style “B” And “BN” Braid Protected Leads

The “B” and “BN” style leads feature full flexible leads with protective stainless steel overbraid. Style “B” leads exit straight out the lead end of the cartridge while the style “BN” leads exit out the side of the sheath at 90 degrees. The lead end of the style “BN” is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style “B” and “BN” leads are popular in applications where external wiring is required and where some additional protection is necessary. A lead length of 12 inches with 10 inches of braid is standard. Unless otherwise specified, leads are 2 inches longer than the requested braid length. When ordering, specify “B” or “BN” leads and desired lead and braid length.

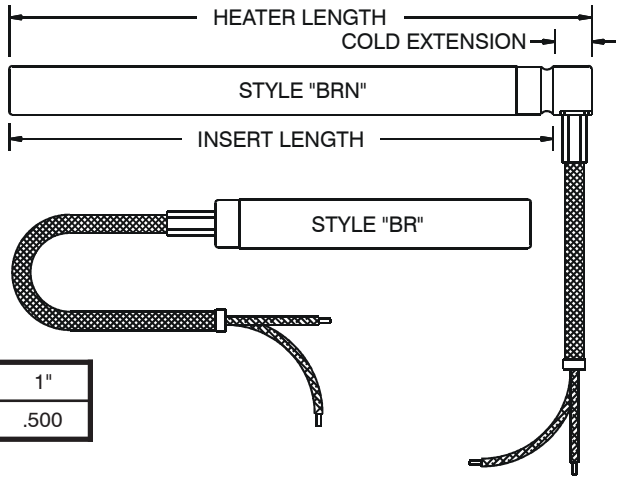



| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .375 | .375 | .375 | .375 | .437 | .437 | .500 |

# Round Cartridge Lead Options

### Style “BR” And “BRN” Braid Protected Leads

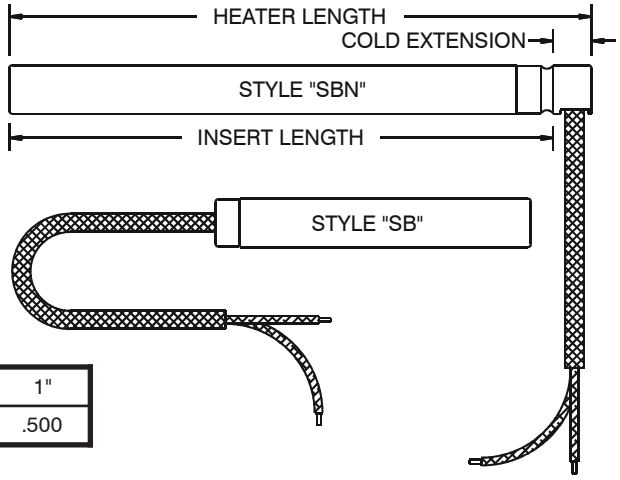
The “BR” and “BRN” style leads feature flexible leads with protective stainless steel overbraid externally crimped to the heater. Style “BR” leads exit straight out the lead end of the cartridge while the style “BRN” leads exit out the side of the sheath at 90 degrees. The lead end of the style “BRN” is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style “BR” and “BRN” leads are useful where protection is required and a rigid lead exit is preferred. A lead length of 12 inches with 10 inches of braid is standard. Unless otherwise specified, leads are 2 inches longer than the braid length. When ordering, specify “BR” or “BRN” leads and desired lead and braid length.




| Cartridge Size | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .375 | .375 | .375 | .375 | .437 | .437 | .500 |

### Style “SB” And “SBN” Sleeve Protected Leads

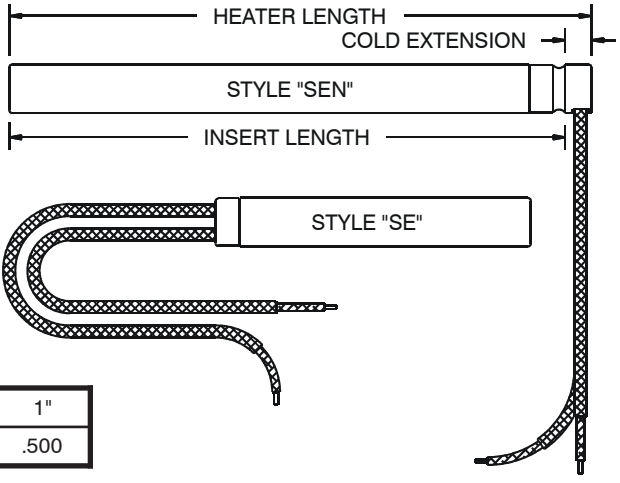
The “SB” and “SBN” style leads feature flexible leads with a single protective silicone fiberglass sleeve over both leads. Style “SB” leads exit straight out the lead end of the cartridge while the style “SBN” leads exit out the side of the sheath at 90 degrees. The lead end of the style “SBN” is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. The silicone coating of the fiberglass sleeve will degrade at temperatures in excess of 600 °F/316 °C. Style “SB” and “SBN” leads are used where some lead protection is desired. A lead length of 12 inches with 10 inches of Sleeving is standard. Unless otherwise specified, leads are 2 inches longer than the sleeve length. When ordering, specify “SB” or “SBN” leads and desired lead and sleeve length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .375 | .375 | .375 | .375 | .437 | .437 | .500 |

### Style “SE" And "SEN" Sleeve Protected Leads

The “SE” and “SEN” style leads feature flexible leads with a single protective silicone fiberglass sleeve over each lead. Style “SE” leads exit straight out the lead end of the cartridge while the style “SEN” leads exit out the side of the sheath at 90 degrees. The lead end of the style “SEN” is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. The silicone coating of the fiberglass sleeve will degrade at temperatures in excess of 600 °F/316 °C. Style “SE” and “SEN” leads are used where some lead protection is desired. A lead length of 12 inches with 10 inches of Sleeving is standard. Unless otherwise specified, leads are 2 inches longer than the sleeve length. When ordering, specify “SE” or “SEN” leads and desired lead and sleeve length.

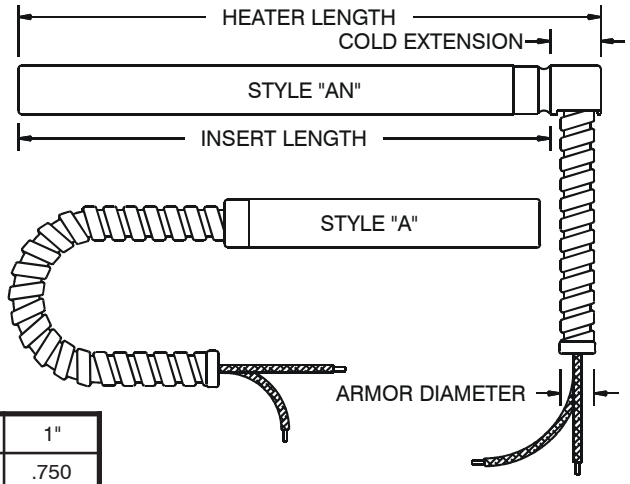



| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .375 | .375 | .375 | .375 | .437 | .437 | .500 |

# Round Cartridge Lead Options

### Style “A” And “AN” Armor Protected Leads

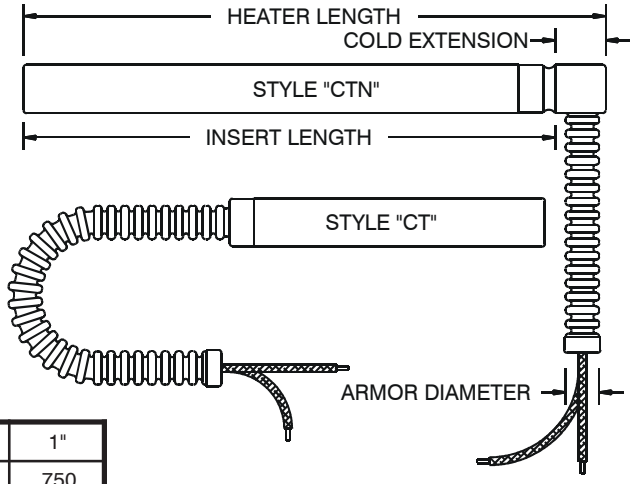
The “A” and “AN” style leads feature full flexible leads with protective stainless steel armor. Style “A” leads exit straight out the lead end of the cartridge while the style “AN” leads exit out the side of the sheath at 90 degrees. The lead end of the style “AN” is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style “A” and “AN” leads are popular in applications where external wiring is required and additional protection is necessary. A lead length of 13 inches with 10 inches of armor is standard. Unless otherwise specified, leads are 3 inches longer than the armor length. When ordering, specify “A” or “AN” leads and desired lead and armor length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .375 | .375 | .500 | .500 | .625 | .625 | .750 |
| Armor O.D. (Max.) | .207 | .244 | .275 | .345 | .437 | .493 | .623 |

### Style “CT” And “CTN” Convoluted Tubing Protected Leads

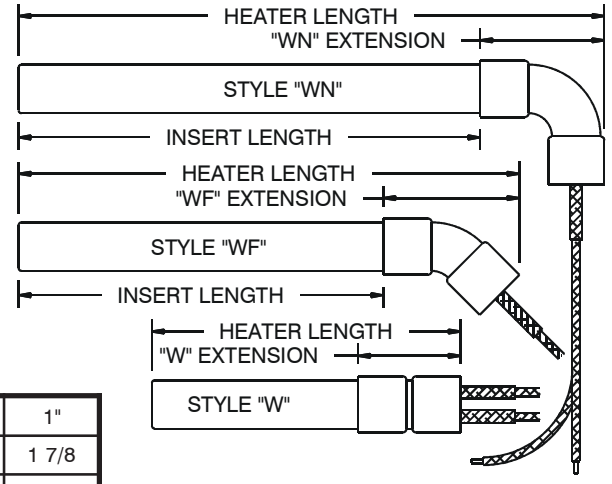
The “CT” and “CTN” style leads feature flexible leads and a totally sealed stainless steel convoluted tubing style armor silver solder sealed to the heater. Style “CT” leads exit straight out the lead end of the cartridge while the style “CTN” leads exit out the side of the sheath at 90 degrees. The lead end of the style “CT” is covered by a welded in end cap. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. Style “CT” and “CTN” leads are popular in applications where the heaters are constantly exposed to contaminants. A lead length of 13 inches with 10 inches of armor is standard. Unless other wise specified, leads are 3 inches longer than the armor length. When ordering, specify “CT” or “CTN” leads and desired lead and armor length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | N/A | N/A | N/A | .500 | .625 | .625 | .750 |
| Armor O.D. (Max.) | N/A | N/A | N/A | .426 | .426 | .570 | .570 |

### Style “W”, "WF And “WN” Wrot Fittings With Standard Leads

The “W” And “WN” lead configurations feature flexible leads exiting the cartridge through a protective wrot copper fitting. The style “W” leads exit the cartridge through a straight coupling while the style “WN” leads exit through a wrot copper elbow to provide a 90 degree lead exit. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. The style “W” and “WN” leads provide lead protection and a positive stop to control heater insertion depth. The wrot copper fittings are also useful in applications where a silicone or epoxy potted seal is required. Lead length, measured from the fitting lead exit, is supplied as 10 inches standard. When ordering specify “W”, "WF" or “WN” and lead length.

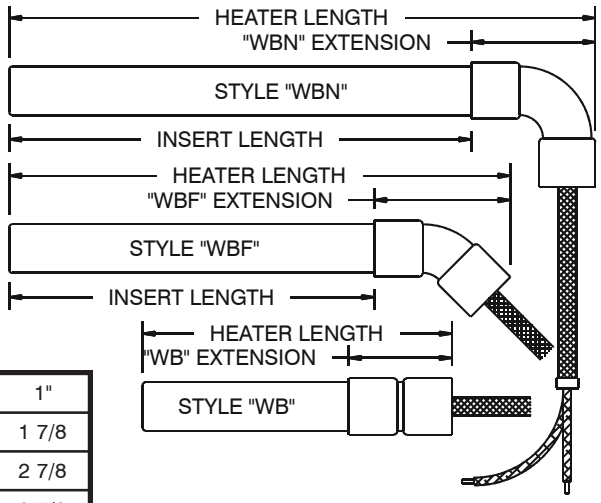



| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| "W" Extension | 7/8 | 3/4 | 3/4 | 7/8 | 1 1/8 | 1 3/8 | 1 7/8 |
| "WF" Extension | 1 | 1 1/8 | 1 1/16 | 1 1/4 | 1 5/8 | 1 7/8 | 2 7/8 |
| "WN" Extension | 7/8 | 1 | 15/16 | 1 1/8 | 1 7/16 | 1 7/8 | 2 7/8 |

# Round Cartridge Lead Options

### Style “WB”, "WBF" And “WBN” Wrot Fittings With Braid

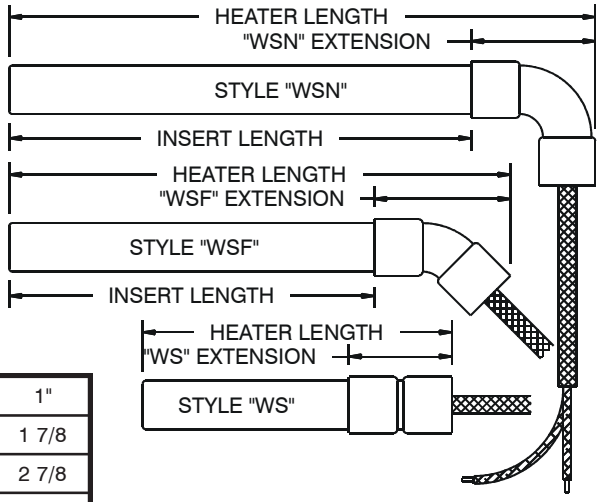
The “WB” and “WBN” lead styles are stainless steel wire braid protected and exit from a protective wrot copper fitting. The style “WB” braid protected leads exit the cartridge from a straight coupling, the "WBF" from a 45 degree elbow and the style “WBN” from a 90 degree elbow. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. “WB”, "WBF" and “WBN” lead systems provide substantial lead protection and a positive stop to control heater insertion depth. The fitting is also useful in applications where a silicone or epoxy seal is required. Standard leads are 13 inches with 10 inches of wire braid, as measured from the fitting lead exit. Unless otherwise specified, leads are 3 inches longer than the braid length. When ordering, specify “WB”, "WBF" or “WBN”, lead length and braid length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| "WB" Extension | 7/8 | 3/4 | 3/4 | 7/8 | 1 1/8 | 1 3/8 | 1 7/8 |
| "WBF" Extension | 1 | 1 1/8 | 1 1/16 | 1 1/4 | 1 5/8 | 1 7/8 | 2 7/8 |
| "WBN" Extension | 7/8 | 1 | 15/16 | 1 1/8 | 1 7/16 | 1 7/8 | 2 7/8 |

### Style “WS”, "WSF" And “WSN” Wrot Fittings With Sleeve

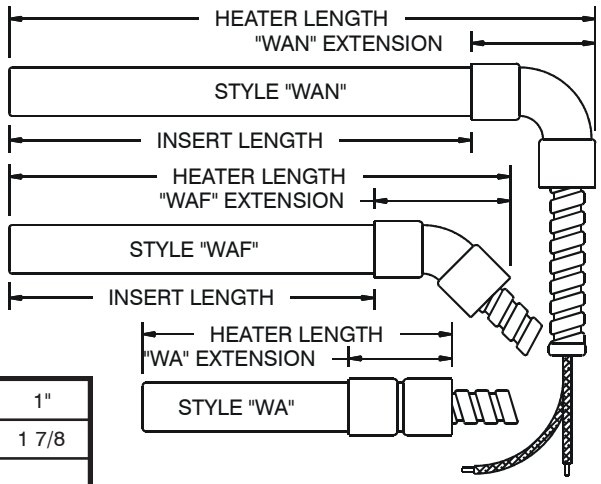
The “WS”, "WSF and “WSN” lead styles are silicone sleeve protected and exit from a protective wrot copper fitting. The style “WS” sleeved leads exit the cartridge from a straight coupling, the "WSF" from a 45 degree elbow and the style “WSN” from a 90 degree elbow. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. “WS”, "WSF" and “WSN” lead systems provide moderate lead protection and a positive stop to control heater insertion depth. The fitting is also useful in applications where a silicone or epoxy seal is required. Standard leads are 13 inches with 10 inches of wire braid, as measured from the fitting lead exit. Unless otherwise specified, leads are 3 inches longer than the braid length. When ordering, specify “WS”, WSF or “WSN”, lead length and braid length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| "WS" Extension | 7/8 | 3/4 | 3/4 | 7/8 | 1 1/8 | 1 3/8 | 1 7/8 |
| "WSF" Extension | 1 | 1 1/8 | 1 1/16 | 1 1/4 | 1 5/8 | 1 7/8 | 2 7/8 |
| "WSN" Extension | 7/8 | 1 | 15/16 | 1 1/8 | 1 7/16 | 1 7/8 | 2 7/8 |

### Style “WA”, WAF And “WAN” Wrot Fittings with Armor

The “WA” and “WAN” lead styles are stainless steel armor protected and exit from a protective wrot copper fitting. The style “WA” leads exit the cartridge through a straight coupling, while the style “WAN” armor protected leads exit through a copper elbow to provide a 90 degree lead exit. Standard lead insulation is rated at 842 °F/450 °C continuous wire temperature. “WA” and “WAN” lead systems provide substantial lead protection and a positive stop to control heater insertion depth. The fitting also accommodates silicone and epoxy potting when required. Standard leads are 13 inches with 10 inches of armor, as measured from the fitting lead exit. Unless otherwise specified, leads are 3 inches longer than the armor length. When ordering, specify “WA”, "WF" or “WAN”, lead length and armor length.

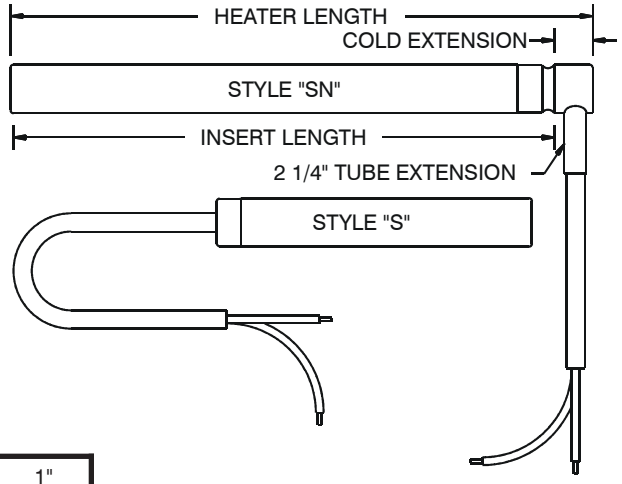



| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| "WA" Extension | 7/8 | 7/8 | 1 | 1 3/16 | 1 1/4 | 1 1/2 | 1 7/8 |
| "WAF" Extension | | | | | | | |
| "WAN" Extension | 1 1/16 | 1 1/16 | 1 3/8 | 1 5/8 | 2 1/16 | 2 1/8 | 2 7/8 |
| Armor O.D. (Max.) | 1/4 | 5/16 | 3/8 | 1/2 | 5/8 | 5/8 | 1 |

# Round Cartridge Lead Options

### Style “S”, “SN” "SP" And "SNP" SJO Cord Style Leads

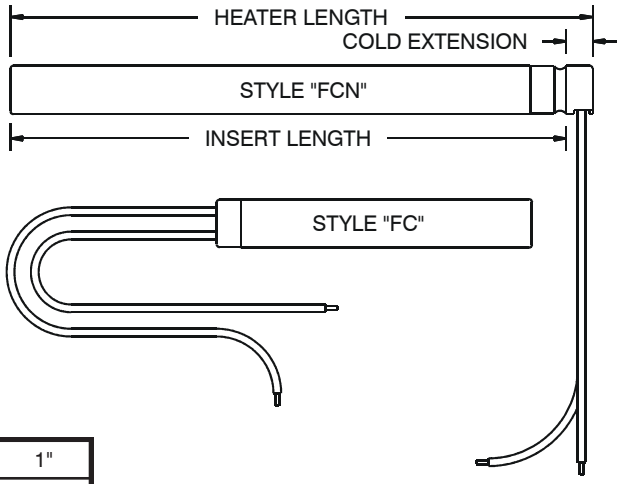
The “S” and “SN” SJO electrical cord style leads provide additional lead protection and moisture resistance in applications where leads are exposed to temperatures below 150 °F. Depending on the application a 2 to 3 inch cold section may be required to insure that the SJO cable is operating below the maximum temperature limit. Style “S” leads exit straight out the lead end of the cartridge while the leads of the style “SN” exit out the side of the sheath at 90 degrees through a protective extension tube. The lead end of the style “SN” is covered by a welded in cap. Style "SP" and "SNP" are similar but include a molded plug. The SJO cable lead styles are particularly useful in applications such as crankcase heating and food processing equipment, where the heater leads may be exposed to liquid contamination. Standard leads include consist of 36 inches of SJO cable. When ordering, specify “S” or “SN” leads and required cable length. If a molded on plug is required, specify "SP" or "SNP" and the required cable length.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .375 | .375 | .375 | .375 | .437 | .437 | .500 |

### Style “FC” And “FCN” Flexible Stainless Steel Cable Leads

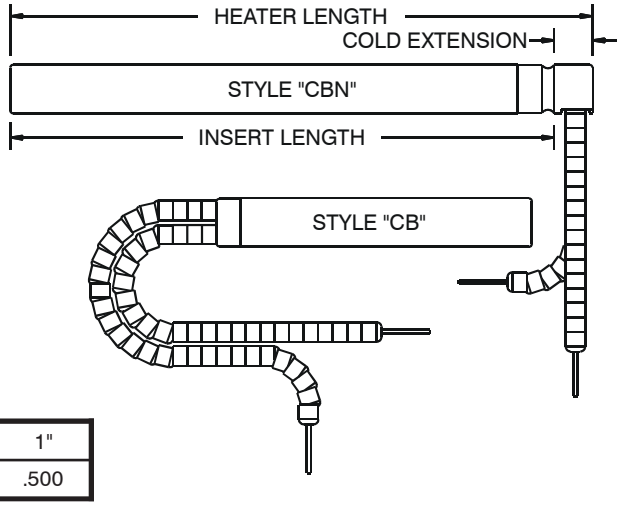
The “FC” and “FCN” style leads provide extended life in applications where severe flexing of leads is unavoidable. The lead conductors consist of flexible stainless steel stranded cable. Style “FC” leads exit straight out the lead end of the cartridge while the leads of the style “FCN” exit out the side of the sheath at 90 degrees. The lead end of the style “FCN” is covered by a welded in cap. The lead styles “FC” and “FCN” are particularly useful in applications such as sealing bars, where the heater leads must withstand constant flexing. “FC” and “FCN” leads can be combined with wire braid or armor for additional lead protection. Standard leads are teflon insulated but can also be supplied with fiberglass insulation or mica tape insulation. When ordering, specify “FC” or “FCN” leads and note any special insulation or lead protection. The stainless steel lead conductor reduces the total current capacity of the leads and can make this lead style impractical on larger high wattage heaters.




| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .250 | .250 | .250 | .250 | .312 | .312 | .375 |

### Style “CB” And “CBN” Ceramic Bead Insulated Leads

The “CB” and “CBN” style leads provide a customer specified length of solid pin leads with high temperature ceramic bead insulation. Style “CB” leads exit straight out the lead end of the cartridge while the leads of the style “CBN” exit out the side of the sheath at 90 degrees. The lead end of the style “CBN” is covered by a welded in cap. The lead styles “CB” and “CBN” are intended for applications where the heater leads are exposed to temperatures exceeding the rating of the standard lead insulation. “CB” and “CBN” leads are often combined with an additional length of crimped on conventional leads. Standard leads include 6 inches of beads on 8 inch pins. When ordering, specify “CB” or “CBN” leads, ceramic bead length and required pin length. Include any crimp connected lead length desired.

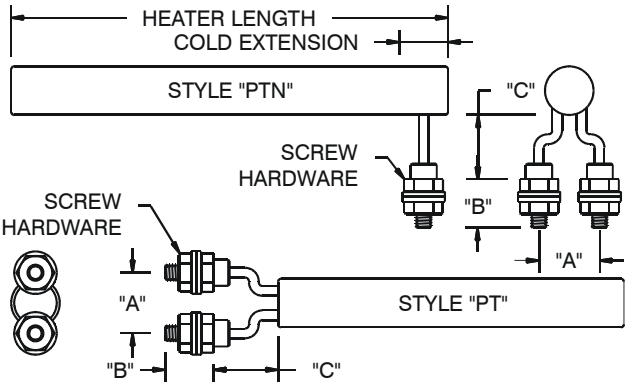



| Cartridge Dia. | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|
| Extension | .375 | .375 | .375 | .375 | .437 | .437 | .500 |

# Round Cartridge Lead Options

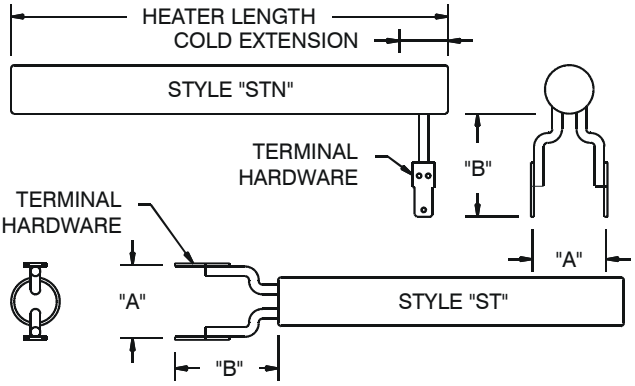
### Style “PT” And “PTN” Post Terminals

The standard “PT” and “PTN” post terminals consists of stainless steel terminals securely welded to the pins exiting the heater and are available on heaters 1/2 inch or more in cross section. Special versions of the post terminal termination utilizing terminal blocks are available for all square cartridge sizes. The post terminal lead system provides a secure external termination for heaters installed in hard wired electrical systems where simple removal of individual heaters without disturbing the wiring. Standard post terminal configurations will be supplied on square cartridges 1/2 inch or larger unless otherwise specified. When ordering, specify “PT” or “PTN” termination. Include a sketch or description of any special terminal dimensions and thread specifications.



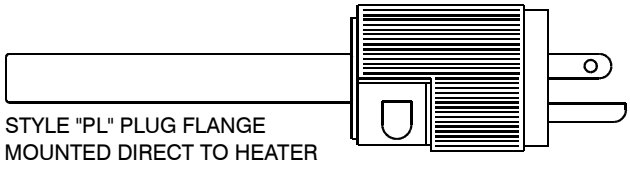

### Style “ST” And "STN" Spade Termination

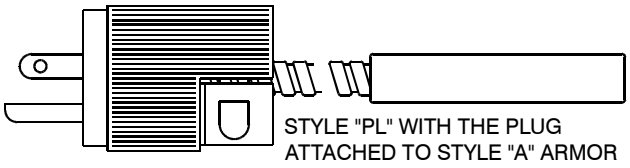
The “ST” and "STN" style terminations feature attached male spade connectors. The quick connect spade connectors are available in a range of standard sizes and configurations and can be attached to any of the square cartridge sizes. The style “ST” and "STN" terminations provide convenience in applications where the frequent connection and disconnection of the heater is required. When ordering, specify style “ST” or "STN" termination and note any special spade terminal size or design required. Include a sketch or description of any special terminal dimensions and thread specifications. Leads with matching female connectors can also be supplied. If required, please include the required lead type and lead length when placing your order.




### Style “PL” Plug Termination

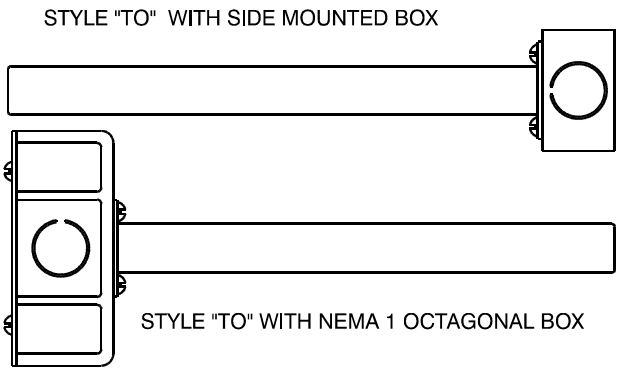
The “PL” style lead termination features an attached male plug with a nylon dead front design and a molded-in cord grip. Available plugs include straight and twist-lock blade types in both grounded and ungrounded versions. The style “PL” plug termination can be attached to any of the protected lead configurations. The style “PL” termination is primarily intended for those applications where the frequent connection and disconnection of the heater is required. When ordering, specify style “PL” termination and provide a complete description of the plug or the manufacturers plug catalog number desired. Please also include the required lead style and lead lengths when placing your order.




### Style “TO”, “TM” And “TE” Box Termination

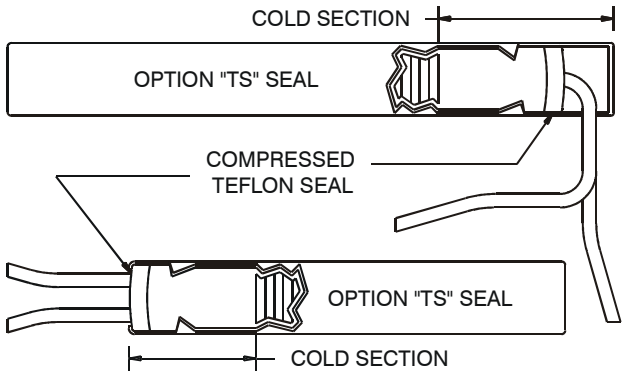
The “TO”, “TM” and “TE” electrical box terminations feature electrical box enclosures mounted to the lead end of the heater. Box style terminations enclose the heater lead connections and provide application environmental protection. Style “TO” features a standard NEMA 1 octagonal box, style “TM” a NEMA 4 moisture-proof box and style “TE” a NEMA 7 explosion proof box. Style “TO”, “TM” and “TE” terminations are useful in applications where external wiring must conform to specific wiring codes or in applications where additional protection of electrical connections is necessary. When ordering, specify “TO”, “TE” or “TE” box termination and desired terminal or lead style. If a specific box is required, please provide a complete description or manufacturers box catalog number.



# Round Cartridge Lead Seal Options

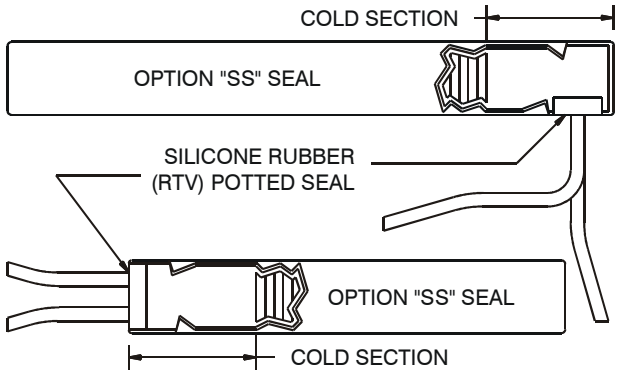
### Style “TS" Compressed Teflon Plug Lead Seals

The style “TS” lead seals feature a swaged in teflon seal plug and teflon leads. The resulting lead construction provides a contamination resistant seal which reduces the possibility of contamination from liquids such as water and oil. The teflon seal is most effective in applications where the seal is exposed to temperatures below 275 °F. Depending on the application a 1 inch or longer cold section may be required to insure that the teflon seal and leads are maintained below recommended temperature limits. Teflon seals can be combined with most standard lead styles. When ordering specify seal option “TS". Please include desired lead style and length.



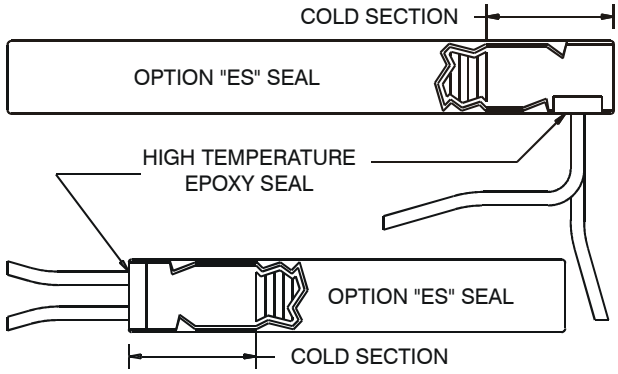

### Style “SS” Silicone Rubber Potted Lead Seals

The style “SS” lead seals consist of silicone rubber sealant potted into a cavity at the lead end of the cartridge. The resulting seal construction reduces the possibility of contamination from liquids such as water and oil. The silicone rubber potted lead seal is most effective in applications where the seal is exposed to temperatures below 450 °F. Depending on the application a 1 inch or longer cold section may be required to insure that the silicone rubber seal and leads are maintained below recommended temperature limits. Silicone rubber seals can be combined with most standard lead styles. When ordering specify seal option “SS". Please include desired lead style and length.




### Style “ES” Epoxy Potted Lead Seals

The style “ES” lead seals consist of high temperature epoxy potted into a cavity at the lead end of the square cartridge. The epoxy sealed lead construction provides both contamination and abuse resistance. The seal reduces the possibility of contamination from liquids such as water and oil. The standard epoxy seal is most effective in applications where the seal is exposed to temperatures below 500 °F. Epoxy with temperature ratings of 600 °F and 700 °F is available for higher temperature seal applications. Depending on the application a 1 inch or longer cold section may be required to insure that the epoxy seal is maintained below recommended temperature limits. Epoxy seals can be combined with most standard lead styles. When ordering specify seal option “ES". Please include desired lead style and length.




### Style “CS” MI Cable Lead Seals

The style “CS” lead seals consist of two high temperature, single conductor, mineral insulated cables, braze sealed to the cartridge. Leads are terminated into sealed transition fitting on each cable. The mineral insulated cable provides both contamination and physical abuse resistance. The seal reduces the possibility of contamination from liquids such as water and oil. The sealed cable area at the end of the cartridge can withstand temperatures up to 1200 °F. This construction requires a 1/2 inch cold section, in which to terminate the cable. Style "CS" seals can be combined with most standard lead styles. When ordering specify seal option “CS". Please include cable length, desired lead insulation and lead length.