



DUREX INDUSTRIES

Engineered Thermal Solutions for Industry

An ISO 9001:2000 Certified Company

**Electric Heaters
Temperature Sensors
Control/Display Modules
Custom Thermal Products**





DUREX INDUSTRIES - ABOUT US

Durex Industries has been a manufacturer of high quality electric heaters and temperature sensors since 1980. Serving a diverse customer base, Durex products are critical components for major equipment manufacturers operating in industries such as plastics, packaging, medical, semiconductor processing, foodservice, military technology, and many process control applications in chemical and petroleum processing.

Over the years, Durex has grown to meet the new challenges of the market through product development, continuous process improvements, and a commitment to high quality standards. Our mission is total customer satisfaction through effective customer communication, on-time deliveries, defect-free products, and a total quality system that promotes constant improvement of our services and operations.

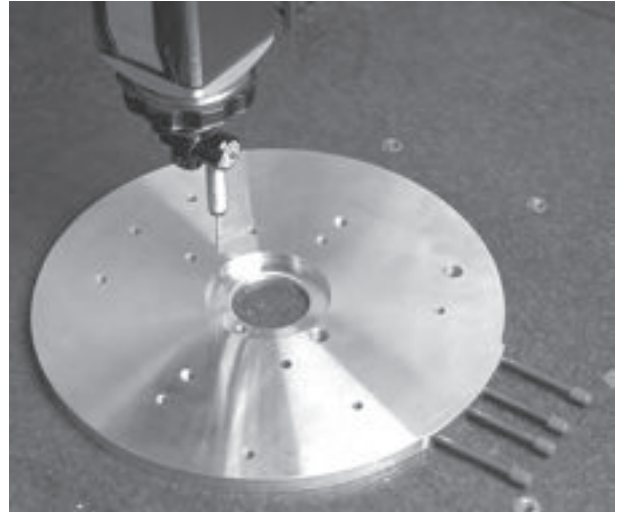


Our design and manufacturing capabilities are diverse and flexible to satisfy the customers' requirements. Durex products range from standard off-the-shelf designs to complex thermal systems. Our engineering experience supports our customers with product solutions from concept through production. State of the art design software allows our staff to provide dynamic visual enhancements of prototype designs prior to manufacturing. Due to the increasing demand for Durex products and services, the manufacturing facility in Cary, Illinois has been expanded to 120, 000 square feet, which includes additional capacity for research and development of new products for tomorrow's applications.

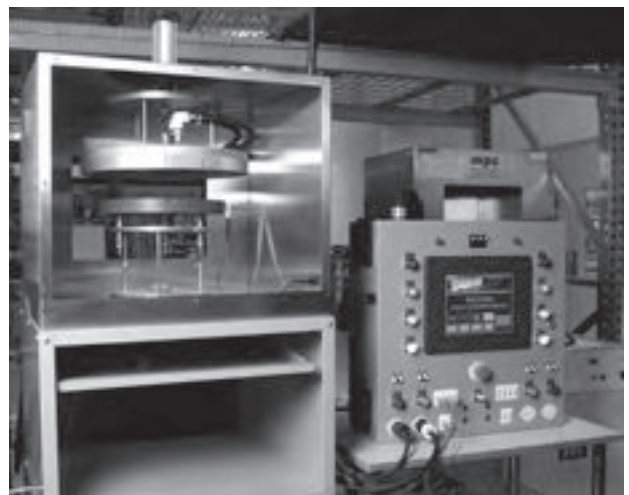


DUREX INDUSTRIES - ABOUT US

A diverse mix of manufacturing operations supports 14 separate thermal component product families with diverse vertical manufacturing operations to control quality and maximize flexibility to customer demand. These in-house operations include heater element manufacturing, foundry operations, heat treating, CNC bending, CNC machining, waterjet cutting, plasma and orbital welding, anodizing and passivation, and Class 1000 clean room assembly.



Our quality assurance capabilities as an ISO 9001: 2000 registered company mirror our commitment to total customer satisfaction. These capabilities include a full service calibration lab traceable to NIST, digital in-house x-ray facility, helium leak test, coordinate measuring machine, temperature profiling acquisition and display, and on-going accelerated life cycle testing.





DUREX INDUSTRIES - ABOUT US

Our OEM Plus service is unique to the industry and is a value added service designed to give a competitive edge to our OEM customers. This program provides more than just quality parts. It maximizes service aspects that will cut operating costs for customers that require more value for the same dollar. The flexible components of this program include:

- Integrated Scheduling and Reporting
- Assigned Customer Service Representatives
- Rapid Prototypes
- Engineering Approval Drawings
- Private Labeling
- No Charge Drop Ship of Component Parts
- Emergency Service
- Blanket Stock and Warehousing



Whether you require a unique thermal component designed for a tough application or a more common part designed to meet the competitive demands of your industry, Durex is ready to prove our commitment to you and your success.

Call us today for immediate service or visit our website.

www.durexindustries.com



CUSTOMER ASSISTANCE

Durex Industries maintains a national network of local sales representatives and distributors to assist you with product identification, application assistance, shipments from stock, and general order requirements.

TOLL FREE FACTORY: 1-800-762-3468
1-847-639-5600

DIRECT FAX: 1-847-639-2199

GENERAL E-MAIL: sales@durexindustries.com

INTERNET ASSISTANCE

All of our company and product information is available 24/7 at
www.durexindustries.com

- | | |
|------------------------------------|---|
| ■ Searchable Product Data | ■ Direct Access to Engineers |
| ■ New Product Updates | ■ National and Regional Trade Show Appearances |
| ■ Electronic RFQ Submission | ■ Representative and Distributor Locator |
| ■ Press Release Updates | |

www.durexindustries.com



As an ISO 9001:2000 registered manufacturing operation, Durex Industries provides value-added support services for all of our products:

- NIST Temperature Calibration Lab
- Heat Profile Certification
- On-Site X-Ray Facility
- CMM Inspection and Certification
- On-Site Teflon® Coating
- On-Site Anodizing Facility
- Helium Leak Testing
- Hydrostatic Pressure Testing
- Life Cycle Testing
- 3D Modeling
- Class 1000 Clean Room Facilities
- Chemical Clean Operation
- FEA Analysis
- Custom Packaging and Environmental Storage
- On-Site Heat Treating and Stress Relieving
- On-Site Plastic and Rubber Molding Process

QUALITY POLICY

We are committed to total customer satisfaction through the competitive value of quality products and services, on-time deliveries, and the integrity of a total quality system that promotes continuous improvement in our services and operations.



DUREX INDUSTRIES

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DUREX INDUSTRIES



CAST-IN HEATER PRODUCTS

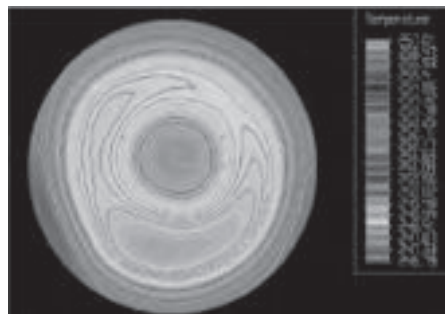
Durex Industries is a leading manufacturer of cast-in heater products in North America. When you choose a supplier of critical thermal components, reliability, quality, and experience are paramount to your decision. As an ISO 9001:2000 registered firm, Durex is a totally integrated manufacturer of these heater products. We control the entire process in our Cary, Illinois manufacturing facility. This process includes material certification, heating element manufacturing and forming, our in-house foundry, CNC machining centers, electrical terminations, Teflon® coating, and final inspection.

Our years of experience in the design of thermal components are a great value to our customers. The engineering staff, tools, and services available to assist the design staff of our customers can provide a great savings of time and money in the design



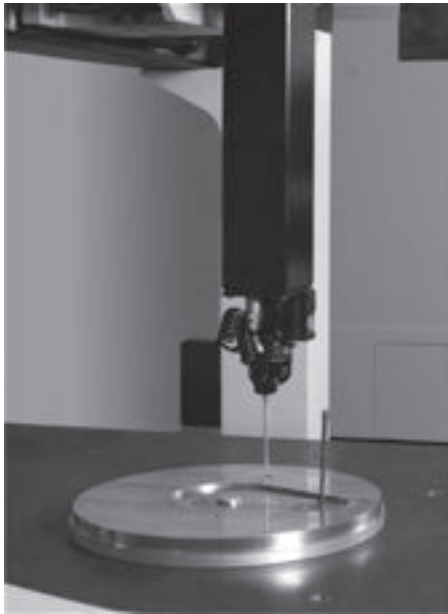
process. Our engineering tools and services include:

- Rapid Prototyping
- Solidworks 3D Modeling
- FEA Analysis
- In-House X-Ray Capabilities
- Heat Uniformity Profiling
- Life Cycle Testing and Analysis





CAST-IN HEATER PRODUCTS



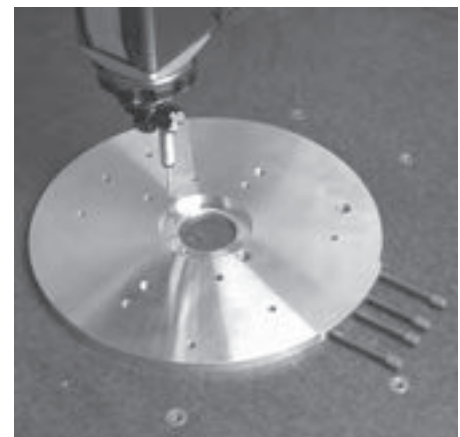
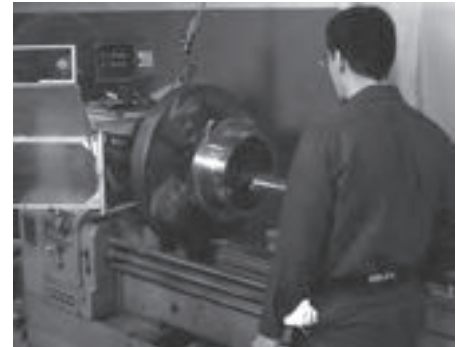
As we continue to discover new applications for our cast-in products, our heaters can be found as thermal components in a wide array of industries.

- Semiconductor Processing
- Plastics Processing
- Foodservice
- Packaging Machinery
- Paper Processing
- Hot Melt Adhesives
- Medical Equipment
- Heat Transfer Presses
- Textile Manufacturing

Manufacturing companies in America require an edge to be competitive in the global market.

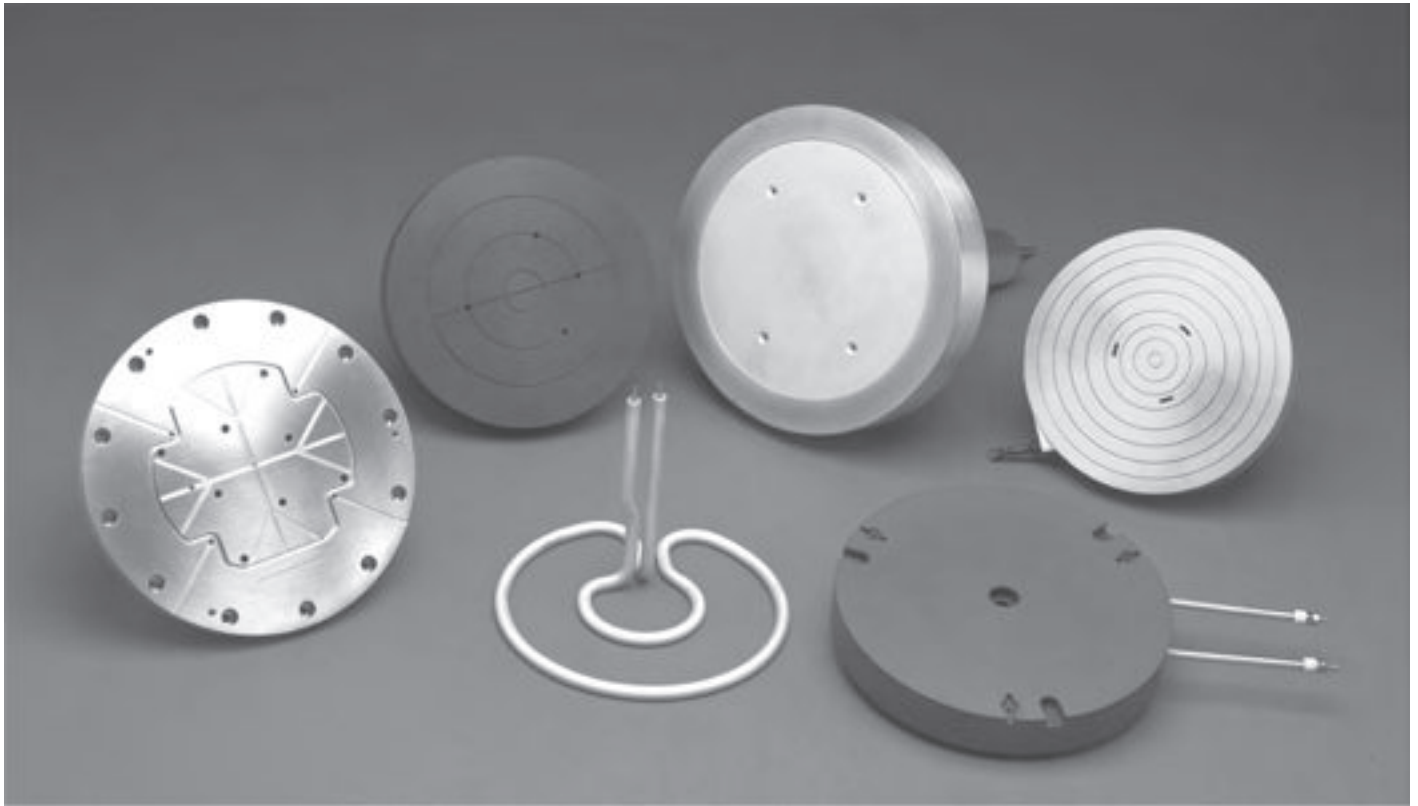
We realize that our value package is more critical now than ever before to the success of our business partners. To be the best in our business, Durex has streamlined operations and enhanced manufacturing techniques, providing our customers with the most competitive pricing available, without sacrificing quality. This value package also includes custom support services tailored to individual customer requirements. These can include systematic order reporting, stocking agreements, custom packaging, drop shipping, emergency service, custom testing and certification, remote inventory, private labeling, and international shipping support.

We welcome the opportunity to discuss your application requirements in detail. Our staff remains ready to prove why Durex Industries is a leader in the Thermal Components industry.





ADVANCED THERMAL SOLUTIONS FOR SEMICONDUCTOR PROCESSING



CVD

Photolithography

Stripping

PVD

Etching

Probing

Wafer Annealing

Plasma Ashing

Flat Panel

High-performance electric platen heaters and related products are available from Durex for all aspects of the semiconductor production process.

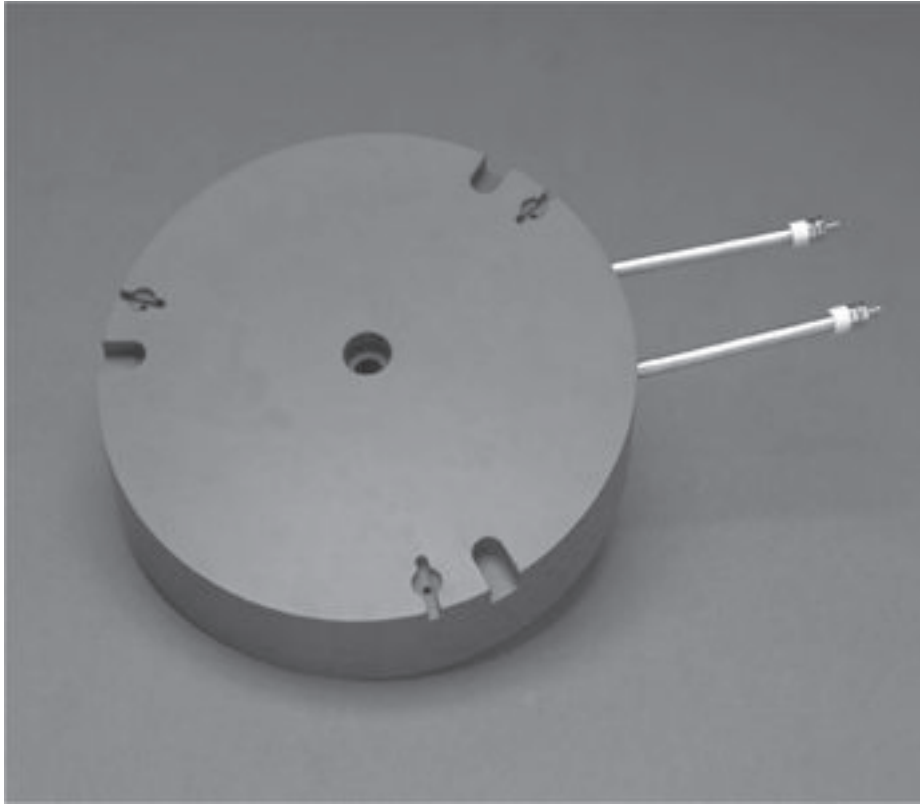
Durex engineers are specialists in designing and building thermal processing solutions for the machinery and equipment OEM's in service to the semiconductor industry, as well as contract fab shops, sub-assemblers

and others who work in this high-precision market. All our capabilities described previously are utilized in this market, in which Durex is an acknowledged leader.

The products shown here have been produced for specific customer applications, but all are available in the same or modified forms for your uses.



ADVANCED THERMAL SOLUTIONS FOR SEMICONDUCTOR PROCESSING



BAKE PLATENS

Utilizing state-of-the-art heater technology, Durex manufactures precision bake platens specifically for processing 200mm and 300mm wafers. These platens are cast from pure aluminum (99.7%) to ensure maximum operating temperatures of 450°C (842°F) with minimum risk of process contamination. The casting process is controlled to eliminate any defects in the

machined surface or casting body caused by porosity. A mineral-insulated heating element distributed throughout the casting provides surface temperature uniformity to $\pm 1\%$ or better of the process operating temperature. A hard-anodized finish provides an abrasion-resistant dielectric barrier on the working surface.



BAKE/CHILL PLATENS

Durex bake/chill platens have essentially the same operating specifications as our bake platens, with the addition of a cooling function. A precision formed cooling tube is added as an integral component to the heater assembly in the body of the casting. This function can be used to rapidly cool the working surface of the platen or to act as a heat exchanger for liquids and gases. A pressure test on the finished part assures the integrity of the cooling tube after the casting process. The platen can also include an integral temperature sensor as part of the assembly.



ADVANCED THERMAL SOLUTIONS FOR SEMICONDUCTOR PROCESSING

PEDESTAL HEATERS

These pedestals comprise a bake or chill platen with an aluminum "shaft" attached to the underside of the platen by electron beam welding. A helium leak test insures a vacuum tight assembly. The surface of the pedestal is precision machined with a flatness of $\pm 0.0005"$ and includes lift pin holes and proximity pins to customer specifications. Various termination options are available to customize the cooling tube exits for new or existing applications.



HOT CHUCKS

Hot chucks or "heated tools" deliver precise heat to wafers during the manufacturing process. These platens are individually customized with vacuum channels on the working surface, as well as specific pin hole locations and other surface or backside mounting holes. Manufactured from pure aluminum (99.7%), these hot chucks have a temperature uniformity of better than $\pm 1\%$ of the process temperature and a flatness



tolerance of $\pm 0.0005"$ across the entire surface. A precision lapped surface is standard, with a hardcoat anodized finish available.

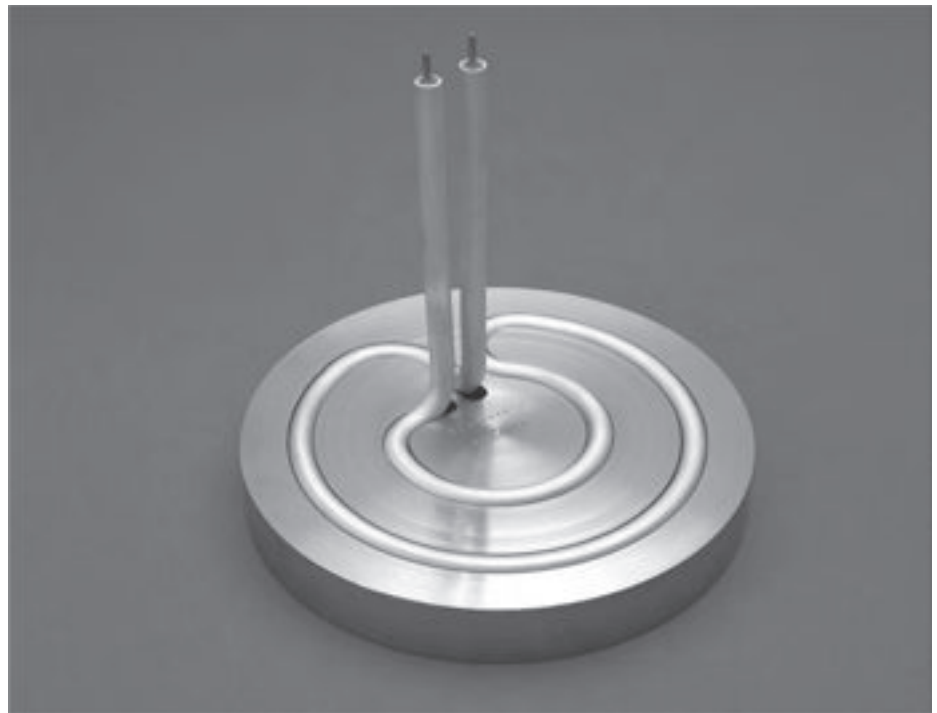


ADVANCED THERMAL SOLUTIONS FOR SEMICONDUCTOR PROCESSING

HIGH-TEMPERATURE PLATENS

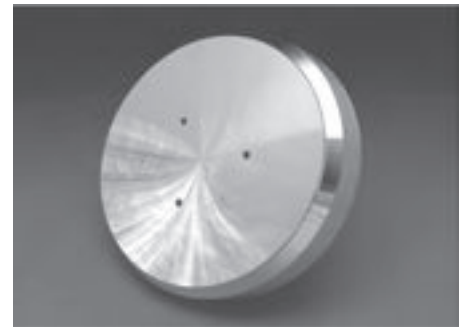
When temperatures exceed the 450°C (842°F) range provided by aluminum platen heaters, Durex offers a unique high-temperature platen heater to extend the range available for a machined heater. The heater body is typically constructed of stainless steel, with other materials such as Nickel, Inconel®, or Copper available, as needed.

The assembly is provided as a single component. A precise groove is machined into the heater body, as determined by the heat profile requirements of the surface. A mineral-insulated heating element is press-fit into the groove to guarantee intimate contact with the heater body, which optimizes heater life and temperature uniformity on the working surface. In addition to high-temperature platens, these units can be manufactured as pedestals and welded vacuum tight.



STANDARD PEDESTAL HEATERS

The standard pedestal heaters manufactured by Durex are designed to provide a quick solution for wafer processing applications. These heaters are designed specifically for 200mm and 300mm wafers. This standard design usually eliminates the need for costly tooling and mold design associated with newly designed custom heaters. Ideal for R&D, rapid prototyping and emergency repair. Made from 356 aluminum standard, cleaned and packaged to cleanroom specification,



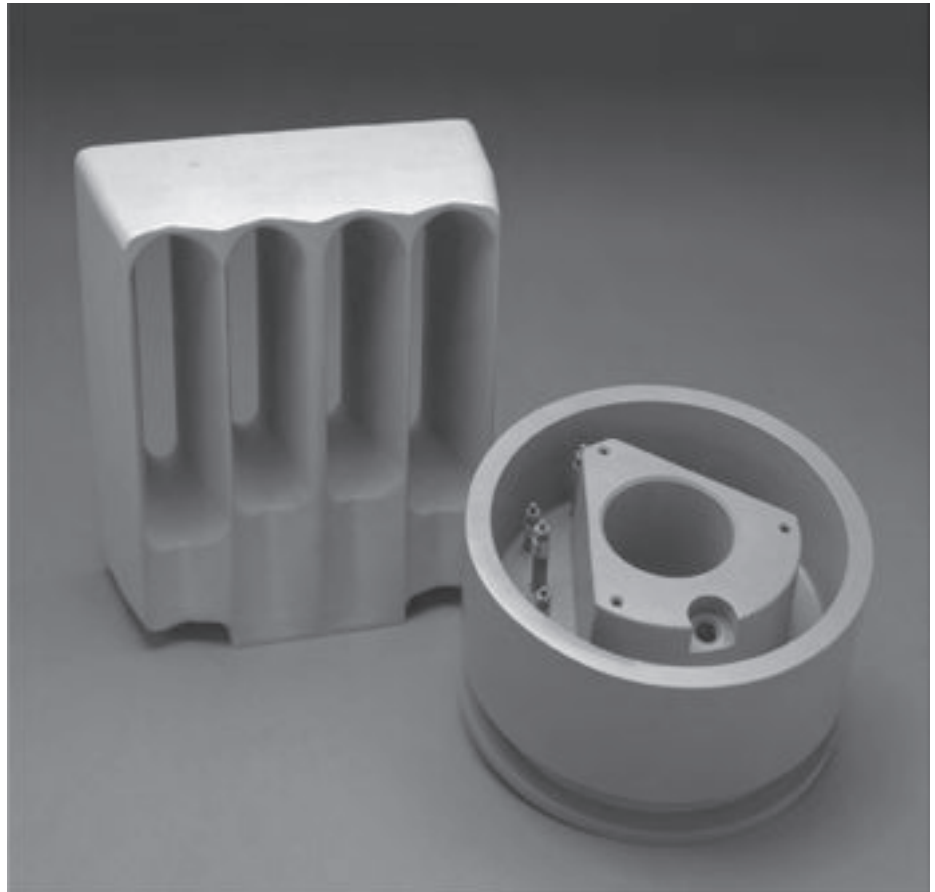
shipped ready to use. A variety of options can be incorporated into the final product with no additional tooling or engineering cost, including 170.1 aluminum (99.7% pure), hard-coat anodized surface, lift pin holes, vacuum channels, sapphire balls for wafer proximity spacing and several electrical termination styles.



DURACAST™ CUSTOM HEATED PARTS

Custom designed cast-in thermal components are more than a heating element that is cast into metal. They are heated parts, which become integral components of complex processing systems. Durex has the knowledge and expertise to assist with your design of these critical components and supply them in accordance with your stringent requirements.

The heated part design eliminates the need for multiple part sourcing and assembly, as well as provide a more uniform thermal process to your application. Our engineering staff can design a part that is "plug and play" for your application. Whether you have a basic concept or a complete drawing with specifications, we can help. Our goal is to assist you with rapid prototypes for your heated part application so you can stop searching and start manufacturing!



Our typical parts are manufactured with 319 aluminum, 356 aluminum, pure aluminum, or a bronze alloy, depending on the application. Our in-house foundry controls the casting process to provide parts that are free of voids and porosity. Experienced CNC technicians perform intricate machining operations that customize your parts to specification, every time.

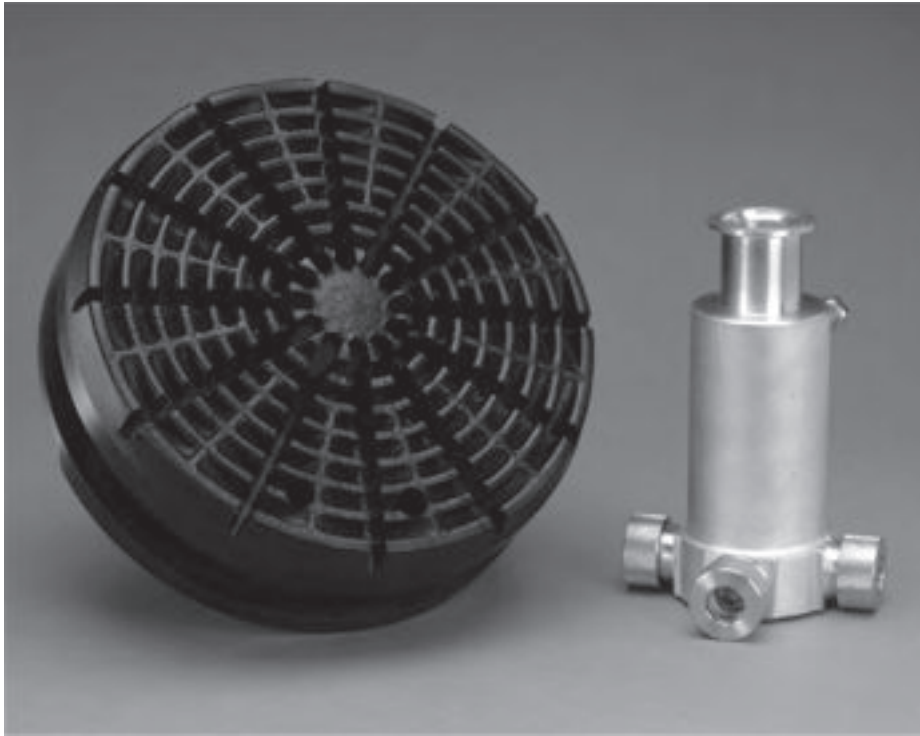
Quality is manufactured into each Durex part from the very beginning. As an ISO 9001:2000 registered firm, our quality system is designed to deliver the accuracy and reliability that our customers have come to expect. We welcome the opportunity to prove our commitment to quality, service, and total customer satisfaction.



DURACAST™ CUSTOM HEATED PARTS

Heated Parts Support Services

- CAD/CAM and Solidworks
3D Design
- FEA Analysis
- CNC Machining Centers
- Lapping Equipment for
Finishing
- Helium Leak Testing
- CMM Inspection Reports
- Chemical Cleaning
- Class 1000 Clean Room
Packaging
- Special Surface Coating
of Teflon® (in-house),
Anodizing, and Electroless
Nickel
- In-House X-Ray Station
- Life Cycle Testing Stations



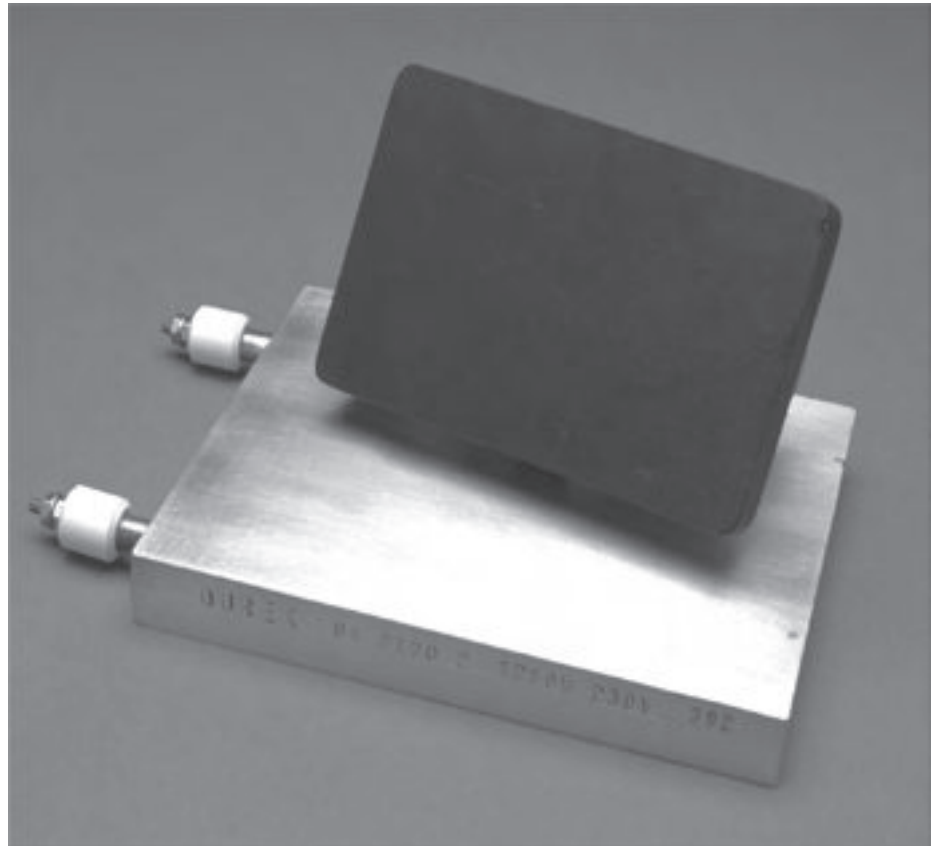


DURACAST™ PLATEN HEATERS

Platen heaters are a versatile cast-in design that can be adapted to a myriad of applications. Typical uses are heat transfer presses, foodservice equipment, die heaters, packaging equipment, and commercial pre-heaters.

Manufactured from aluminum or bronze alloys, the platen heater consists of a tubular heating element that is designed and formed to provide maximum efficiency and temperature uniformity on the working surface of the casting. The platens can also be designed with integral cooling tubes or as stand alone cooling platens for chilling applications.

The working surface of the platen heater can be supplied with various machined finishes to customer specifications. Durex can also provide a ground surface for stringent flat surface requirements. In addition, surface coatings of electroless nickel, Teflon®, and



hard-coat anodizing can be applied per application requirements.

Mounting options can be cast in the design of the platen or machined as a secondary process. These options include threaded stand-offs, cast-in anchors, ribbed back supports, tapped holes, and mounting slots. Electrical terminations can be threaded terminals, flexible wire,

three-prong electrical plugs, or NEMA housings.

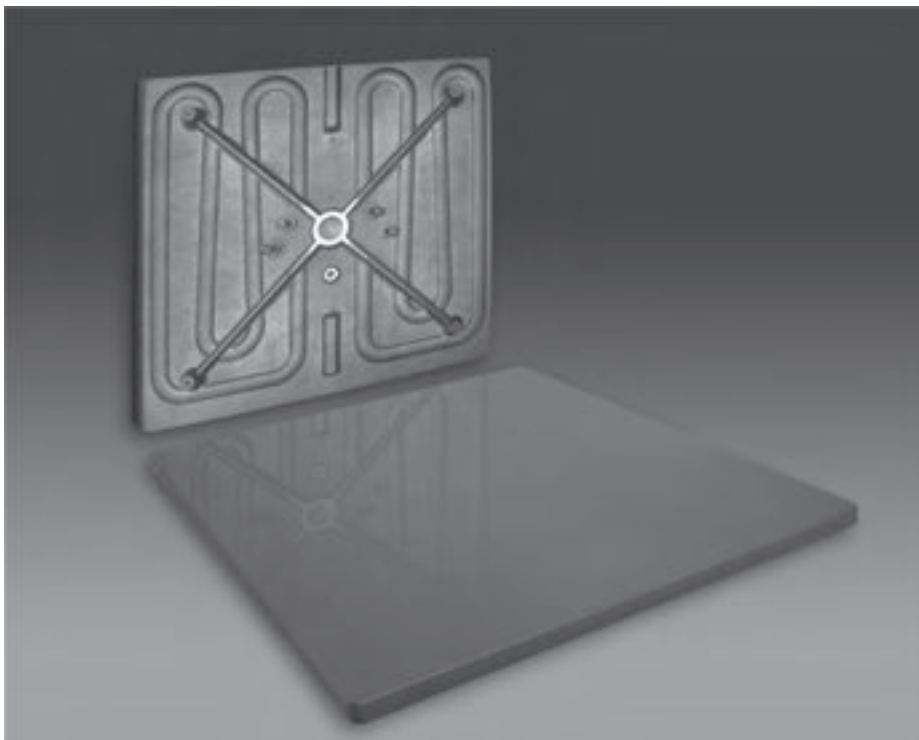
Durex manufactures all platen designs to customer specification. Engineering assistance is available to help create a new design or modify your existing one using our FEA analysis profiles and rapid prototype simulations.



DURACAST™ PLATEN HEATERS

Design Features

- Aluminum or Bronze cast alloys
- Custom Machined Surfaces
- Surface coatings of electroless Nickel, Teflon or Anodized
- Liquid cooling option
- Flexible electrical terminations
- Single or three-phase electrical circuits
- Custom mounting options





DURACAST™ RING HEATERS



Cast-in ring heaters are used in various punching, forming, sealing, and warming applications. They are also a direct replacement for mica style ring heaters. The cast-in heating element delivers a robust construction in a low profile design that is well suited for continuous production applications. The ring design can include mounting features such as cast mounting tabs, threaded inserts, and drilled holes.

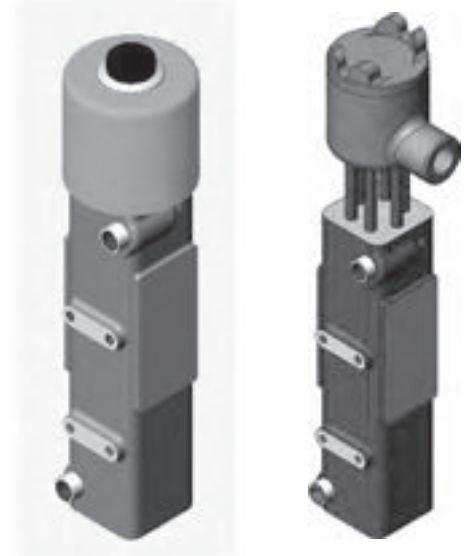
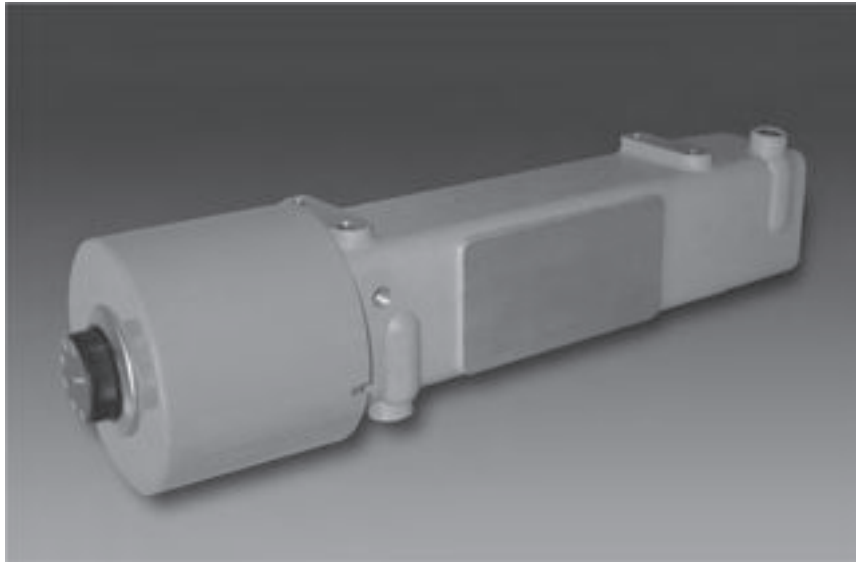
Ring heaters can also be designed as die sets for heated stamping applications.

Features:

- Low profile construction as thin as .50"
- Engineered to replace any existing ring design
- Available in aluminum or bronze
- Custom electrical plug terminations
- Cast-In anchors for heavy duty threaded mounting holes
- Precision machining of surfaces and mounting holes
- Flexible lead wire terminations of any length



DURACAST™ DuroFlow HEAT EXCHANGER



The DuroFlow is a cast-in heat exchanger designed to provide superior heat transfer characteristics in flow applications. The heating element is integrated with a helically coiled tube and cast-in aluminum for maximum efficiency. The result is a compact heat transfer component that can be modified to endless sizes and heat requirements.

The engineered construction of the DuroFlow can provide significant cost, space, and performance advantages over standard circulation heater

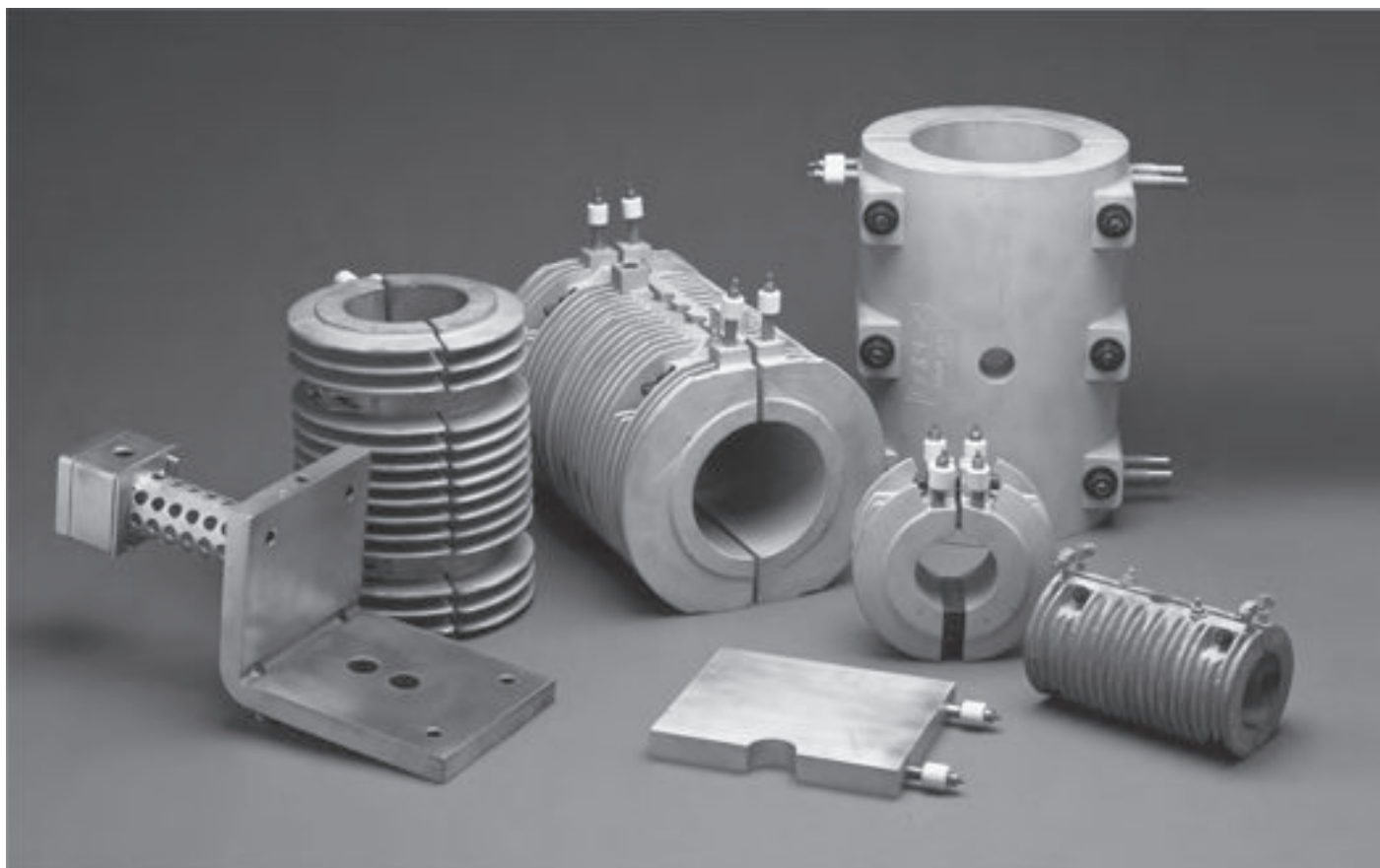
designs. The cast-in aluminum construction allows precise temperature control of the application material. The internal tube construction can be designed to handle various flow rates, dwell times, and chemically resistive

requirements. Mounting options include machined platforms with threaded holes or cast-in brackets designed per application. Inlet and outlet terminations can be cast-in threaded fittings or plain tube extensions.

Features:

- Integral heating and cooling in one compact design
- Wide variety of fluid tube and electrical terminations
- Versatile machining options for application mounting
- Available with integral temperature sensors or hi-limits
- Body can be painted or coated to customer specification

DURACAST™ HEATERS FOR PLASTICS PROCESS MACHINERY



Durex Industries is a leading edge manufacturer of cast-in heater products for the plastics processing industry. Our products are utilized as the standard for thermal processing on plastics process equipment throughout the world.

Engineering of our cast-in products for extrusion applications is based on

our years of expertise in development of these products for the largest equipment manufacturers in the world. We know what works, why it works, and how to manufacture these designs with the least possible cost.

As the plastics equipment market continues to become more competitive and productive, Durex has risen

to the challenge of providing the highest quality OEM components designed to meet the requirements of production, at the most competitive prices available. However, quality products and competitive prices are only as good as the quality of service that is provided. To meet the increasing service demands of our customers' and the markets they serve, Durex



DURACAST™ HEATERS FOR PLASTICS PROCESS MACHINERY



A representative list of products we supply for plastics processing equipment would include:

- Liquid cooled barrel heaters
- Air cooled barrel heaters
- Shroud assemblies for air cooled heaters
- "L" shaped barrel heaters
- Die heaters
- Vent and Cut-Out heaters
- Ring heaters
- Feed Throats

Durex Industries has thousands of standard tooling designs available for immediate use. Our in-house tooling capability can rapidly produce any design available on the market. If it has been made or can be made, Durex can do it.

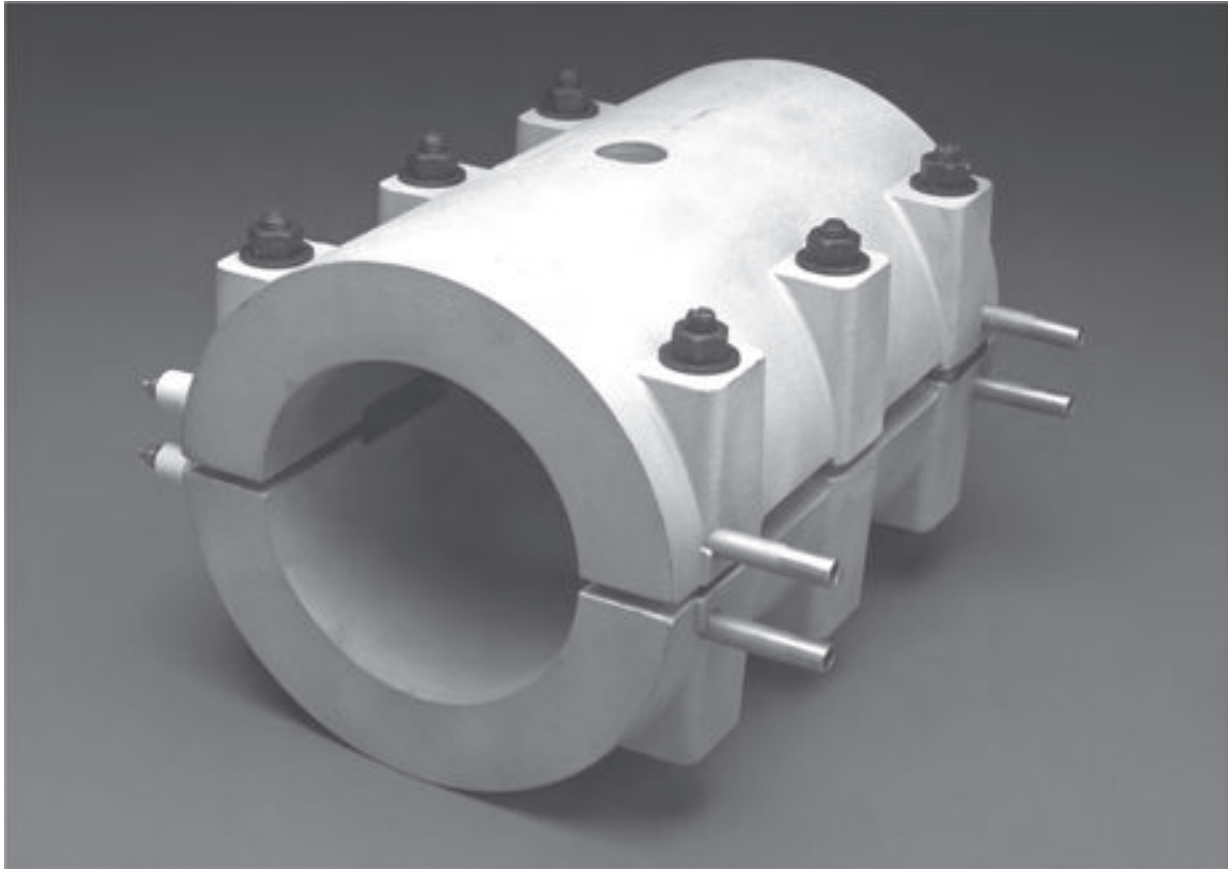
has implemented unique production scheduling methodologies, cellular manufacturing operations, expanded plant operations and

streamlined processing of our orders from beginning to end. The bottom line is to provide the right product, at the right price, at the right time, period.

Our customer service and design staffs remain ready to satisfy your plastics equipment requirements.



DURACAST™ LIQUID COOLED BARREL HEATERS



Liquid cooled cast-in heaters are designed to combine the function of heating and cooling the barrel during the extrusion process. These heaters are available with a wide range of standard and custom options for maximizing machine operations using various material types.

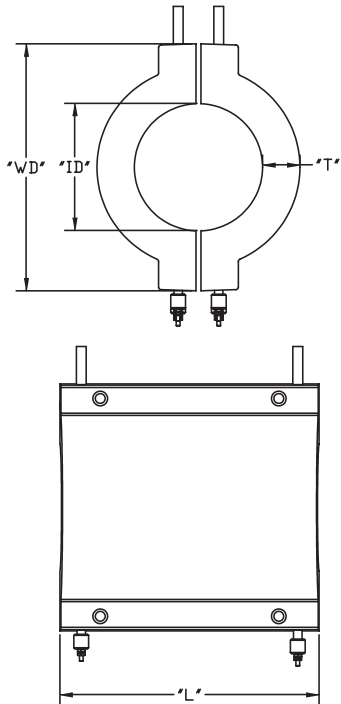
Features:

- High quality Incoloy or stainless steel cooling tubes
- Available with Dual Cooling for reduced downtime or increased cooling capacity
- Large .430 diameter heating element with large cold pin for rugged termination
- Customized cooling tube options for specific applications
- Mounting to barrel can be bolt-on or strap-on design

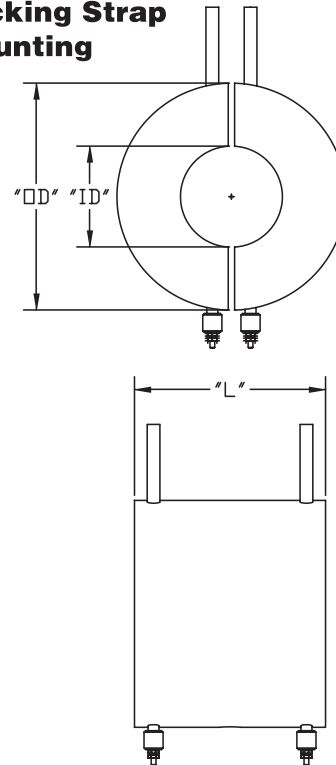


DURACAST™ LIQUID COOLED BARREL HEATERS

Bolt Mounting



Locking Strap Mounting



Ordering Information

Mounting Option:

☐ Bolt

☐ Locking Strap

Material:

☐ Aluminum

☐ Bronze

Inner Diameter ("D"):

Length ("L")

Wattage (Per Half):

Voltage (Per Half)

Number of Elements (Per Half):

Termination Type (See page at
end of section):

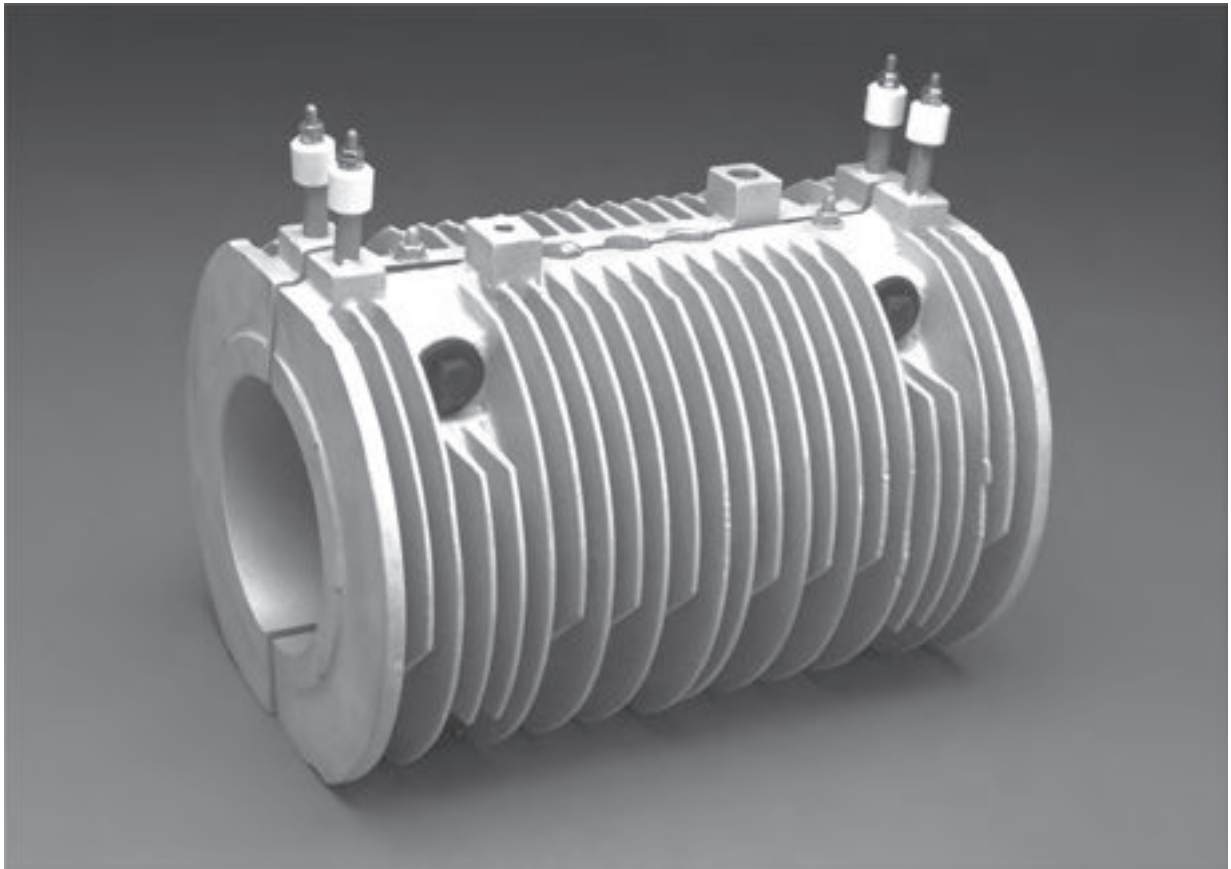
Cooling Termination Type:

Hole on Notch Location:

Special Features:



DURACAST™ AIR COOLED BARREL HEATERS



Air cooled barrel heaters utilize a cast fin pattern to maximize airflow over the body of the casting for cooling during the extrusion process. These heaters can be designed for individual shrouds with blowers or other forced air systems. Aluminum alloys are the primary materials used due to their excellent heat transfer characteristics. Bronze alloys can also be used with this

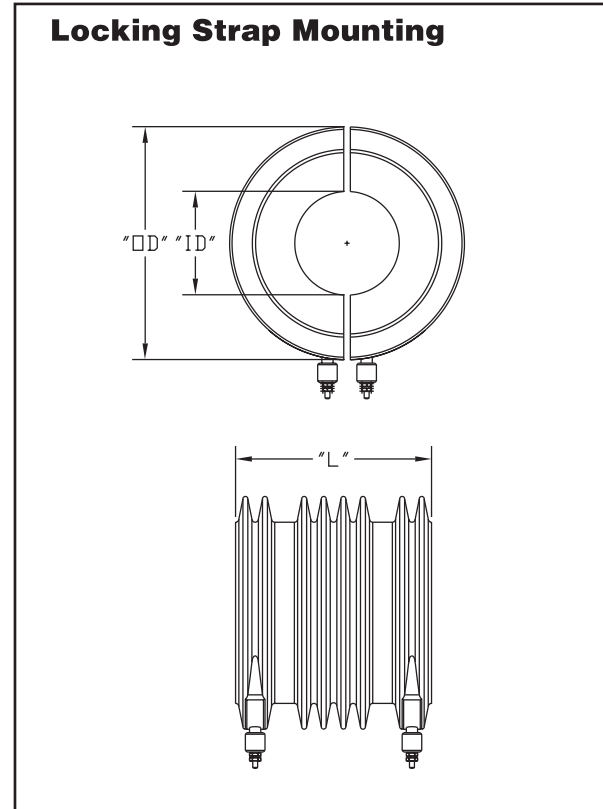
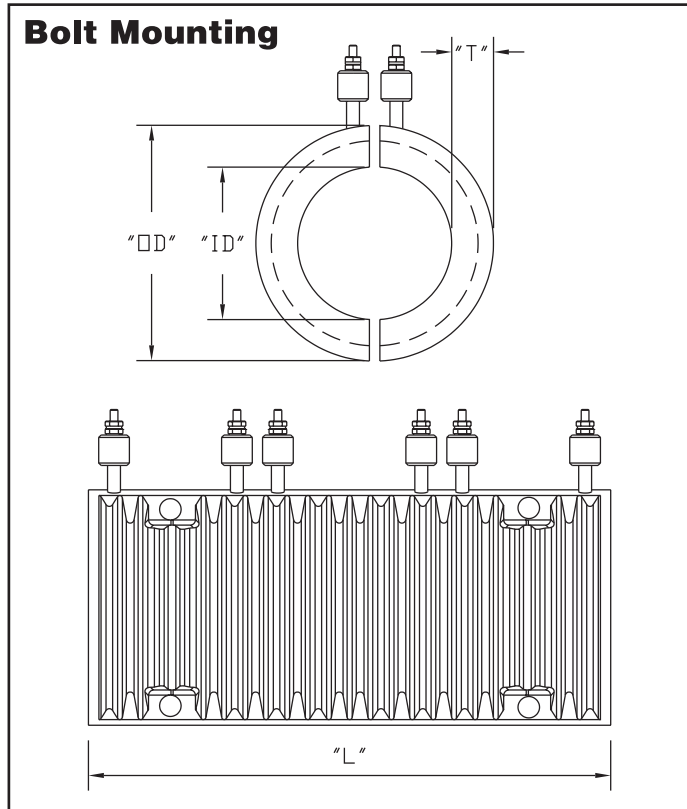
design for applications that require service temperatures in excess of 750°F.

Features:

- Manufactured with various fin patterns for maximum airflow distribution
- Available with low profile fins for space restricted designs
- Mounting to barrel can be bolt-on or strap-on design
- Engineered to fit any existing shroud assembly
- Wide variety of heavy duty electrical termination options



DURACAST™ AIR COOLED BARREL HEATERS



Ordering Information

Mounting Option:

☐ Bolt

☐ Locking Strap

Material:

☐ Aluminum

☐ Bronze

Inner Diameter ("D"):

Length ("L")

Wattage (Per Half):

Voltage (Per Half)

Number of Elements (Per Half):

Termination Type (See page at
end of section):

Hole on Notch Location:

Special Features:



DURACAST™ AIR COOLED SHROUD AND BLOWER SYSTEMS



Air cooled fin heaters with an integral shroud and blower can provide an efficient, self contained heating and cooling system for each zone of the extruder barrel. The shroud system can be manufactured as a two piece aluminum casting or as a stainless steel clam shell and fits tight to the heater. The blower inlet throat is designed to maximize airflow into the shroud assembly,

allowing the cooling fins of the heater to disperse the

flow for even cooling of the barrel section.

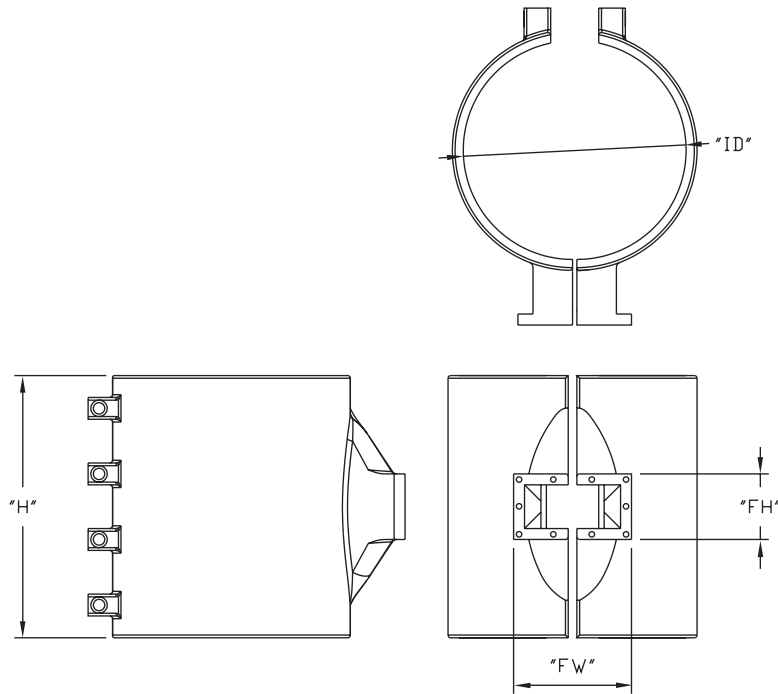
Features:

- Shrouds are manufactured as cast aluminum or bronze
- Internal air deflector system for maximum airflow
- Vertical or horizontal mounting platforms for blowers
- Custom mounting platforms for customer supplied blowers
- Manufactured to support standard 145CFM to 495 CFM blowers

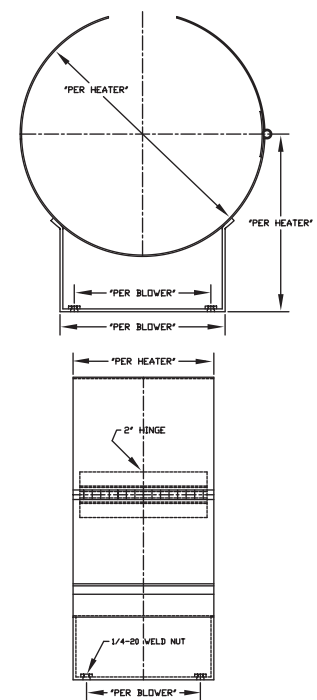


DURACAST™ AIR COOLED SHROUD AND BLOWER SYSTEMS

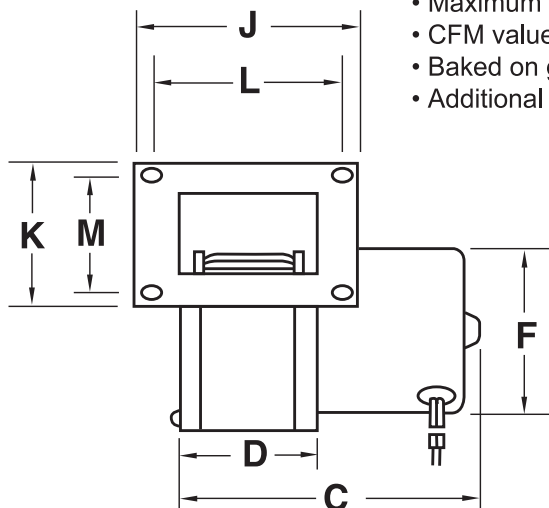
Cast Aluminum Shroud



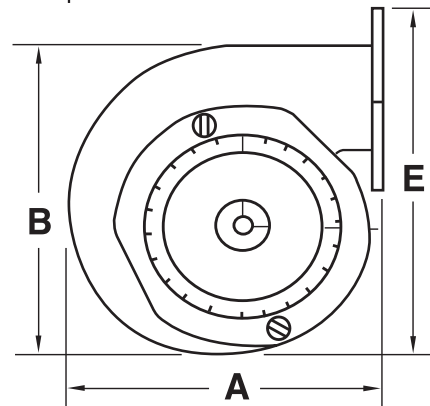
Sheet Metal Shroud



Part Number	Voltage	Hz	RPM	Amps	CFM	Outlet (In.)		Dimensions (In.)									
						Height	Width	A	B	C	D	E	F	J	K	L	M
356001	115	60/50	1530	2.9	465	3 5/8	8 1/16	8 13/16	9 7/8	9 1/4	8 3/32	12	3 5/16	9 15/32	5	8 13/16	4 3/8
356006	230	60/50	1570	1.7	495	4 1/8	5 1/8	10 5/16	11 1/8	9 1/2	5 1/4	12	4 7/16	6 5/8	5 5/8	6	5
356010	115	60/50	3160	1.54/1.37	148	2 1/16	3 1/4	5 5/16	5 3/4	7 1/2	3 5/16	6 1/2	3 5/16	4 19/32	3 1/2	3 31/32	2 7/8
356040	230	60/50	1610	.98/.93	265	3 11/16	4 1/8	8	9 7/8	7 9/16	4 3/16	10 7/8	3 5/16	5 1/2	5	4 7/8	4 3/8

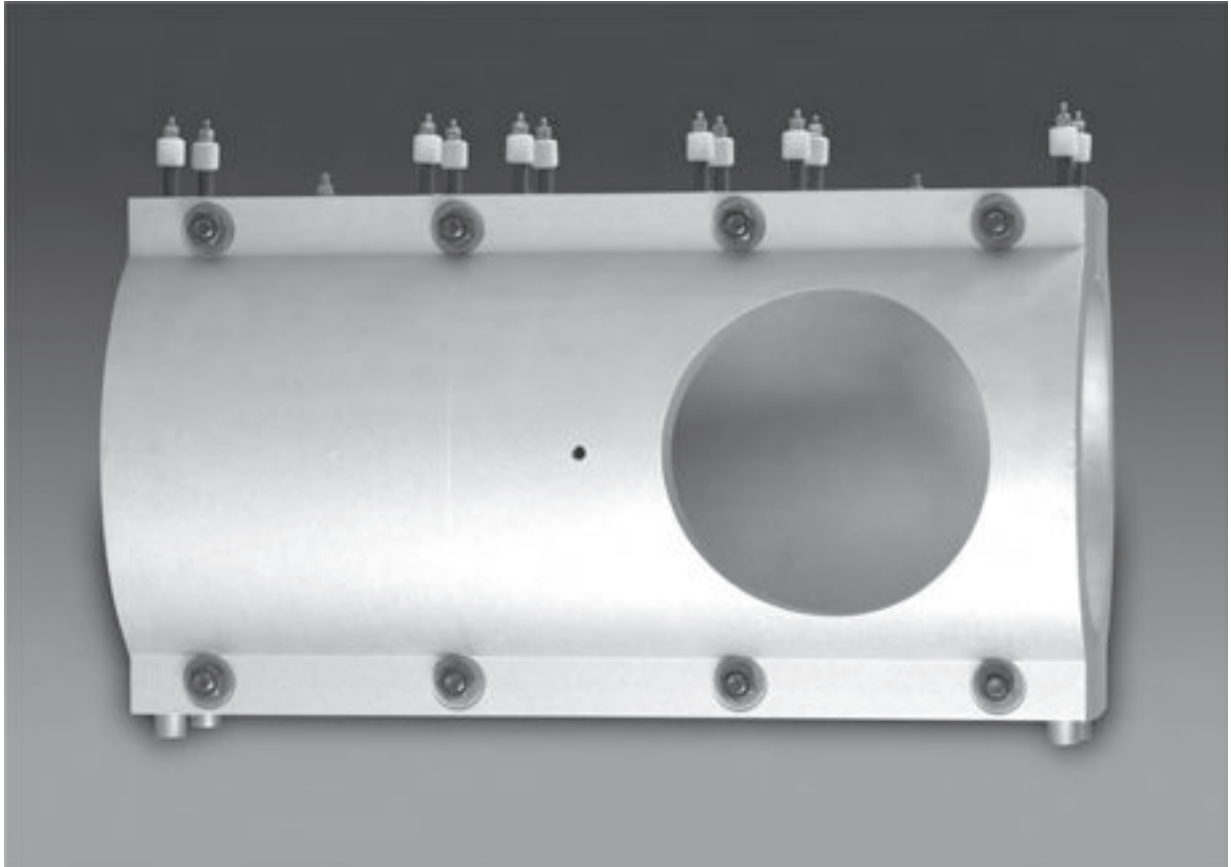


- Maximum ambient temperature 104°F (40°C)
- CFM values shown are representative of catalog specifications within ±15%
- Baked on gray enamel finish
- Additional blowers available on request





DURACAST™ VENT/CUTOUT CAST-IN HEATER



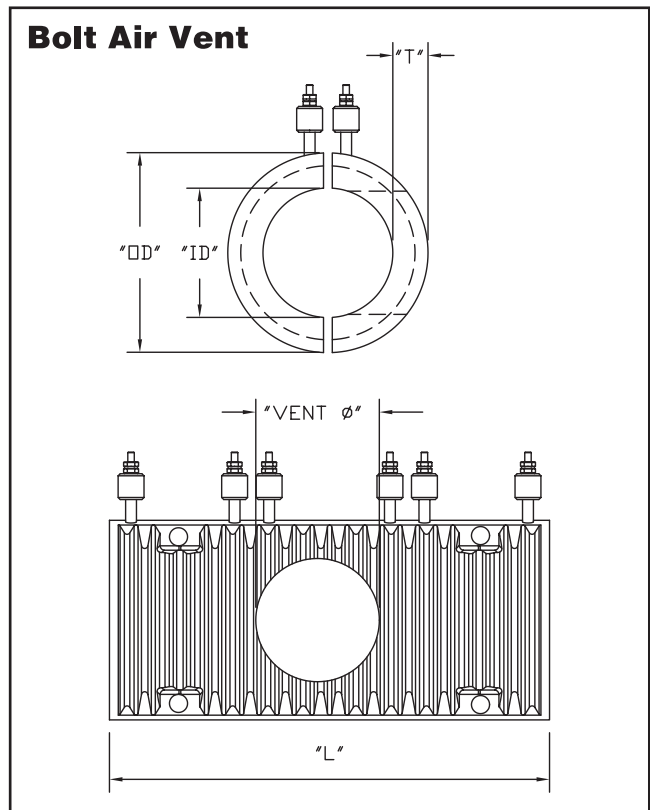
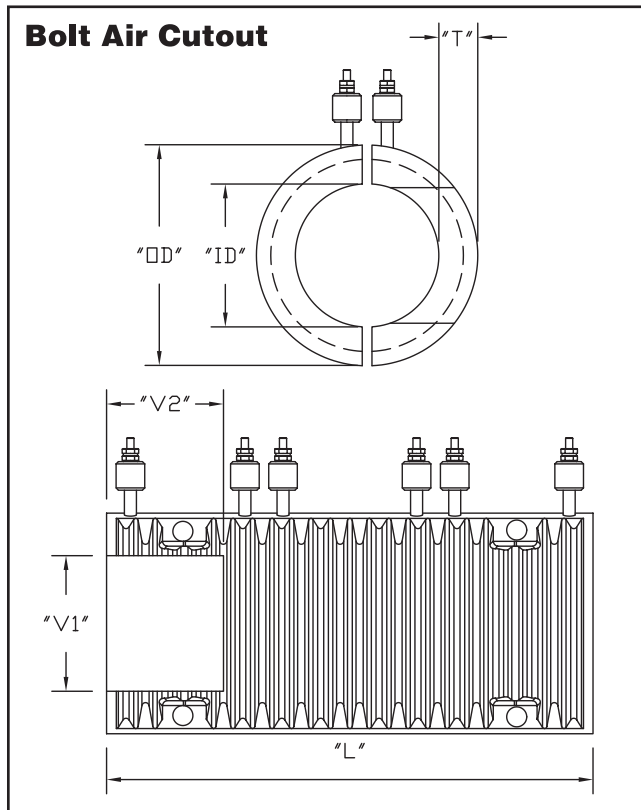
Special sections of the extruder barrel such as a vent or feed throat require custom modifications to fit properly. These heaters are designed with element locations that maximize heater performance, but allow for special machined sections that could not be added to a standard barrel design.

Features:

- Designed for uniform heat of vent zone
- Available in aluminum or bronze
- Manufactured per customer specification
- Available with all standard terminations



DURACAST™ VENT/CUTOUT CAST-IN HEATER



Ordering Information

Mounting Option:

☐ Bolt

☐ Locking Strap

Material:

☐ Aluminum

☐ Bronze

Inner Diameter ("D"):

Length ("L")

Wattage (Per Half):

Voltage (Per Half)

Number of Elements (Per Half):

Termination Type (See page at
end of section):

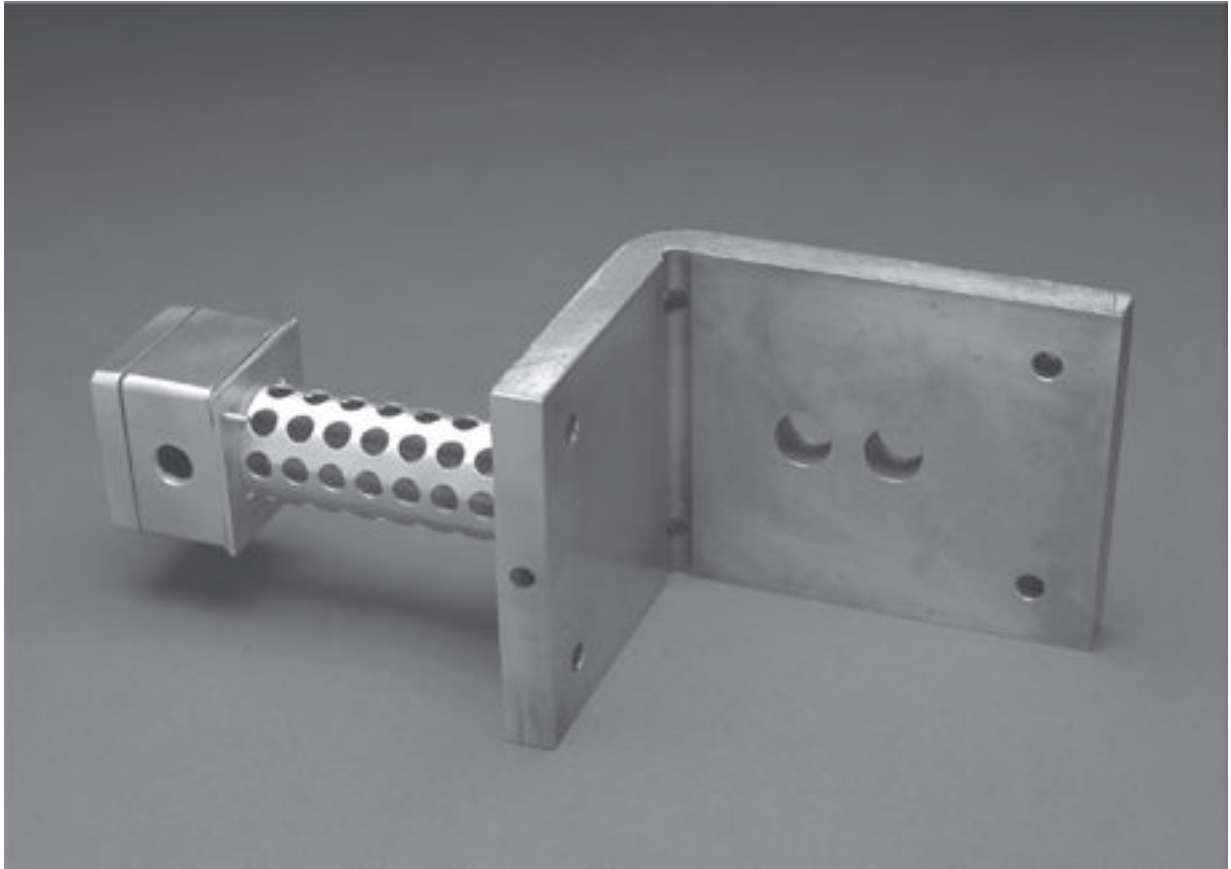
Vent/Cutout Size
and location:

Cooling Termination Type:

Note: A drawing or sketch is preferred for Quoting Purposes.



DURACAST™ “L” SHAPED BARREL HEATERS



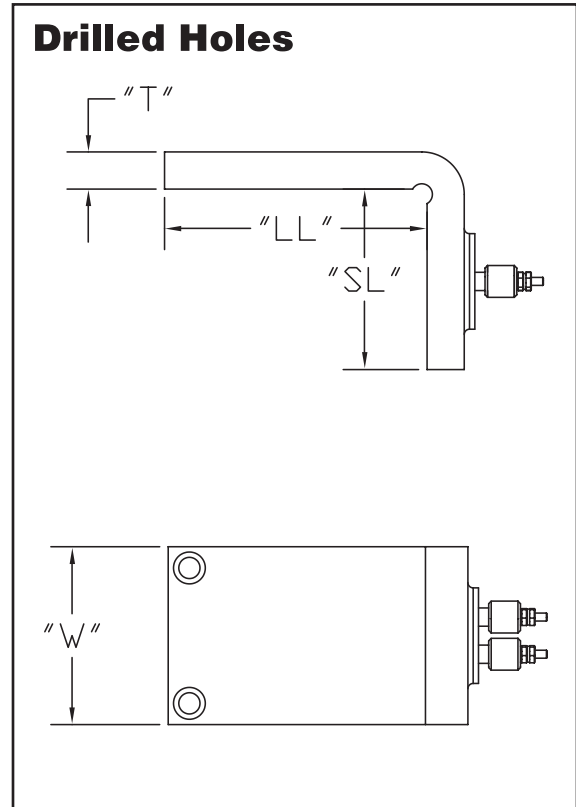
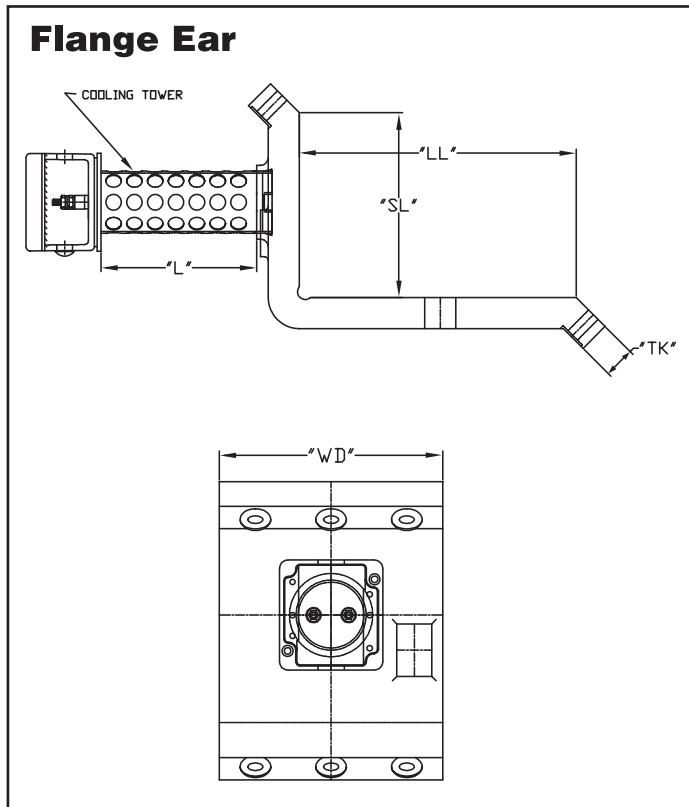
Square and rectangular twin screw extruder barrels require "L" shaped heaters. Typically used in compounding, resin manufacturing, and high performance material applications that generate a high shear temperature, these heaters are most commonly manufactured from a bronze alloy to withstand these higher temperatures and high watt densities.

Features:

- Flange ear or drilled holes for mounting to the barrel
- Durable cast-in vented towers for terminal box mounting
- Manufactured in aluminum alloy for lower temp applications
- Cooling tubes can be cast-in for liquid cooling capacity
- Machined holes for transducers and thermocouple locations



DURACAST™ "L" SHAPED BARREL HEATERS



Ordering Information

Mounting Option:

☐ Flange Ear

☐ Drilled Holes

Material:

☐ Aluminum

☐ Bronze

Length ("LL"):

Length ("SL")

Wattage (Per Pc.):

Voltage (Per Pc.)

Number of Elements (Per Pc.):

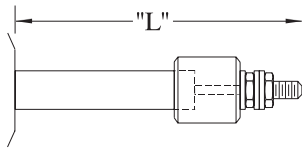
Termination Type (See page at
end of section):

Hole or Notch Location:

Special Features:

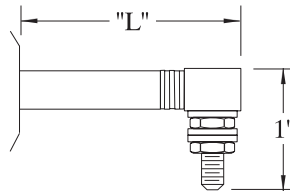


ELECTRICAL TERMINATIONS



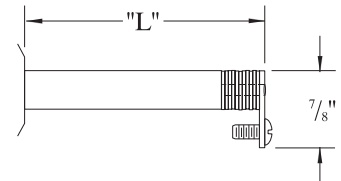
TYPE S

10-32 threaded screw terminal with ceramic insulator. Included nuts and washers. Type S standard for cast-in heaters. 6-32, 8-32 and metric sizes also available.



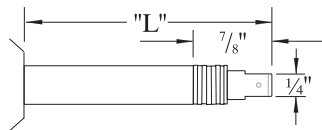
TYPE A

Right angle terminal block seated on mica washers with 10-32 threaded stud. Included nuts and washers.



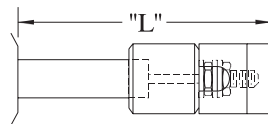
TYPE R

Screw lug terminal seated on mica washers and welded to pin. Includes 8-32 screw for wire connection.



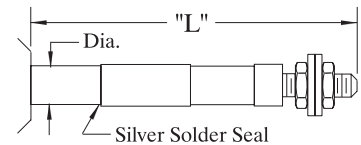
TYPE D

Quick-disconnect spade lug with 1/4" blade welded to pin. Other blade sizes available upon request.



TYPE T

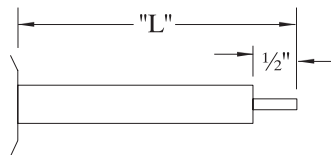
Ceramic insulator with ceramic top for insulation of electrical connections. Includes complete Type "S" termination with 10-32 threaded stud.



TYPE HS

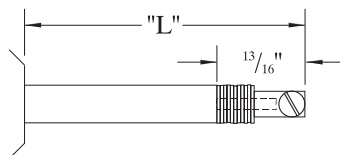
Ceramic to metal hermetic seal is silver soldered directly to heating element for moisture-proof termination. 10-32 screw terminal includes nuts and washers.

Dia.	"L"	Thread
.430	1 1/8"	1/4-28
.315	1 3/8"	10-32
.250	1 5/8"	8-32



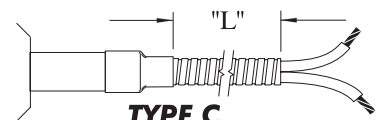
TYPE P

Plain pin for field attachment of termination. Pin Length is 1/2" standard.



TYPE L

Terminal lug with 10-32 screw is welded directly to heater pin. Can be oriented straight or at a right angle.

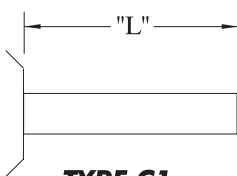


TYPE C

Flexible armor cable for abrasion resistance with high temperature leadwire attached to heating element. Specify "L" dimension when ordering.

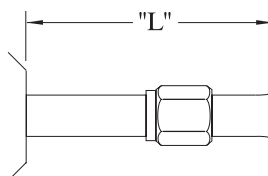
Special Termination Design and Element Seals Are Also Available.

COOLING TUBE TERMINATIONS



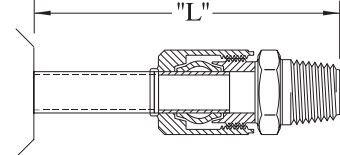
TYPE C1

Plain cooling tube cut to standard 3" length extending from heater. Specify longer length if required.



TYPE C2

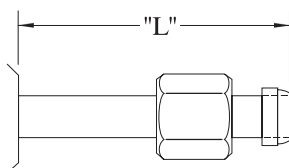
37° Flare nut fitting allows for cooling tube connection to compression fitting.



TYPE C3

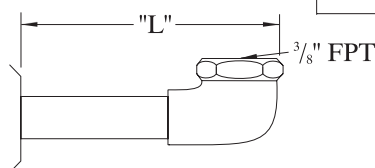
Compression fitting mounted directly to cooling tube provides seal for high pressure hook up. Available in standard 3/8" and 1/2" NPT.

3/8 Dia #55-0010 1/2 Dia #55-0011



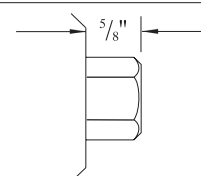
TYPE C4

Brazed seal with locknut provides an effective seal for high pressure applications. Mating fittings available upon request.



TYPE C5

Brazed angle fitting mounted directly to cooling tube with right angle 3/8 FPT as standard. Specify "L" dimensions for clearance.

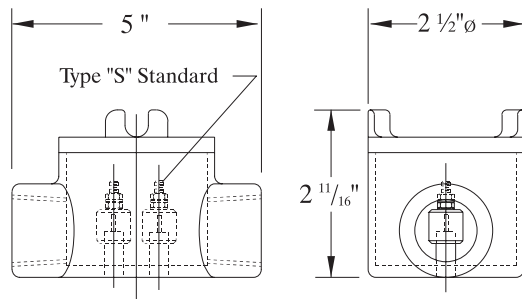


TYPE C6

Cast-in fitting with standard 3/8 FPT for quick installation of cooling lines with no additional fittings.

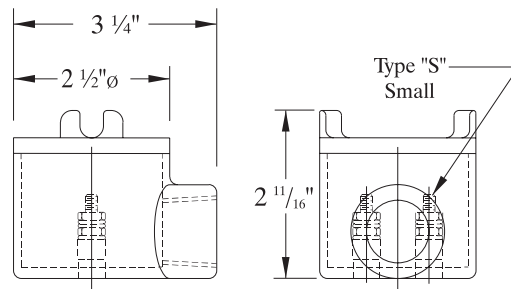


PROTECTIVE HOUSINGS



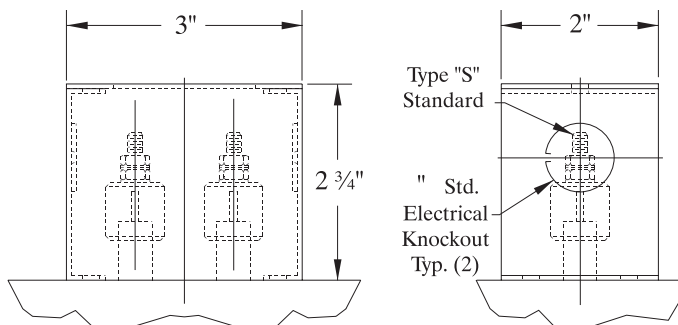
Type B1

Explosion proof cast iron housing with 1/2" NPT double hub. Single phase design shown. Larger housing for 3 phase design also available.



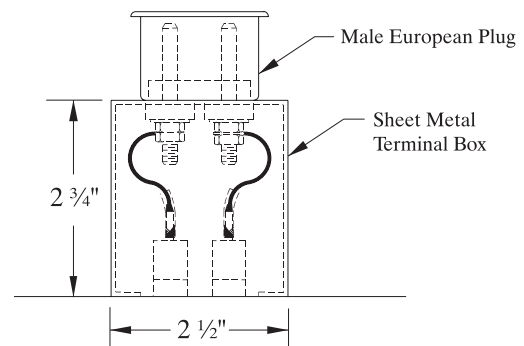
Type B2

Explosion proof cast iron housing with 1/2" NPT single hub. Single phase design shown. Larger housing for 3 phase design also available.



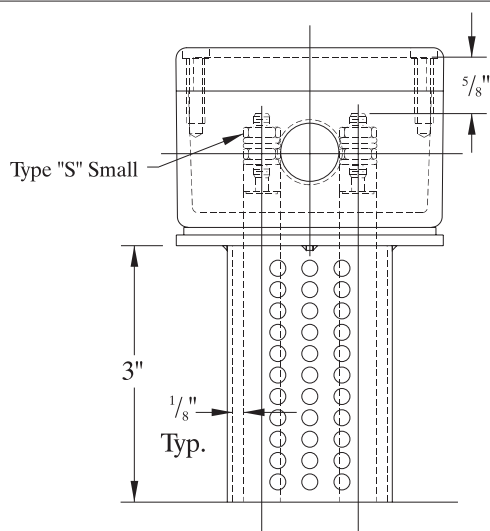
Type B3

Standard size stainless steel sheet metal box with (2) 1/2" electrical knockouts. Other sizes and types available.



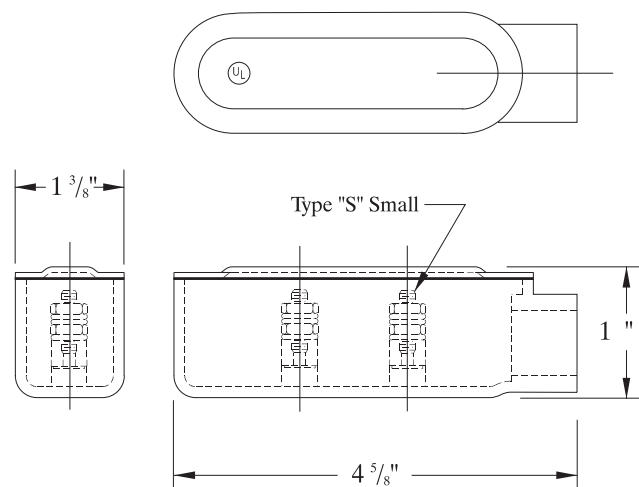
Type B4

Stainless steel terminal enclosure with male ERGE plug mounted on top. Mating connections available upon request.



Type B5

Die cast aluminum enclosure with 1/2" or 3/4" threaded electrical connections mounted to vented cooling tower. Other sizes and types available for single and 3 phase designs.



Type B6

Explosion proof box with 1/2" NPT single hub, designed for low profile applications. Single phase only. Different hub configurations are available.



DURACAST™ HEATER SPECIFICATIONS

Cast Materials	Max. Operating Temperature
Aluminum 443	800°F (427°C)
Aluminum 319/356	700°F (371°C)
Bronze/Copper alloys	1400°F (769°C)
Iron	900°F (482°C)

If required, other cast materials are available

Cast Processes

Durocast™ perm-mold system uses steel permanent molds. No bake sand system for special castings and short production runs.

Machine Finish

CNC machining is performed for tight tolerances and complex configurations. Milled finishes are provided per specification. Belt sanding, lapping and polishing available to meet application specifications.

Standard Machine Finish Range: 64 to 125 rms.

Fine Finish Per Specifications: 8 to 32 rms.

Standard Flatness: Belt Sanded: .015

Milled: $\pm .005$

Lapped: .001

Holes, Cutouts, Thermowells

Mounting or clearance holes, cutouts and thermowells, for inserting temperature measurement probes, cast-in or machined per your specifications.

Inserts

Threaded studs, precision component parts, bushings and special design parts cast accurately in place.

Electrical

Resistance tolerance NEMA standard +10% -5%.

Voltages:

Element diameter	.200	.260	.315	.430	.475
Maximum volts	240	240	277	600	600

(Three phase available on large heaters.)

Maximum watt densities depends on size and application. Consult a Durex Engineer.

UL Component Recognition

DA series cast-in heaters are recognized per file E110394.

Inspection/Testing

- Electrical per UL 499 and UL 1030, Canadian
- Standard C22.2 No. 72
- Dimensional per specifications using
- Coordinate Measure Machine
- Quality standard per MIL-Q_9858A



CAST-IN HEATER SPECIAL SERVICES

Radiograph (X-ray):

Confirmation of internal element configuration and casting soundness available through X-ray.

Plating/Coating:

Electroless nickel plating, anodize, Telfon® coatings and special blasted surfaces are available per customer specification.

Pressure Testing:

High pressure leakage testing is done in-house per application requirements.

Heat Treating:

Stress relieving and aging through heat treating available as required.

CMM Inspection:

Coordinate Measuring Machine used for precision quality control of tight tolerance machining requirements.

Helium Leak:

Detect microleakage from casting body.

Temperature Uniformity:

Confirm heat uniformity across the finished surface.

Class 1000 Clean Room:

Clean room assembly and packaging per class 1000 standards.

Solidworks 3D Modeling:

Engineering software provides 3D models of proposed or existing product designs.

Custom Packaging:

Customer specific packaging for delicate surfaces, large multi-product shipments, or long term storage.

Life Cycle Testing:

Life cycle test chamber for long term testing of uniformity and performance characteristics.

Material Certifications:

Precise records and certifications on materials which require traceability to specific standards.

Sensor Calibration:

NIST traceable calibration lab for calibration and certification of any temperature sensor requirements.

FEA Analysis:

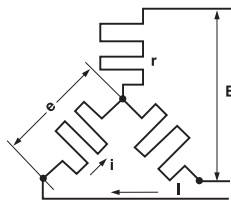
Preview of proposed design constructions using FEA analysis.



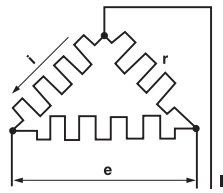
INSTALLATION AND MAINTENANCE GUIDELINES FOR CAST-IN HEATERS

1. Always ensure that cast-in heaters are properly mounted to the application to avoid warping of flat heaters or "walking" of barrel heaters. After the initial start-up, retighten the heater mounting system to assure complete surface contact. Periodically check bolts or straps and tighten as required maintenance.
2. Tighten all liquid cool connections securely to avoid rupture from internal steam pressures. Cast-in C6 fittings or brazed connections are the most reliable. Properly maintain these connections to avoid leaks that will destroy the heater. Do not operate heating and cooling simultaneously to avoid thermal shock of the cooling tubes.
3. It is recommended that water used for liquid cooling applications be treated to avoid corrosion and hard water deposits that will clog the cooling tubes over time.
4. Install proper temperature control prior to operation of the heaters to ensure protection from over-temp situations which may damage the heater or equipment. Periodically changing temperature sensors is good preventive maintenance.
5. Electrical terminals must be properly insulated and made tightly to ensure safe operation. All heater installations must be properly grounded. All electrical terminations must be made per applicable Electrical Safety Codes and O.S.H.A. regulations.
6. Do not operate the heaters outside of the rated voltage and temperature of the design. This will cause the heaters to fail.
7. ALWAYS disconnect the electrical power to heaters prior to service.

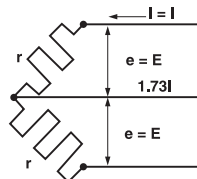
ELECTRICAL DATA



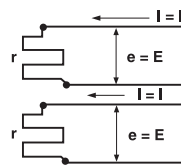
WYE OR STAR CONNECTION



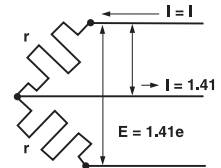
DELTA CONNECTION



3-PHASE OPEN DELTA



2-PHASE 4 WIRE



2-PHASE 3 WIRE

The energy put out by a heating unit is measured in watts.
The power factor is always unity.

Single phase, $W = I^2 R = EI$

Three Phase Delta, $W = 3EI = 1.73 EI$

Three Phase Wye, $W = 3ei = 1.73 EI$

Two Phase 4 Wire, $W = 2I^2 R = 2 EI$

Two Phase, 3 Wire, $W = 2I^2 R = 2 EI$

(Voltage between outside wires = 1.41e)

$$\text{Phase Amps} = I = \frac{W}{E \times \text{PF}}$$

$$\text{A.C., 3 Phase Amps} = I = \frac{W}{1.73 E \times \text{PF}}$$

$$\text{A.C., 2 Phase 3 Wire: Middle Wire Amps} = \text{Amps in outside Wire} \times 1.41$$

W = Power, Watts

E = E.M.F. Volts

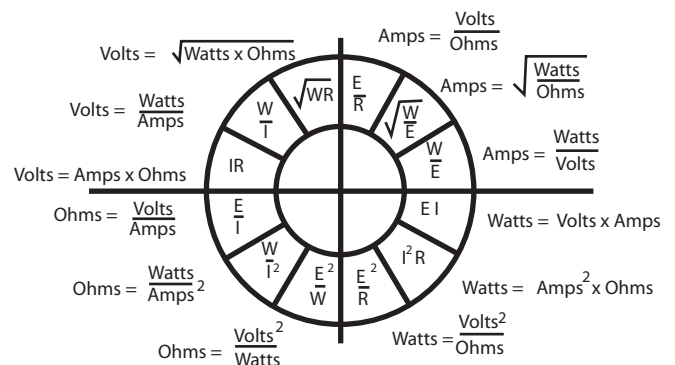
I = Current, Amperes

R = Resistance, Ohms

PF = Power Factor

$$\text{Amps} = I = \frac{W}{E} = \frac{E}{R}$$

OHMS LAW



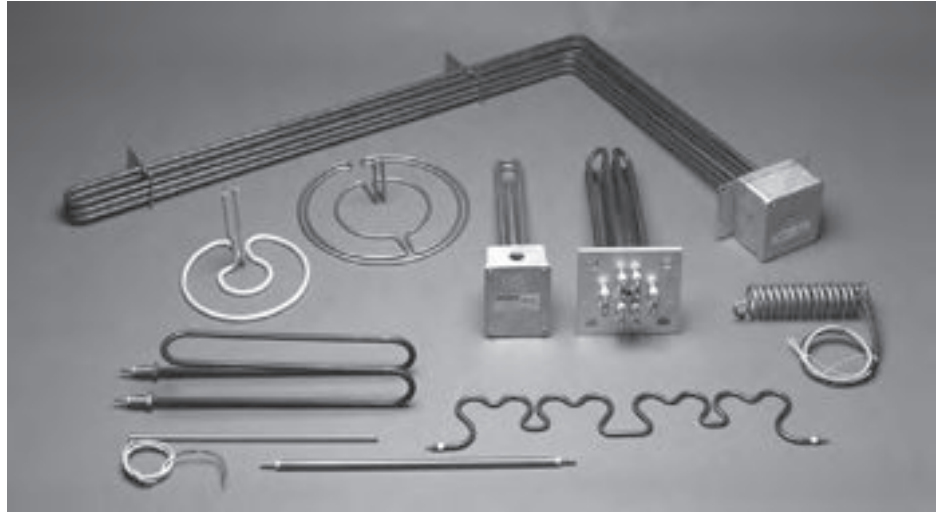


DUREX INDUSTRIES



PROCESS HEATERS

Straight and formed Durotube™ tubular heating elements, screw plug immersion heaters, flanged immersion heaters, circulation heaters, and high temperature process air heaters are available in a wide selection of standard designs from Durex Industries. Durex engineering is available to assist with the design and development of special heaters for particular requirements.



FEATURES:

- Select high quality sheath materials to suit the application.
- Precision wound helical Nichrome resistance wire.
- High purity MgO (Magnesium Oxide) powder insulation compacted to provide maximum heat conductivity and dielectric strength.
- Integral cold pin fusion welded to helical resistance wire for optimum current carrying capability.

TYPICAL APPLICATIONS:

- Mold and die heating
- Plastic manifold heating
- Immersion heating
- Pipe or tube heating
- Defrosting
- High process air heating

TUBULAR HEATING ELEMENT

1. Selected high quality sheath materials (see table below for selection).
2. Precision helical wound nickel-chrome resistance wire.
3. High purity magnesium oxide powder compacted to provide maximum heat conductivity and optimum dielectric strength.
4. Integral cold pin fusion welded to helical resistance wire provides optimum current carrying capacity.
5. Threaded screw terminal with ceramic or mica insulator provides a positive connection from leadwire to terminals.
6. UL recognized elements, optional.

SHEATH MATERIAL SELECTION

MATERIAL	MAX. TEMP. °F	MAX. WATT/SQ. IN.	RECOMMENDED APPLICATIONS
Copper	350	60	Water, non-corrosive liquids
Steel	750	20	Oil immersion
Stainless Steel	1200	30	Corrosive liquids, food processing
Incoloy	1600	40	Corrosive liquids, air, clamp on

Other materials available: Inconel 600, Monel 400, Hastelloy, Titanium, Carpenter 20

PHYSICAL AND ELECTRICAL SPECIFICATIONS

Sheath Dia. $\pm .005"$	.260	.315	.375	.430	.475	.496	.625
Sheath Length Max. (Inches)	222	260	222	260	260	222	222
Maximum Voltage	250	277	480	550	550	550	550
Maximum Amperage	15	30	30	40	40	40	40
Wattage Tolerance	Industry Standard +5% -10%						
Resistance Tolerance	Industry Standard +10% -5%						

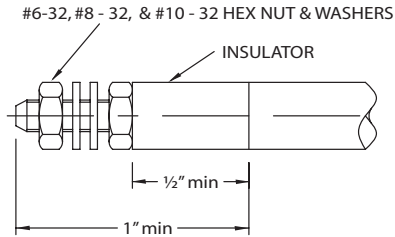
LENGTH TOLERANCES

Overall Sheath Length	11-20	21-50	51-80	81-110	111-140	141-170	171-200	201& up
Sheath Length	$\pm 3/32$	$\pm 1/8$	$\pm 5/32$	$\pm 3/16$	$\pm 7/32$	$\pm 1/4$	$\pm 3/8$	$\pm 1/2$
Heated Length	$\pm 1/4$	$\pm 1/2$	$\pm 7/8$	$\pm 1-1/8$	$\pm 1-3/8$	$\pm 1-5/8$	$\pm 1-7/8$	$\pm 2-3/8$
Min. Unheated	1	1-1/4	1-1/2	1-5/8	1-3/4	2	2-1/4	2-1/2

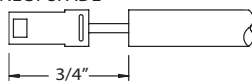


TERMINATIONS

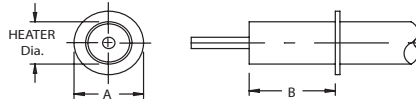
TYPE - S THREADED STUD TERMINAL



TYPE - D QUICK DISCONNECT SPADE

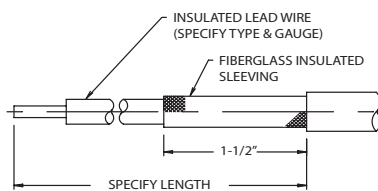


TYPE - R LOCATOR WASHERS

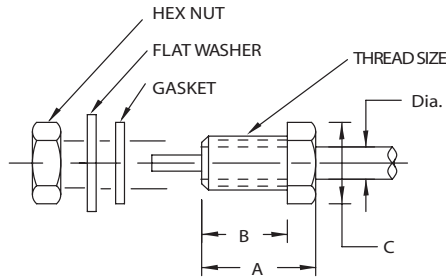


HEATER DIA.	A	B
.260	3/4"	ADVISE
.315	5/8"	ADVISE
.430	3/4"	ADVISE

TYPE - W LEAD WIRE TERMINAL ASSEMBLY



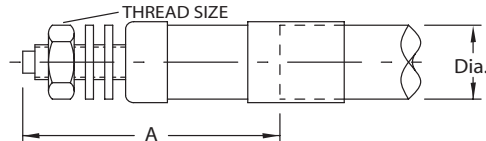
TYPE - B THREADED BULKHEAD FITTINGS



DIA.	THD.	A	B*	C	MATERIAL
.260	1/2-20	3/4"	5/8"	3/4"	Brass
.315	1/2-20	3/4"	5/8"	3/4"	Brass & Stainless
.430	5/8-18	15/16"	3/4"	7/8"	Brass, Steel & Stainless

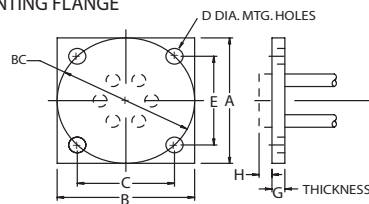
*Custom bulkhead length and threads available.

TYPE - H CERAMIC TO METAL HERMETIC TERMINALS

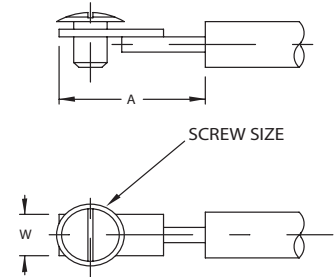


THREAD SIZE	DIA.	A
#8-32	.260	1-3/4"
#10-32	.315	1-7/8"
#1/4-28	.430	2-1/8"

TYPE - F MOUNTING FLANGE

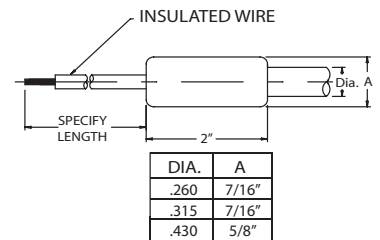


TYPE - L SCREW LUG TERMINAL



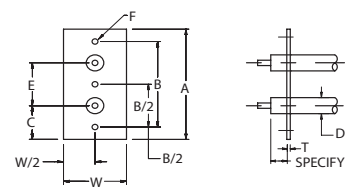
SCREW SIZE	A	W
#6-32	5/8"	1/4"
#8-32	7/8"	5/16"
#10-32	1-1/16"	7/16"

TYPE - M MOLDED RUBBER LEAD



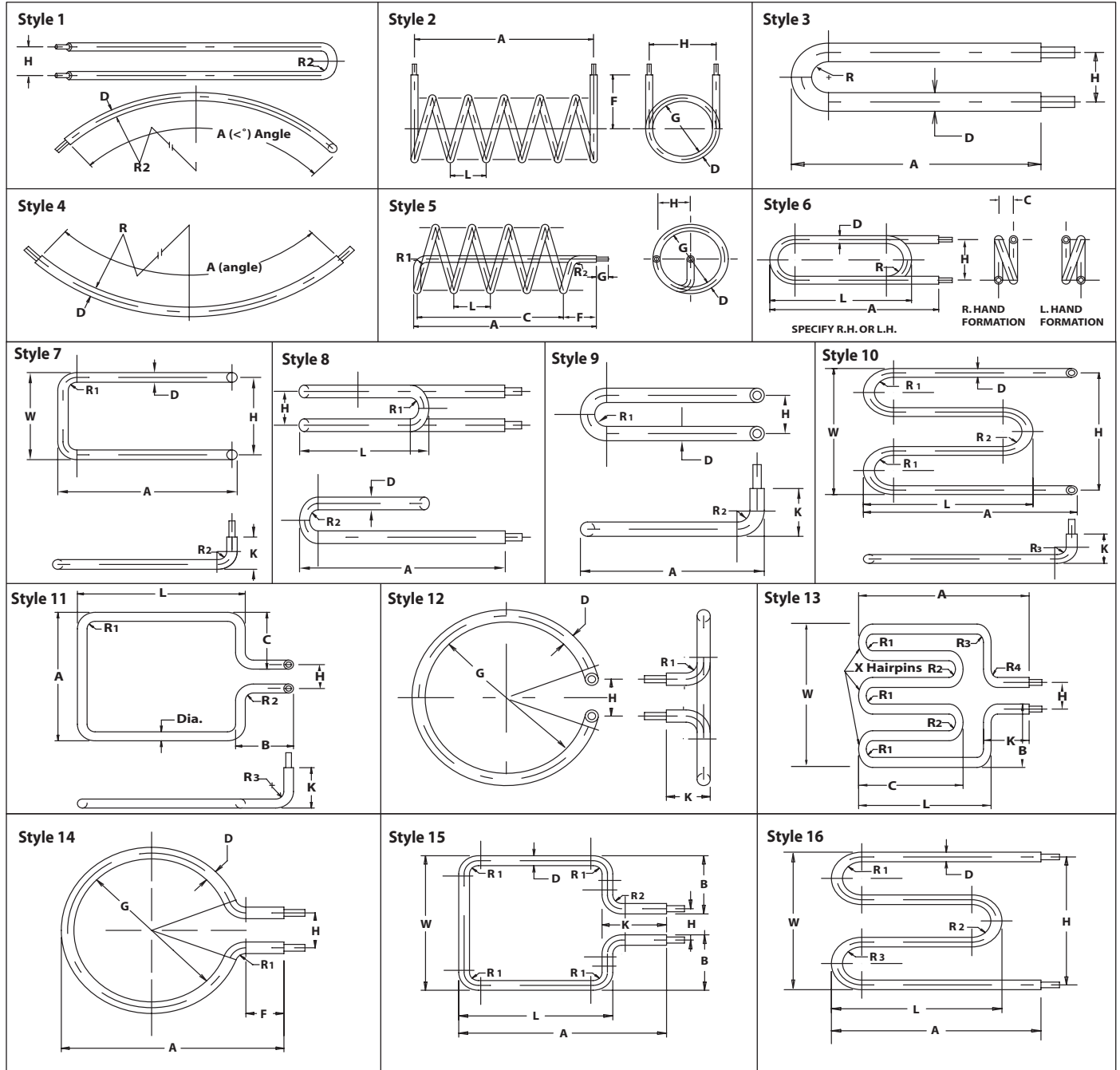
DIA.	A
.260	7/16"
.315	7/16"
.430	5/8"

TYPE - K MOUNTING BRACKET



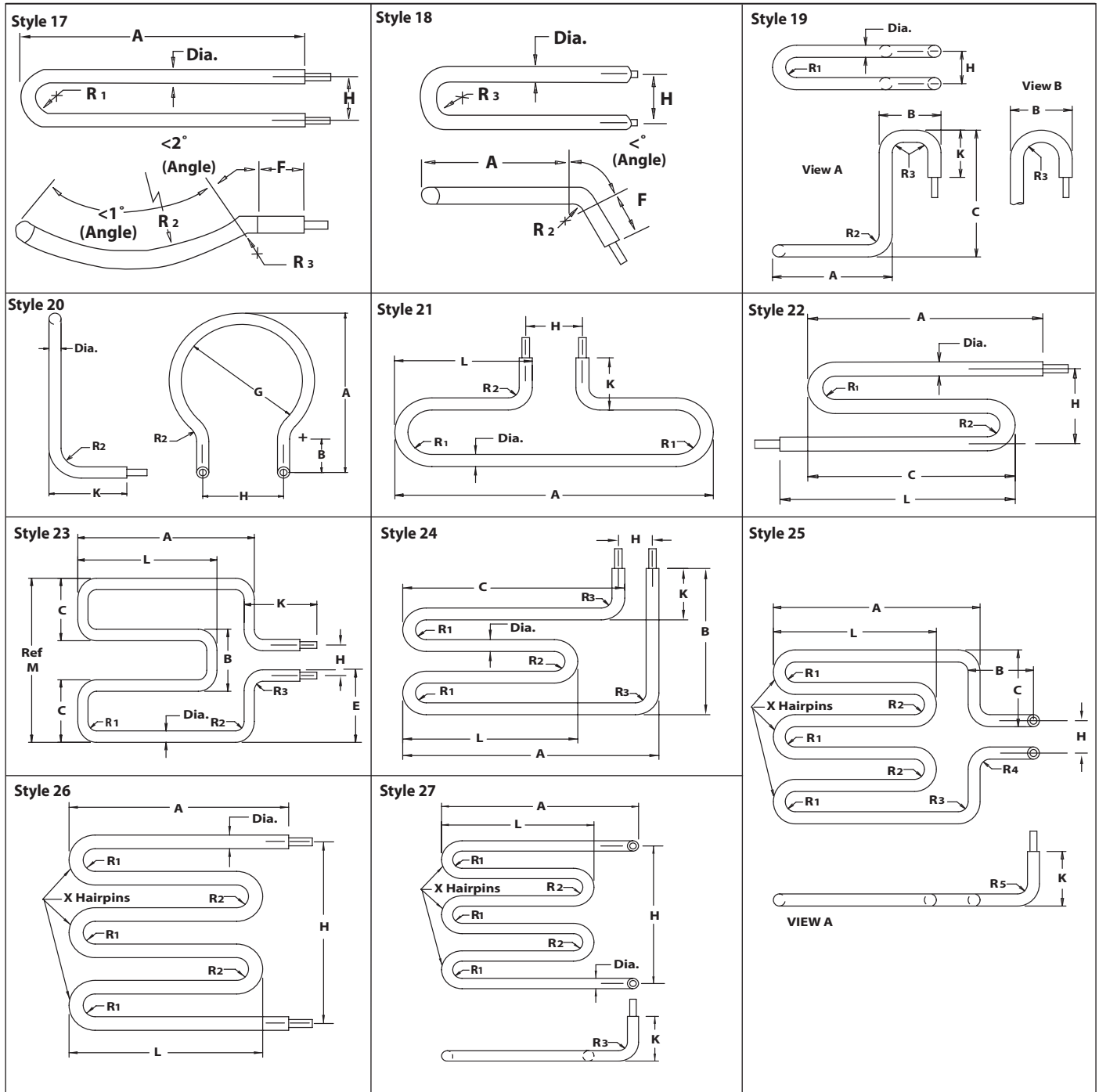


TYPICAL BEND FORMATIONS





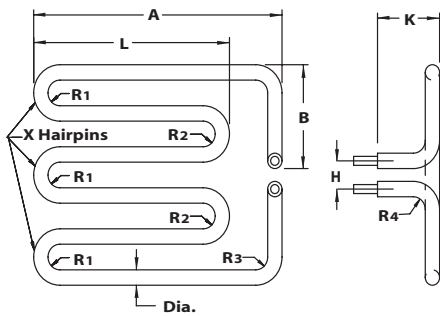
TYPICAL BEND FORMATIONS



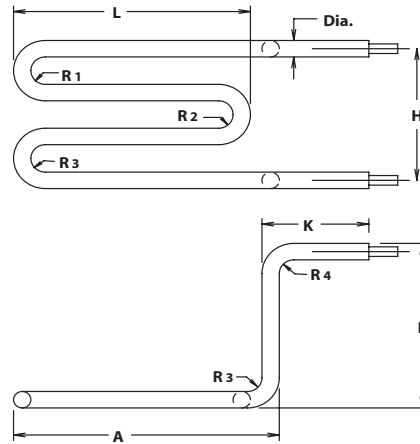


TYPICAL BEND FORMATIONS

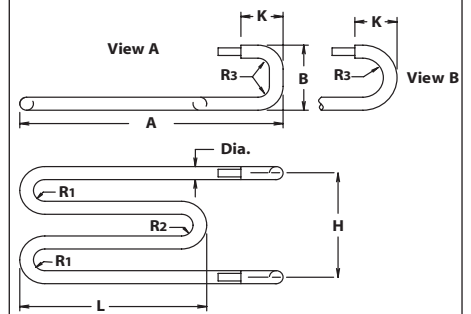
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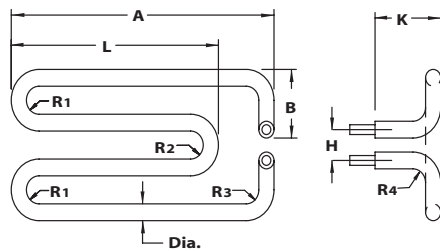
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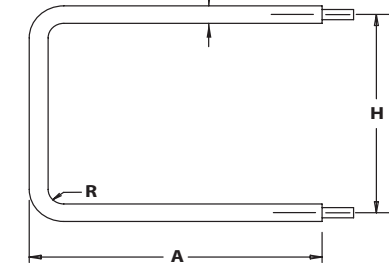
Style 30



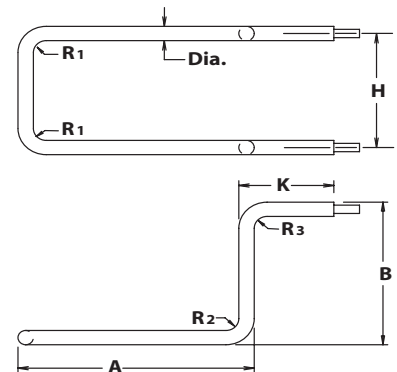
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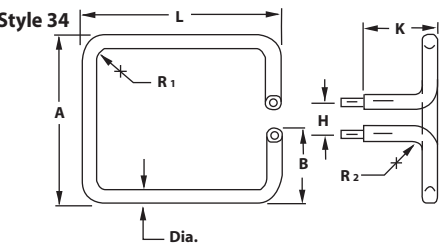
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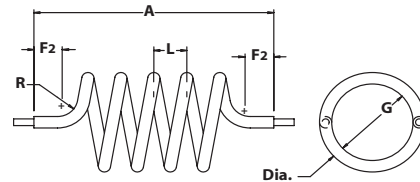
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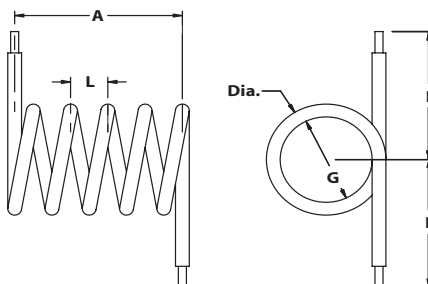
Style 34



Style 35



Style 36

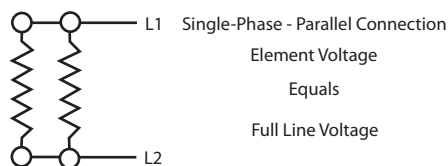
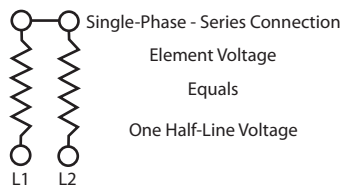




PROCESS HEATER WIRING DIAGRAMS

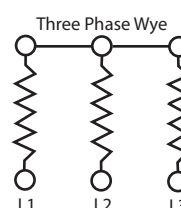
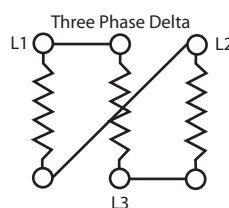
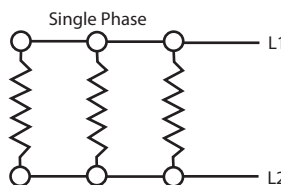
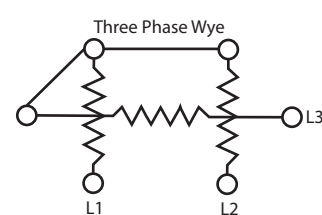
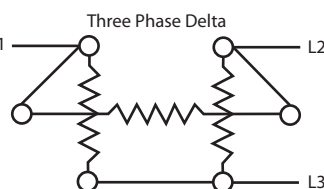
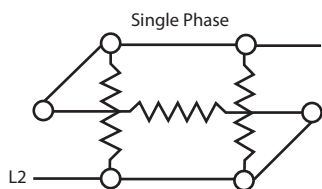
TYPICAL WIRING DIAGRAMS WITHOUT THERMOSTATS

Process Heaters with Two Elements



Note: Dual-Voltage heaters are factory wired for the highest voltage (series connection) unless otherwise specified. Easily rewired for lower voltage operation (parallel connection).

Process Heaters with Three Elements



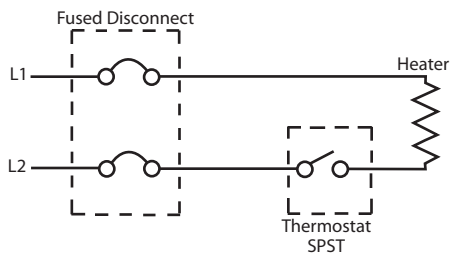
Standard process style heaters with three elements are factory wired for three-phase delta. They can be rewired for single-phase operation with no wattage change. Wattage can be reduced to one third of the designed wattage by switching from three-phase delta to Wye connection.



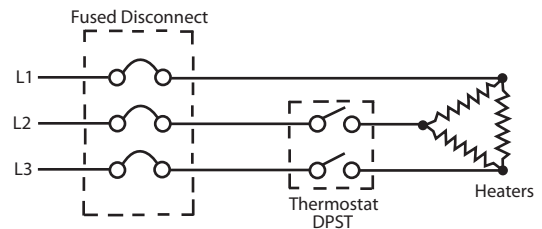
PROCESS HEATER WIRE DIAGRAMS

TYPICAL WIRING DIAGRAMS FOR HEATERS WITH THERMOSTATS

When Heater Amperage Does Not Exceed the Amperage of the Thermostat

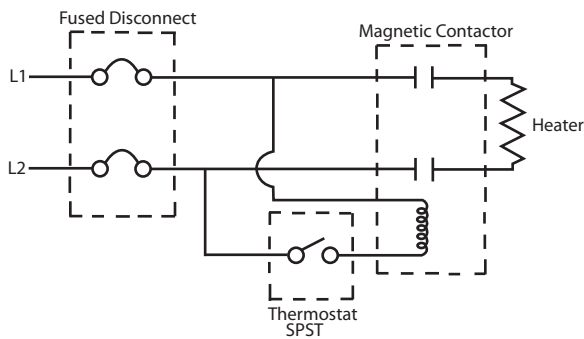


120V Single-Phase Heater

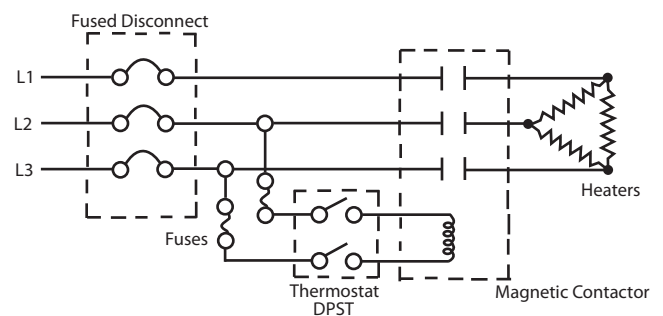


Three-Phase Heater

When Heater Amperage Exceeds the Amperage of the Thermostat



Any Voltage Single-Phase Heater



Three-Phase Heater

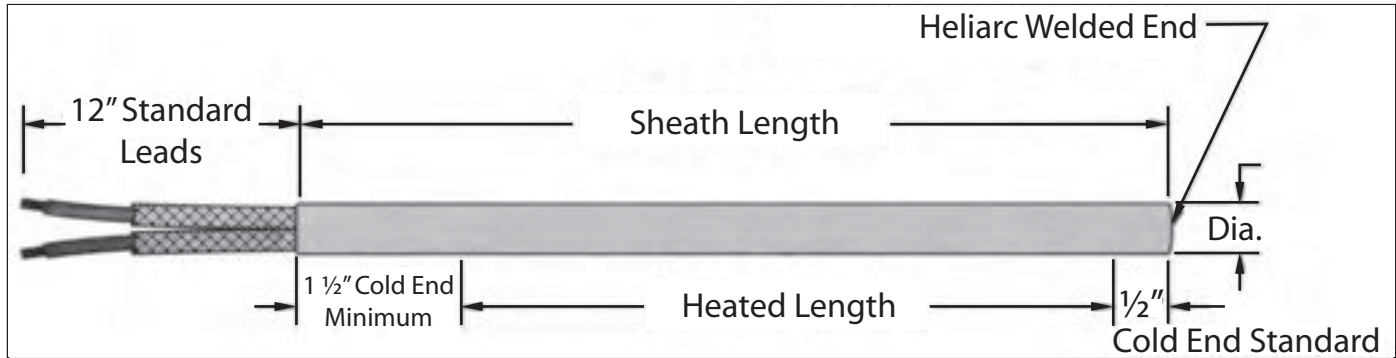
Use a Single Pole-Single Throw (SPST) thermostat wired in series with the holding coil of a magnetic contactor or mercury relay (pilot duty).

Use a Double Pole-Single Throw (DPST) thermostat wired in series with the holding coil of a magnetic contactor or mercury relay (pilot duty).



CART-TUBE

SINGLE END TUBULAR HEATER



CART-TUBE – The single-ended tubular element design with the lead termination at one end. This type of construction makes it a very versatile heater that can be used for a wide variety of applications. The Cart-Tube heater is custom designed to fit your particular requirement. Cart-Tube is available in many sheath diameters and materials.

FEATURES

- Rugged tubular element compacted construction
- High purity magnesium oxide insulation
- Nickel Chrome resistance wire
- Heliarc welded end
- High temperature alloy sheath materials

APPLICATIONS

- Heating molds and dies
- Plastic manifold heating
- Immersion heating
- Pipe or tube heating
- Defrosting

SPECIFICATIONS

SHEATH DIA.	TOLERANCE	LENGTH		MAXIMUM VOLTAGE	MAXIMUM AMPERAGE	MIN. BEND RADIUS	SHEATH MATERIALS
		MIN	MAX				
.315	± .003	10"	96"	240	15	3/4"	STEEL 304 STAINLESS STEEL 316 STAINLESS STEEL INCOLOY COPPER
.375	± .003	12"	96"	240	15	3/4"	
.430	± .004	15"	120"	240	20	1.0"	
.475	± .005	15"	120"	240	25	1-1/4"	
.495	± .005	15"	120"	240	25	1-1/4"	
.625	± .005	18"	120"	480	30	2"	
.687	± .005	18"	120"	480	30	2"	
.750	± .005	18"	120"	480	30	2-1/2"	

WATTAGE TOLERANCE: NEMA STANDARD +5% - 10%

LEAD TERMINATIONS

Type S	Standard 10" long fiberglass insulated leadwire	Type B1	Stainless steel overbraid lead protection
Type C1	Stainless steel flexhose lead protection	Type B2	Right angle stainless steel lead protection
Type C4	Right angle stainless steel flexhose	Type BF	Threaded bulkhead fitting

BENDING/FORMING

The Cart-Tube heater can be custom formed to meet your particular specifications. Please see previous pages for typical bend formations.



SCREW PLUG IMMERSION HEATERS

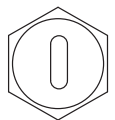
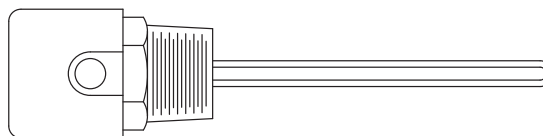
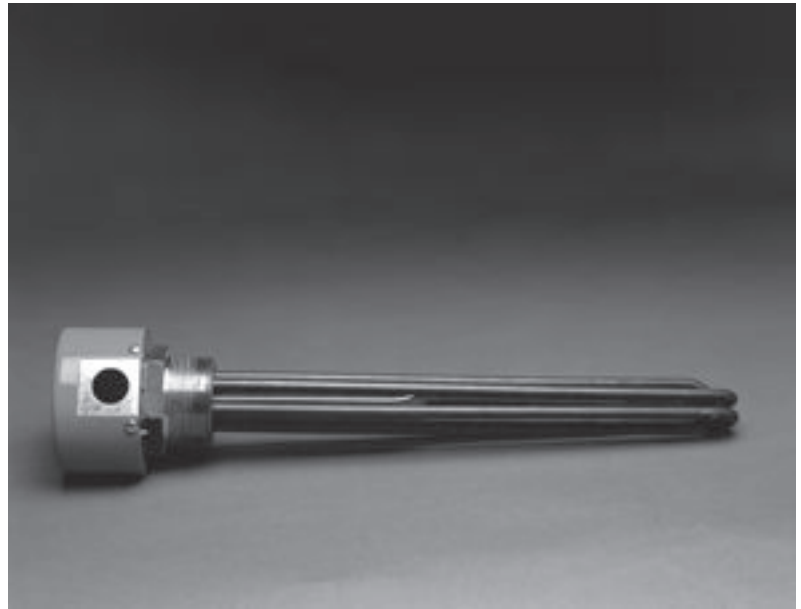
Screw plug immersion heaters utilize an NPT screw plug for direct immersion into liquids, oils, or other heat transfer mediums. These heaters utilize a rugged tubular heating element with sheath materials of copper, stainless steel, or Incoloy®. The elements are formed and welded or brazed into the screw plug fitting for a liquid tight seal.

STANDARD FEATURES:

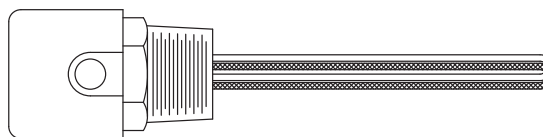
- Various heavy-duty metal sheath elements
- Recompact bends for consistent MgO density
- Three standard terminal boxes:
 - NEMA 1 for General Purpose,
 - NEMA 4 for Moisture Resistance,
 - NEMA 7 for Explosion Resistance
- Standard NPT threads in five sizes:
 - 1", 1 ¼", 1 ½", 2", and 2 ½"
- Screw plug materials: Brass, Steel, Stainless Steel
- Optional thermowells for thermostats
- Corrosion-resistant hardware
- Hydrostatic pressure tested.

OPTIONAL FEATURES:

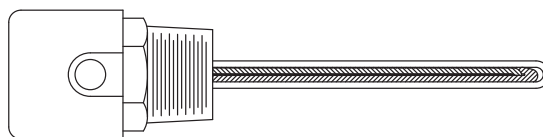
- Thermostatic controls in NEMA 1, 4 or 7 enclosures available in 3 temperature ranges.
- Element watt densities to suit the application. Type 316 stainless steel elements in all plug sizes.
- Thermocouples in either Type "J" or "K" for control or high limit protection.
- Sheath materials: Carpenter 20, Monel 400, Inconel 600, Hastelloy, and Titanium.
- Passivated elements and plugs for pure and deionized water, photo chemicals, and special processes.



Single Element



Two Element



Three Element



SCREW PLUG IMMERSION HEATERS

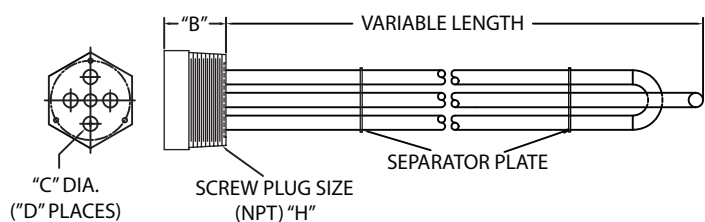
APPLICATION GUIDELINES

Application Element - Guidelines

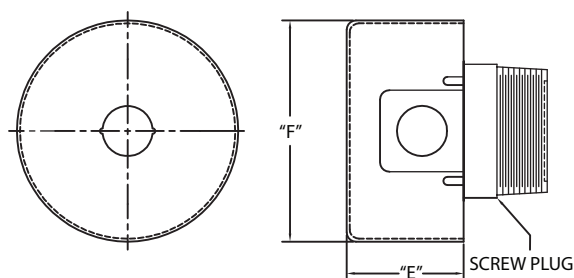
Application	Screw Plug Size	Sheath Material	Screw Plug Material
Clean Water	1"	Copper	Brass
	1¼"	Copper	Brass
	2"	Copper	Brass
	2"	Copper	Brass
	2"	Copper	Brass
	2"	Incoloy®	Brass
	2½"	Copper	Brass
Process Water	2½"	Copper	Brass
	1"	304 Stainless Steel	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2½"	304 Stainless Steel	304 Stainless Steel
Solution Water	2½"	304 Stainless Steel	304 Stainless Steel
	2"	Incoloy®	304 Stainless Steel
	2"	Incoloy®	304 Stainless Steel
	2"	Incoloy®	304 Stainless Steel
	2"	Incoloy®	304 Stainless Steel
	2½"	Incoloy®	304 Stainless Steel
Corrosive Solutions	2½"	Incoloy®	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2"	Incoloy®	304 Stainless Steel
Severely Corrosive Solutions	2"	Incoloy®	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2"	304 Stainless Steel	304 Stainless Steel
	2"	Incoloy®	304 Stainless Steel
Light Weight Oil	2"	Incoloy®	304 Stainless Steel
	1"	Steel	Steel
	1¼"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
Medium Weight Oil	2½"	Steel	Steel
	2½"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
Heavy Weight Oil	2½"	Steel	Steel
	2½"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel
	2"	Steel	Steel

SCREW PLUG TERMINATION ENCLOSURE CONFIGURATIONS

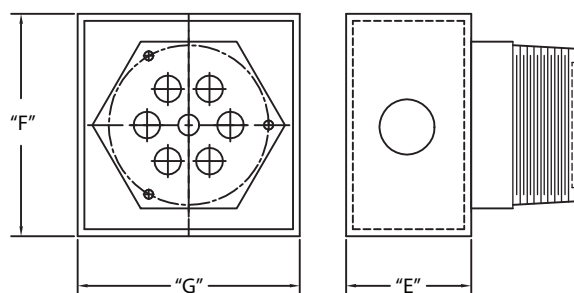
SCREW PLUG HEATER WITHOUT ENCLOSURE



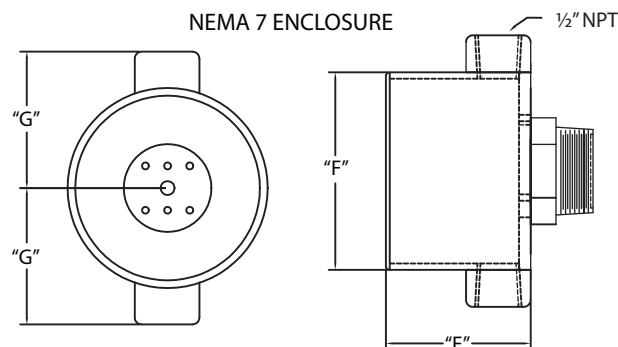
NEMA 1 ENCLOSURE



NEMA 4 ENCLOSURE



NEMA 7 ENCLOSURE



Screw Plug Size	Enclosure Type	Number of Elements	B	C (Max. Element Dia.)	D	E	F	G
1.00	No Enclosure	1	1.25"	0.32"	2.00	N/A	N/A	N/A
1.00	NEMA 1	1	1.25"	0.32"	2.00	1.63"	3.25"	3.25"
1.00	NEMA 4	1	1.25"	0.32"	2.00	4.72"	3.50"	3.50"
1.00	NEMA 7	1	1.25"	0.32"	2.00	5.11"	3.50"	4.50"
1.25	No Enclosure	1, 2, 3	1.25"	0.32"	2, 4, 6	N/A	N/A	N/A
1.25	NEMA 1	1, 2, 3	1.25"	0.32"	2, 4, 6	1.63"	3.25"	3.25"
1.25	NEMA 4	1, 2, 3	1.25"	0.48"	2, 4, 6	2.50"	3.50"	3.50"
1.25	NEMA 7	1, 2, 3	1.25"	0.32"	2, 4, 6	5.11"	3.50"	4.50"
1.50	No Enclosure	1, 2, 3	1.50"	0.38"	2, 4, 6	N/A	N/A	N/A
1.50	NEMA 1	1, 2, 3	1.50"	0.32"	2, 4, 6	2.63"	4.00"	4.00"
1.50	NEMA 4	1, 2, 3	1.50"	0.44"	2, 4, 6	3.92"	4.00"	4.00"
1.50	NEMA 7	1, 2, 3	1.50"	0.32"	2, 4, 6	5.11"	4.75"	5.25"
2.00	No Enclosure	3	1.88"	0.43"	6.00	N/A	N/A	N/A
2.00	NEMA 1	3	1.88"	0.43"	6.00	2.50"	4.00"	4.00"
2.00	NEMA 4	3	1.88"	0.43"	6.00	2.25"	4.00"	4.00"
2.00	NEMA 7	3	1.88"	0.43"	6.00	5.35"	4.75"	5.25"
2.50	No Enclosure	3	1.88"	0.43"	6.00	N/A	N/A	N/A
2.50	NEMA 1	3	1.88"	0.48"	6.00	2.63"	4.75"	4.75"
2.50	NEMA 4	3	1.88"	0.44"	6.00	4.50"	4.75"	4.75"
2.50	NEMA 7	3	1.88"	3.92"	6.00	3.92"	5.75"	6.50"

Standard Material Combinations	
Screw Plug	Element
Brass	Copper
Brass	Incoloy
Brass	Steel
Stainless Steel	Incoloy
Stainless Steel	Stainless steel
Steel	Copper
Steel	Incoloy
Steel	Steel

SCREW PLUG IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: CLEAN WATER

1" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
BRASS PLUG	4-1/2"	500	■	■	1	60	MS103C-H04HN-0500 □
	6-1/2"	750	■	■	1	60	MS103C-H06HN-0750 □
	6-5/8"	1000	■	■	1	60	MS103C-H06KN-1000 □
COPPER SHEATHED ELEMENTS	8"	1250	■	■	1	60	MS103C-H08ON-1250 □
	10-5/8"	1500	■	■	1	60	MS103C-H10KN-1500 □
	12-1/2"	2000	■	■	1	60	MS103C-H12HN-2000 □
	14-3/4"	2500	■	■	1	60	MS103C-H14MN-2500 □
NEMA 1 HOUSING	16-3/4"	3000	■	■	1	60	MS103C-H16MN-3000 □
	21"	4000	■	■	1	60	MS103C-H21ON-4000 □

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS.

1" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
STEEL PLUG	6-1/2"	250	■	■	1	20	MS101B-H06HN-0250 □
	9-1/4"	350	■	■	1	20	MS101B-H09DN-0350 □
STEEL SHEATHED ELEMENTS	9-3/4"	500	■	■	1	20	MS101B-H09MN-0500 □
	13-1/2"	750	■	■	1	20	MS101B-H13HN-0750 □
	16-3/4"	1000	■	■	1	20	MS101B-H16MN-1000 □
	23-3/4"	1500	■	■	1	20	MS101B-H23MN-1500 □
NEMA 1 HOUSING							

APPLICATION: CLEAN WATER

1-1/4" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
BRASS PLUG	4-3/8"	500	■	■	1	60	MS1D3C-H04FN-0500 □
	4-3/8"	1000	■	■	2	60	MS1D3C-J04FN-1000 □
	6-3/8"	750	■	■	1	60	MS1D3C-H06FN-0750 □
COPPER SHEATHED ELEMENTS	6-3/8"	1500	■	■	2	60	MS1D3C-J06FN-1500 □
	8-1/2"	2000	■	■	2	60	MS1D3C-J08HN-2000 □
	10-3/4"	2500	■	■	2	60	MS1D3C-J10MN-2500 □
	15"	3000	■	■	2	60	MS1D3C-J15ON-3000 □
NEMA 1 HOUSING	19"	4300	■	■	2	60	MS1D3C-J19ON-4300 □
	23-1/2"	5000	■	■	2	60	MS1D3C-J23HN-5000 □
	27-1/2"	6000	■	■	2	60	MS1D3C-J27HN-6000 □

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS.

1-1/4" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
STEEL PLUG	6-3/8"	500	■	■	2	20	MS1D1B-J06FN-0500 □
	8-7/8"	700	■	■	2	20	MS1D1B-J08PN-0700 □
STEEL SHEATHED ELEMENTS	12-3/4"	1000	■	■	2	20	MS1D1B-J12MN-1000 □
	19-3/8"	1500	■	■	2	20	MS1D1B-J19FN-1500 □
	25-3/8"	2000	■	■	2	20	MS1D1B-J25FN-2000 □
	36-7/8"	3000	■	■	2	20	MS1D1B-J36PN-3000 □
NEMA 1 HOUSING							

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

1-1/4" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
304 STAINLESS STEEL PLUG INCOLOY® SHEATHED ELEMENTS	13-3/8"	1000	■	■	2	23	MS1D2N-J13FN-1000 □
	19"	1500	■	■	2	23	MS1D2N-J19ON-1500 □
	24-3/8"	2000	■	■	2	23	MS1D2N-J24FN-2000 □
NEMA 1 HOUSING							

* Blank box denotes voltage selection: See Table 4 on Page 86.

SCREW PLUG IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: CLEAN WATER

2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 3PH	480V 1PH	480V 3PH			
BRASS PLUG	8-1/8"	2000	■		■		2	60	MS203C-J08BN-2000 □
	8-1/8"	3000		■		■	3	60	MS203C-A08BN-3000 □
	11-1/8"	2000	■		■		2	60	MS203C-J11BN-2000 □
COPPER SHEATHED ELEMENTS	11-1/8"	4500		■		■	3	60	MS203C-A11BN-4500 □
	15-1/8"	4000	■		■		2	60	MS203C-J15BN-4000 □
	15-1/8"	6000		■		■	3	60	MS203C-A15BN-6000 □
NEMA 1 HOUSING	21-1/8"	6000	■		■		2	60	MS203C-J21BN-6000 □
	21-1/8"	9000		■		■	3	60	MS203C-A21BN-9000 □
	26-5/8"	8000	■		■		2	60	MS203C-J26KN-8000 □
	26-5/8"	12000		■		■	3	60	MS203C-A26KN-120C □
	32-1/8"	10000	■		■		2	60	MS203C-J32BN-100C □
	32-1/8"	15000		■		■	3	60	MS203C-A32BN-150C □

APPLICATION: PROCESS WATER

2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 3PH	480V 1PH	480V 3PH			
304 STAINLESS STEEL PLUG	9-3/4"	2000	■		■		2	48	MS202N-J09MN-2000 □
	9-3/4"	3000		■		■	3	48	MS202N-A09MN-3000 □
	13-1/4"	2000	■		■		2	48	MS202N-J13DN-2000 □
	13-3/4"	4500		■		■	3	48	MS202N-A13MN-4500 □
INCOLOY® SHEATHED ELEMENTS	17-3/4"	4000	■		■		2	48	MS202N-J17MN-4000 □
	17-3/4"	6000		■		■	3	48	MS202N-A17MN-6000 □
	20-1/4"	5000	■		■		2	48	MS202N-J20DN-5000 □
	20-1/4"	7500		■		■	3	48	MS202N-A20DN-7500 □
NEMA 1 HOUSING	25-3/4"	6000	■		■		2	48	MS202N-J25MN-6000 □
	25-3/4"	9000		■		■	3	48	MS202N-A25MN-9000 □
	32-3/4"	8000	■		■		2	48	MS202N-J32MN-8000 □
	32-3/4"	12000		■		■	3	48	MS202N-A32MN-120C □
	40-1/4"	10000	■		■		2	48	MS202N-J40DN-100C □
	40-1/4"	15000		■		■	3	48	MS202N-A40DN-150C □
	47-3/4"	18000		■		■	3	48	MS202N-A47MN-180C □

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL PLUG	9-1/2"	1000	■		■		2	23	MS201C-J09HN-1000 □
	9-1/2"	1500		■		■	3	23	MS201C-A09HN-1500 □
	13-1/2"	1500	■		■		2	23	MS201C-J13HN-1500 □
COPPER SHEATHED ELEMENTS	17-1/2"	2000	■		■		2	23	MS201C-J17HN-2000 □
	17-1/2"	3000		■		■	3	23	MS201C-A17HN-3000 □
	20-1/2"	2500	■		■		2	23	MS201C-J20HN-2500 □
NEMA 1 HOUSING	25"	3000	■		■		2	23	MS201C-J25ON-3000 □
	25"	4500		■		■	3	23	MS201C-A25ON-4500 □
	32-1/2"	4000	■		■		2	23	MS201C-J32HN-4000 □
	32-1/2"	6000		■		■	3	23	MS201C-A32HN-6000 □
	40"	5000	■		■		2	23	MS201C-J40ON-5000 □
	40"	7500		■		■	3	23	MS201C-A40ON-7500 □
	47-1/2"	6000	■		■		2	23	MS201C-J47HN-6000 □
	47-1/2"	9000		■		■	3	23	MS201C-A47HN-9000 □
	64"	12500		■		■	3	23	MS201C-A64ON-125C □

* Blank box denotes voltage selection: See Table 4 on Page 86

SCREW PLUG IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: DEIONIZED WATER, DEMINERALIZED WATER, CLEAN WATER

2-1/2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
BRASS PLUG	7-5/8"	3000	■	■	3	60	MS2H3C-A07KN-3000 □
	10-5/8"	4500	■	■	3	60	MS2H3C-A10KN-4500 □
COPPER SHEATHED ELEMENTS	14-5/8"	6000	■	■	3	60	MS2H3C-A14KN-6000 □
	17-5/8"	7500	■	■	3	60	MS2H3C-A17KN-7500 □
	20-5/8"	9000	■	■	3	60	MS2H3C-A20KN-9000 □
	26-1/8"	12000	■	■	3	60	MS2H3C-A26BN-120C □
NEMA 1 HOUSING	31-5/8"	15000	■	■	3	60	MS2H3C-A31KN-150C □
	37-1/8"	18000	■	■	3	60	MS2H3C-A37BN-180C □

APPLICATION: PROCESS WATER

2-1/2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
304 STAINLESS STEEL PLUG	9-3/8"	3000	■	■	3	48	MS2H2N-A09FN-3000 □
	12-7/8"	4500	■	■	3	48	MS2H2N-A12PN-4500 □
INCOLOY® SHEATHED ELEMENTS	17-3/8"	6000	■	■	3	48	MS2H2N-A17FN-6000 □
	19-7/8"	7500	■	■	3	48	MS2H2N-A19PN-7500 □
	24-7/8"	9000	■	■	3	48	MS2H2N-A24PN-9000 □
	32-3/8"	12000	■	■	3	48	MS2H2N-A32FN-120C □
NEMA 1 HOUSING	39-7/8"	15000	■	■	3	48	MS2H2N-A39PN-150C □
	47-3/8"	18000	■	■	3	48	MS2H2N-A47FN-180C □

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

2-1/2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
304 STAINLESS STEEL PLUG	17-3/8"	3000	■	■	3	23	MS2H2N-A17FN-3000 □
	24-7/8"	4500	■	■	3	23	MS2H2N-A24PN-4500 □
INCOLOY® SHEATHED ELEMENTS	32-3/8"	6000	■	■	3	23	MS2H2N-A32FN-6000 □
	39-7/8"	7500	■	■	3	23	MS2H2N-A39PN-7500 □
	47-3/8"	9000	■	■	3	23	MS2H2N-A47FN-9000 □
	63-7/8"	12000	■	■	3	23	MS2H2N-A63PN-125C □
NEMA 1 HOUSING	76-3/8"	15000	■	■	3	23	MS2H2N-A76FN-150C □

APPLICATION: MEDIUM WEIGHT OILS, HEAT TRANSFER OILS.

2-1/2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
STEEL PLUG	17-1/4"	3000	■	■	3	23	MS2H1B-A17DN-3000 □
	24-3/4"	4500	■	■	3	23	MS2H1B-A24MN-4500 □
STEEL SHEATHED ELEMENTS	32-1/4"	6000	■	■	3	23	MS2H1B-A32DN-6000 □
	39-3/4"	7500	■	■	3	23	MS2H1B-A39MN-7500 □
	47-1/4"	9000	■	■	3	23	MS2H1B-A47DN-9000 □
NEMA 1 HOUSING	63-3/4"	12000	■	■	3	23	MS2H1B-A63MN-125C □
	76-1/4"	15000	■	■	3	23	MS2H1B-A76DN-150C □

APPLICATION: BUNKER C AND #6 FUEL OILS

2-1/2" NPT	IMMERSED LENGTH "B"	WATTS	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			120V 1PH	240V 1PH			
STEEL PLUG	17-1/4"	1000	■	■	3	8	MS2H1B-A17DN-1000 □
	24-3/4"	1500	■	■	3	8	MS2H1B-A24MN-1500 □
STEEL SHEATHED ELEMENTS	32-1/4"	2000	■	■	3	8	MS2H1B-A32DN-2000 □
	39-3/4"	2500	■	■	3	8	MS2H1B-A39MN-2500 □
	47-1/4"	3000	■	■	3	8	MS2H1B-A47DN-3000 □
NEMA 1 HOUSING	63-3/4"	4000	■	■	3	8	MS2H1B-A63MN-4000 □
	76-1/4"	5000	■	■	3	8	MS2H1B-A76DN-5000 □

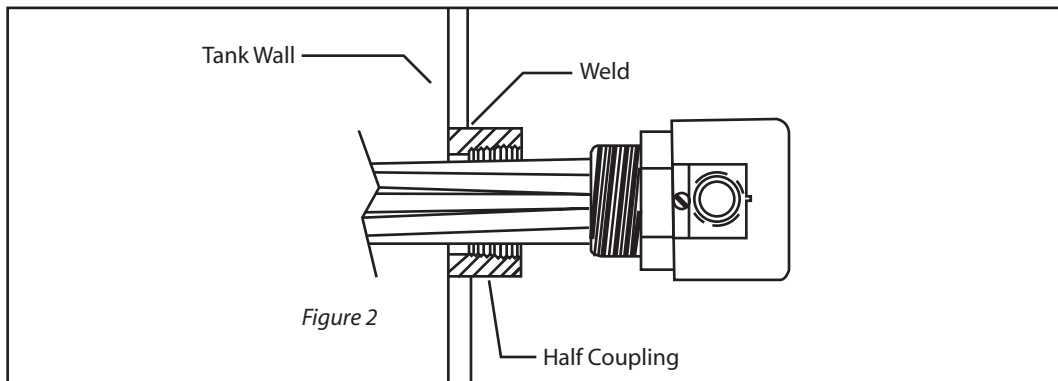
* Blank box denotes voltage selection: See Table 4 on Page 86.



SCREW PLUG IMMERSION HEATER INSTALLATION AND OPERATION

BEFORE INSTALLING:

1. Unpack the heater at the place of installation. Inspect the heater for shipping damage and report any claims to the carrier. Do not operate damaged equipment.
2. Check the nameplate watt and volt rating against your supply voltage and capacity and the requirements of your installation.



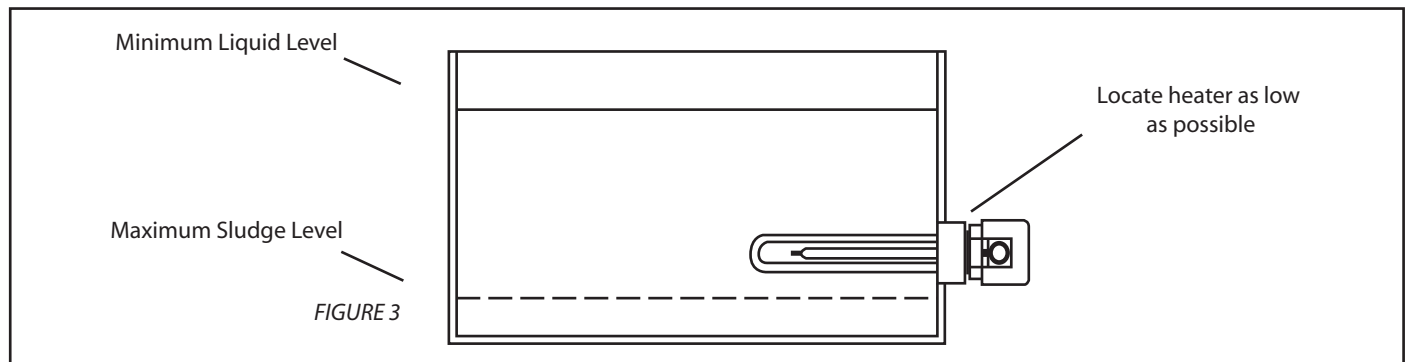
INSTALLATION INSTRUCTIONS

MOUNTING (FIGURE 2)

1. The heater must be installed so that the heated section is immersed at all times. Premature failure of the element will occur if this is not done.
2. Horizontal mounting of the heater is recommended.
3. The heater should be located as close to the bottom of the tank as possible for maximizing heating efficiency.
4. Locate the heater below the minimum liquid level and above the maximum expected sludge level. (Figure 3)
5. Cover the threads of screw plug immersion heaters with teflon tape or sealing compound before installing.
6. Use a wrench on the hex portion of screw plug to tighten the heater in the threaded tank opening. Do not turn the heater by the terminal enclosure.

WIRING

1. All wiring should be done in accordance with the National Electrical Code and applicable local codes.
2. Refer to the typical wiring diagrams on pages 45 and 46 for the proper method of connecting the heater.
3. The current carrying capacity of the power supply leads should exceed the heater amperage by at least 25%. Be sure to consider the ambient operating temperature and apply the appropriate correction factor to the ampacity rating of the wire. Lead wire used must be rated for 150°C minimum.



FLANGE IMMERSION HEATERS

Flanged Immersion Heaters are constructed with formed tubular heating elements brazed or welded to a high pressure flange for direct immersion into tanks and pressure vessels. Capable of achieving higher wattage requirements than conventional screw plug heaters due to additional heating elements that can be added to this heater design.



FEATURES:

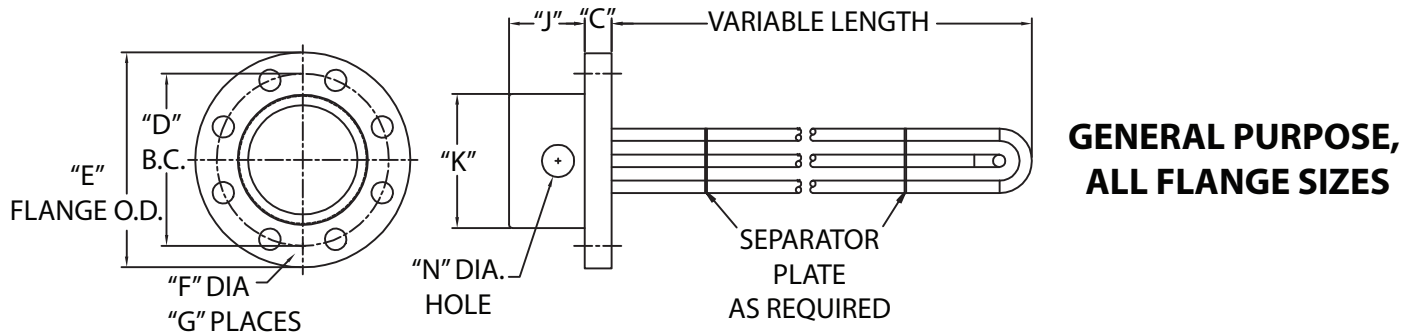
- Standard sheath materials: copper, Incoloy®, and steel
- Recompacted bends for consistent MgO density
- Elements are sealed to prevent leakage and contamination.
- Heavy duty metal sheath elements
- NEMA 1 housing (optional NEMA 4 or 7 available)
- Silver braze construction on non-ferrous flanges
- Thermowells
- 150 lb rated flange with 1/16" raised face
- Optional 300 lb rated flange
- Flanges meet ASTM & ANSI specifications
- Corrosion resistant hardware
- Welded construction between elements and flanges
- Hydrostatic pressure testing

TYPICAL APPLICATIONS:

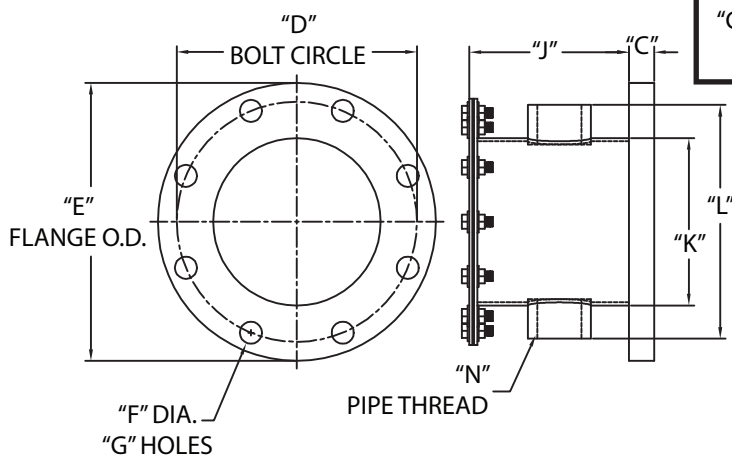
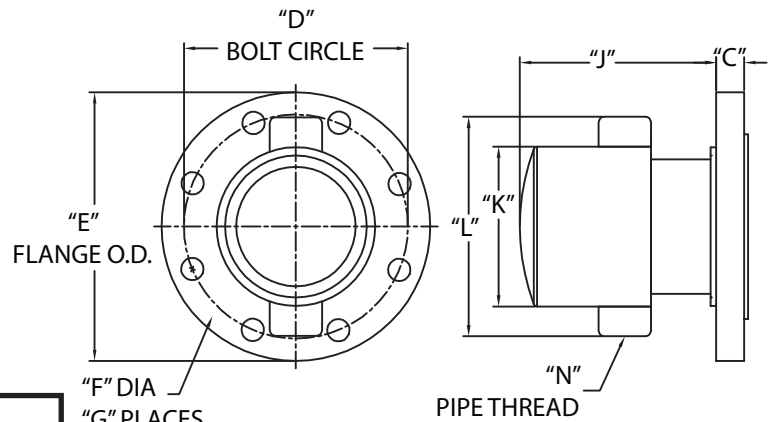
- Freeze Protection
- Process Liquids
- Solution Liquids
- Asphalt
- Wax
- Paraffin
- Fluid Heating



FLANGE IMMERSION HEATER TERMINAL ENCLOSURE CONFIGURATIONS

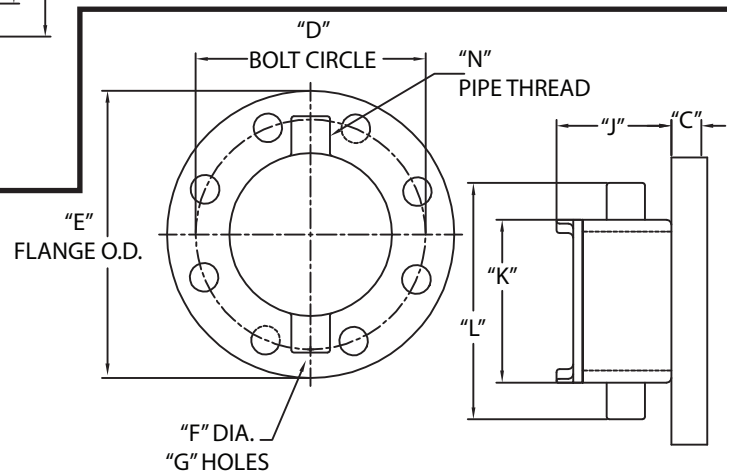


MOISTURE RESISTANT/ EXPLOSION RESISTANT 3" FLANGE ONLY, WITH THERMOSTAT



NEMA 4, ALL FLANGES

EXPLOSION RESISTANT



*See next page for corresponding values.

FLANGE IMMERSION HEATER TERMINAL ENCLOSURE CONFIGURATIONS

Flange Size	Enclosure Type	Max. Number of Elements	C	D Bolt Circle	E Flange O.D.	F	G	J	K	L	N
3"	No Enclosure	3	0.94"	6.00"	7.50"	0.75"	4	N/A	N/A	N/A	N/A
3"	NEMA 1	3	0.94"	6.00"	7.50"	0.75"	4	4.00"	5.50"	N/A	1.13"
3"	NEMA 4	3	0.94"	6.00"	7.50"	0.75"	4	6.00"	5.50"	7.00"	1.50"
3"	NEMA 7	3	0.94"	6.00"	7.50"	0.75"	4	6.00"	5.50"	7.00"	1.50"
4"	No Enclosure	6	0.94"	7.50"	9.00"	0.75"	8	N/A	N/A	N/A	N/A
4"	NEMA 1	6	0.94"	7.50"	9.00"	0.75"	8	4.00"	5.50"	N/A	1.13"
4"	NEMA 4	6	0.94"	7.50"	9.00"	0.75"	8	6.00"	5.50"	7.00"	1.50"
4"	NEMA 7	6	0.94"	7.50"	9.00"	0.75"	8	6.00"	5.50"	7.00"	1.50"
5"	No Enclosure	9	0.94"	8.50"	10.0"	0.88"	8	N/A	N/A	N/A	N/A
5"	NEMA 1	9	0.94"	8.50"	10.0"	0.88"	8	4.00"	6.00"	N/A	1.13"
5"	NEMA 4	9	0.94"	8.50"	10.0"	0.88"	8	6.00"	6.00"	7.50"	1.50"
5"	NEMA 7	9	0.94"	8.50"	10.0"	0.88"	8	6.00"	6.00"	7.50"	1.50"
6"	No Enclosure	12	1.0"	9.50"	11.0"	0.88"	8	N/A	N/A	N/A	N/A
6"	NEMA 1	12	1.0"	9.50"	11.0"	0.88"	8	4.00"	7.00"	N/A	1.13"
6"	NEMA 4	12	1.0"	9.50"	11.0"	0.88"	8	6.00"	7.00"	8.50"	1.50"
6"	NEMA 7	12	1.0"	9.50"	11.0"	0.88"	8	6.00"	7.00"	8.50"	1.50"
8"	No Enclosure	18	1.12"	11.75"	13.0"	0.88"	8	N/A	N/A	N/A	N/A
8"	NEMA 1	18	1.12"	11.75"	13.0"	0.88"	8	6.00"	9.00"	N/A	1.13"
8"	NEMA 4	18	1.12"	11.75"	13.0"	0.88"	8	6.00"	9.00"	10.50"	1.50"
8"	NEMA 7	18	1.12"	11.75"	13.0"	0.88"	8	6.00"	9.00"	10.50"	1.50"
10"	No Enclosure	36	1.19"	14.25"	16.0"	1.00"	12	N/A	N/A	N/A	N/A
10"	NEMA 1	36	1.19"	14.25"	16.0"	1.00"	12	6.00"	10.0"	N/A	1.13"
10"	NEMA 4	36	1.19"	14.25"	16.0"	1.00"	12	7.00"	10.0"	11.50"	1.50"
10"	NEMA 7	36	1.19"	14.25"	16.0"	1.00"	12	7.00"	10.0"	11.50"	1.50"
12"	No Enclosure	45	1.25"	17.0"	19.0"	1.00"	12	N/A	N/A	N/A	N/A
12"	NEMA 1	45	1.25"	17.0"	19.0"	1.00"	12	6.00"	10.0"	N/A	1.13"
12"	NEMA 4	45	1.25"	17.0"	19.0"	1.00"	12	7.00"	10.0"	11.50"	1.50"
12"	NEMA 7	45	1.25"	17.0"	19.0"	1.00"	12	7.00"	10.0"	11.50"	1.50"

FLANGE IMMERSION HEATERS

SELECTION GUIDELINES

OPTIONAL FEATURES

- NEMA 4 (moisture resistant) or NEMA 7 (explosion resistant) enclosures.
- Thermostatic controls in NEMA 1, 4, or 7 enclosures available in 3 temperature ranges.
- Passivated elements and flanges for pure and deionized water applications, photo chemicals and special processes.
- Standoff housing design available for high temperature applications.
- Other sheath materials: Carpenter 20, Monel 400, Inconel 600, Hastelloy, and Titanium.
- Type 304 or 316 Stainless Steel flanges.
- 300 lb ANSI rated flange.

Application	Flange Size (In.)	Sheath Material	Flange Material	Watt Density
Clean Water	3"	Copper	Steel	40-80
	4"	Copper	Steel	40-80
	5"	Copper	Steel	40-80
	6"	Copper	Steel	40-80
	8"	Copper	Steel	40-80
	10"	Copper	Steel	40-80
	12"	Copper	Steel	40-80
Process Water	3"	304 Stainless Steel	Steel	60
	4"	304 Stainless Steel	Steel	60
	5"	304 Stainless Steel	Steel	60
	6"	304 Stainless Steel	Steel	60
	8"	304 Stainless Steel	Steel	60
Solution Water	3"	Incoloy®	Steel	50
	4"	Incoloy®	Steel	50
	5"	Incoloy®	Steel	50
	6"	Incoloy®	Steel	50
	8"	Incoloy®	Steel	50
Mildly Corrosive Solution	3"	304 Stainless Steel	Steel	25
	4"	304 Stainless Steel	Steel	25
	5"	304 Stainless Steel	Steel	25
	6"	304 Stainless Steel	Steel	25
	8"	304 Stainless Steel	Steel	25
Corrosive Solution & Gas	3"	Incoloy®	Steel	25
	4"	Incoloy®	Steel	25
	5"	Incoloy®	Steel	25
	6"	Incoloy®	Steel	25
	8"	Incoloy®	Steel	25
	10"	Incoloy®	Steel	25
	12"	Incoloy®	Steel	25
Severely Corrosive Solution	3"	Incoloy®	304 Stainless Steel	15
	4"	Incoloy®	304 Stainless Steel	15
	5"	Incoloy®	304 Stainless Steel	15
	6"	Incoloy®	304 Stainless Steel	15
Demineralized or De-ionized Water	3"	Incoloy®	304 Stainless Steel	25
	5"	Incoloy®	304 Stainless Steel	25
Boiler & Water	2½ sq.	Copper	Brass	15
	2½ sq.	Incoloy®	Steel	15
	4½ sq.	Copper	Steel	15
Light Weight Oil	3"	Steel	Steel	25
	4"	Steel	Steel	25
	5"	Steel	Steel	25
	6"	Steel	Steel	25
	8"	Steel	Steel	25
	10"	Steel	Steel	25
	12"	Steel	Steel	25
Medium Weight Oil	3"	Steel	Steel	15
	4"	Steel	Steel	15
	5"	Steel	Steel	15
	6"	Steel	Steel	15
Heavy Weight Oil	3"	Steel	Steel	8
	4"	Steel	Steel	8
	5"	Steel	Steel	8

FLANGE IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: CLEAN WATER

3" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				MAX. NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
COPPER SHEATHED ELEMENTS	15-1/2"	6.75	■	■	■	■	3	60	MFPR03-C15HA-6750□□N
	21-1/2"	9.0	■	■	■	■	3	60	MFPR03-C21HA-9000□□N
	27"	12.0	■	■	■	■	3	60	MFPR03-C27OA-120C□□N
	32-1/2"	15.0	■	■	■	■	3	60	MFPR03-C32HA-150C□□N
	38"	18.0	■	■	■	■	3	60	MFPR03-C38OA-180C□□N
NEMA 1 HOUSING	51"	25.0			■	■	3	60	MFPR03-C51OA-250C□□N
	60-1/2"	30.0			■	■	3	60	MFPR03-C60HA-300C□□N

APPLICATION: PROCESS WATER

3" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				MAX. NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	13-1/2"	4.5	■	■	■	■	3	48	MFPR03-N13HA-4500□□N
	18"	6.0	■	■	■	■	3	48	MFPR03-N18OA-6000□□N
	20-1/2"	7.5	■	■	■	■	3	48	MFPR03-N20HA-7500□□N
	25-1/2"	9.0	■	■	■	■	3	48	MFPR03-N25HA-9000□□N
	33"	12.0	■	■	■	■	3	48	MFPR03-N33OA-120C□□N
NEMA 1 HOUSING	40-1/2"	15.0			■	■	3	48	MFPR03-N40HA-150C□□N
	48"	18.0			■	■	3	48	MFPR03-N48OA-180C□□N

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

3" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				MAX. NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	18"	3.0	■	■	■	■	3	23	MFPR03-N18OA-3000□□N
	25-1/2"	4.5	■	■	■	■	3	23	MFPR03-N25HA-4500□□N
	33"	6.0	■	■	■	■	3	23	MFPR03-N33OA-6000□□N
	40-1/2"	7.5	■	■	■	■	3	23	MFPR03-N40HA-7500□□N
	48"	9.0	■	■	■	■	3	23	MFPR03-N48OA-9000□□N
NEMA 1 HOUSING	64-1/2"	12.5			■	■	3	23	MFPR03-N64HA-125C□□N
	77"	15.0			■	■	3	23	MFPR03-N77OA-150C□□N

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

3" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				MAX. NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	18"	3.0	■	■	■	■	3	23	MFPR03-B18OA-3000□□N
	25-1/2"	4.5	■	■	■	■	3	23	MFPR03-B25HA-4500□□N
	33"	6.0	■	■	■	■	3	23	MFPR03-B33OA-6000□□N
	40-1/2"	7.5	■	■	■	■	3	23	MFPR03-B40HA-7500□□N
	48"	9.0	■	■	■	■	3	23	MFPR03-B48OA-9000□□N
NEMA 1 HOUSING	64-1/2"	12.5			■	■	3	23	MFPR03-B64HA-125C□□N
	77"	15.0			■	■	3	23	MFPR03-B77OA-150C□□N

APPLICATION: BUNKER C AND #6 FUEL OILS

3" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				MAX. NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	33"	2.0		■		■	3	8	MFPR03-B33OA-2000□□N
	48"	3.0		■		■	3	8	MFPR03-B48OA-3000□□N
	64-1/2"	4.0		■		■	3	8	MFPR03-B64HA-4000□□N
	77"	5.0		■		■	3	8	MFPR03-B77OA-5000□□N
NEMA 1 HOUSING									

* 1st Blank box denotes voltage selection: See Table 4 on Page 86.

2nd Blank box denotes number of phases.

FLANGE IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: CLEAN WATER

4" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
COPPER SHEATHED ELEMENTS	15-1/2"	13.5	■	■	■	■	6	60	MFPR04-C15HB-135C□□N
	21-1/2"	19.5	■	■	■	■	6	60	MFPR04-C21HB-195C□□N
	27"	25.0	■	■	■	■	6	60	MFPR04-C27OB-250C□□N
	32-1/2"	31.5	■	■	■	■	6	60	MFPR04-C32HB-315C□□N
	38"	36.0	■	■	■	■	6	60	MFPR04-C38OB-360C□□N
NEMA 1 HOUSING	51"	49.5			■	■	6	60	MFPR04-C51OB-495C□□N
	60-1/2"	57.0			■	■	6	60	MFPR04-C60HB-570C□□N

APPLICATION: PROCESS WATER

4" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	13-1/2"	9.3	■	■	■	■	6	48	MFPR04-N13HB-9300□□N
	18"	13.2	■	■	■	■	6	48	MFPR04-N18OB-132C□□N
	20-1/2"	15.0	■	■	■	■	6	48	MFPR04-N20HB-150C□□N
	25-1/2"	18.0	■	■	■	■	6	48	MFPR04-N25HB-180C□□N
	33"	24.9	■	■	■	■	6	48	MFPR04-N33OB-249C□□N
NEMA 1 HOUSING	40-1/2"	30.6			■	■	6	48	MFPR04-N40HB-306C□□N
	48"	36.6			■	■	6	48	MFPR04-N48OB-366C□□N

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

4" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	18"	6.3	■	■	■	■	6	23	MFPR04-N18OB-6300□□N
	25-1/2"	9.0	■	■	■	■	6	23	MFPR04-N25HB-9000□□N
	33"	12.0	■	■	■	■	6	23	MFPR04-N33OB-120C□□N
	40-1/2"	15.0	■	■	■	■	6	23	MFPR04-N40HB-150C□□N
	48"	18.0	■	■	■	■	6	23	MFPR04-N48OB-180C□□N
NEMA 1 HOUSING	64-1/2"	24.0			■	■	6	23	MFPR04-N64HB-240C□□N
	77"	28.5			■	■	6	23	MFPR04-N77OB-285C□□N

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

4" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	18"	6.3	■	■	■	■	6	23	MFPR04-B18OB-6300□□N
	25-1/2"	9.0	■	■	■	■	6	23	MFPR04-B25HB-9000□□N
	33"	12.0	■	■	■	■	6	23	MFPR04-B33OB-120C□□N
	40-1/2"	15.0	■	■	■	■	6	23	MFPR04-B40HB-150C□□N
	48"	18.0	■	■	■	■	6	23	MFPR04-B48OB-180C□□N
NEMA 1 HOUSING	64-1/2"	24.0			■	■	6	23	MFPR04-B64HB-240C□□N
	77"	28.5			■	■	6	23	MFPR04-B77OB-285C□□N

APPLICATION: BUNKER C AND #6 FUEL OILS

4" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	33"	4.5		■		■	6	8	MFPR04-B33OB-4500□□N
	48"	6.0		■		■	6	8	MFPR04-B48OB-6000□□N
	64-1/2"	7.5		■		■	6	8	MFPR04-B64HB-7500□□N
	77"	9.0		■		■	6	8	MFPR04-B77OB-9000□□N
NEMA 1 HOUSING									

* 1st Blank box denotes voltage selection: See Table 4 on Page 86.

2nd Blank box denotes number of phases.

FLANGE IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: CLEAR WATER

5" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
COPPER SHEATHED ELEMENTS	15-1/2"	20.7	■	■	■	■	9	60	MFPR05-C15HK-207C□□N
	21-1/2"	28.0	■	■	■	■	9	60	MFPR05-C21HK-280C□□N
	27"	37.5	■	■	■	■	9	60	MFPR05-C270K-375C□□N
	32-1/2"	45.0		■	■	■	9	60	MFPR05-C32HK-450C□□N
	38"	54.0		■	■	■	9	60	MFPR05-C380K-540C□□N
NEMA 1 HOUSING	51"	72.0				■	9	60	MFPR05-C510K-720C□□N
	60-1/2"	85.5				■	9	60	MFPR05-C60HK-855C□□N

APPLICATION: PROCESS WATER

5" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	13-1/2"	13.5	■	■	■	■	9	48	MFPR05-N13HK-135C□□N
	18"	19.5	■	■	■	■	9	48	MFPR05-N180K-195C□□N
	20-1/2"	22.5	■	■	■	■	9	48	MFPR05-N20HK-225C□□N
	25-1/2"	28.5	■	■	■	■	9	48	MFPR05-N25HK-285C□□N
	33"	37.5	■	■	■	■	9	48	MFPR05-N330K-375C□□N
NEMA 1 HOUSING	40-1/2"	46.0		■	■	■	9	48	MFPR05-N40HK-460C□□N
	48"	55.0		■	■	■	9	48	MFPR05-N480K-550C□□N

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

5" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	18"	9.5	■	■	■	■	9	23	MFPR05-N180K-9500□□N
	25-1/2"	13.5	■	■	■	■	9	23	MFPR05-N25HK-135C□□N
	33"	18.0	■	■	■	■	9	23	MFPR05-N330K-180C□□N
	48"	26.1	■	■	■	■	9	23	MFPR05-N480K-261C□□N
NEMA 1 HOUSING	64-1/2"	34.0		■	■	■	9	23	MFPR05-N64HK-340C□□N
	77"	43.0		■	■	■	9	23	MFPR05-N770K-430C□□N

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

5" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	18"	9.5	■	■	■	■	9	23	MFPR05-B180K-9500□□N
	25-1/2"	13.5	■	■	■	■	9	23	MFPR05-B25HK-135C□□N
	33"	18.0	■	■	■	■	9	23	MFPR05-B330K-180C□□N
	40-1/2"	26.1	■	■	■	■	9	23	MFPR05-B40HK-261C□□N
	48"	31.0	■	■	■	■	9	23	MFPR05-B480K-310C□□N
NEMA 1 HOUSING	64-1/2"	34.0		■	■	■	9	23	MFPR05-B64HK-340C□□N
	77"	43.0		■	■	■	9	23	MFPR05-B770K-430C□□N

APPLICATION: BUNKER C AND #6 FUEL OILS

5" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	40-1/2"	7.7		■		■	9	8	MFPR05-B40HK-7700□3N
	48"	9.0		■		■	9	8	MFPR05-B480K-9000□3N
	64-1/2"	12.0		■		■	9	8	MFPR05-B64HK-120C□3N
	77"	15.0		■		■	9	8	MFPR05-B770K-150C□3N
NEMA 1 HOUSING									

* 1st Blank box denotes voltage selection: See Table 4 on Page 86.

2nd Blanks box denotes number of phases.

FLANGE IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: CLEAR WATER

6" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
COPPER SHEATHED ELEMENTS	15-3/8"	28	■	■	■	■	12	60	MFPR06-C15FC-280C□□N
	21-3/8"	38	■	■	■	■	12	60	MFPR06-C21FC-380C□□N
	26-7/8"	50		■	■	■	12	60	MFPR06-C26PC-500C□□N
	32-3/8"	61.2		■	■	■	12	60	MFPR06-C32FC-612C□□N
	37-7/8"	72		■		■	12	60	MFPR06-C37PC-720C□□N
NEMA 1 HOUSING	50-7/8"	96				■	12	60	MFPR06-C50PC-960C□3N
	60-3/8"	115				■	12	60	MFPR06-C60FC-115K□3N

APPLICATION: PROCESS WATER

6" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	13-1/2"	18.6	■	■	■	■	12	48	MFPR06-N13HC-186C□□N
	18"	26.4	■	■	■	■	12	48	MFPR06-N18OC-264C□□N
	20-1/2"	32.0	■	■	■	■	12	48	MFPR06-N20HC-320C□□N
	25-1/2"	38.0	■	■	■	■	12	48	MFPR06-N25HC-380C□□N
	33"	50.0	■	■	■	■	12	48	MFPR06-N33OC-500C□□N
NEMA 1 HOUSING	40-1/2"	60.5		■	■	■	12	48	MFPR06-N40HC-605C□□N
	48"	72.0		■	■	■	12	48	MFPR06-N48OC-720C□□N

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

6" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	18"	12.5	■	■	■	■	12	23	MFPR06-N18OC-125C□□N
	25-1/2"	18.0	■	■	■	■	12	23	MFPR06-N25HC-180C□□N
	33"	24.0	■	■	■	■	12	23	MFPR06-N33OC-240C□□N
	40-1/2"	29.5	■	■	■	■	12	23	MFPR06-N40HC-295C□□N
	48"	35.0	■	■	■	■	12	23	MFPR06-N48OC-350C□□N
NEMA 1 HOUSING	64-1/2"	46.5		■	■	■	12	23	MFPR06-N64HC-465C□□N
	77"	57.0		■	■	■	12	23	MFPR06-N77OC-570C□□N

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

6" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	18"	12.5	■	■	■	■	12	23	MFPR06-B18OC-125C□□N
	25-1/2"	18.0	■	■	■	■	12	23	MFPR06-B25HC-180C□□N
	33"	24.0	■	■	■	■	12	23	MFPR06-B33OC-240C□□N
	40-1/2"	29.5	■	■	■	■	12	23	MFPR06-B40HC-295C□□N
	48"	35.0	■	■	■	■	12	23	MFPR06-B48OC-350C□□N
NEMA 1 HOUSING	64-1/2"	46.5		■	■	■	12	23	MFPR06-B64HC-465C□□N
	77"	57.0		■	■	■	12	23	MFPR06-B77OC-570C□□N

APPLICATION: BUNKER C AND #6 FUEL OILS

6" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE				NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 1PH	240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	40-1/2"	9.6		■		■	12	8	MFPR06-B40HC-9600□3N
	48"	12.0		■		■	12	8	MFPR06-B48OC-120C□3N
	64-1/2"	16.2		■		■	12	8	MFPR06-B64HC-162C□3N
	77"	19.2		■		■	12	8	MFPR06-B77OC-192C□3N
NEMA 1 HOUSING									

* 1st Blank box denotes voltage selection: See Table 4 on Page 86.

2nd Blank box denotes number of phases.

FLANGE IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: CLEAR WATER

8" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE			NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 1PH	480V 3PH			
COPPER SHEATHED ELEMENTS	21-3/4"	61.2	■	■	■	18	60	MFPR08-C21MD-612C□□N
	29-3/4"	85.5	■		■	18	60	MFPR08-C29MD-855C□3N
	37-1/4"	103.5	■		■	18	60	MFPR08-C37DD-103K□3N
	45-1/4"	129.5	■		■	18	60	MFPR08-C45DD-129K□3N
	52-3/4"	151.0			■	18	60	MFPR08-C52MD-151K 83N
NEMA 1 HOUSING	60-3/4"	172.5			■	18	60	MFPR08-C60MD-172K 83N
	68-1/4"	193.5			■	18	60	MFPR08-C68DD-193K 83N

APPLICATION: PROCESS WATER

8" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE			NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	25-3/4"	56.5	■	■	■	18	48	MFPR08-N25MD-565C□□N
	35-3/4"	79.0	■		■	18	48	MFPR08-N35MD-790C□3N
	44-1/4"	99.0	■		■	18	48	MFPR08-N44DD-990C□3N
	54-1/4"	121.5	■		■	18	48	MFPR08-N54DD-121K□3N
	63-1/4"	145.0			■	18	48	MFPR08-N63DD-145K 83N
NEMA 1 HOUSING	72-3/4"	166.5			■	18	48	MFPR08-N72MD-166K 83N
	82-1/4"	190.0			■	18	48	MFPR08-N82DD-190K 83N

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

8" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE			NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS	32-3/4"	36	■	■	■	18	23	MFPR08-N32MD-360C□□N
	43-1/4"	46.5	■	■	■	18	23	MFPR08-N43DD-465C□□N
	51-1/4"	55.0	■	■	■	18	23	MFPR08-N51DD-550C□□N
NEMA 1 HOUSING								

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

8" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE			NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	32-3/4"	36	■	■	■	18	23	MFPR08-B32MD-360C□□N
	43-1/4"	46.5	■	■	■	18	23	MFPR08-B43DD-465C□□N
	51-1/4"	55.0	■	■	■	18	23	MFPR08-B51DD-550C□□N
	61-3/4"	65.7	■	■	■	18	23	MFPR08-B61MD-657C□□N
	70-1/4"	77.4	■	■	■	18	23	MFPR08-B70DD-774C□□N
NEMA 1 HOUSING	79-1/4"	86.5	■		■	18	23	MFPR08-B79DD-865C□3N

APPLICATION: BUNKER C AND #6 FUEL OILS

8" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE			NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 1PH	480V 3PH			
STEEL SHEATHED ELEMENTS	43-1/4"	16.2	■		■	18	8	MFPR08-B43DD-162C□3N
	53-1/4"	19.8	■		■	18	8	MFPR08-B53DD-198C□3N
	61-1/4"	22.5	■		■	18	8	MFPR08-B61DD-225C□3N
	70-1/4"	26.5	■		■	18	8	MFPR08-B70DD-265C□3N
NEMA 1 HOUSING	79-1/4"	29.7	■		■	18	8	MFPR08-B79DD-297C□3N

* 1st Blank box denotes voltage selection: See Table 4 on Page 86.
2nd Blank box denotes number of phases.

FLANGE IMMERSION HEATERS

LIST OF SIZES & RATINGS

APPLICATION: PROCESS WATER

10" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS NEMA 1 HOUSING	54-3/4"	252		■	36	48	MFPR10-N54MF-252K83N
	63-3/4"	295		■	36	48	MFPR10-N63MF-295K83N
	73-3/4"	342		■	36	48	MFPR10-N73MF-342K83N

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

10" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS NEMA 1 HOUSING	33-1/4"	72.0	■	■	36	23	MFPR10-N33DF-720C□3N
	43-3/4"	92.0	■	■	36	23	MFPR10-N43MF-920C□3N
	57-3/4"	126.0	■	■	36	23	MFPR10-N57MF-126K□3N

APPLICATION: LIGHTWEIGHT OILS, DEGREASING SOLUTIONS, HEAT TRANSFER OILS

10" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 3PH			
STEEL SHEATHED ELEMENTS NEMA 1 HOUSING	33-1/4"	72.0	■	■	36	23	MFPR10-B33DF-720C□3N
	43-3/4"	92.0	■	■	36	23	MFPR10-B43MF-920C□3N
	57-3/4"	126.0	■	■	36	23	MFPR10-B57MF-126K□3N
	62-1/4"	137.0		■	36	23	MFPR10-B62DF-137K83N
	70-3/4"	152.0		■	36	23	MFPR10-B70MF-152K83N
	78-3/4"	171.0		■	36	23	MFPR10-B78MF-171K83N

APPLICATION: BUNKER C AND #6 FUEL OILS

10" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 3PH	480V 3PH			
STEEL SHEATHED ELEMENTS NEMA 1 HOUSING	51-3/4"	37.8	■	■	36	8	MFPR10-B51MF-378C□3N
	62-1/4"	46.8	■	■	36	8	MFPR10-B62DF-468C□3N
	70-3/4"	54.0	■	■	36	8	MFPR10-B70MF-540C□3N
	78-3/4"	59.5	■	■	36	8	MFPR10-B78MF-595C□3N

APPLICATION: PROCESS WATER

12" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS NEMA 1 HOUSING	54-5/8"	315.0		■	45	48	MFPR12-N54KG-315K83N
	63-5/8"	366.5		■	45	48	MFPR12-N63KG-366K83N
	73-1/8"	416.0		■	45	48	MFPR12-N73BG-416K83N

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

12" 150 LB ANSI FLANGE	IMMERSED LENGTH	KW	VOLTAGE		NUMBER OF ELEMENTS	WATT DENSITY	PART NUMBER*
			240V 1PH	480V 3PH			
INCOLOY® SHEATHED ELEMENTS NEMA 1 HOUSING	33-1/8"	88.0		■	45	23	MFPR12-N33BG-880C83N
	43-5/8"	124.0		■	45	23	MFPR12-N43KG-124K83N
	57-5/8"	157.5		■	45	23	MFPR12-N57KG-157K83N

* Blank box denotes voltage selection: See Table 4 on Page 86.

Listed sizes are standard. Custom sizes can be ordered as specified by the customer.



FLANGE IMMERSION HEATER INSTALLATION AND OPERATION

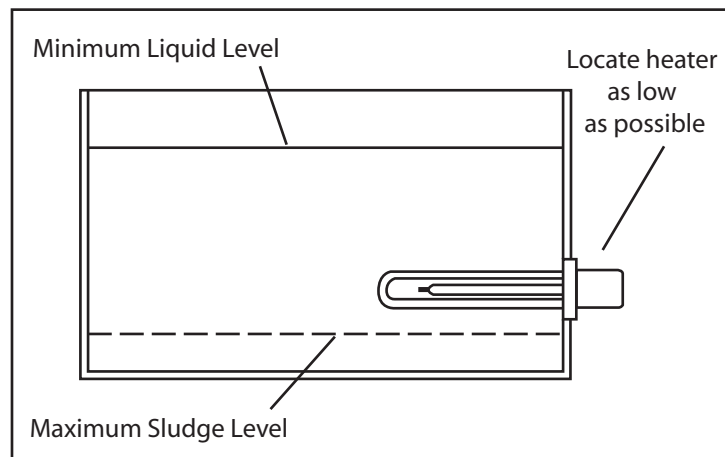
BEFORE INSTALLING:

1. Unpack the heater at the place of installation. Inspect the heater for shipping damage and report any claims to the carrier. Do not operate damaged equipment.
2. Check the nameplate watt and volt rating against your supply voltage and capacity and the requirements of your installation.

INSTALLATION INSTRUCTIONS

MOUNTING

1. Most Flanged heaters are designed for direct immersion into a liquid. Heater tubes must be installed into the system so that the tubes are covered by liquid at all times during operation. Care should be taken to avoid air entrapment or pockets of overheated fluid around the heater tubes.
2. Flanged heaters mounted into tanks should be installed horizontally near the tank bottom to allow natural circulation. Agitation of the liquid in the tank will improve system performance. Heaters should be located to avoid sludge build around the heater tubes.
3. Circulating or forced flow systems must have unrestricted flow to ensure proper control performance, heater life, and system integrity.



WIRING

1. Heater should be properly grounded to prevent electrical shock hazard.
2. Do not support or suspend heater from termination or wiring.
3. Make sure the heater supply voltage is the same as the rated heater voltage.
4. System should include a flow switch, low liquid level cut-off switch, over temperature switch, or other safety device (depending on type of system). Heater tubes designed for direct immersion will fail if operated in air.
5. Do not exceed 105% of rated voltage. Higher voltages result in higher wattage output which could damage the heater, system, or medium heated.
6. All wiring should be done in accordance with the National Electrical Code and applicable local codes.
7. Refer to the typical wiring diagrams on pages 45 and 46 for the proper method of connecting the heater.
8. The current carrying capacity of the power supply leads should exceed the heater amperage by at least 25%. Be sure to consider the ambient operating temperature and apply the appropriate correction factor to the ampacity rating of the wire. Lead wire used must be rated for 150°C minimum.



SCREW PLUG & FLANGE IMMERSION HEATER INSTALLATION AND OPERATION

BEFORE ENERGIZING:

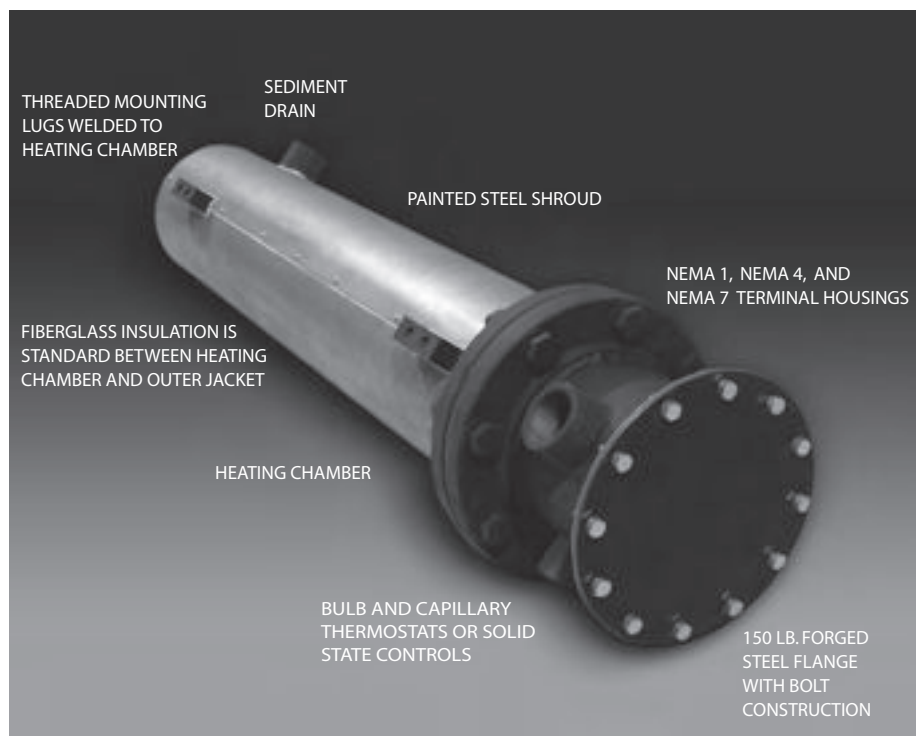
1. Check that the pipe plug is properly sealed and screwed tightly into the coupling.
2. Check that power supply connections are made according to the wiring diagram. Also, check for positive connection of all bus bars and power supply leads.
3. The insulation material used in electric heaters may absorb moisture during shipping. While in storage or when subjected to a humid environment. Because this moisture can lead to eventual failure of the heater, it is recommended that the heater be subjected to a high potential test and/or checked with a megohmmeter before energizing. A test voltage of 1000 volts plus twice the rated voltage should be used for the high potential test.
[ex: Heater Voltage = 480V. Test voltage = $1000V + (2 \times 480V) = 1960V$].
A reading of 50 megohms or greater can be considered acceptable if checking insulation resistance.

OPERATION AND MAINTENANCE:

1. Do not operate the heater unless it is completely immersed.
2. Do not bend the elements.
3. The heater can be protected from possible mechanical damage by placing a screen or grill around the elements.
4. Protect the terminal end of the heater from spray, condensation, dripping and vapors. A protective terminal enclosure should be used if the heater is to be subjected to these conditions.
5. If the heater is to be operated in the presence of explosive vapors or dust, an explosion resistant terminal enclosure must be provided.
6. Do not set the thermostats above the boiling point of the liquid. The boiling liquid could create a steam pocket which could cause the element(s) to overheat and burn out.
7. Periodically, remove the heater from the tank to inspect the elements for signs of corrosion and remove any deposits from the sheath. BE SURE POWER IS DISCONNECTED BEFORE REMOVING ELEMENTS.
8. Be sure the sheath material is compatible with the material being heated. Copper sheathed elements are used to heat oil, alkaline, wax and other similar materials. Stainless steel and Incoloy sheathed elements are most often used for heating water and corrosive solutions.
9. Make sure the watt-density of the heater is suitable for the material being heated. The velocity, viscosity, thermal conductivity of the material and operating temperature are all factors in determining the allowable watt-density of the element.
10. When heating liquids in a large tank, the use of several small heaters will provide more uniform heat distribution than a single large heater.

CIRCULATION HEATERS

Circulation Heater for 3" - 8" units. Inlet - outlet connections are NPT pipe threads (flanged connections are optional). Standard inlet - outlet connections on 10" and larger units are 150 lb. rated flanges.



OPTIONAL FEATURES

- Weather proof insulated shroud
- All stainless steel construction
- ASME section 8 construction on vessel.
- Other sheath materials: Carpenter 20, Model 400, Inconel 600, Hastelloy, and Titanium
- High pressure construction
- High temperature ceramic fiber insulation
- Passivation on all wetted surfaces

APPLICATION FACTORS

Heater selection is influenced by the following parameters:

- The heated medium, viscosity, specific heat, density and corrosive properties
- The presence of contaminants in the medium
- The corrosion resistant properties of the heated medium
- The sheath watt density of the heating elements (the watts/in²) and the flow rate of the heated medium
- The vessel design and materials of construction
- Times, temperature, and pressure

CIRCULATION HEATERS

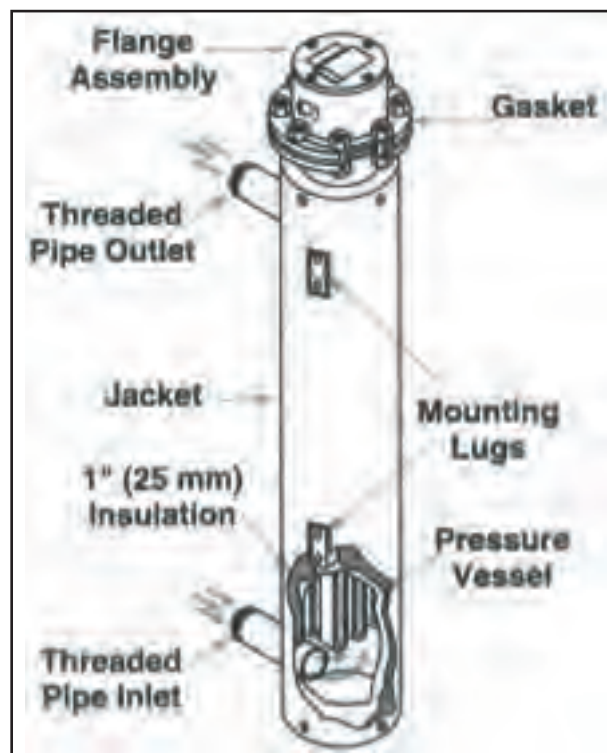
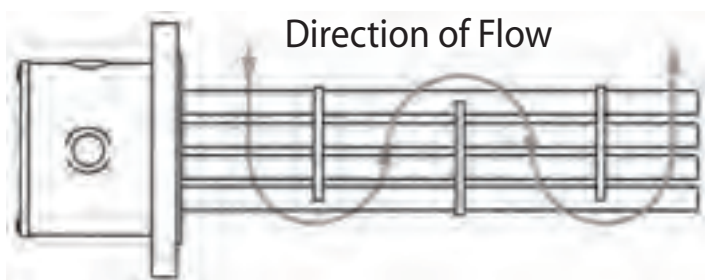
PRESSURE VESSELS

All standard pressure vessel (tank) materials are rated to 150 lb. and made from:

- Carbon Steel
- 304/316 Stainless Steel

All catalog pressure vessels (tank) are steel unless otherwise noted.

Baffles

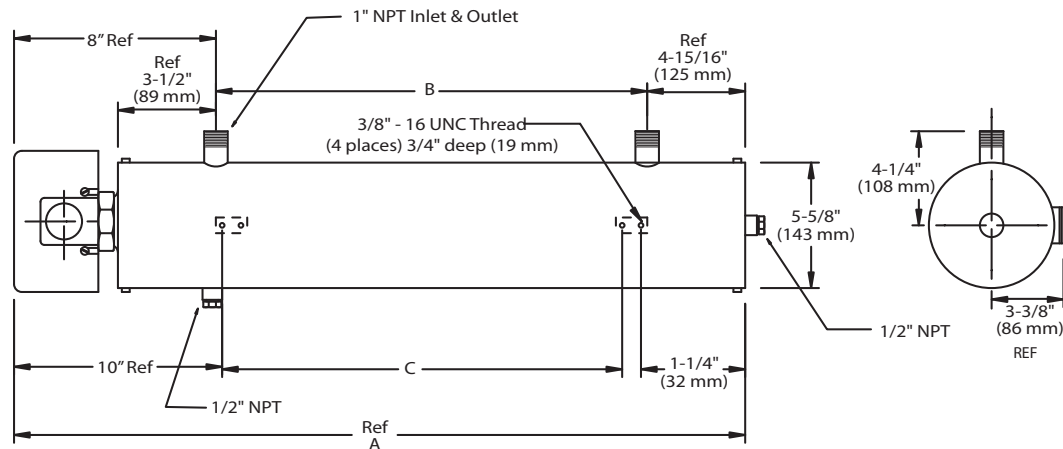


APPLICATION	1	2	3	4	5
	SOLUTION OR HEATER TYPE	ALKALINE OR ACID CONTENT (EST. % BY VOLUME)	SHEATH MATERIAL	WATT DENSITY (W/In ²)	VESSEL MATERIAL
Water	Clean Water	pH6 to pH8 (Neutral)	Copper	45-100	Galvanized Steel
Mild Solutions	Process Water and Very Weak Solutions	pH5 to pH9 (2-3%)	Incoloy®	45-86	Stainless Steel
	Weak Solutions	5-6%	Incoloy®	45-75	Stainless Steel
	Demineralized, De-ionized, or Pure Water	—	Incoloy®	45-75	Stainless Steel
Corrosive & High Viscous Solutions	Mildly Corrosive Solutions	5-15%	Incoloy®	20-25	Stainless Steel
	More Severe Corrosive Solutions	10-25%	Incoloy®	20-25	Stainless Steel
	Severely Corrosive Solutions	30-60%	Incoloy®	10-20	Stainless Steel
Oil	Low Viscosity Oils	—	Steel	20-25	Steel
	Medium Viscosity Oils	—	Steel	10-20	Steel
	High Viscosity Oils (Fuel Oil)	—	Steel	5-15	Steel
Air, Gases & Steam	Medium Temperatures to 750°F	—	Incoloy®	20-25	Steel
	High Temperatures to 1400°F	—	Incoloy®	10-20	Stainless Steel



CIRCULATION HEATERS

SCREW PLUG TYPE



APPLICATION: PROCESS WATER

2" NPT	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		120V/240V 1PH	240V/480V 1PH						
SCREW PLUG	3	■	■	23-1/4"	15"	—	20	3	HCP200-N23DW-3000 ☐
INCOLOY® SHEATHED ELEMENTS	4	■	■	31-1/4"	23"	—	27	3	HCP200-N31DW-4000 ☐
	5	■	■	31-1/4"	23"	—	27	3	HCP200-N31DW-5000 ☐
STEEL TANK	6	■	■	31-1/4"	23"	—	27	3	HCP200-N31DW-6000 ☐
48 W/IN ²	8	■	■	38-3/4"	30-1/2"	26"	36	3	HCP200-N38MW-8000 ☐
NEMA 4 HOUSING	10	■	■	46-1/4"	38"	26"	43	3	HCP200-N46DW-100C ☐
	12	■	■	54-1/4"	46"	39"	50	3	HCP200-N54DW-120C ☐

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

2" NPT	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		120V/240V 1PH	240V/480V 1PH						
SCREW PLUG	1.5	■	■	23-1/4"	15"	—	20	3	HCP200-B23DW-1500 ☐
STEEL SHEATHED ELEMENTS	2	■	■	31-1/4"	23"	—	27	3	HCP200-B31DW-2000 ☐
	2.5	■	■	31-1/4"	23"	—	27	3	HCP200-B31DW-2500 ☐
STEEL TANK	3	■	■	31-1/4"	23"	—	27	3	HCP200-B31DW-3000 ☐
23 W/IN ²	4	■	■	38-3/4"	30-1/2"	26"	36	3	HCP200-B38MW-4000 ☐
NEMA 4 HOUSING	5	■	■	46-1/4"	38"	26"	43	3	HCP200-B46DW-5000 ☐
	6	■	■	54-1/4"	46"	39"	50	3	HCP200-B54DW-6000 ☐

APPLICATION: PROCESS WATER

2-1/2" NPT	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
SCREW PLUG	6	■	■	21"	22-1/2"	16-1/2"	65	3	HCP2H0-N21OW-6000 ☐
INCOLOY® SHEATHED ELEMENTS	7.5	■	■	31"	22-1/2"	16-1/2"	65	3	HCP2H0-N31OW-7500 ☐
	9	■	■	31"	22-1/2"	16-1/2"	65	3	HCP2H0-N31OW-9000 ☐
STEEL TANK	12	■	■	41"	32-1/2"	26-1/2"	76	3	HCP2H0-N41OW-120C ☐
48 W/IN ²	15	■	■	53-1/2"	45"	39"	93	3	HCP2H0-N53HW-150C ☐
NEMA 4 HOUSING	18	■	■	53-1/2"	45"	39"	95	3	HCP2H0-N53HW-180C ☐

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

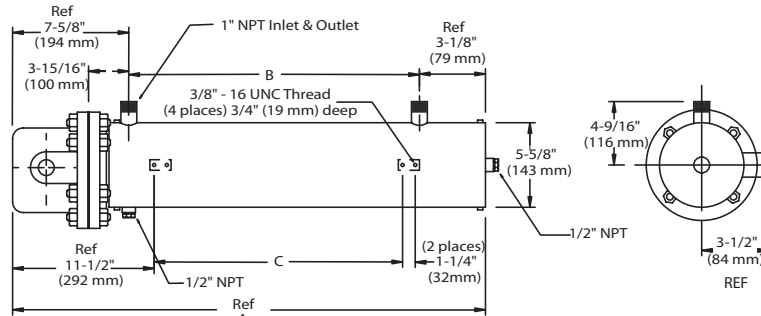
2-1/2" NPT	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		120V/240V 1PH	240V/480V 1PH						
SCREW PLUG	3	■	■	31"	22-1/2"	16-1/2"	70	3	HCP2H0-B31OW-3000 ☐
STEEL SHEATHED ELEMENTS	3.75	■	■	31"	22-1/2"	16-1/2"	70	3	HCP2H0-B31OW-3750 ☐
	4.5	■	■	31"	22-1/2"	16-1/2"	70	3	HCP2H0-B31OW-4500 ☐
STEEL TANK	6	■	■	41"	32-1/2"	26-1/2"	80	3	HCP2H0-B41OW-6000 ☐
23 W/IN ²	7.5	■	■	53-1/2"	45"	39"	96	3	HCP2H0-B53HW-7500 ☐
NEMA 4 HOUSING	9	■	■	53-1/2"	45"	39"	96	3	HCP2H0-B53HW-9000 ☐

* Blank box denotes voltage selection: See Table 4 on Page 86.



CIRCULATION HEATERS

FLANGED TYPE: 3"



APPLICATION: PROCESS WATER, MILD SOLUTIONS

3" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	6	■	■	33"	22-1/2"	16-1/2"	70	3	HCF031-N33OW-6000 ☐
	7.5	■	■	33"	22-1/2"	16-1/2"	70	3	HCF031-N33OW-7500 ☐
	9	■	■	33"	32-1/2"	26-1/2"	70	3	HCF031-N33OW-9000 ☐
	12	■	■	43-1/4"	45"	39"	80	3	HCF031-N43DW-120C ☐
	15	■	■	55-3/4"	45"	39"	96	3	HCF031-N55MW-150C ☐
	18	■	■	55-3/4"	63"	53"	98	3	HCF031-N55MW-180C ☐

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER OILS

3" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	3	■	■	33"	22-1/2"	16-1/2"	70	3	HCF031-N33OW-3000 ☐
	4.5	■	■	33"	22-1/2"	16-1/2"	70	3	HCF031-N33OW-4500 ☐
	6	■	■	43-1/4"	32-1/2"	26-1/2"	80	3	HCF031-N43DW-6000 ☐
	7.5	■	■	55-3/4"	45"	39"	96	3	HCF031-N55MW-7500 ☐
	9	■	■	55-3/4"	45"	39"	98	3	HCF031-N55MW-9000 ☐
	12.5	■	■	73-3/4"	63"	53"	120	3	HCF031-N73MW-125C ☐

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

3" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	3	■	■	33-1/4"	22-1/2"	16-1/2"	70	3	HCF031-B33DW-3000 ☐
	4.5	■	■	33-1/4"	22-1/2"	16-1/2"	70	3	HCF031-B33DW-4500 ☐
	6	■	■	43-1/4"	32-1/2"	26-1/2"	80	3	HCF031-B43DW-6000 ☐
	7.5	■	■	55-3/4"	45"	39"	96	3	HCF031-B55MW-7500 ☐
	9	■	■	55-3/4"	45"	39"	98	3	HCF031-B55MW-9000 ☐
	12.5	■	■	73-3/4"	63"	53"	120	3	HCF031-B73MW-125C ☐

APPLICATION: MEDIUM WEIGHT OILS, LUBE OILS, LIQUID PARAFIN, #4 AND #5 FUEL OIL

3" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 13 W/IN ² NEMA 4 HOUSING	3	■	■	43-1/4"	32-1/2"	26-1/2"	80	3	HCF031-B43DW-3000 ☐
	3.75	■	■	52-3/4"	41"	26-1/2"	120	3	HCF031-B52MW-3750 ☐
	5	■	■	61-3/4"	51"	26-1/2"	120	3	HCF031-B61MW-5000 ☐
	6.25	■	■	73-3/4"	63"	26-1/2"	120	3	HCF031-B73MW-6250 ☐
	7.5	■	■	85-5/8"	74-7/8"	26-1/2"	140	3	HCF031-B85KW-7500 ☐

APPLICATION: BUNKER C AND #6 FUEL OIL

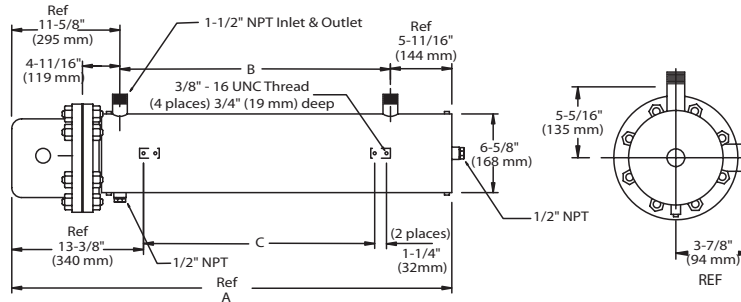
3" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 8 W/IN ² NEMA 4 HOUSING	2	■	■	43-1/4"	32-1/2"	26-1/2"	80	3	HCF031-B43DW-2000 ☐
	2.5	■	■	73-3/4"	63"	26-1/2"	120	3	HCF031-B73MW-2500 ☐
	3	■	■	73-3/4"	63"	26-1/2"	120	3	HCF031-B73MW-3000 ☐
	4.25	■	■	73-3/4"	63"	26-1/2"	120	3	HCF031-B73MW-4250 ☐
	5	■	■	85-5/8"	74-7/8"	26-1/2"	140	3	HCF031-B85KW-5000 ☐

* Blank box denotes voltage selection: See Table 4 on Page 86.



CIRCULATION HEATERS

FLANGED TYPE: 4"



APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

4" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	6	■	■	37-13/16"	20-1/2"	17"	125	6	HCF041-N37NW-6000 ☐
	9	■	■	42-1/2"	25-3/4"	22"	160	6	HCF041-N42HW-9000 ☐
	12	■	■	48-5/16"	31"	27-1/2"	163	6	HCF041-N48EW-120C ☐
	15	■	■	69-5/16"	52"	48-1/2"	229	6	HCF041-N69EW-150C ☐
	18	■	■	69-5/16"	52"	48-1/2"	234	6	HCF041-N69EW-180C ☐
	25	■	■	90-15/16"	73"	69-1/2"	298	6	HCF041-N90RW-250C ☐
	30	■	■	90-15/16"	73"	69-1/2"	306	6	HCF041-N90RW-300C ☐

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER

4" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	6	■	■	37-13/16"	20-1/2"	17"	125	6	HCF041-B37NW-6000 ☐
	9	■	■	42-1/2"	25-3/4"	22"	160	6	HCF041-B42HW-9000 ☐
	12	■	■	48-5/16"	31"	27-1/2"	163	6	HCF041-B48EW-120C ☐
	15	■	■	69-5/16"	52"	48-1/2"	229	6	HCF041-B69EW-150C ☐
	18	■	■	69-5/16"	52"	48-1/2"	234	6	HCF041-B69EW-180C ☐
	25	■	■	90-15/16"	73"	69-1/2"	298	6	HCF041-B90RW-250C ☐
	30	■	■	90-15/16"	73"	69-1/2"	306	6	HCF041-B90RW-300C ☐

APPLICATION: MEDIUM WEIGHT OILS, LUBE OILS, LIQUID PARAFIN

4" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 16 W/IN ² NEMA 4 HOUSING	3	■	■	30"	13"	11"	125	6	HCF041-N300W-3000 ☐
	4	■	■	34-1/2"	17"	13"	125	6	HCF041-N34HW-4000 ☐
	5	■	■	37-3/4"	20-1/2"	17"	127	6	HCF041-N37MW-5000 ☐
	6	■	■	42-1/2"	25-3/4"	22"	160	6	HCF041-N42HW-6000 ☐
	8	■	■	48-5/16"	31"	27-1/2"	163	6	HCF041-N48EW-8000 ☐
	10	■	■	69-5/16"	52"	48-1/2"	229	6	HCF041-N69EW-100C ☐
	12	■	■	69-5/16"	52"	48-1/2"	234	6	HCF041-N69EW-120C ☐

APPLICATION: BUNKER C AND #6 FUEL OIL

4" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 8 W/IN ² NEMA 4 HOUSING	5	■	■	69-5/16"	52"	48-1/2"	229	6	HCF041-B69EW-5000 ☐
	6	■	■	69-5/16"	52"	48-1/2"	234	6	HCF041-B69EW-6000 ☐
	8	■	■	90-5/16"	73"	69-1/2"	298	6	HCF041-B90EW-8000 ☐
	10	■	■	90-5/16"	73"	69-1/2"	306	6	HCF041-B90EW-100C ☐

APPLICATION: PROCESS WATER

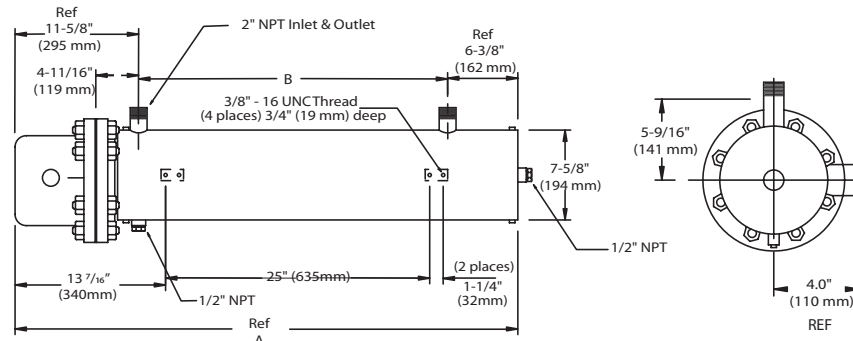
4" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	9	■	■	37-13/16"	20-1/2"	17"	122	6	HCF041-N37NW-9000 ☐
	12	■	■	37-13/16"	20-1/2"	17"	125	6	HCF041-N37NW-120C ☐
	15	■	■	37-13/16"	20-1/2"	17"	127	6	HCF041-N37NW-150C ☐
	18	■	■	37-13/16"	20-1/2"	17"	160	6	HCF041-N37NW-180C ☐
	24	■	■	37-13/16"	20-1/2"	17"	165	6	HCF041-N37NW-240C ☐
	30	■	■	69-5/16"	52"	48-1/2"	229	6	HCF041-N69EW-300C ☐
	36	■	■	69-5/16"	52"	48-1/2"	234	6	HCF041-N69EW-360C ☐

* Blank box denotes voltage selection: See Table 4 on Page 86.



CIRCULATION HEATERS

FLANGED TYPE: 5"



APPLICATION: PROCESS WATER

5" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	37.0	■	■	41-3/4"	30"	25"	140	9	HCF051-N41MW-370C □
	45.0	■	■	48-3/4"	37"	25"	155	9	HCF051-N48MW-450C □
	54.0	■	■	60-1/4"	48-1/2"	25"	176	9	HCF051-N60DW-540C □
	62.0	■	■	60-3/4"	48-1/2"	25"	176	9	HCF051-N60MW-620C □
	72.0	■	■	75-5/8"	61-7/8"	25"	210	9	HCF051-N75KW-720C □
	87.0	■	■	86-5/8"	74-7/8"	25"	240	9	HCF051-N86KW-870C □

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER OILS

5" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	15.0	■	■	43-3/4"	30"	25"	140	9	HCF051-N43MW-150C □
	18.0	■	■	48-3/4"	37"	25"	155	9	HCF051-N48MW-180C □
	22.0	■	■	60-1/4"	48-1/2"	25"	176	9	HCF051-N60DW-220C □
	26.0	■	■	60-1/4"	48-1/2"	25"	176	9	HCF051-N60DW-260C □
	34.0	■	■	73-5/8"	61-7/8"	25"	210	9	HCF051-N73KW-340C □
	40.0	■	■	86-5/8"	74-7/8"	25"	240	9	HCF051-N86KW-400C □

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

5" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	18.0	■	■	55"	37"	17-9/16"	145	9	HCF051-B550W-180C □
	22.0	■	■	55"	37"	17-9/16"	167	9	HCF051-B550W-220C □
	26.0	■	■	66-1/2"	48-1/2"	23-15/16"	180	9	HCF051-B66HW-260C □
	34.0	■	■	79-7/8"	61-7/8"	29-7/8"	195	9	HCF051-B79PW-340C □
	40.0	■	■	92-7/8"	74-7/8"	36-15/16"	220	9	HCF051-B92PW-400C □

APPLICATION: MEDIUM WEIGHT OILS, LUBE OILS, LIQUID PARAFIN, #4 AND #5 FUEL OIL

5" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 13 W/IN ² NEMA 4 HOUSING	10.0	■	■	43-1/2"	32-1/2"	25"	150	9	HCF051-B43HW-100C □
	12.0	■	■	48-3/4"	37"	25"	155	9	HCF051-B48MW-120C □
	14.5	■	■	60-1/4"	48-1/2"	25"	176	9	HCF051-B60DW-145C □
	18.0	■	■	73-5/8"	61-7/8"	25"	210	9	HCF051-B73KW-180C □
	21.5	■	■	86-5/8"	74-7/8"	25"	240	9	HCF051-B86KW-215C □

APPLICATION: BUNKER C AND #6 FUEL OIL

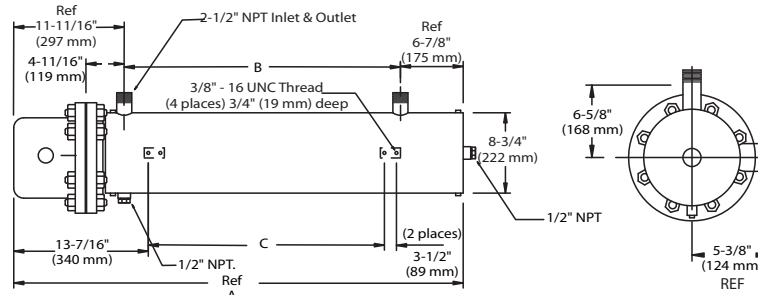
5" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 13 W/IN ² NEMA 4 HOUSING	6	■	■	33"	22-1/2"	25"	120	9	HCF051-B33OW-6000 □
	11.5	■	■	48-3/4"	37"	25"	155	9	HCF051-B48MW-115C □
	16.0	■	■	60-1/4"	48-1/2"	25"	176	9	HCF051-B60DW-160C □
	20.0	■	■	73-5/8"	61-7/8"	25"	210	9	HCF051-B73KW-200C □
	27.0	■	■	86-5/8"	74-7/8"	25"	240	9	HCF051-B86KW-270C □

* Blank box denotes voltage selection: See Table 4 on Page 86.



CIRCULATION HEATERS

FLANGED TYPE: 6"



APPLICATION: CLEAN WATER

6" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 60 W/IN ² NEMA 4 HOUSING	24	■	■	39-1/16"	20-1/2"	17"	212	12	HCF061-N39AW-240C □
	36	■	■	39-1/16"	20-1/2"	17"	217	12	HCF061-N39AW-360C □
	48	■	■	49-9/16"	31"	27-1/2"	222	12	HCF061-N49JW-480C □
	72	■	■	70-9/16"	52"	48-1/2"	290	12	HCF061-N70JW-720C □
	120	■	■	91-9/16"	73"	69-1/2"	360	12	HCF061-N91JW-120K □

APPLICATION: PROCESS WATER

6" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	18	■	■	39-1/16"	20-1/2"	17"	212	12	HCF061-N39AW-180C □
	24	■	■	39-1/16"	20-1/2"	17"	214	12	HCF061-N39AW-240C □
	36	■	■	39-1/16"	20-1/2"	17"	222	12	HCF061-N39AW-360C □
	48	■	■	49-9/16"	31"	27-1/2"	226	12	HCF061-N49JW-480C □
	72	■	■	70-9/16"	52"	48-1/2"	298	12	HCF061-N70JW-720C □

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

6" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	12	■	■	39-1/16"	20-1/2"	17"	214	12	HCF061-N39AW-120C □
	18	■	■	39-1/16"	20-1/2"	17"	222	12	HCF061-N39AW-180C □
	24	■	■	49-9/16"	31"	27-1/2"	226	12	HCF061-N49JW-240C □
	36	■	■	70-9/16"	52"	48-1/2"	298	12	HCF061-N70JW-360C □
	50	■	■	91-9/16"	73"	67-1/2"	360	12	HCF061-N91JW-500C □
	60	■	■	91-9/16"	73"	67-1/2"	370	12	HCF061-N91JW-600C □

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER OILS

6" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	12	■	■	39-1/16"	20-1/2"	17"	212	12	HCF061-B39AW-120C □
	18	■	■	39-1/16"	20-1/2"	17"	218	12	HCF061-B39AW-180C □
	24	■	■	49-9/16"	31"	27-1/2"	230	12	HCF061-B49JW-240C □
	36	■	■	70-9/16"	52"	48-1/2"	298	12	HCF061-B70JW-360C □
	50	■	■	91-9/16"	73"	67-1/2"	360	12	HCF061-B91JW-500C □
	60	■	■	91-9/16"	73"	67-1/2"	368	12	HCF061-B91JW-600C □

APPLICATION: MEDIUM WEIGHT OILS, LUBE OILS, LIQUID PARAFIN, #4 AND #5 FUEL OILS

6" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 16 W/IN ² NEMA 4 HOUSING	6	■	■	39-1/16"	20-1/2"	17"	212	12	HCF061-N39AW-6000 □
	8	■	■	39-1/16"	20-1/2"	17"	214	12	HCF061-N39AW-8000 □
	10	■	■	39-1/16"	20-1/2"	17"	217	12	HCF061-N39AW-100C □
	16	■	■	49-9/16"	31"	27-1/2"	226	12	HCF061-N49JW-160C □
	20	■	■	70-9/16"	52"	48-1/2"	290	12	HCF061-N70JW-200C □
	24	■	■	70-9/16"	52"	48-1/2"	298	12	HCF061-N70JW-240C □

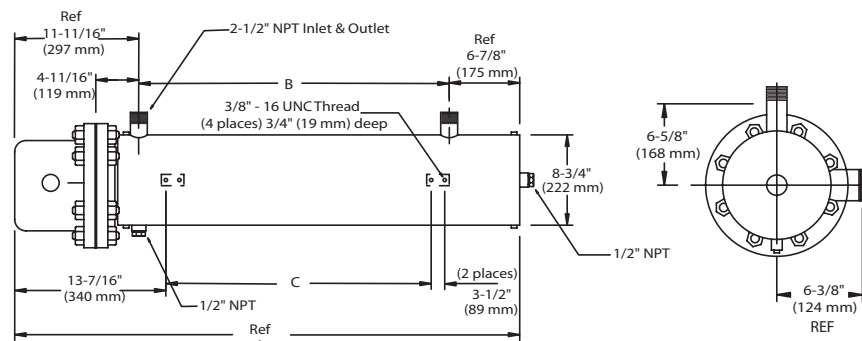
APPLICATION: BUNKER C AND #6 FUEL OIL

6" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	8	■	■	49-9/16"	31"	27-1/2"	226	12	HCF061-B49JW-8000 □
	10	■	■	70-9/16"	52"	48-1/2"	290	12	HCF061-B70JW-100C □
	12	■	■	70-9/16"	52"	48-1/2"	298	12	HCF061-B70JW-120C □
	16.5	■	■	91-9/16"	73"	69-1/2"	360	12	HCF061-B91JW-165C □
	20	■	■	91-9/16"	73"	69-1/2"	368	12	HCF061-B91JW-200C □

* Blank box denotes voltage selection: See Table 4 on Page 86.

CIRCULATION HEATERS

FLANGED TYPE: 8"



APPLICATION: PROCESS WATER

8" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	50	■	■	45-1/4"	24-3/4"	21-1/4"	425	18	HCF081-N45DW-500C □
	75	■	■	53-1/4"	32-3/4"	29-1/4"	295	18	HCF081-N53DW-750C □
	100	■	■	60-1/4"	39-3/4"	36-1/4"	415	18	HCF081-N60DW-100K □
	150	■	■	77-3/8"	56-3/4"	53-1/4"	535	18	HCF081-N77FW-150K □
	175	■	■	86-3/8"	65-3/4"	62-1/4"	625	18	HCF081-N86FW-175K □
	200	■	■	96-3/8"	75-3/4"	72-1/4"	705	18	HCF081-N96FW-200K □

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER OILS

8" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	30	■	■	53-1/4"	32-3/4"	29-1/4"	366	18	HCF081-N53DW-300C □
	40	■	■	60-1/4"	39-3/4"	36-1/4"	436	18	HCF081-N60DW-400C □
	50	■	■	67-7/8"	47-1/4"	43-3/4"	500	18	HCF081-N67PW-500C □
	60	■	■	77-3/8"	56-3/4"	53-1/4"	590	18	HCF081-N77FW-600C □
	70	■	■	86-3/8"	65-3/4"	62-1/4"	660	18	HCF081-N86FW-700C □
	80	■	■	96-3/8"	75-3/4"	72-1/4"	750	18	HCF081-N96FW-800C □

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

8" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	30	■	■	54"	32-11/16"	29-3/16"	370	18	HCF081-B540W-300C □
	40	■	■	61"	39-11/16"	36-3/16"	410	18	HCF081-N60DW-400C □
	50	■	■	68-5/8"	47-5/16"	43-13/16"	440	18	HCF081-N67PW-500C □

APPLICATION: MEDIUM WEIGHT OILS, OILS, LUBE OILS, LIQUID PARAFIN, #4 AND #5 FUEL OIL

8" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 13 W/IN ² NEMA 4 HOUSING	25	■	■	60-1/4"	39-3/4"	36-1/4"	500	18	HCF081-B60DW-250C □
	30	■	■	67-7/8"	47-1/4"	43-3/4"	565	18	HCF081-B67PW-300C □
	37.5	■	■	86-3/8"	65-3/4"	62-1/4"	725	18	HCF081-B86FW-375C □
	44	■	■	96-3/8"	75-3/4"	72-1/4"	815	18	HCF081-B96FW-440C □
	50	■	■	96-3/8"	75-3/4"	72-1/4"	815	18	HCF081-B96FW-500C □

APPLICATION: BUNKER C AND #6 FUEL OIL

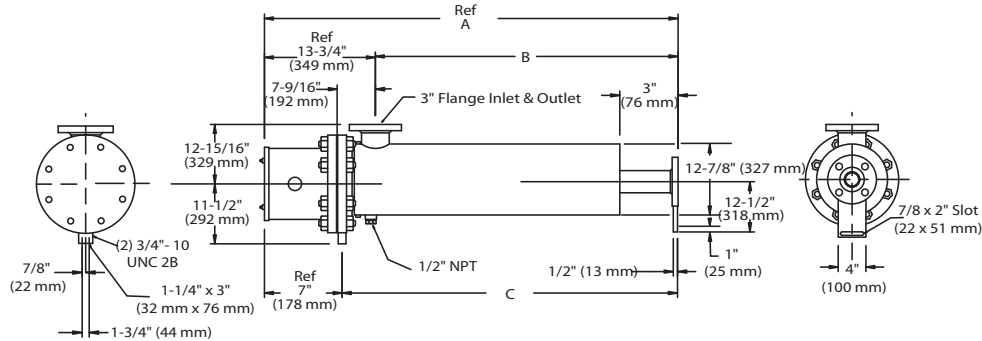
8" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 8 W/IN ² NEMA 4 HOUSING	13.3	■	■	60-1/4"	22-1/2"	36-3/4"	500	18	HCF081-B60DW-133C □
	16.7	■	■	67-7/8"	37"	47-1/4"	565	18	HCF081-B67PW-167C □
	20	■	■	77-3/8"	48-1/2"	53-1/4"	650	18	HCF081-B77FW-200C □
	23	■	■	86-3/8"	61-7/8"	62-1/4"	725	18	HCF081-B86FW-230C □
	27	■	■	96-3/8"	74-7/8"	72-1/4"	815	18	HCF081-B96FW-270C □

* Blank box denotes voltage selection: See Table 4 on Page 86.



CIRCULATION HEATERS

FLANGED TYPE: 10"



APPLICATION: PROCESS WATER

10" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	170	■	■	59"	46"	52"	510	33	HCF101-N59OW-170K□
	205	■	■	66"	53"	58-1/2"	540	33	HCF101-N66OW-205K□
	231	■	■	73"	60"	65-1/2"	575	33	HCF101-N73OW-231K□
	285	■	■	66"	73"	78-5/8"	650	33	HCF101-N66OW-285K□
	305	■	■	80"	80"	86-1/8"	675	33	HCF101-N80OW-305K□
	347	■	■	88"	88"	93-5/8"	710	33	HCF101-N88OW-347K□

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER OILS

10" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		120V/240V 3PH	240V/480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	135	■	■	86"	73"	78-5/8"	650	33	HCF101-B86OW-135K□
	147.5	■	■	93"	80"	86-1/8"	675	33	HCF101-B93OW-147K□
	165	■	■	101"	88"	93-5/8"	710	33	HCF101-B101W-165K□

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

10" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	107.5	■	■	74-5/16"	61"	67-5/16"	515	33	HCF101-N74EW-107K□
	124	■	■	81-13-16"	67"	74-13-16"	530	33	HCF101-N81NW-124K□

APPLICATION: MEDIUM WEIGHT OILS, LUBE OILS, LIQUID PARAFIN, #4 AND #5 FUEL OILS

10" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 13 W/IN ² NEMA 4 HOUSING	57.5	■	■	66"	55"	58-1/2"	675	33	HCF101-B66OW-575C□
	61.0	■	■	73"	60"	65-1/2"	715	33	HCF101-B73OW-610C□
	74.5	■	■	86"	73"	78-5/8"	795	33	HCF101-B86OW-745C□
	85.5	■	■	93"	80"	86-1/8"	845	33	HCF101-B93OW-855C□
	94.0	■	■	101"	88"	93-5/8"	895	33	HCF101-B101W-940C□

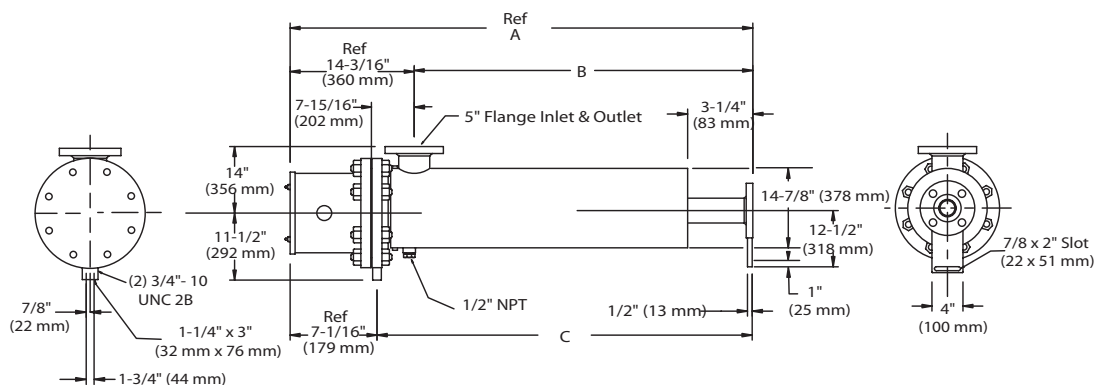
APPLICATION: BUNKER C AND #6 FUEL OIL

10" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 8 W/IN ² NEMA 4 HOUSING	33.0	■	■	66"	53"	58-1/2"	675	33	HCF101-B66OW-330C□
	38.0	■	■	73"	60"	65-1/2"	715	33	HCF101-B73OW-380C□
	46.2	■	■	86"	73"	78-5/8"	795	33	HCF101-B86OW-462C□
	52.8	■	■	93"	80"	86-1/8"	845	33	HCF101-B93OW-528C□
	57.8	■	■	101"	88"	93-5/8"	895	33	HCF101-B101W-578C□

* Blank box denotes voltage selection: See Table 4 on Page 86.

CIRCULATION HEATERS

FLANGED TYPE: 12"



APPLICATION: PROCESS WATER

12" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	232.5	■	■	59"	44-13/16"	52"	635	48	HCF121-N59OW-232K□
	276.0	■	■	66"	51-13/16"	58-1/2"	675	48	HCF121-N66OW-276K□
	319.0	■	■	73"	58-13/16"	65-1/2"	715	48	HCF121-N73OW-319K□
	396.0	■	■	86"	71-13/16"	78-5/8"	795	48	HCF121-N86OW-396K□
	444.0	■	■	93"	78-13/16"	86-1/8"	845	48	HCF121-N93OW-444K□
	492.0	■	■	101"	86-13/16"	93-5/8"	895	48	HCF121-N101W-492K□

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER OILS

12" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	134.5	■	■	66"	51-13/16"	58-1/2"	675	48	HCF121-B66OW-134K□
	154.0	■	■	73"	58-13/16"	65-1/2"	715	48	HCF121-B73OW-154K□

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

12" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	162.5	■	■	66"	60-7/16"	67-9/16"	73	48	HCF121-N66OW-162K□
	180.0	■	■	73"	68"	75-1/16"	73	48	HCF121-N73OW-180K□

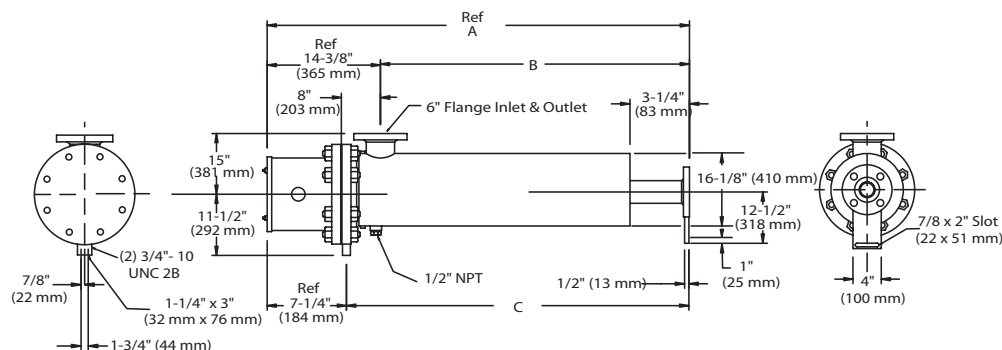
APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

12" 150LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 13 W/IN ² NEMA 4 HOUSING	125.0	■	■	96-3/4"	82-1/2"	87-11/16"	700	48	HCF121-N96MW-125K□
	136.0	■	■	104-3/4"	90"	97-11/16"	750	48	HCF121-N105W-136K□

* Blank box denotes voltage selection: See Table 4 on Page 86.

CIRCULATION HEATERS

FLANGED TYPE: 14"



APPLICATION: PROCESS WATER

14" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
INCOLOY® SHEATHED ELEMENTS STEEL TANK 48 W/IN ² NEMA 4 HOUSING	272.5	■	■	59"	44-5/8"	52"	780	57	HCF141-N59OW-272K□
	327.8	■	■	66"	51-5/8"	58-1/2"	830	57	HCF141-N66OW-327K□
	367.0	■	■	73"	58-5/8"	65-1/2"	890	57	HCF141-N73OW-376K□
	470.0	■	■	86"	71-5/8"	78-5/8"	990	57	HCF141-N86OW-470K□
	527.0	■	■	93"	78-5/8"	86-1/8"	1045	57	HCF141-N93OW-527K□
	584.0	■	■	101"	86-5/8"	93-5/8"	1100	57	HCF141-N101W-584K□

APPLICATION: LIGHTWEIGHT OILS, HEAT TRANSFER OILS

14" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		120V/240V 3PH	240V/480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 23 W/IN ² NEMA 4 HOUSING	228.0	■	■	86"	71-5/8"	78-5/8"	990	57	HCF141-B86OW-228K□
	242.5	■	■	93"	78-5/8"	86-1/8"	1045	57	HCF141-B93OW-242K□
	276.5	■	■	101"	86-5/8"	93-5/8"	1100	57	HCF141-B101W-276K□

APPLICATION: FORCED AIR AND GASES, CAUSTIC SOLUTIONS, DEGREASING SOLUTIONS

14" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		480V 3PH							
INCOLOY® SHEATHED ELEMENTS STEEL TANK 23 W/IN² NEMA 4 HOUSING	236.5	■	90"	75-5/8"	81"	1025	57	HCF141-N900W-236K	
	270.0	■	97"	82-5/8"	89"	1160	57	HCF141-N970W-270K	
	290.0	■	105"	90-5/8"	96"	1200	57	HCF141-N105W-290K	

APPLICATION: MEDIUM WEIGHT OILS, LUBE OILS, LIQUID PARAFIN, #4 AND #5 FUEL OILS

14" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 13 W/IN ² NEMA 4 HOUSING	85.5	■	■	66"	51-5/8"	58-1/2"	830	57	HCF141-B66OW-855C □
	99.5	■	■	73"	58-5/8"	65-1/2"	890	57	HCF141-B73OW-995C □
	128.0	■	■	86"	71-5/8"	78-5/8"	990	57	HCF141-B86OW-128K □
	142.5	■	■	93"	78-5/8"	86-1/8"	1045	57	HCF141-B93OW-142K □
	156.5	■	■	101"	86-5/8"	93-5/8"	1100	57	HCF141-B101W-156K □

APPLICATION: BUNKER C AND #6 FUEL OIL

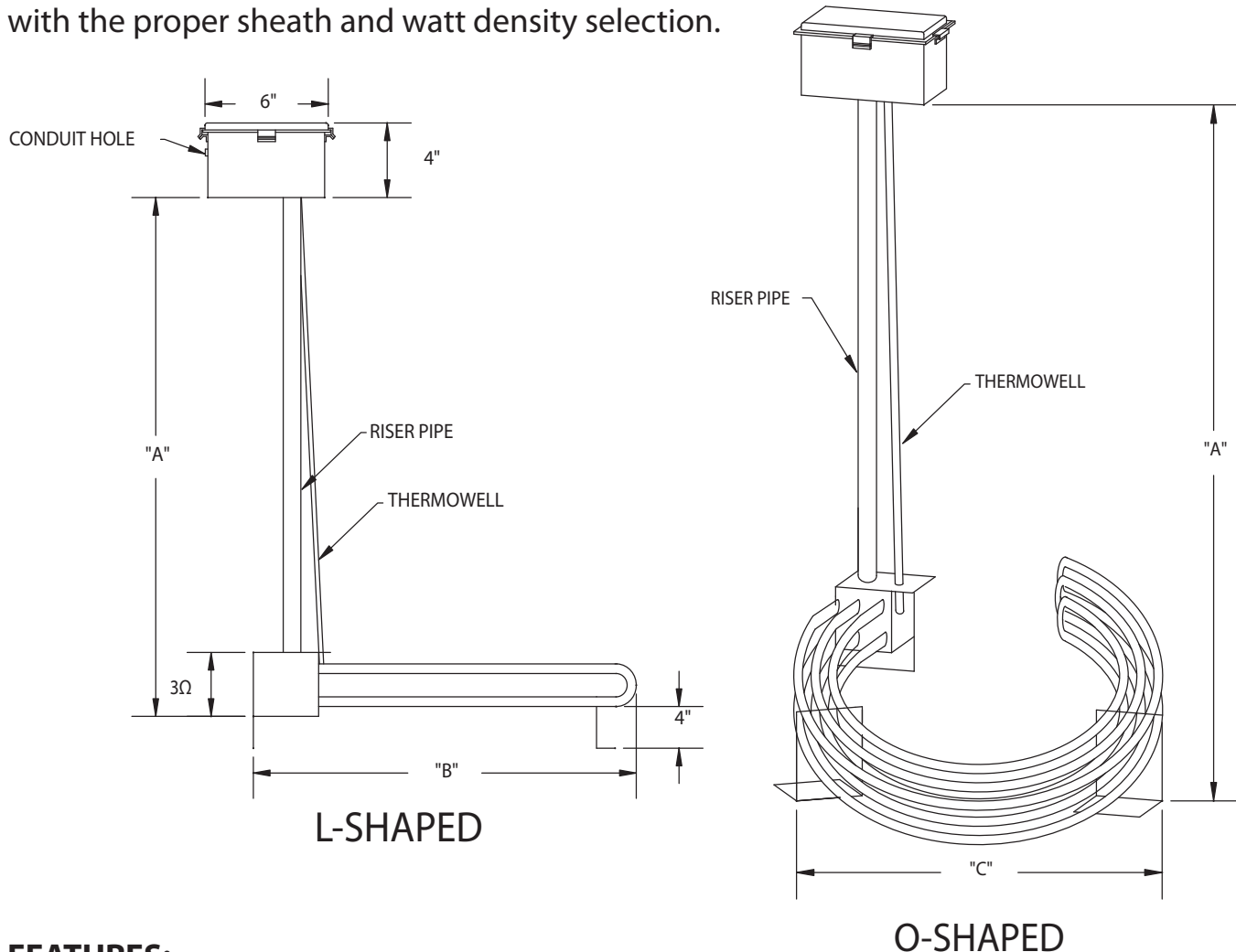
14" 150 LB ANSI FLANGE	KW	VOLTAGE		A	B	C	WT. (lbs.)	NUMBER OF ELEMENTS	PART NUMBER*
		240V 3PH	480V 3PH						
STEEL SHEATHED ELEMENTS STEEL TANK 8 W/IN ² NEMA 4 HOUSING	51.0	■	■	66"	51-5/8"	58-1/2"	830	57	HCF141-B66OW-510C □
	62.5	■	■	73"	58-5/8"	65-1/2"	890	57	HCF141-B73OW-625C □
	74.0	■	■	86"	71-5/8"	78-5/8"	990	57	HCF141-B86OW-740C □
	88.5	■	■	93"	78-5/8"	86-1/8"	1045	57	HCF141-B93OW-885C □
	97.0	■	■	101"	86-5/8"	93-5/8"	1100	57	HCF141-B101W-970C □

* Blank box denotes voltage selection: See Table 4 on Page 86.



LN & ON OVER-THE-SIDE IMMERSION HEATERS

Used in tanks in which through-the-wall heaters cannot be installed, portability is required, or when heaters must be removed without emptying the tank. Suitable for freeze protection, heating viscous materials for improved flow, or in most open tank applications with the proper sheath and watt density selection.



FEATURES:

- Lightweight and portable
- Self supporting
- All compatible materials
 - Stainless steel elements and stainless steel riser
 - Incoloy® elements and stainless steel riser
 - Steel elements and steel riser
- NEMA 4 housing with terminal block for wiring
- Thermowell for installation of thermostat
- Sludge legs

OPTIONS:

- Built-in thermostat: 60-250°F or 150-550°F
- Explosion resistant terminal enclosure (NEMA 7)
- Shorter or longer riser height
- Special ratings or materials
- Right angle risers
- Passivation or other external finishing
- Thermocouples for process control and/or high limit

LN & ON OVER-THE-SIDE IMMERSION HEATERS

KW	VOLTS 3-PHASE	A	B	LN CATALOG NUMBER	C	ON CATALOG NUMBER
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INCOLOY SHEATHED ELEMENTS

3	240	39.312"	14.625"	MTLNA-39E14KW-30005	10.75"	MTONA-39E10MW-30005
	480	39.312"	14.625"	MTLNA-39E14KW-30008	10.75"	MTONA-39E10MW-30008
6	240	39.312"	22.625"	MTLNA-39E22KW-60005	13.5"	MTONA-39E13HW-60005
	480	39.312"	22.625"	MTLNA-39E22KW-60008	13.5"	MTONA-39E13HW-60008
9	240	39.312"	30.125"	MTLNA-39E30BW-90005	16"	MTONA-39E160W-90005
	480	39.312"	30.125"	MTLNA-39E30BW-90008	16"	MTONA-39E160W-90008
12	240	51.312"	37.625"	MTLNA-51E37KW-120C5	18.5"	MTONA-51E18HW-120C5
	480	51.312"	37.625"	MTLNA-51E37KW-120C8	18.5"	MTONA-51E18HW-120C8
15	240	51.312"	45.125"	MTLNA-51E45BW-150C5	21.25"	MTONA-51E21DW-150C5
	480	51.312"	45.125"	MTLNA-51E45BW-150C8	21.25"	MTONA-51E21DW-150C8
18	240	51.312"	52.625"	MTLNA-51E52KW-180C5	23.5"	MTONA-51E23HW-180C5
	480	51.312"	52.625"	MTLNA-51E52KW-180C8	23.5"	MTONA-51E23HW-180C8

STEEL SHEATHED ELEMENTS

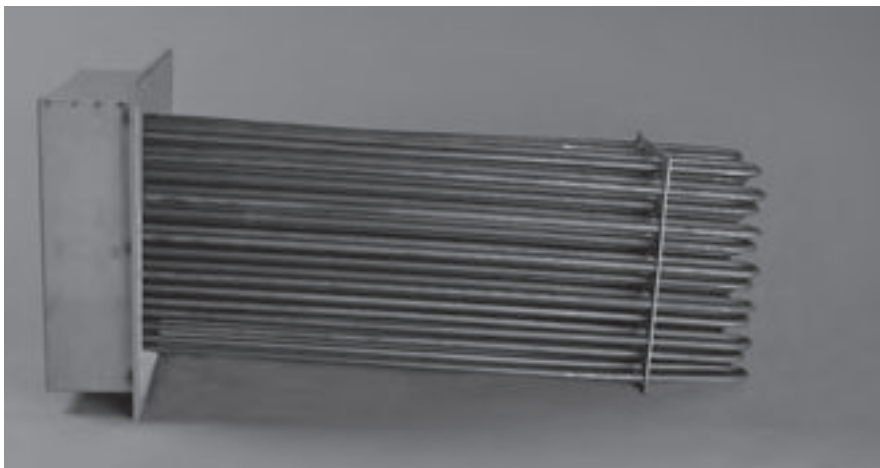
3	240	39.312"	22.625"	MTLBA-39E22KW-30005	13.5"	MToba-39E13HW-30005
	480	39.312"	22.625"	MTLBA-39E22KW-30008	13.5"	MToba-39E13HW-30008
4.5	240	39.312"	30.125"	MTLBA-39E30BW-45005	16"	MToba-39E160W-45005
	480	39.312"	30.125"	MTLBA-39E30BW-45008	16"	MToba-39E160W-45008
6	240	39.312"	37.625"	MTLBA-39E37KW-60005	18.5"	MToba-39E18HW-60005
	480	39.312"	37.625"	MTLBA-39E37KW-60008	18.5"	MToba-39E18HW-60008
7.5	240	51.312"	45.125"	MTLBA-51E45BW-75005	21.25"	MToba-51E21DW-75005
	480	51.312"	45.125"	MTLBA-51E45BW-75008	21.25"	MToba-51E21DW-75008
9	240	51.312"	52.625"	MTLBA-51E52KW-90005	23.5"	MToba-51E23HW-90005
	480	51.312"	52.625"	MTLBA-51E52KW-90008	23.5"	MToba-51E23HW-90008

STAINLESS STEEL SHEATHED ELEMENTS

3	240	39.312"	14.625"	MTLRA-39E14KW-30005	10.75"	MTORA-39E10MW-30005
	480	39.312"	14.625"	MTLRA-39E14KW-30008	10.75"	MTORA-39E10MW-30008
6	240	39.312"	22.625"	MTLRA-39E22KW-60005	13.5"	MTORA-39E13HW-60005
	480	39.312"	22.625"	MTLRA-39E22KW-60008	13.5"	MTORA-39E13HW-60008
9	240	39.312"	30.125"	MTLRA-39E30BW-90005	16"	MTORA-39E160W-90005
	480	39.312"	30.125"	MTLRA-39E30BW-90008	16"	MTORA-39E160W-90008
12	240	51.312"	37.625"	MTLRA-51E37KW-120C5	18.5"	MTORA-51E18HW-120C5
	480	51.312"	37.625"	MTLRA-51E37KW-120C8	18.5"	MTORA-51E18HW-120C8
15	240	51.312"	45.125"	MTLRA-51E45BW-150C5	21.25"	MTORA-51E21DW-150C5
	480	51.312"	45.125"	MTLRA-51E45BW-150C8	21.25"	MTORA-51E21DW-150C8
18	240	51.312"	52.625"	MTLRA-51E52KW-180C5	23.5"	MTORA-51E23HW-180C5
	480	51.312"	52.625"	MTLRA-51E52KW-180C8	23.5"	MTORA-51E23HW-180C8

FLANGED DUCT HEATERS

Tubular duct heaters are used for both natural and forced convection industrial applications. These units are a source of consistent heat in processes which require high air temperatures. Durex Industries duct heaters feature heavy gauge



mounting flange, terminal box, built-in thermowell, and rugged stainless steel construction. Typical uses are high temperature drying, heat treating, annealing, process ovens, and other high temperature applications.

CONSTRUCTION FEATURES:

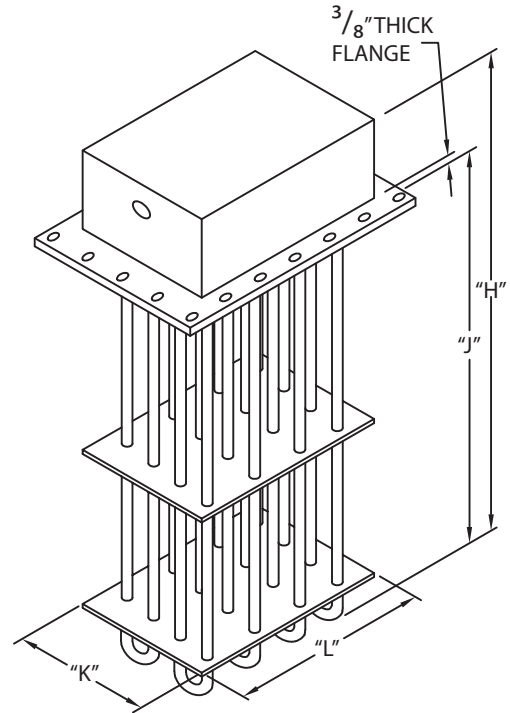
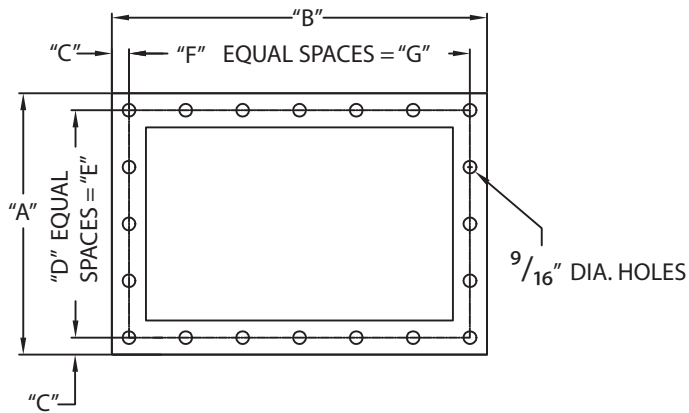
- Heavy gauge terminal box with NEMA 1 housing and high temperature aluminum paint
- 3/8" thick steel mounting flange
- Silicone rubber seals at the terminals retard moisture absorption during storage
- Incoloy® sheath
- Recompacted bends to restore MgO density

OPTIONAL FEATURES:

- Built-in thermowell with heat sink as required
- Duct guide frame
- Installed thermocouples
- Restriction Baffles



FLANGED DUCT HEATERS



Heater Kw Rating	Number of Elements	A In Inches	B In Inches	C In Inches	D # of Holes	E In Inches	F # of Holes	G In Inches	H In Inches	J In Inches	K In Inches	L In Inches	Heater Voltage	Number of Circuits	Part Number	Misc. Notes
6	6	10.00	12.00	0.75	4	2.12	5	2.10	28.00	24.00	7.00	9.00	240-480	1	FDH43N-06024N-60005-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
12	12	12.00	14.00	0.75	5	2.10	6	2.08	34.00	30.00	9.00	11.00	240-480	1	FDH43N-12030N-120C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
18	18	14.00	14.00	0.75	5	2.16	6	2.08	34.00	30.00	11.00	11.00	240-480	1	FDH43N-18030N-180C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
24	24	14.00	20.00	0.75	6	2.08	9	2.06	34.00	30.00	11.00	14.00	240-480	1,2	FDH43N-24030N-240C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
30	30	12.50	20.00	0.75	5	2.20	9	2.06	34.00	30.00	9.00	21.00	240-480	1,2	FDH43N-30030N-300C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
36	36	14.00	24.00	0.75	6	2.08	10	2.25	34.00	30.00	14.00	15.00	240-480	1,2,3	FDH43N-36030N-360C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
42	42	15.50	24.00	0.75	7	2.07	10	2.25	34.00	30.00	11.00	13.00	240-480	1,2	FDH43N-42030N-420C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
48	48	17.00	24.00	0.75	7	2.21	10	2.25	34.00	30.00	14.00	21.00	240-480	2,4	FDH43N-48030N-480C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
54	54	18.50	24.00	0.75	8	2.12	10	2.25	34.00	30.00	15.00	21.00	240-480	3	FDH43N-54030N-540C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT
60	60	20.00	24.00	0.75	9	2.06	10	2.25	34.00	30.00	17.00	21.00	240-480	4,5	FDH43N-60030N-600C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE WITHOUT THERMOSTAT

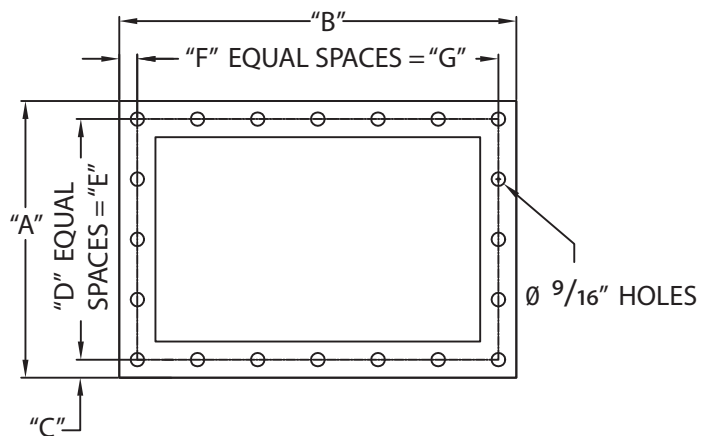


HIGH TEMPERATURE PROCESS AIR HEATERS

High temperature Process Air Heaters are used for both natural and forced convection industrial applications. Durex Industries Process Air Heaters feature heavy gauge mounting flange and terminal box, built-in thermowell with heat sink, and rugged stainless steel construction. Typical uses for high temperature process air heaters include higher temperature recirculating ovens, preheating combustion air, oven conversions, high temperature drying, heat treating, annealing, and dehumidification.

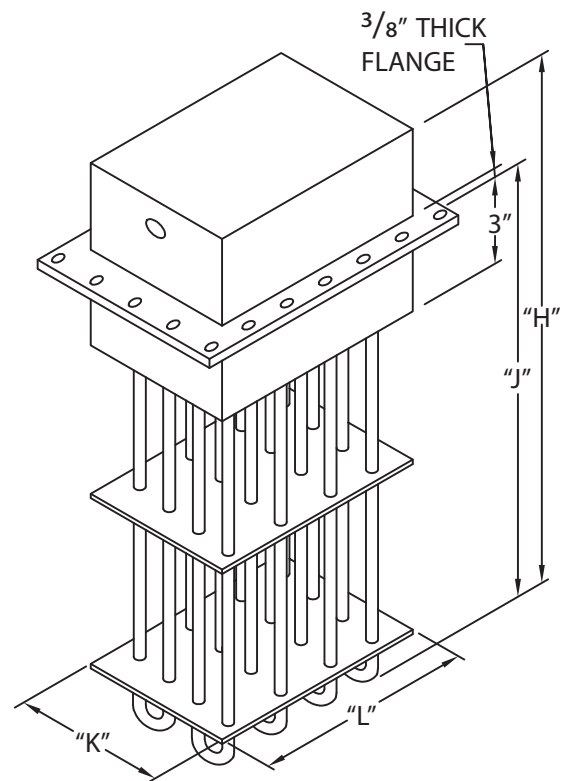
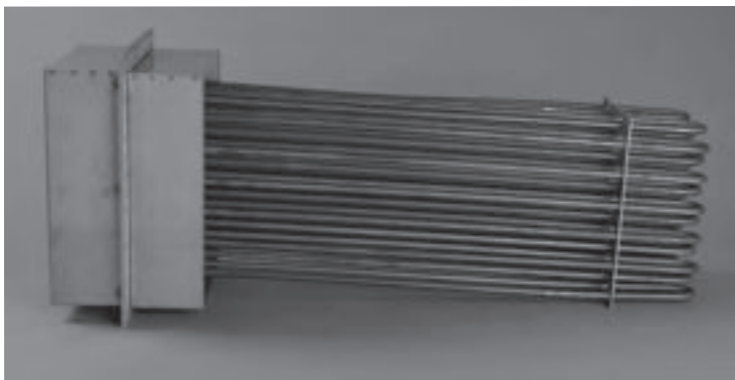
CONSTRUCTION FEATURES:

- Heavy gauge terminal box with Nema 1 housing and high temperature aluminum paint
- 3/8" thick steel mounting flange
- Silicone rubber seals at the terminals retard moisture absorption during storage
- Incoloy® sheath
- Recompact bends to restore MgO density



OPTIONAL FEATURES:

- Four 3/8" diameter stainless steel support rods and stainless steel support plate
- Built-in thermowell with heat sink
- Thermostat installed
- Guide frame
- Restriction baffles



HIGH TEMPERATURE PROCESS AIR HEATERS

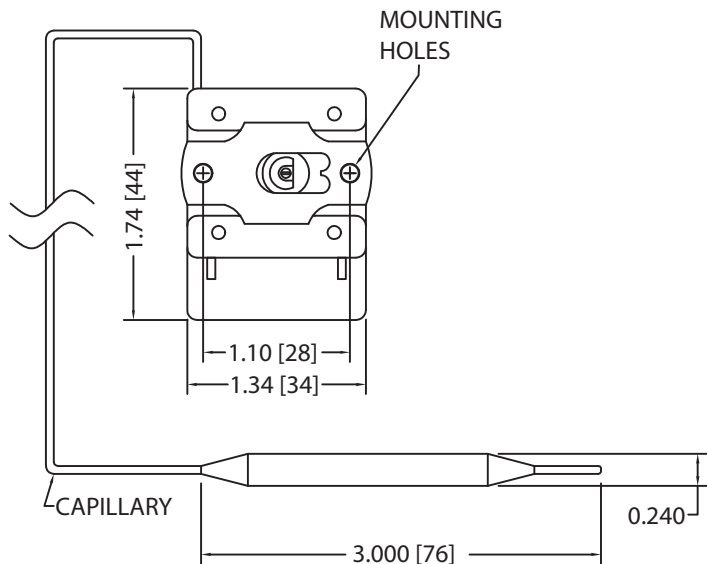
Heater Kw Rating	Number of Elements	A in inches	B in inches	C in inches	D # of holes	E in inches	F # of holes	G in inches	H in inches	J in inches	K in inches	L in inches	Heater Voltage	Number of Circuits	Catalog Part Number	Misc. Notes
5	3	8.00	10.00	0.75	3	2.15	4	2.12	28.00	24.00	3.00	4.50	240-480	1	PH43N-03024N-5000S-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
10	6	10.00	12.00	0.75	4	2.12	5	2.10	28.00	24.00	4.50	6.00	240-480	1	PH43N-06024N-100C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
15	9	10.00	14.00	0.75	4	2.12	6	2.08	28.00	24.00	4.50	9.00	240-480	1	PH43N-09024N-150C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
20	12	12.00	14.00	0.75	5	2.10	6	2.08	34.00	30.00	6.00	9.00	240-480	1,2	PH43N-12030N-200C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
25	15	13.00	14.00	0.75	5	2.10	6	2.08	34.00	30.00	7.50	9.00	240-480	1,2	PH43N-15030N-250C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
30	18	14.00	14.00	0.75	6	2.08	6	2.08	34.00	30.00	9.00	9.00	240-480	1,2,3	PH43N-18030N-300C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
35	21	14.00	16.00	0.75	4	2.12	12	2.05	34.00	30.00	9.00	10.50	240-480	1,3	PH43N-21030N-350C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
40	24	14.00	17.00	0.75	6	2.08	9	2.06	34.00	30.00	9.00	12.00	240-480	2,4	PH43N-24030N-400C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
45	27	14.00	18.50	0.75	4	2.12	14	2.18	34.00	30.00	9.00	13.50	240-480	3	PH43N-27030N-450C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
50	30	14.00	20.00	0.75	5	2.10	9	2.06	34.00	30.00	9.00	15.00	240-480	2,5	PH43N-30030N-500C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
80	36	14.00	24.00	0.75	6	2.08	10	2.25	34.00	30.00	9.00	18.00	240-480	2,3	PH43N-36030N-800C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
80	48	17.00	24.00	0.75	7	2.21	10	2.25	34.00	30.00	12.00	18.00	240-480	2,4	PH43N-48030N-800C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
90	54	18.50	24.00	0.75	8	2.12	10	2.25	34.00	30.00	13.50	18.00	240-480	3,6	PH43N-54030N-900C5-XXXX01	240 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
100	60	20.00	24.00	0.75	9	2.06	10	2.25	34.00	30.00	15.00	18.00	480	4,5,6	PH43N-60030N-100K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
120	36	14.00	24.00	0.75	6	2.08	10	2.25	62.00	58.00	9.00	18.00	480	4,6	PH43N-36058N-120K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
144	48	17.00	24.00	0.75	7	2.21	10	2.25	56.00	52.00	12.00	18.00	480	4,6	PH43N-48052N-144K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
160	48	17.00	24.00	0.75	7	2.21	10	2.25	62.00	58.00	12.00	18.00	480	4,8	PH43N-48058N-160K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
162	54	18.50	24.00	0.75	8	2.12	10	2.25	56.00	52.00	13.50	18.00	480	6	PH43N-54052N-162K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
180	54	18.50	24.00	0.75	8	2.12	10	2.25	62.00	58.00	13.50	18.00	480	4,6	PH43N-54058N-180K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
218	72	24.00	24.00	0.75	8	2.12	13	2.19	56.00	52.00	18.00	18.00	480	6	PH43N-72052N-218K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
240	72	20.00	24.00	0.75	8	2.12	13	2.19	62.00	58.00	18.00	18.00	480	6,8	PH43N-72058N-240K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
270	80	20.00	28.00	0.75	9	2.06	13	2.19	56.00	52.00	15.00	22.50	480	10	PH43N-80052N-270K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT
300	90	20.00	32.00	0.75	9	2.06	14	2.18	62.00	58.00	15.00	27.00	480	10	PH43N-90058N-300K8-XXXX01	480 Volt, NEMA 1 ENCLOSURE without THERMOSTAT

NOTE: See drawings on previous page

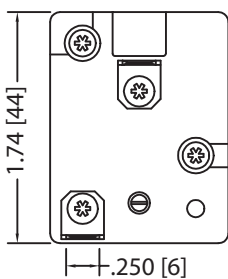
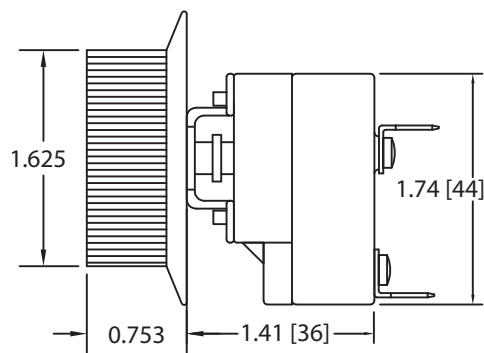


PROCESS HEATERS

THERMOSTAT OPTIONS



- SPST Adjustable thermostat
- Wide range of temperature selections
- Complete with knob & bezel

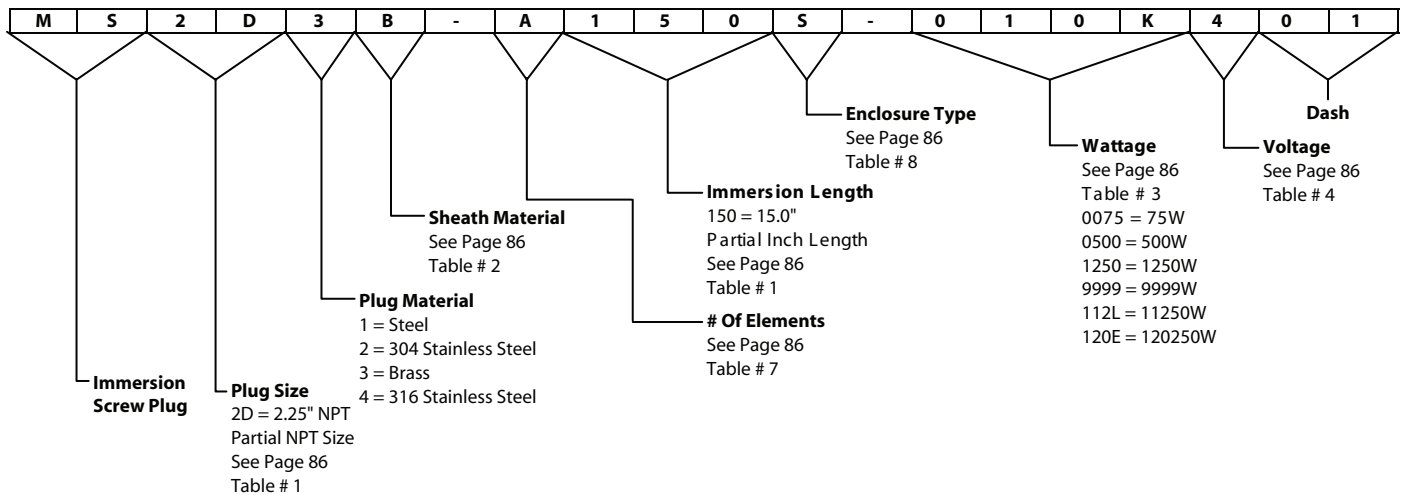


PART NUMBER	DESCRIPTION
CNTR-TSTAT-351-1	Adjustable Thermostat from 50-110°F
CNTR-TSTAT-2567F2-1	DPST Thermostat Controller from 0-100°F
CNTR-TSTAT-2567F1-1	Thermostat Controller from 60-250°F
CNTR-TSTAT-CAP-85-230-1	SPST Adjustable Thermostat from 80-230°F with knob & bezel
CNTR-TSTAT-CAP-120-570-1	SPST Adjustable Thermostat from 120-570°F with knob & bezel

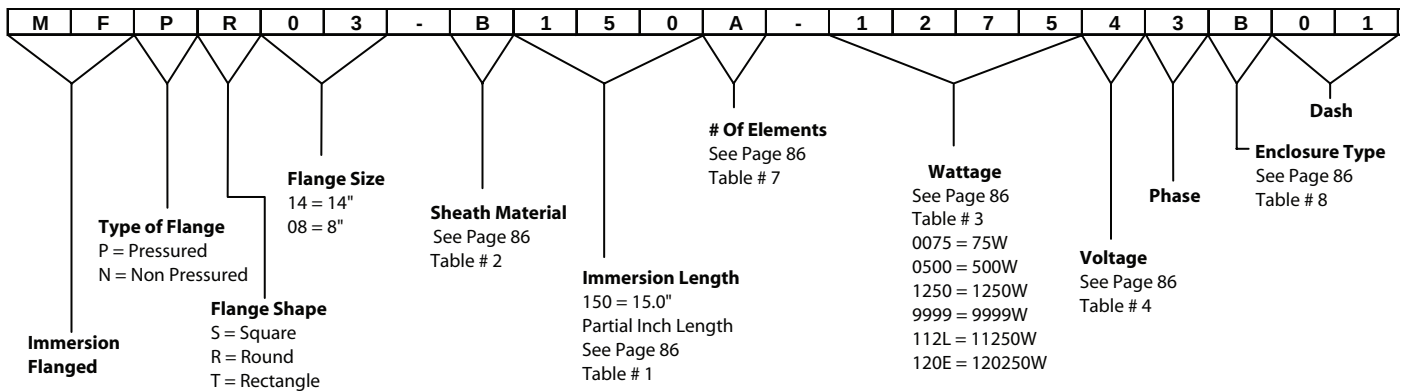


PART NUMBERS

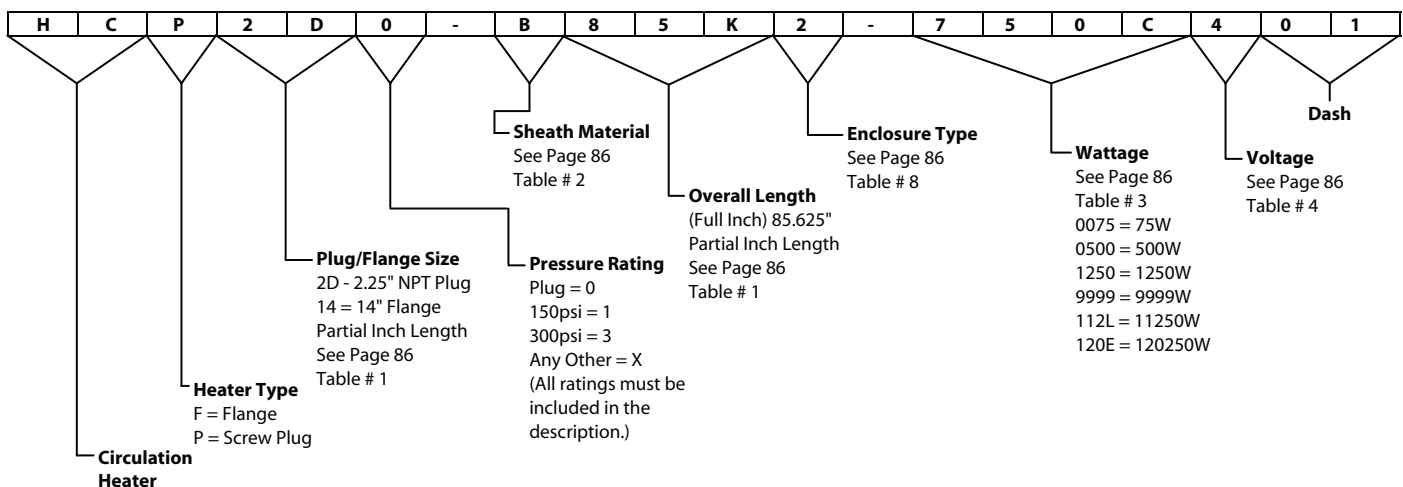
Immersion Screw Plug



Immersion Flanged



Circulation Heater





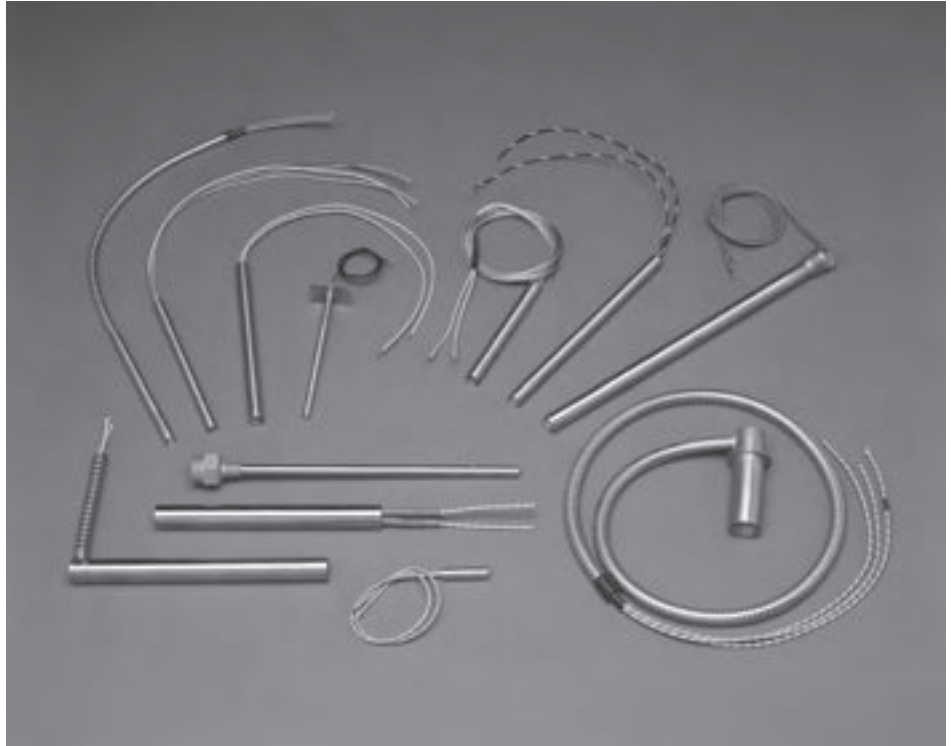
TABLES AND CODES

<table><tr><th colspan="4"><u>Table # 1</u></th></tr><tr><th>Frac.</th><th>=</th><th>Deci.</th><th>= Code</th></tr><tr><td>0</td><td>=</td><td>0</td><td>= 0</td></tr><tr><td>1/16"</td><td>=</td><td>.062"</td><td>= A</td></tr><tr><td>1/8"</td><td>=</td><td>.125"</td><td>= B</td></tr><tr><td>3/16"</td><td>=</td><td>.188"</td><td>= C</td></tr><tr><td>1/4"</td><td>=</td><td>.250"</td><td>= D</td></tr><tr><td>5/16"</td><td>=</td><td>.312"</td><td>= E</td></tr><tr><td>3/8"</td><td>=</td><td>.375"</td><td>= F</td></tr><tr><td>7/16"</td><td>=</td><td>.438"</td><td>= G</td></tr><tr><td>1/2"</td><td>=</td><td>.500"</td><td>= H</td></tr><tr><td>9/16"</td><td>=</td><td>.562"</td><td>= J</td></tr><tr><td>5/8"</td><td>=</td><td>.625"</td><td>= K</td></tr><tr><td>11/16"</td><td>=</td><td>.688"</td><td>= L</td></tr><tr><td>3/4"</td><td>=</td><td>.750"</td><td>= M</td></tr><tr><td>13/16"</td><td>=</td><td>.812"</td><td>= N</td></tr><tr><td>7/8"</td><td>=</td><td>.875"</td><td>= P</td></tr><tr><td>15/16"</td><td>=</td><td>.938"</td><td>= R</td></tr><tr><td>1"</td><td>=</td><td>1.000"</td><td>= S</td></tr></table>	<u>Table # 1</u>				Frac.	=	Deci.	= Code	0	=	0	= 0	1/16"	=	.062"	= A	1/8"	=	.125"	= B	3/16"	=	.188"	= C	1/4"	=	.250"	= D	5/16"	=	.312"	= E	3/8"	=	.375"	= F	7/16"	=	.438"	= G	1/2"	=	.500"	= H	9/16"	=	.562"	= J	5/8"	=	.625"	= K	11/16"	=	.688"	= L	3/4"	=	.750"	= M	13/16"	=	.812"	= N	7/8"	=	.875"	= P	15/16"	=	.938"	= R	1"	=	1.000"	= S	<table><tr><th colspan="2"><u>Table # 2</u></th></tr><tr><th colspan="2">Sheath Material Code</th></tr><tr><td colspan="2">C = Copper (COP)</td></tr><tr><td colspan="2">B = Steel (STL)</td></tr><tr><td colspan="2">R = 304 Stainless STL (304SS)</td></tr><tr><td colspan="2">S = 316 Stainless STL (316SS)</td></tr><tr><td colspan="2">N = Incoloy (INC)</td></tr><tr><td colspan="2">L = Inconel (INL)</td></tr><tr><td colspan="2">X = Special (SPL)</td></tr></table>	<u>Table # 2</u>		Sheath Material Code		C = Copper (COP)		B = Steel (STL)		R = 304 Stainless STL (304SS)		S = 316 Stainless STL (316SS)		N = Incoloy (INC)		L = Inconel (INL)		X = Special (SPL)		<table><tr><th colspan="2"><u>Table # 3</u></th></tr><tr><th colspan="2">Wattage Codes</th></tr><tr><td colspan="2">C = 00</td></tr><tr><td colspan="2">A = 25</td></tr><tr><td colspan="2">L = 50</td></tr><tr><td colspan="2">B = 75</td></tr><tr><td colspan="2">K = 000</td></tr><tr><td colspan="2">E = 250</td></tr><tr><td colspan="2">D = 500</td></tr><tr><td colspan="2">F = 750</td></tr></table>	<u>Table # 3</u>		Wattage Codes		C = 00		A = 25		L = 50		B = 75		K = 000		E = 250		D = 500		F = 750																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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MAGNUM™ CARTRIDGE HEATERS

Magnum™ cartridge heaters from Durex are simply the benchmark of Industry. Packaging, Plastics Processing, Foodservice, and Process Industries alike look to our cartridge heaters as a reliable, efficient, and cost-effective heat source. Swaged-in designs are made for use in applications where high density, high temperatures, and long service life are critical to reduce downtime and minimize cost.



FEATURES:

- UL/CUL component recognition available
- Rugged dependable heat source
- Temperatures up to 1500°F (820°C)
- Many diameters offered as standard
- Metric sizes also available
- Highly compacted unit which resists shock and vibration
- Alloy sheath for high corrosion resistance
- Custom manufactured to specifications

TYPICAL APPLICATIONS:

- Liquid Immersion
- Plastic Molds
- Dies
- Labeling
- Medical Equipment
- Platens
- Packaging Equipment
- Hot Stamping
- Sealing
- Injection Molding



MAGNUM™ CARTRIDGE HEATERS

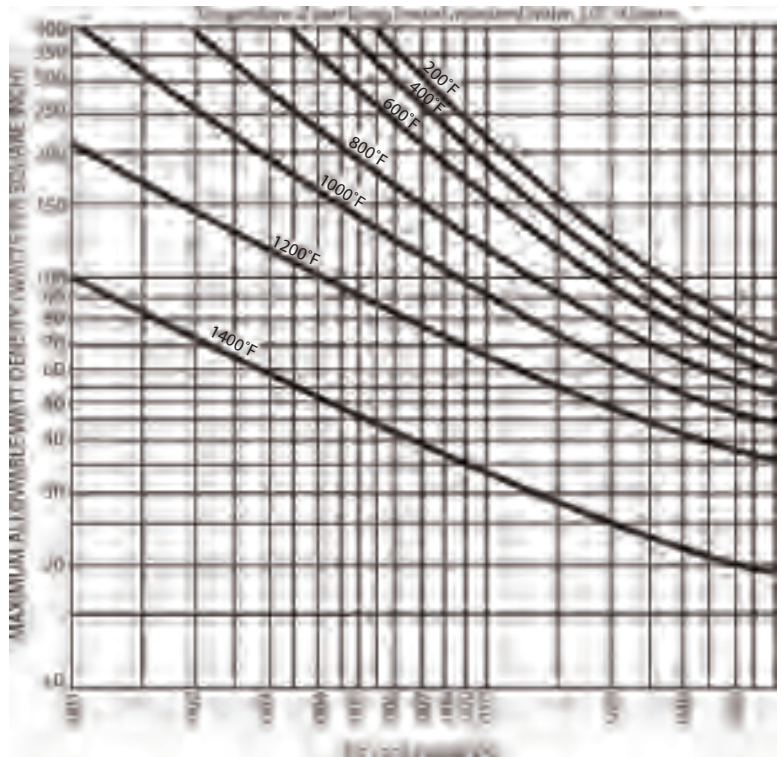
SPECIFICATIONS

Nominal

Diameter	1/4"	5/16"	3/8"	1/2"	5/8"	11/16"	3/4"	7/8"	1"	6.5mm	8mm	10mm	12.5mm	16mm	20mm
Actual ± Diameter .002	.246	.309	.371	.496	.621	.683	.746	.871	.996	.252	.312	.391	.489	.627	.784
Maximum Volts	240	240	240	240	480	480	480	480	480	240	240	240	240	480	480
Maximum Amps	4.2	6.0	6.5	10.5	22.0	22.0	22.0	22.0	25.0	4.0	6.0	6.0	10.5	22	22
Minimum Wattage	Consult Durex for minimum wattage														
Wattage Tolerance	+5%-10% of rated wattage														
Length Tolerance	±2% of length, ±3/32 minimum														
Camber Tolerance	Up to 12" long: .010 per foot Over 12" long: .015 per foot														
Watt Density	= $\frac{\text{Total Wattage}}{\text{Diameter} \times 3.14 \times \text{heated length}}$														

FACTORS FOR LONGER HEATER LIFE

1. Do not exceed recommended maximum watt density specified for the heater size.
2. The heater sheath must fit properly into the machined hole. A tight fit is critical.
3. Protect the heater from contaminants such as oil, grease, and vapors.
4. Install adequate Kw to accomplish work load and make up for heat losses.





MAGNUM™ CARTRIDGE HEATERS

ORDERING INFORMATION

When ordering Cartridge Heaters, specify the following:

A. Nominal Diameter - see specifications for assistance.

B. Overall Sheath Length - measured in inches or millimeters from end to end of heater sheath.

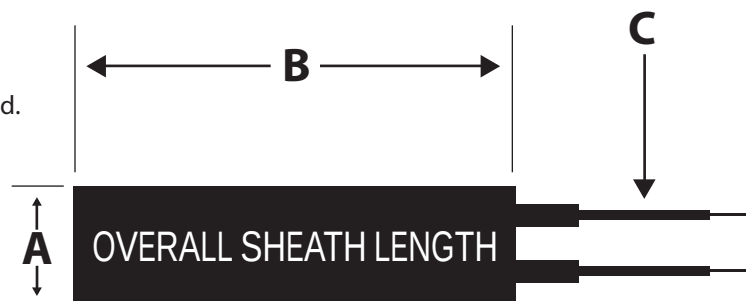
C. Lead Length - specify in inches.

D. Termination Type - see following pages for assistance.

E. Voltage - specify.

F. Wattage - specify.

G. Special Modifications - specify as required.



SPECIAL MODIFICATIONS

In addition to the standard design, Durex offers a variety of special modifications which are available to customize the heater for your application.

Distributed Wattage: Resistance windings can be concentrated in specific areas of the heater for localized heat distribution.

Centerless Grinding: Precision grinding of the heater sheath provides tighter diameter tolerances when required.

Teflon Coating: Teflon coating can be provided on heater sheath for applications requiring chemical resistance.

Ground Leadwire: Separate color coded groundwire can be provided when required.

Special Connectors: Various connectors for power leads can be provided upon request.

CARTRIDGE CARE AND MAINTENANCE

1. Store heaters in a dry area, especially during periods of high humidity.
2. Protect leads from abuse and abrasion.
3. Maintain temperature control and keep accessories in good working condition to obtain correct operating conditions.
4. All cartridge heaters have hygroscopic tendencies and can accumulate moisture in shipping and storage. Low heater insulation (less than 1 meg ohm) can be baked in an oven for several hours or started at low voltage to eliminate moisture.



MAGNUM™ CARTRIDGE HEATERS

S1 - STANDARD LEADS

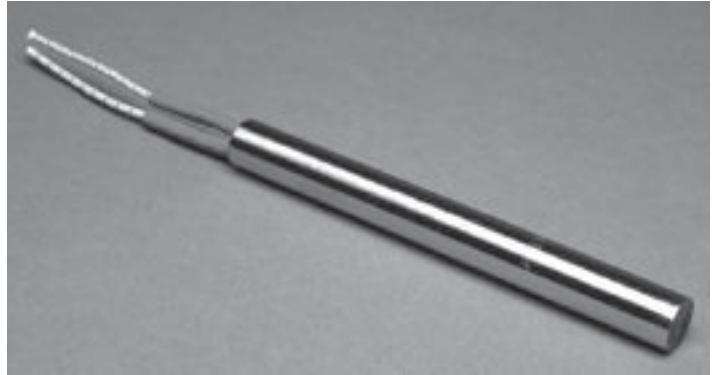
Fiberglass insulated leadwires are externally connected to nickel pins. The connection area is electrically insulated with heavy-wall fiberglass sleeving.

12" leads are standard.

Specify longer leads if required.

Standard cold length at lead exit: 0.375"

Standard cold length at disc end: 0.25"



F1 - SWAGED-IN FLEXIBLE LEADS

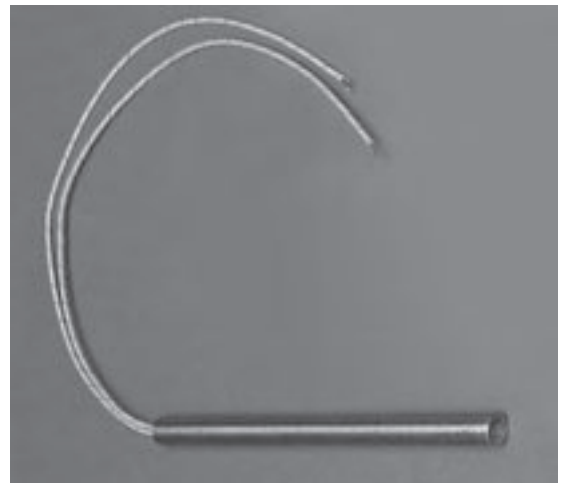
Fiberglass insulated leadwires are internally connected to nickel pins. This design allows for great flexibility at the lead exit point of the heater.

12" leads are standard.

Specify longer leads if required.

Standard cold length at lead exit: 0.375"

Standard cold length at disc end: 0.25"



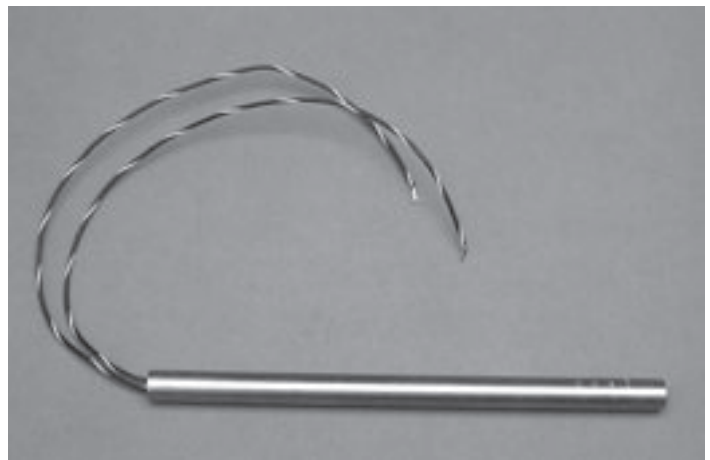
TS - TEFLON LEADS & SEAL

Teflon insulated leadwires with a Teflon end seal swaged into the heater sheath provides a moisture resistant design. This design requires a minimum of 1" cold section at lead exit end of heater.

12" leads are standard.

Specify longer leads if required.

Specify "E" for epoxy potted end seal with 12" Teflon insulated leads.





MAGNUM™ CARTRIDGE HEATERS

R1 - RIGHT ANGLE LEADS

Fiberglass insulated leads exit at a right angle from the heater sheath. Includes stainless steel end cap and high temperature potting. Specify overall length of heater.

Sheath Diameter	"L" Length
3/8"	3/8"
1/2"	1/2"
5/8"	9/16"
3/4"	9/16"
1"	9/16"

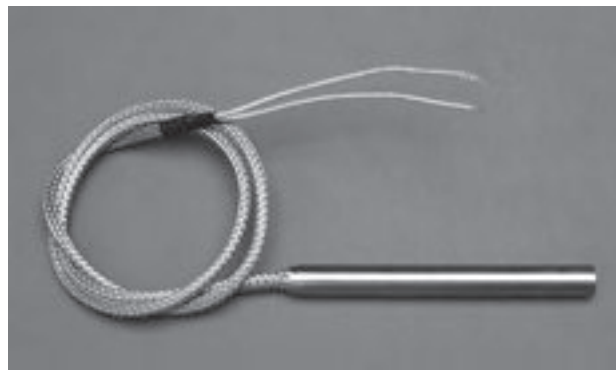


B1 - STRAIGHT BRAID LEAD PROTECTION

Stainless steel braid over fiberglass insulated leadwires exits straight from heater sheath for abrasion resistance, yet is flexible enough for sharp bends.

3" additional lead beyond braid is standard. Specify longer lead if required.

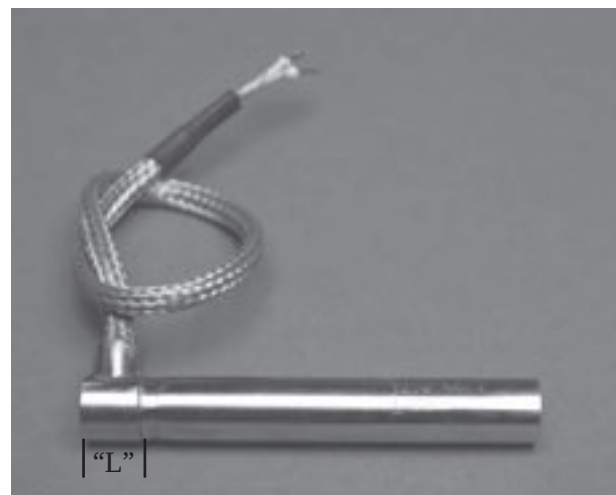
Standard cold length at lead exit: 0.375"
Standard cold length at disc end: 0.25"



B2 - RIGHT ANGLE BRAID PROTECTION

Stainless steel braid over fiberglass insulated leadwires exits at right angle from heater sheath. Includes stainless steel end cap. 3" lead beyond braid is standard. Specify longer lead if required. Specify overall heater length when ordering.

Sheath Diameter	"L" Length
3/8"	1/4"
1/2"	1/4"
5/8"	1/4"
3/4"	3/8"
1"	3/8"





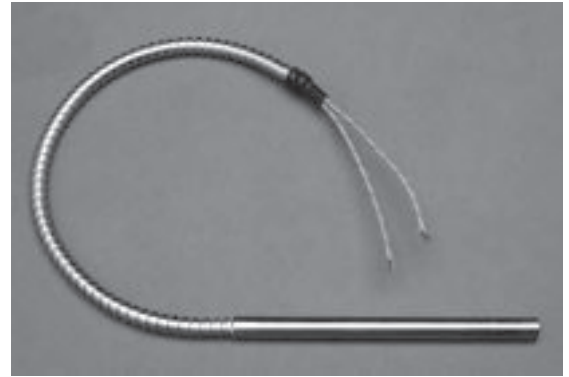
MAGNUM™ CARTRIDGE HEATERS

C1 - STRAIGHT ARMOR CABLE

Armor cable over fiberglass insulated leadwire exits straight from heater sheath for heavy duty lead protection.

3" lead beyond armor is standard.
Specify longer lead if required.

Specify galvanized or stainless steel armor when ordering.



C2 - RIGHT ANGLE ARMOR CABLE

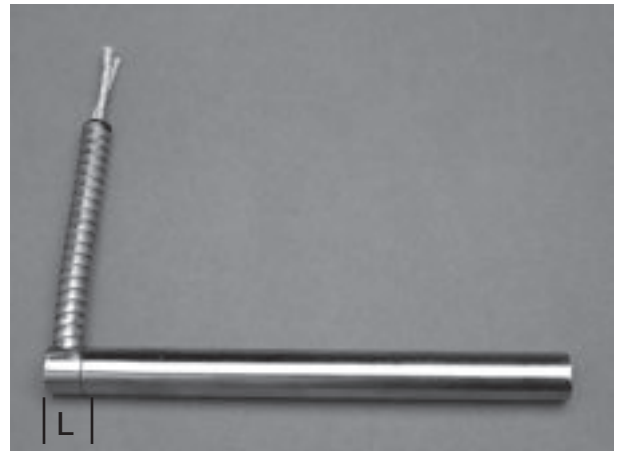
Armor cable over fiberglass insulated leadwire exits at a right angle from heater sheath.

Includes stainless steel end cap.

3" lead beyond armor is standard.

Specify longer lead if required. Specify: galvanized or stainless steel armor; overall heater length.

Sheath Diameter	Flex Diameter	"L" Length
3/8"	11/32"	3/8"
1/2"	13/32"	9/16"
5/8"	1/2"	9/16"
3/4"	1/2"	9/16"
1"	5/8"	3/4"



C4 - RIGHT ANGLE ARMOR CABLE WITH COPPER ELBOW

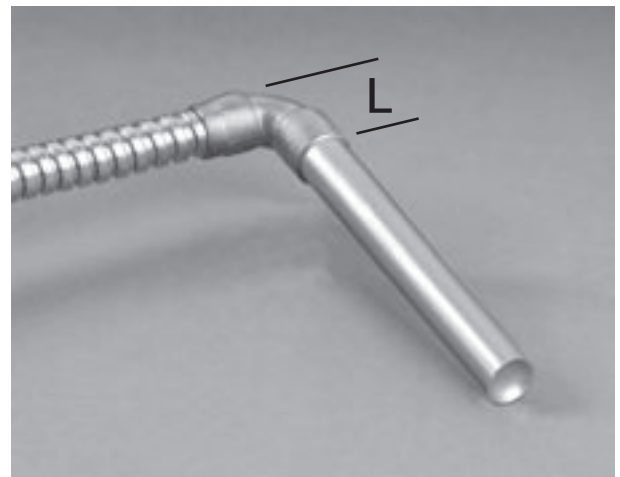
Armor cable leads extend at right angle from heater with right angle copper elbow.

3" lead beyond armor is standard.

Specify longer lead if required. Specify: galvanized or stainless steel armor; length of heater sheath.

Note: For Galvanized armor add "G" as suffix to termination number.

Sheath Diameter	Flex Diameter	"L" Length
1/4"	9/32"	7/8"
3/8"	11/32"	7/8"
1/2"	1/2"	1 1/8"
5/8"	1/2"	1 1/4"
3/4"	5/8"	1 3/4"
1"	5/8"	1 1/8"





MAGNUM™ CARTRIDGE HEATERS

TC - INTERNAL THERMOCOUPLE

Type J thermocouple provides an integral method for temperature control. Thermocouple junction (grounded or ungrounded) can be located at the end disc, center, or lead end. Please specify.

Other thermocouple types are available.



M - IMMERSION PIPE FITTING

Threaded NPT pipe fitting is silver soldered or welded directly to heater sheath for immersion applications. Fiberglass insulated leadwires exit high temperature cement potting.

3/4" cold required before fitting.

Specify: "MS" for stainless fitting
"MB" for brass fitting.



Diameter Inches	Minimum Unheated	Pipe Thread Size NPT	Fitting Length
1/4"	3/4"	1/8"	1/2"
3/8"	1"	1/4"	5/8"
1/2"	1"	3/8"	3/4"
5/8"	1"	1/2"	7/8"
3/4"	1 1/4"	3/4"	1"
1"	1 1/4"	1"	1 1/8"

N1 - POST TERMINALS

Threaded stainless steel terminals are welded directly to nickel pin for rigid mount applications. Includes two (2) nuts and washers for each terminal.

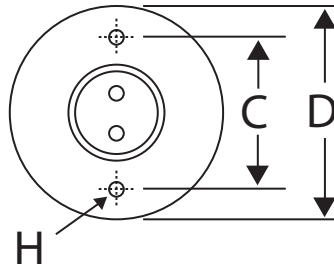




MAGNUM™ CARTRIDGE HEATERS

MF -MOUNTING FLANGE

Stainless steel flange welded directly to heater sheath.
Fiberglass insulated leadwires are standard.
Other flange sizes and hole patterns
are available upon request.



Diameter Inches	Flange Size	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

DURASLIK

The new Duraslik™ coating for cartridge heaters, developed by Durex Industries, allows any cartridge heater to be removed with relative ease after long term use. The patented non-stick coating acts as a corrosion inhibitor and solid lubricant when the heater is inserted into a drilled hole and energized.

Benefits:

- Reduced downtime caused by "sticky" heater removal
- Coating is bonded directly to the heater sheath for easy handling
- No need for secondary release agents prior to insertion
- Superior heater transfer characteristics for increased life



Technical Data:

- Maximum recommended diameter of 1"
- Minimum recommended diameter of 1/4"
- Coating is applied up to 1/4" of lead exit
- Heater diameter is manufactured to within standard tolerances after the coating is applied



CARTRIDGE HEATER PART NUMBERS

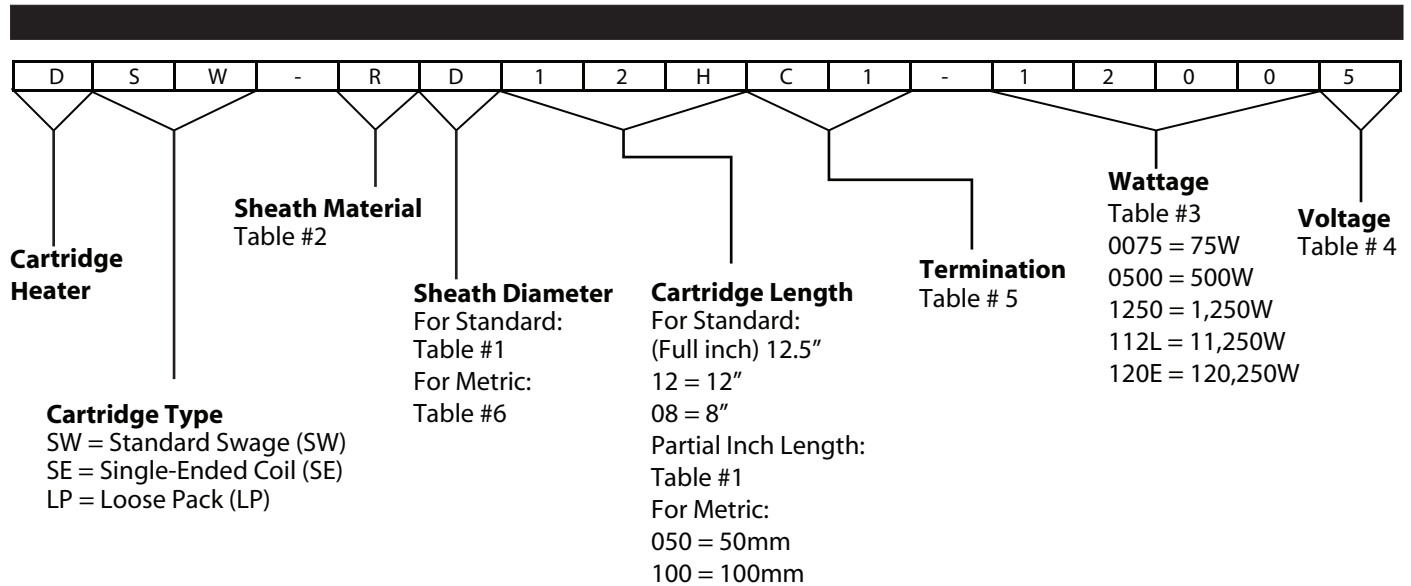


Table #1

Frac.	=	Deci.	=	Code
0	=	0	=	0
1/16"	=	.062"	=	A
1/8"	=	.125"	=	B
3/16"	=	.188"	=	C
1/4"	=	.250"	=	D
5/16"	=	.312"	=	E
3/8"	=	.375"	=	F
7/16"	=	.438"	=	G
1/2"	=	.500"	=	H
9/16"	=	.562"	=	J
5/8"	=	.625"	=	K
11/16"	=	.688"	=	L
3/4"	=	.750"	=	M
13/16"	=	.812"	=	N
7/8"	=	.875"	=	P
15/16"	=	.938"	=	R
1"	=	1.000"	=	S

Table #2

Sheath Material Code
C = Copper (COP)
B = Steel (STL)
R = 304 Stainless STL (304SS)
S = 316 Stainless STL (316SS)
N = Incoloy (INC)
L = Inconel (INL)
X = Special (SPL)

Table #3

Wattage Codes
C = 00
A = 25
L = 50
B = 75
K = 000
E = 250
D = 500
F = 750

Table #4

Voltage Codes
< - 100 = 1
101 - 130 = 2
131 - 199 = 3
200 - 219 = 4
220 - 250 = 5
251 - 300 = 6
301 - 420 = 7
421 - 500 = 8
500 - > = 9
Dual Rating = X

Table #5

Termination Code
S1 = Standard Leads
F1 = Swaged-In Flexible Leads
TS = Teflon Leads & Seal
TC = Internal Thermocouple
R1 = Right Angle Leads
B1 = Straight Braid Lead Protection
B2 = Right Angle Braid Protection
C1 = Straight Armor Cable
C2 = Right Angle Armor Cable
C4 = Right Angle Armor Cable w/ Copper Elbow
M = Immersion Pipe Fitting
MF = Mounting Flange
XX = Special

Table #6

Metric Dia. Code
1 = 6.5mm
2 = 8.0mm
3 = 10.0mm
4 = 12.5mm
5 = 16.0mm
6 = 20.0mm



MAGNUM™ CARTRIDGE HEATERS

STOCK LIST

Magnum™ Cartridge Heaters					
1/4" Incoloy, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
1/4" (.246" ±.002")	1"	80	120	136	DSW-ND010F1-00802
1/4" (.246" ±.002")	1"	100	120	204	DSW-ND010F1-01002
1/4" (.246" ±.002")	1¼"	75	120	130	DSW-ND01DF1-00752
1/4" (.246" ±.002")	1¼"	150	120	258	DSW-ND01DF1-01502
1/4" (.246" ±.002")	1½"	30	120	34	DSW-ND01HF1-00302
1/4" (.246" ±.002")	1½"	100	120	130	DSW-ND01HF1-01002
1/4" (.246" ±.002")	1½"	100	240	130	DSW-ND01HF1-01005
1/4" (.246" ±.002")	1½"	125	120	140	DSW-ND01HF1-01252
1/4" (.246" ±.002")	1½"	150	120	170	DSW-ND01HF1-01502
1/4" (.246" ±.002")	1½"	200	120	258	DSW-ND01HF1-02002
1/4" (.246" ±.002")	1½"	200	240	258	DSW-ND01HF1-02005
1/4" (.246" ±.002")	1¾"	150	120	155	DSW-ND01MF1-01502
1/4" (.246" ±.002")	1¾"	200	120	207	DSW-ND01MF1-02002
1/4" (.246" ±.002")	1¾"	200	240	207	DSW-ND01MF1-02005
1/4" (.246" ±.002")	2"	40	120	31	DSW-ND020F1-00402
1/4" (.246" ±.002")	2"	40	240	31	DSW-ND020F1-00405
1/4" (.246" ±.002")	2"	75	120	59	DSW-ND020F1-00752
1/4" (.246" ±.002")	2"	125	120	105	DSW-ND020F1-01252
1/4" (.246" ±.002")	2"	125	240	105	DSW-ND020F1-01255
1/4" (.246" ±.002")	2"	150	120	127	DSW-ND020F1-01502
1/4" (.246" ±.002")	2"	150	240	127	DSW-ND020F1-01505
1/4" (.246" ±.002")	2"	200	120	157	DSW-ND020F1-02002
1/4" (.246" ±.002")	2"	200	240	157	DSW-ND020F1-02005
1/4" (.246" ±.002")	2"	250	120	215	DSW-ND020F1-02502
1/4" (.246" ±.002")	2"	250	240	215	DSW-ND020F1-02505
1/4" (.246" ±.002")	2"	300	240	255	DSW-ND020F1-03005
1/4" (.246" ±.002")	2½"	250	120	157	DSW-ND02HF1-02502
1/4" (.246" ±.002")	2½"	250	240	157	DSW-ND02HF1-02505
1/4" (.246" ±.002")	2¾"	200	240	115	DSW-ND02MF1-02005
1/4" (.246" ±.002")	2¾"	300	240	140	DSW-ND02MF1-03005
1/4" (.246" ±.002")	3"	125	120	72	DSW-ND030F1-01252
1/4" (.246" ±.002")	3"	125	240	64	DSW-ND030F1-01255
1/4" (.246" ±.002")	3"	200	240	102	DSW-ND030F1-02005
1/4" (.246" ±.002")	3"	250	240	126	DSW-ND030F1-02505
1/4" (.246" ±.002")	3"	300	120	146	DSW-ND030F1-03002
1/4" (.246" ±.002")	3"	300	240	146	DSW-ND030F1-03005
1/4" (.246" ±.002")	4"	100	120	35	DSW-ND040F1-01002
1/4" (.246" ±.002")	4"	200	120	74	DSW-ND040F1-02002
1/4" (.246" ±.002")	4"	200	240	74	DSW-ND040F1-02005
1/4" (.246" ±.002")	4"	300	120	105	DSW-ND040F1-03002
1/4" (.246" ±.002")	4"	300	240	105	DSW-ND040F1-03005
1/4" (.246" ±.002")	4½"	350	240	113	DSW-ND04HF1-03505



MAGNUM™ CARTRIDGE HEATERS

STOCK LIST

Magnum™ Cartridge Heaters

1/4" Incoloy, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
1/4" (.246" ±.002")	5"	200	240	58	DSW-ND050F1-02005
1/4" (.246" ±.002")	5"	330	240	93	DSW-ND050F1-03305
1/4" (.246" ±.002")	5"	400	120	111	DSW-ND050F1-04002
1/4" (.246" ±.002")	5"	400	240	111	DSW-ND050F1-04005
1/4" (.246" ±.002")	5"	450	240	127	DSW-ND050F1-04505
1/4" (.246" ±.002")	6"	300	120	68	DSW-ND060F1-03002
1/4" (.246" ±.002")	6"	400	240	85	DSW-ND060F1-04005
1/4" (.246" ±.002")	7"	400	240	72	DSW-ND070F1-04005
1/4" (.246" ±.002")	8"	200	240	34	DSW-ND080F1-02005
1/4" (.246" ±.002")	8"	300	120	50	DSW-ND080F1-03002
1/4" (.246" ±.002")	8"	400	240	68	DSW-ND080F1-04005
1/4" (.246" ±.002")	10"	600	240	80	DSW-ND100F1-06005
1/4" (.246" ±.002")	11"	600	240	73	DSW-ND110F1-06005
1/4" (.246" ±.002")	13"	725	240	74	DSW-ND130F1-07255

3/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/8" (.371" ±.002")	1"	100	120	170	DSW-RF010F1-01002
3/8" (.371" ±.002")	1"	150	120	256	DSW-RF010F1-01502
3/8" (.371" ±.002")	1"	150	240	256	DSW-RF010F1-01505
3/8" (.371" ±.002")	1 1/4"	50	120	57	DSW-RF01DF1-00502
3/8" (.371" ±.002")	1 1/4"	80	120	108	DSW-RF01DF1-00802
3/8" (.371" ±.002")	1 1/4"	100	120	114	DSW-RF01DF1-01002
3/8" (.371" ±.002")	1 1/4"	125	120	141	DSW-RF01DF1-01252
3/8" (.371" ±.002")	1 1/4"	200	120	228	DSW-RF01DF1-02002
3/8" (.371" ±.002")	1 1/4"	200	240	228	DSW-RF01DF1-02005
3/8" (.371" ±.002")	1 3/8"	150	120	146	DSW-RF01FF1-01502
3/8" (.371" ±.002")	1 1/2"	30	120	25	DSW-RF01HF1-00302
3/8" (.371" ±.002")	1 1/2"	50	120	42	DSW-RF01HF1-00502
3/8" (.371" ±.002")	1 1/2"	60	120	51	DSW-RF01HF1-00602
3/8" (.371" ±.002")	1 1/2"	75	120	64	DSW-RF01HF1-00752
3/8" (.371" ±.002")	1 1/2"	85	120	72	DSW-RF01HF1-00852
3/8" (.371" ±.002")	1 1/2"	100	240	86	DSW-RF01HF1-01005
3/8" (.371" ±.002")	1 1/2"	150	120	127	DSW-RF01HF1-01502
3/8" (.371" ±.002")	1 1/2"	150	240	127	DSW-RF01HF1-01505
3/8" (.371" ±.002")	1 1/2"	200	120	170	DSW-RF01HF1-02002
3/8" (.371" ±.002")	1 1/2"	200	240	170	DSW-RF01HF1-02005
3/8" (.371" ±.002")	1 1/2"	250	120	212	DSW-RF01HF1-02502
3/8" (.371" ±.002")	1 1/2"	250	240	212	DSW-RF01HF1-02505
3/8" (.371" ±.002")	1 3/4"	125	120	86	DSW-RF01MF1-01252
3/8" (.371" ±.002")	1 3/4"	150	240	102	DSW-RF01MF1-01505
3/8" (.371" ±.002")	1 3/4"	175	120	120	DSW-RF01MF1-01752



MAGNUM™ CARTRIDGE HEATERS

STOCK LIST

Magnum™ Cartridge Heaters					
3/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/8" (.371" ±.002")	1¾"	200	240	136	DSW-RF01MF1-02005
3/8" (.371" ±.002")	1¾"	250	120	163	DSW-RF01MF1-02502
3/8" (.371" ±.002")	1¾"	250	240	163	DSW-RF01MF1-02505
3/8" (.371" ±.002")	2"	50	120	28	DSW-RF020F1-00502
3/8" (.371" ±.002")	2"	75	120	42	DSW-RF020F1-00752
3/8" (.371" ±.002")	2"	100	120	57	DSW-RF020F1-01002
3/8" (.371" ±.002")	2"	100	240	57	DSW-RF020F1-01005
3/8" (.371" ±.002")	2"	150	120	85	DSW-RF020F1-01502
3/8" (.371" ±.002")	2"	150	240	85	DSW-RF020F1-01505
3/8" (.371" ±.002")	2"	165	240	94	DSW-RF020F1-01655
3/8" (.371" ±.002")	2"	200	120	114	DSW-RF020F1-02002
3/8" (.371" ±.002")	2"	200	240	114	DSW-RF020F1-02005
3/8" (.371" ±.002")	2"	250	120	141	DSW-RF020F1-02502
3/8" (.371" ±.002")	2"	250	240	141	DSW-RF020F1-02505
3/8" (.371" ±.002")	2"	300	120	170	DSW-RF020F1-03002
3/8" (.371" ±.002")	2"	300	240	170	DSW-RF020F1-03005
3/8" (.371" ±.002")	2"	400	120	226	DSW-RF020F1-04002
3/8" (.371" ±.002")	2"	400	240	226	DSW-RF020F1-04005
3/8" (.371" ±.002")	2¼"	75	120	37	DSW-RF02DF1-00752
3/8" (.371" ±.002")	2¼"	125	120	62	DSW-RF02DF1-01252
3/8" (.371" ±.002")	2¼"	125	240	62	DSW-RF02DF1-01255
3/8" (.371" ±.002")	2¼"	250	120	121	DSW-RF02DF1-02502
3/8" (.371" ±.002")	2¼"	250	240	121	DSW-RF02DF1-02505
3/8" (.371" ±.002")	2⅝"	75	120	34	DSW-RF02FF1-00752
3/8" (.371" ±.002")	2⅝"	165	120	75	DSW-RF02FF1-01652
3/8" (.371" ±.002")	2⅝"	165	240	75	DSW-RF02FF1-01655
3/8" (.371" ±.002")	2⅝"	200	120	91	DSW-RF02FF1-02002
3/8" (.371" ±.002")	2⅝"	200	240	91	DSW-RF02FF1-02005
3/8" (.371" ±.002")	2⅝"	250	120	113	DSW-RF02FF1-02502
3/8" (.371" ±.002")	2⅝"	250	240	113	DSW-RF02FF1-02505
3/8" (.371" ±.002")	2⅝"	300	120	136	DSW-RF02FF1-03002
3/8" (.371" ±.002")	2⅝"	300	240	136	DSW-RF02FF1-03005
3/8" (.371" ±.002")	2⅝"	400	120	181	DSW-RF02FF1-04002
3/8" (.371" ±.002")	2½"	100	120	42	DSW-RF02HF1-01002
3/8" (.371" ±.002")	2½"	100	240	42	DSW-RF02HF1-01005
3/8" (.371" ±.002")	2½"	250	240	141	DSW-RF02HF1-02505
3/8" (.371" ±.002")	2½"	400	240	174	DSW-RF02HF1-04005
3/8" (.371" ±.002")	2½"	500	120	215	DSW-RF02HF1-05002
3/8" (.371" ±.002")	2½"	500	240	215	DSW-RF02HF1-05005
3/8" (.371" ±.002")	2¾"	100	120	38	DSW-RF02MF1-01002
3/8" (.371" ±.002")	2¾"	200	120	76	DSW-RF02MF1-02002
3/8" (.371" ±.002")	2¾"	250	120	95	DSW-RF02MF1-02502



MAGNUM™ CARTRIDGE HEATERS

STOCK LIST

Magnum™ Cartridge Heaters					
3/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/8" (.371" ±.002")	2¾"	275	240	104	DSW-RF02MF1-02755
3/8" (.371" ±.002")	2¾"	300	240	114	DSW-RF02MF1-03005
3/8" (.371" ±.002")	2¾"	500	240	190	DSW-RF02MF1-05005
3/8" (.371" ±.002")	3"	100	120	34	DSW-RF030F1-01002
3/8" (.371" ±.002")	3"	100	240	34	DSW-RF030F1-01005
3/8" (.371" ±.002")	3"	150	120	51	DSW-RF030F1-01502
3/8" (.371" ±.002")	3"	150	240	51	DSW-RF030F1-01505
3/8" (.371" ±.002")	3"	200	120	68	DSW-RF030F1-02002
3/8" (.371" ±.002")	3"	200	240	68	DSW-RF030F1-02005
3/8" (.371" ±.002")	3"	225	240	76	DSW-RF030F1-02255
3/8" (.371" ±.002")	3"	250	120	106	DSW-RF030F1-02502
3/8" (.371" ±.002")	3"	250	240	86	DSW-RF030F1-02505
3/8" (.371" ±.002")	3"	260	240	110	DSW-RF030F1-02605
3/8" (.371" ±.002")	3"	300	120	102	DSW-RF030F1-03002
3/8" (.371" ±.002")	3"	300	240	102	DSW-RF030F1-03005
3/8" (.371" ±.002")	3"	400	120	136	DSW-RF030F1-04002
3/8" (.371" ±.002")	3"	400	240	136	DSW-RF030F1-04005
3/8" (.371" ±.002")	3"	450	240	153	DSW-RF030F1-04505
3/8" (.371" ±.002")	3"	500	120	170	DSW-RF030F1-05002
3/8" (.371" ±.002")	3"	500	240	212	DSW-RF030F1-05005
3/8" (.371" ±.002")	3"	600	240	206	DSW-RF030F1-06005
3/8" (.371" ±.002")	3½"	120	120	34	DSW-RF03HF1-01202
3/8" (.371" ±.002")	3½"	250	240	71	DSW-RF03HF1-02505
3/8" (.371" ±.002")	3½"	300	120	85	DSW-RF03HF1-03002
3/8" (.371" ±.002")	3½"	300	240	85	DSW-RF03HF1-03005
3/8" (.371" ±.002")	3½"	320	240	90	DSW-RF03HF1-03205
3/8" (.371" ±.002")	3½"	350	120	92	DSW-RF03HF1-03502
3/8" (.371" ±.002")	3½"	350	240	92	DSW-RF03HF1-03505
3/8" (.371" ±.002")	3½"	400	240	113	DSW-RF03HF1-04005
3/8" (.371" ±.002")	3½"	500	120	142	DSW-RF03HF1-05002
3/8" (.371" ±.002")	3½"	500	240	142	DSW-RF03HF1-05005
3/8" (.371" ±.002")	3¾"	175	240	46	DSW-RF03MF1-01755
3/8" (.371" ±.002")	3¾"	300	240	79	DSW-RF03MF1-03005
3/8" (.371" ±.002")	3¾"	400	240	105	DSW-RF03MF1-04005
3/8" (.371" ±.002")	3¾"	500	240	130	DSW-RF03MF1-05005
3/8" (.371" ±.002")	4"	125	120	30	DSW-RF040F1-01252
3/8" (.371" ±.002")	4"	125	240	30	DSW-RF040F1-01255
3/8" (.371" ±.002")	4"	150	120	36	DSW-RF040F1-01502
3/8" (.371" ±.002")	4"	150	240	36	DSW-RF040F1-01505
3/8" (.371" ±.002")	4"	200	120	49	DSW-RF040F1-02002
3/8" (.371" ±.002")	4"	250	120	61	DSW-RF040F1-02502
3/8" (.371" ±.002")	4"	250	240	61	DSW-RF040F1-02505



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Magnum™ Cartridge Heaters					
3/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/8" (.371" ±.002")	4"	300	120	76	DSW-RF040F1-03002
3/8" (.371" ±.002")	4"	300	240	76	DSW-RF040F1-03005
3/8" (.371" ±.002")	4"	400	120	97	DSW-RF040F1-04002
3/8" (.371" ±.002")	4"	400	240	97	DSW-RF040F1-04005
3/8" (.371" ±.002")	4"	450	240	109	DSW-RF040F1-04505
3/8" (.371" ±.002")	4"	500	120	121	DSW-RF040F1-05002
3/8" (.371" ±.002")	4"	500	240	121	DSW-RF040F1-05005
3/8" (.371" ±.002")	4"	600	240	146	DSW-RF040F1-06005
3/8" (.371" ±.002")	4 1/4"	400	240	91	DSW-RF04DF1-04005
3/8" (.371" ±.002")	4 1/2"	300	120	65	DSW-RF04HF1-03002
3/8" (.371" ±.002")	4 1/2"	300	240	65	DSW-RF04HF1-03005
3/8" (.371" ±.002")	4 1/2"	400	120	85	DSW-RF04HF1-04002
3/8" (.371" ±.002")	4 1/2"	400	240	85	DSW-RF04HF1-04005
3/8" (.371" ±.002")	4 1/2"	420	240	102	DSW-RF04HF1-04205
3/8" (.371" ±.002")	4 1/2"	500	120	106	DSW-RF04HF1-05002
3/8" (.371" ±.002")	4 1/2"	500	240	106	DSW-RF04HF1-05005
3/8" (.371" ±.002")	4 3/4"	300	120	60	DSW-RF04MF1-03002
3/8" (.371" ±.002")	4 3/4"	300	240	60	DSW-RF04MF1-03005
3/8" (.371" ±.002")	4 3/4"	400	120	80	DSW-RF04MF1-04002
3/8" (.371" ±.002")	4 3/4"	400	240	80	DSW-RF04MF1-04005
3/8" (.371" ±.002")	4 3/4"	500	240	98	DSW-RF04MF1-05005
3/8" (.371" ±.002")	5"	150	120	29	DSW-RF050F1-01502
3/8" (.371" ±.002")	5"	150	240	29	DSW-RF050F1-01505
3/8" (.371" ±.002")	5"	200	120	38	DSW-RF050F1-02002
3/8" (.371" ±.002")	5"	300	120	57	DSW-RF050F1-03002
3/8" (.371" ±.002")	5"	300	240	57	DSW-RF050F1-03005
3/8" (.371" ±.002")	5"	400	120	75	DSW-RF050F1-04002
3/8" (.371" ±.002")	5"	470	240	90	DSW-RF050F1-04705
3/8" (.371" ±.002")	5"	500	120	95	DSW-RF050F1-05002
3/8" (.371" ±.002")	5"	500	240	95	DSW-RF050F1-05005
3/8" (.371" ±.002")	5"	750	240	141	DSW-RF050F1-07505
3/8" (.371" ±.002")	5"	1000	240	195	DSW-RF050F1-10005
3/8" (.371" ±.002")	5 1/2"	250	240	43	DSW-RF05HF1-02505
3/8" (.371" ±.002")	5 1/2"	300	240	51	DSW-RF05HF1-03005
3/8" (.371" ±.002")	5 1/2"	600	240	102	DSW-RF05HF1-06005
3/8" (.371" ±.002")	5 3/4"	400	240	65	DSW-RF05MF1-04005
3/8" (.371" ±.002")	5 3/4"	500	240	81	DSW-RF05MF1-05005
3/8" (.371" ±.002")	5 3/4"	600	120	97	DSW-RF05MF1-06002
3/8" (.371" ±.002")	5 3/4"	600	240	97	DSW-RF05MF1-06005
3/8" (.371" ±.002")	6"	225	120	35	DSW-RF060F1-02252
3/8" (.371" ±.002")	6"	225	240	35	DSW-RF060F1-02255
3/8" (.371" ±.002")	6"	400	120	58	DSW-RF060F1-04002



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3/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/8" (.371" ±.002")	6"	400	240	58	DSW-RF060F1-04005
3/8" (.371" ±.002")	6"	500	120	77	DSW-RF060F1-05002
3/8" (.371" ±.002")	6"	500	240	77	DSW-RF060F1-05005
3/8" (.371" ±.002")	6"	575	240	85	DSW-RF060F1-05755
3/8" (.371" ±.002")	6"	600	120	93	DSW-RF060F1-06002
3/8" (.371" ±.002")	6"	600	240	93	DSW-RF060F1-06005
3/8" (.371" ±.002")	6"	750	240	116	DSW-RF060F1-07505
3/8" (.371" ±.002")	6"	1000	240	165	DSW-RF060F1-10005
3/8" (.371" ±.002")	6½"	600	240	86	DSW-RF06HF1-06005
3/8" (.371" ±.002")	6½"	1000	240	142	DSW-RF06HF1-10005
3/8" (.371" ±.002")	6¾"	300	240	41	DSW-RF06MF1-03005
3/8" (.371" ±.002")	7"	350	120	46	DSW-RF070F1-03502
3/8" (.371" ±.002")	7"	350	240	46	DSW-RF070F1-03505
3/8" (.371" ±.002")	7"	400	120	52	DSW-RF070F1-04002
3/8" (.371" ±.002")	7"	450	240	60	DSW-RF070F1-04505
3/8" (.371" ±.002")	7"	500	240	65	DSW-RF070F1-05005
3/8" (.371" ±.002")	7"	600	240	80	DSW-RF070F1-06005
3/8" (.371" ±.002")	7"	675	240	95	DSW-RF070F1-06755
3/8" (.371" ±.002")	7"	1000	240	131	DSW-RF070F1-10005
3/8" (.371" ±.002")	7¼"	600	240	76	DSW-RF07DF1-06005
3/8" (.371" ±.002")	7½"	300	240	36	DSW-RF07HF1-03005
3/8" (.371" ±.002")	7½"	600	120	73	DSW-RF07HF1-06002
3/8" (.371" ±.002")	7½"	600	240	73	DSW-RF07HF1-06005
3/8" (.371" ±.002")	7½"	1000	240	122	DSW-RF07HF1-10005
3/8" (.371" ±.002")	7¾"	750	240	85	DSW-RF07MF1-07505
3/8" (.371" ±.002")	8"	300	120	34	DSW-RF080F1-03002
3/8" (.371" ±.002")	8"	300	240	34	DSW-RF080F1-03005
3/8" (.371" ±.002")	8"	500	120	57	DSW-RF080F1-05002
3/8" (.371" ±.002")	8"	500	240	57	DSW-RF080F1-05005
3/8" (.371" ±.002")	8"	600	120	68	DSW-RF080F1-06002
3/8" (.371" ±.002")	8"	600	240	68	DSW-RF080F1-06005
3/8" (.371" ±.002")	8"	650	240	79	DSW-RF080F1-06505
3/8" (.371" ±.002")	8"	775	240	96	DSW-RF080F1-07755
3/8" (.371" ±.002")	8"	1000	240	113	DSW-RF080F1-10005
3/8" (.371" ±.002")	9"	500	240	50	DSW-RF090F1-05005
3/8" (.371" ±.002")	9"	885	240	94	DSW-RF090F1-08855
3/8" (.371" ±.002")	9"	1000	240	100	DSW-RF090F1-10005
3/8" (.371" ±.002")	9½"	600	240	57	DSW-RF09HF1-06005
3/8" (.371" ±.002")	9½"	1000	240	95	DSW-RF09HF1-10005
3/8" (.371" ±.002")	10"	600	120	54	DSW-RF100F1-06002
3/8" (.371" ±.002")	10"	600	240	54	DSW-RF100F1-06005
3/8" (.371" ±.002")	10"	1000	240	90	DSW-RF100F1-10005



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3/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/8" (.371" ±.002")	12"	500	240	37	DSW-RF120F1-05005
3/8" (.371" ±.002")	12"	600	240	44	DSW-RF120F1-06005
3/8" (.371" ±.002")	12"	1000	240	74	DSW-RF120F1-10005
3/8" (.371" ±.002")	12¾"	1000	240	68	DSW-RF12MF1-10005

1/2" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
1/2" (.496" ±.002)	1¼"	125	120	108	DSW-RH01DF1-01252
1/2" (.496" ±.002)	1¼"	125	240	108	DSW-RH01DF1-01255
1/2" (.496" ±.002)	1¼"	200	240	171	DSW-RH01DF1-02005
1/2" (.496" ±.002)	1½"	150	120	96	DSW-RH01HF1-01502
1/2" (.496" ±.002)	1½"	150	240	96	DSW-RH01HF1-01505
1/2" (.496" ±.002)	1½"	200	120	128	DSW-RH01HF1-02002
1/2" (.496" ±.002)	1½"	200	240	128	DSW-RH01HF1-02005
1/2" (.496" ±.002)	1½"	250	240	159	DSW-RH01HF1-02505
1/2" (.496" ±.002)	1¾"	200	240	102	DSW-RH01MF1-02005
1/2" (.496" ±.002)	1¾"	250	120	128	DSW-RH01MF1-02502
1/2" (.496" ±.002)	1¾"	300	240	154	DSW-RH01MF1-03005
1/2" (.496" ±.002)	1¾"	400	240	205	DSW-RH01MF1-04005
1/2" (.496" ±.002)	2"	130	240	55	DSW-RH020F1-01305
1/2" (.496" ±.002)	2"	200	120	55	DSW-RH020F1-02002
1/2" (.496" ±.002)	2"	200	240	85	DSW-RH020F1-02005
1/2" (.496" ±.002)	2"	250	120	106	DSW-RH020F1-02502
1/2" (.496" ±.002)	2"	250	240	106	DSW-RH020F1-02505
1/2" (.496" ±.002)	2"	300	120	128	DSW-RH020F1-03002
1/2" (.496" ±.002)	2"	300	240	128	DSW-RH020F1-03005
1/2" (.496" ±.002)	2"	400	120	170	DSW-RH020F1-04002
1/2" (.496" ±.002)	2"	400	240	170	DSW-RH020F1-04005
1/2" (.496" ±.002)	2"	500	120	214	DSW-RH020F1-05002
1/2" (.496" ±.002)	2¼"	125	120	45	DSW-RH02DF1-01252
1/2" (.496" ±.002)	2¼"	250	120	91	DSW-RH02DF1-02502
1/2" (.496" ±.002)	2¼"	250	240	91	DSW-RH02DF1-02505
1/2" (.496" ±.002)	2¼"	400	120	147	DSW-RH02DF1-04002
1/2" (.496" ±.002)	2¼"	400	240	147	DSW-RH02DF1-04005
1/2" (.496" ±.002)	2⅜"	100	240	35	DSW-RH02FF1-01005
1/2" (.496" ±.002)	2⅜"	225	120	76	DSW-RH02FF1-02252
1/2" (.496" ±.002)	2⅜"	400	120	136	DSW-RH02FF1-04002
1/2" (.496" ±.002)	2⅜"	400	240	136	DSW-RH02FF1-04005
1/2" (.496" ±.002)	2⅜"	475	120	161	DSW-RH02FF1-04752
1/2" (.496" ±.002)	2⅜"	475	240	161	DSW-RH02FF1-04755
1/2" (.496" ±.002)	2½"	100	120	32	DSW-RH02HF1-01002
1/2" (.496" ±.002)	2½"	100	240	32	DSW-RH02HF1-01005



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1/2" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
1/2" (.496" ±.002)	2½"	120	120	38	DSW-RH02HF1-01202
1/2" (.496" ±.002)	2½"	150	240	46	DSW-RH02HF1-01505
1/2" (.496" ±.002)	2½"	300	120	96	DSW-RH02HF1-03002
1/2" (.496" ±.002)	2½"	300	240	96	DSW-RH02HF1-03005
1/2" (.496" ±.002)	2½"	500	120	160	DSW-RH02HF1-05002
1/2" (.496" ±.002)	2½"	500	240	160	DSW-RH02HF1-05005
1/2" (.496" ±.002)	2¾"	250	120	71	DSW-RH02MF1-02502
1/2" (.496" ±.002)	2¾"	400	120	114	DSW-RH02MF1-04002
1/2" (.496" ±.002)	2¾"	400	240	114	DSW-RH02MF1-04005
1/2" (.496" ±.002)	3"	150	120	38	DSW-RH030F1-01502
1/2" (.496" ±.002)	3"	150	240	38	DSW-RH030F1-01505
1/2" (.496" ±.002)	3"	200	120	51	DSW-RH030F1-02002
1/2" (.496" ±.002)	3"	200	240	51	DSW-RH030F1-02005
1/2" (.496" ±.002)	3"	250	120	64	DSW-RH030F1-02502
1/2" (.496" ±.002)	3"	250	240	64	DSW-RH030F1-02505
1/2" (.496" ±.002)	3"	300	120	76	DSW-RH030F1-03002
1/2" (.496" ±.002)	3"	300	240	76	DSW-RH030F1-03005
1/2" (.496" ±.002)	3"	400	120	102	DSW-RH030F1-04002
1/2" (.496" ±.002)	3"	400	240	102	DSW-RH030F1-04005
1/2" (.496" ±.002)	3"	500	120	127	DSW-RH030F1-05002
1/2" (.496" ±.002)	3"	500	240	127	DSW-RH030F1-05005
1/2" (.496" ±.002)	3"	600	120	153	DSW-RH030F1-06002
1/2" (.496" ±.002)	3"	600	240	153	DSW-RH030F1-06005
1/2" (.496" ±.002)	3"	750	120	192	DSW-RH030F1-07502
1/2" (.496" ±.002)	3"	750	240	192	DSW-RH030F1-07505
1/2" (.496" ±.002)	3½"	250	120	53	DSW-RH03HF1-02502
1/2" (.496" ±.002)	3½"	250	240	53	DSW-RH03HF1-02505
1/2" (.496" ±.002)	3½"	350	240	75	DSW-RH03HF1-03505
1/2" (.496" ±.002)	3½"	420	240	97	DSW-RH03HF1-04205
1/2" (.496" ±.002)	3½"	500	120	106	DSW-RH03HF1-05002
1/2" (.496" ±.002)	3½"	500	240	106	DSW-RH03HF1-05005
1/2" (.496" ±.002)	3¾"	250	120	49	DSW-RH03MF1-02502
1/2" (.496" ±.002)	3¾"	500	120	98	DSW-RH03MF1-05002
1/2" (.496" ±.002)	3¾"	500	240	98	DSW-RH03MF1-05005
1/2" (.496" ±.002)	3¾"	1000	240	197	DSW-RH03MF1-10005
1/2" (.496" ±.002)	4"	150	120	27	DSW-RH040F1-01502
1/2" (.496" ±.002)	4"	150	240	27	DSW-RH040F1-01505
1/2" (.496" ±.002)	4"	250	120	45	DSW-RH040F1-02502
1/2" (.496" ±.002)	4"	250	240	45	DSW-RH040F1-02505
1/2" (.496" ±.002)	4"	300	120	56	DSW-RH040F1-03002
1/2" (.496" ±.002)	4"	300	240	56	DSW-RH040F1-03005
1/2" (.496" ±.002)	4"	400	120	73	DSW-RH040F1-04002



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1/2" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
1/2" (.496" ±.002)	4"	400	240	73	DSW-RH040F1-04005
1/2" (.496" ±.002)	4"	490	240	90	DSW-RH040F1-04905
1/2" (.496" ±.002)	4"	500	120	91	DSW-RH040F1-05002
1/2" (.496" ±.002)	4"	500	240	91	DSW-RH040F1-05005
1/2" (.496" ±.002)	4"	750	240	137	DSW-RH040F1-07505
1/2" (.496" ±.002)	4"	1000	240	184	DSW-RH040F1-10005
1/2" (.496" ±.002)	4½"	300	240	48	DSW-RH04HF1-03005
1/2" (.496" ±.002)	4½"	350	120	56	DSW-RH04HF1-03502
1/2" (.496" ±.002)	4½"	500	240	80	DSW-RH04HF1-05005
1/2" (.496" ±.002)	4½"	750	240	119	DSW-RH04HF1-07505
1/2" (.496" ±.002)	4¾"	200	240	30	DSW-RH04MF1-02005
1/2" (.496" ±.002)	4¾"	300	240	44	DSW-RH04MF1-03005
1/2" (.496" ±.002)	4¾"	500	240	75	DSW-RH04MF1-05005
1/2" (.496" ±.002)	4¾"	1000	240	148	DSW-RH04MF1-10005
1/2" (.496" ±.002)	5"	200	120	28	DSW-RH050F1-02002
1/2" (.496" ±.002)	5"	200	240	28	DSW-RH050F1-02005
1/2" (.496" ±.002)	5"	300	240	42	DSW-RH050F1-03005
1/2" (.496" ±.002)	5"	350	120	50	DSW-RH050F1-03502
1/2" (.496" ±.002)	5"	350	240	50	DSW-RH050F1-03505
1/2" (.496" ±.002)	5"	400	120	57	DSW-RH050F1-04002
1/2" (.496" ±.002)	5"	400	240	57	DSW-RH050F1-04005
1/2" (.496" ±.002)	5"	500	240	71	DSW-RH050F1-05005
1/2" (.496" ±.002)	5"	625	240	99	DSW-RH050F1-06255
1/2" (.496" ±.002)	5"	750	240	107	DSW-RH050F1-07505
1/2" (.496" ±.002)	5"	800	240	113	DSW-RH050F1-08005
1/2" (.496" ±.002)	5"	1000	240	142	DSW-RH050F1-10005
1/2" (.496" ±.002)	5¼"	250	120	33	DSW-RH05DF1-02502
1/2" (.496" ±.002)	5¼"	250	240	33	DSW-RH05DF1-02505
1/2" (.496" ±.002)	5½"	500	120	65	DSW-RH05HF1-05002
1/2" (.496" ±.002)	5½"	500	240	65	DSW-RH05HF1-05005
1/2" (.496" ±.002)	5½"	700	240	89	DSW-RH05HF1-07005
1/2" (.496" ±.002)	5½"	750	240	96	DSW-RH05HF1-07505
1/2" (.496" ±.002)	5¾"	350	240	42	DSW-RH05MF1-03505
1/2" (.496" ±.002)	5¾"	500	120	61	DSW-RH05MF1-05002
1/2" (.496" ±.002)	5¾"	500	240	61	DSW-RH05MF1-05005
1/2" (.496" ±.002)	5¾"	1000	240	122	DSW-RH05MF1-10005
1/2" (.496" ±.002)	6"	200	120	23	DSW-RH060F1-02002
1/2" (.496" ±.002)	6"	300	120	35	DSW-RH060F1-03002
1/2" (.496" ±.002)	6"	300	240	35	DSW-RH060F1-03005
1/2" (.496" ±.002)	6"	350	240	40	DSW-RH060F1-03505
1/2" (.496" ±.002)	6"	500	120	58	DSW-RH060F1-05002
1/2" (.496" ±.002)	6"	500	240	58	DSW-RH060F1-05005



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1/2" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
1/2" (.496" ±.002)	6"	700	240	82	DSW-RH060F1-07005
1/2" (.496" ±.002)	6"	750	240	88	DSW-RH060F1-07505
1/2" (.496" ±.002)	6"	775	240	99	DSW-RH060F1-07755
1/2" (.496" ±.002)	6"	1000	120	116	DSW-RH060F1-10002
1/2" (.496" ±.002)	6"	1000	240	116	DSW-RH060F1-10005
1/2" (.496" ±.002)	6"	1200	240	140	DSW-RH060F1-12005
1/2" (.496" ±.002)	6½"	500	240	55	DSW-RH06HF1-05005
1/2" (.496" ±.002)	6½"	1000	240	108	DSW-RH06HF1-10005
1/2" (.496" ±.002)	6¾"	500	120	51	DSW-RH06MF1-05002
1/2" (.496" ±.002)	6¾"	500	240	51	DSW-RH06MF1-05005
1/2" (.496" ±.002)	7"	350	240	34	DSW-RH070F1-03505
1/2" (.496" ±.002)	7"	500	120	49	DSW-RH070F1-05002
1/2" (.496" ±.002)	7"	500	240	49	DSW-RH070F1-05005
1/2" (.496" ±.002)	7"	600	240	59	DSW-RH070F1-06005
1/2" (.496" ±.002)	7"	900	240	95	DSW-RH070F1-09005
1/2" (.496" ±.002)	7"	1000	240	98	DSW-RH070F1-10005
1/2" (.496" ±.002)	7½"	500	240	46	DSW-RH07HF1-05005
1/2" (.496" ±.002)	7½"	1000	240	91	DSW-RH07HF1-10005
1/2" (.496" ±.002)	7¾"	1000	240	88	DSW-RH07MF1-10005
1/2" (.496" ±.002)	7¾"	1200	240	106	DSW-RH07MF1-12005
1/2" (.496" ±.002)	7¾"	1500	240	132	DSW-RH07MF1-15005
1/2" (.496" ±.002)	8"	300	120	25	DSW-RH080F1-03002
1/2" (.496" ±.002)	8"	300	240	25	DSW-RH080F1-03005
1/2" (.496" ±.002)	8"	400	120	34	DSW-RH080F1-04002
1/2" (.496" ±.002)	8"	400	240	34	DSW-RH080F1-04005
1/2" (.496" ±.002)	8"	500	120	42	DSW-RH080F1-05002
1/2" (.496" ±.002)	8"	500	240	42	DSW-RH080F1-05005
1/2" (.496" ±.002)	8"	600	240	51	DSW-RH080F1-06005
1/2" (.496" ±.002)	8"	800	240	68	DSW-RH080F1-08005
1/2" (.496" ±.002)	8"	1000	240	85	DSW-RH080F1-10005
1/2" (.496" ±.002)	8"	1050	240	93	DSW-RH080F1-10505
1/2" (.496" ±.002)	8"	1500	240	130	DSW-RH080F1-15005
1/2" (.496" ±.002)	8"	2000	240	171	DSW-RH080F1-20005
1/2" (.496" ±.002)	8½"	300	240	23	DSW-RH08HF1-03005
1/2" (.496" ±.002)	8½"	500	240	40	DSW-RH08HF1-05005
1/2" (.496" ±.002)	8½"	1000	240	85	DSW-RH08HF1-10005
1/2" (.496" ±.002)	8½"	1100	240	93	DSW-RH08HF1-11005
1/2" (.496" ±.002)	8¾"	1000	240	77	DSW-RH08MF1-10005
1/2" (.496" ±.002)	9"	500	240	37	DSW-RH090F1-05005
1/2" (.496" ±.002)	9"	900	240	70	DSW-RH090F1-09005
1/2" (.496" ±.002)	9"	1000	240	75	DSW-RH090F1-10005
1/2" (.496" ±.002)	9"	1200	240	98	DSW-RH090F1-12005



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Magnum™ Cartridge Heaters

1/2" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
1/2" (.496" ±.002)	9½"	500	240	35	DSW-RH09HF1-05005
1/2" (.496" ±.002)	9½"	1000	240	71	DSW-RH09HF1-10005
1/2" (.496" ±.002)	10"	500	120	34	DSW-RH100F1-05002
1/2" (.496" ±.002)	10"	500	240	34	DSW-RH100F1-05005
1/2" (.496" ±.002)	10"	600	240	40	DSW-RH100F1-06005
1/2" (.496" ±.002)	10"	750	240	50	DSW-RH100F1-07505
1/2" (.496" ±.002)	10"	1000	240	67	DSW-RH100F1-10005
1/2" (.496" ±.002)	10"	1500	240	101	DSW-RH100F1-15005
1/2" (.496" ±.002)	10"	2000	240	134	DSW-RH100F1-20005
1/2" (.496" ±.002)	10½"	1400	240	94	DSW-RH10HF1-14005
1/2" (.496" ±.002)	11"	1000	240	61	DSW-RH110F1-10005
1/2" (.496" ±.002)	11"	1470	240	88	DSW-RH110F1-14705
1/2" (.496" ±.002)	11"	1500	240	91	DSW-RH110F1-15005
1/2" (.496" ±.002)	11½"	1525	240	94	DSW-RH11HF1-15255
1/2" (.496" ±.002)	12"	500	240	28	DSW-RH120F1-05005
1/2" (.496" ±.002)	12"	1000	240	55	DSW-RH120F1-10005
1/2" (.496" ±.002)	12"	1500	240	83	DSW-RH120F1-15005
1/2" (.496" ±.002)	12"	2000	240	111	DSW-RH120F1-20005
1/2" (.496" ±.002)	12½"	1675	240	92	DSW-RH12HF1-16755
1/2" (.496" ±.002)	14"	1000	240	47	DSW-RH140F1-10005
1/2" (.496" ±.002)	14"	1700	240	83	DSW-RH140F1-17005
1/2" (.496" ±.002)	14"	2300	240	108	DSW-RH140F1-23005
1/2" (.496" ±.002)	15"	2000	240	88	DSW-RH150F1-20005
1/2" (.496" ±.002)	16"	900	240	37	DSW-RH160F1-09005
1/2" (.496" ±.002)	16½"	2200	240	90	DSW-RH16HF1-22005
1/2" (.496" ±.002)	18"	1700	240	62	DSW-RH180F1-17005
1/2" (.496" ±.002)	19½"	2875	240	99	DSW-RH19HF1-28755

Magnum™ Cartridge Heaters

5/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
5/8" (.621" ±.002")	1½"	250	120	126	DSW-RK01HF1-02502
5/8" (.621" ±.002")	1½"	250	240	126	DSW-RK01HF1-02505
5/8" (.621" ±.002")	2"	200	120	68	DSW-RK020F1-02002
5/8" (.621" ±.002")	2"	200	240	68	DSW-RK020F1-02005
5/8" (.621" ±.002")	2⅝"	280	120	81	DSW-RK02FF1-02802
5/8" (.621" ±.002")	2⅝"	280	240	81	DSW-RK02FF1-02805
5/8" (.621" ±.002")	2⅝"	350	120	102	DSW-RK02FF1-03502
5/8" (.621" ±.002")	2½"	150	120	41	DSW-RK02HF1-01502
5/8" (.621" ±.002")	2½"	180	120	49	DSW-RK02HF1-01802
5/8" (.621" ±.002")	2½"	200	120	54	DSW-RK02HF1-02002
5/8" (.621" ±.002")	3"	150	120	30	DSW-RK030F1-01502



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Magnum™ Cartridge Heaters					
5/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
5/8" (.621" ±.002")	3"	250	120	51	DSW-RK030F1-02502
5/8" (.621" ±.002")	3"	250	240	51	DSW-RK030F1-02505
5/8" (.621" ±.002")	3"	500	120	107	DSW-RK030F1-05002
5/8" (.621" ±.002")	3"	500	240	107	DSW-RK030F1-05005
5/8" (.621" ±.002")	3"	750	240	154	DSW-RK030F1-07505
5/8" (.621" ±.002")	3½"	525	240	93	DSW-RK03HF1-05255
5/8" (.621" ±.002")	3¾"	240	120	39	DSW-RK03MF1-02402
5/8" (.621" ±.002")	3¾"	240	240	39	DSW-RK03MF1-02405
5/8" (.621" ±.002")	3¾"	525	120	86	DSW-RK03MF1-05252
5/8" (.621" ±.002")	3¾"	525	240	86	DSW-RK03MF1-05255
5/8" (.621" ±.002")	3¾"	750	240	118	DSW-RK03MF1-07505
5/8" (.621" ±.002")	4"	250	120	38	DSW-RK040F1-02502
5/8" (.621" ±.002")	4"	250	240	38	DSW-RK040F1-02505
5/8" (.621" ±.002")	4"	400	240	58	DSW-RK040F1-04005
5/8" (.621" ±.002")	4"	500	240	73	DSW-RK040F1-05005
5/8" (.621" ±.002")	4"	525	240	79	DSW-RK040F1-05255
5/8" (.621" ±.002")	4"	600	240	88	DSW-RK040F1-06005
5/8" (.621" ±.002")	4"	750	240	113	DSW-RK040F1-07505
5/8" (.621" ±.002")	4"	1000	240	151	DSW-RK040F1-10005
5/8" (.621" ±.002")	4½"	700	120	92	DSW-RK04HF1-07002
5/8" (.621" ±.002")	4½"	700	240	92	DSW-RK04HF1-07005
5/8" (.621" ±.002")	4¾"	250	240	30	DSW-RK04MF1-02505
5/8" (.621" ±.002")	4¾"	750	240	90	DSW-RK04MF1-07505
5/8" (.621" ±.002")	5"	250	240	27	DSW-RK050F1-02505
5/8" (.621" ±.002")	5"	300	240	35	DSW-RK050F1-03005
5/8" (.621" ±.002")	5"	500	240	56	DSW-RK050F1-05005
5/8" (.621" ±.002")	5"	750	240	86	DSW-RK050F1-07505
5/8" (.621" ±.002")	5"	1000	240	112	DSW-RK050F1-10005
5/8" (.621" ±.002")	5⅝"	800	120	86	DSW-RK05FF1-08002
5/8" (.621" ±.002")	5⅝"	800	240	86	DSW-RK05FF1-08005
5/8" (.621" ±.002")	5¾"	500	240	48	DSW-RK05MF1-05005
5/8" (.621" ±.002")	5¾"	1000	240	97	DSW-RK05MF1-10005
5/8" (.621" ±.002")	5¾"	1500	240	146	DSW-RK05MF1-15005
5/8" (.621" ±.002")	6"	300	240	28	DSW-RK060F1-03005
5/8" (.621" ±.002")	6"	375	240	36	DSW-RK060F1-03755
5/8" (.621" ±.002")	6"	500	240	47	DSW-RK060F1-05005
5/8" (.621" ±.002")	6"	600	240	57	DSW-RK060F1-06005
5/8" (.621" ±.002")	6"	750	240	71	DSW-RK060F1-07505
5/8" (.621" ±.002")	6"	1000	240	95	DSW-RK060F1-10005
5/8" (.621" ±.002")	6"	1500	240	139	DSW-RK060F1-15005
5/8" (.621" ±.002")	6½"	350	120	30	DSW-RK06HF1-03502
5/8" (.621" ±.002")	6½"	350	240	30	DSW-RK06HF1-03505



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Magnum™ Cartridge Heaters					
5/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
5/8" (.621" ±.002")	6½"	500	240	43	DSW-RK06HF1-05005
5/8" (.621" ±.002")	6½"	600	240	52	DSW-RK06HF1-06005
5/8" (.621" ±.002")	6½"	900	240	78	DSW-RK06HF1-09005
5/8" (.621" ±.002")	6¾"	500	240	40	DSW-RK06MF1-05005
5/8" (.621" ±.002")	6¾"	1000	240	81	DSW-RK06MF1-10005
5/8" (.621" ±.002")	7"	1000	240	85	DSW-RK070F1-10005
5/8" (.621" ±.002")	7"	1500	240	117	DSW-RK070F1-15005
5/8" (.621" ±.002")	7¾"	400	240	28	DSW-RK07MF1-04005
5/8" (.621" ±.002")	7¾"	500	240	35	DSW-RK07MF1-05005
5/8" (.621" ±.002")	7¾"	1000	240	70	DSW-RK07MF1-10005
5/8" (.621" ±.002")	7¾"	1500	240	105	DSW-RK07MF1-15005
5/8" (.621" ±.002")	8"	500	240	35	DSW-RK080F1-05005
5/8" (.621" ±.002")	8"	850	240	62	DSW-RK080F1-08505
5/8" (.621" ±.002")	8"	1000	240	69	DSW-RK080F1-10005
5/8" (.621" ±.002")	8"	1200	240	83	DSW-RK080F1-12005
5/8" (.621" ±.002")	8"	1500	240	102	DSW-RK080F1-15005
5/8" (.621" ±.002")	8¾"	1700	240	105	DSW-RK08MF1-17005
5/8" (.621" ±.002")	9"	550	240	33	DSW-RK090F1-05505
5/8" (.621" ±.002")	9"	1000	240	64	DSW-RK090F1-10005
5/8" (.621" ±.002")	9"	1700	240	103	DSW-RK090F1-17005
5/8" (.621" ±.002")	10"	500	240	27	DSW-RK100F1-05005
5/8" (.621" ±.002")	10"	600	240	33	DSW-RK100F1-06005
5/8" (.621" ±.002")	10"	650	120	35	DSW-RK100F1-06502
5/8" (.621" ±.002")	10"	750	240	40	DSW-RK100F1-07505
5/8" (.621" ±.002")	10"	1000	240	54	DSW-RK100F1-10005
5/8" (.621" ±.002")	10"	1500	240	81	DSW-RK100F1-15005
5/8" (.621" ±.002")	10"	2000	240	108	DSW-RK100F1-20005
5/8" (.621" ±.002")	11"	1000	240	51	DSW-RK110F1-10005
5/8" (.621" ±.002")	11"	1500	240	74	DSW-RK110F1-15005
5/8" (.621" ±.002")	12"	500	240	22	DSW-RK120F1-05005
5/8" (.621" ±.002")	12"	775	240	35	DSW-RK120F1-07755
5/8" (.621" ±.002")	12"	1000	240	46	DSW-RK120F1-10005
5/8" (.621" ±.002")	12"	1500	240	67	DSW-RK120F1-15005
5/8" (.621" ±.002")	12"	2000	240	89	DSW-RK120F1-20005
5/8" (.621" ±.002")	13"	850	240	35	DSW-RK130F1-08505
5/8" (.621" ±.002")	13"	1500	240	59	DSW-RK130F1-15005
5/8" (.621" ±.002")	14"	900	240	34	DSW-RK140F1-09005
5/8" (.621" ±.002")	14"	1500	240	59	DSW-RK140F1-15005
5/8" (.621" ±.002")	14"	3700	240	138	DSW-RK140F1-37005
5/8" (.621" ±.002")	15"	600	240	21	DSW-RK150F1-06005
5/8" (.621" ±.002")	15"	975	240	35	DSW-RK150F1-09755
5/8" (.621" ±.002")	15"	2400	240	85	DSW-RK150F1-24005



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5/8" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
5/8" (.621" ±.002")	15"	4000	240	140	DSW-RK150F1-40005
5/8" (.621" ±.002")	16"	1050	240	35	DSW-RK160F1-10505
5/8" (.621" ±.002")	16"	4500	240	145	DSW-RK160F1-45005
5/8" (.621" ±.002")	17"	1000	240	32	DSW-RK170F1-10005
5/8" (.621" ±.002")	18"	1500	240	43	DSW-RK180F1-15005
5/8" (.621" ±.002")	18"	2000	240	60	DSW-RK180F1-20005
5/8" (.621" ±.002")	18"	4700	240	135	DSW-RK180F1-47005
5/8" (.621" ±.002")	20"	1000	240	27	DSW-RK200F1-10005
5/8" (.621" ±.002")	20"	2500	240	66	DSW-RK200F1-25005
5/8" (.621" ±.002")	20"	4700	240	122	DSW-RK200F1-47005
5/8" (.621" ±.002")	22"	1000	240	25	DSW-RK220F1-10005

Magnum™ Cartridge Heaters

3/4" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/4" (.746" ±.002)	3"	500	240	85	DSW-RM030F1-05005
3/4" (.746" ±.002)	3¾"	500	240	65	DSW-RM03MF1-05005
3/4" (.746" ±.002)	3¾"	1000	240	131	DSW-RM03MF1-10005
3/4" (.746" ±.002)	4"	300	240	38	DSW-RM040F1-03005
3/4" (.746" ±.002)	4"	525	240	66	DSW-RM040F1-05255
3/4" (.746" ±.002)	4"	1000	240	122	DSW-RM040F1-10005
3/4" (.746" ±.002)	4½"	350	120	42	DSW-RM04HF1-03502
3/4" (.746" ±.002)	4¾"	750	240	75	DSW-RM04MF1-07505
3/4" (.746" ±.002)	5"	500	240	49	DSW-RM050F1-05005
3/4" (.746" ±.002)	5"	700	240	68	DSW-RM050F1-07005
3/4" (.746" ±.002)	5"	1000	240	95	DSW-RM050F1-10005
3/4" (.746" ±.002)	5¾"	1000	240	81	DSW-RM05MF1-10005
3/4" (.746" ±.002)	5¾"	1100	240	89	DSW-RM05MF1-11005
3/4" (.746" ±.002)	6"	350	120	28	DSW-RM060F1-03502
3/4" (.746" ±.002)	6"	350	240	28	DSW-RM060F1-03505
3/4" (.746" ±.002)	6"	500	240	39	DSW-RM060F1-05005
3/4" (.746" ±.002)	6"	700	240	55	DSW-RM060F1-07005
3/4" (.746" ±.002)	6"	750	240	59	DSW-RM060F1-07505
3/4" (.746" ±.002)	6"	1100	240	87	DSW-RM060F1-11005
3/4" (.746" ±.002)	6"	1500	240	115	DSW-RM060F1-15005
3/4" (.746" ±.002)	7"	500	240	33	DSW-RM070F1-05005
3/4" (.746" ±.002)	7"	750	240	49	DSW-RM070F1-07505
3/4" (.746" ±.002)	7"	1000	240	65	DSW-RM070F1-10005
3/4" (.746" ±.002)	7"	1250	240	82	DSW-RM070F1-12505
3/4" (.746" ±.002)	7½"	450	120	32	DSW-RM07HF1-04502
3/4" (.746" ±.002)	7¾"	1350	240	79	DSW-RM07MF1-13505



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Magnum™ Cartridge Heaters					
3/4" Stainless steel, Swaged-In Flexible Leads					
Dia.	Length	Watts	Volts	Watts/Sq. In.	Part Number
3/4" (.746" ±.002)	8"	350	240	20	DSW-RM080F1-03505
3/4" (.746" ±.002)	8"	500	240	28	DSW-RM080F1-05005
3/4" (.746" ±.002)	8"	600	240	36	DSW-RM080F1-06005
3/4" (.746" ±.002)	8"	700	240	40	DSW-RM080F1-07005
3/4" (.746" ±.002)	8"	850	240	48	DSW-RM080F1-08505
3/4" (.746" ±.002)	8"	1000	240	68	DSW-RM080F1-10005
3/4" (.746" ±.002)	8"	1350	240	78	DSW-RM080F1-13505
3/4" (.746" ±.002)	8"	1445	240	84	DSW-RM080F1-14455
3/4" (.746" ±.002)	8"	2000	240	115	DSW-RM080F1-20005
3/4" (.746" ±.002)	9"	1500	240	75	DSW-RM090F1-15005
3/4" (.746" ±.002)	9"	2000	240	101	DSW-RM090F1-20005
3/4" (.746" ±.002)	9¾"	2000	240	92	DSW-RM09MF1-20005
3/4" (.746" ±.002)	10"	600	240	27	DSW-RM100F1-06005
3/4" (.746" ±.002)	10"	800	240	36	DSW-RM100F1-08005
3/4" (.746" ±.002)	10"	1000	240	46	DSW-RM100F1-10005
3/4" (.746" ±.002)	10"	1200	240	54	DSW-RM100F1-12005
3/4" (.746" ±.002)	10"	2000	240	90	DSW-RM100F1-20005
3/4" (.746" ±.002)	11 ¾"	1000	240	37	DSW-RM11MF1-10005
3/4" (.746" ±.002)	11 ¾"	1500	240	56	DSW-RM11MF1-15005
3/4" (.746" ±.002)	11 ¾"	2000	240	75	DSW-RM11MF1-20005
3/4" (.746" ±.002)	12"	600	240	22	DSW-RM120F1-06005
3/4" (.746" ±.002)	12"	800	240	30	DSW-RM120F1-08005
3/4" (.746" ±.002)	12"	1000	240	38	DSW-RM120F1-10005
3/4" (.746" ±.002)	12"	1500	240	56	DSW-RM120F1-15005
3/4" (.746" ±.002)	12"	2000	240	75	DSW-RM120F1-20005
3/4" (.746" ±.002)	13"	1000	240	34	DSW-RM130F1-10005
3/4" (.746" ±.002)	14"	1100	240	35	DSW-RM140F1-11005
3/4" (.746" ±.002)	14"	1400	240	45	DSW-RM140F1-14005
3/4" (.746" ±.002)	14"	2000	240	63	DSW-RM140F1-20005
3/4" (.746" ±.002)	14"	2500	240	78	DSW-RM140F1-25005
3/4" (.746" ±.002)	14 ¾"	1500	240	44	DSW-RM14MF1-15005
3/4" (.746" ±.002)	16"	1000	240	28	DSW-RM160F1-10005
3/4" (.746" ±.002)	16"	1250	240	35	DSW-RM160F1-12505
3/4" (.746" ±.002)	16"	1500	240	44	DSW-RM160F1-15005
3/4" (.746" ±.002)	16"	1800	240	49	DSW-RM160F1-18005
3/4" (.746" ±.002)	18"	1450	240	35	DSW-RM180F1-14505
3/4" (.746" ±.002)	18"	2000	240	49	DSW-RM180F1-20005
3/4" (.746" ±.002)	20"	2200	240	48	DSW-RM200F1-22005
3/4" (.746" ±.002)	24"	1950	240	35	DSW-RM240F1-19505
3/4" (.746" ±.002)	24"	2750	240	50	DSW-RM240F1-27505

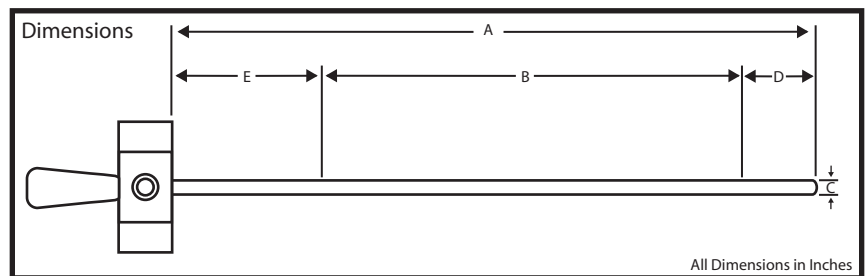
For sizes or material not listed here please inquire directly to Durex Industries



MAGNUM™ CARTRIDGE HEATERS

BOLT HEATERS

Bolt Heaters are used to tighten large bolts that secure heavy machinery and equipment. The shaft of the heater is inserted into the hollow bolt and energized to expand it, which allows further tightening of the nut. This heater design is manufactured with specific diameter sheaths to fit industry standard hollow bolts. High watt densities with special heated lengths distribute heat evenly to the surrounding bolt.



ORDERING INFORMATION

Insert Length A	Heated Length B	Diameter C	Cold End D	Cold End E	Max. Bolt Heater Hole Dia.
18	12	0.533	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.616
24	18	0.533	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.616
30	24	0.533	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.616
36	30	0.533	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.616
18	12	0.660	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.735
24	18	0.660	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.735
30	24	0.660	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.735
36	30	0.660	1 $\frac{1}{8}$ "	6 $\frac{7}{8}$ "	0.735
18	12	0.730	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.860
24	18	0.730	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.860
36	30	0.730	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.860
48	42	0.730	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.860
60	54	0.730	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.860
24	18	0.855	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.985
30	24	0.855	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.985
42	36	0.855	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.985
48	42	0.855	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	0.985
42	36	0.980	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	1.110
54	48	0.980	1 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "	1.110

PRACTICAL APPLICATIONS

- Cylinders
- Die Blocks
- Turbines
- Engine Heads
- Large Compressors
- Presses
- Pressure Vessels



DUREX INDUSTRIES



BAND HEATERS

Durex provides a complete line of mica and ceramic band heaters used extensively for injection molding and extrusion applications. Operating at temperatures up to 1200°F, these heaters are an economical heat source, providing quick thermal response with maximum flexibility of design



parameters. Mica band heaters are available with strap lock-up, flange lock-up, or wedge lock-up clamping styles. Ceramic band heaters are available with built-in brackets, latch and trunion lock-up, or flange lock-up clamping styles.

SPECIAL OPTIONAL FEATURES:

- Two piece construction
- Holes and cutouts
- Dual voltage
- Partial coverage
- Ground stud

TYPICAL APPLICATIONS:

- Plastic Injection Molding
- Plastic, Food, or Candy Extruders
- Food Service Warming
- Blow Molding Machines
- Holding Tanks
- Drum Heating

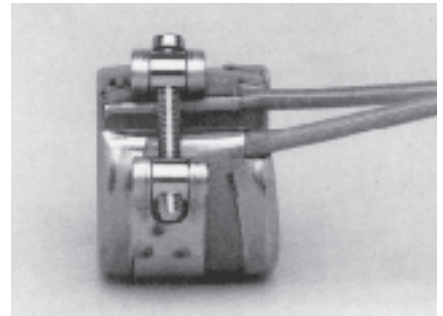


BAND HEATERS

MICA BAND HEATERS

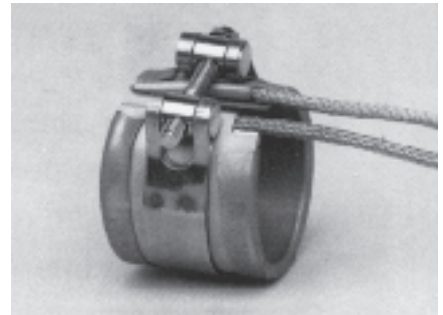
Type A

Lead wires exit the same side of the heater on each side of the gap. This termination is the most common for small diameter heaters.



Type D

Lead wires exit the same side of the heater similar to Type A with the addition of a protective stainless steel overbraid.



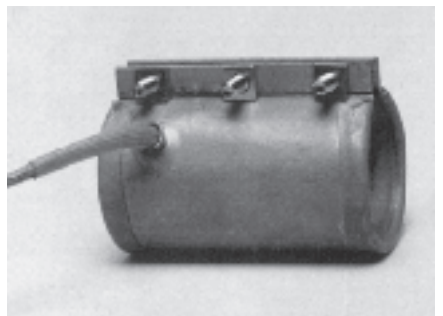
Type G

High temperature European style plug is mounted directly to the outside of the heater body. This design can be constructed with various locations to suit the application.



Type B

Lead wires exit through outside of heater body with protective fiberglass sleeve at lead exit point.



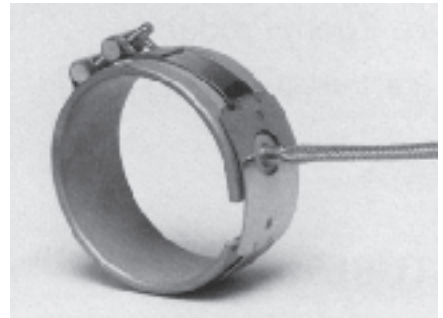


BAND HEATERS

MICA BAND HEATERS

Type E

Lead wires exit through outside of heater body similar to Type B except with addition of a protective stainless steel overbraid.



Type F

Lead wires exit through the outside of the heater body similar to Type B with the addition of a protective stainless steel armor cable.



Type H

Threaded post terminals exit the outside of the heater body at the gap on each side of the heater.



Type J

Threaded post terminals exit the outside of the heater body similar to Type H except both terminals are located on one side of the gap.

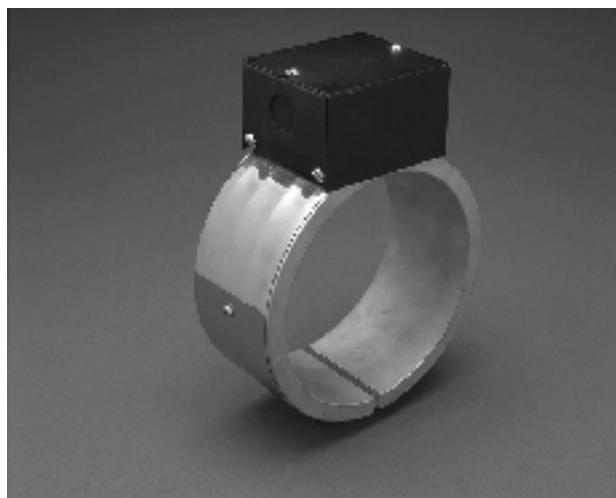


BAND HEATERS

DUROFLEX BAND HEATERS

Duroflex Band Heaters can be custom designed based on the customer's specification. Duroflex heaters feature precision formed aluminum sections for optimum heat transfer, a heavy duty clamping band, and an optional terminal box.

Band widths are available in 1 ½", 3", and 4".



SPECIFICATIONS

Resistance Tolerance: NEMA standard +10%, -5%

Wattage Tolerance: NEMA standard +5%, -10%

Maximum Volts: 277 each half

Maximum Amperage: 30

Maximum Watt Density: 20 watts/sq. inch on sheath

Minimum I.D.: 3 ½"

Maximum I.D.: Consult Factory

Standard Gap When Tightened: ¼" up to 12" I.D.

Gap increases with diameter to compensate for thermal expansion.

TERMINATION OPTIONS

Type T: Threaded Stud Terminals

Type S: Sheet Metal Box (NEMA 1)

Type B: Braided Leads

Type F: Flex Hose Leads

Type X: Special

FEATURES:

- Long, dependable service
- Contamination resistant design
- Uniform surface temperature
- Low expansion clamping mechanism for tight fit
- Excellent heat transfer

TYPICAL APPLICATIONS:

- Plastic Extruder Barrels
- Injection Molding Machines
- Blow Molding Equipment
- Blow Film Dies

BAND HEATERS

DUROFLEX BAND HEATERS

1 1/2" Wide			
Part Number	I.D.	Watts	Volts
DBH-03D01H-6500□S	3 3/4	650	120/240
DBH-03H01H-7000□S	3 1/2	700	120/240
DBH-04001H-7500□S	4	750	120/240
DBH-04D01H-7750□S	4 3/4	775	120/240
DBH-04H01H-8000□S	4 1/2	800	120/240
DBH-04M01H-8500□S	4 3/4	850	120/240
DBH-05001H-9250□S	5	925	120/240
DBH-05D01H-9750□S	5 3/4	975	120/240
DBH-05H01H-1000□S	5 1/2	1000	120/240
DBH-06001H-1100□S	6	1100	120/240
DBH-06D01H-1150□S	6 3/4	1150	120/240
DBH-06H01H-1200□S	6 1/2	1200	120/240
DBH-06M01H-1250□S	6 3/4	1250	120/240
DBH-07001H-1300□S	7	1300	120/240
DBH-07D01H-1350□S	7 3/4	1350	120/240
DBH-07H01H-1400□S	7 1/2	1400	120/240
DBH-07M01H-1450□S	7 3/4	1450	120/240
DBH-08001H-1475□S	8	1475	120/240
DBH-08D01H-1525□S	8 3/4	1525	120/240
DBH-08H01H-1550□S	8 1/2	1550	120/240
DBH-08M01H-1600□S	8 3/4	1600	120/240
DBH-09001H-1675□S	9	1675	120/240
DBH-09D01H-1725□S	9 3/4	1725	120/240
DBH-09H01H-1775□S	9 1/2	1775	120/240
DBH-09M01H-1825□S	9 3/4	1825	120/240
DBH-10001H-1850□S	10	1850	120/240
DBH-10D01H-1900□S	10 3/4	1900	120/240
DBH-10H01H-1950□S	10 1/2	1950	120/240
DBH-10M01H-2000□S	10 3/4	2000	120/240
DBH-11001H-2025□S	11	2025	120/240
DBH-11D01H-2075□S	11 3/4	2075	120/240
DBH-11H01H-2125□S	11 1/2	2125	120/240
DBH-11M01H-2175□S	11 3/4	2175	120/240
DBH-12001H-2225□S	12	2225	120/240
DBH-12D01H-2275□S	12 3/4	2275	120/240
DBH-12H01H-2300□S	12 1/2	2300	120/240
DBH-12M01H-2375□S	12 3/4	2375	120/240
DBH-13001H-2425□S	13	2425	120/240
DBH-13D01H-2475□S	13 3/4	2475	120/240
DBH-13H01H-2500□S	13 1/2	2500	120/240
DBH-13M01H-2550□S	13 3/4	2550	120/240
DBH-14001H-2600□S	14	2600	120/240

3" Wide			
Part Number	I.D.	Watts	Volts
DBH-050030-1400□S	5	1400	120/240
DBH-05D030-1475□S	5 3/4	1475	120/240
DBH-05H030-1550□S	5 1/2	1550	120/240
DBH-05M030-1625□S	5 3/4	1625	120/240
DBH-060030-1700□S	6	1700	120/240
DBH-06D030-1775□S	6 3/4	1775	120/240
DBH-06H030-1825□S	6 1/2	1825	120/240
DBH-06M030-1900□S	6 3/4	1900	120/240
DBH-070030-1975□S	7	1975	120/240
DBH-07D030-2050□S	7 3/4	2050	240/480
DBH-07H030-2125□S	7 1/2	2125	240/480
DBH-07M030-2200□S	7 3/4	2200	240/480
DBH-080030-2275□S	8	2275	240/480
DBH-08D030-2350□S	8 3/4	2350	240/480
DBH-08H030-2400□S	8 1/2	2400	240/480
DBH-08M030-2475□S	8 3/4	2475	240/480
DBH-090030-2550□S	9	2550	240/480
DBH-09D030-2675□S	9 3/4	2675	240/480
DBH-09H030-2675□S	9 1/2	2675	240/480
DBH-09M030-2750□S	9 3/4	2750	240/480
DBH-100030-2825□S	10	2825	240/480
DBH-10D030-2900□S	10 3/4	2900	240/480
DBH-10H030-2975□S	10 1/2	2975	240/480
DBH-10M030-3025□S	10 3/4	3025	240/480
DBH-110030-3100□S	11	3100	240/480
DBH-11D030-3175□S	11 3/4	3175	240/480
DBH-11H030-3250□S	11 1/2	3250	240/480
DBH-11M030-3325□S	11 3/4	3325	240/480
DBH-120030-3400□S	12	3400	240/480
DBH-12D030-3475□S	12 3/4	3475	240/480
DBH-12H030-3525□S	12 1/2	3525	240/480
DBH-12M030-3600□S	12 3/4	3600	240/480
DBH-130030-3675□S	13	3675	240/480
DBH-13D030-3750□S	13 3/4	3750	240/480
DBH-13H030-3800□S	13 1/2	3800	240/480
DBH-13M030-3875□S	13 3/4	3875	240/480
DBH-140030-3950□S	14	3950	240/480

NOTE: □ Insert voltage code from table 3 page 120

NOTE: All sizes listed are "Type S" termination

See Chart on Page 119



BAND HEATERS

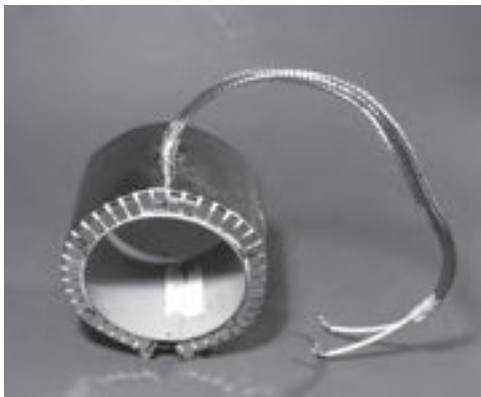
CERAMIC BAND HEATERS

Type Q

Post Terminals are the standard termination on typical ceramic band heater designs. Supplied with high temperature washers and nuts for lead wire attachments.



Type S



Leads exit through outside sheath of the heater with strain relief. This termination style is also available with protective stainless steel overbraid or stainless steel armor cable.

Type U

Terminal Box is mounted directly to the outside sheath of the heater. Lead wire extensions with stainless steel braid or armor cable can be an optional attachment.





BAND HEATERS

ORDERING INFORMATION

D	B	H	-	0	8	M	0	4	0	-	1	0	0	0	5	D
Duroflex Band Heater			Inner Diameter of Heater (Full Inch) 8.75" Partial Inch Length Use Table #1			Width (Full Inch) 4.0" Partial Inch Length Use Table #1			Wattage Per Sheet Use Table #2 0075 = 75W 0500 = 500W 1250 = 1250W 112L = 11,250W			Voltage Per Half Use Table #3			Termination T = Threaded Stud S = Sheet Metal Box B = Braided Leads F = Flex Hose Leads X = Special	

C	B	H	-	0	8	M	0	4	0	-	1	0	0	0	5	D	
Ceramic Band Heater			Inner Diameter of Heater (Full Inch) 8.75" Partial Inch Length Use Table #1			Width (Full Inch) 4.0" Partial Inch Length Use Table #1			Wattage Per Sheet Use Table #2 0075 = 75W 0500 = 500W 1250 = 1250W 112L = 11,250W			Voltage Per Half Use Table #3			Termination S = Post Terminals L = Outside Sheath with Strain Relief (Optional Overbraid or Armor) B = Terminal Box		

M	B	H	-	0	8	M	0	4	0	-	1	0	0	0	5	D		
Mica Band Heater			Inner Diameter of Heater (Full Inch) 8.75" Partial Inch Length Use Table #1			Width (Full Inch) 4.0" Partial Inch Length Use Table #1			Wattage Per Sheet Use Table #2 0075 = 75W 0500 = 500W 1250 = 1250W 112L = 11,250W			Voltage Per Half Use Table #3					Termination A = Leads Exit Side D = Overbraid Leads Exit Side G = European Plug B = Leads Exit Outside Body E = Overbraid Exit Outside Body F = Armor Cable Exit Outside Body H = Post Terminals Opposite Sides J = Post Terminals Same Side	

See Tables on Page 120

See Tables on Page 120



BAND HEATERS

ORDERING INFORMATION

Table #1			
Frac.	=	Deci.	= Code
0	=	0	= 0
1/16"	=	.062"	= A
1/8"	=	.125"	= B
3/16"	=	.188"	= C
1/4"	=	.250"	= D
5/16"	=	.312"	= E
3/8"	=	.375"	= F
7/16"	=	.438"	= G
1/2"	=	.500"	= H
9/16"	=	.562"	= J
5/8"	=	.625"	= K
11/16"	=	.688"	= L
3/4"	=	.750"	= M
13/16"	=	.812"	= N
7/8"	=	.875"	= P
15/16"	=	.938"	= R
1"	=	1.000"	= S

Table #2 Wattage Codes

C = 00

A = 25

L = 50

B = 75

K = 000

E = 250

D = 500

F = 750

Table #3 Voltage Codes

< - 100 = 1

101 - 130 = 2

131 - 199 = 3

200-219 = 4

220 - 250 = 5

251 - 300 = 6

301 - 420 = 7

421 - 500 = 8

500 - > = 9

Dual Rating = X

CERAMIC / QUARTZ ELECTRIC HEATERS

Ceramic Heaters

Durex Industries offers a line of ceramic long wave infrared heaters, in wattages up to 1400W and all popular international voltages. The high emissivity of these heaters ensures optimum radiant efficiency in a wide range of applications, including plastics, coatings, thermoforming, drying, foodservice, packaging, and OEM oven construction.



Flat, trough, hollow and bulb styles are available in standard configurations with cast-in iron-chrome aluminum resistance wire heating elements. The glazed ceramic surface protects the coil from corrosion and chemical contamination. These heaters provide a temperature range from 300°C – 730°C (572°F – 1346°F), producing an IR wavelength from 2-10 microns.

Aluminized steel reflectors can be supplied with these ceramic heaters to direct more heat to the target area. Heat-sensitive color heaters are offered, which change color when maximum temperatures are achieved. Built-in Type K or J thermocouples for ceramic elements are also available.

Quartz Heaters

Durex offers medium wave infrared resistance wire helix elements inside quartz tubes for applications where rapid response time is required for heating and cooling. Polished parabolic radiant aluminum reflectors maximize the efficiency of these heaters. Coating curing, ink drying, plastic film processing, adhesive activation, laminating, rubber vulcanizing, sterilizing, photocopying, image setting and myriad other uses benefit from this energy-efficient and clean hot source.



Durex quartz heaters feature element temperature ranges to 1700F (930C) and infrared radiation with a peak energy wavelength of 2.5 microns. ½" or " (12.7mm or 15.8mm) diameter tubes are offered in various lengths to 60" (1.52 m). Tube watt densities to 45W/in² (6.2W/cm²). Full operating temperature is achieved in 60 seconds or less, depending on size. Capable of cooling to 50% of output in 15 seconds or less. Designed for horizontal use only.

Various mounting and row configurations are available. Thermocouple bracket and Type K thermocouple on ceramic end caps are optional. Quartz tubes are also available without reflector housings. Quartz/Tungsten and Quartz/Halogen elements are offered, as well as "Fast IR" instant on/off modular units.

CERAMIC / QUARTZ ELECTRIC HEATERS

CERAMIC HEATERS

All styles shown are available in white, yellow, coral and black. Color does not effect heat output. Yellow changes to orange, when heated; coral changes to grey. White and black do not change. 6" ceramic bead insulated leads are standard, other lengths are available.

WP-FFE	Full flat element 150W-1000W	9.65" x 2.36" (245mm x 60mm)
WP-FFEh	Full flat element hollow 150W-800W	9.65" x 2.36" (245mm x 60mm)
WP-FTE	Full trough element 150W-1000W	9.65" x 2.36" (245mm x 60mm)
WP-FTElN	Full trough element longneck 150W-1000W	9.65" x 2.36" (245mm x 60mm)
WP-FTES	Full trough element slim 150W-650W	9.65" x 1.57" (245mm x 40mm)
WP-HFE	Half flat element 125W-500W	4.80" x 2.36" (122mm x 60mm)
WP-HFEh	Half flat element hollow 300W-1400W	4.80" x 2.36" (122mm x 60mm)
WP-HTE	Half trough element 125W-500W	4.80" x 2.36" (122mm x 60mm)
WP-LFFE	Large full flat element 300W-1400W	9.65" x 3.54" (245mm x 90mm)
WP-LFTE	Large full trough element 300W-1400W	9.65" x 3.54" (245mm x 90mm)
WP-QCE	Quarter curved element 150W-1000W	2.36" x 2.36" (60mm x 60mm)
WP-QFE	Quarter flat element 125W-250W	2.36" x 2.36" (60mm x 60mm)
WP-QTE	Quarter trough element 125W-250W	2.36" x 2.36" (60mm x 60mm)
WP-SFEh	Square flat element hollow 125W-250W	1.26" 2.44" x 0.748" (32mm x 62mm x 19mm)
WP-SFSE	Square flat solid element 150W-750W	4.80" x 4.80" (122mm x 122mm)
WP-LCH	Long ceramic heater. Various glazed colors. Reflectors and assemblies available.	18" and 12" (0.457m and 0.304m)
WP-ESE	Ceramic bulbs/Edison base 60W and 100W	3.15" dia. x 4.33" (80mm dia. x 110mm)
	Ceramic bulbs/Edison base 150W and 250W	3.74" dia. x 5.51" (95mm dia. x 140mm)
CERIX THERMOCOUPLE Built-in thermocouple for ceramic element, Type K or J standard or calibrated.		

CERAMIC / QUARTZ ELECTRIC HEATERS

QUARTZ HEATERS

All styles shown are available in custom row and width configurations, with or without reflectors. Other wattage and voltage ratings, as well as coated backing on tubes for greater heat concentration, are available. 6" ceramic bead insulated leads are standard, other lengths are available.

WP-FQE	Full quartz element 250W - 1000W	9.72" x 2.46" (247mm x 62.5mm)
WP-FQEG	Full quartz element gold 250W - 1000W (gold-backed tubes)	9.72" x 2.46" (247mm x 62.5mm)
WP-FQEGS	Full quartz element gold 250W - 1200W (stainless steel reflector bodies)	9.72" x 2.46" (247mm x 62.5mm)
WP-HQE	Half quartz element 125W - 500W	4.86" x 2.46" (123.5mm x 62.5mm)
WP-PFQE	Pillared full quartz element 250W - 1000W	9.72" x 2.46" (247mm x 62.5mm)
WP-PHQE	Pillared half quartz element 125W - 500W	4.86" x 2.46" (123.5mm x 62.5mm)
WP-QQE	Quarter quartz element 125W - 250W	2.46" x 2.46" (62.5mm x 62.5mm)
WP-SQE	Square quartz element 150W - 1000W	4.86" x 4.86" (123.5mm x 123.5mm)
WP-QT	Quartz tungsten element 750W / 230V	0.39" dia. x 8.78" or x 18.62" (10mm dia. x 223mm or x 473mm)
WP-QH	Quartz halogen element 150W / 230V	0.39" dia. x 8.78" or x 18.62" (10mm dia. x 223mm or x 473mm)
Both WP-QT and WP-QH are available with R-7, leads, various lengths, terminals and wattage/voltage ratings.		
FAST IR	Modular units with instant on/off feature 8KW / 240V / 480V	12" x 12" (0.304m x 0.304m)
	Modular units with instant on/off feature 12KW / 240V / 480V	20" x 20" (0.508m x 0.508m)
Quartz tungsten and quartz halogen elements are available for FAST IR, depending on application.		

Many accessories are available for all ceramic and quartz heaters, including:

- Ceramic Terminal End Blocks
- Edison Screw Bulb Holders
- Mounting Bushings
- Mounting Clips
- Stainless Steel Busbars
- Ceramic Bulb Reflectors
- Reflectors and Grills
- Complete Platen Assemblies and Panel Heaters



DUREX INDUSTRIES



COIL HEATERS

Durex coil heaters feature continuous operating temperatures up to 1200°F. Rapid heating and cooling occur, due to the low mass construction. All heating elements are sealed from contamination and the stainless steel sheath provides maximum corrosion resistance. Optional internal thermocouples may be utilized for precise control. These heaters are available in profiled coil configuration for maximum heating efficiency.



FEATURES:

- Continuous operating temperatures to 1200°F. Intermittent operating temperatures to 1500°F.
- Rapid heating and cooling due to low mass construction.
- Heating elements sealed from contamination.
- Stainless steel sheath for corrosion resistance.
- Optional internal thermocouple for temperature control.
- Available in profiled coil configuration for maximum efficiency.

TYPICAL APPLICATIONS:

- Blow Molding
- Custom Die Applications
- Extrusion
- Hot Runner Systems
- Injection Molding
- Thermoforming



COIL HEATERS

ENGINEERING SPECIFICATIONS

Standard Sheath Material: 304 stainless steel
For Temperatures up to 1500°F (815°C)
Optional Sheath Material: Inconel®
For Temperatures up to 1800°F (982°C)
Standard Thermocouple: ANSI Type J
Optional Thermocouple: ANSI Type K
Minimum Bending Radius: Two times the sheath diameter

Dimensional

Standard square cable: 0.125", 0.132" square
Standard rectangle cable: 0.105" x 0.150"
Standard round cable diameters: 0.093", 0.125", 0.150"
..... 0.170", 0.200", 0.250"
..... 0.312", 0.375"
Other Dimensions Available
Cable diameter tolerance: ± 0.005
Standard potting adapter: 0.281" / 0.250" Diameter
Used with heater only and heater with T/C leads, 20 gauge and under.
..... 1/2" Diameter
Used with heater only and heater with T/C leads, 18 gauge to 10 gauge.
Standard potting adapter length: 1 1/2"
Other lengths available
Standard Coil I.D.: From 3/8" up to 2 1/2" in any increments
Applicable Coil I.D. is subject to cable diameter.
Coil I.D. Tolerances: 3/8" to 3/4", +0.000", -0.020"
..... 7/8" to 1 1/4", +0.000", -0.030"
..... 1 1/2" to 2 1/2", +0.000", -0.060"
Coil Width (length): Up to 12" on 3/8" to 3/4" I.D.
..... Up to 16" on 7/8" to 1 1/4" I.D.
..... Up to 18" on 1 1/2" to 2 1/2"
Coil Width Tolerance: 0 to 6": + 0, - 1/8"
..... 6 to 12": + 1/8", - 1/4"
..... 12 to 18": ± 1/4"

Electrical

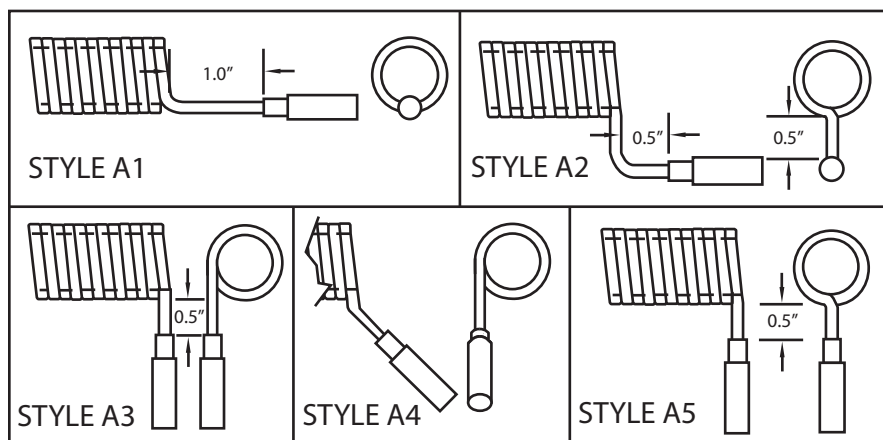
Resistance Tolerance: ± 10%
Wattage Tolerance: ± 10%
Maximum Amperage: Size dependent - consult factory
Standard Voltage: 120 or 240 Volts

For higher or lower wattages contact Durex Industries



COIL HEATERS

LEAD ADAPTER ORIENTATIONS

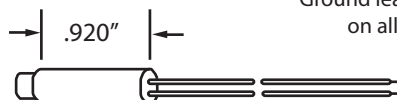


LEADWIRE TERMINATION OPTIONS

TYPE L

PTFE lead wire 36" standard

Ground lead is optional
on all terminations



TYPE S

Fiberglass sleeve



TYPE C

Stainless steel flex hose



TYPE B

Stainless steel overbraid



STANDARD SPECIFICATIONS

Sheath Cross Section	Maximum Voltage	Maximum Amperage	Adapter		Minimum Radius Diameter
			Diameter	Length	
0.062 Dia.	120	4.5	0.25	1.12	0.12
0.093 Dia.	120	6.2	0.25	1.12	0.18
0.105 x 0.152	240	9.6	0.25	1.12	0.25
0.125 Dia.	240	9.6	0.25	1.12	0.25
0.132 Sq.	240	9.6	0.25	1.12	0.25
0.150 Dia.	240	12	0.25	1.12	0.25
0.188 Dia.	240	15	0.38	1.5	0.38
0.250 Dia.	240	18	0.38	1.5	0.5
0.375 Dia.	240	22	0.38	1.5	0.75

Resistance / Wattage Tolerance $\pm 10\%$



COIL HEATERS

STANDARD AVAILABLE SIZES

.085 x .145 RECTANGULAR SHEATH FIBERGLASS SLEEVING, STYLE A5 TERMINATION EXIT

Part No.	ID	Length	Watts	Volts	Lead Length	GRD (Y/N)	JTC (Y/N)
KH1140	0.500"	1.45"	250	240	36" FLH	Y	Y
KH1141	0.500"	2.00"	340	240	36" FLH	Y	Y
KH1142	0.500"	2.50"	450	240	40" FLH	Y	Y
KH1143	0.500"	2.50"	450	240	40" FLH	Y	Y
KH1144	0.500"	4.50"	300	240	36" FLH	Y	Y
KH1145	0.500"	4.50"	300	240	36" FLH	Y	Y
KH1146	0.500"	4.50"	300	240	48" FLH	Y	Y
KH1147	0.500"	4.50"	400	240	48" FLH	Y	Y
KH1148	0.625"	0.98"	225	240	42" FGS	Y	Y
KH1149	0.625"	2.00"	300	240	36" FGS	Y	Y
KH1150	0.625"	2.50"	350	240	36" FGS	Y	Y
KH1151	0.625"	3.00"	400	240	36" FGS	Y	Y
KH1152	0.625"	3.50"	425	240	36" FGS	Y	Y
KH1153	0.625"	4.00"	500	240	36" FGS	Y	Y
KH1154	0.625"	5.00"	500	240	36" FGS	Y	Y
KH1155	0.625"	6.00"	550	240	36" FGS	Y	Y
KH1156	0.750"	1.44"	250	240	36" FGS	Y	Y
KH1157	0.750"	1.75"	315	240	45" FGS	Y	Y
KH1158	0.750"	1.94"	300	240	36" FGS	Y	Y
KH1159	0.750"	2.44"	350	240	36" FGS	Y	Y
KH1160	0.750"	2.44"	315	240	45" FGS	Y	Y
KH1161	0.750"	2.94"	400	240	36" FGS	Y	Y
KH1162	0.750"	3.44"	425	240	36" FGS	Y	Y
KH1163	0.750"	4.44"	500	240	36" FGS	Y	Y
KH1164	0.750"	5.44"	500	240	36" FGS	Y	Y
KH1165	0.875"	2.13"	400	240	36" FGS	Y	Y
KH1166	0.875"	2.63"	450	240	36" FGS	Y	Y
KH1167	0.875"	3.13"	550	240	36" FGS	Y	Y
KH1168	0.875"	3.63"	700	240	36" FGS	Y	Y
KH1169	0.875"	4.13"	800	240	36" FGS	Y	Y
KH1170	0.875"	5.13"	900	240	36" FGS	Y	Y
KH1171	0.875"	6.13"	1000	240	36" FGS	Y	Y
KH1172	0.875"	7.13"	1100	240	36" FGS	Y	Y

.125 OD ROUND FIBERGLASS SLEEVING, STYLE A5 TERMINATION EXIT

Part No.	ID	Length	Watts	Volts	Lead Length	GRD (Y/N)	JTC (Y/N)
KH1430	0.500"	2.00"	340	120 or 240	36" FGS	Y	Y
KH1431	0.500"	2.50"	340	120 or 240	36" FGS	Y	Y
KH1432	0.500"	3.00"	380	120 or 240	36" FGS	Y	Y
KH1433	0.500"	3.50"	380	120 or 240	36" FGS	Y	Y
KH1434	0.500"	4.50"	400	120 or 240	36" FGS	Y	Y
KH1435	0.500"	5.50"	400	120 or 240	36" FGS	Y	Y
KH1436	0.500"	6.50"	400	120 or 240	36" FGS	Y	Y
KH1437	0.875"	2.60"	480	240	36" FGS	Y	Y
KH1438	0.875"	3.00"	480	240	36" FGS	Y	Y
KH1439	0.875"	3.60"	550	240	36" FGS	Y	Y
KH1440	0.875"	4.00"	550	240	36" FGS	Y	Y
KH1441	0.875"	5.00"	650	240	36" FGS	Y	Y
KH1442	0.875"	6.00"	650	240	36" FGS	Y	Y
KH1443	0.875"	7.00"	650	240	36" FGS	Y	Y
KH1444	0.875"	8.00"	630	240	36" FGS	Y	Y
KH1445	0.875"	9.00"	630	240	36" FGS	Y	Y
KH1446	0.875"	10.00"	850	240	36" FGS	Y	Y
KH1447	0.875"	11.00"	850	240	36" FGS	Y	Y
KH1448	0.875"	12.00"	850	240	36" FGS	Y	Y
KH1449	0.875"	13.00"	850	240	36" FGS	Y	Y
KH1450	0.875"	14.00"	850	240	36" FGS	Y	Y
KH1451	1.250"	2.50"	600	120 or 240	36" FGS	Y	Y
KH1452	1.250"	4.50"	800	120 or 240	36" FGS	Y	Y
KH1453	1.250"	6.50"	1100	120 or 240	36" FGS	Y	Y
KH1454	1.250"	8.50"	1400	120 or 240	36" FGS	Y	Y
KH1455	1.250"	10.50"	1600	120 or 240	36" FGS	Y	Y



WEDGE-LOCK MINI COIL HEATERS

Durex Wedge-Lock Coil Heaters feature a revolutionary locking mechanism for injection molding nozzle applications that allows the clamping band of the heater to be mounted or removed using a standard Allen wrench. This eliminates the need for an additional tool while delivering incredible clamping force to the heater band. The heater itself is a durable mini-tubular element which is tightly wound inside the clamping band with flexible tails exiting the band for easy installation through the tooling wire channels.

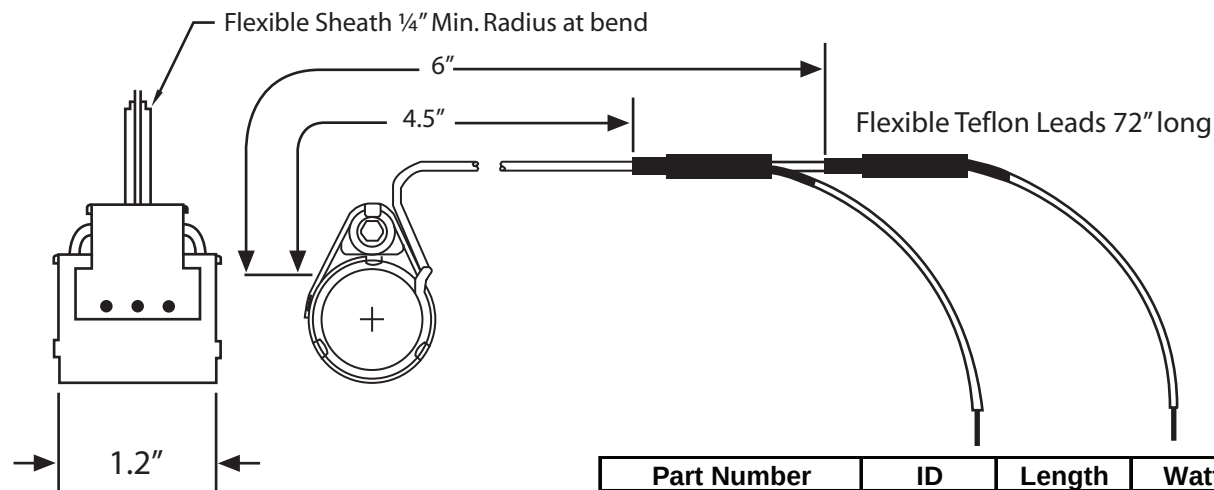


FEATURES:

- Rectangular element provides 10 times more surface contact than standard round design.
- Moisture proof leadwire and element connections.
- Wedge-Lock mechanism maintains positive clamping force at extended temperature.
- Direct replacement for Husky® systems.
- Optional internal thermocouple for integral temperature control.
- $\pm 5\%$ Resistance tolerance on the heating elements.
- Quick installation for multiple gate molds.

TYPICAL APPLICATIONS:

- Blow Molding
- Custom Die Applications
- Extrusion
- Hot Runner Systems
- Injection Molding
- Thermoforming



Part Number	ID	Length	Watts	Volts
KH1277-01	.750"	1.20"	149	240
KH1277-02	.750"	1.20"	268	240



STANDARD HOLLOW CAST® NOZZLE HEATERS

The Hollow Cast® nozzle heater design was developed by Durex to provide a maximum efficiency heating device for plastic molders. Utilizing casting technology, a high performance mineral insulated heater is cast-in a bronze or aluminum alloy and machined for a precision fit onto the injection nozzle.



FEATURES:

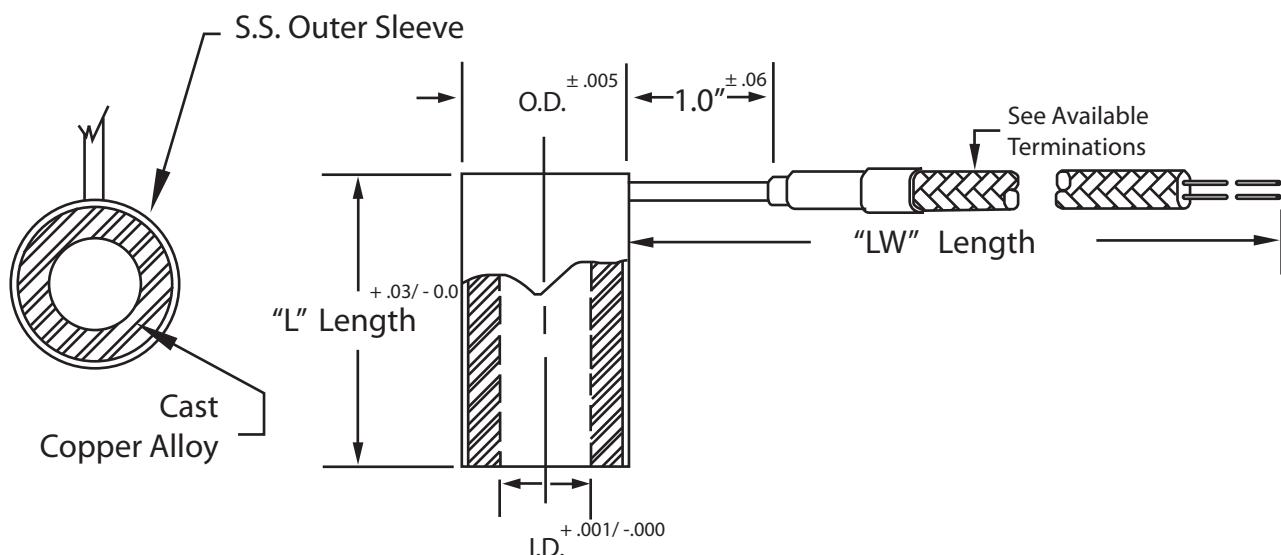
- Precision machined I.D. for press fit
- Stainless steel outer shell provides for a durable protective casting
- Optional internal thermocouple for integral temperature control
- Copper alloy casting achieves temperatures to 1200°F
- Sealed heater construction eliminates failures from contamination or moisture
- Optimum heat transfer

TYPICAL APPLICATIONS:

- Blow Molding
- Custom Die Applications
- Extrusion
- Hot Runner Systems
- Injection Molding
- Thermoforming



STANDARD HOLLOW CAST® NOZZLE HEATERS



HEATER SPECIFICATIONS

- Inside diameter tolerance: ± 0.001
- Length tolerance: ± 0.015
- Maximum temperature: Aluminum 750°F
Bronze 1200°F
- Maximum voltage: 240V
- Maximum amperage: 9.6A
- Wattage tolerance: $\pm 10\%$

The Hollow Cast® heaters are available with leadwire terminations that include Teflon® and high temperature fiberglass with stainless steel overbraid or flexible armor cable.

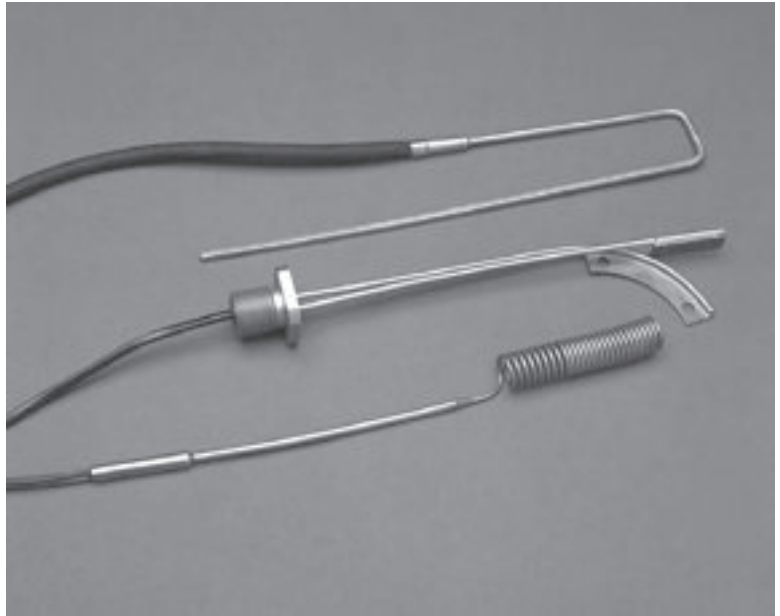
STANDARD AVAILABLE SIZES

Part No.	ID	OD	Length	Watts	Volts	Lead Length	Grd (Y/N)	JTC (Y/N)
KH1843-01	.750"	1.250"	1.16"	250	240	45" FGS	Y	Y
KH1844-01	.625"	1.125"	2.00"	300	240	45" FGS	Y	Y
KH1845-01	.625"	1.125"	2.50"	350	240	45" FGS	Y	Y
KH1846-01	.625"	1.125"	3.00"	400	240	45" FGS	Y	Y
KH1847-01	.625"	1.125"	3.50"	425	240	45" FGS	Y	Y
KH1848-01	.625"	1.125"	4.00"	500	240	45" FGS	Y	Y
KH1849-01	.625"	1.125"	5.00"	500	240	45" FGS	Y	Y
KH1850-01	.625"	1.125"	6.00"	550	240	45" FGS	Y	Y
KH1851-01	.875"	1.250"	2.19"	400	240	45" FGS	Y	Y
KH1852-01	.875"	1.250"	2.69"	450	240	45" FGS	Y	Y
KH1853-01	.875"	1.250"	3.19"	550	240	45" FGS	Y	Y
KH1854-01	.875"	1.250"	3.69"	700	240	45" FGS	Y	Y
KH1855-01	.875"	1.250"	4.19"	800	240	45" FGS	Y	Y
KH1856-01	.875"	1.250"	5.19"	900	240	45" FGS	Y	Y
KH1857-01	.875"	1.250"	6.19"	1000	240	45" FGS	Y	Y



CABLE HEATERS

Mineral insulated cable heaters can be formed to a wide variety of shapes and sizes that can deliver high temperatures to areas where standard heaters are impractical due to size or space restrictions. Cable heaters can be formed to cover cylindrical areas that require uniform heat patterns. Custom-formed cable heaters are transitioned with a moisture resistant transition to a flexible leadwire, which can have additional protective jackets such as stainless steel braid or stainless steel armor.



FEATURES:

- Wattage and voltage customized to application.
- Elements can be formed to specification or formed on location.
- Optional internal thermocouple can be located at various points for precise temperature control.
- Sealed leadwire transition eliminates contamination.
- Sheath materials available in 304 stainless steel, 316 stainless steel, Inconel®, and Incoloy®

TYPICAL APPLICATIONS:

- Heat trace / freeze protection
- Semiconductor manufacturing
- Plastic molding hot runners systems
- Air or liquid immersion
- Cutting and sealing bars
- Tube and pipe heating
- Large surface areas
- Vacuum chambers



CABLE HEATERS

ENGINEERING SPECIFICATIONS

Performance Ratings

Watt Density: 150 watts per square inch of sheath surface
area maximum with factory approval

Maximum Temperature: 1500°F (815°C)

Dimensional

Heater Cable Diameters: 0.040", 0.062", 0.093", 0.125"
0.132", 0.150", 0.170", 0.188"
0.200", 0.250", 0.312", 0.375"
Consult Durex for additional sizes

Cable Diameter Tolerance: ± 0.005

Heater Length Tolerance: 0 to 6" ($\pm 1/8"$), 6 to 18" ($\pm 1/4"$)
18 to 24" ($\pm 3/8"$), 24 to 120" ($\pm 3/4"$)
120 to 300" (+ 1")

Electrical

Resistance Tolerance: $\pm 10\%$

Standard Voltage: 120 or 240 Volts
For higher or lower voltages contact Durex Industries

Thermocouples: ANSI Type J to 1500°F (815°C)
Type K to 1800°F (982°C)

TRANSITION AND TERMINATION

Transition (Potting) Adapters:..... 5/16" O.D. x 1-1/2" long for heater cable 0.163" diameter and smaller.
1/2" O.D. x 1-1/2" long for heater cable diameters above 0.163".

Transition Temperature Ratings:..... Standard transition is rated to 482°F (250°C).
Optional High Temperature Transition is rated to 842°F (450°C).
Standard heater lead wire insulation is TGGT
(Teflon®, double fiberglass, Teflon® impregnation),
which is rated to 482°F (250°).

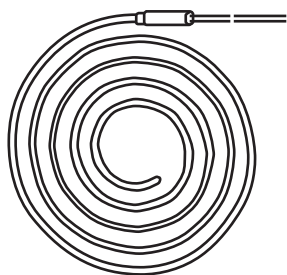
Thermocouple:..... Standard leads use a fiberglass insulation rated to 900°F (482°C).
Teflon® insulation is available upon request.

Optional Lead Protection: Stainless steel overbraid or stainless steel armor cable.

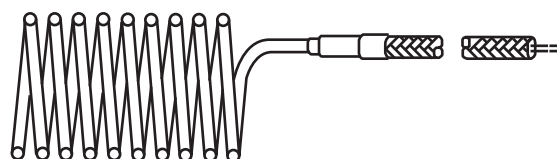
CABLE HEATERS

BASIC FORMS

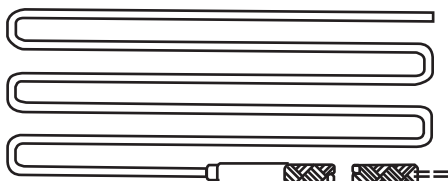
Flat Spiral



Helical Spiral



Multiple Bend



Flat "U" Form



STANDARD SPECIFICATIONS

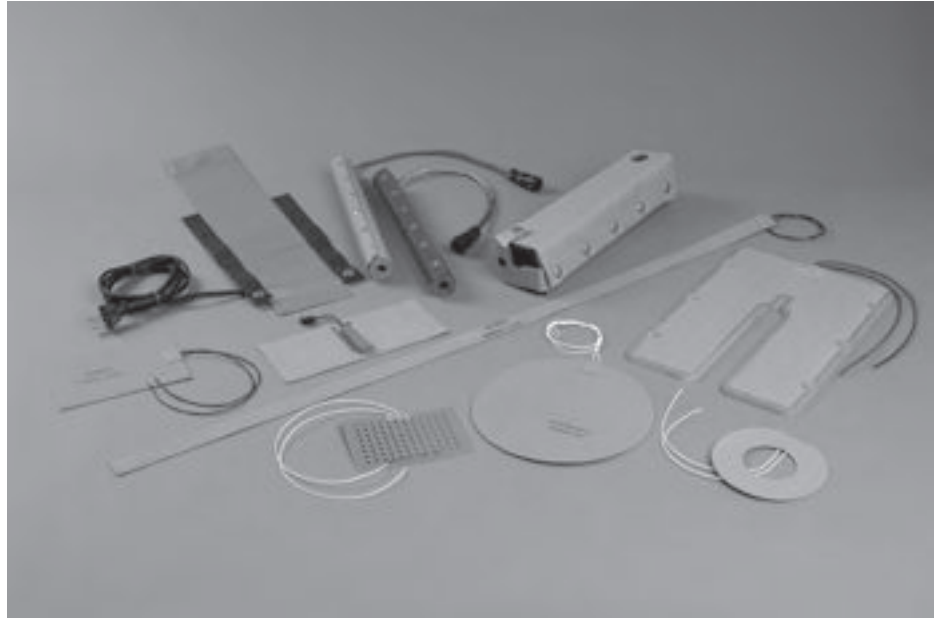
Sheath Cross Section	Maximum Voltage	Maximum Amperage	Adapter		Minimum Radius Diameter
			Diameter	Length	
0.040 Dia.	120	3.8	0.25	1.12	0.06
0.062 Dia.	120	4.5	0.25	1.12	0.12
0.093 Dia.	120	6.2	0.25	1.12	0.18
0.105 x 0.152	240	9.6	0.25	1.12	0.25
0.125 Dia.	240	9.6	0.25	1.12	0.25
0.132 Sq.	240	9.6	0.25	1.12	0.25
0.150 Dia.	240	12.0	0.25	1.12	0.25
0.188 Dia.	240	15.0	0.38	1.5	0.38
0.250 Dia.	240	18.0	0.38	1.5	0.5
0.375 Dia.	480	22.0	0.38	1.5	0.75

Resistance / Wattage Tolerance $\pm 10\%$



SILICONE RUBBER HEATERS

Silicone rubber heaters permit composite bonding and curing, as well as freeze protection, condensation prevention, and various repair and fabrication operations in many industries. Equal length circuits and a "cool tab" are provided, while a fiberglass reinforced heater cover means long service life and superior durability. Silicone rubber heaters can be easily bonded to heat sinks and other parts.



FEATURES:

- Standard watt density: 5 W/in²
- UL recognition available
- Many stock sizes, contact Sales for details
- Chemical, moisture, oil, and solvent resistance
- Available with wire wound or etched foil elements
- Operate in temperatures from -60°F to +450°F (-50°C to +230°C)
- Conform to almost any shape

TYPICAL APPLICATIONS:

- Food Service
- Medical Imaging
- Image Setting
- Photo Developing
- Photocopiers
- Composite Bonding
- Glue Curing
- Aerospace Instrumentation
- Fluid Line Freeze Protection
- Motor Dehumidification



SILICONE RUBBER HEATERS

ETCHED FOIL HEATERS

Creating etched foil silicone rubber heaters is a five step process.

1. The heaters start as sheets of metallic foil and silicone rubber laminate.
2. The designed circuit is photo imaged on the sheets.
3. The sheets are chemically etched until only the designed portion remains.
4. Individual heaters are cut from the sheets.
5. A top layer of silicone rubber laminate is applied to each circuit, followed by the termination.

Etched foil heaters are very economical for small, complex circuits that would be costly to create with wound wire.

SPECIFICATIONS

- **Sizes:** up to 12" x 60"
- **Standard Thicknesses:** .030" or .043"
- **Maximum Operating Temperature:** 450°F (230°C)
- **Minimum Operating Temperature:** -60°F (-50°C)
- **Standard Maximum Resistance Density:** 75 ohms/in²
- **Standard Dimensional Tolerances:** Less than 12" ± .062, Greater than 12" ± .125
- **Maximum Watt Density:** 60 W/in²
(depending on application)
- **Maximum Voltage:** 600 volts
- **Wattage Tolerance:** ±10% standard

WIRE WOUND HEATERS

Wire wound silicone heaters feature multiple strands of resistance wire that have been wound together. Selections are made to determine the resistance and flexibility of the heater. Then, the wound element is transferred to one layer of silicone rubber, while a second layer is positioned over the element to complete the heater. Larger heaters are more economical when wire wound since no material is wasted. Because of their size, large silicone rubber heaters are costly and wasteful to etch.

SPECIFICATIONS

- **Sizes:** up to 36" wide x (consult factory)
- **Standard Thicknesses:** .030", .043", or .056"
- **Max. Operating Temp:** 500°F (260°C) intermittent
- **Minimum Operating Temperature:** -60°F (-50°C)
- **Standard Maximum Resistance Density:** 55 ohms/in²
- **Standard Dimensional Tolerances:** Less than 12" ± .062, Greater than 12" ± .125
- **Maximum Watt Density:** 5 watts/in²
(depending on application) Consult Factory for higher densities
- **Maximum Voltage:** 600 volts
- **Wattage Tolerance:** ±10% standard



SILICONE RUBBER HEATERS

MOUNTING OPTIONS

Vulcanizing:

Silicone rubber heaters are most effectively attached to factory surface parts through vulcanization. Using a heat and pressure process, Durex Industries' silicone rubber heaters can be bonded to a metal surface with no adhesive. The resulting bond is not only strong, but it also allows excellent heat transfer. This method permits higher watt densities and temperatures than other methods while still operating safely.

Silicone RTV:

Silicone RTV is a liquid silicone adhesive that can be used to bond silicone rubber heaters to a surface. It is important that the surface is clean and free from any bumps or grooves to ensure an even bond. Without an even bond, heat can not be evenly transferred and overheating can occur. RTV cures at room temperature and requires humidity to cure properly. To guarantee moisture, place a humidifier near the heater or a moist towel over it if the environment is dry.

Pressure Sensitive Adhesive:

Silicone rubber heaters can also be applied with a pressure sensitive adhesive. First, ensure that the heater is being applied to a clean surface. The heater should then be rolled in place to eliminate any air bubbles that would compromise the bond. Large, heavy heaters may not effectively bond with PSA as their weight can pull them off the surface as temperatures rise. PSA does have a limited shelf life.

Mechanical Bonding:

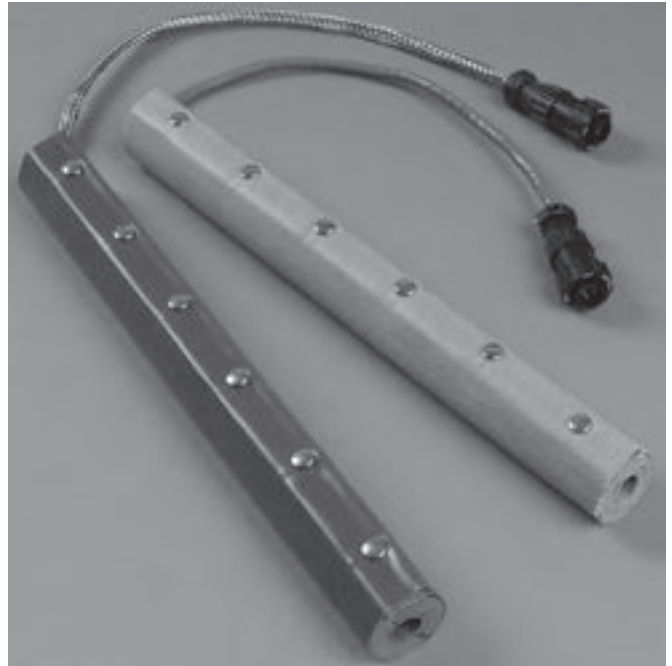
If heaters need to be removable, mechanical bonding options may be ideal. These include lacing eyelets, spring and eyelet combinations, boot hooks, boot type fasteners, snaps, and hook and loop velcro type fabric straps. Clamps can also be used. The surface must be free of dirt and any chemicals that might harm the silicone. The surface should also be examined for sharp protrusions that could pierce the heater. Insulation can be used to direct heat towards the surface and cushion the heater during compression.



INSULATED GAS LINE HEATERS

Uniform gas temperature in delivery lines is critical to eliminate condensation and contamination of the wafer process.

Durex Industries introduces improved gas line heater designs to maximize heat profile uniformity and prevent unwanted thermal gradients that lead to reduced yields and tool downtime.

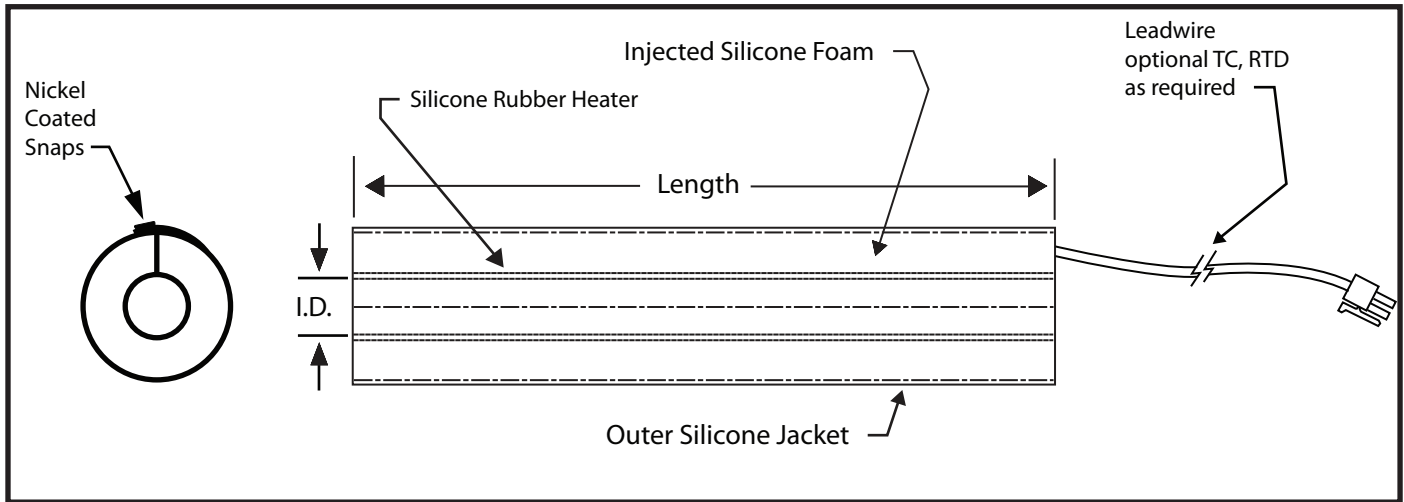


FEATURES:

- Uniform or profiled heat throughout or in discrete zones.
- Integral temperature control with embedded thermocouples, thermostats, RTD's, and/or thermistors.
- Surface temperature isolated by insulation provides operator safety.
- Nickel coated snaps for clean room compatibility.
- Post cured to eliminate outgassing.
- Termination area engineered to assure temperature uniformity.
- Foam molded parts for precision fit.
- Molded foam creating faster ramp and more uniform soak.
- Series or parallel wiring for ease of installation.



INSULATED GAS LINE HEATERS



PHYSICAL SPECIFICATIONS

- Maximum operating temperature 475°F (246°C).
- Insulation thickness of .250", .375", or .500".
- Designed to fit lines from 0.250" O.D. to 4.0" O.D.
- Leadwire insulation and configuration designed to suit the application.
- Heater jacket constructed of fiberglass reinforced silicone sheet material.
- Available in orange and gray.

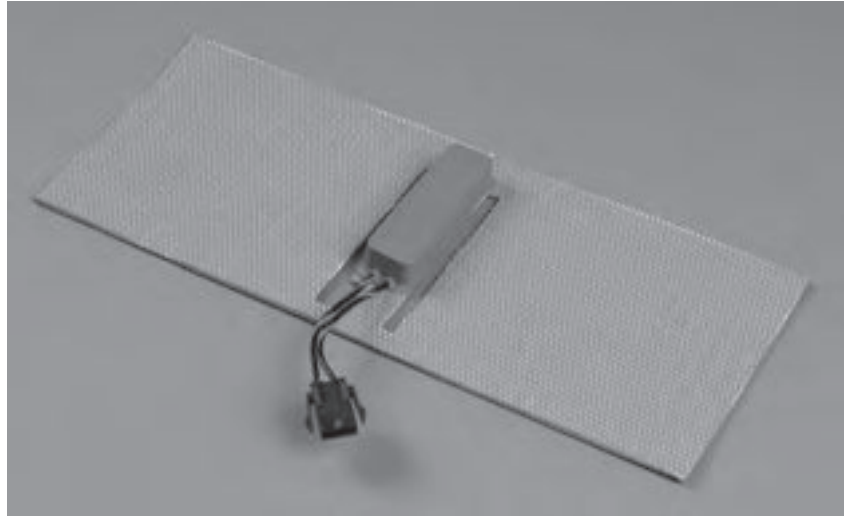
ELECTRICAL SPECIFICATIONS

- Watt density from 1-5 watts/in².
- Heaters can be designed with input voltages from 12 V to 240 V based on amperage.
- Typical electrical terminations are Amp connectors rated up to 10 amps.
- Integral temperature control utilizing thermocouple, RTD, or thermostat.
- Interconnect sections up to 10 amps.



SILICONE RUBBER TEMPERATURE CONTROL OPTIONS

One way of providing temperature control of surface heaters is a built-in thermostat. Wired to the heater, the thermostat can be mounted over a heated section to sense the heater's temperature or over a cold section to indirectly sense the temperature of the part.



When mounted over a cold section,

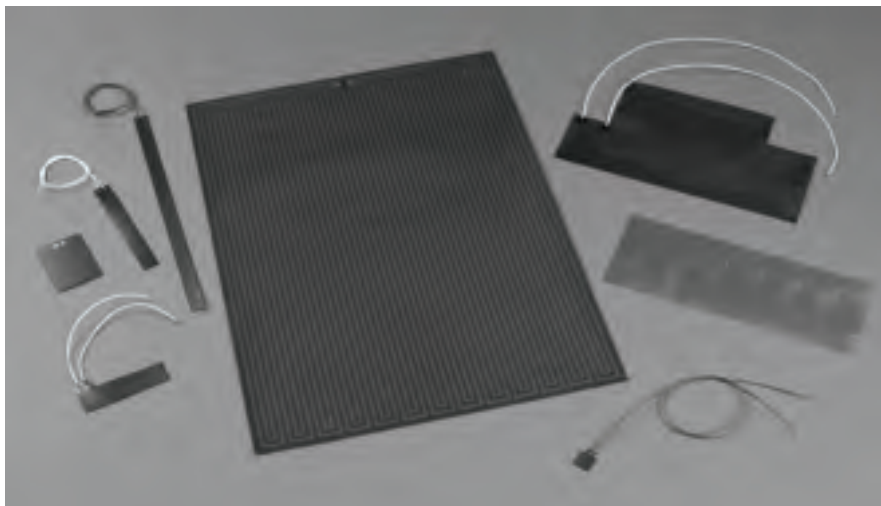
the thermostat avoids limiting the temperature of the heating element. Thermostats can be preset with a wide variety of ranges. Silicone Rubber heaters can also feature a thermal switch or an adjustable thermostat. If chosen, the temperature should be increased slowly over time to determine the proper thermostat setting.

SENSORS

Other temperature control options include thermocouples, RTD's, and thermistors. Multiple thermocouple types are available and can be mounted over heated or cold sections. Specify when ordering. RTD's provide accuracy and stability since their resistance increases as the temperature of the heater rises. Thermistors are also resistance-based, but are ideal for limited temperature ranges or a specific single temperature.

KAPTON® FLEX HEATERS

Kapton® flexible heaters offer superior tensile strength and tear resistance with precision heat distribution. They are ideal for extreme temperature environments. Kapton® is an organic polymer with very high dielectric capabilities, while providing



superior resistance to most solvents, oils, even radiation. For temperature control on Kapton® heaters, Durex recommends an RTD or thermocouple. Sensors are mounted to the surface of the heater and send a resistance measurement to an external controller that cycles the heater at a set temperature.

FEATURES:

- Operate in extreme temperatures: -319°F to +500°F (-195°C to +260°C)
- Thickness can range from 0.006" to 0.012" (.0002 to .0004mm), and up to 16" x 29" (475 mm x 660 mm)
- Watt density of 5 W/in² (0.8 W/cm²) standard with units available up to 50 W/in² (7.8 W/cm²)
- Transparent Kapton® film allows easy visual inspection on the internal structures
- Etched foil heating elements
- Kapton®, Teflon®, or Silicone leads are available

TYPICAL APPLICATIONS:

- Vacuum Chambers
- Incubators
- Shrink Film Packaging
- Semiconductor Processing
- Telcom Packaging
- ATM's
- Platen Heating
- Laser Printing
- Autoclaves



KAPTON® FLEX HEATERS

MOUNTING OPTIONS

Pressure Sensitive Adhesive:

PSA is the most common option for mounting Kapton® heaters. By selecting proper materials, including the release agent, you can promote a strong bond and effective heat transfer.

Clamping:

Kapton® heaters can also be clamped to their heating surface. A pressure plate is then fastened in place. To ensure even distribution of heat, and to protect the heater, a pressure pad or insulation layer is advised. The work surface should be free of any debris, dirt, chemicals, bumps, or grooves. This will protect the heater as well as prevent overheating.

Self-Fusing Tape:

When mounting to a smooth cylindrical surface, Kapton® heaters can be mounted with self-fusing tape. This will provide a safe operation and even transfer of heat.

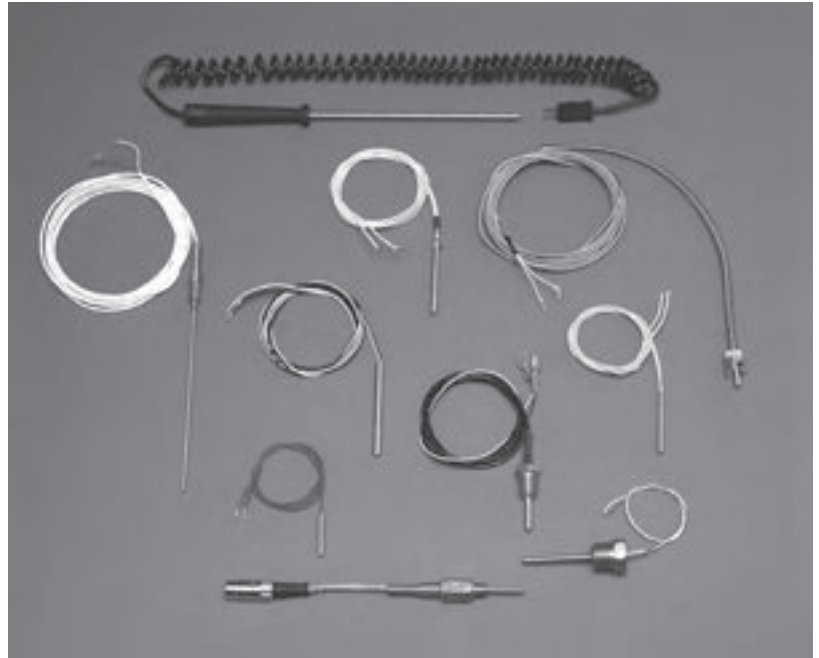
SPECIFICATIONS

- **Sizes:** up to 16" x 29"
- **Standard Thickness:** .007" in
- **Maximum Watt Density:** 50 W/in²
(depending on application)
- **Standard Maximum Resistance Density:** 100 ohms/in²
- **Standard Dimensional Tolerances:** Less than 12" ± .062, Greater than 12" ± .125
- **Maximum Operating Temperature:** 500°F (260°C)
- **Minimum Operating Temperature:** -319°F (-195°C)
- **Wattage Tolerance:** ±10%
- **Dielectric Strength:** 1000 VAC



RESISTANCE TEMPERATURE DETECTORS

For high-accuracy temperature measurements in a variety of industrial and commercial air and gas applications, Durex Industries offers RTD's of multiple elements and styles. Durex RTD's are available with an assortment of connections, mounting hardware, and enclosures to suit harsh chemical, immersion, and other heavy-duty requirements. Sealed leadwire transitions eliminate contamination. Multiple sensing elements can be located at various points for precise temperature control. Because Durex designs, manufactures, and assembles virtually all of the components of its RTD's, custom orders are not only a cost-effective alternative to standard products, but also an easy way to fulfill your requirements. NIST traceable calibrations are available upon request.



FEATURES:

- Platinum, Nickel, or Nickel Iron elements
- 2 -, 3 -, or 4 - wire styles
- High pressure applications up to 5000 PSI
- Optional sanitary - grade stainless steel hardware
- Temperatures up to 1500°F (816°C)
- Optional braiding or armor cable shielding

TYPICAL APPLICATIONS:

- Food Service
- Semiconducting
- Packaging
- Hot Melt Dispensing
- Vacuum Sealing and Forming
- Automotive
- Medical/ Laboratory Settings



RESISTANCE TEMPERATURE DETECTORS

RTD ASSEMBLY TEMPERATURE RANGES

STYLE: R1L, R2L,
R3L & R4L

The maximum rated temperature for these four styles is 500° F. Typically they are constructed with Teflon leads and the lead end is protected with an epoxy seal. This epoxy seal provides a moisture resistant barrier.

STYLE: R1M, R2M,
R3M & R4M

The maximum rated temperature for these next four styles is 900° F. They are constructed with high temperature fiberglass insulated conductors. The lead end is sealed and protected with a high temperature cement.

STYLE: R1P, R2P,
R3P & R4P

The maximum rated temperature for these last four styles is 1200° F. Their construction features highly compacted magnesium oxide insulation. Nickel conductors provide for extended temperature ratings and harsh environments.

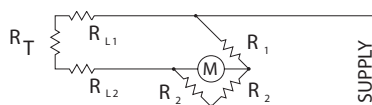
Custom manufactured RTD assemblies are available for operating temperatures up to 1500° F. Please consult Durex engineering for specifications and construction details.

AVAILABLE RTD ELEMENTS

CODE	ELEMENT TYPE	TEMPERATURE COEFFICIENT	TOLERANCE AT 0 C
A	100 ohm Platinum	.00385	.1%
B	100 ohm Platinum	.00385	.06%
C	100 ohm Platinum	.00385	.03%
D	500 ohm Platinum	.00385	.1%
E	1000 ohm Platinum	.00385	.1%
F	2000 ohm Platinum	.00385	.1%
G	100 ohm Platinum	.00392	.1%
H	100 ohm Platinum	.00392	.03%
J	120 ohm Nickel	.00672	.5%
K	604 ohm Nickel Iron	.00520	.5%

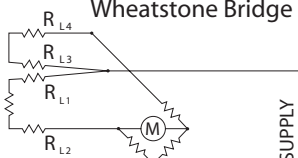
WIRING DIAGRAMS

2 Wire, Wheatstone Bridge



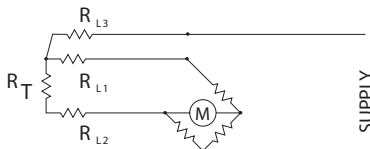
The meter reads R_T + the two lead resistances, R_{L1} and R_{L2} .

4 Wire, Compensated Wheatstone Bridge



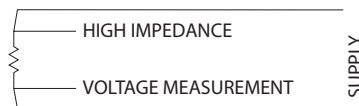
In this type R_{L3} and R_{L4} appear in one arm of the bridge. R_{L1} and R_{L2} appear in the other. Errors are $R_{L1} + R_{L2} - R_{L3} - R_{L4}$.

3 Wire, Wheatstone Bridge



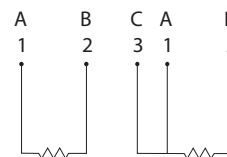
One lead resistance is included in each of two arms of the bridge. The errors reduce to $R_{L1} - R_{L2}$.

4 Wire, Connected



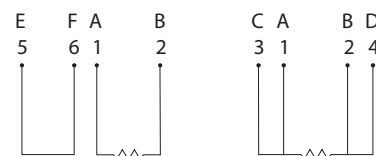
Errors can be made negligible by having a very high input impedance amplifier.

Internal Wiring Diagram



2 Wire

3 Wire



4 Wire Compensated

4 Wire Connected



RESISTANCE TEMPERATURE DETECTORS

GENERAL SPECIFICATIONS

Unless otherwise specified, Durex's RTD assemblies include photo-lithographically structured, high-purity platinum thin-film elements laser trimmed to precise resistance values. These sensors feature brief response times, excellent long term stability, low self heating and excellent resistance to vibration and temperature shocks.

Thermal Response Time:

The response time $T_{0.63}$ is the time the sensors need to respond to 63% of the change in temperature. The response time depends on the sheath dimension, but can be as low as 1.2 seconds.

Long Term Stability:

The change of ohmage after 1,000 hrs at maximum operating temperature amounts to less than 0.03%.

Self Heating:

To measure the resistance an electric current has to flow through the element, which will generate heat energy resulting in errors of measurement. To minimize error, the testing current should be kept low (approximately 1 mA for Pt-100).

Temperature error $\Delta T = \frac{R I^2}{E}$; with

E = self-heating coefficient in mW/K

R = resistance in k Ω ,

I = measuring current in mA.

The self-heating coefficient (E) for the standard elements used in Durex RTD assemblies is 4 mW/K in air and 40mW/K in water.

Measuring Current:

Measurement current causes heating of the platinum thin-film sensor. The resulting temperature error is given by: $\Delta T = P/E$ with P (the power loss) = $I^2 R$, and E (the self heating coefficient) in mW/K.

The amount of thermal transfer from the sensor in application determines how much measuring current can be applied. There is no bottom limit of the measurement current with platinum thin-film.

The measurement current depends highly on the application in use.

We recommend at:

100 Ω : typ. 1mA max. 5 mA

500 Ω : typ. 0.5 mA max. 3 mA

1000 Ω : typ. 0.3 mA max. 2 mA

2000 Ω : typ. 0.2 mA max. 1 mA



RESISTANCE TEMPERATURE DETECTORS

GENERAL SPECIFICATIONS

Nominal Values:

The nominal or rated value of the sensor is the target value of the sensor resistance at 0°C. The temperature coefficient α is defined as $\alpha = \frac{R_{100} - R_0}{100 - R_0} [K^{-1}]$ and has the numerical value of 0.00385 K⁻¹ according to DIN IEC 751.

In practice, a value multiplied by 10⁶ is often entered: $TCR = 10^6 * \frac{R_{100} - R_0}{100 - R_0} [ppm/K]$.
In this case, the numerical value is 3850 ppm/K.

Temperature Characteristic Curve:

The temperature characteristic curve determines the dependence of the electrical resistivity on the temperature. The following definition of the temperature curve according to DIN EN 60751 standard applies:

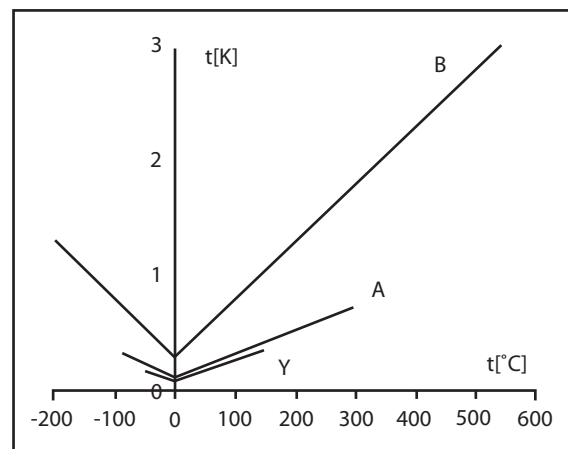
$$\begin{aligned} -200 \text{ to } 0^\circ\text{C} & \quad R(t) = R_0 (1 + A*t + B*t^2 + C*[t-100]*t^3) \\ 0 \text{ to } 850^\circ\text{C} & \quad R(t) = R_0 (1 + A*t + B*t^2) \end{aligned}$$

Platinum (3850 ppm/K):

$$\begin{aligned} A &= 3.9083 * 10^{-3} [^\circ\text{C}^{-1}]; \quad B = -5.775 * 10^{-7} [^\circ\text{C}^{-2}]; \\ C &= -4.183 * 10^{-12} [^\circ\text{C}^{-4}] \end{aligned}$$

Platinum (3750 ppm/K):

$$\begin{aligned} A &= 3.9083 * 10^{-3} [^\circ\text{C}^{-1}]; \quad B = -6.01888 * 10^{-7} [^\circ\text{C}^{-2}]; \\ C &= -6 * 10^{-12} [^\circ\text{C}^{-4}] \end{aligned}$$



Tolerance field

R_0 = Resistance value in ohm at 0°C

t = temperature in accordance with ITS 90

Tolerance Classes:

The temperature sensors are divided into classes according to their limit deviations:

Class	+/- limit deviations in °C (K)	IST AG designation	Temperature range
DIN 60751, class B	$0.30 + 0.005 \times T $	B	-200°C to 850°C
DIN 60751, class A	$0.15 + 0.002 \times T $	A	-90°C to 300°C
1/3 DIN 60751, class B	$0.10 + 0.0017 \times T $	Y	-50°C to 150°C

$|T|$ is the numerical value of the temperature in °C without taking into account either negative or positive signs.

Special selection of sensors upon request (pairings, grouping, special tolerances)

RESISTANCE TEMPERATURE DETECTORS

CODE DEFINITIONS

"L" Dimensions			"B" Dimensions			"A" Dimensions	Fractional Dimension Letter CODE	
"L" dimensions are specified in whole inches and a single alpha character which represents a fraction. Enter the three digit CODE as follows:			"B" dimensions are specified in fractions from 1/8" to 1". Use the single alpha character to indicate the tip length. Enter the CODE as follows:			"A" dimensions are specified in whole inches only. Enter three digit CODE as follows:	1/16" = A	5/8" = K
3" = 030	9 5/8" = 09K		1/8" = B	5/8" = K		36" = 036	1/8" = B	11/16" = L
22 1/8" = 22B	17 3/4" = 17M		1/4" = D	3/4" = M		144" = 144	3/16" = C	3/4" = M
6 1/4" = 06D	7 7/8" = 07P		3/8" = F	7/8" = P		12" = 012	1/4" = D	13/16" = N
15 3/8" = 15F	10 5/8" = 10K		1/2" = H	1" = S		9" = 009	5/16" = E	7/8" = P
4 1/2" = 04H	12" = 120						3/8" = F	15/16" = R
							7/16" = G	1" = S
							1/2" = H	0 = NO
							9/16" = J	Fraction

CALIBRATION SERVICES

Durex RTD calibrations are fully traceable to the National Institute of Standards and Technology (NIST) and are useful for defining the exact temperature coefficient of the sensor. For sensor applications below 32°F (0°C), a cryogenic



range calibration is recommended. Certificates are supplied with all calibrations. Printed tables of interpolated values are only supplied with cryogenic range calibrations.



RESISTANCE TEMPERATURE DETECTORS

RTD Temperature vs. Resistance Table

For European Curve, Alpha = 0.00385, ITS-90

1° Celsius Increments

°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.
-200	18.52		-140	43.88	0.42	-80	68.33	0.41	-20	92.16	0.39	+0	100.00	0.39	+60	123.24	0.38
-199	18.96	0.44	-139	44.29	0.41	-79	68.73	0.40	-19	92.55	0.39	+1	100.39	0.39	61	123.62	0.38
-198	19.39	0.43	-138	44.71	0.42	-78	69.13	0.40	-18	92.95	0.40	2	100.78	0.39	62	124.01	0.39
-197	19.82	0.43	-137	45.12	0.41	-77	69.53	0.40	-17	93.34	0.39	3	101.17	0.39	63	124.39	0.38
-196	20.25	0.43	-136	45.53	0.41	-76	69.93	0.40	-16	93.73	0.39	4	101.56	0.39	64	124.77	0.38
-195	20.68	0.43	-135	45.95	0.42	-75	70.33	0.40	-15	94.12	0.39	5	101.95	0.39	65	125.17	0.40
-194	21.11	0.43	-134	46.35	0.40	-74	70.73	0.40	-14	94.52	0.40	6	102.34	0.39	66	125.55	0.38
-193	21.54	0.43	-133	46.76	0.41	-73	71.13	0.40	-13	94.91	0.39	7	102.73	0.39	67	125.93	0.38
-192	21.97	0.43	-132	47.18	0.42	-72	71.53	0.40	-12	95.30	0.39	8	103.12	0.39	68	126.32	0.39
-191	22.40	0.43	-131	47.59	0.41	-71	71.93	0.40	-11	95.69	0.39	9	103.51	0.39	69	126.70	0.38
-190	22.83	0.43	-130	48.00	0.41	-70	72.33	0.40	-10	96.09	0.40	10	103.90	0.39	70	127.08	0.38
-189	23.26	0.43	-129	48.41	0.41	-69	72.73	0.40	-9	96.48	0.39	11	104.29	0.39	71	127.46	0.38
-188	23.69	0.43	-128	48.82	0.41	-68	73.13	0.40	-8	96.87	0.39	12	104.68	0.39	72	127.85	0.39
-187	24.12	0.43	-127	49.23	0.41	-67	73.53	0.40	-7	97.26	0.39	13	105.07	0.39	73	128.23	0.38
-186	24.55	0.43	-126	49.64	0.41	-66	73.93	0.40	-6	97.65	0.39	14	105.46	0.39	74	128.61	0.38
-185	24.97	0.42	-125	50.06	0.42	-65	74.33	0.40	-5	98.04	0.39	15	105.85	0.39	75	128.99	0.38
-184	25.39	0.42	-124	50.47	0.41	-64	74.73	0.40	-4	98.44	0.40	16	106.24	0.39	76	129.38	0.39
-183	25.82	0.43	-123	50.88	0.41	-63	75.13	0.40	-3	98.83	0.39	17	106.63	0.39	77	129.76	0.38
-182	26.25	0.43	-122	51.29	0.41	-62	75.53	0.40	-2	99.22	0.39	18	107.02	0.39	78	130.14	0.38
-181	26.67	0.42	-121	51.70	0.41	-61	75.93	0.40	-1	99.61	0.39	19	107.40	0.38	79	130.52	0.38
-180	27.10	0.43	-120	52.11	0.41	-60	76.33	0.40				20	107.79	0.39	80	130.90	0.38
-179	27.52	0.42	-119	52.52	0.41	-59	76.73	0.40				21	108.18	0.39	81	131.28	0.38
-178	27.95	0.43	-118	52.92	0.40	-58	77.13	0.40				22	108.57	0.39	82	131.67	0.39
-177	28.37	0.42	-117	53.33	0.41	-57	77.52	0.39				23	108.96	0.39	83	132.05	0.38
-176	28.80	0.43	-116	53.74	0.41	-56	77.92	0.40				24	109.35	0.39	84	132.43	0.38
-175	29.22	0.42	-115	54.15	0.41	-55	78.32	0.40				25	109.73	0.38	85	132.81	0.38
-174	29.65	0.43	-114	54.56	0.41	-54	78.72	0.40				26	110.12	0.39	86	133.19	0.38
-173	30.07	0.42	-113	54.97	0.41	-53	79.11	0.39				27	110.51	0.39	87	133.57	0.38
-172	30.49	0.42	-112	55.38	0.41	-52	79.51	0.40				28	110.90	0.39	88	133.95	0.38
-171	30.92	0.43	-111	55.78	0.40	-51	79.91	0.40				29	111.28	0.38	89	134.33	0.38
-170	31.34	0.42	-110	56.19	0.41	-50	80.31	0.40				30	111.67	0.39	90	134.71	0.38
-169	31.76	0.42	-109	56.60	0.41	-49	80.70	0.39				31	112.06	0.39	91	135.09	0.38
-168	32.18	0.42	-108	57.00	0.40	-48	81.10	0.40				32	112.45	0.39	92	135.47	0.38
-167	32.61	0.43	-107	57.41	0.41	-47	81.50	0.40				33	112.83	0.38	93	135.85	0.38
-166	33.03	0.42	-106	57.82	0.41	-46	81.89	0.39				34	113.22	0.39	94	136.23	0.38
-165	33.45	0.42	-105	58.22	0.40	-45	82.29	0.40				35	113.61	0.39	95	136.61	0.38
-164	33.86	0.41	-104	58.63	0.41	-44	82.69	0.40				36	113.99	0.38	96	136.99	0.38
-163	34.28	0.42	-103	59.04	0.41	-43	83.08	0.39				37	114.38	0.39	97	137.37	0.38
-162	34.70	0.42	-102	59.44	0.40	-42	83.48	0.40				38	114.77	0.39	98	137.75	0.38
-161	35.12	0.42	-101	59.85	0.41	-41	83.88	0.40				39	115.15	0.38	99	138.13	0.38
-160	35.54	0.42	-100	60.26	0.41	-40	84.27	0.39				40	115.54	0.39	100	138.51	0.38
-159	35.96	0.42	-99	60.67	0.41	-39	84.67	0.40				41	115.93	0.39	101	138.89	0.38
-158	36.38	0.42	-98	61.07	0.40	-38	85.06	0.39				42	116.31	0.38	102	139.27	0.38
-157	36.80	0.42	-97	61.48	0.41	-37	85.46	0.40				43	116.70	0.39	103	139.65	0.38
-156	37.22	0.42	-96	61.87	0.41	-36	85.85	0.39				44	117.08	0.38	104	140.03	0.38
-155	37.63	0.41	-95	62.29	0.42	-35	86.25	0.40				45	117.47	0.39	105	140.39	0.36
-154	38.05	0.42	-94	62.69	0.40	-34	86.64	0.39				46	117.85	0.38	106	140.77	0.38
-153	38.47	0.42	-93	63.10	0.41	-33	87.04	0.40				47	118.24	0.39	107	141.15	0.38
-152	38.89	0.42	-92	63.50	0.40	-32	87.43	0.39				48	118.62	0.38	108	141.53	0.38
-151	39.31	0.42	-91	63.91	0.41	-31	87.83	0.40				49	119.01	0.39	109	141.91	0.38
-150	39.72	0.41	-90	64.30	0.39	-30	88.22	0.39				50	119.40	0.39	110	142.29	0.38
-149	40.14	0.42	-89	64.70	0.40	-29	88.62	0.40				51	119.78	0.38	111	142.66	0.37
-148	40.56	0.42	-88	65.11	0.41	-28	89.01	0.39				52	120.16	0.38	112	143.04	0.38
-147	40.97	0.41	-87	65.51	0.40	-27	89.40	0.39				53	120.55	0.39	113	143.42	0.38
-146	41.39	0.42	-86	65.91	0.40	-26	89.80	0.40				54	120.93	0.38	114	143.80	0.38
-145	41.80	0.41	-85	66.31	0.40	-25	90.19	0.39				55	121.32	0.39	115	144.18	0.38
-144	42.22	0.42	-84	66.72	0.41	-24	90.59	0.40				56	121.70	0.38	116	144.56	0.38
-143	42.64	0.42	-83	67.12	0.40	-23	90.98	0.39				57	122.09	0.39	117	144.94	0.38
-142	43.05	0.41	-82	67.52	0.40	-22	91.37	0.39				58	122.47	0.38	118	145.32	0.38
-141	43.46	0.41	-81	67.92	0.40	-21	91.77	0.40				59	122.86	0.39	119	145.69	0.37



RESISTANCE TEMPERATURE DETECTORS

RTD Temperature vs. Resistance Table

For European Curve, Alpha = 0.00385, ITS 90

1° Celsius Increments

°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.
+120	146.07	0.38	+180	168.48	0.37	+240	190.47	0.36	+300	212.05	0.36	+360	233.21	0.35	+420	253.96	0.34
121	146.45	0.38	181	168.85	0.37	241	190.83	0.36	301	212.40	0.35	361	233.56	0.35	421	254.30	0.34
122	146.82	0.37	182	169.22	0.37	242	191.20	0.37	302	212.76	0.36	362	233.91	0.35	422	254.65	0.35
123	147.20	0.38	183	169.59	0.37	243	191.56	0.36	303	213.12	0.36	363	234.26	0.35	423	254.99	0.34
124	147.58	0.38	184	169.96	0.37	244	191.92	0.36	304	213.47	0.35	364	234.60	0.36	424	255.33	0.34
125	147.95	0.37	185	170.33	0.37	245	192.28	0.36	305	213.83	0.36	365	234.95	0.35	425	255.67	0.34
126	148.33	0.38	186	170.69	0.36	246	192.66	0.38	306	214.19	0.36	366	235.30	0.35	426	256.01	0.34
127	148.71	0.38	187	171.06	0.37	247	193.02	0.36	307	214.55	0.36	367	235.65	0.35	427	256.35	0.34
128	149.08	0.37	188	171.43	0.37	248	193.38	0.36	308	214.90	0.35	368	236.00	0.35	428	256.70	0.35
129	149.46	0.38	189	171.80	0.37	249	193.74	0.36	309	215.26	0.36	369	236.35	0.35	429	257.04	0.34
130	149.83	0.37	190	172.17	0.37	250	194.10	0.36	310	215.61	0.35	370	236.70	0.35	430	257.38	0.34
131	150.21	0.38	191	172.54	0.37	251	194.47	0.37	311	215.97	0.36	371	237.05	0.35	431	257.72	0.34
132	150.58	0.37	192	172.91	0.37	252	194.83	0.36	312	216.32	0.35	372	237.40	0.35	432	258.06	0.34
133	150.96	0.38	193	173.27	0.36	253	195.19	0.36	313	216.68	0.36	373	237.75	0.35	433	258.40	0.34
134	151.34	0.38	194	173.64	0.37	254	195.55	0.36	314	217.03	0.35	374	238.09	0.34	434	258.74	0.34
135	151.71	0.37	195	174.01	0.37	255	195.90	0.35	315	217.39	0.36	375	238.44	0.35	435	259.08	0.34
136	152.09	0.38	196	174.39	0.38	256	196.26	0.36	316	217.73	0.34	376	238.79	0.35	436	259.42	0.34
137	152.46	0.37	197	174.75	0.36	257	196.62	0.36	317	218.08	0.35	377	239.14	0.35	437	259.76	0.34
138	152.84	0.38	198	175.12	0.37	258	196.98	0.36	318	218.44	0.36	378	239.48	0.34	438	260.10	0.34
139	153.21	0.37	199	175.49	0.37	259	197.35	0.37	319	218.79	0.35	379	239.83	0.35	439	260.44	0.34
140	153.58	0.37	200	175.86	0.37	260	197.71	0.36	320	219.15	0.36	380	240.18	0.35	440	260.78	0.34
141	153.95	0.37	201	176.23	0.37	261	198.07	0.36	321	219.50	0.35	381	240.52	0.34	441	261.12	0.34
142	154.32	0.37	202	176.59	0.36	262	198.43	0.36	322	219.85	0.35	382	240.87	0.35	442	261.46	0.34
143	154.71	0.39	203	176.96	0.37	263	198.79	0.36	323	220.21	0.36	383	241.22	0.35	443	261.80	0.34
144	155.08	0.37	204	177.33	0.37	264	199.15	0.36	324	220.56	0.35	384	241.56	0.34	444	262.14	0.34
145	155.46	0.38	205	177.70	0.37	265	199.51	0.36	325	220.91	0.35	385	241.91	0.35	445	262.48	0.34
146	155.83	0.37	206	178.06	0.36	266	199.87	0.36	326	221.27	0.36	386	242.25	0.34	446	262.83	0.35
147	156.21	0.38	207	178.43	0.37	267	200.23	0.36	327	221.62	0.35	387	242.60	0.35	447	263.17	0.34
148	156.58	0.37	208	178.80	0.37	268	200.59	0.36	328	221.97	0.35	388	242.95	0.35	448	263.50	0.33
149	156.96	0.38	209	179.16	0.36	269	200.95	0.36	329	222.32	0.35	389	243.29	0.34	449	263.84	0.34
150	157.33	0.37	210	179.53	0.37	270	201.31	0.36	330	222.68	0.36	390	243.64	0.35	450	264.18	0.34
151	157.71	0.38	211	179.90	0.37	271	201.67	0.36	331	223.03	0.35	391	243.98	0.34	451	264.52	0.34
152	158.08	0.37	212	180.26	0.36	272	202.03	0.36	332	223.38	0.35	392	244.33	0.35	452	264.86	0.34
153	158.45	0.37	213	180.63	0.37	273	202.38	0.35	333	223.73	0.35	393	244.67	0.34	453	265.20	0.34
154	158.83	0.38	214	180.99	0.36	274	202.74	0.36	334	224.09	0.36	394	245.02	0.35	454	265.54	0.34
155	159.20	0.37	215	181.36	0.37	275	203.10	0.36	335	224.45	0.36	395	245.36	0.34	455	265.87	0.33
156	159.56	0.36	216	181.73	0.37	276	203.46	0.36	336	224.80	0.35	396	245.71	0.35	456	266.21	0.34
157	159.94	0.38	217	182.09	0.36	277	203.82	0.36	337	225.15	0.35	397	246.05	0.34	457	266.55	0.34
158	160.31	0.37	218	182.46	0.37	278	204.18	0.36	338	225.50	0.35	398	246.40	0.35	458	266.89	0.34
159	160.68	0.37	219	182.82	0.36	279	204.54	0.36	339	225.85	0.35	399	246.74	0.34	459	267.22	0.33
160	161.05	0.37	220	183.19	0.37	280	204.90	0.36	340	226.21	0.36	400	247.09	0.35	460	267.56	0.34
161	161.43	0.38	221	183.55	0.36	281	205.25	0.35	341	226.56	0.35	401	247.43	0.34	461	267.90	0.34
162	161.80	0.37	222	183.92	0.37	282	205.61	0.36	342	226.91	0.35	402	247.78	0.35	462	268.24	0.34
163	162.17	0.37	223	184.28	0.36	283	205.97	0.36	343	227.26	0.35	403	248.12	0.34	463	268.57	0.33
164	162.54	0.37	224	184.65	0.37	284	206.33	0.36	344	227.61	0.35	404	248.46	0.34	464	268.91	0.34
165	162.91	0.37	225	185.01	0.36	285	206.70	0.37	345	227.96	0.35	405	248.81	0.35	465	269.25	0.34
166	163.28	0.37	226	185.38	0.37	286	207.05	0.35	346	228.31	0.35	406	249.15	0.34	466	269.58	0.33
167	163.66	0.38	227	185.74	0.36	287	207.41	0.36	347	228.66	0.35	407	249.50	0.35	467	269.92	0.34
168	164.03	0.37	228	186.11	0.37	288	207.77	0.36	348	229.01	0.35	408	249.84	0.34	468	270.26	0.34
169	164.40	0.37	229	186.47	0.36	289	208.13	0.36	349	229.36	0.35	409	250.18	0.34	469	270.59	0.33
170	164.77	0.37	230	186.84	0.37	290	208.48	0.35	350	229.72	0.34	410	250.53	0.35	470	270.93	0.34
171	165.14	0.37	231	187.20	0.36	291	208.84	0.36	351	230.07	0.35	411	250.89	0.34	471	271.27	0.34
172	165.51	0.37	232	187.56	0.36	292	209.20	0.36	352	230.42	0.35	412	251.21	0.34	472	271.60	0.33
173	165.88	0.37	233	187.93	0.37	293	209.55	0.35	353	230.77	0.35	413	251.55	0.34	473	271.94	0.34
174	166.25	0.37	234	188.29	0.36	294	209.91	0.36	354	231.12	0.35	414	251.90	0.35	474	272.27	0.33
175	166.62	0.37	235	188.65	0.36	295	210.27	0.36	355	231.47	0.35	415	252.24	0.34	475	272.61	0.34
176	167.00	0.38	236	189.02	0.37	296	210.62	0.35	356	231.81	0.36	416	252.59	0.35	476	272.95	0.34
177	167.37	0.37	237	189.38	0.36	297	210.98	0.36	357	232.16	0.35	417	252.94	0.35	477	273.28	0.33
178	167.74	0.37	238	189.74	0.36	298	211.34	0.36	358	232.51	0.35	418	253.28	0.34	478	273.62	0.34
179	168.11	0.37	239	190.11	0.37	299	211.69	0.35	359	232.86	0.35	419	253.62	0.34	479	273.95	0.33



RESISTANCE TEMPERATURE DETECTORS

RTD Temperature vs. Resistance Table

For European Curve, Alpha = 0.00385, ITS-90

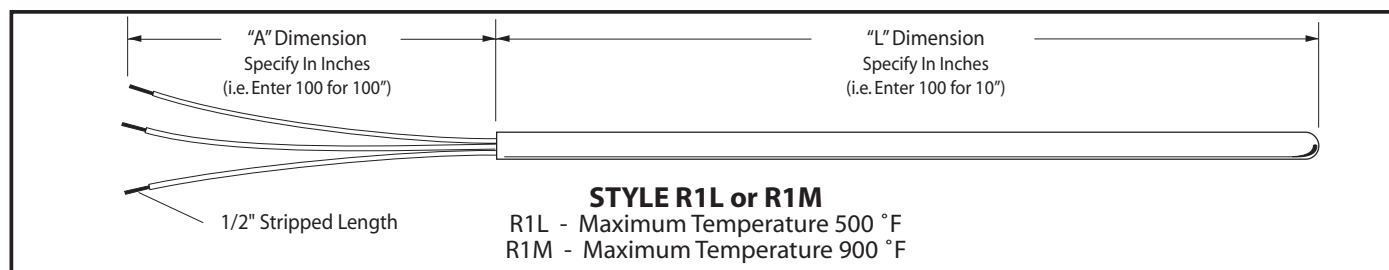
1° Celsius Increments

°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.
+480	274.29	0.34	+542	294.87	0.33	+604	315.00	0.32	+666	334.68	0.32	+728	353.91	0.30	+790	372.71	0.30
481	274.62	0.33	543	295.20	0.33	605	315.32	0.32	667	334.99	0.31	729	354.22	0.31	791	373.01	0.30
482	274.96	0.34	544	295.53	0.33	606	315.64	0.32	668	335.31	0.32	730	354.53	0.31	792	373.31	0.30
483	275.29	0.33	545	295.85	0.32	607	315.96	0.32	669	335.62	0.31	731	354.83	0.30	793	373.61	0.30
484	275.63	0.34	546	296.18	0.33	608	316.28	0.32	670	335.93	0.31	732	355.14	0.31	794	373.91	0.30
485	275.96	0.33	547	296.51	0.33	609	316.60	0.32	671	336.25	0.32	733	355.44	0.30	795	374.21	0.30
486	276.31	0.34	548	296.84	0.33	610	316.92	0.32	672	336.56	0.31	734	355.75	0.31	796	374.51	0.30
487	276.64	0.33	549	297.16	0.32	611	317.24	0.32	673	336.87	0.31	735	356.06	0.31	797	374.80	0.29
488	276.97	0.33	550	297.49	0.33	612	317.56	0.32	674	337.18	0.31	736	356.37	0.31	798	374.10	0.30
489	277.31	0.34	551	297.82	0.33	613	317.88	0.32	675	337.50	0.32	737	356.68	0.31	799	375.40	0.30
490	277.64	0.33	552	298.14	0.32	614	318.20	0.32	676	337.81	0.31	738	356.98	0.30	800	375.70	0.30
491	277.98	0.34	553	298.47	0.33	615	318.52	0.32	677	338.12	0.31	739	357.29	0.31	801	376.00	0.30
492	278.31	0.33	554	298.80	0.33	616	318.85	0.33	678	338.43	0.31	740	357.59	0.30	802	376.29	0.29
493	278.64	0.33	555	299.12	0.32	617	319.17	0.32	679	338.75	0.32	741	357.90	0.31	803	376.59	0.30
494	278.98	0.34	556	299.45	0.33	618	319.49	0.32	680	339.06	0.31	742	358.20	0.30	804	376.89	0.30
495	279.31	0.33	557	299.78	0.33	619	319.81	0.32	681	339.37	0.31	743	358.51	0.31	805	377.19	0.30
496	279.64	0.33	558	300.10	0.32	620	320.12	0.31	682	339.68	0.31	744	358.81	0.30	806	377.49	0.30
497	279.98	0.34	559	300.43	0.33	621	320.44	0.32	683	339.99	0.31	745	359.12	0.31	807	377.79	0.30
498	280.31	0.33	560	300.75	0.32	622	320.76	0.32	684	340.30	0.31	746	359.42	0.30	808	378.09	0.30
499	280.64	0.33	561	301.08	0.33	623	321.08	0.32	685	340.62	0.32	747	359.72	0.30	809	378.39	0.30
500	280.98	0.34	562	301.41	0.33	624	321.40	0.32	686	340.94	0.32	748	360.03	0.31	810	378.68	0.29
501	281.31	0.33	563	301.73	0.32	625	321.72	0.32	687	341.25	0.31	749	360.33	0.30	811	378.98	0.30
502	281.64	0.33	564	302.06	0.33	626	322.03	0.31	688	341.55	0.30	750	360.64	0.31	812	379.28	0.30
503	281.97	0.33	565	302.38	0.32	627	322.34	0.31	689	341.87	0.32	751	360.94	0.30	813	379.57	0.29
504	282.31	0.34	566	302.71	0.33	628	322.66	0.32	690	342.18	0.31	752	361.24	0.30	814	379.87	0.30
505	282.64	0.33	567	303.03	0.32	629	322.98	0.32	691	342.49	0.31	753	361.55	0.31	815	380.17	0.30
506	282.97	0.33	568	303.36	0.33	630	323.30	0.32	692	342.80	0.31	754	361.85	0.30	816	380.46	0.29
507	283.30	0.33	569	303.68	0.32	631	323.61	0.31	693	343.11	0.31	755	362.15	0.30	817	380.76	0.30
508	283.63	0.33	570	304.01	0.33	632	323.93	0.32	694	343.42	0.31	756	362.46	0.31	818	381.05	0.29
509	283.97	0.34	571	304.33	0.32	633	324.25	0.32	695	343.73	0.31	757	362.76	0.30	819	381.35	0.30
510	284.30	0.33	572	304.66	0.33	634	324.57	0.32	696	344.04	0.31	758	363.06	0.30	820	381.65	0.30
511	284.63	0.33	573	304.98	0.32	635	324.88	0.31	697	344.35	0.31	759	363.36	0.30	821	381.94	0.29
512	284.96	0.33	574	305.30	0.32	636	325.21	0.33	698	344.66	0.31	760	363.67	0.31	822	382.24	0.30
513	285.29	0.33	575	305.63	0.33	637	325.53	0.32	699	344.97	0.31	761	363.97	0.30	823	382.53	0.29
514	285.62	0.33	576	305.95	0.32	638	325.85	0.32	700	345.28	0.31	762	364.27	0.30	824	382.83	0.30
515	285.95	0.33	577	306.28	0.33	639	326.16	0.31	701	345.59	0.31	763	364.57	0.30	825	383.12	0.29
516	286.30	0.35	578	306.60	0.32	640	326.48	0.32	702	345.90	0.31	764	364.88	0.31	826	383.42	0.30
517	286.63	0.33	579	306.92	0.32	641	326.79	0.31	703	346.21	0.31	765	365.18	0.30	827	383.71	0.29
518	286.96	0.33	580	307.25	0.33	642	327.11	0.32	704	346.52	0.31	766	365.49	0.31	828	384.01	0.30
519	287.29	0.33	581	307.57	0.32	643	327.43	0.32	705	346.83	0.31	767	365.79	0.30	829	384.30	0.29
520	287.62	0.33	582	307.89	0.32	644	327.74	0.31	706	346.15	0.32	768	366.09	0.30	830	384.60	0.30
521	287.95	0.33	583	308.22	0.33	645	328.06	0.32	707	347.46	0.31	769	366.40	0.31	831	384.89	0.29
522	288.28	0.33	584	308.54	0.32	646	328.38	0.32	708	347.76	0.30	770	366.70	0.30	832	385.18	0.29
523	288.61	0.33	585	308.86	0.32	647	328.69	0.31	709	348.07	0.31	771	367.00	0.30	833	385.48	0.30
524	288.94	0.33	586	309.19	0.33	648	329.01	0.32	710	348.38	0.31	772	367.30	0.30	834	385.77	0.29
525	289.27	0.33	587	309.51	0.32	649	329.32	0.31	711	348.69	0.31	773	367.60	0.30	835	386.07	0.30
526	289.60	0.33	588	309.83	0.32	650	329.64	0.32	712	349.00	0.31	774	367.90	0.30	836	386.37	0.30
527	289.93	0.33	589	310.15	0.32	651	329.95	0.31	713	349.31	0.31	775	368.20	0.30	837	386.66	0.29
528	290.26	0.33	590	310.48	0.33	652	330.27	0.32	714	349.61	0.30	776	368.50	0.30	838	386.96	0.30
529	290.59	0.33	591	310.80	0.32	653	330.58	0.31	715	349.92	0.31	777	368.81	0.31	839	387.25	0.29
530	290.92	0.33	592	311.12	0.32	654	330.90	0.32	716	350.23	0.31	778	369.11	0.30	840	387.55	0.30
531	291.25	0.33	593	311.45	0.33	655	331.21	0.31	717	350.54	0.31	779	369.41	0.30	841	387.84	0.29
532	291.58	0.33	594	311.78	0.33	656	331.53	0.32	718	350.85	0.31	780	369.71	0.30	842	388.13	0.29
533	291.90	0.32	595	312.10	0.32	657	331.84	0.31	719	351.15	0.30	781	370.01	0.30	843	388.42	0.29
534	292.23	0.33	596	312.43	0.33	658	332.16	0.32	720	351.46	0.31	782	370.31	0.30	844	388.72	0.30
535	292.56	0.33	597	312.75	0.32	659	332.47	0.31	721	351.77	0.31	783	370.61	0.30	845	389.01	0.29
536	292.90	0.34	598	313.07	0.32	660	332.79	0.32	722	352.07	0.30	784	370.91	0.30	846	389.31	0.30
537	293.23	0.33	599	313.39	0.32	661	333.10	0.31	723	352.38	0.31	785	371.21	0.30	847	389.61	0.30
538	293.56	0.33	600	313.71	0.32	662	333.41	0.31	724	352.69	0.31	786	371.52	0.31	848	389.90	0.29
539	293.89	0.33	601	314.04	0.33	663	333.73	0.32	725	352.99	0.30	787	371.82	0.30	849	390.19	0.29
540	294.21	0.32	602	314.36	0.32	664	334.04	0.31	726	353.30	0.31	788	372.12	0.30	850	390.48	0.29
541	294.54	0.33	603	314.68	0.32	665	334.36	0.32	727	353.61	0.31	789	372.41	0.29			



RESISTANCE TEMPERATURE DETECTORS

RTD WITH LEADWIRE



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
J	120 ohm Nickel .00672 Coefficient (R1L Only)
K	604 ohm Nickel Iron .00520 Coefficient (R1L Only)

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel
8	Inconel 600

CODE	TABLE 4: SHEATH DIAMETER
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.
F	.375" or 3/8" O.D.

TABLE 5: SHEATH LENGTH ("L")
Specify In Inches (i.e. Enter CODE 100 for 10") See Tables on Page 147.

TABLE 6: LEAD LENGTH ("A")
Specify In Inches (i.e. Enter CODE 100 for 10") See Tables on Page 147.

CODE	TABLE 7: LEADWIRE TYPE
A	Fiberglass Leadwire
B	Fiberglass Leadwire with Overall Fiberglass Jacket
C	Fiberglass Leadwire with Stainless Steel Overbraid
D	Fiberglass Leadwire with Stainless Steel Armor
E	Mica/Fiberglass Leadwire
F	Teflon Leadwire Leads (R1L Only)
G	Teflon Leads with Overall Teflon Jacket (R1L Only)
H	Teflon Leadwire with Braid Shield (R1L Only)
J	Teflon Leadwire with S.S. Overbraid (R1L Only)
K	Teflon Leadwire with S.S. Armor (R1L Only)
M	PVC Leadwire with Mylar Shield (R1L Only)

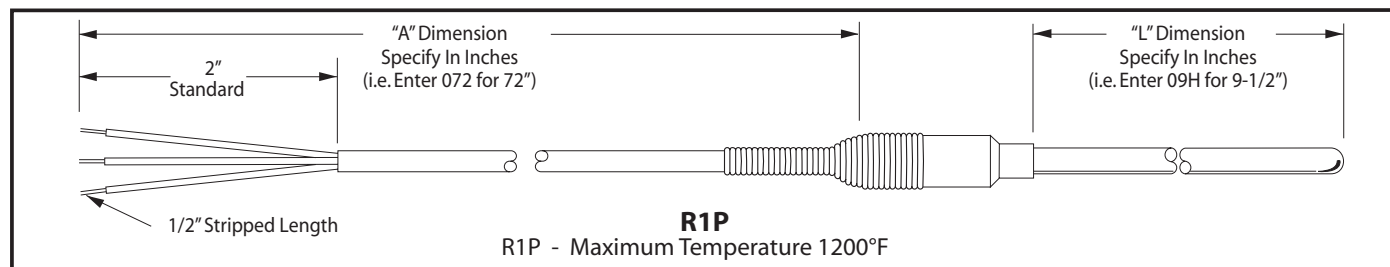
CODE	TABLE 8: TERMINAL CONNECTORS
1	#6 Spade Lug
3	Standard Plug
A	3/16" Disconnect
B	3/16" Disconnect, Insulated
C	1/4" Disconnect
D	1/4" Disconnect, Insulated
M	Mini Plug
X	Special, Specify

CODE	TABLE 9: MOUNTING OPTIONS
O	No Additional Mounting
N	1/8" N.P.T. Compression, Brass
R	1/4" N.P.T. Compression, Brass
P	1/8" N.P.T. Compression, Stainless Steel
S	1/4" N.P.T. Compression, Stainless Steel
V	1/2" N.P.T. Compression, Stainless Steel
X	Special, Specify

PART NUMBER SEQUENCE										
i.e. R1M-AB4F100-100FCR										
Enter CODE From Tables	R1L or R1M	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8	Table 9
	Sensor Type & Style No.	Element Type	Wiring Configuration	Sheath Material	Sheath Diameter	"L" Sheath Length	"A" Lead Length	Leadwire Type	Terminal Connectors	Mounting Options

RESISTANCE TEMPERATURE DETECTORS

HIGH TEMPERATURE RTD WITH LEADWIRE



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel
8	Inconel 600

CODE	TABLE 4: SHEATH DIAMETER
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.
F	.375" or 3/8" O.D.

TABLE 5: SHEATH LENGTH ("L")
Specify In Inches (i.e. Enter CODE 09H for 9 1/2") See Page 147.

TABLE 6: LEAD LENGTH ("A")
Specify In Inches (i.e. Enter CODE 072 for 72") See Tables on Page 147.

CODE	TABLE 7: LEADWIRE TYPE
A	Fiberglass Leadwire
B	Fiberglass Leadwire with Overall Fiberglass Jacket
C	Fiberglass Leadwire with Stainless Steel Overbraid
D	Fiberglass Leadwire with Stainless Steel Armor
E	Mica/Fiberglass Leadwire
F	Teflon Leadwire
H	Teflon Leadwire with Braid Shield
J	Teflon Leadwire with Stainless Steel Overbraid

CODE	TABLE 8: TERMINAL CONNECTORS
1	#6 Spade Lug
3	Standard Plug
A	3/16" Disconnect
B	3/16" Disconnect, Insulated
C	1/4" Disconnect
D	1/4" Disconnect, Insulated
M	Mini Plug
X	Special, Specify

CODE	TABLE 9: MOUNTING OPTIONS
O	No Additional Mounting
N	1/8" N.P.T. Compression, Brass
R	1/4" N.P.T. Compression, Brass
P	1/8" N.P.T. Compression, Stainless Steel
S	1/4" N.P.T. Compression, Stainless Steel
V	1/2" N.P.T. Compression, Stainless Steel
X	Special, Specify

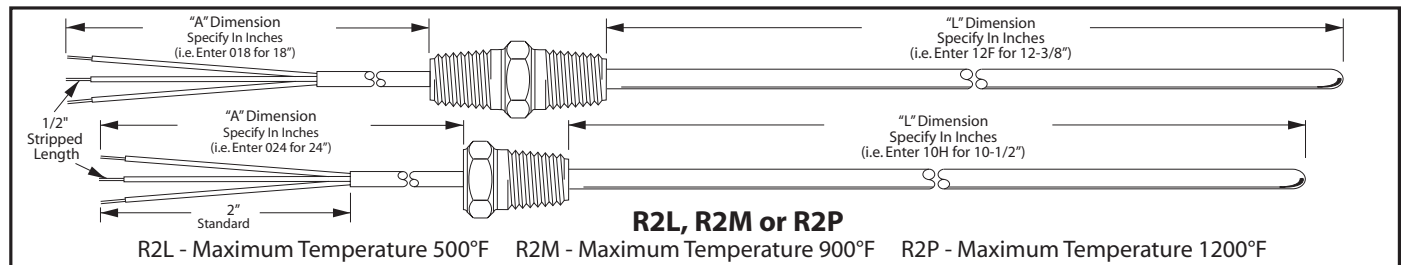
PART NUMBER SEQUENCE i.e. R1P-AA4B09H-072ECR

Enter CODE From Tables	R1P	-	A	A	4	B	09H	-	072	E	C	R
	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8	Table 9			
	Sensor Type & Style No.	Element Type	Wiring Configuration	Sheath Material	Sheath Diameter	"L" Sheath Length	"A" Lead Length	Leadwire Type	Terminal Connectors	Mounting Options		



RESISTANCE TEMPERATURE DETECTORS

RTD WITH FIXED FITTING



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
J	120 ohm Nickel .00672 Coefficient (R2L Only)
K	604 ohm Nickel Iron .00520 Coefficient (R2L Only)

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel
8	Inconel 600

CODE	TABLE 4: SHEATH DIAMETER
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.
F	.375" or 3/8" O.D.

TABLE 5: SHEATH LENGTH ("L")
Specify In Inches (i.e. Enter CODE 12F for 12 3/8") See Page 147.

TABLE 6: LEAD LENGTH ("A")
Specify In Inches (i.e. Enter CODE 018 for 18") See Tables on Page 147.

CODE	TABLE 7: LEADWIRE TYPE
A	Fiberglass Leadwire
B	Fiberglass Leadwire with Overall Fiberglass Jacket
C	Fiberglass Leadwire with Stainless Steel Overbraid
D	Fiberglass Leadwire with Stainless Steel Armor
E	Mica/Fiberglass Leadwire
F	Teflon Leadwire (R2L Only)
G	Teflon Leads with Overall Teflon Jacket (R2L Only)
H	Teflon Leadwire with Braid Shield (R2L Only)
J	Teflon Leadwire with S.S. Overbraid (R2L Only)
K	Teflon Leadwire with S.S. Armor (R2L Only)
M	PVC Leadwire with Mylar Shield (R2L Only)

CODE	TABLE 8: SPRING LOADED OPTIONS
1	Fixed Fitting
2	Spring Loaded Fitting

CODE	TABLE 9: FITTING OPTIONS
1	1/4" N.P.T. x 1/4" N.P.T. Brass
2	1/4" N.P.T. x 1/4" N.P.T. Stainless Steel
5	1/2" N.P.T. x 1/2" N.P.T. Brass
6	1/2" N.P.T. x 1/2" N.P.T. Stainless Steel
C	1/4" N.P.T. Brass
D	1/4" N.P.T. Stainless Steel
G	1/2" N.P.T. Brass
H	1/2" N.P.T. Stainless Steel
X	Special, Specify

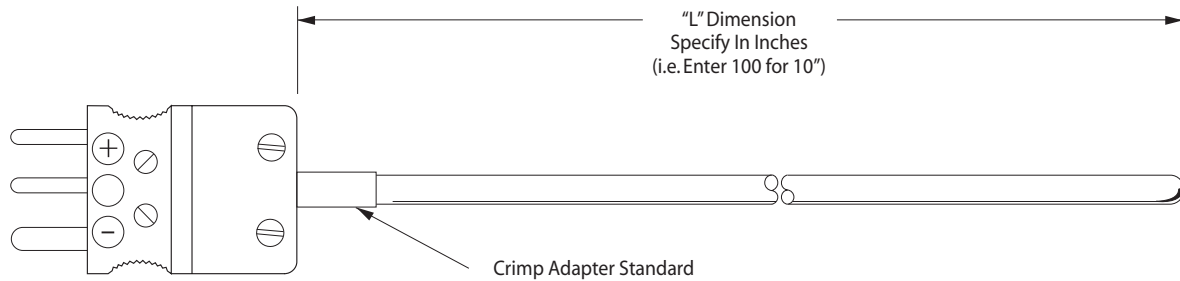
PART NUMBER SEQUENCE i.e. R2P-EB4V12F-018E2C

Enter CODE From Tables	R2P	-	E	B	4	V	12F	-	018	E	2	C
	R2L, R2M or R2P	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8	Table 9		
	Sensor Type & Style No.	Element Type	Wiring Configuration	Sheath Material	Sheath Diameter	"L" Sheath Length	"A" Lead Length	Leadwire Type	Spring Loading	Fitting Options		



RESISTANCE TEMPERATURE DETECTORS

RTD WITH PLUG



R3L, R3M or R3P

R3L - Maximum Temperature 500°F

R3M - Maximum Temperature 900°F

R3P - Maximum Temperature 1200°F

CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
J	120 ohm Nickle .00672 Coefficient (R3L Only)
K	604 ohm Nickle Iron .00520 Coefficient (R3L Only)

CODE	TABLE 4: SHEATH DIAMETER
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.
F	.375" or 3/8" O.D.

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

TABLE 5: SHEATH LENGTH ("L")
Specify In Inches (i.e. Enter CODE 100 for 10") See Tables on Page 147.

CODE	TABLE 3: SHEATH MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel
8	Inconel 600

CODE	TABLE 6: TERMINAL CONNECTORS
5	Standard Plug with Crimp Connector
7	Standard Plug with Tube Adapter
J	Circular Terminal Block, Ceramic Insulated
K	Circular Terminal Block, Glass Cloth Insulated
M	Mini Plug
X	Special, Specify

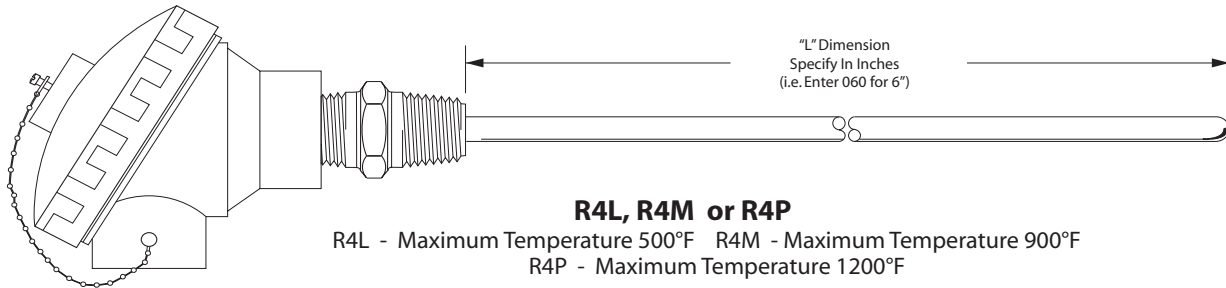
PART NUMBER SEQUENCE i.e. R3L-BB6F100-5

Enter CODE From Tables	R3L	-	B	B	6	F	100	-	5
	R3L, R3M or R3P		Table 1	Table 2	Table 3	Table 4	Table 5		Table 6
	Sensor Type & Style No.		Element Type	Wiring Configuration	Sheath Material	Sheath Diameter	"L" Sheath Length		Terminal Connectors



RESISTANCE TEMPERATURE DETECTORS

RTD WITH TERMINAL HEAD



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
J	120 ohm Nickel .00672 Coefficient (R4L Only)
K	604 ohm Nickel Iron .00520 Coefficient (R4L Only)

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel
8	Inconel 600

CODE	TABLE 4: SHEATH DIAMETER
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.
F	.375" or 3/8" O.D.

TABLE 5: SHEATH LENGTH ("L")
Specify In Inches (i.e. Enter CODE 060 for 6") See Table on Page 147.

CODE	TABLE 6: PROCESS CONNECTIONS
6	1/2" N.P.T., Stainless Steel Nipple
8	3/4" N.P.T., Stainless Steel Nipple

CODE	TABLE 7: SPRING LOADED OPTIONS
1	Fixed Fitting
2	Spring Loaded Fitting

CODE	TABLE 8: TERMINAL HEADS
A	Aluminum Screw Cover Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Screw Cover Head; 3/4" N.P.T. Conduit Connection
C	Cast Iron Screw Cover Head; 1/2" N.P.T. Conduit Connection
D	Cast Iron Screw Cover Head; 1/2" N.P.T. Conduit Connection
P	Plastic Screw Cover Head; 1/2" N.P.T. Conduit Connection
M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
Z	Explosion Proof; 1/2" N.P.T. Conduit Connection
W	White Polypropylene FDA Compliant Screw Cover Head; 1/2" N.P.T. Conduit Connection

CODE	TABLE 9: MOUNTING OPTIONS
O	No Additional Mounting
N	1/8" N.P.T. Compression, Brass
R	1/4" N.P.T. Compression, Brass
P	1/8" N.P.T. Compression, Stainless Steel
S	1/4" N.P.T. Compression, Stainless Steel
V	1/2" N.P.T. Compression, Stainless Steel
X	Special, Specify

PART NUMBER SEQUENCE i.e. R4L-EA4C060-S2AR

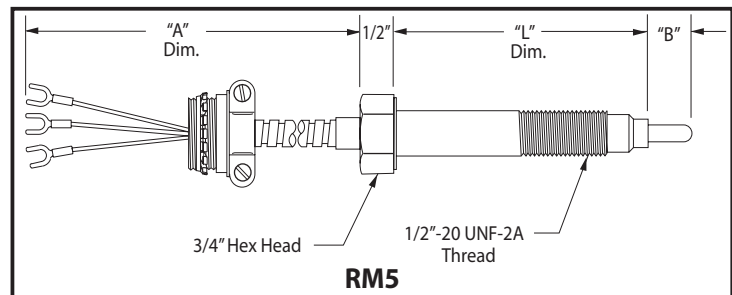
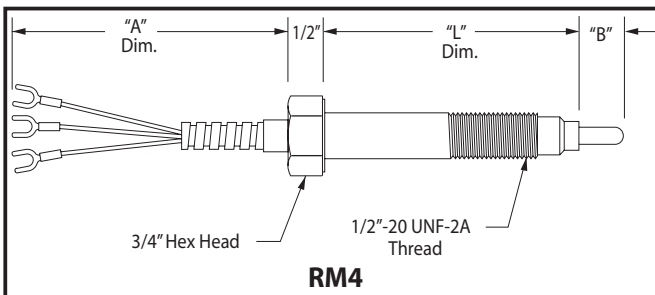
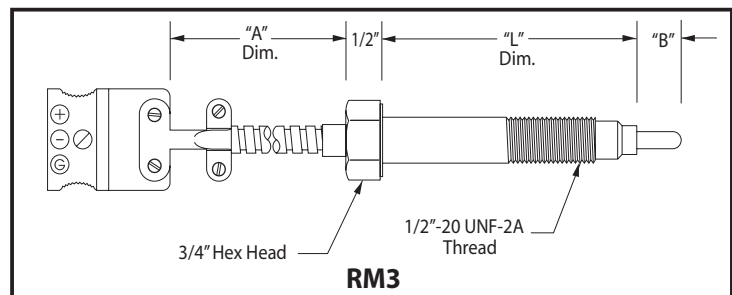
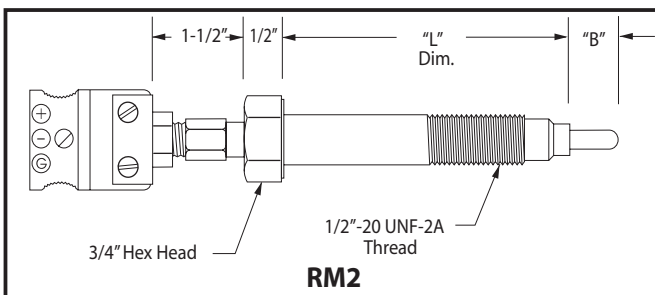
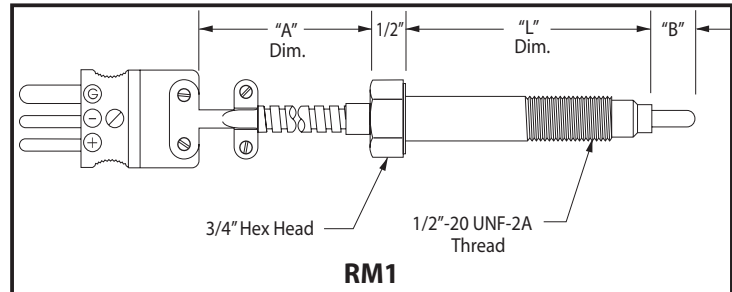
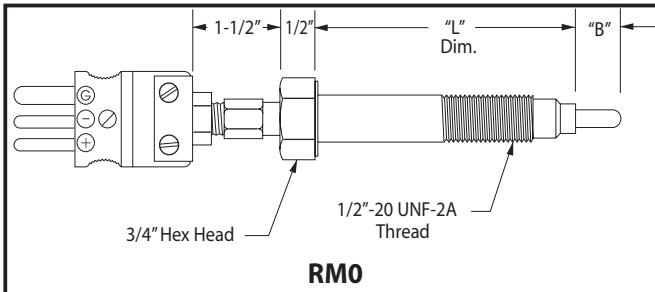
Enter CODE From Tables	R4L	-	E	A	4	C	060	-	S	2	A	R
	R4L, R4M or R4P Sensor Type & Style No.		Table 1 Element Type	Table 2 Wiring Configuration	Table 3 Sheath Material	Table 4 Sheath Diameter	Table 5 "L" Sheath Length		Table 6 Process Connections	Table 7 Spring Loading	Table 8 Terminal Head	Table 9 Mounting Options



RTD ASSEMBLIES FOR THE PLASTIC INDUSTRY

MELT BOLT RESISTANCE TEMPERATURE DETECTORS

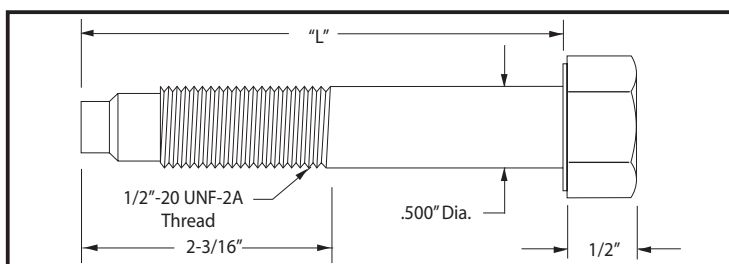
Durex melt bolts are designed for dependable temperature measurement of the plastic melt stream within extruders and injection molding equipment. Standard assemblies are supplied with mineral insulated sensing elements for extended pressure and temperature performance. For options at the probe tip there are thermal barriers of Teflon (500°F) and Mycalex (900°F); available upon request.



ENTER CODE i.e. RM1-ES3030-S024L

Enter CODE From Tables	Sensor Type & Design No.	Element Type (See table on Pg. 144 for Element Type CODE)	(S) Single or (D) Dual And # of Wires (i.e. S3)	"L" Dim. 3/4" or 6" Std. See Table on Page 147	"B" Dim. 1/8" Dia. Tip (i.e. Enter S for 1") See Page 147	"A" Dim. Where Applicable (i.e. Enter 024 for 24") See Page 147	Operating Temperature L-500°F / M-900°F
------------------------	-----------------------------	---	---	---	--	--	---

BLANK BOLTS



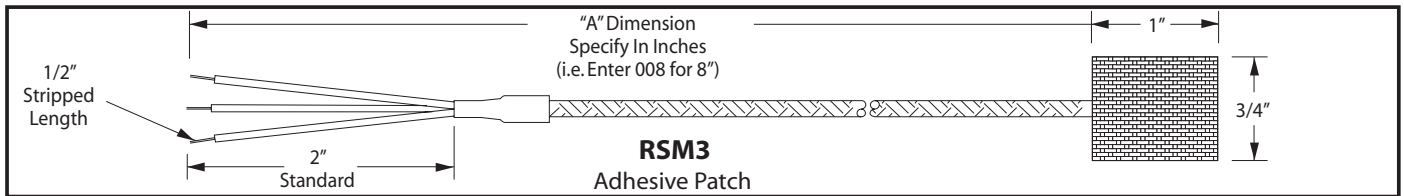
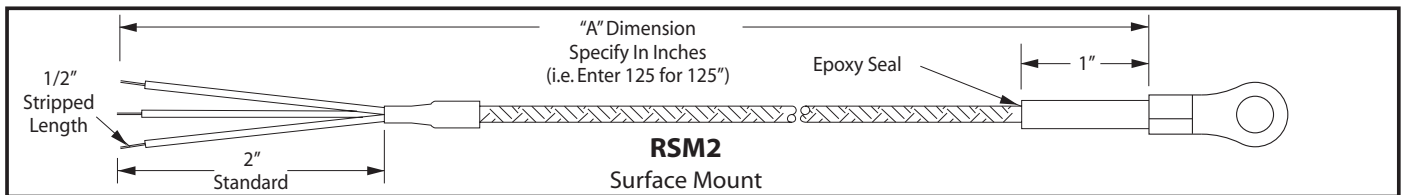
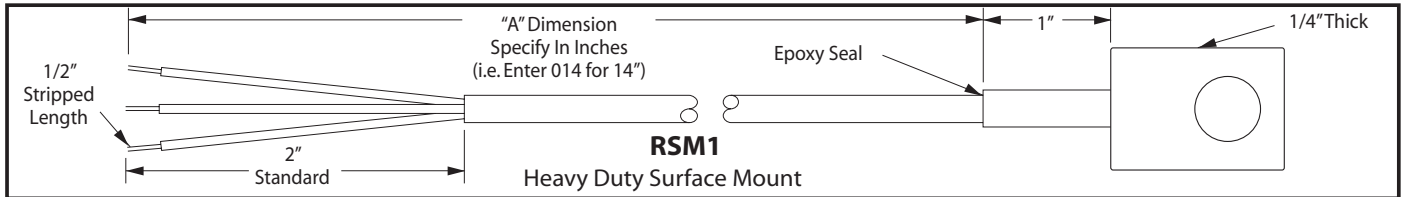
CATALOG #	'L' Dimension
244008	3"
244009	6"

Blank bolts occupy hole when Melt Bolt is removed.



RESISTANCE TEMPERATURE DETECTORS

SURFACE MOUNT RTD'S



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient

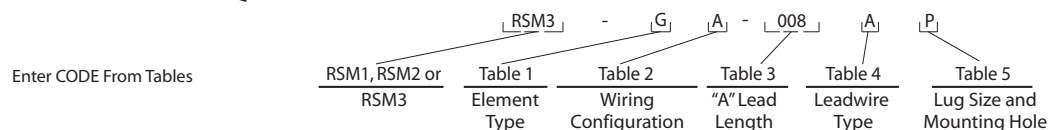
CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")

TABLE 3: LEAD LENGTH ("A")
Specify In Inches (i.e. Enter CODE 008 for 8") See Table on Page 147.

CODE	TABLE 4: LEADWIRE TYPE
A	Fiberglass Leadwire
B	Fiberglass Leadwire with Overall Fiberglass Jacket
C	Fiberglass Leadwire with Stainless Steel Overbraid
D	Fiberglass Leadwire with Stainless Steel Armor
E	Mica/Fiberglass Leadwire
F	Teflon Leadwire
G	Teflon Leadwire with Overall Teflon Jacket
H	Teflon Leadwire with Braid Shield
J	Teflon Leadwire with Stainless Steel Overbraid
K	Teflon Leadwire with Stainless Steel Armor
M	PVC Leadwire with Mylar Shield

CODE	TABLE 5: MOUNTING HOLE
A	No. 6 Stud Size, .144" Hole Diameter
B	No. 8 Stud Size, .169" Hole Diameter
C	No. 10 Stud Size, .196" Hole Diameter
D	1/4" Stud Size, .266" Hole Diameter
E	3/8" Stud Size, .390" Hole Diameter
P	Adhesive Patch, No Stud Required

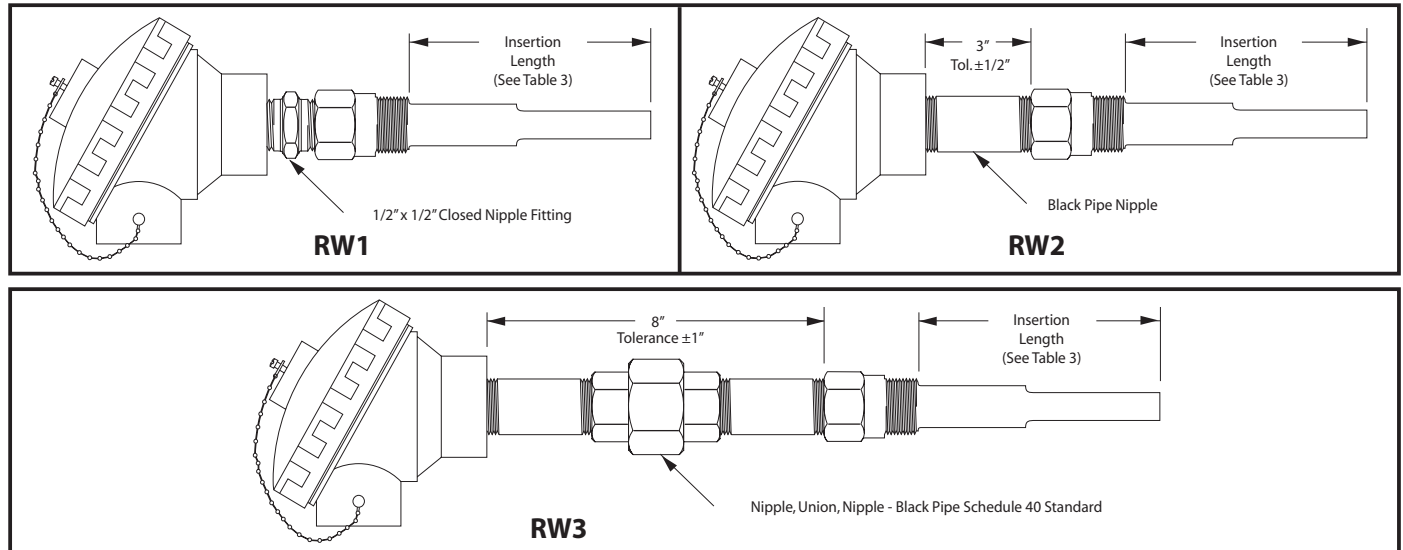
PART NUMBER SEQUENCE i.e. RSM3-GA-008AP





RESISTANCE TEMPERATURE DETECTORS

RTD THERMOWELLS



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
J	120 ohm Nickel .00672 Coefficient
K	604 ohm Nickel Iron .00520 Coefficient

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

TABLE 3: THERMOWELL NUMBER
See Next Page For Thermowell CODE Number

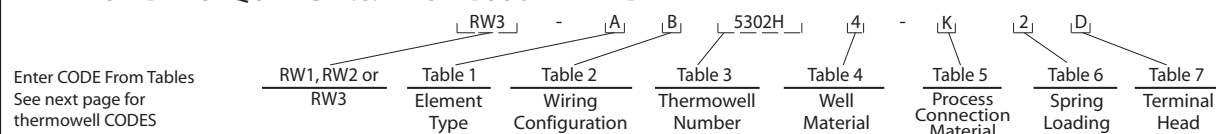
CODE	TABLE 4: WELL MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel

CODE	TABLE 5: PROCESS CONNECTION MATERIAL
K	Black Pipe, Schedule 40
Y	Galvanized
4	Stainless Steel 304

CODE	TABLE 6: SPRING LOADED OPTIONS
1	Fixed Fitting
2	Spring Loaded Fitting

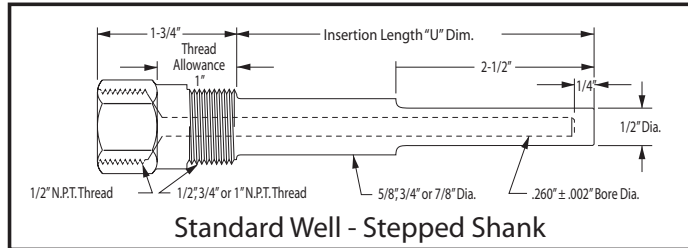
CODE	TABLE 7: TERMINAL HEADS
A	Aluminum Screw Cover Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Screw Cover Head; 3/4" N.P.T. Conduit Connection
C	Cast Iron Screw Cover Head; 1/2" N.P.T. Conduit Connection
D	Cast Iron Screw Cover Head; 3/4" N.P.T. Conduit Connection
P	Plastic Screw Cover Head; 1/2" N.P.T. Conduit Connection
M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
Z	Explosion Proof; 1/2" N.P.T. Conduit Connection
W	White Polypropylene FDA Compliant Screw Cover Head; 1/2" N.P.T. Conduit Connection

PART NUMBER SEQUENCE i.e. RW3-AB5302H4-K2D

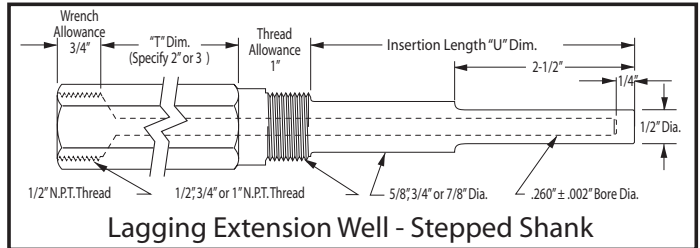




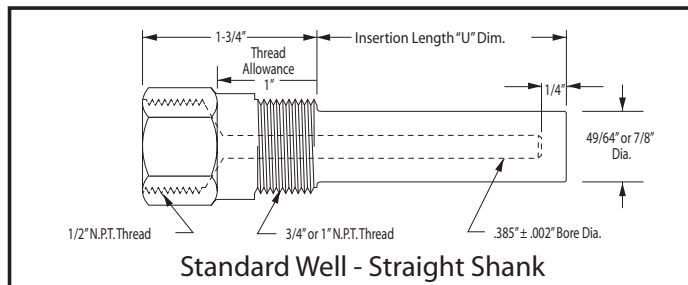
RTD THERMOWELLS



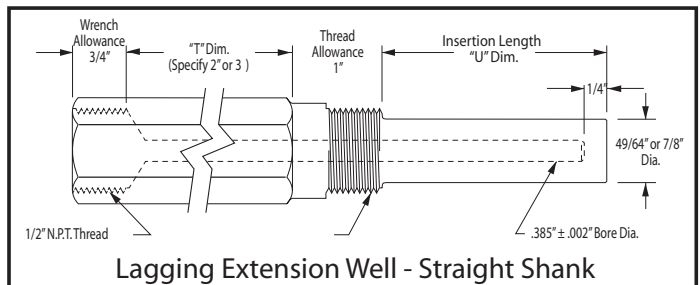
"U" Dim.	1/2" N.P.T.	3/4" N.P.T.	1" N.P.T.
2-1/2"	1202H	1302H	1402H
4-1/2"	1204H	1304H	1404H
6"	12060	13060	14060
7-1/2"	1207H	1307H	1407H
10-1/2"	1210H	1310H	1410H
12"	12120	13120	14120
16-1/2"	1216H	1316H	1416H
22-1/2"	1222H	1322H	1422H



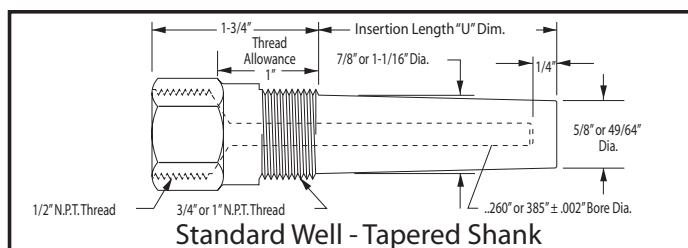
"U" Dim.	1/2" N.P.T.	3/4" N.P.T.	1" N.P.T.
2-1/2"	2202H	2302H	2402H
4-1/2"	2204H	2304H	2404H
6"	22060	23060	24060
7-1/2"	2207H	2307H	2407H
10-1/2"	2210H	2310H	2410H
12"	22120	23120	24120
16-1/2"	2216H	2316H	2416H
22-1/2"	2222H	2322H	2422H



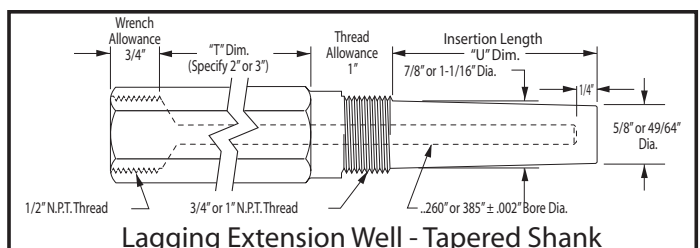
"U" Dim.	3/4" N.P.T.	1" N.P.T.
2-1/2"	3302H	3402H
4-1/2"	3304H	3404H
6"	33060	34060
7-1/2"	3307H	3407H
10-1/2"	3310H	3410H
12"	33120	34120
16-1/2"	3316H	3416H
22-1/2"	3322H	3422H



"U" Dim.	3/4" N.P.T.	1" N.P.T.
2-1/2"	4302H	4402H
4-1/2"	4304H	4404H
6"	43060	44060
7-1/2"	4307H	4407H
10-1/2"	4310H	4410H
12"	43120	44120
16-1/2"	4316H	4416H
22-1/2"	4322H	4422H



"U" Dim.	3/4" N.P.T.		1" N.P.T.	
	.260" BORE	.385" BORE	.260" BORE	.385" BORE
2-1/2"	5302H	6302H	5402H	6402H
4-1/2"	5304H	6304H	5404H	6404H
6"	53060	63060	54060	64060
7-1/2"	5307H	6307H	5407H	6407H
10-1/2"	5310H	6310H	5410H	6410H
12"	53120	63120	54120	64120
16-1/2"	5316H	6316H	5416H	6416H
22-1/2"	5322H	6322H	5422H	6422H

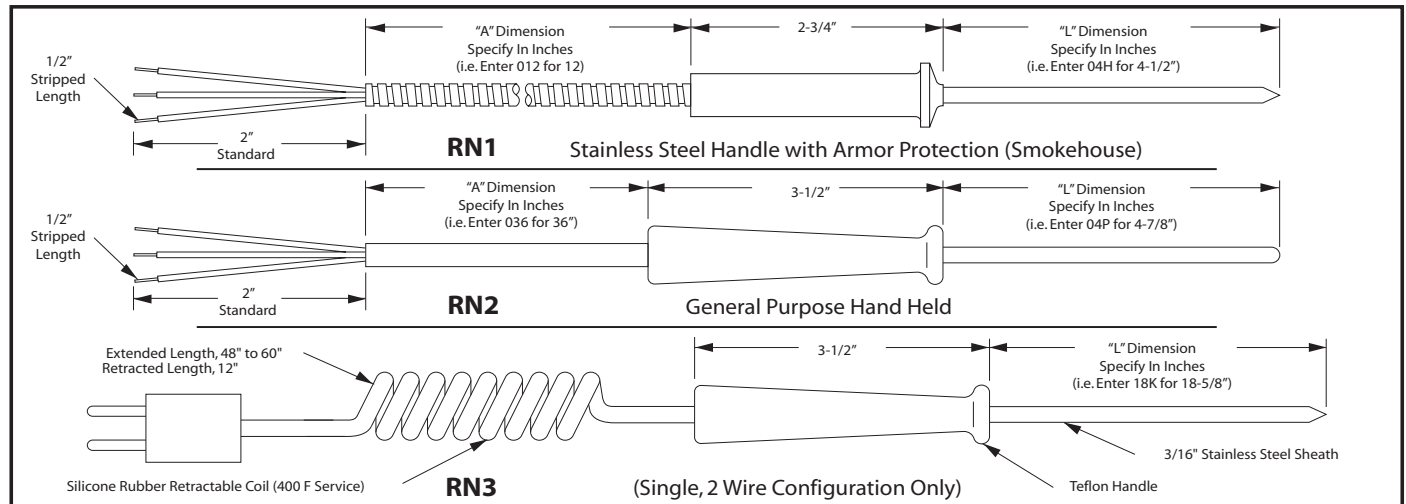


"U" Dim.	3/4" N.P.T.		1" N.P.T.	
	.260" BORE	.385" BORE	.260" BORE	.385" BORE
2-1/2"	7302H	8302H	7402H	8402H
4-1/2"	7304H	8304H	7404H	8404H
6"	73060	83060	74060	84060
7-1/2"	7307H	8307H	7407H	8407H
10-1/2"	7310H	8310H	7410H	8410H
12"	73120	83120	74120	84120
16-1/2"	7316H	8316H	7416H	8416H
22-1/2"	7322H	8322H	7422H	8422H



RESISTANCE TEMPERATURE DETECTORS

HAND HELD RTD'S



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
J	120 ohm Nickel .00672 Coefficient
K	604 ohm Nickel Iron .00520 Coefficient

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH DIAMETER
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.
F	.375" or 3/8" O.D.

TABLE 4: SHEATH LENGTH ("L")
Specify In Inches (i.e. Enter CODE 04P for 4-7/8") See Page 147.

TABLE 5: LEAD LENGTH ("A")
Specify In Inches (i.e. Enter CODE 036 for 36") See Table on Page 147.

CODE	TABLE 6: LEADWIRE TYPE
C	Fiberglass Leadwire with Stainless Steel Overbraid
H	Teflon Leadwire with Braid Shield
J	Teflon Leadwire with Stainless Steel Overbraid
K	Teflon Leadwire with Stainless Steel Armor
M	PVC Leadwire with Mylar Shield
R	Coiled PVC Cord (Single 2 Wire Only)
S	Coiled Silicone Rubber Cord (Single 2 Wire Only)

CODE	TABLE 7: TIP CONFIGURATION
R	Round
P	Piercing
A	Air Temperature
S	Surface

CODE	TABLE 8: TERMINAL CONNECTORS
0	Split Leads
1	#6 Spade Lug
3	Standard Plug
B	3/16" Disconnect, Insulated
C	1/4" Disconnect
D	1/4" Disconnect, Insulated
M	Mini Plug
X	Special, Specify

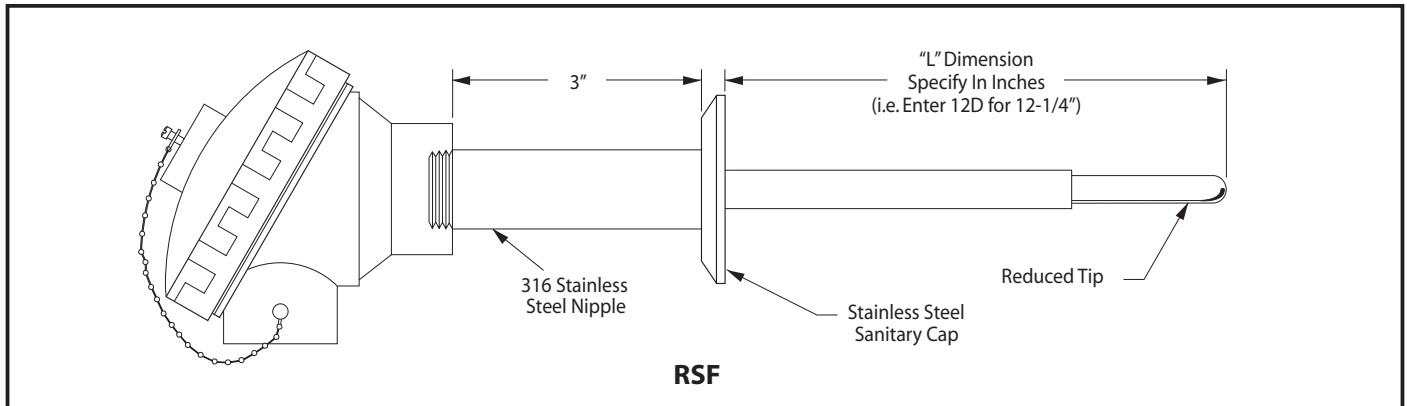
PART NUMBER SEQUENCE i.e. RN2-ABC04P-036MRD

Enter CODE From Tables	RN2	-	A	B	C	-	04P	-	036	M	R	D
	RN1, RN2 or RN3	Table 1	Table 2		Table 3	Table 4	Table 5	Table 6	Table 7	Table 8		
	Sensor Type & Style No.	Element Type	Wiring Configuration		Sheath Diameter	Sheath Length	Lead Length	Leadwire Type	Tip Configuration	Terminal Connectors		



RESISTANCE TEMPERATURE DETECTORS

RTD WITH SANITARY FITTING



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
C	100 ohm Platinum, .03% at 0°C .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
H	100 ohm Platinum, .03% at 0°C .00392 Coefficient

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH MATERIAL
6	316 Stainless Steel

CODE	TABLE 4: SHEATH DIAMETER
D	.250" or 1/4" O.D.
C	.188" O.D.

TABLE 5: IMMERSION LENGTH ("L")
Specify In Inches (i.e. Enter CODE 12D for 12 1/4") See Page 147.

CODE	TABLE 6: SANITARY CAP TYPE
T	16A Plain Cap, Tri Clover
U	16A Plain Cap & 13H Hex Union Nut, Tri Clover
X	Special, Specify

CODE	TABLE 7: SANITARY CAP SIZE
1	1-1/2" (Tube O.D.)
2	2" (Tube O.D.)
3	2-1/2" (Tube O.D.)
4	3" (Tube O.D.)
X	Special, Specify

CODE	TABLE 8: TERMINAL HEAD
A	Aluminum Screw Cover Head; 1/2" N.P.T. Conduit Connection
W	White Polypropylene FDA Compliant Screw Cover Head; 1/2" N.P.T. Conduit Connection

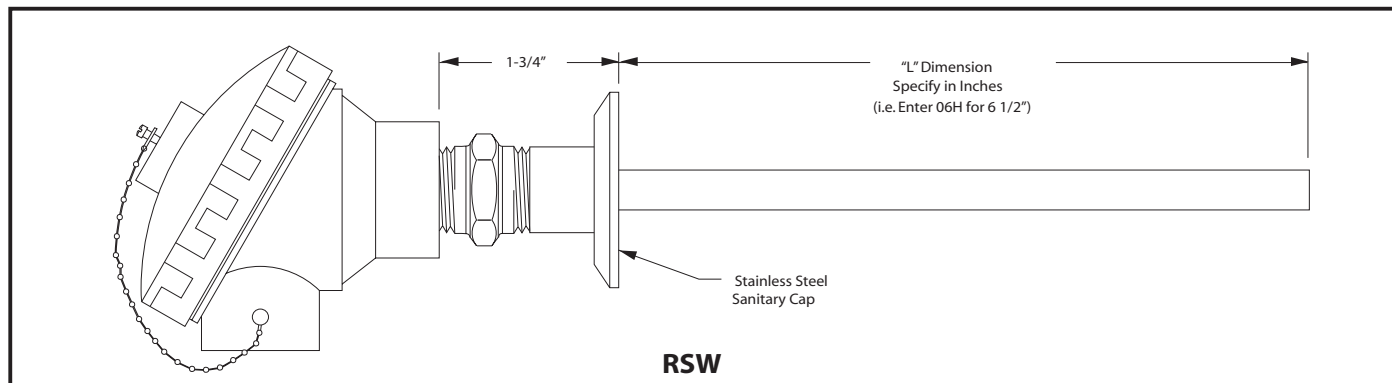
PART NUMBER SEQUENCE i.e. RSF-HB6D12D-T1W

Enter CODE From Tables	RSF	-	H	B	6	D	12D	-	T	1	W
	Table 1		Table 2	Table 3	Table 4	Table 5	Table 6		Table 7	Table 8	
	Sensor Type & Style No.		Element Type	Wiring Configuration	Sheath Material	Sheath Diameter	Immersion Length "L"		Cap Type	Cap Size	Terminal Head



RESISTANCE TEMPERATURE DETECTORS

RTD WITH SANITARY WELLS CONNECTED



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
C	100 ohm Platinum, .03% at 0°C, .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
H	100 ohm Platinum, .03% at 0°C, .00392 Coefficient

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire (Minimum sheath diameter .156")
C	Single, 4 Wire (Minimum sheath diameter .188")
D	Dual, 4 Wire (Minimum sheath diameter .188")
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH MATERIAL
6	316 Stainless Steel

CODE	TABLE 4: SHEATH DIAMETER
H	.500" or 1/2" O.D.

TABLE 5: IMMERSION LENGTH ("L")
Specify In Inches (i.e. Enter CODE 06H for 6 1/2") See Page 147.

CODE	TABLE 6: SANITARY CAP TYPE
T	16A Plain Cap, Tri Clover
U	16A Plain Cap & 13H Hex Union Nut, Tri Clover
X	Special, Specify

CODE	TABLE 7: SANITARY CAP SIZE
1	1-1/2" (Tube O.D.)
2	2" (Tube O.D.)
3	2-1/2" (Tube O.D.)
4	3" (Tube O.D.)
X	Special, Specify

CODE	TABLE 8: TERMINAL HEAD
A	Aluminum Screw Cover Head; 1/2" N.P.T. Conduit Connection
W	White Polypropylene FDA Compliant Screw Cover Head; 1/2" N.P.T. Conduit Connection

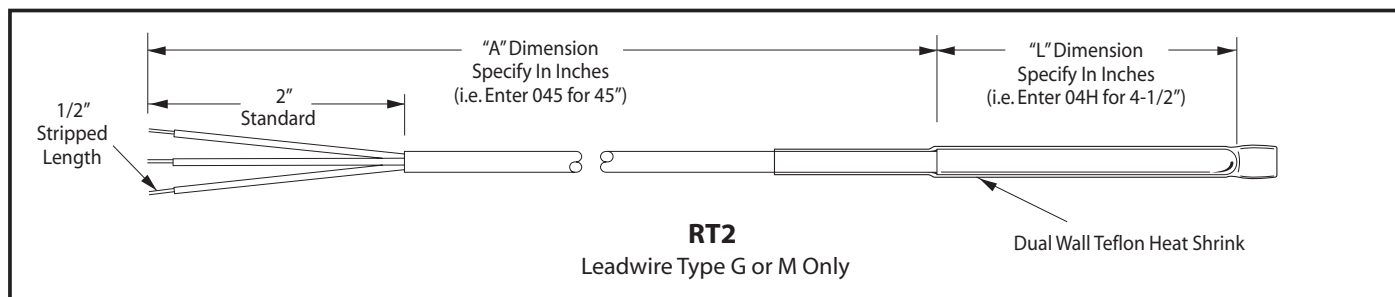
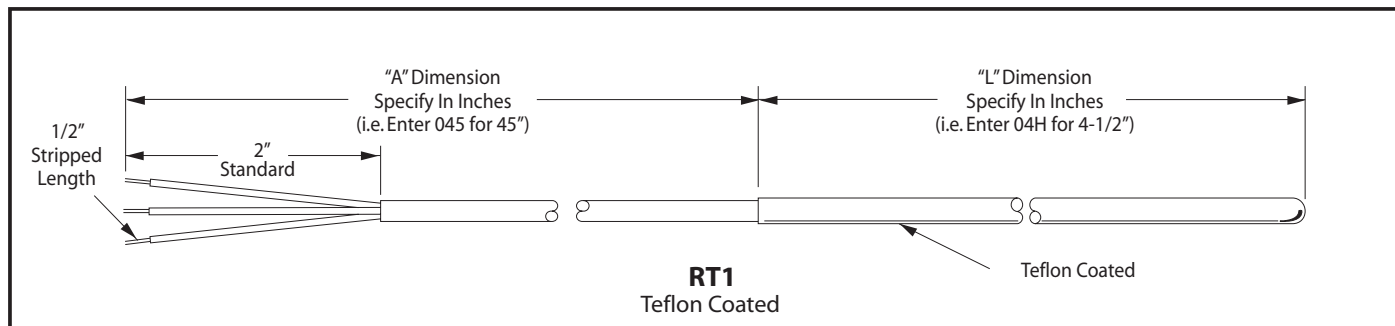
PART NUMBER SEQUENCE i.e. RSW-ED6H06H-T1W

Enter CODE From Tables	RSW	-	E	D	6	H	06H	-	T	1	W
	RSW	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8		
	Sensor Type & Style No.	Element Type	Wiring Configuration	Sheath Material	Sheath Diameter	Immersion Length "L"	Cap Type	Cap Size	Terminal Head		



RESISTANCE TEMPERATURE DETECTORS

TEFLON SHIELDED RTD



CODE	TABLE 1: ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
C	100 ohm Platinum, .03% at 0°C .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient
H	100 ohm Platinum, .03% at 0°C .00392 Coefficient

CODE	TABLE 2: WIRING CONFIGURATION
A	Single, 2 Wire
B	Single, 3 Wire
C	Single, 4 Wire
D	Dual, 4 Wire
E	Dual, 6 Wire (Minimum sheath diameter .250")

CODE	TABLE 3: SHEATH MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel

CODE	TABLE 4: SHEATH DIAMETER		
	Nominal	RT1	RT2
C	.188"	.200"	.220"
D	.250"	.262"	.285"

TABLE 5: SANITARY LENGTH ("L")
Specify In Inches (i.e. Enter CODE 04H for 4-1/2") See Page 147.

TABLE 6: LEAD LENGTH ("A")
Specify In Inches (i.e. Enter CODE 024 for 24") See Table on Page 147.

CODE	TABLE 7: LEADWIRE TYPE
F	Teflon Leadwire
G	Teflon leadwire with Overall Teflon Jacket
H	Teflon Leadwire with Braid Shield
M	PVC Leadwire with Mylar Shield

PART NUMBER SEQUENCE i.e. RT2-AB4C04H-024H

Enter CODE From Tables	RT2	-	A	B	4	C	04H	-	024	H
	RT1 or RT2	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7		
	Sensor Type & Style No.	Element Type	Wiring Configuration	Sheath Material	Sheath Diameter	"L" Sheath Length	"A" Lead Length	Leadwire Type		

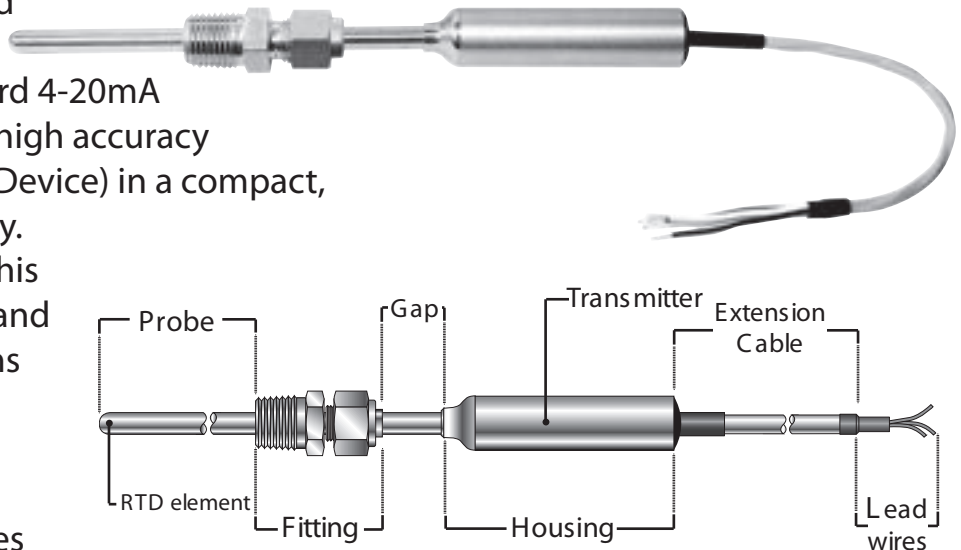


INTEGRATED TRANSMITTER RTD ASSEMBLY

The unique line of Integrated Transmitter RTD Assemblies combine an industry standard 4-20mA transmitter with a matched high accuracy RTD (Resistive Temperature Device) in a compact, hermetically sealed assembly.

The robust construction of this product enables it to withstand vibrations, harsh wash downs and drastic temperature changes in the roughest environmental conditions.

This unique design eliminates the need for additional connection leads and hardware such as mounting boxes, transmitter housings, and cable tracks. Customer specified temperature range for the transmitter calibration as well as custom probe dimensions, extension cable length and type, and process connection types make these sensors a sure fit for the most challenging applications.



FEATURES:

- Can be recalibrated and re-scaled in the field
- Compact size permits easy usage where space is limited
- Standard 2.5" long by 0.62" diameter housing holds electronic circuit and microprocessor
- Robust construction of transmitter housing resists wear in severe operating conditions
- Hermatic seal prevents moisture from entering the transmitter housing, ensuring reliability
- Sturdy construction is resistant to vibrations
- Cost effective and maintenance free

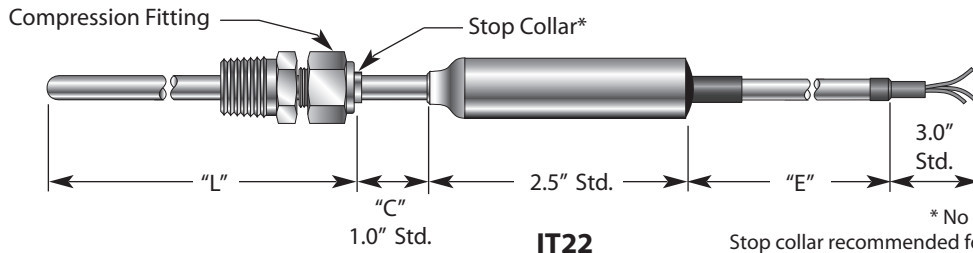
TYPICAL APPLICATIONS:

- Generators
- Engines
- Compressors
- Pharmaceutical Industries
- Utilities
- Chemical Plants
- Gas Pipelines
- Food Preparation
- Refineries
- Petrochemical plants
- Paper Mills



INTEGRATED TRANSMITTER RTD ASSEMBLY

INDUSTRIAL TEMPERATURE SENSOR WITH EXTENSION CABLE



The IT22 assembly's configuration range stands out amongst other temperature sensors in its class. With a wide variety of probe diameters, temperature ranges, and fitting configurations, the IT22 can be designed to fit an abundance of applications.

CODE	TABLE 1: Calibrated Temperature Range
05	0°C to 50°C (32/122°F)
10	0°C to 100°C (32/212°F)
15	0°C to 150°C (32/302°F)
20	0°C to 200°C (32/392°F)
55	-50°C to 50°C (-58/122°F)
51	-50°C to 150°C (-58/302°F)
52	-50°C to 200°C (-58/392°F)
XX	Custom Temperature Range

XX = Specify Temperature Range in Description

Integrated Transmitter RTD Assemblies are factory calibrated to an accuracy of $\pm 0.25\%$ of span or better.

CODE	TABLE 2: Output
LP	4-20 mA loop, upscale burnout (std.)
LD	4-20 mA loop, downscale burnout

CODE	TABLE 3: Probe Diameter "D"
B	1/8"
C	3/16"
D	1/4"
F	3/8"
H	1/2"

Other diameters available. Consult factory.

CODE	TABLE 4: Probe Material
S	Stainless Steel 316

Other materials available. Consult factory.

CODE	TABLE 5: Probe Length "L"
---	In 0.1 inch increments Ex: 065 = 6.5" long Ex: 120 = 12.0" long

CODE	TABLE 6: Extension Length "C"
N --	In 0.1" increments (1.0" Std.) Ex: N20 = 2.0" long

CODE	TABLE 7: Fitting Type
N	None
S**S	Compression Fitting

Ferrule material:

S = Stainless steel* B = Brass* T = Teflon

*Not readjustable with metal ferrule

Process NPT size:

** 18 = 1/8" NPT 14 = 1/4" NPT

38 = 3/8" NPT 12 = 1/2" NPT

34 = 3/4" NPT 44 = 1.0" NPT

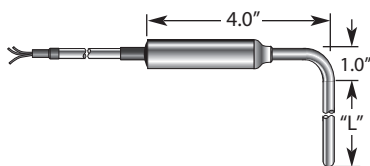
Fitting material:

S = Stainless steel B = Brass

Ex: T14B = Teflon ferrule, 1/4" NPT, Brass fitting

CODE	TABLE 8: Extension Cable Type
PV	PVC insulation, 90°C (195°F) max.
TF	Teflon insulation, 200°C (392°F) max.
TA	Teflon with Stainless Steel armor, 200°C (392°F) max.
TB	Teflon with Stainless Steel overbraid, 200°C (392°F) max.

CODE	TABLE 9: Extension Cable Length "E"
---	In Inches Ex: 060 = 60" long



To order the IT22 with a 90° bend, add suffix "B" after the model number.
Ex: IT22B

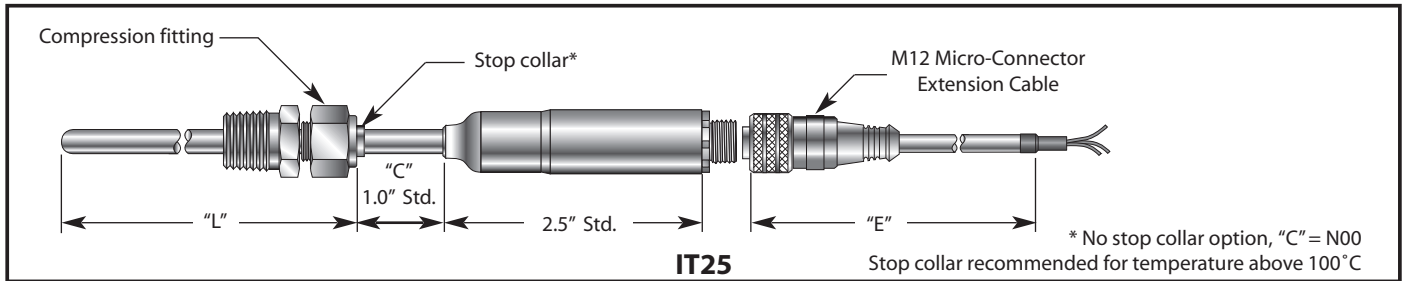
PART NUMBER SEQUENCE i.e. IT22-05-LP-B-S-065-N20-N-TA-060

Enter CODE From Tables	IT22 Model Number	- Table 1 - Temp Range	- Table 2 - Output	- Table 3 - Probe Diameter	- Table 4 - Probe Material	- Table 5 - Probe Length	- Table 6 - Extension Length	- Table 7 - Fitting Type	- Table 8 - Extension Cable Type	- Table 9 - Extension Cable Length
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INTEGRATED TRANSMITTER RTD ASSEMBLY

INDUSTRIAL TEMPERATURE SENSOR WITH M12 MICRO-CONNECTOR



IT25 assemblies can be utilized in similar applications as the IT22, but the IT25 allows for quick disconnections. IT25 devices are effective in laboratory test equipment, hydraulic power units, skids, generators, and mobile equipment.

CODE	TABLE 1: Calibrated Temperature Range
05	0°C to 50°C (32/122°F)
10	0°C to 100°C (32/212°F)
15	0°C to 150°C (32/302°F)
20	0°C to 200°C (32/392°F)
55	-50°C to 50°C (-58/122°F)
51	-50°C to 150°C (-58/302°F)
52	-50°C to 200°C (-58/392°F)
XX	Custom Temperature Range

XX = Specify Temperature Range in Description

Integrated Transmitter RTD Assemblies are factory calibrated to an accuracy of $\pm 0.25\%$ of span or better.

CODE	TABLE 2: Output
LP	4-20 mA loop, upscale burnout (std.)
LD	4-20 mA loop, downscale burnout

CODE	TABLE 3: Probe Diameter "D"
B	1/8"
C	3/16"
D	1/4"
F	3/8"
H	1/2"

Other diameters available. Consult factory.

CODE	TABLE 4: Probe Material
S	Stainless Steel 316

Other materials available. Consult factory.

CODE	TABLE 5: Probe Length "L"
---	In 0.1 inch increments Ex: 065 = 6.5" long Ex: 120 = 12.0" long

CODE	TABLE 6: Extension Length "C"
N --	In 0.1" increments (1.0" Std.) Ex: N20 = 2.0" long

CODE	TABLE 7: Fitting Type
N	None
S**S	Compression Fitting

Ferrule material:

S = Stainless steel* B = Brass* T = Teflon
*Not readjustable with metal ferrule

Process NPT size:

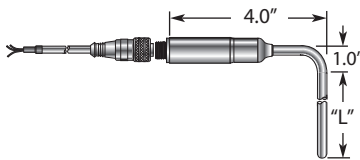
** 18 = 1/8" NPT 14 = 1/4" NPT
38 = 3/8" NPT 12 = 1/2" NPT
34 = 3/4" NPT 44 = 1.0" NPT

Fitting material:

S = Stainless steel B = Brass
Ex: T14B = Teflon ferrule, 1/4" NPT, Brass fitting

CODE	TABLE 8: Connector Type
M12	M12 Micro-Connector 5 pin male receptacle, nickel plated brass

CODE	TABLE 9: Extension Cable "E"
N	None
A2	Straight, 2 meters
A5	Straight, 5 meters
B2	Right angle, 2 meters
B5	Right angle, 5 meters



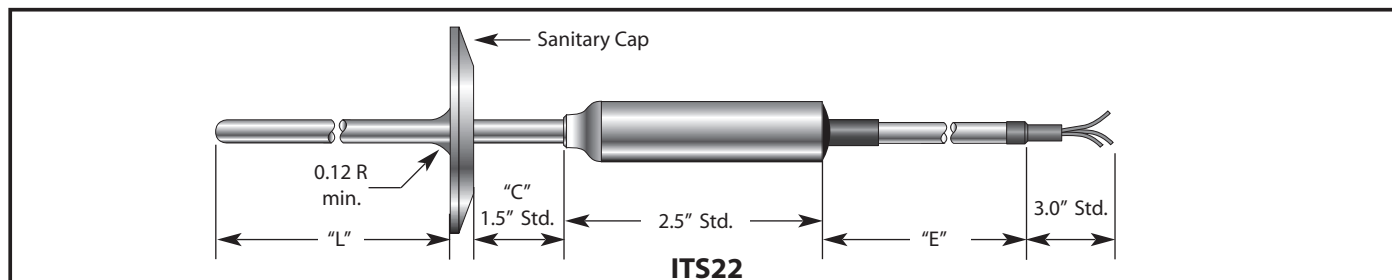
To order the IT25 with a 90° bend, add suffix "B" after the model number.
Ex: IT25B

PART NUMBER SEQUENCE i.e. IT25-05-LP-B-S-065-N20-N-M12-A2

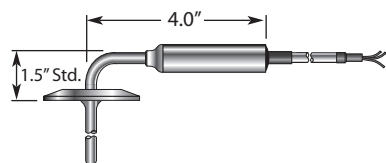
Enter CODE From Tables	IT25 Model Number	- Table 1 - Temp Range	- Table 2 - Output	- Table 3 - Probe Diameter	- Table 4 - Probe Material	- Table 5 - Probe Length	- Table 6 - Extension Length	- Table 7 - Fitting Type	- Table 8 - Connector Type	- Table 9 - Extension Cable
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INTEGRATED TRANSMITTER RTD ASSEMBLY

SANITARY TEMPERATURE SENSOR WITH EXTENSION CABLE



ITS22 assemblies are particularly useful where extreme operating conditions exist in wash down situations and very wet environments. While external cables will withstand wash downs, to further protect the sensor and ensure longer life, stainless steel armor or overbraid can be custom added to prevent abrasion wear.



To order the ITS22 with a 90° bend, add suffix "B" after the model number.
Ex: ITS22B

CODE	TABLE 1: Calibrated Temperature Range
05	0°C to 50°C (32/122°F)
10	0°C to 100°C (32/212°F)
15	0°C to 150°C (32/302°F)
20	0°C to 200°C (32/392°F)
55	-50°C to 50°C (-58/122°F)
51	-50°C to 150°C (-58/302°F)
52	-50°C to 200°C (-58/392°F)
XX	Custom Temperature Range

XX = Specify Temperature Range in Description

Integrated Transmitter RTD Assemblies are factory calibrated to an accuracy of $\pm 0.25\%$ of span or better.

CODE	TABLE 2: Output
LP	4-20 mA loop, upscale burnout (std.)
LD	4-20 mA loop, downscale burnout

CODE	TABLE 3: Probe Diameter "D"	
D	1/4"	
F	3/8"	
H	1/2"	
CODE	Sheath O.D.	Tip O.D.
DB	1/4"	1/8"
FC	3/8"	3/16"
HC	1/2"	3/16"
HD	1/2"	1/4"
JD	5/8"	1/4"

Other diameters available. Consult factory.

CODE	TABLE 4: Probe Material
S	Stainless Steel 316

Other materials available. Consult factory.

CODE	TABLE 5: Probe Length "L"
---	In 0.1 inch increments Ex: 065 = 6.5" long Ex: 120 = 12.0" long

CODE	TABLE 6: Extension Length "C"
N --	In 0.1" increments (1.0" Std.) Ex: N20 = 2.0" long

CODE	TABLE 7: Fitting Type
T15	Tri-Clamp, 1.5" (16 AMP)
T20	Tri-Clamp, 2" (16AMP)
T25	Tri-Clamp, 2.5" (16 AMP)
T30	Tri-Clamp, 3" (16 AMP)

Other fittings available. Consult factory.

CODE	TABLE 8: Extension Cable Type
PV	PVC insulation, 90°C (195°F) max.
TF	Teflon insulation, 200°C (392°F) max.
TA	Teflon with Stainless Steel armor, 200°C (392°F) max.
TB	Teflon with Stainless Steel overbraid, 200°C (392°F) max.

CODE	TABLE 9: Extension Cable Length "E"
---	In Inches Ex: 060 = 60" long

CODE	TABLE 10: Surface Finish
S	Standard
P	Pharmaceutical

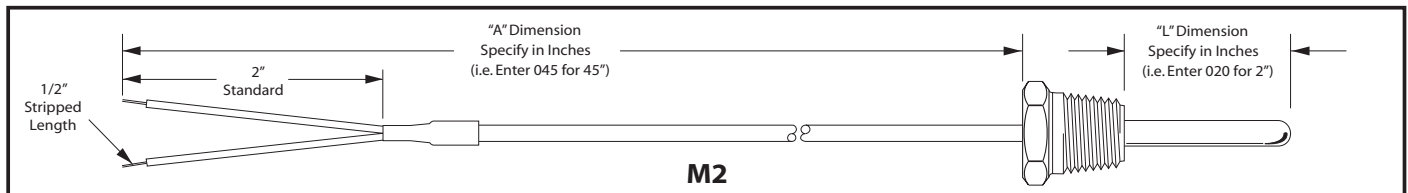
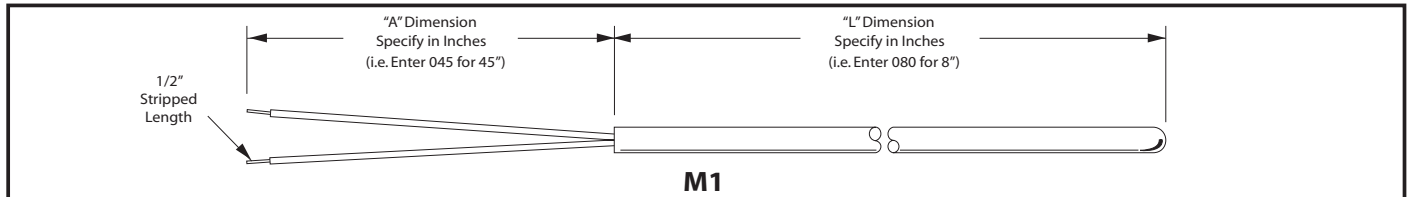
PART NUMBER SEQUENCE i.e. ITS22-05-LP-DB-S-065-N20-T15-PV-060-S

Enter CODE From Tables	ITS22	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8	Table 9	Table 10
	Model Number	Temp Range	Output	Probe Diameter	Probe Material	Probe Length	Extension Length	Fitting Type	Extension Cable Type	Extension Cable Length	Surface Finish



RESISTANCE TEMPERATURE DETECTORS

THERMISTOR SENSORS



CODE	TABLE 1: ELEMENT TYPE
1	10K ohm at 25°C, Curve 3
2	30K ohm at 25°C, Curve 4
3	50K ohm at 25°C, Curve 5
4	100K ohm at 25°C, Curve 6
5	500K ohm at 25°C, Curve 7

CODE	TABLE 2: ELEMENT TOLERANCE
A	± 1% at 25°C
B	± 5% at 25°C
C	± 10% at 25°C
D	± 20% at 25°C

CODE	TABLE 3: SHEATH MATERIAL
4	304 Stainless Steel
6	316 Stainless Steel

CODE	TABLE 4: SHEATH DIAMETER
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.

TABLE 5: SHEATH LENGTH ("L")
Specify In Inches (i.e. Enter CODE 020 for 2") See Table on Page 147.

TABLE 6: LEAD LENGTH ("A")
Specify In Inches (i.e. Enter CODE 045 for 45") See Table on Page 147.

CODE	TABLE 7: LEADWIRE TYPE
A	Fiberglass Leadwire
F	Teflon Leadwire
G	Teflon Leadwire with Overall Teflon Jacket

CODE	TABLE 8: FITTING OPTIONS (M2 ONLY)
A	1/8" N.P.T., Brass
B	1/8" N.P.T., Stainless Steel
C	1/4" N.P.T., Brass
D	1/4" N.P.T., Stainless Steel
E	3/8" N.P.T., Brass
F	3/8" N.P.T., Stainless Steel
G	1/2" N.P.T., Brass
H	1/2" N.P.T., Stainless Steel
O	No Fitting (M1 Only)

CODE	TABLE 9: TERMINAL CONNECTORS
1	#6 Spade Lug
A	3/16" Disconnect
B	3/16" Disconnect, Insulated
C	1/4" Disconnect
D	1/4" Disconnect, Insulated
X	Special, Specify

PART NUMBER SEQUENCE i.e. M2-3B4B020-045AHC

Enter CODE From Tables	M2	-	3	B	4	B	020	-	045	A	H	C
	M1 or M2 Sensor Type & Style No.		Table 1 Element Type	Table 2 Element Tolerance	Table 3 Sheath Material	Table 4 Sheath Diameter	Table 5 "L" Sheath Length		Table 6 "A" Lead Length	Table 7 Leadwire Type	Table 8 Fitting Options	Table 9 Terminal Connectors

THERMISTOR SENSORS

RESISTANCE CURVES

Durex thermistor assemblies are designed to be reliable low-cost probes for a wide variety of temperature control applications. Configurations can be built for surface measurements, liquid immersion and gas temperature measurements.

	CURVE 3	CURVE 4	CURVE 5	CURVE 6	CURVE 7
Temp.°C	10K	30K	50K	100K	500K
-50	670,090	1,693,200	3,066,000	6,702,000	53,450,000
-40	336,450	884,600	1,572,500	3,365,000	25,200,000
-30	176,960	481,000	841,500	1,770,000	12,465,000
-20	97,072	271,200	468,100	970,800	6,435,000
-10	55,326	158,000	269,400	553,300	3,454,000
0	32,650	94,980	159,950	326,500	1,919,000
10	19,899	58,750	98,400	199,000	1,093,500
20	12,492	37,300	62,250	124,900	644,000
* 25	10,000	30,000	50,000	100,000	500,000
0	8,057	24,270	40,400	80,570	390,850
40	5,326	16,150	26,835	53,260	243,700
50	3,602	10,970	18,205	36,020	155,750
60	2,488	7,599	12,600	24,880	101,650
70	1,752	5,359	8,885	17,520	67,850
80	1,255	3,843	6,370	12,560	46,215
90	915.4	2,799	4,642	9,162	32,075
100	678.6	2,069	3,431	6,786	22,645
110	510.6	1,550	2,572	5,102	16,235
120	389.6	1,176	1,953	3,894	11,810
130	301.0	903	1,502	3,010	8,720
140	235.4	701	1,169	2,354	6,525
150	186.1	550	919	1,860	4,944

* Thermistors are ordered usually at their resistance reading at 25°C.*

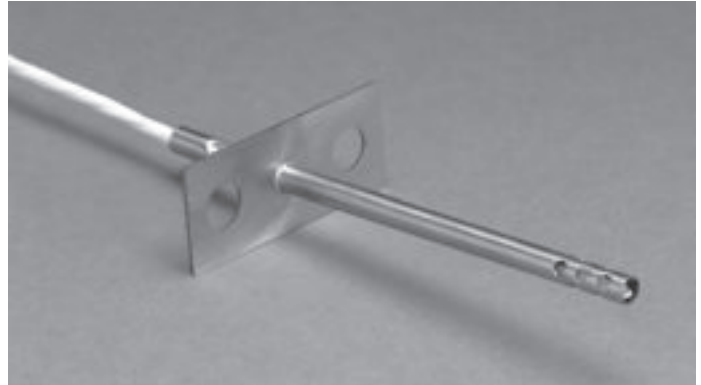
- Resistance values are nominal and are dependant on specified tolerance of thermistor element.
- Other curves and resistance values are available.
- Negative Temperature Coefficient (NTC) thermistors have a very predictable resistance gain that is inversely proportional to change in ambient temperature. Each thermistor curve has its own slope over a given temperature range.



SPECIALTY SENSORS

AIR TEMPERATURE RTD'S

The perforated tip of the air resistance temperature detector is designed for rapid monitoring of airflow temperature in various applications. Small film elements used in these housings can detect incremental changes more quickly than conventional housings. This construction can also be adapted to include special flanges and fittings, as well as custom connector options.



SELF ADHESIVE RTD'S

If the surface being measured for temperature cannot be penetrated or if space limitations require it, Durex can provide an RTD with an adhesive patch for direct surface mounting. We routinely provide such sensors with special adhesive to accommodate temperature and vapor release requirements.



MINIATURE RTD'S

Durex produces RTD probes down to 0.062" diameter, owing to our unique manufacturing capability. There is simply no point of sensing we can't reach for you, while providing accuracy, reliability, and long service life with a miniaturized probe and compatible hardware.





SPECIALTY SENSORS

TEFLON®-COATED PROBES

RTD's are available with Teflon® coated sheaths for applications that require contact temperature measurement in corrosive or chemical environments. The Teflon® coating can be applied directly to the sheath of the RTD, providing protection while minimizing effects to response. In applications that require considerable long-term protection, a welded Teflon® sleeve can be used adding as much as 1/16" thick of Teflon® protection to the surface of the probe. Flexible RTD designs are available, which encapsulate the entire length of the RTD for applications requiring long lengths of immersion.



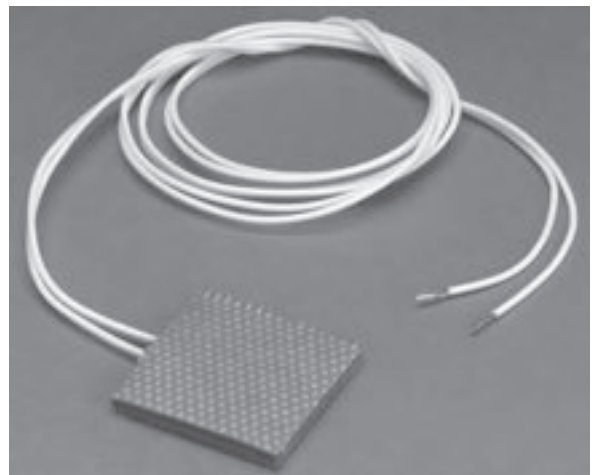
BENDABLE RTD'S

When an RTD needs to "snake" through an installation because of space limitations or other factors, Durex offers bendable elements with overbraid shielding or armor to suit the specifics of your application.



FLEXIBLE RTD'S

Utilizing the same technology as a sealed Silicone Rubber heater, Durex offers a surface mount RTD sensor for direct mounting to flat or curved surfaces. The design can be maintained in various thicknesses and supplied with an adhesive backing for quick application. A thinner profile can be used to wrap the sensor to curved surfaces such as cooling or water lines.





SPECIALTY SENSORS

HAND HELD RTD'S

Durex manufactures a line of multi-purpose hand held resistance temperature detectors for foodservice, industrial process, and laboratory applications.

Probe features include handles of stainless steel, Teflon®, or plastic and coil cord leadwires that can be constructed to withstand ambient temperatures up to 400°F. Standard designs include a mini

plug connector, but many options are available. The RTD sheath itself is typically stainless steel and can be constructed with tips designed for piercing frozen meat, sensing gas temperatures, liquid immersion, or surface temperature measurements.



FOOD SERVICE RTD'S

Accuracy and reliability are the main requirements for probes designed for use in the foodservice industry. Robust designs that can handle the rigors of the industry are essential for long term performance. Durex has manufactured a wide variety of temperature sensors specifically for use in commercial cooking and food processing equipment. All probes are designed to the rigid specifications of the individual applications including such requirements as NSF, FDA, and UL/CSA. Customer designs are available in thermocouples, RTD's, or thermistors.





INDUSTRIAL PROCESS THERMOCOUPLES

Durex Industries manufactures a wide selection of industrial process thermocouples to meet the requirements of the most demanding process applications in the world. These thermocouples are assembled under rigid quality control standards per ANSI specifications.



FEATURES:

- Various connection and mounting styles available
- Extreme high-temperature ranges
- Capable of handling direct immersion into high pressure or corrosive applications
- Utilized in heavy duty industrial applications
- Ideal for limited space requirements

TYPICAL APPLICATIONS:

- Steel Processing
- Turbine and Diesel Engine
- Temperature Measurement
- Chemical Processing
- Foodservice
- Packaging
- Semiconductor Processing



CALIBRATION SERVICES

THERMOCOUPLE CALIBRATION

Durex offers testing at standard temperatures for determination of initial calibration tolerances for thermocouples. All calibration tests are fully traceable to the National Institute of Standards and Technology (NIST). Calibration is also available for application

temperatures other than the standard points in a range from -110°F to 3000°F (-79°C to 1650°C) depending on material. Certificates are supplied for all items calibrated.

<i>Calibration (T/C Type)</i>	<i>Temperatures Available</i>	<i>Applicable Specifications</i>
E, J, K, N, T	32°F to 2300°F (0°C to 1250°C)	ASTM E 207 ASTM E 220
B, R, S	32°F to 3000°F (0°C to 1649°C)	ASTM E 230 ANSI MC 96.1
E, K, N, T	-320°F & -110°F to 23°F (-196°C & -79°C to 0°C)	

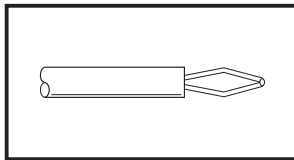
Durex manufactures thermocouple assemblies in the following calibrations:

ANSI LETTER	DUREX CODE and CALIBRATION	CALIBRATION DESCRIPTION
Type E	E Chromel P-Constantan®	Standard Limits 32°F to 1652°F (0°C to 900°C) ±1.7°C or ±0.5% Tol. Special Limits 32°F to 1652°F (0°C to 900°C) ±1.0°C or ±0.4% Tol.
Type J	J Iron - Constantan®	Standard Limits 32°F to 1382°F (0°C to 750°C) ±2.2°C or ±0.75% Tol. Special Limits 32°F to 1382°F (0°C to 750°C) ±1.1°C or ±0.4% Tol.
Type K	K Chromel P - Alumel®	Standard Limits 32°F to 2282°F (0°C to 1250°C) ±2.2°C or ±0.75% Tol. Special Limits 32°F to 2282°F (0°C to 1250°C) ±1.1°C or ±0.4% Tol.
Type T	T Copper-Constantan®	Standard Limits 32°F to 662°F (0°C to 350°C) ±1.0°C or ±0.75% Tol. Special Limits 32°F to 662°F (0°C to 350°C) ±0.5°C or ±0.4% Tol.
Type N	N Nicrosil-NISIL	Standard Limits 32°F to 2282°F (0°C to 1250°C) ±2.2°C or ±0.75% Tol. Special Limits 32°F to 2282°F (0°C to 1250°C) ±1.1°C or ±0.4% Tol.
Type R	R Pt 13% Rhodium-Platinum	Standard Limits 32°F to 2642°F (0°C to 1450°C) ±1.5°C or ±0.25% Tol. Special Limits 32°F to 2642°F (0°C to 1450°C) ±0.6°C or ±0.1% Tol.
Type S	S Pt 10% Rhodium-Platinum	Standard Limits 32°F to 2642°F (0°C to 1450°C) ±1.5°C or ±0.25% Tol. Special Limits 32°F to 2642°F (0°C to 1450°C) ±0.6°C or ±0.1% Tol.
Type B	B Pt 30% Rhodium-Platinum 6% Rhodium	Standard Limits 1598°F to 3092°F (870°C to 1700°C) ±.5% Tol.



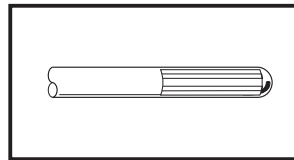
SPECIFICATIONS AND DATA

JUNCTION TYPES



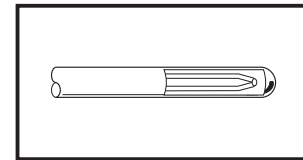
EXPOSED (E)

Joined and welded wires. Specified where fast response is required.



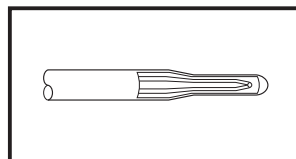
GROUNDED (G)

Junction is seal welded integrally to the sheath. Protects wire from corrosive conditions.



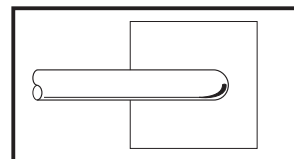
UNGROUNDED (U)

Junction is electrically insulated from seal welded sheath. Design helps prevent stray EMF's.



NECKDOWN (N)

Neckdown provides faster response. Junction can be single or dual circuit and grounded or ungrounded.



PAD (P)

Pad is designed for welding directly to boiler or process tubes for sensing skin temperatures.

SHEATH DIAMETERS

SHEATH CODE	T	Y	W	A	B	V	C	D	E	F	H
SHEATH DIA.	.020"	.032"	.040"	.062"	.125"	.156"	.188"	.250"	.313"	.375"	.500"
WIRE GAUGE	38	34	33	30	24	22	20	18	16	15	11
MAX. LENGTH	100'	150'	200'	400'	250'	200'	175'	100'	55'	40'	30'

PART NUMBER CODE DEFINITIONS

"L" Dimensions and "U" Dimensions	"A" Dimensions	Fractional Dimension Letter CODE
"L" and "U" dimensions are specified in whole inches and use a letter CODE for the fraction (Enter zero when there is no fraction). Enter the three digit CODE per examples below: 3" is entered as 030 8 5/8" is entered as 08K 4 1/8" is entered as 04B 9 3/4" is entered as 09M 5 1/4" is entered as 05D 10 7/8" is entered as 10P 6 3/8" is entered as 06F 12" is entered as 120 7 1/2" is entered as 07H 15" is entered as 150	"A" dimensions are specified in whole inches only. Enter the three digit CODE per examples below: 36" is entered as 036 144" is entered as 144 12" is entered as 012 9" is entered as 009	1/16" = A 5/8" = K 1/8" = B 11/16" = L 3/16" = C 3/4" = M 1/4" = D 13/16" = N 5/16" = E 7/8" = P 3/8" = F 15/16" = R 7/16" = G 1" = S 1/2" = H 0 = No Fraction 9/16" = J



SPECIFICATIONS AND DATA

SHEATH

Materials: 304 Stainless steel & Incoloy® 600 are most commonly used. See Sheath material tables on the following pages for the metal types used and their CODES.

Tolerances: Outside diameter $\pm .002$ " of nominal size.

FINISH

Bright annealed, 32 micro-inch or better.

INSULATION

High purity magnesium oxide is standard; ultra high purity magnesium oxide and alumina oxide are available.

CONFIGURATIONS

Sheath diameters available from .020" to .500". Two wire (single circuit) and four wire (double circuit) configurations are standard in most diameters.

FORMABILITY

Minimum radii: 2X sheath diameter for most thermocouple materials. Consult Durex Industries if special forming is required.

WELDABILITY

Thermocouple sheath can be brazed, soldered, or welded without loss of insulation resistance. Welding of special sheath materials by the customer is not recommended.

INSULATION RESISTANCE

PHYSICAL TESTING

- Dimensional and visual
- Helium leak
- Radiographic (X-Ray)
- Dye Penetration
- Metallurgical per ASTM E-2, E-3, and E-112
- Compaction density per RDT C2-IT

ELECTRICAL TESTING

- Calibration per ASTM E-220 traceable to NIST
- Insulation resistance
- Wire resistance (ohms per foot loop)
- Time response per RDT C2-3T
- Thermal cycling per ASTM E-225

ASTM TESTING

Sheathed thermocouple material and sheathed thermocouples are tested using the following specifications:

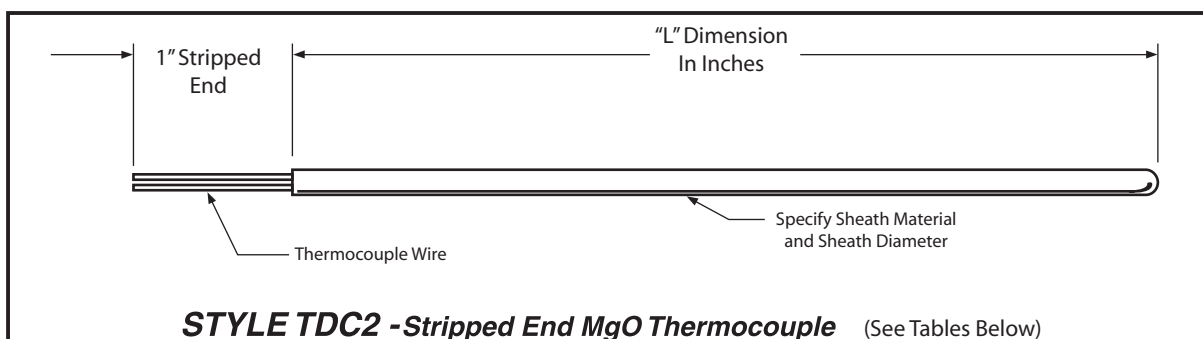
- ASTM E585 Standard specifications for sheathed base-metal thermocouple materials.
- ASTM E608 Standard specification for metal-sheathed base-metal thermocouples.
- ASTM E780 Standard method for measuring the insulation resistance of sheathed thermocouple-material at room temperature.
- ASTME839 Standard test methods for sheathed thermocouples and sheathed thermocouple material.

Nominal Sheath Outside Diameter	Applied D.C. Voltage (min.)	Insulation Resistance Meg Ω
.030" Dia. and smaller	50	100
.030" to .059" Dia.	50	500
.062" Dia. and larger	500	1000

SHEATHED MgO THERMOCOUPLE ASSEMBLIES

THERMOCOUPLE WITH STRIPPED END

The TDC2 Style Thermocouple features an MgO insulated element which is junctioned and terminated with a standard 1" long strip. This style is designed for field replacement or addition of other termination options.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

CODE	SINGLE JUNCTION	CODE	DUAL JUNCTION
G	Grounded	H	Grounded
U	Ungrounded	L	Ungrounded Isolated
C	Exposed	V	Ungrounded Common
P	Pad	W	Exposed

SHEATH MATERIAL

CODE	METAL TYPE
1	310 Stainless Steel
2	321 Stainless Steel
3	330 Stainless Steel
4	304 Stainless Steel
5	446 Stainless Steel
6	316 Stainless Steel
7	347 Stainless Steel
8	Inconel® 600 (Alloy 600)
9	Alloy 702
A	Alloy 601

SHEATH DIAMETER

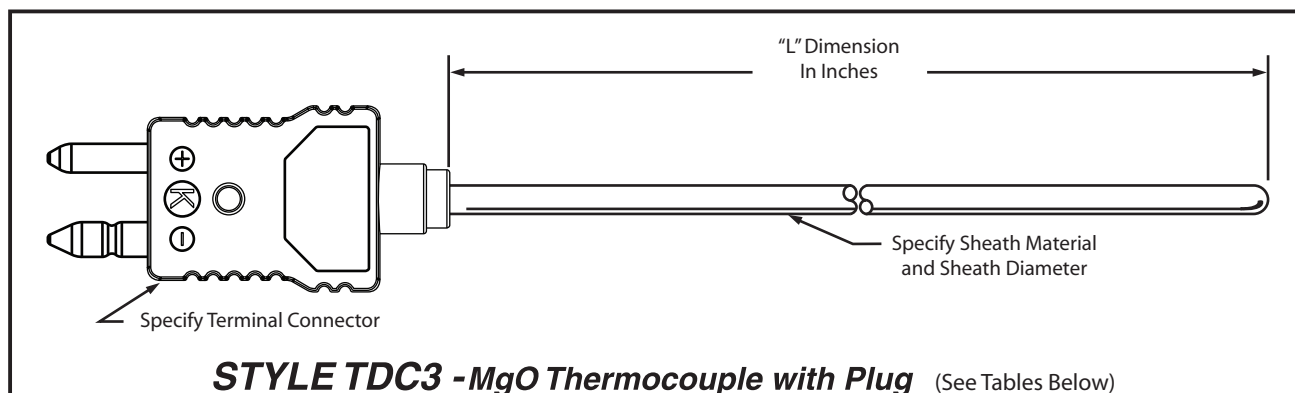
CODE	O. D. SIZE
T	.020" O. D.
Y	.032" or 1/32" O. D.
W	.040" O. D.
A	.062" or 1/16" O. D.
B	.125" or 1/8" O. D.
V	.156" or 5/32" O. D.
C	.188" or 3/16" O. D.
D	.250" or 1/4" O. D.
E	.313" or 5/16" O. D.
F	.375" or 3/8" O. D.
H	.500" or 1/2" O. D.

Enter CODE i.e. TDC2 - JG - 4F100	TDC2 Sensor Type & Style No.	Thermocouple Type (See Table above)	Junction Type (See Table above)	Sheath Material (See Table above)	Sheath Diameter (See Table above)	"L" Dimension 3 digit CODE (i.e. enter 100 for 10") See CODES on Page 175
--	---	--	--	--	--	--

SHEATHED MgO THERMOCOUPLE ASSEMBLIES

THERMOCOUPLE WITH PLUG

The TDC3 Style Thermocouple features an MgO insulated element with universal disconnect plug for reliable connections. Plugs are available in standard (400°F), high temperature (800°F), and ceramic (1200°F) materials.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

CODE	SINGLE JUNCTION	CODE	DUAL JUNCTION
G	Grounded	H	Grounded
U	Ungrounded	L	Ungrounded Isolated
C	Exposed	V	Ungrounded Common
		W	Exposed

SHEATH MATERIAL

CODE	METAL TYPE
1	310 Stainless Steel
2	321 Stainless Steel
3	330 Stainless Steel
4	304 Stainless Steel
5	446 Stainless Steel
6	316 Stainless Steel
7	347 Stainless Steel
8	Inconel® 600 (Alloy 600)
9	Alloy 702
A	Alloy 601

SHEATH DIAMETER

CODE	O. D. SIZE
T	.020" O. D.
Y	.032" or 1/32" O. D.
W	.040" O. D.
A	.062" or 1/16" O. D.
B	.125" or 1/8" O. D.
V	.156" or 5/32" O. D.
C	.188" or 3/16" O. D.
D	.250" or 1/4" O. D.
E	.313" or 5/16" O. D.
F	.375" or 3/8" O. D.
H	.500" or 1/2" O. D.

TERMINAL CONNECTOR

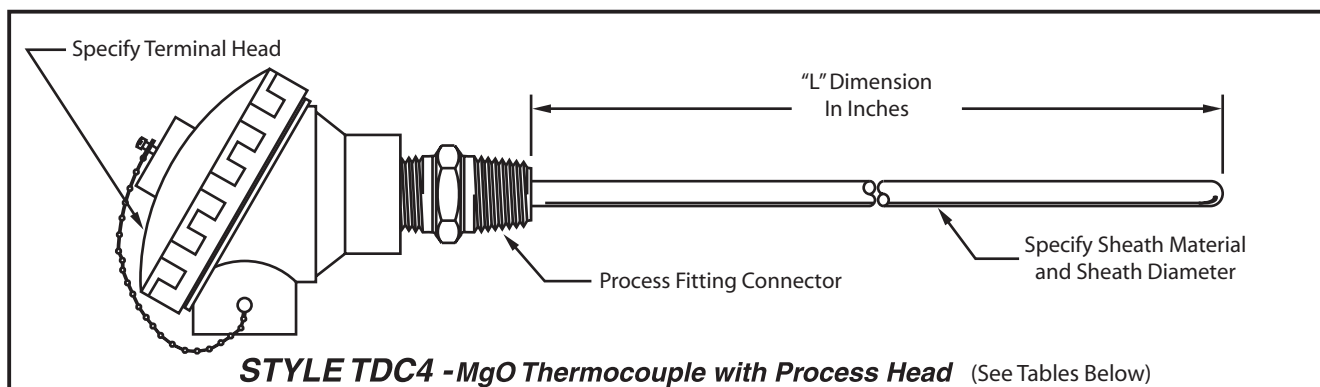
CODE	TERMINATION STYLE
E	Standard Molded Plug
6	Standard Plug with Brazing Adapter
7	Standard Plug with Tube Adapter
8	High Temp. Plug with Crimp Adapter
9	Ceramic Plug with Tube Adapter
M	Mini Plug
X	Special, Specify

Enter CODE i.e. TDC3 - JG - 4F12F - E	TDC3	-	-	-	-	-
	Sensor Type & Style No.	Thermocouple Type (See Table above)	Junction Type (See Table above)	Sheath Material (See Table above)	Sheath Diameter (See Table above)	"L" Dimension 3 digit CODE (i.e. enter 12F for 12 3/8") See CODES on Page 175

SHEATHED MgO THERMOCOUPLE ASSEMBLIES

THERMOCOUPLE WITH PROCESS HEAD

The TDC4 Style Thermocouple features an MgO insulated element with a protective terminal housing and process connector. This style can be manufactured as spring loaded for direct field replacement into existing thermowells.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

CODE	SINGLE JUNCTION	CODE	DUAL JUNCTION
G	Grounded	H	Grounded
U	Ungrounded	L	Ungrounded Isolated
C	Exposed	V	Ungrounded Common
		W	Exposed

SHEATH MATERIAL

CODE	METAL TYPE
1	310 Stainless Steel
2	321 Stainless Steel
3	330 Stainless Steel
4	304 Stainless Steel
5	446 Stainless Steel
6	316 Stainless Steel
7	347 Stainless Steel
8	Inconel® 600 (Alloy 600)
9	Alloy 702
A	Alloy 601

SHEATH DIAMETER

CODE	O. D. SIZE
T	.020" O. D.
Y	.032" or 1/32" O. D.
W	.040" O. D.
A	.062" or 1/16" O. D.
B	.125" or 1/8" O. D.
V	.156" or 5/32" O. D.
C	.188" or 3/16" O. D.
D	.250" or 1/4" O. D.
E	.313" or 5/16" O. D.
F	.375" or 3/8" O. D.
H	.500" or 1/2" O. D.

PROCESS CONNECTION

CODE	PROCESS SIZE
O	No Process Connection
S	1/2" NPT Stainless Steel
T	3/4" NPT Stainless Steel

SPRING LOADED OPTION

CODE	PROBE TIP STYLE
1	Fixed
2	Spring Loaded

SCREW COVER TERMINAL HEADS

CODE	SCREW COVER HEAD MATERIALS	CODE	SCREW COVER HEAD MATERIALS
A	Aluminum Head; 1/2" N.P.T. Conduit Connection	P	Plastic Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Head; 3/4" N.P.T. Conduit Connection	M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
C	Cast Iron Head; 1/2" N.P.T. Conduit Connection	Z	Explosion Proof Cast Iron Head; Specify 1/2" or 3/4" N.P.T. Conduit Connection
D	Cast Iron Head; 3/4" N.P.T. Conduit Connection	W	White Polypropylene FDA Compliant Head; 1/2" N.P.T. Conduit Connection

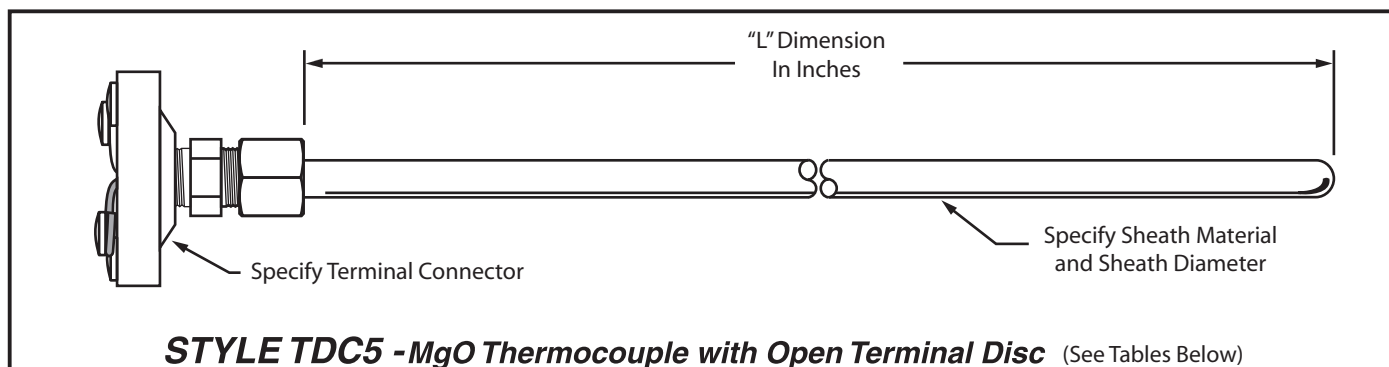
TDC4									
Enter CODE i.e. TDC4 - JG - 6C060 - S1A	Sensor Type & Style No.	Thermocouple Type (See Table above)	Junction Type (See Table above)	Sheath Material (See Table above)	Sheath Diameter (See Table above)	"L" Dimension 3 digit CODE (i.e. enter 060 for 6") See CODES on Page 175	Process Connection (See Table above)	Spring Loaded Option (See Table above)	Terminal Heads (See Table above)



SHEATHED MgO THERMOCOUPLE ASSEMBLIES

THERMOCOUPLE WITH OPEN TERMINAL DISC

The TDC5 Style Thermocouple features an MgO insulated element with an open terminal disc design. This design allows greater accessibility in wiring for space restricted areas.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

CODE	SINGLE JUNCTION	CODE	DUAL JUNCTION
G	Grounded	H	Grounded
U	Ungrounded	L	Ungrounded Isolated
C	Exposed	V	Ungrounded Common
N	Neckdown	W	Exposed

SHEATH MATERIAL

CODE	METAL TYPE
1	310 Stainless Steel
2	321 Stainless Steel
3	330 Stainless Steel
4	304 Stainless Steel
5	446 Stainless Steel
6	316 Stainless Steel
7	347 Stainless Steel
8	Inconel® 600 (Alloy 600)
9	Alloy 702
A	Alloy 601

SHEATH DIAMETER

CODE	O. D. SIZE
T	.020" O. D.
Y	.032" or 1/32" O. D.
W	.040" O. D.
A	.062" or 1/16" O. D.
B	.125" or 1/8" O. D.
V	.156" or 5/32" O. D.
C	.188" or 3/16" O. D.
D	.250" or 1/4" O. D.
E	.313" or 5/16" O. D.
F	.375" or 3/8" O. D.
H	.500" or 1/2" O. D.

TERMINAL CONNECTOR

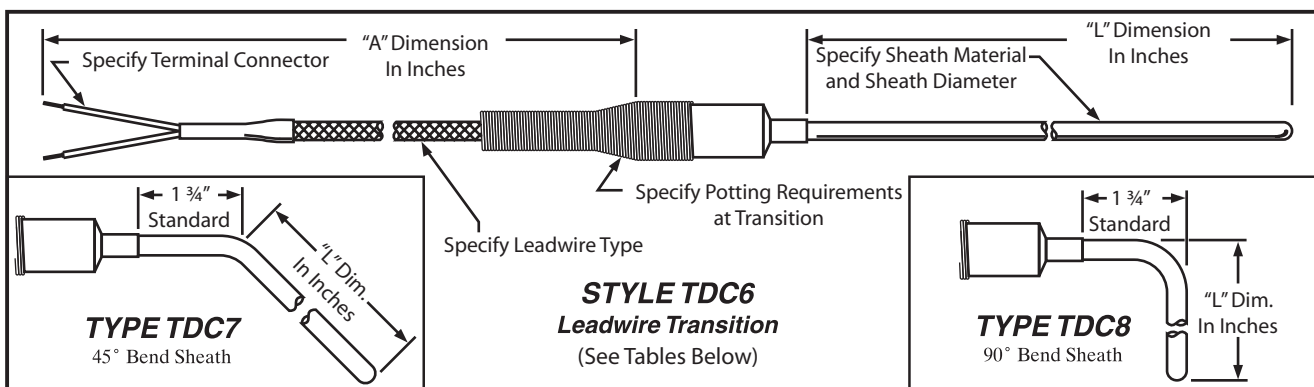
CODE	TERMINATION STYLE
J	Circular Terminal Block, Ceramic
K	Circular Terminal Block, Glass Cloth
X	Special, Specify

	TDC5	-		-		-	
Enter CODE	Sensor Type & Style No.	Thermocouple Type	Junction Type	Sheath Material	Sheath Diameter	"L" Dimension	Terminal Connector
i.e. TDC5 - KG - 4D09D - K		(See Table above)	(See Table above)	(See Table above)	(See Table above)	3 digit CODE (i.e. enter 09D for 9 1/4") See CODES on Page 175	(See Table above)

SHEATHED MgO THERMOCOUPLE ASSEMBLIES

THERMOCOUPLE WITH INSULATED LEADWIRE

The TDC6 Style Thermocouple features an MgO insulated element that is terminated to an insulated extension wire. An optional terminal connector can be added to the extension wire.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

CODE	SINGLE JUNCTION	CODE	DUAL JUNCTION
G	Grounded	H	Grounded
U	Ungrounded	L	Ungrounded Isolated
C	Exposed	V	Ungrounded Common
		W	Exposed

SHEATH MATERIAL

CODE	METAL TYPE
1	310 Stainless Steel
2	321 Stainless Steel
3	330 Stainless Steel
4	304 Stainless Steel
5	446 Stainless Steel
6	316 Stainless Steel
7	347 Stainless Steel
8	Inconel® 600 (Alloy 600)
9	Alloy 702
A	Alloy 601

SHEATH DIAMETER

CODE	O. D. SIZE
T	.020" O. D.
Y	.032" or 1/32" O. D.
W	.040" O. D.
A	.062" or 1/16" O. D.
B	.125" or 1/8" O. D.
V	.156" or 5/32" O. D.
C	.188" or 3/16" O. D.
D	.250" or 1/4" O. D.
E	.313" or 5/16" O. D.
F	.375" or 3/8" O. D.
H	.500" or 1/2" O. D.

LEADWIRE TYPE & CONSTRUCTION

INSULATION TYPE	CONDUCTOR TYPE	STANDARD	S. S. OVERBRAID	S. S. ARMOR
Fiberglass	Solid	A	B	C
Teflon	Solid	D	E	F
Fiberglass	Stranded	G	H	J
Teflon	Stranded	K	L	M
Kapton	Solid	N	P	Q
PVC	Solid	R	S	T
PVC	Stranded	W	Y	Z

POTTING REQUIREMENTS

CODE	MAX. TEMPS.
L	500° F
M	1000° F

TERMINAL CONNECTOR

CODE	TERMINATION STYLE
0	Split Leads, 2" Length Standard
1	3/16" Spade Lugs
3	Standard Plug
4	Standard Jack
M	Mini Plug
N	Mini Jack
X	Special, Specify

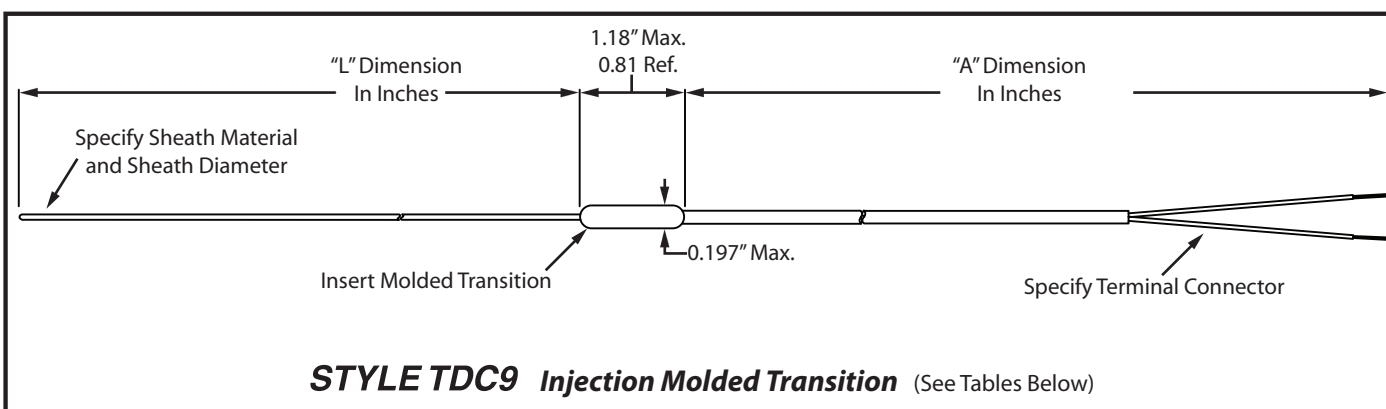
TDC6 - - - - -										
<i>Enter CODE</i> i.e. TDC6-TG-6D08M-024COM	Sensor Type & Style No.	Thermocouple Type (See Table above)	Junction Type (See Table above)	Sheath Material (See Table above)	Sheath Diameter (See Table above)	“L” Dimension 3 digit CODE (i.e. 08M for 8 ¾”) See CODES on Page 175	“A” Dimension 3 digit CODE (i.e. 024 for 24”) See CODES on Page 175	Leadwire Const. (See Table above)	Terminal Conn. (See Table above)	Potting Req. (See Table above)



SHEATHED MgO THERMOCOUPLE ASSEMBLIES

MINI THERMOCOUPLE WITH MOLDED TRANSITION

The TDC9 Style Thermocouple features an MgO insulated element that is terminated to an insulated extension wire and encapsulated in a plastic injection molded "mini" transition using insert mold technology and a Liquid Crystal Polymer. Transition can withstand continuous exposure to temperatures up to 562°F.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

CODE	SINGLE JUNCTION
G	Grounded
U	Ungrounded
C	Exposed

SHEATH MATERIAL

CODE	METAL TYPE
4	304 Stainless Steel
6	316 Stainless Steel
8	Inconel® 600 (Alloy 600)

SHEATH DIAMETER

CODE	O. D. SIZE
T	.020" O. D.
Y	.032" or 1/32" O. D.
W	.040" O. D.
A	.062" O.D.
X	Special, Specify

LEADWIRE TYPE & CONSTRUCTION

INSULATION TYPE	CONDUCTOR TYPE	STANDARD
Fiberglass	Solid	A
Teflon	Solid	D
Fiberglass	Stranded	G
Teflon	Stranded	K
Kapton	Solid	N

TERMINAL CONNECTOR

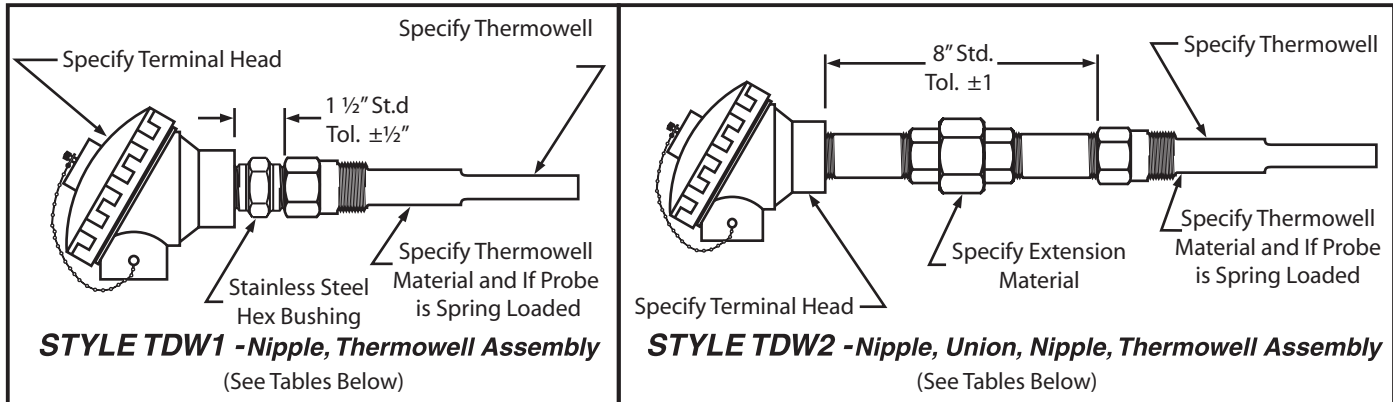
CODE	TERMINATION STYLE
0	Split Leads, 2" Length Standard
1	#6 Spade Lugs
3	Standard Plug
4	Standard Jack
X	Special, Specify

TDC9 - - - - -									
Enter CODE i.e. TDC9-TG-6T08M-024A0	Sensor Type & Style No.	Thermocouple Type (See Table above)	Junction Type (See Table above)	Sheath Material (See Table above)	Sheath Diameter (See Table above)	"L" Dimension 3 digit CODE (i.e. 08M for 8 3/4") See CODES on Page 175	"A" Dimension 3 digit CODE (i.e. 024 for 24") See CODES on Page 175	Leadwire Const. (See Table above)	Terminal Conn. (See Table above)



THERMOCOUPLE WITH THREADED THERMOWELL

The TDW1 and TDW2 Style Thermocouple assemblies feature a thermocouple element protected by a drilled bar stock thermowell. Various well materials and terminal heads are available as options. See next page for well selections.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

ELEMENT TYPE

CODE	METAL TYPE
M	Beaded, 14 Gauge, Single, UNG
N	Beaded, 14 Gauge, Dual, UNG
O	MI Cable, 18 Gauge, Single, UNG
P	MI Cable, 18 Gauge, Dual, UNG

WELL MATERIAL

CODE	METAL TYPE
4	304 Stainless Steel
6	316 Stainless Steel
B	Brass
M	Monel
R	Carbon Steel

EXTENSION MATERIAL (TDW2 Only)

CODE	NIPPLE MATERIAL
K	Black Pipe, Schedule 40
Y	Galvanized Steel
4	304 Stainless Steel
6	316 Stainless Steel

SPRING LOADED OPTION

CODE	PROBE TIP STYLE
1	Fixed Fitting
2	Spring Loaded Fitting

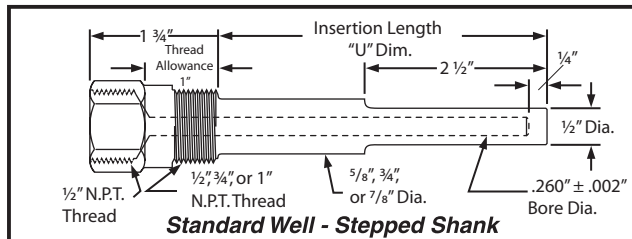
SCREW COVER TERMINAL HEADS

CODE	SCREW COVER HEAD MATERIALS	CODE	SCREW COVER HEAD MATERIALS
A	Aluminum Head; 1/2" N.P.T. Conduit Connection	P	Plastic Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Head; 3/4" N.P.T. Conduit Connection	M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
C	Cast Iron Head; 1/2" N.P.T. Conduit Connection	Z	Explosion Proof Cast Iron Head; Specify 1/2" or 3/4" N.P.T. Conduit Connection
D	Cast Iron Head; 3/4" N.P.T. Conduit Connection	W	White Polypropylene FDA Compliant Head; 1/2" N.P.T. Conduit Connection

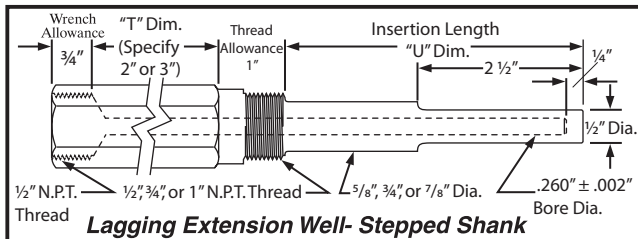
Enter CODE i.e. TDW1-KP-1207H-61A	TDW1	-		-		-		-	
	Sensor Type & Style No.	Thermocouple Type (See Table above)	Element Type (See Table above)	Thermowell Number 5 Digit CODE (On next page)	Well Material (See Table above)	Extension Material (See Table above)	Spring Loaded Option (See Table above)	Terminal Heads (See Table above)	



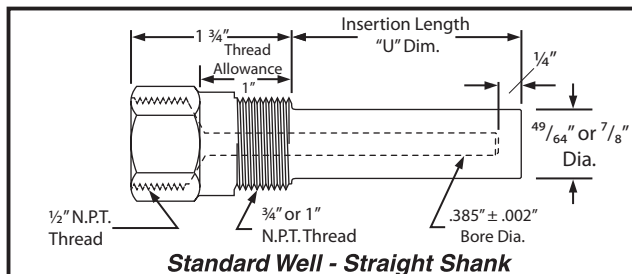
THERMOWELL STYLES



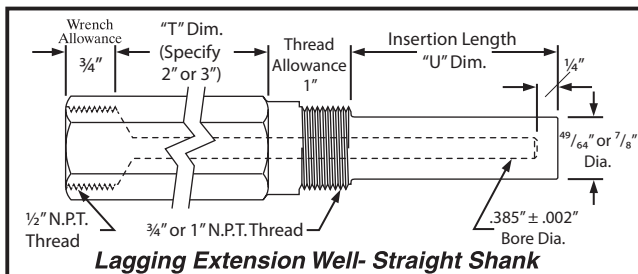
'U' Dim.	1/2" N.P.T.	3/4" N.P.T.	1" N.P.T.
2 1/2"	1202H	1302H	1402H
4 1/2"	1204H	1304H	1404H
6"	12060	13060	14060
7 1/2"	1207H	1307H	1407H
10 1/2"	1210H	1310H	1410H
12"	12120	13120	14120
16 1/2"	1216H	1316H	1416H
22 1/2"	1222H	1322H	1422H



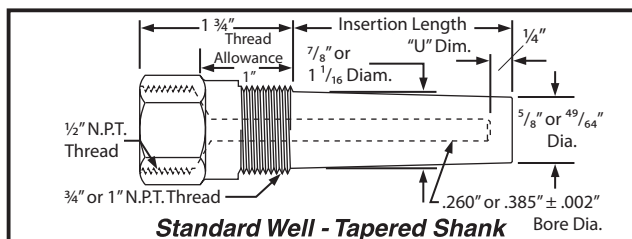
'U' Dim.	1/2" N.P.T.	3/4" N.P.T.	1" N.P.T.
2 1/2"	2202H	2302H	2402H
4 1/2"	2204H	2304H	2404H
6"	22060	23060	24060
7 1/2"	2207H	2307H	2407H
10 1/2"	2210H	2310H	2410H
12"	22120	23120	24120
16 1/2"	2216H	2316H	2416H
22 1/2"	2222H	2322H	2422H



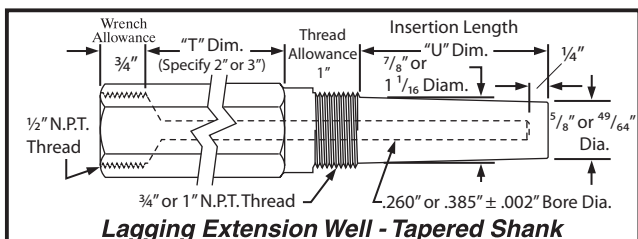
'U' Dim.	3/4" N.P.T.	1" N.P.T.
2 1/2"	3302H	3402H
4 1/2"	3304H	3404H
6"	33060	34060
7 1/2"	3307H	3407H
10 1/2"	3310H	3410H
12"	33120	34120
16 1/2"	3316H	3416H
22 1/2"	3322H	3422H



'U' Dim.	3/4" N.P.T.	1" N.P.T.
2 1/2"	4302H	4402H
4 1/2"	4304H	4404H
6"	43060	44060
7 1/2"	4307H	4407H
10 1/2"	4310H	4410H
12"	43120	44120
16 1/2"	4316H	4416H
22 1/2"	4322H	4422H



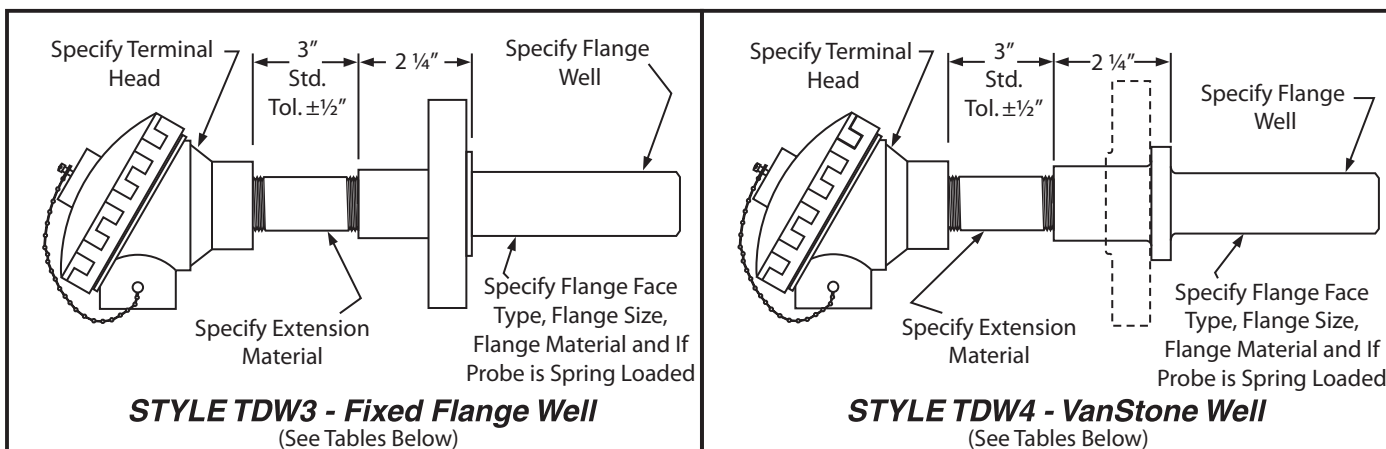
'U' Dim.	3/4" N.P.T.		1" N.P.T.	
	.260" BORE	.385" BORE	.260" BORE	.385" BORE
2 1/2"	5302H	6302H	5402H	6402H
4 1/2"	5304H	6304H	5404H	6404H
6"	53060	63060	54060	64060
7 1/2"	5307H	6307H	5407H	6407H
10 1/2"	5310H	6310H	5410H	6410H
12"	53120	63120	54120	64120
16 1/2"	5316H	6316H	5416H	6416H
22 1/2"	5322H	6322H	5422H	6422H



'U' Dim.	3/4" N.P.T.		1" N.P.T.	
	.260" BORE	.385" BORE	.260" BORE	.385" BORE
2 1/2"	7302H	8302H	7402H	8402H
4 1/2"	7304H	8304H	7404H	8404H
6"	73060	83060	74060	84060
7 1/2"	7307H	8307H	7407H	8407H
10 1/2"	7310H	8310H	7410H	8410H
12"	73120	83120	74120	84120
16 1/2"	7316H	8316H	7416H	8416H
22 1/2"	7322H	8322H	7422H	8422H

THERMOCOUPLE WITH FLANGED THERMOWELLS

The TDW3 and TDW4 Style Thermowell assemblies feature a thermocouple element protected by a flanged thermowell. Various well materials, flange materials, and sizes are available. See next page for well selection.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

ELEMENT TYPE

CODE	METAL TYPE
M	Beaded, 14 Gauge, Single, UNG
N	Beaded, 14 Gauge, Dual, UNG
O	MI Cable, 18 Gauge, Single, UNG
P	MI Cable, 18 Gauge, Dual, UNG

FLANGE FACE TYPE

CODE	FACE TYPE
1	Raised Face
2	Flat Face
3	Ring Joint
4	Lap Joint

FLANGE SIZE

CODE	FLANGE SIZE (STYLE TDW3 Only)
D	1 1/2" Flange
E	2" Flange
F	2 1/2" Flange
G	3" Flange
H	4" Flange

WELL MATERIAL

CODE	METAL TYPE
4	304 Stainless Steel
6	316 Stainless Steel
B	Brass
M	Monel
R	Carbon Steel

EXTENSION MATERIAL

CODE	NIPPLE MATERIAL
K	Black Pipe, Schedule 40
Y	Galvanized Steel
4	304 Stainless Steel
6	316 Stainless Steel

SPRING LOADED OPTION

CODE	PROBE TIP STYLE
1	Fixed Fitting
2	Spring Loaded Fitting

SCREW COVER TERMINAL HEADS

CODE	SCREW COVER HEAD MATERIALS	CODE	SCREW COVER HEAD MATERIALS
A	Aluminum Head; 1/2" N.P.T. Conduit Connection	D	Cast Iron Head; 3/4" N.P.T. Conduit Connection
B	Aluminum Head; 3/4" N.P.T. Conduit Connection	Z	Explosion Proof Cast Iron Head; 1/2" or 3/4" N.P.T. Conduit Connection
C	Cast Iron Head; 1/2" N.P.T. Conduit Connection		

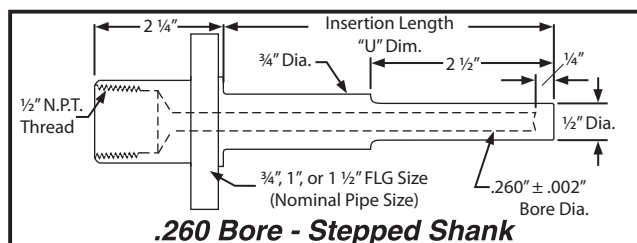
Enter CODE

i.e. TDW3-JM1F410701E4K1A

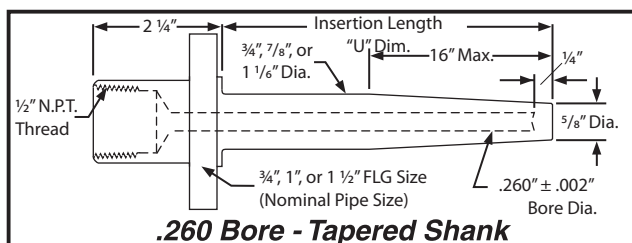
Sensor Type & Style No.	Thermocouple Type	Element Type	Flanged Thermowell No.	Flange Face Type	Flange Size	Well Material	Extension Material	Spring Loaded Option	Terminal Heads
	(See Table above)	(See Table above)	6 digit CODE (On next page)	(See Table above)	(See Table above)	(See Table above)	(See Table above)	(See Table above)	(See Table above)



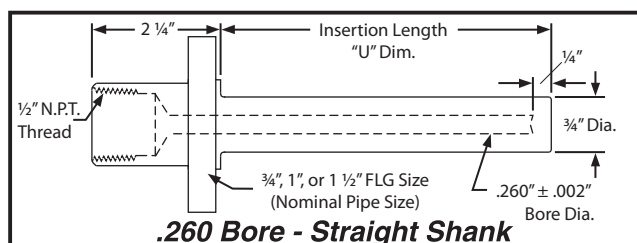
FLANGED THERMOWELL STYLES



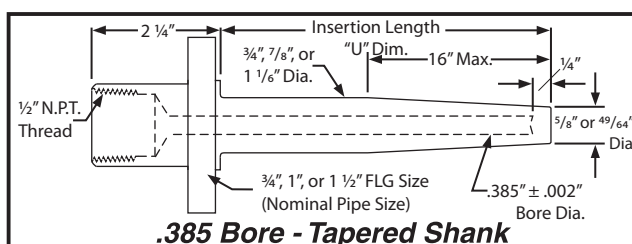
'U' Dim.	3/4" FLG Size	1" FLG Size	1 1/2" FLG Size
4"	F11040	F12040	F13040
7"	F11070	F12070	F13070
10"	F11100	F12100	F13100
13"	F11130	F12130	F13130
16"	F11160	F12160	F13160
22"	F11220	F12220	F13220



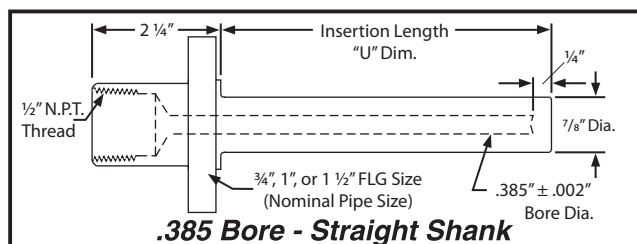
'U' Dim.	3/4" FLG Size	1" FLG Size	1 1/2" FLG Size
4"	F51040	F52040	F53040
7"	F51070	F52070	F53070
10"	F51100	F52100	F53100
13"	F51130	F52130	F53130
16"	F51160	F52160	F53160
22"	F51220	F52220	F53220



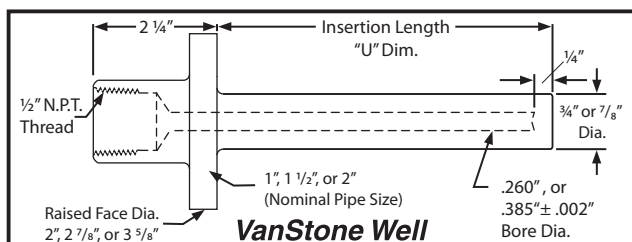
'U' Dim.	3/4" FLG Size	1" FLG Size	1 1/2" FLG Size
4"	F31040	F32040	F33040
7"	F31070	F32070	F33070
10"	F31100	F32100	F33100
13"	F31130	F32130	F33130
16"	F31160	F32160	F33160
22"	F31220	F32220	F33220



'U' Dim.	3/4" FLG Size	1" FLG Size	1 1/2" FLG Size
4"	F61040	F62040	F63040
7"	F61070	F62070	F63070
10"	F61100	F62100	F63100
13"	F61130	F62130	F63130
16"	F61160	F62160	F63160
22"	F61220	F62220	F63220



'U' Dim.	3/4" FLG Size	1" FLG Size	1 1/2" FLG Size
4"	F41040	F42040	F43040
7"	F41070	F42070	F43070
10"	F41100	F42100	F43100
13"	F41130	F42130	F43130
16"	F41160	F42160	F43160
22"	F41220	F42220	F43220

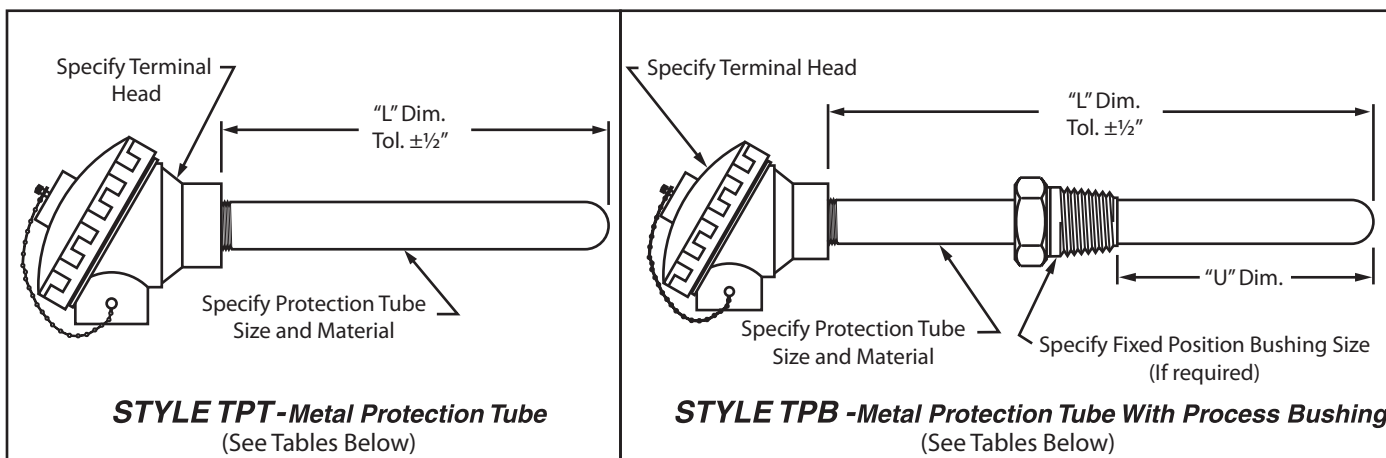


260 BORE	'U' Dim.	1" NPS	1 1/2" NPS	2" NPS
	4"	F81040	F82040	F83040
	7"	F81070	F82070	F83070
	10"	F81100	F82100	F83100
	13"	F81130	F82130	F83130
	16"	F81160	F82160	F83160
	22"	F81220	F82220	F83220

385 BORE	'U' Dim.	1" NPS	1 1/2" NPS	2" NPS
	4"	F91040	F92040	F93040
	7"	F91070	F92070	F93070
	10"	F91100	F92100	F93100
	13"	F91130	F92130	F93130
	16"	F91160	F92160	F93160
	22"	F91220	F92220	F93220

BASE METAL PROTECTION TUBE ASSEMBLY

The TPT Style Thermocouple assemblies feature a base metal thermocouple and metal protection tube for use in corrosive or hostile environments. Optional mounting bushings and flanges are available.



THERMOCOUPLE TYPE				
THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

ELEMENT TYPE	
CODE	METAL TYPE
L	Beaded, 8 Gauge, Single, UNG
M	Beaded, 14 Gauge, Single, UNG
N	Beaded, 14 Gauge, Dual, UNG
O	MI Cable, 18 Gauge, Single, UNG
P	MI Cable, 18 Gauge, Dual, UNG

PROTECTION TUBE SIZE	
CODE	IPS (Nominal)
L	1/2" (.840)
M	3/4" (1.050)
N	1" (1.315)
O	1 1/4" (1.660)
P	1 1/2" (1.900)

WALL THICKNESS	
CODE	NOMINAL WALL
W	Schedule 40
Y	Schedule 80
Z	Schedule 160

PROTECTION TUBE MATERIALS			
CODE	Metal Materials	CODE	Metal Materials
4	304 Stainless Steel	8	Inconel® 600
6	316 Stainless Steel	A	Inconel® 601
3	330 Stainless Steel	R	Carbon Steel
5	446 Stainless Steel		

PROCESS FITTING(If Applicable)

CODE	DESCRIPTION
H	1/2" NPT Stainless Steel
K	3/4" NPT Stainless Steel
9	Adjustable Mounting Flange
X	Special

SCREW COVER TERMINAL HEADS

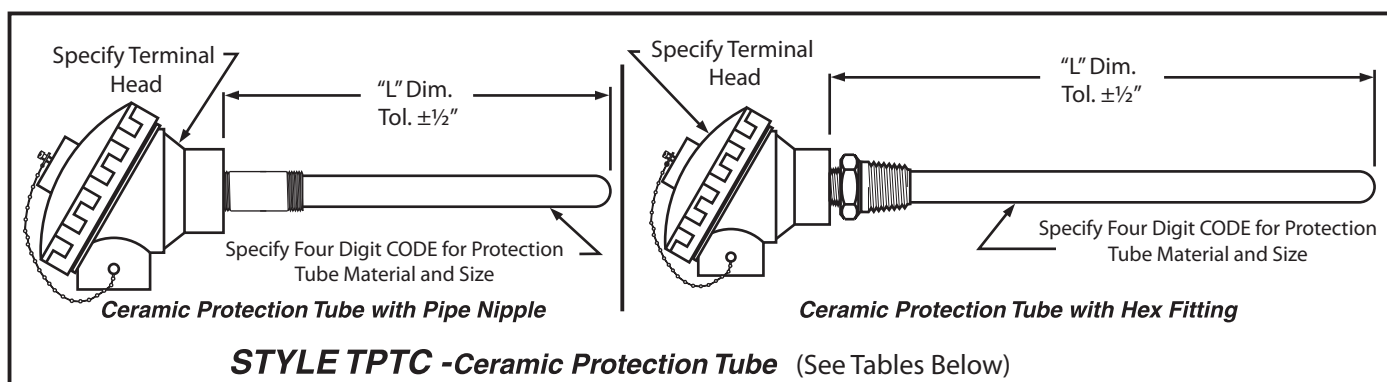
CODE	SCREW COVER HEAD MATERIALS	CODE	SCREW COVER HEAD MATERIALS
A	Aluminum Head; 1/2" N.P.T. Conduit Connection	P	Plastic Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Head; 3/4" N.P.T. Conduit Connection	M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
C	Cast Iron Head; 1/2" N.P.T. Conduit Connection	Z	Explosion Proof Cast Iron Head; 1/2" or 3/4" N.P.T. Conduit Connection
D	Cast Iron Head; 3/4" N.P.T. Conduit Connection	W	White Polypropylene FDA Compliant Head; 1/2" N.P.T. Conduit Connection

TPT - - - - -										
Enter CODE i.e. TPT-EN-LW120A-06FA	Sensor Type & Style No.	Thermocouple Type (See Table above)	Element Type (See Table above)	Tube Size (See Table above)	Wall Thickness (See Table above)	"U" Dimension (If applicable) 3 Digit CODE See CODES on Page 175	Tube Material (See Table above)	"L" Dimensin 3 Digit Code (i.e. 06f for 6 3/8") See CODES on Page 175	Process Fitting (If applicable) (See Table above)	Terminal Heads (See Table above)



BASE METAL CERAMIC PROTECTION TUBE ASSEMBLY

The TPTC Style Thermocouple assembly features a base metal thermocouple element and ceramic protection tube for high temperature service. Ceramic mounting bushings are available.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

ELEMENT TYPE

CODE	METAL TYPE
L	Beaded, 8 Gauge, Single, UNG
M	Beaded, 14 Gauge, Single, UNG
N	Beaded, 14 Gauge, Dual, UNG
O	MI Cable, 18 Gauge, Single, UNG
P	MI Cable, 18 Gauge, Dual, UNG

PROCESS CONN. MATERIAL

CODE	DESCRIPTION
B	Brass
4	304 Stainless Steel
R	Carbon Steel
6	316 Stainless Steel

CERAMIC PROTECTION TUBE

CODE		DESCRIPTION		
MULITE 2750°F	ALUMINA 3400°F	TUBE SIZE ID x OD	THREAD SIZE	FITTING SPECIFICATION
M11N	A11N	1/4 x 3/8	1/2 NPT	1" Long Nipple
M14N	A14N	1/4 x 3/8	1/2 NPT	4" Long Nipple
M11F	A11F	1/4 x 3/8	1/2 NPT	Hex Fitting
M21N	A21N	1/2 x 3/4	3/4 NPT	1" Long Nipple
M24N	A24N	1/2 x 3/4	3/4 NPT	4" Long Nipple
M22F	A22F	1/2 x 3/4	3/4 NPT	Hex Fitting
M23C	A23C	1/2 x 3/4	1" NPT	Female Coupling
M31N	A31N	7/16 x 11/16	3/4 NPT	1" Long Nipple
M34N	A34N	7/16 x 11/16	3/4 NPT	4" Long Nipple
M32F	A32F	7/16 x 11/16	3/4 NPT	Hex Fitting
M32C	A32C	7/16 x 11/16	1" NPT	Female Coupling
M44N	A44N	3/4 x 1	1" NPT	4" Long Nipple
M43F	A43F	3/4 x 1	1" NPT	Hex Fitting
M54N	A54N	1 x 1 1/4	1 1/4 NPT	4" Long Nipple
M54F	A54F	1 x 1 1/4	1 1/4 NPT	Hex Fitting

SCREW COVER TERMINAL HEADS

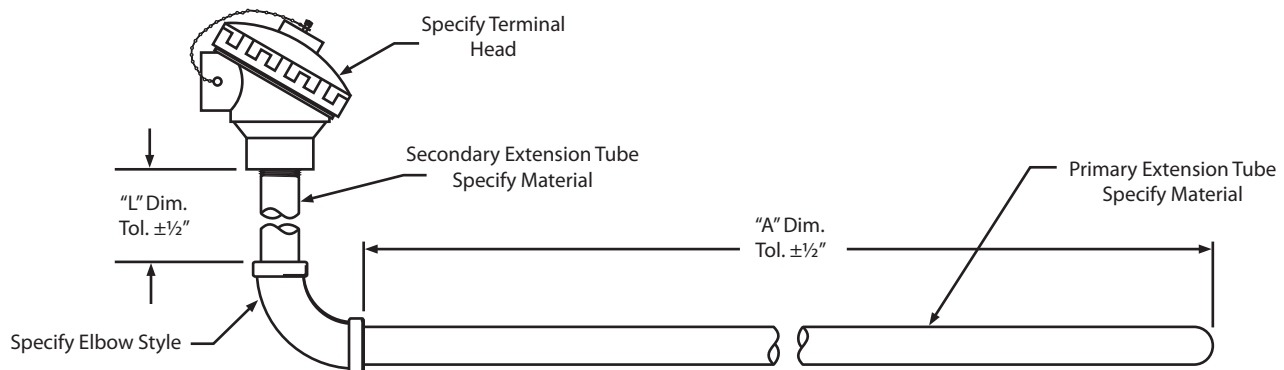
CODE	SCREW COVER HEAD MATERIALS
A	Aluminum Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Head; 3/4" N.P.T. Conduit Connection
C	Cast Iron Head; 1/2" N.P.T. Conduit Connection
D	Cast Iron Head; 3/4" N.P.T. Conduit Connection
P	Plastic Head; 1/2" N.P.T. Conduit Connection
M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
Z	Explosion Proof Cast Iron Head; 1/2" or 3/4" N.P.T. Conduit Connection
W	White Polypropylene FDA Compliant Head; 1/2" N.P.T. Conduit Connection

Enter CODE i.e. TPTC-EO-M11N06F-1A	TPTC	Sensor Type & Style No.	Thermocouple Type (See Table above)	Element Type (See Table above)	Ceramic Protection Tube 4 Digit CODE (See Table above)	"L" Dimensin 3 Digit Code (i.e. 06f for 6 3/8") See CODES on Page 175	Process Connection Material (See Table above)	Terminal Head (See Table above)
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BASE METAL 90° PROTECTION TUBE ASSEMBLY

The TPA Style Thermocouple assembly features a base metal thermocouple element and metal protection tube with a 90° angle design for over-the-side applications.



STYLE TPA - 90° Protection Tube (See Tables Below)

THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

ELEMENT TYPE

CODE	METAL TYPE
L	Beaded, 8 Gauge, Single
M	Beaded, 14 Gauge, Single
N	Beaded, 14 Gauge, Dual
O	Beaded, 18 Gauge, Single
P	Beaded, 18 Gauge, Dual

PROTECTION TUBE SIZE

CODE	IPS (Nominal)
L	1/2" (.840)
M	3/4" (1.050)
N	1" (1.315)
O	1 1/4" (1.660)
P	1 1/2" (1.900)

PROTECTION TUBE MATERIALS

CODE	Metal Materials	CODE	Metal Materials
4	304 Stainless Steel	8	Inconel® 600
6	316 Stainless Steel	A	Inconel® 601
3	330 Stainless Steel	R	Carbon Steel
5	446 Stainless Steel		

WALL THICKNESS

CODE	NOMINAL WALL
W	Schedule 40
Y	Schedule 80
Z	Schedule 160

ELBOW STYLE

CODE	ELBOW TYPE
F	Fixed Elbow
U	Universal Elbow

SCREW COVER TERMINAL HEADS

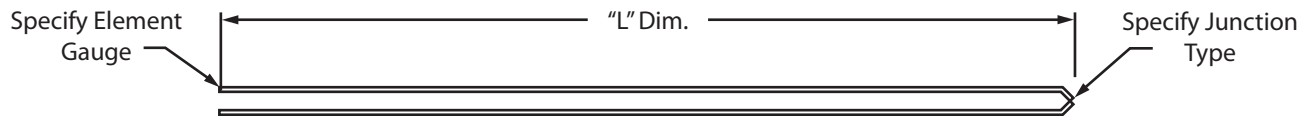
CODE	SCREW COVER HEAD MATERIALS	CODE	SCREW COVER HEAD MATERIALS
A	Aluminum Head; 1/2" N.P.T. Conduit Connection	P	Plastic Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Head; 3/4" N.P.T. Conduit Connection	M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
C	Cast Iron Head; 1/2" N.P.T. Conduit Connection	Z	Explosion Proof Cast Iron Head; Specify 1/2" or 3/4" N.P.T. Conduit Connection
D	Cast Iron Head; 3/4" N.P.T. Conduit Connection	W	White Polypropylene FDA Compliant Head; 1/2" N.P.T. Conduit Connection

TPA -											
Enter CODE i.e. TPA-JOLWR100G-030Fa	Sensor Type & Style No.	Thermocouple Type	Element Type	Tube Size	Wall Thickness	Primary Tube Material	“L” Dim.	Secondary Tube Material	“A” Dim.	Elbow Style	Terminal Head
							3 Digit Code		3 Dift CODE		
		(See Table above)	(See Table above)	(See Table above)	(See Table above)	(See Table above)	(See Table above)	(I.e. 100 for 10”) See CODES on Page 175	(See Table above)	(i.e. 030 for 30”) See CODES on Page 175	(See Table above)



BASE METAL THERMOCOUPLE ELEMENTS

The TEBA and TEBD Style Thermocouples are base metal replacement elements for all ceramic or metal protection tube assemblies.



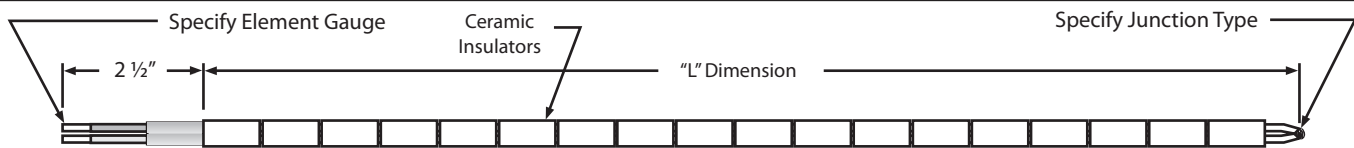
STYLE TEBA - Bare Element Thermocouple (See Tables Below)

THERMOCOUPLE TYPE				
THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE	
CODE	SINGLE JUNCTION
B	Buttwelded
D	Twisted & Welded

BARE ELEMENT GAUGE	
CODE	Thermocouple Wire Gauge Size
06	6 Gauge
08	8 Gauge
12	12 Gauge
14	14 Gauge
20	20 Gauge

Enter CODE	TEBA				
i.e. TEBA-JB-0822H	Sensor Type & Style No.	Thermocouple Type	Junction Type	Bare Element Gauge	"L" Dimension
		(See Table above)	(See Table above)	(See Table above)	3 Digit Code (i.e. 22H for 22 1/2") See CODES on Page 175



STYLE TEBD - Insulated Thermocouple (See Tables Below)

THERMOCOUPLE TYPE				
THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE	
CODE	SINGLE JUNCTION
B	Buttweld
D	Twisted & Welded
CODE	DUAL JUNCTION
F	Buttweld, 14 GA. & 20 GA. Only
M	Twisted & Welded, 14 GA. & 20 GA. Only

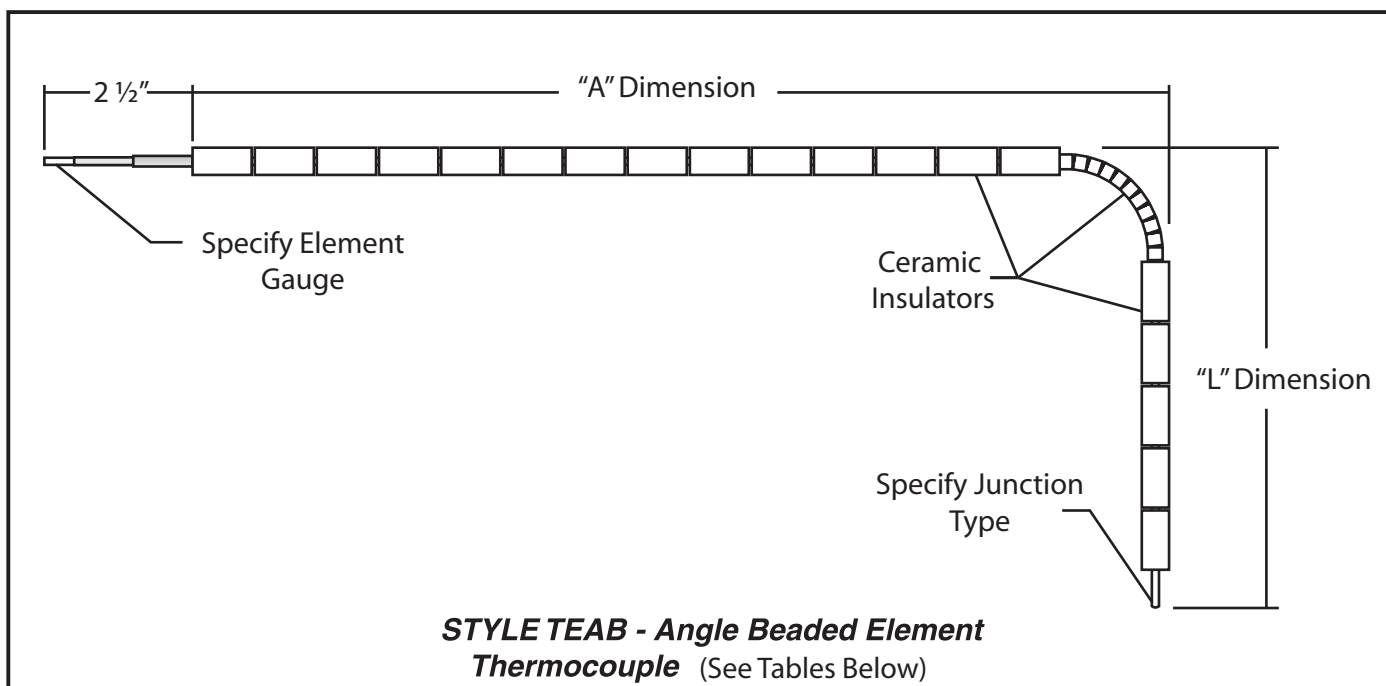
ELEMENT GAUGE	
CODE	Thermocouple Wire Gauge Size
06	6 Gauge
08	8 Gauge
12	12 Gauge
14	14 Gauge
20	20 Gauge

INSULATOR TYPE	
CODE	Description
1	Single Round Insul.
2	1" Oval Insulator
3	1" Round Insulator
4	3" Round Insulator

Enter CODE	TEBD					
i.e. TEBD-JB-12SR160	Sensor Type & Style No.	Thermocouple Type	Junction Type	Bare Element Gauge	Insulator Type	"L" Dimension
		(See Table above)	(See Table above)	(See Table above)	(See Table above)	3 Digit Code (i.e. 160 for 16") See CODES on Page 175

BASE METAL THERMOCOUPLE ELEMENTS

The TEAB Style Thermocouple is a replacement element for the TPAM 90° angle protection tube thermocouple assembly.



THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

CODE	SINGLE JUNCTION
B	Buttwelded
D	Twisted & Welded

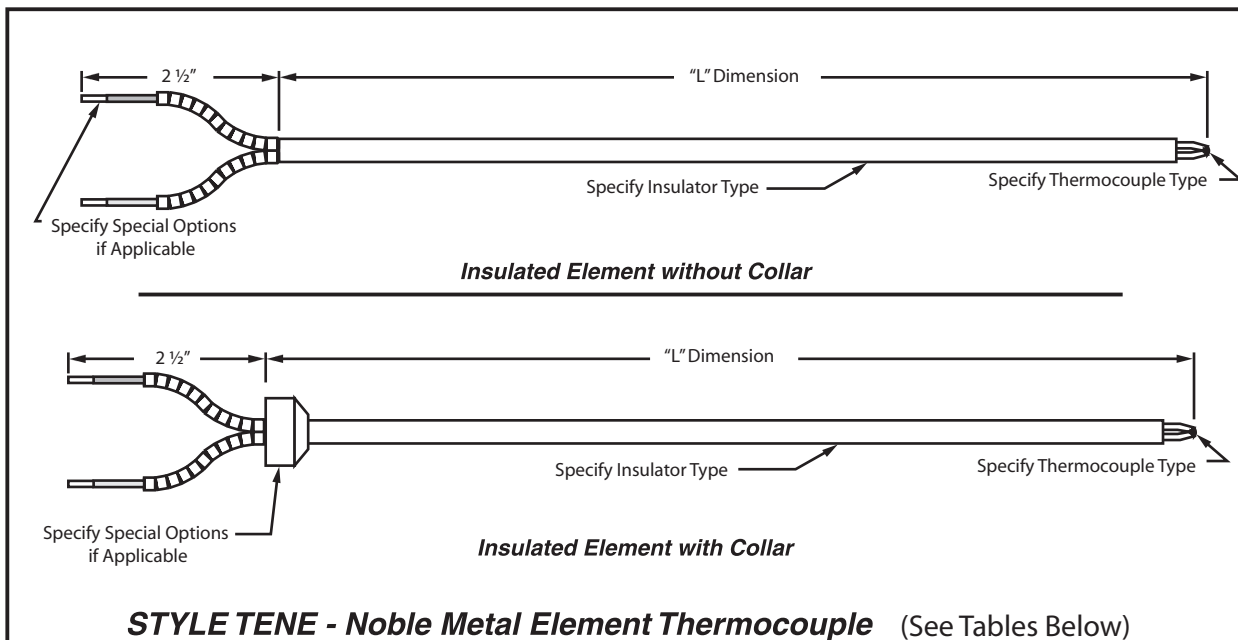
BARE ELEMENT GAUGE

CODE	Thermocouple Wire Gauge Size
08	8 Gauge
14	14 Gauge
20	20 Gauge

Enter CODE	TEAB Sensor Type & Style No.	Thermocouple Type	Junction Type	Bare Element Gauge	"L" Dimension	"A" Dimension
i.e. TEAB-JB-1412D-32M		(See Table above)	(See Table above)	(See Table above)	3 Digit Code (i.e. 12D for 12 1/4") See CODES on Page 175	3 Digit Code (i.e. 32M for 32 3/4") See CODES on Page 175

NOBLE METAL THERMOCOUPLE ELEMENTS

The TENE Style Thermocouple is a noble metal element designed as a replacement for high temperature protection tube assemblies.



THERMOCOUPLE TYPE

ELEMENT TYPE and GAUGE	
SINGLE	DUAL
SR26	DR26
SR24	DR24
SR20	DR20
SS26	DS26
SS24	DS24
SS20	DS20
SB24	DB24
SC24	DC24

INSULATOR TYPE

CODE	Size / Material
BM	1/8 OD Mullite
CM	3/16 OD Mullite
DM	1/4 OD Mullite
BA	1/8 OD Alumina
CA	3/16 OD Alumina
DA	1/4 OD Alumina

SPECIAL OPTIONS

CODE	Description
C	1/2" OD Collar
R	Recessed Junction
L	Special Limits of Error

Enter CODE

i.e. TENE-SR26-CM120C

TENE
Sensor Type
& Style No.

**Thermocouple
Type**
(See Table above)

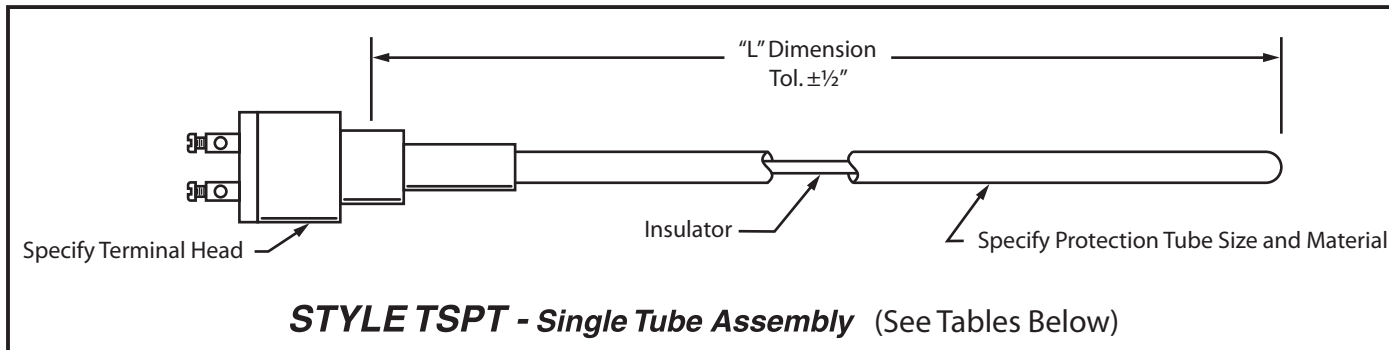
Insulator Type
(See Table
above)

"L" Dimension
3 Digit Code
(i.e. 120 for 12")
See CODES on Page 175

Special Options
(See Table
above)

NOBLE METAL THERMOCOUPLE WITH SINGLE CERAMIC TUBE

The TSPT Style Thermocouple assembly features a noble metal thermocouple and single ceramic protection tube. A variety of process connection and terminal housing options are available.



THERMOCOUPLE TYPE

ELEMENT TYPE and GAUGE

SINGLE	DUAL
SR26	DR26
SR24	DR24
SR20	DR20
SS26	DS26
SS24	DS24
SS20	DS20
SB24	DB24
SC24	DC24

PROTECTION TUBE

CODE	Tube Size / Material
A	3/8 OD Mullite
B	3/8 OD Alumina
C	11/16 OD Mullite
D	11/16 OD Alumina
X	Special

PROCESS CONNECTION

(for use with terminal heads only)

CODE	Process Fitting
O	No Process Fitting
G	1/2 NPT, Brass
H	1/2 NPT, Stainless Steel
J	3/4 NPT, Brass
K	3/4 NPT, Stainless Steel
Q	1" NPT, Stainless Steel

TERMINATION OPTIONS

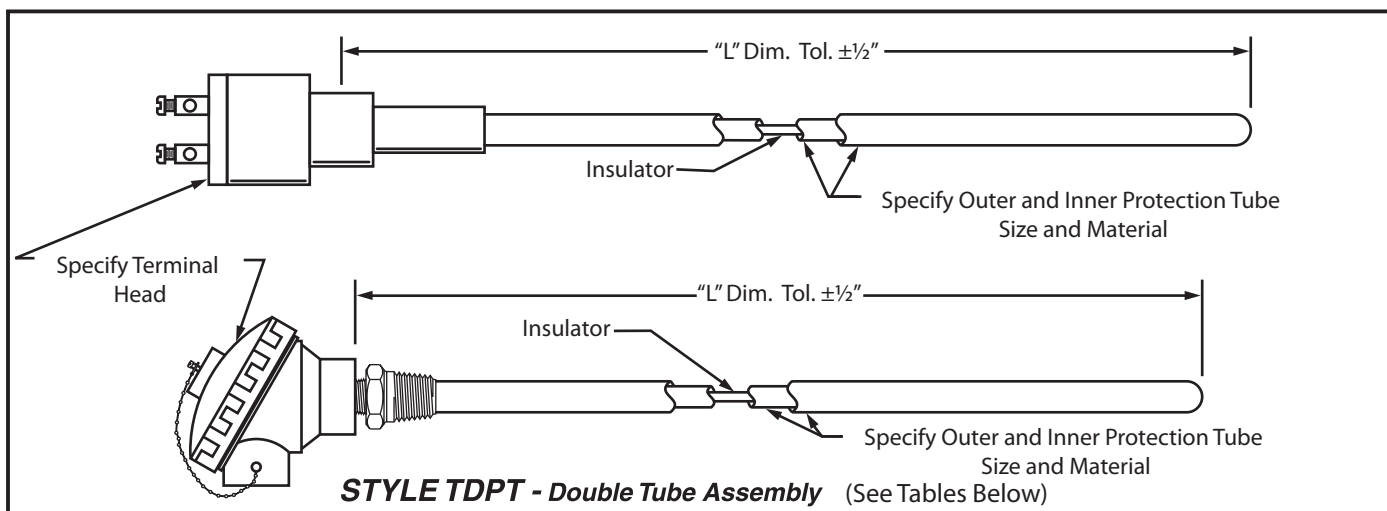
CODE	Termination Type
3	Male Plug with Tube Adapter
Y	Open Head Brass Terminal
D	Cast Iron Head: 3/4 NPT Conduit Connection
B	Cast Aluminum Head: 3/4 NPT Conduit Connection

Enter CODE	TSPT Sensor Type & Style No.	Thermocouple Type (See Table above)	Protection Tube Type (See Table above)	"L" Dimension 3 Digit Code (i.e. 12D for 12 1/4") See CODES on Page 175	Process Connection for use with terminal heads only (See Table above)	Termination Options (See Table above)
i.e. TSPT-SR20-B12D-OY						



NOBLE METAL THERMOCOUPLE WITH DOUBLE CERAMIC TUBE

The TDPT Style Thermocouple assembly features a noble metal thermocouple element with a primary and secondary ceramic protection tube for additional protection in extreme environments.



THERMOCOUPLE TYPE

ELEMENT TYPE and GAUGE	
SINGLE	DUAL
SR26	DR26
SR24	DR24
SR20	DR20
SS26	DS26
SS24	DS24
SS20	DS20
SB24	DB24
SC24	DC24

OUTER PROTECTION TUBE

CODE	Tube Size / Material
LL	11/16 OD Alumina
LW	11/16 OD Mullite
PZ	7/8 OD LT-1
UA	1.05" OD Incone [®] 601

INNER PROTECTION TUBE

CODE	Tube Size & Material
F	3/8 Diameter

PROCESS CONNECTION

CODE	Process Fitting
O	No Process Fitting
G	1/2 NPT, Brass
H	1/2 NPT, Stainless Steel
J	3/4 NPT, Brass
K	3/4 NPT, Stainless Steel
Q	1" NPT, Stainless Steel

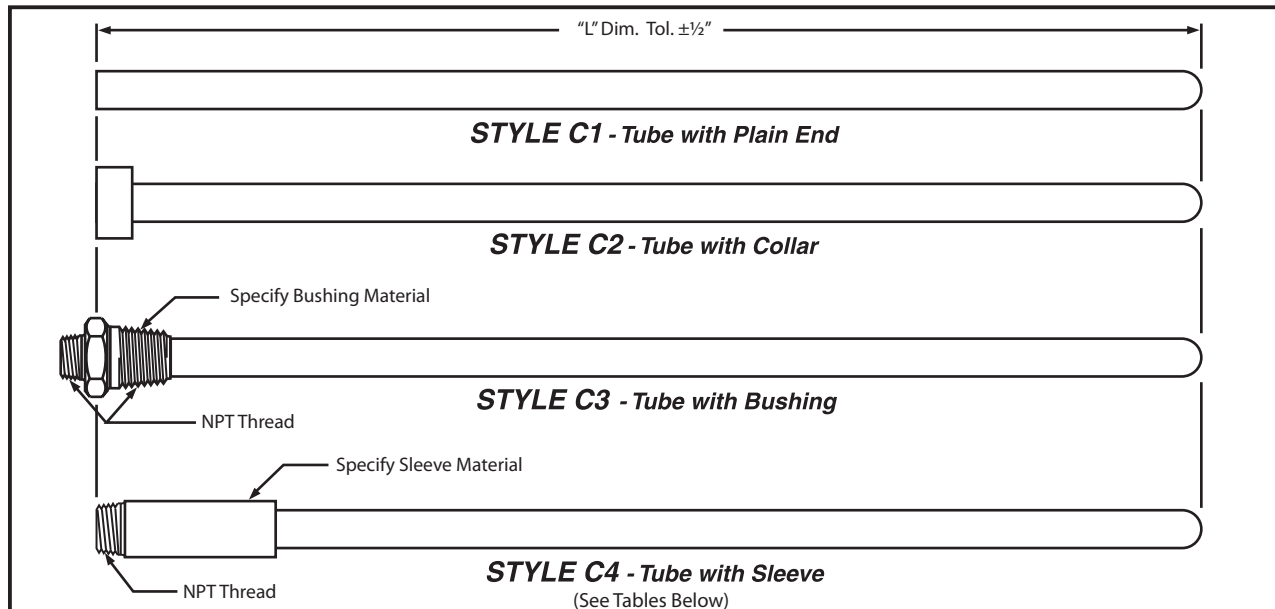
TERMINATION OPTIONS

CODE	Termination Type
3	Male Plug with Tube Adapter
Y	Open Head Brass Terminal
D	Cast Iron Head: 3/4 NPT Conduit Connection
B	Cast Aluminum Head: 3/4 NPT Conduit Connection

Enter CODE i.e. TDPT-SS24-AM12D-OY	TDPT	-	-	-	-	-	-
	Sensor Type & Style No.	Thermocouple Type (See Table above)	Outer Protection Tube Type (See Table above)	Inner Protection Tube Type (See Table above)	"L" Dimension 3 Digit Code (i.e. 12D for 12 1/4") See CODES on Page 175	Process Connection (See Table above)	Termination Options (See Table above)

REPLACEMENT CERAMIC PROTECTION TUBES

Replacement ceramic protection tubes are available for all thermocouple protection tube assemblies.



TUBE MATERIAL

CODE	Material
W	Mullite
L	Alumina

TUBE SIZE

CODE	Description
D	3/16 ID x 1/4 OD
F	1/4 ID x 3/8 OD
H	3/8 ID x 1/2 OD
L	7/16 ID x 11/16 OD
S	3/4 ID x 1 OD
Q	1 ID x 1 1/4 OD

BUSHING STYLE

CODE	Description
0	No Bushing
1	1/2 x 1/2 NPT
2	1/2 x 3/4 NPT
3	3/4 x 3/4 NPT
4	3/4 x 1" NPT
5	1" x 1" NPT
6	1" x 1 1/4 NPT

SUPPORT SLEEVE

CODE	Description
0	No Sleeve
1	Threaded Sleeve 7/8 - 27
2	1" NPT x 1 1/2" Long Close Nipple
3	1 1/4 NPT x 1 1/2" Long Close Nipple
4	3/4 NPT Sleeve
5	1" NPT Sleeve

BUSHING / SUPPORT SLEEVE MATERIAL

CODE	Description
B	Brass
4	304 Stainless Steel
6	316 Stainless Steel
R	Carbon Steel

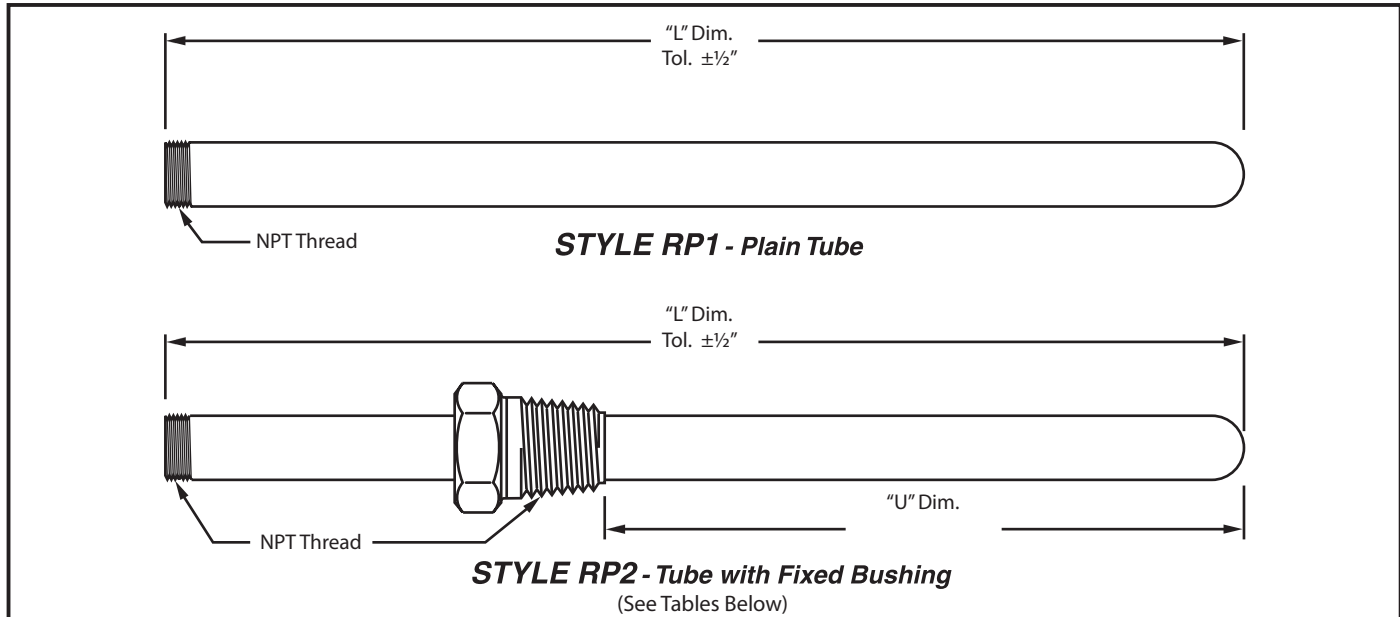
Enter CODE

i.e. C4-WD12D-05040B

Tube Style No.	Tube Material (See Table above)	Tube Size (See Table above)	"L" Dimension 3 Digit Code (i.e. 12D for 12 1/4") See CODES on Page 175	Bushing Style (See Table above)	Support Sleeve (See Table above)	Support Sleeve Length If applicable 3 Digit CODE (i.e. 040 for 4")	Bushing/ Support Sleeve Material (See Table above)
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REPLACEMENT METAL PROTECTION TUBES



PROTECTION TUBE SIZE

CODE	IPS (Nominal)
L	1/2" (.840)
M	3/4" (1.050)
N	1" (1.315)
O	1 1/4" (1.660)
P	1 1/2" (1.900)

WALL THICKNESS

CODE	NOMINAL WALL
W	Schedule 40
Y	Schedule 80
Z	Schedule 160

PROTECTION TUBE MATERIALS

CODE	Metal Materials	CODE	Metal Materials
4	304 Stainless Steel	8	Inconel® 600
6	316 Stainless Steel	A	Inconel® 601
3	330 Stainless Steel	R	Carbon Steel
5	446 Stainless Steel		

PROCESS FITTING (If Applicable)

CODE	DESCRIPTION
H	1/2" NPT Stainless Steel
K	3/4" NPT Stainless Steel
9	Adjustable Mounting Flange

Enter CODE

i.e. RP1 - LW806F - H04B

Tube Style
No.

Protection
Tube Size
(See Table
above)

Wall
Thickness
(See Table
above)

Protection
Tube
Material
(See Table
above)

"L" Dimension
3 Digit CODE
(i.e. 06F for 6 3/8")
See CODES
on Page 175

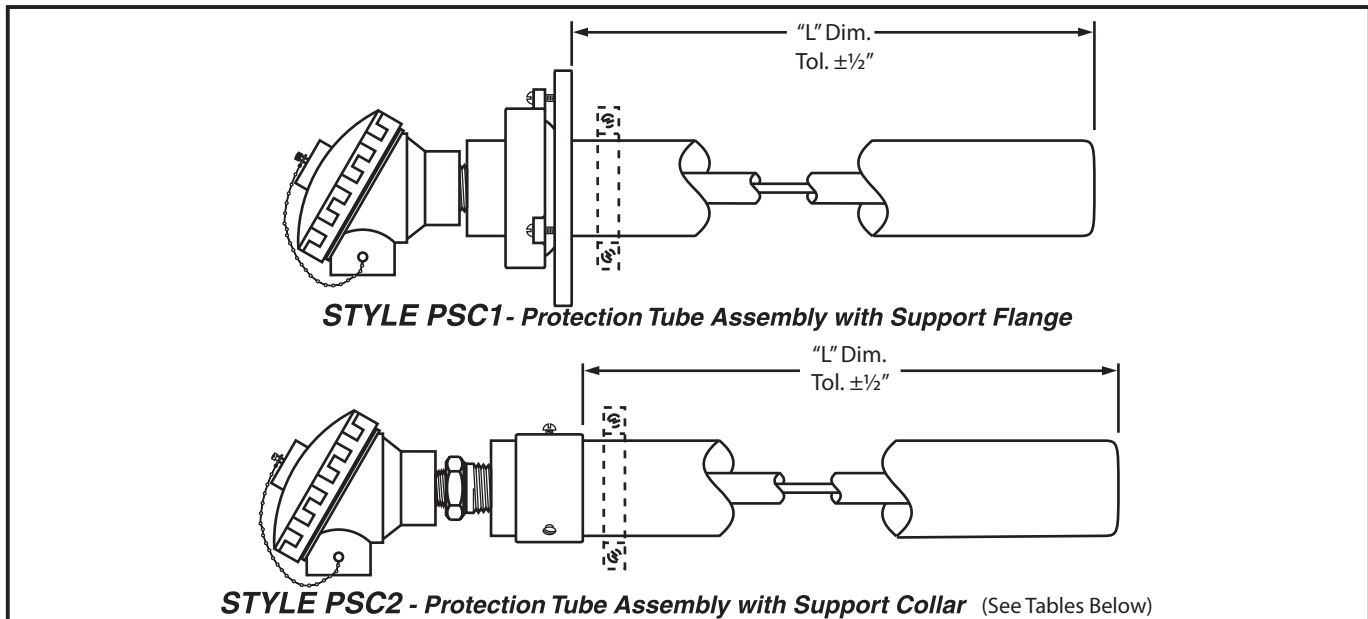
Process
Fitting
(If applicable)
(See Table
above)

"U" Dimension
3 Digit Code
See CODES
on Page 175



SILICON CARBIDE PROTECTION TUBE ASSEMBLY

The PSC1 and PSC2 Style Thermocouple assemblies feature a silicon carbide protection tube along with an inner ceramic tube for additional protection of the element.



THERMOCOUPLE TYPE

ELEMENT TYPE and GAUGE	
SINGLE	DUAL
SR26	DR26
SR24	DR24
SR20	DR20
SS26	DS26
SS24	DS24
SS20	DS20
SB24	DB24
SC24	DC24

SCREW COVER TERMINAL HEADS

CODE	SCREW COVER HEAD MATERIALS	CODE	SCREW COVER HEAD MATERIALS
A	Aluminum Head; 1/2" N.P.T. Conduit Connection	P	Plastic Head; 1/2" N.P.T. Conduit Connection
B	Aluminum Head; 3/4" N.P.T. Conduit Connection	M	Miniature Plastic Head; 1/4" N.P.T. Conduit Connection
C	Cast Iron Head; 1/2" N.P.T. Conduit Connection	Z	Explosion Proof Cast Iron Head; 1/2" N.P.T. Conduit Connection
D	Cast Iron Head; 3/4" N.P.T. Conduit Connection	W	White Polypropylene FDA Compliant Head; 1/2" N.P.T. Conduit Connection

FLANGE OPTIONS

CODE	DESCRIPTION
O	No Flange
F	Square Split Flange

Enter CODE

i.e. PSC2-SR24-12D-DF

PSC1 or PSC2 -

Sensor Type

Thermocouple Type
(See Table above)

"L" Dimension
3 Digit CODE
(i.e. 12D for 12 1/4")
See CODES on Page 175

Terminal Head
(See Table above)

Flange Option
(See Table above)



TECHNICAL DATA

NATIONAL STANDARDS

Color-codes have been adopted by various national and international standard agencies for identification of thermocouple wire and thermocouple products. In the United States, thermocouple grade wire normally has a brown overall jacket. For Types B, R and S the color-codes relate to the compensating cable normally used.

TYPE	UNITED STATES ANSI 96.1	UNITED KINGDOM BS 1843	GERMANY DIN 43714	FRANCE NF C42-323	JAPAN JIS C1610-1981
E	PURPLE + PURPLE - RED	BROWN + BROWN - BLUE	BLACK + RED - BLACK		PURPLE +RED - WHITE
J	BLACK + WHITE - RED	BLACK + YELLOW - BLUE	BLUE + RED - BLUE	BLACK + YELLOW - BLACK	YELLOW + RED - WHITE
K	YELLOW + YELLOW - RED	RED + BROWN - BLUE	GREEN + RED - GREEN	YELLOW + YELLOW - PURPLE	BLUE + RED - WHITE
N	ORANGE + ORANGE - RED				
B	GREY +GREY - RED		GREY + RED - GREY		GREY + RED - WHITE
R	GREEN + BLACK - RED	GREEN + WHITE - BLUE			BLACK + RED - WHITE
S	GREEN + BLACK - RED	GREEN + WHITE - BLUE	WHITE + RED -WHITE	GREEN + YELLOW - GREEN	BLACK +RED - WHITE
T	BLUE +BLUE - RED	BLUE +WHITE - BLUE	BROWN + RED - BROWN	BLUE + YELLOW - BLUE	BROWN + RED - WHITE

TECHNICAL DATA

MATERIAL SELECTION GUIDE FOR THERMOWELL APPLICATIONS

Chemical	Temp. °F	Concen- tration %	Recommended Material
Acetic Acid	212	All	Monel, 430 SS
Acetic Anhydride	300	-	Nickel, Monel
Acetone	212	All	304 SS
Acetylene	400	All	304 SS, Monel, Nickel
Alcohols (Methyl, Ethyl)	212	All	304 SS
Aluminum (Potassium or Sodium)	300	All	Hastelloy - C
Aluminum Acetate	-	Sat.	304 SS
Aluminum Chloride	212	All	Hastelloy - B
Aluminum Sulfate	212	All	316 SS
Ammonia, Dry	212	All	304, 316 SS
Ammonium Hydroxide (Ammonia, Aqua)	212	All	304, 316 SS
Ammonium Chloride	300	50	Monel
Ammonium Nitrate	300	All	304 SS
Ammonium Sulfate	212	All	316 SS
Amyl Acetate	300	All	304 SS, Monel
Aniline	75	All	Monel
Asphalt	250	All	304 SS
Barium Compound	70	All	Hastelloy - C
Beer	70	-	304 SS
Benzene (Benzol)	212	-	Steel (C1018)
Benzine	-	-	Steel (C1018)
Benoic Acid	212	All	316 SS
Bleaching Powder	70	20	Monel
Borax	212	All	Brass
Bordeaux Mixture	200	-	304 SS
Boric Acid	212	All	316 SS
Bromine	125	Dry	Monel, Tantalum
Butabien	-	All	Brass, 304 SS
Butane	70	All	Steel, 304 SS
Butyl Alcohol	212	All	304 SS
Butyric Acid	70	5	Hastelloy - C, 304 SS
Calcium Bisulphite	75	All	Hastelloy - C, 316 SS
Calcium Chloride	212	All	Hastelloy - C, 304 SS
Calcium Hydroxide	212	50	Hastelloy - C, 317 SS
Calcium Hypochlorite	70	20	Monel
Carbolic Acid	212	All	316 SS
Carbon Dioxide, Dry	212	All	Brass, Steel (C1018)
Carbonated Water	212	All	304 SS
Carbonated Beverages	212	All	304 SS
Carbon Disulfide	200	-	304 SS
Carbon Tetrachloride	70	All	Monel

Chemical	Temp. °F	Concen- tration %	Recommended Material
Chlorine, Dry	-	100	Monel
Chlorine, Moist	212	All	Hastelloy - C
Chloracetic Acid	212	All	Monel
Chloroform, Dry	212	-	Monel
Chromic Acid	212	50	Hastelloy - C, 316 SS
Cider	212	All	304 SS
Citric Acid	212	All	Hastelloy - C, 316 SS
Coal Tar	212	-	304 SS
Copper (10) Chloride	212	All	Hastelloy - C
Copper (10) Nitrate	300	All	316 SS
Copper (10) Sulfate	300	All	316 SS
Copper Plating Solution (Cyanide)	180	-	304 SS
Copper Plating Solution (Acid)	75	-	304 SS
Corn Oil	300	-	304 SS
Cottonseed Oil	300	-	304 SS
Creosote, Crude	200	All	304 SS, Monel
Crude Oil	300	-	Monel
Ethyl Acetate	300	All	Monel
Ethyl Chloride, Dry	500	-	Steel
Ethylene Glycol	212	All	Steel
Ethylene Oxide	75	-	Steel
Fatty Acids	500	All	316 SS
Ferric Chloride	75	All	Hastelloy-C, Tantalum
Ferric Sulfate	70	All	304 SS
Formaldehyde	212	All	316 SS
Formic Acid	150	All	316 SS
Freon	-	-	Steel
Fluorine, Anhydrous	100	-	304 SS
Furfural	450	-	316 SS
Gallic Acid	150	5	Monel
Gasoline	70	-	Steel, 304 SS
Glucose	300	All	304 SS
Glue pH 6-8	300	All	304 SS
Glycerin	212	All	Brass, 304 SS
Glycerol	-	-	Brass, 304 SS
Hydrobromic Acid	212	All	Hastelloy - B
Hydrochloric Acid (37-38%)	225	All	Hastelloy - B
Hydrogen Chloride, Dry	300	-	304 SS
Hydrocyanic Acid	212	All	316 SS
Hydrofluoric Acid	212	60	Monel, Hastelloy - C
Hydrogen Fluoride, Dry	175	-	Steel



TECHNICAL DATA

MATERIAL SELECTION GUIDE FOR THERMOWELL APPLICATIONS

Chemical	Temp. °F	Concen- tration %	Recommended Material
Hydrofluogilicic Acid	212	40	Monel
Hydrogen Peroxide	212	10-100	316 SS
Iodine	70	All	Tantalum
Kerosene	70	-	Steel, 304 SS
Lacquers & Thinners	300	All	Monel
Lactic Acid	212	All	316 SS, Tantalum
Lime	212	All	316 SS
Linseed Oil	75	-	Steel, 304 SS
Magnesium Chloride	212	50	Nickel
Magnesium Hydroxide	75	All	304 SS
Magnesium Sulfate	212	40	304 SS
Malic Acid	212	All	316 SS
Mercuric Chloride	75	10	Hastelloy - C
Mercury	-	-	Steel, 304 SS
Methane	70	All	Steel
Methylene Chloride	212	All	304 SS
Methyl Chloride, Dry	75	-	Steel
Milk, Fresh, or Sour	180	-	304 SS, Nickel
Molasses	300	All	304 SS
Natural Gas	70	-	304 SS
Nitric Acid	75	All	304 SS
Nitric Acid	300	All	316 SS, Tantalum
Nitrobenzene	70	-	304 SS
Oxygen	70	All	Steel
Oleic Acid	500	All	316 SS
Oxalic Acid	212	All	Monel
Palmitic Acid	500	All	316 SS
Photographic Bleaching	100	All	304 SS
Phosphoric Acid	212	All	316 SS
Phenol		All	316 SS
Potassium Compounds		See Sodium Compounds	
Propane	70	All	Steel
Rosin	700	100	316 SS
Sea Water	212	-	Monel
Soap & Detergents	212	All	304 SS
Sodium Bicarbonate	212	20	316 SS
Sodium Bisulphite	212	20	304 SS
Sodium Bisulfate	212	20	304 SS
Sodium Carbonate	212	40	316 SS
Sodium Chloride	300	30	Monel
Sodium Chromate	212	All	316 SS
Sodium Cyanide	212	All	304 SS
Sodium Hydroxide	212	30	316 SS
Sodium Hypochlorite	75	10	Hastelloy - C

Chemical	Temp. °F	Concen- tration %	Recommended Material
Sodium Nitrate	212	40	304 SS
Sodium Nitrate	75	20	316 SS
Sodium Phosphate	212	10	Steel
Sodium Silicate	212	10	Steel
Sodium Sulfate	212	30	316 SS
Sodium Sulfide	212	10	316 SS
Sodium Sulfite	212	30	304 SS
Sodium Thiosulfate	212	All	304 SS
Steam	-	-	304 SS
Stearic Acid	500	All	316 SS
Sugar Solutions	300	All	304 SS
Sulfur	500	-	304 SS
Sulfur Chloride, Dry	75	-	316 SS
Sulfur Dioxide, Dry	500	-	316 SS
Sulfur Trioxide, Dye	500	-	316 SS
Sulfuric Acid	212	5	Hastelloy - B
Sulfuric Acid	212	5-100	Hastelloy - B, Hastelloy - D
Sulfuric Acid, Fuming	175	-	Hastelloy - C
Sulfurous Acid	75	20	316 SS
Titanium Tetrachloride	75	All	316 SS
Tannic Acid	75	40	Hastelloy - B
Toluene	75	-	Steel
Trichloroacetic Acid	75	All	Hastelloy - B
Trichlorethylene	-	-	Steel (C1018)
Turpentine	75	All	316 SS
Varnish	150	-	Steel, 304 SS
Vinegar	212	All	Monel, 304 SS
Zinc Chloride	212	All	Hastelloy - B
Zinc Sulfate	212	All	316 SS



PLASTIC INDUSTRY and GENERAL PURPOSE SENSORS

Durex offers a complete line of thermocouples that are specifically designed for the plastics processing industry. These thermocouples are typically ANSI type J or K calibration and consist of a flexible thermocouple conductor insulated with



fiberglass. Designs utilize factory standard bayonet fittings or threaded fittings that retrofit most plastic processing equipment that is currently on the market. Durex also offers European and Japanese retrofit parts with equivalent color codes for direct replacement in these machines.

FEATURES:

- Typical terminations: split leads, spade lugs, or polarized male plugs
- Adjustable to various immersion depths
- Provide fast response times
- Wide variety of sizes and styles
- Custom designs available
- Dependable temperature measurement
- Economical general purpose thermocouples

TYPICAL APPLICATIONS:

- Extrusion
- Injection Molding
- Blow Molding
- Hot Runner Systems
- Thermoforming
- Custom Die Applications



CODE DEFINITIONS and TERMINATION TYPES

THERMOCOUPLE TYPE

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

JUNCTION TYPE

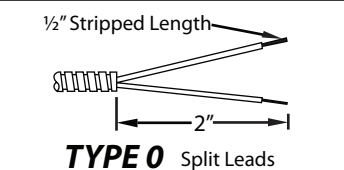
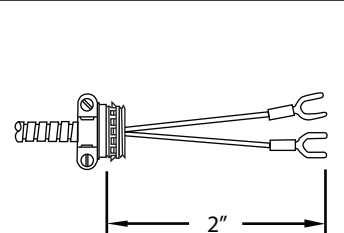
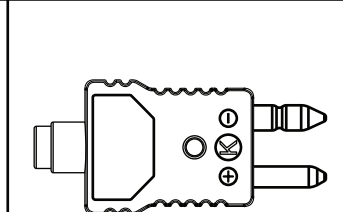
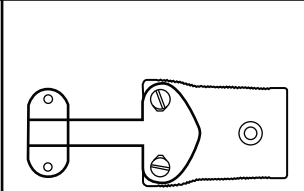
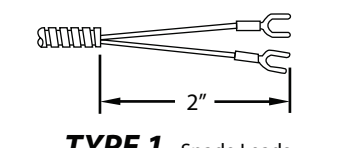
CODE	SINGLE JUNCTION
G	Grounded
U	Ungrounded

SHEATH DIAMETER

CODE	DIAMETERS
B	.125" or 1/8" O.D.
V	.156" or 5/32" O.D.
C	.188" or 3/16" O.D.
D	.250" or 1/4" O.D.
F	.375" or 3/8" O.D.

"L" Dimensions	"B" Dimensions	"A" Dimensions	Fractional Dimension Letter CODE																																								
"L" dimensions are specified in whole inches and a single alpha character which represents a fraction. Enter the three digit CODE as follows: <table><tr><td>3" = 030</td><td>8-5/8" = 08K</td></tr><tr><td>4-1/8" = 04B</td><td>9-3/4" = 09M</td></tr><tr><td>5-1/4" = 05D</td><td>10-7/8" = 10P</td></tr><tr><td>6-3/8" = 06F</td><td>12" = 120</td></tr><tr><td>7-1/2" = 07H</td><td>15' = 150</td></tr></table>	3" = 030	8-5/8" = 08K	4-1/8" = 04B	9-3/4" = 09M	5-1/4" = 05D	10-7/8" = 10P	6-3/8" = 06F	12" = 120	7-1/2" = 07H	15' = 150	"B" dimensions are specified in fractions from 1/8" to 1". Use the single alpha character to indicate the tip length. Enter the CODE as follows: <table><tr><td>1/8" = B</td><td>5/8" = K</td></tr><tr><td>1/4" = D</td><td>3/4" = M</td></tr><tr><td>3/8" = F</td><td>7/8" = P</td></tr><tr><td>1/2" = H</td><td>1" = S</td></tr></table>	1/8" = B	5/8" = K	1/4" = D	3/4" = M	3/8" = F	7/8" = P	1/2" = H	1" = S	"A" dimensions are specified in whole inches only. Enter three digit CODE as follows: <table><tr><td>36" = 036</td></tr><tr><td>144" = 144</td></tr><tr><td>12" = 012</td></tr><tr><td>9" = 009</td></tr></table>	36" = 036	144" = 144	12" = 012	9" = 009	<table><tr><td>1/16" = A</td><td>5/8" = K</td></tr><tr><td>1/8" = B</td><td>11/16" = L</td></tr><tr><td>3/16" = C</td><td>3/4" = M</td></tr><tr><td>1/4" = D</td><td>13/16" = N</td></tr><tr><td>5/16" = E</td><td>7/8" = P</td></tr><tr><td>3/8" = F</td><td>15/16" = R</td></tr><tr><td>7/16" = G</td><td>1" = S</td></tr><tr><td>1/2" = H</td><td>0 = NO</td></tr><tr><td>9/16" = J</td><td>Fraction</td></tr></table>	1/16" = A	5/8" = K	1/8" = B	11/16" = L	3/16" = C	3/4" = M	1/4" = D	13/16" = N	5/16" = E	7/8" = P	3/8" = F	15/16" = R	7/16" = G	1" = S	1/2" = H	0 = NO	9/16" = J	Fraction
3" = 030	8-5/8" = 08K																																										
4-1/8" = 04B	9-3/4" = 09M																																										
5-1/4" = 05D	10-7/8" = 10P																																										
6-3/8" = 06F	12" = 120																																										
7-1/2" = 07H	15' = 150																																										
1/8" = B	5/8" = K																																										
1/4" = D	3/4" = M																																										
3/8" = F	7/8" = P																																										
1/2" = H	1" = S																																										
36" = 036																																											
144" = 144																																											
12" = 012																																											
9" = 009																																											
1/16" = A	5/8" = K																																										
1/8" = B	11/16" = L																																										
3/16" = C	3/4" = M																																										
1/4" = D	13/16" = N																																										
5/16" = E	7/8" = P																																										
3/8" = F	15/16" = R																																										
7/16" = G	1" = S																																										
1/2" = H	0 = NO																																										
9/16" = J	Fraction																																										

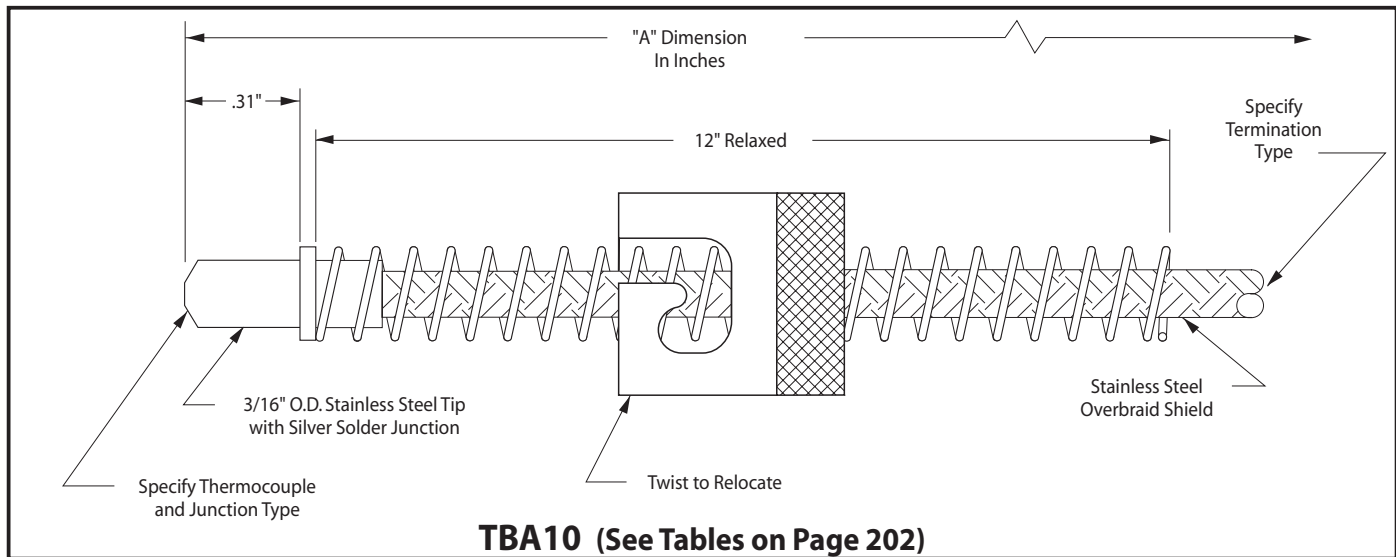
TERMINATION TYPE NUMBERS

 TYPE 0 Split Leads	 TYPE 2 BX Connector With Lugs	 TYPE 3 Standard Molded Plug	 TYPE 4 Standard Cable Clamp Jack
 TYPE 1 Spade Leads			



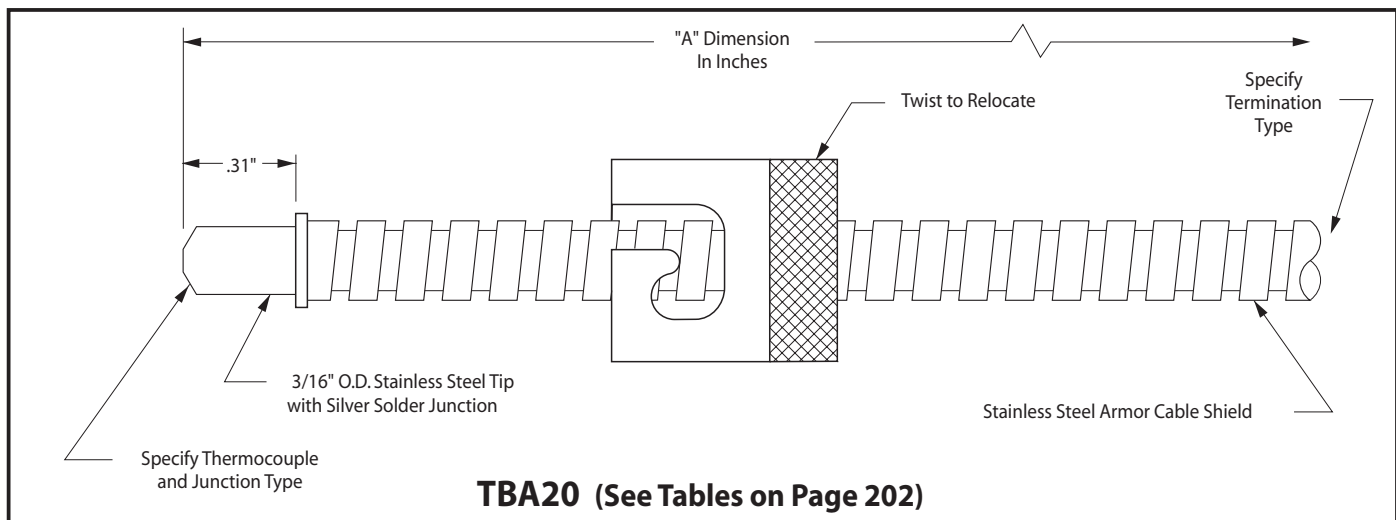
TEMPERATURE SENSORS

ADJUSTABLE DEPTH THERMOCOUPLE WITH SPRING



The TBA10 thermocouple uses a compression spring and bayonet lockcap which allows this design to adjust to hole depths up to 12" deep. This design also features a stainless steel tip with a silver solder junction for fast response. A tig welded junction is available upon request.

ADJUSTABLE DEPTH THERMOCOUPLE WITH ARMOR



The TBA20 thermocouple uses flexible stainless steel armor cable with a rotating bayonet lockcap on the outside diameter that adjusts to various immersion depths. The armor cable assures maximum protection of the thermocouple element for extension from the process

ENTER CODE i.e. TBA10-JG-0360

Sensor Type
& Style No.
(See above)

Thermocouple
Type

Junction Type

"A" Dimension
3 Digit CODE
(i.e. Enter 036 for 36")

Termination No.

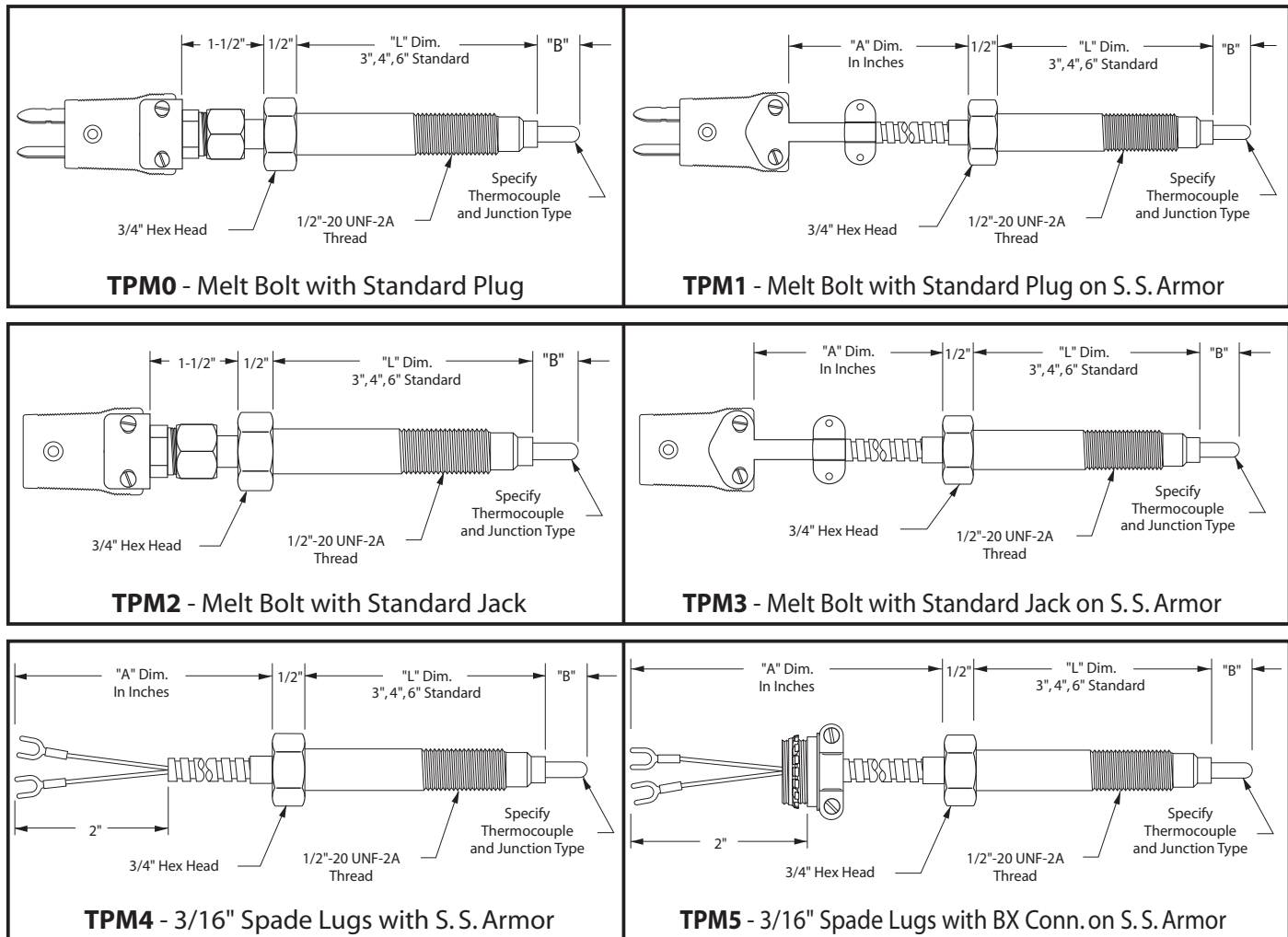
See Tables on Page 202



TEMPERATURE SENSORS

MELT BOLT THERMOCOUPLE

Durex melt bolts are designed for dependable temperature measurement of the plastic melt stream within extruders and injection molding equipment. Standard assemblies are supplied with mineral insulated sensing elements for extended pressure and temperature performance. Optional thermal barriers of Teflon (500°F) and Mycalex (900°F) are available upon request.



ENTER CODE i.e. TPM4-JG-030-P012

Sensor Type
& Style No.
(See above)

Thermocouple
Type

Junction Type

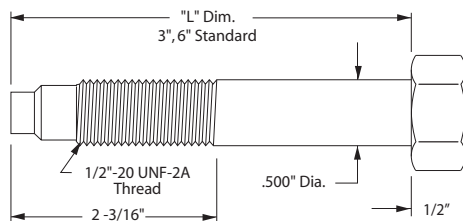
"L" Dimension
3 Digit CODE
(i.e. Enter 030 for 3")

"B" Dimension
Letter CODE
(i.e. Enter P for 7/8")

"A" Dimension
When Applicable
(i.e. Enter 012 for 12")

See Tables on Page 202

BLANK BOLTS



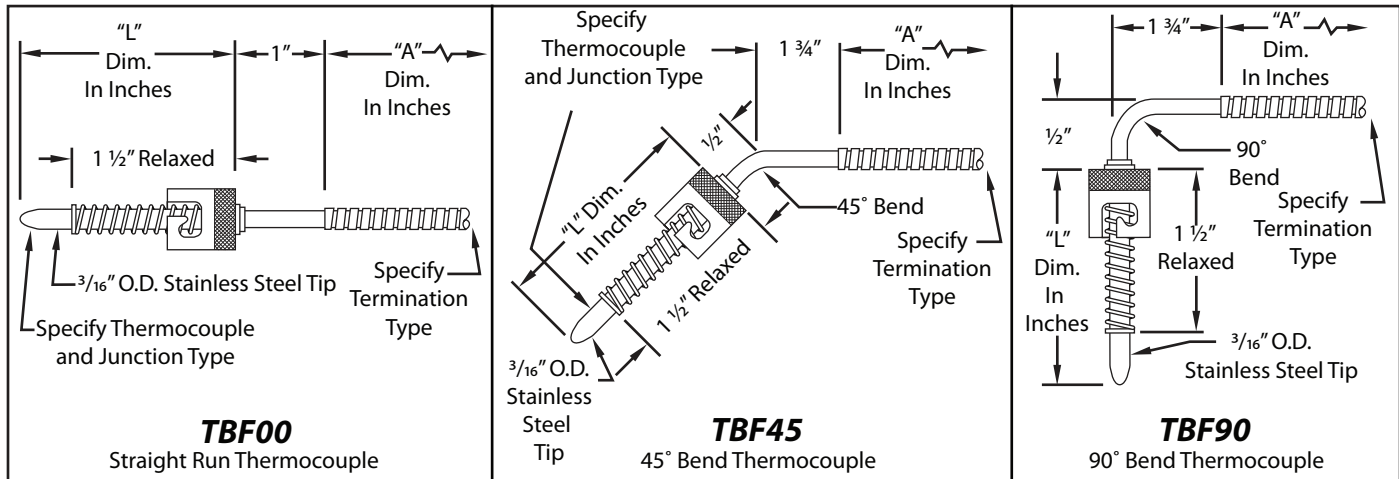
CATALOG #	"L" Dimension
244008	3"
244009	6"

Blank bolt occupies hole when melt bolt is removed.



TEMPERATURE SENSORS

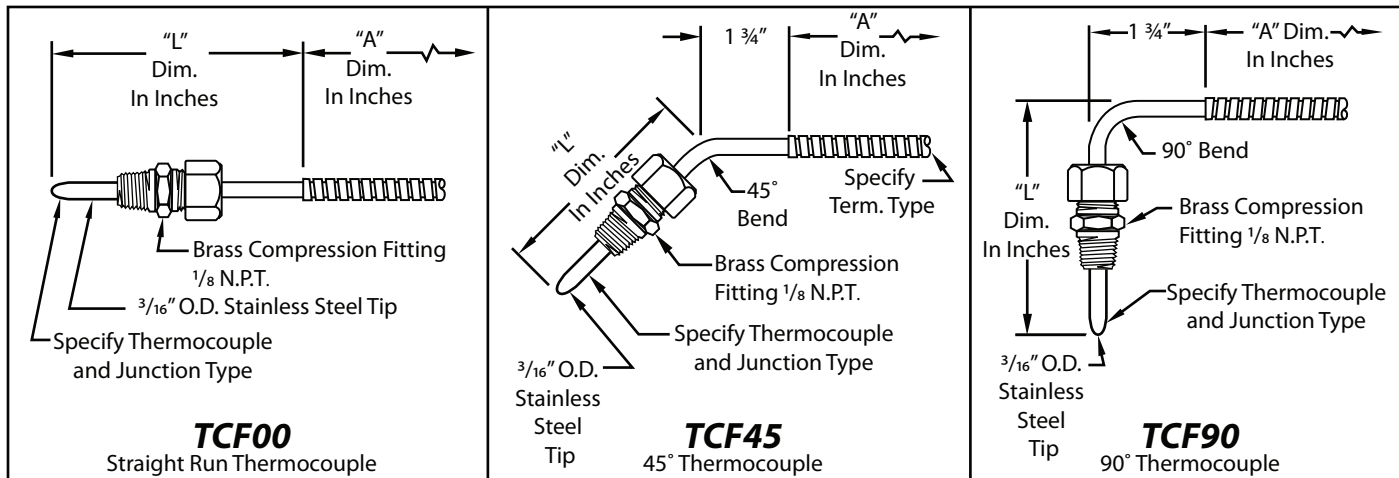
FIXED BAYONET THERMOCOUPLES



Enter CODE i.e. TBF45 - JG-060-0241	Sensor Type & Style No. (See above)	Thermocouple Type	Junction Type	"L" Dimension 3 Digit CODE (i.e. Enter 060 for 6")	"A" Dimension 3 Digit CODE (i.e. Enter 024 for 24")	Termination No.
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See Tables on Page 202

COMPRESSION FITTING THERMOCOUPLE



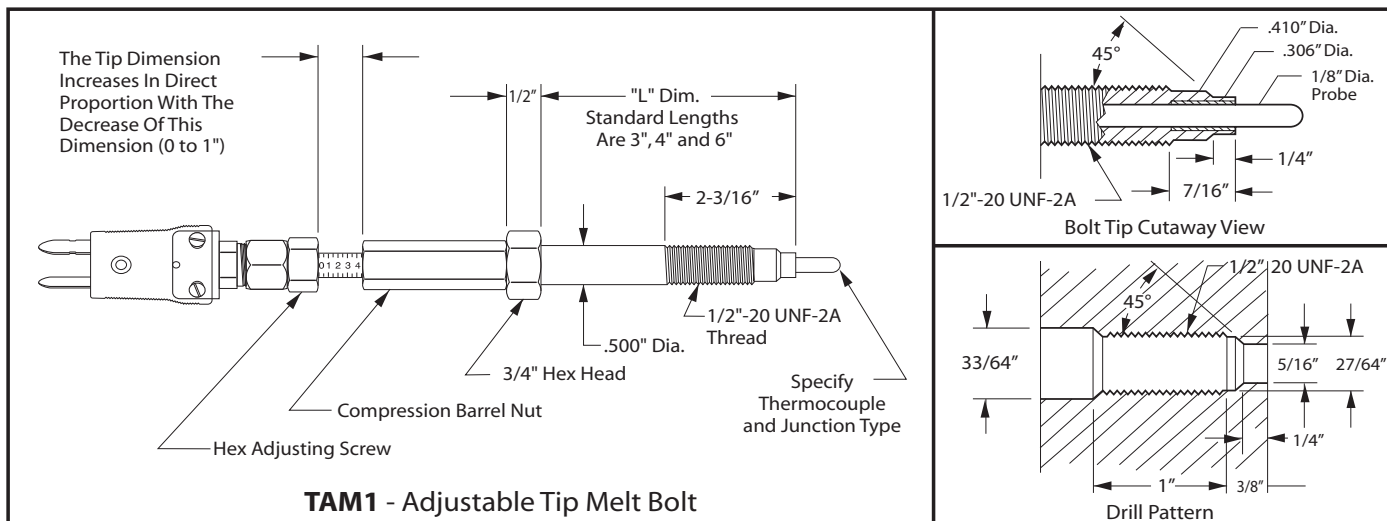
Enter CODE i.e. TCF00-JG-030-0361	Sensor Type & Style No. (See above)	Thermocouple Type	Junction Type	"L" Dimension 3 Digit CODE (i.e. Enter 030 for 3")	"A" Dimension 3 Digit CODE (i.e. Enter 036 for 36")	Termination No.
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See Tables on Page 202



TEMPERATURE SENSORS

ADJUSTABLE MELT BOLT THERMOCOUPLES

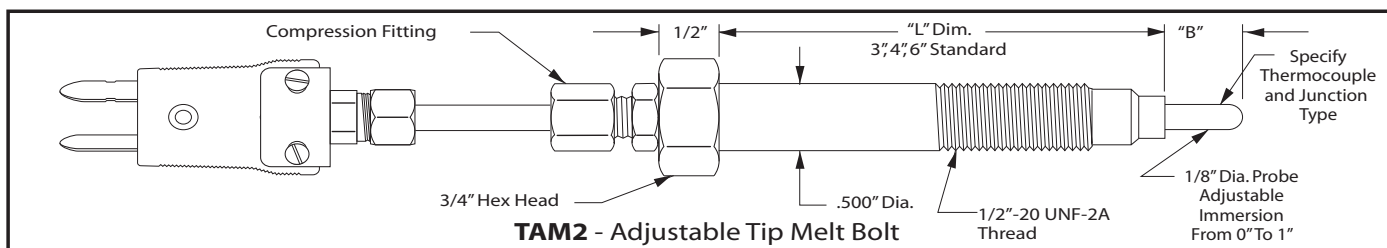


The standard assembly consists of an 1/8" O.D. MgO insulated type "J" thermocouple in a stainless steel sheath. The body is stainless steel with a 1/2"-20UNF-2A thread. A thermal barrier reduces heat transfer from body to thermocouple. Other parts include a packing seal, compression barrel nut, hex adjusting screw and a polarized quick-disconnect male plug. Standard immersion is adjustable from flush to 1". Standard body lengths are 3", 4" and 6" measured from the beginning of wrench flats to the bolt tip. The adjustable plastic melt thermocouple has a movable probe activated by an inner screw mechanism. The probe can be immersed into or withdrawn from the plastic melt stream while the extruder is in full operation at maximum flow rates and pressures. This feature permits temperature measurement at various depths in the melt stream, eliminates thermocouple breakage at start-up and prevents hang-up. The thermocouple is self-cleaning; as it is retracted into the body any film formed on it is scraped off.

ENTER CODE i.e. TAM1-JG-040

TAM1	-		-	
Sensor Type & Style No.		Thermocouple Type		Junction Type
				"L" Dimension
				3 Digit Code
				(i.e. Enter 040 for 4")

See Tables on Page 202



The TAM2 adjustable melt thermocouple features an all stainless steel construction and uses a compression fitting as the mechanism for adjustment. The TAM2 allows for easy and economical replacement of the mineral insulated thermocouple element.

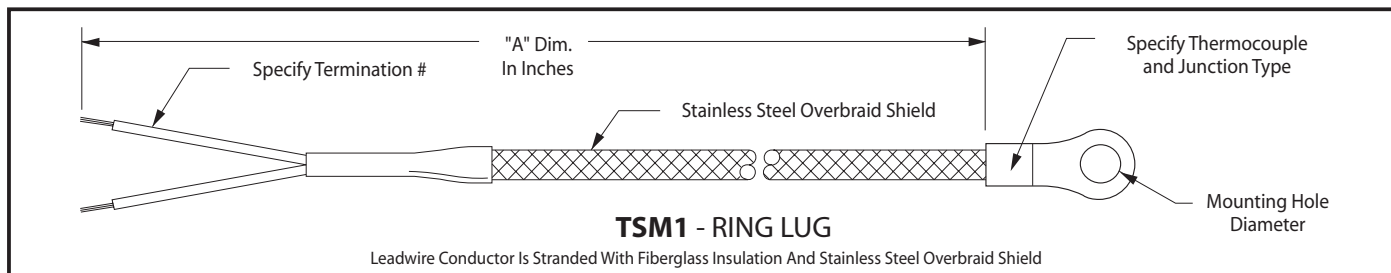
ENTER CODE i.e. TAM2-JG-040-M

TAM2	-		-		-	
Sensor Type & Style No.		Thermocouple Type		Junction Type		"L" Dimension
						3 Digit Code
						(i.e. Enter 040 for 4")
						"B" Dimension
						Specify Max. Immersion Depth
						(i.e. Enter M for 3/4")

See Tables on Page 202

TEMPERATURE SENSORS

SURFACE MOUNT THERMOCOUPLES



TERMINATION OPTIONS

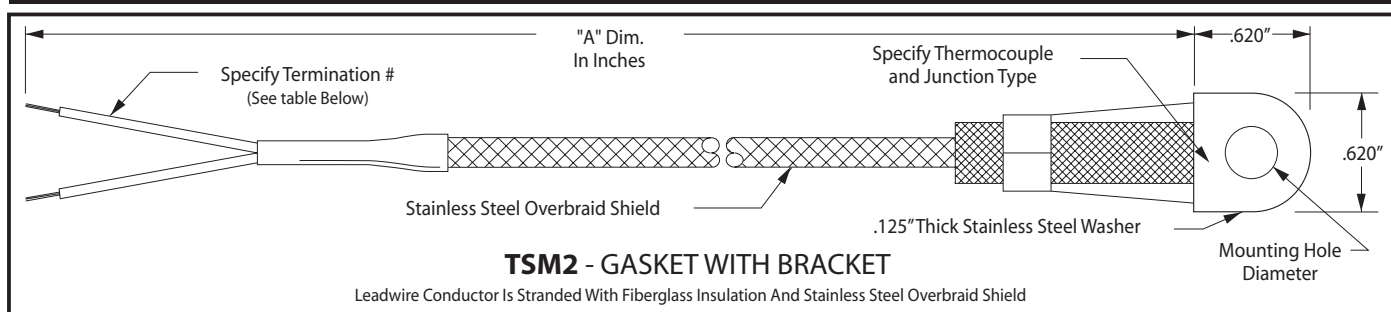
TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug
4	Standard Jack
X	Special, Specify

MOUNTING HOLE OPTIONS

MOUNTING HOLE TYPE	STUD SIZE	HOLE DIAMETER
A	No. 6	.144
B	No. 8	.169
C	No. 10	.196
D	1/4"	.266
E	3/8"	.390

ENTER CODE i.e. TSM1-JG-0240C

TSM1	-		-		-		-	
Sensor Type & Style No.		Thermocouple Type		Junction Type		"A" Dimension 3 Digit CODE (i.e. Enter 024 for 24")		Termination Option (See Table Above)
		See Table on page 202		See Table on page 202		See Table on page 202		Mounting Hole Diameter (See Table Above)



TERMINATION OPTIONS

TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug
4	Standard Jack
X	Special, Specify

MOUNTING HOLE OPTIONS

MOUNTING HOLE TYPE	STUD SIZE	HOLE DIAMETER
A	1/4"	9/32"
B	5/16"	11/32"
C	3/8"	13/32"
D	7/16"	15/32"
E	1/2"	17/32"

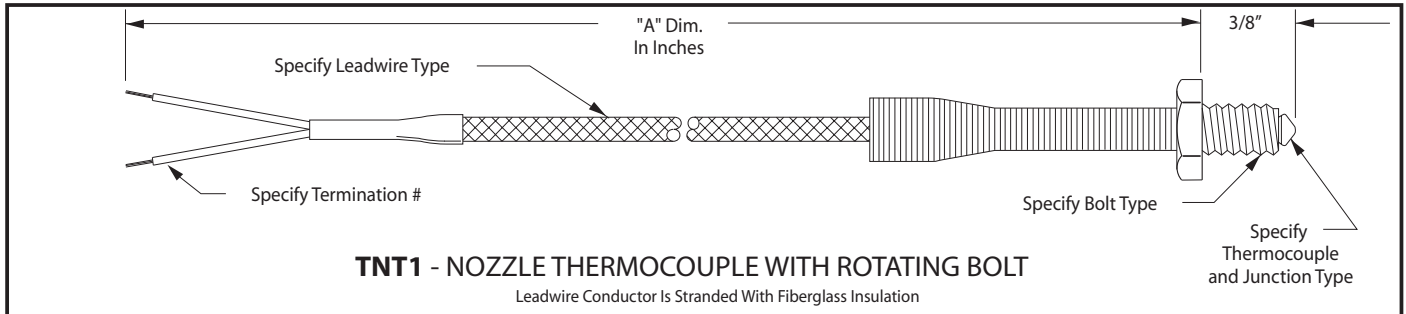
ENTER CODE i.e. TSM2-JG-0180B

TSM2	-		-		-		-	
Sensor Type & Style No.		Thermocouple Type		Junction Type		"A" Dimension 3 Digit CODE (i.e. Enter 018 for 18")		Termination Option (See Table Above)
		See Table on page 202		See Table on page 202		See Table on page 202		Mounting Hole Diameter (See Table Above)



TEMPERATURE SENSORS

NOZZLE THERMOCOUPLES



LEADWIRE TYPE

LEADWIRE #	DESCRIPTION
H	Fiberglass Leadwire with S. S. Overbraid
J	Fiberglass Leadwire with S. S. Armor

TERMINATION OPTIONS

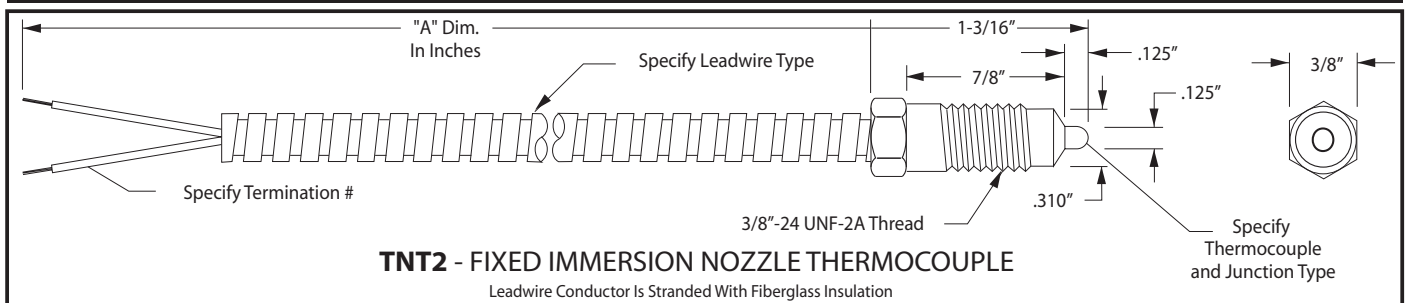
TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug
4	Standard Jack
X	Special, Specify

BOLT OPTIONS

BOLT TYPE	DESCRIPTION
S	1/4-28
Y	6 mm
Z	8 mm

ENTER CODE i.e. TNT1-JG-036C0Y

TNT1	-		-					
Sensor Type & Style No.		Thermocouple Type		Junction Type	"A" Dimension 3 Digit CODE (i.e. Enter 036 for 36")	Leadwire (See Table Above)	Termination Option (See Table Above)	Bolt Options (See Table Above)
		See Table on page 202		See Table on page 202	See Table on page 202			



LEADWIRE OPTIONS

LEADWIRE #	DESCRIPTION
H	Fiberglass Leadwire with S. S. Overbraid
J	Fiberglass Leadwire with S. S. Armor

TERMINATION OPTIONS

TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug
X	Special, Specify

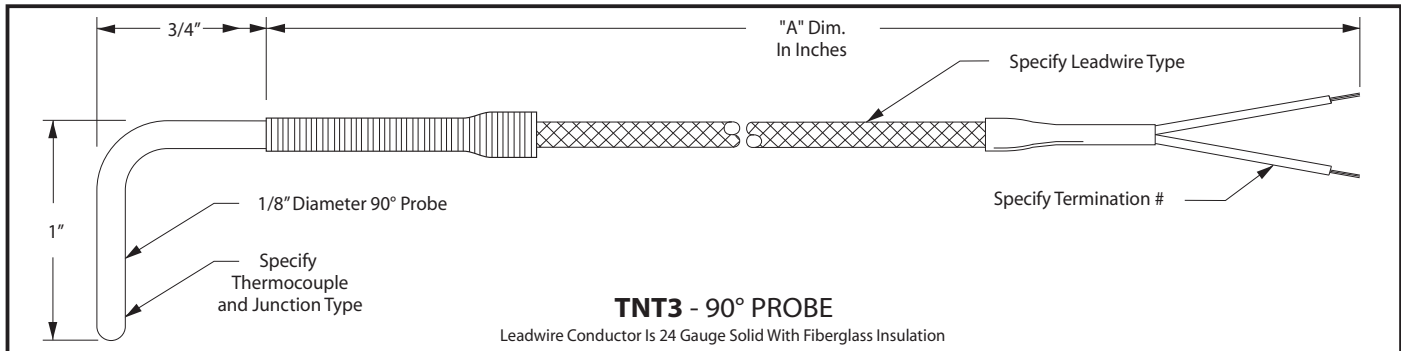
ENTER CODE i.e. TNT2-JG-048D0

TNT2	-		-				
Sensor Type & Style No.		Thermocouple Type		Junction Type	"A" Dimension 3 Digit CODE (i.e. Enter 048 for 48")	Leadwire (See Table Above)	Termination Option (See Table Above)
		See Table on page 202		See Table on page 202	See Table on page 202		



TEMPERATURE SENSORS

PLASTIC NOZZLE THERMOCOUPLES



LEADWIRE TYPES

LEADWIRE #	DESCRIPTION
H	Fiberglass Leadwire with S. S. Overbraid
J	Fiberglass Leadwire with S. S. Armor

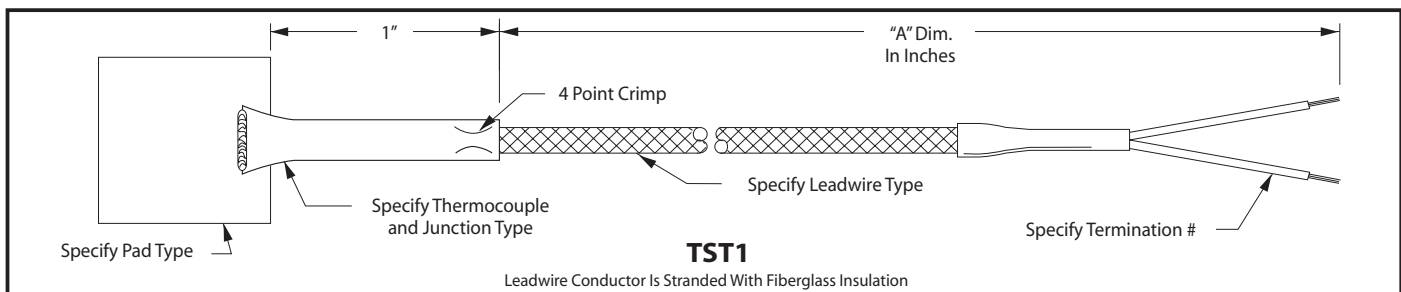
TERMINATION OPTIONS

TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug

ENTER CODE i.e. TNT3-JG-072C0

TNT3									
Sensor Type & Style No.	Thermocouple Type	Junction Type	"A" Dimension	Leadwire	Termination				
	See Table on page 202	See Table on page 202	3 Digit CODE (i.e. Enter 072 for 72") See Table on page 202	(See Table Above)	Option	(See Table Above)			

SHIM STOCK THERMOCOUPLES



LEADWIRE OPTIONS

LEADWIRE #	DESCRIPTION
G	Fiberglass Leadwire with Fiberglass Jacket
H	Fiberglass Leadwire with S. S. Overbraid Shield
J	Fiberglass Leadwire with S. S. Armor Cable Shield

TERMINATION OPTIONS

TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug

PAD OPTIONS

PAD TYPE	DESCRIPTION
S	3/4" x 3/4" x .007" Thick
P	1" x 1" x .032" Thick
B	1" x 1" x .060" Thick

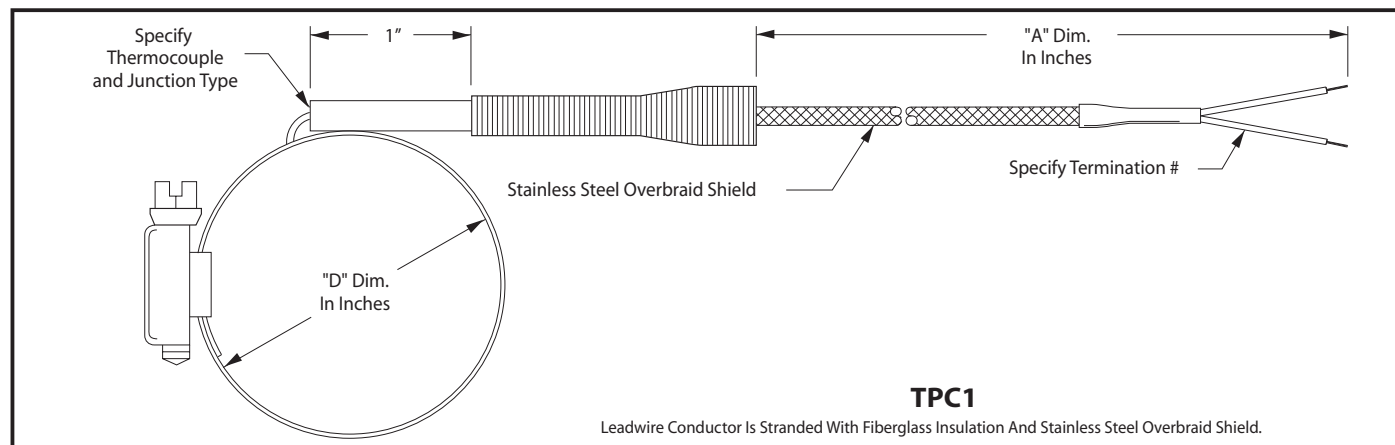
ENTER CODE i.e. TST1-JG-036A0P

TST1											
Sensor Type & Style No.	Thermocouple Type	Junction Type	"A" Dimension	Leadwire	Termination Option	Pad Type					
	See Table on page 202	See Table on page 202	3 Digit CODE (i.e. Enter 036 for 36") See Table on page 202	(See Table Above)	(See Table Above)	(See Table Above)					



TEMPERATURE SENSORS

PIPE CLAMP THERMOCOUPLES



"D" DIMENSION OPTIONS

"D" Dim. #	DESCRIPTION	"D" Dim. #	DESCRIPTION
N	1/2" to 7/8"	3	2-3/4" to 3-5/16"
1	7/8" to 1-1/4"	4	3-1/4" to 4-1/4"
2	1-1/4" to 2-1/4"	5	4-1/4" to 5-1/4"

TERMINATION OPTIONS

TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug

ENTER CODE i.e. TPC1-JG-04230

TPC1

Sensor Type
& Style No.

Thermocouple
Type
See Table
on page 202

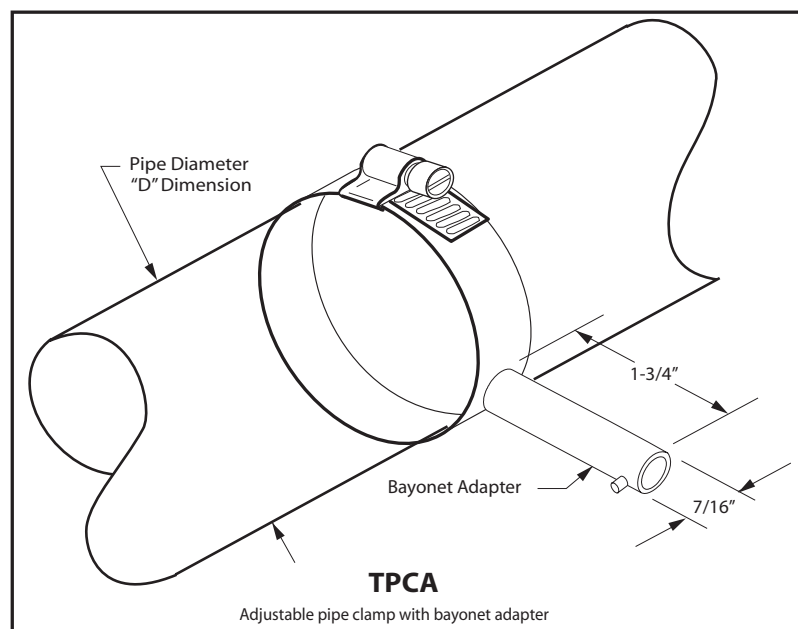
Junction Type
See Table
on page 202

"A" Dimension
3 Digit CODE
(i.e. Enter 042 for 42")
See Table on page 202

"D" Dimension
(See Table
Above)

Termination
Option
(See Table Above)

PIPE CLAMP ADAPTERS



"D" DIMENSION OPTIONS

"D" Dim. #	DESCRIPTION
N	1/2" to 7/8"
1	7/8" to 1-1/4"
2	1-1/4" to 2-1/4"
3	2-3/4" to 3-5/16"
4	3-1/4" to 4-1/4"
5	4-1/4" to 5-1/4"

ENTER CODE i.e. TPCA-2

TPCA
Sensor Type
& Style No.

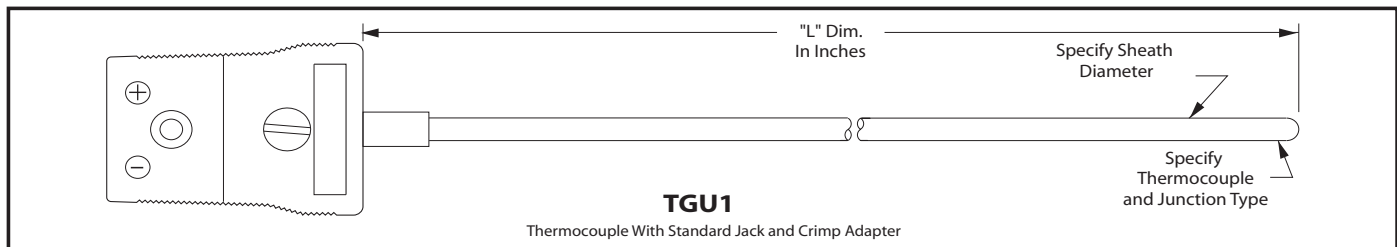
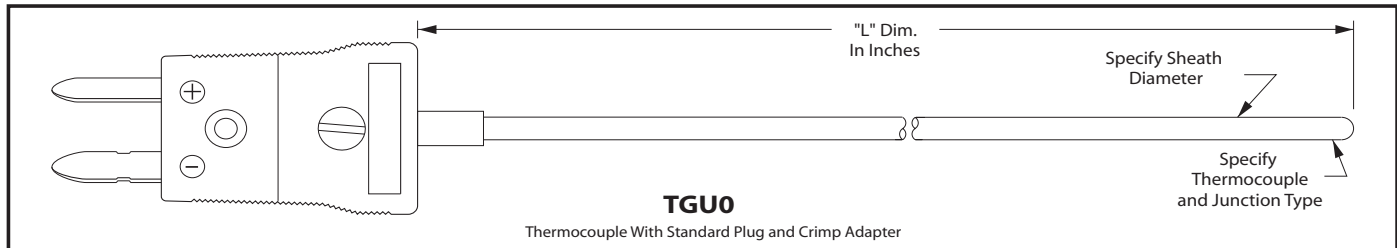
"D" Dimension
(Enter Letter From
Table Above)



TEMPERATURE SENSORS

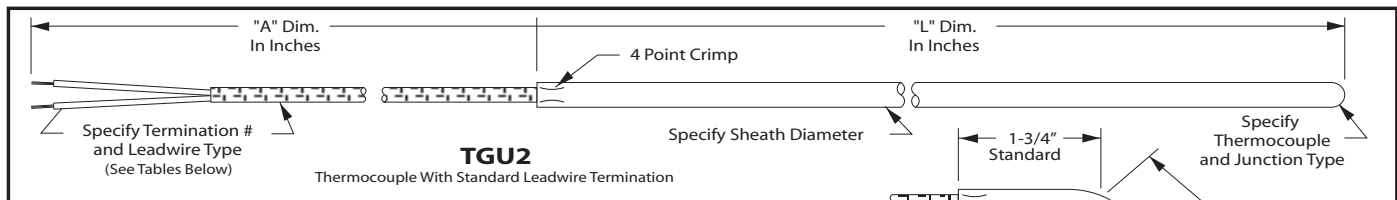
GENERAL USE THERMOCOUPLES

General use thermocouples are designed for economical use in a wide variety of applications up to 800°F. Sheath material is 304 stainless steel. Type J (Iron-Constantan) calibration is standard. Other calibrations available upon request.



ENTER CODE i.e. TGU1-JG-C12H

TGU1	-		-		-		-	
Sensor Type & Style No.		Thermocouple Type		Junction Type		Sheath Dia. Enter Letter CODE (i.e. C for .188")		"L" Dimension 3 Digit CODE (i.e. Enter 12H for 12-1/2")
See Tables on Page 202								



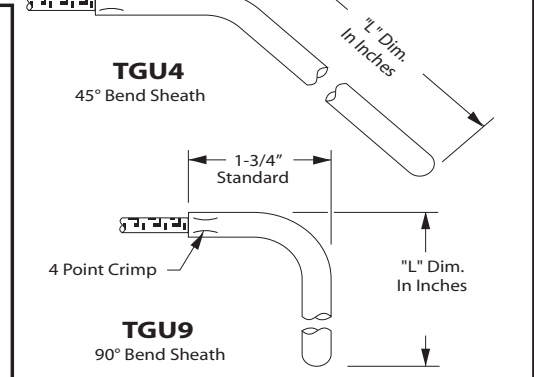
TERMINATION OPTIONS

TERMINATION #	DESCRIPTION
0	2" Split Leads
1	Spade Lugs
3	Standard Plug
4	Standard Jack

*LEADWIRE OPTIONS

LEADWIRE TYPE	DESCRIPTION
G	Fiberglass Leadwire with Overall Fiberglass Jacket
H	Fiberglass Leadwire with S. S. Overbraid Shield
J	Fiberglass Leadwire with S. S. Armor Cable Shield
K	Teflon Leadwire with Overall Teflon Jacket (400°F Max.)

*Standard assemblies supplied with stranded leadwire conductor. Solid conductor available upon request.



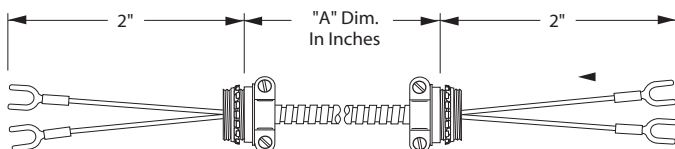
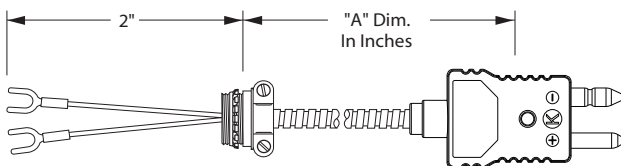
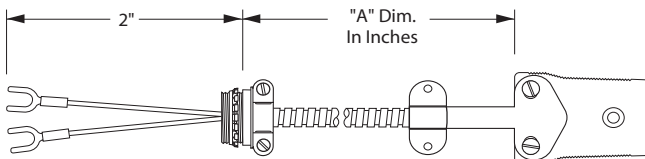
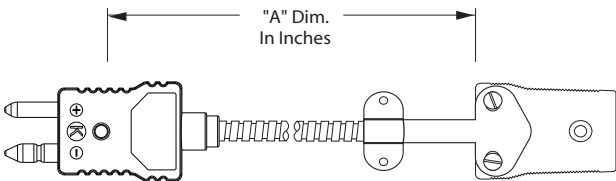
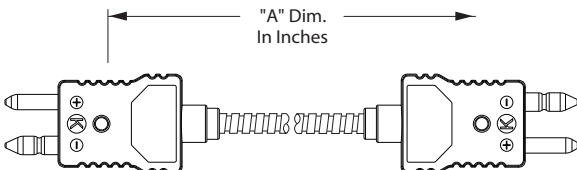
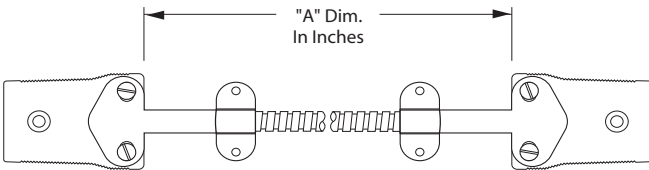
ENTER CODE i.e. TGU2-JGV18D-035B0

TGU2	-		-		-		-	
Sensor Type & Style No.		Thermocouple Type See Table on Page 202		Junction Type See Table on Page 202		Sheath Dia. Enter Letter CODE (i.e. V for .156") See Table on Page 202		"L" Dimension 3 Digit CODE (i.e. Enter 18D for 18-1/4") See Table on Page 202
								"A" Dimension 3 Digit CODE (i.e. Enter 035 for 35") See Table on Page 202
								Leadwire Type (See Table Above)
								Termination No. (See Table Above)

TEMPERATURE SENSORS

EXTENSION ASSEMBLIES

Standard assemblies are manufactured with fiberglass insulated thermocouple wire and stainless steel armor cable protection. Standard calibration is type "J". Other calibrations and special connections are available upon request.

DESIGN NUMBER	TERMINATION DESCRIPTION	EXTENSION STYLE
TEX1	Two BX Connectors With Spade Lugs	
TEX2	BX Connector With Spade Lugs and Standard Molded Plug	
TEX3	BX Connector With Spade Lugs and Standard Jack	
TEX4	Standard Molded Plug and Jack	
TEX5	Two Standard Molded Plugs	
TEX6	Two Standard Jacks	

ENTER CODE i.e. TEX4-J-048

Sensor Type
& Style No.

Thermocouple
Type

"A" Dimension
(i.e. Enter 048 for 48")

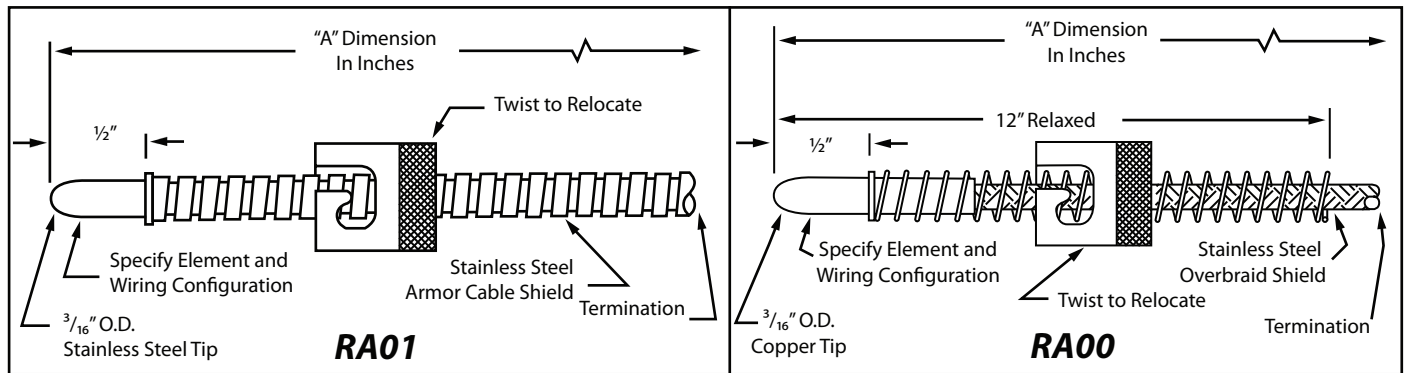
See Tables on Page 202



RTD ASSEMBLIES FOR THE PLASTICS INDUSTRY

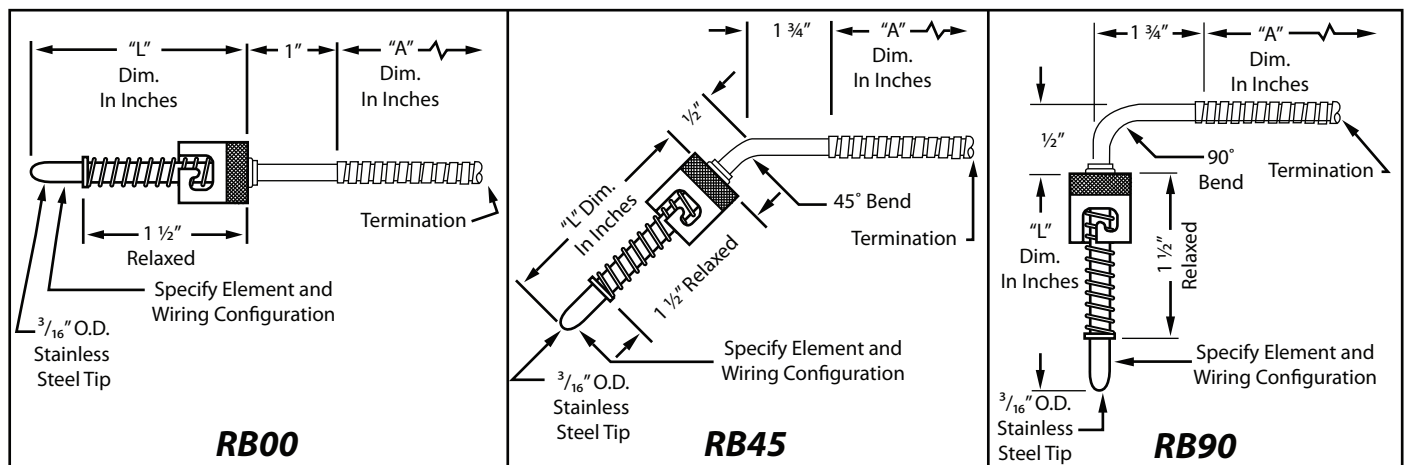
Resistance Temperature Detectors (RTDs) are continuing to expand as a temperature sensor for plastic machinery applications. All the standard plastics thermocouple designs are available in RTD configurations. The standard element is 100 ohm Platinum, .00385Ω/Ω°C, Class B per IEC 751 and DIN 43760 (± 0.1% at 0°C). All assemblies can be specified as 2, 3, or 4 wire configurations. Please specify any special requirements.

ADJUSTABLE DEPTH RTD'S



Enter CODE i.e. RA01-AB-048L1	Sensor Type & Style No.	Element Type (See Table on next page)	Wiring Configuration (See Table on next page)	"A" Dimension 3 Digit CODE (i.e. Enter 048 for 48") See Table on Page 202	Operating Temperature L = 500°F / M = 900°F	Termination Type (See Options on next page)
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FIXED BAYONET RTD'S



Enter CODE i.e. RB00-GB-09F-022L4	Sensor Type & Style No.	Element Type (See Table on next page)	Wiring Configuration (See Table on next page)	"L" Dimension In Inches (i.e. Enter 09F for 9 3/8") See Table on Page 202	"A" Dimension 3 Digit CODE (i.e. Enter 022 for 22") See Table on Page 202	Operating Temperature L = 500°F / M = 900°F	Termination Type (See Options on next page)
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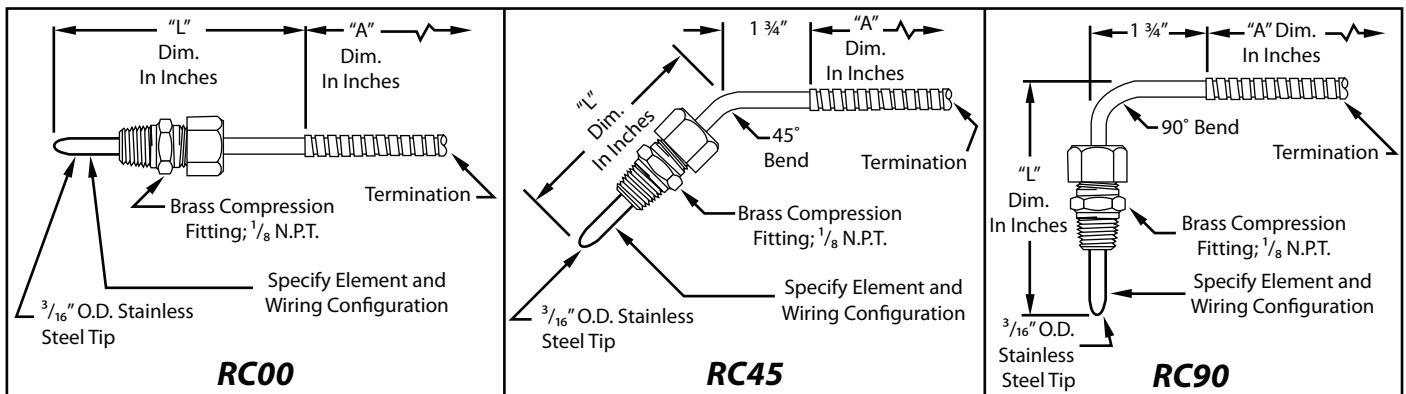
RTD ASSEMBLIES FOR THE PLASTICS INDUSTRY

RTD OPTIONS

CODE	ELEMENT TYPE
A	100 ohm Platinum, Class B .00385 Coefficient
B	100 ohm Platinum, Class A .00385 Coefficient
E	1000 ohm Platinum, Class B .00385 Coefficient
G	100 ohm Platinum, Class B .00392 Coefficient

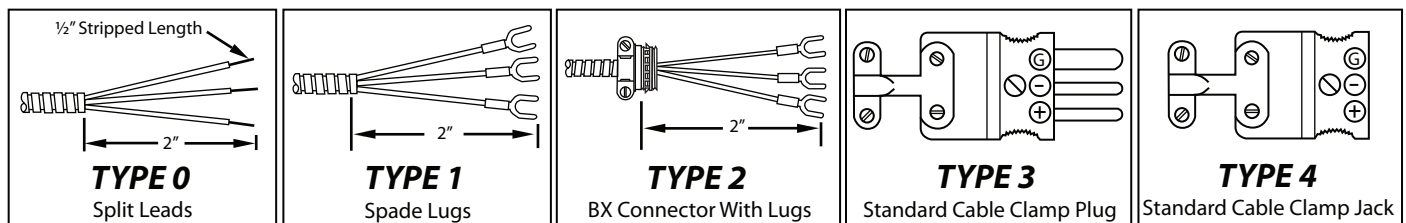
CODE	WIRING
A	Single, 2 Wire
B	Single, 3 Wire
C	Single, 4 Wire
D	Double, 4 Wire

COMPRESSION FITTING RTD'S



Enter CODE	RC45 Sensor Type & Style No.	Element Type (See Table above)	Wiring Configuration (See Table above)	"L" Dimension In Inches (i.e. Enter 04K for 4 5/8") See Table on Page 202	"A" Dimension 3 Digit CODE (i.e. Enter 028 for 28") See Table on Page 202	Operating Temperature L = 500°F / M = 900°F	Termination Type (See Options below)
i.e. RC45-ED-04K-028L0							

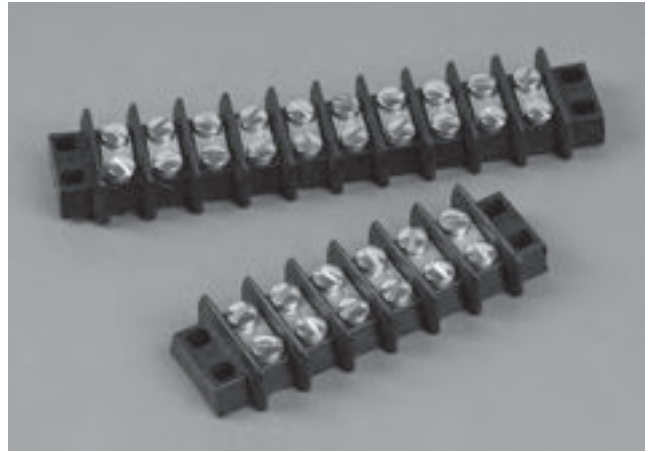
TERMINATION OPTIONS





ACCESSORIES

All the “extras” needed to complete your thermal processing installation are available from Durex. A comprehensive line of sensor accessories are stocked and ready for immediate shipping.



THERMOCOUPLE WIRE

INSULATED THERMOCOUPLE WIRE

TYPE "J" THERMOCOUPLE WIRE

ANSI Color Code: Positive - White, Negative - Red, Overall - Brown

INSULATION	INSULATION TEMPERATURE RATING	GAUGE	PART NUMBER	LIMITS OF ERROR	SOLID / STRANDED
Flexible PVC Plastic, Duplex Parallel, "Ripcord" Peelable Construction	220° F (105° C)	24	LJD-24-SL-PVC-RIP	Standard	Solid
		24	LJS-24-SL-PVC-RIP	Special	Solid
Extruded Flexible Teflon® FEP Plastic, Duplex Parallel, Extruded FEP Jacket	400° F (204° C)	20	LJD-20-SL-FEP-FEP	Standard	Solid
		20	LJS-20-SL-FEP-FEP	Special	Solid
		20	LJD-20-ST-FEP-FEP	Standard	Stranded
		24	LJD-24-SL-FEP-FEP	Standard	Solid
		24	LJS-24-SL-FEP-FEP	Special	Solid
		24	LJD-24-ST-FEP-FEP	Standard	Stranded
Fused TFE Tape, Duplex Parallel, TFE Tape Jacket	500° F (260° C)	20	LJD-20-SL-TFE-TFE	Standard	Solid
		20	LJS-20-SL-TFE-TFE	Special	Solid
		24	LJD-24-SL-TFE-TFE	Standard	Solid
		24	LJS-24-SL-TFE-TFE	Special	Solid
Polyimide Fused Tape, Duplex Parallel, Polyimide Fused Tape Jacket	600° F (316° C)	20	LJD-20-SL-KAP-KAP	Standard	Solid
		20	LJD-20-ST-KAP-KAP	Standard	Stranded
		20	LJS-20-SL-KAP-KAP	Special	Solid
		24	LJD-24-ST-KAP-KAP	Standard	Stranded
Polyimide Fused Tape, Twisted Pair, No Jacket	600° F (316° C)	24	LJS-24-SL-KAP-TW	Special	Solid
Fiberglass Wrap, Duplex Parallel, Fiberglass Braided Jacket	900° F (480° C)	28	LJD-28-SL-FGW-FBG	Standard	Solid
		28	LJS-28-SL-FGW-FBG	Special	Solid
		30	LJD-30-SL-FGW-FBG	Standard	Solid
		30	LJS-30-SL-FGW-FBG	Special	Solid
Fiberglass Braid, Duplex Parallel, Fiberglass Braid Jacket	900° F (480° C)	20	LJD-20-SL-FBG-FBG	Standard	Solid
		20	LJS-20-SL-FBG-FBG	Special	Solid
		20	LJD-20-ST-FBG-FBG	Standard	Stranded
		22	LJD-22-ST-FBG-FBG	Standard	Stranded
		24	LJD-24-SL-FBG-FBG	Standard	Solid
		24	LJS-24-SL-FBG-FBG	Special	Solid
		24	LJD-24-ST-FBG-FBG	Standard	Stranded
Fiberglass Braid, Duplex Parallel, Fiberglass Braid Jacket, Stainless Steel Overbraid	900° F (480° C)	20	LJD-20-SL-FBG-SSB	Standard	Solid
		20	LJD-20-ST-FBG-SSB	Standard	Stranded
		22	LJD-22-ST-FBG-SSB	Standard	Stranded
High Temperature Glass Braid, Duplex Parallel, High Temperature Glass Braid Jacket	1300° F (705° C)	20	LJD-20-SL-FBH-FBG	Standard	Solid
		20	LJS-20-SL-FBH-FBG	Special	Solid

THERMOCOUPLE WIRE

INSULATED THERMOCOUPLE WIRE

TYPE "K" THERMOCOUPLE WIRE

ANSI Color Code: Positive - Yellow, Negative - Red, Overall - Brown

INSULATION	INSULATION TEMPERATURE RATING	GAUGE	PART NUMBER	LIMITS OF ERROR	SOLID / STRANDED
Flexible PVC Plastic, Duplex Parallel, "Ripcord" Peelable Construction	220° F (105° C)	24	LKD-24-SL-PVC-RIP	Standard	Solid
		24	LKS-24-SL-PVC-RIP	Special	Solid
Extruded Flexible Teflon® FEP Plastic, Duplex Parallel, Extruded FEP Jacket	400° F (204° C)	20	LKD-20-SL-FEP-FEP	Standard	Solid
		20	LKS-20-SL-FEP-FEP	Special	Solid
		20	LKD-20-ST-FEP-FEP	Standard	Stranded
		24	LKD-24-SL-FEP-FEP	Standard	Solid
		24	LKS-24-SL-FEP-FEP	Special	Solid
		24	LKD-24-ST-FEP-FEP	Standard	Stranded
Fused TFE Tape, Duplex Parallel, TFE Tape Jacket	500° F (260° C)	20	LKD-20-SL-TFE-TFE	Standard	Solid
		20	LKS-20-SL-TFE-TFE	Special	Solid
		24	LKD-24-SL-TFE-TFE	Standard	Solid
		24	LKS-24-SL-TFE-TFE	Special	Solid
Polyimide Fused Tape, Duplex Parallel, Polyimide Fused Tape Jacket	600° F (316° C)	20	LKD-20-SL-KAP-KAP	Standard	Solid
		20	LKD-20-ST-KAP-KAP	Standard	Stranded
		20	LKS-20-SL-KAP-KAP	Special	Solid
		24	LKS-24-ST-KAP-KAP	Standard	Stranded
Polyimide Fused Tape, Twisted Pair, No Jacket	600° F (316° C)	24	LKD-24-SL-KAP-TW	Standard	Solid
Fiberglass Wrap, Duplex Parallel, Fiberglass Braided Jacket	900° F (480° C)	28	LKD-28-SL-FGW-FBG	Standard	Solid
		28	LKS-28-SL-FGW-FBG	Special	Solid
		30	LKD-30-SL-FGW-FBG	Standard	Solid
		30	LKS-30-SL-FGW-FBG	Special	Solid
Fiberglass Braid, Duplex Parallel, Fiberglass Braid Jacket	900° F (480° C)	20	LKD-20-SL-FBG-FBG	Standard	Solid
		20	LKS-20-SL-FBG-FBG	Special	Solid
		20	LKD-20-ST-FBG-FBG	Standard	Stranded
		22	LKD-22-ST-FBG-FBG	Standard	Stranded
		24	LKD-24-SL-FBG-FBG	Standard	Solid
		24	LKS-24-SL-FBG-FBG	Special	Solid
		24	LKD-24-ST-FBG-FBG	Standard	Stranded
Fiberglass Braid, Duplex Parallel, Fiberglass Braid Jacket, Stainless Steel Overbraid	900° F (480° C)	20	LKD-20-SL-FBG-SSB	Standard	Solid
		20	LKD-20-ST-FBG-SSB	Standard	Stranded
		22	LKD-22-ST-FBG-SSB	Standard	Stranded
High Temperature Glass Braid, Duplex Parallel, High Temperature Glass Braid Jacket	1300° F (705° C)	20	LKD-20-SL-FBH-FBG	Standard	Solid
		20	LKS-20-SL-FBH-FBG	Special	Solid
Ceramic Fiber Braid, Twisted Pair, No Jacket (CRH = Heavy Build, CRM = Medium Build)	2200° F (1205° C)	28	LKD-20-SL-CRH-CRH	Standard	Solid
		28	LKS-20-SL-CRH-CRH	Special	Solid
		30	LKD-20-SL-CRM-CRM	Standard	Solid
		30	LKS-20-SL-CRM-CRM	Special	Solid

THERMOCOUPLE WIRE

INSULATED THERMOCOUPLE WIRE (continued)

TYPE "T" THERMOCOUPLE WIRE

ANSI Color Code: Positive - Blue, Negative - Red, Overall - Brown

INSULATION	INSULATION TEMPERATURE RATING	GAUGE	PART NUMBER	LIMITS OF ERROR	SOLID / STRANDED
Flexible PVC Plastic, Duplex Parallel, "Ripcord" Peelable Construction	220° F (105° C)	24	LTD-24-SL-PVC-RIP	Standard	Solid
		24	LTS-24-SL-PVC-RIP	Special	Solid
Extruded Flexible Teflon® FEP Plastic, Duplex Parallel, Extruded FEP Jacket	500° F (260° C)	20	LTD-20-SL-FEP-FEP	Standard	Solid
		20	LTS-20-SL-FEP-FEP	Special	Solid
		20	LTD-20-ST-FEP-FEP	Standard	Stranded
		24	LTD-24-SL-FEP-FEP	Special	Solid
		30	LTS-30-SL-FEP-FEP	Special	Solid
Flexible FEP Plastic, Twisted Pair with Aluminum Shield and Copper Drain Wire, FEP Jacket	500° F (260° C)	20	LTD-20-SL-FEP-FEPS	STD	Solid
Fused TFE Tape, Duplex Parallel, TFE Tape Jacket	600° F (316° C)	20	LTS-20-SL-TFE-TFE	Special	Solid
		24	LTD-24-SL-TFE-TFE	Standard	Solid
Fiberglass Braid, Duplex Parallel, Fiberglass Braided Jacket	900° F (480° C)	20	LTD-20-SL-FBG-FBG	Standard	Solid
		24	LTD-24-SL-FBG-FBG	Standard	Solid

INSULATED THERMOCOUPLE EXTENSION WIRE

TYPE "JX" THERMOCOUPLE EXTENSION WIRE

ANSI Color Code: Positive - White, Negative - Red, Overall - Brown

INSULATION	INSULATION TEMPERATURE RATING	GAUGE	PART NUMBER	LIMITS OF ERROR	SOLID / STRANDED
Flexible PVC Plastic, Duplex Parallel, PVC Jacket	220° F (105° C)	16	LJX-16-SL-PVC-PVC	Standard	Solid
		20	LJX-20-SL-PVC-PVC	Standard	Solid
		20	LJX-20-ST-PVC-PVC	Standard	Stranded
Flexible PVC Plastic, Twisted Pair with Aluminum Shield and Copper Drain Wire, PVC Jacket	220° F (105° C)	16	LJX-16-SL-PVC-PVCS	Standard	Solid
		20	LJX-20-SL-PVC-PVCS	Standard	Solid
		20	LJX-20-ST-PVC-PVCS	Standard	Strained
Flexible PVC Plastic, 4 Twisted Pairs, PVC Jacket with Aluminum Shield and Copper Drain Wire	220° F (105° C)	20	LJX-20-SL-PVC-PVCS-4PR	Standard	Solid
Flexible PVC Plastic, 8 Twisted Pairs, PVC Jacket with Aluminum Shield and Copper Drain Wire	220° F (105° C)	20	LJX-20-SL-PVC-PVCS-8PR	Standard	Solid
Flexible FEP Plastic, Duplex Parallel, FEP Jacket	400° F (204° C)	20	LJX-20-SL-FEP-FEP	Standard	Solid
Flexible FEP Plastic, Twisted Pair with Aluminum Shield and Copper Drain Wire, FEP Jacket	400° F (204° C)	16	LJX-16-SL-FEP-FEP	Special	Solid
		20	LJX-20-SL-FEP-FEP	Standard	Solid
Fiberglass Braid, Duplex Parallel, Fiberglass Braided Jacket	900° F (480° C)	16	LJX-16-SL-FBG-FBG	Standard	Solid

THERMOCOUPLE WIRE

INSULATED THERMOCOUPLE EXTENSION WIRE

TYPE "KX" THERMOCOUPLE EXTENSION WIRE

ANSI Color Code: Positive - Yellow, Negative - Red, Overall - Brown

INSULATION	INSULATION TEMPERATURE RATING	GAUGE	PART NUMBER	LIMITS OF ERROR	SOLID / STRANDED
Flexible PVC Plastic, Duplex Parallel, PVC Jacket	220° F (105° C)	16	LKX-16-SL-PVC-PVC	Standard	Solid
		20	LKX-20-SL-PVC-PVC	Standard	Solid
		20	LKX-20-ST-PVC-PVC	Standard	Stranded
Flexible PVC Plastic, Twisted Pairs, PVC Jacket with Aluminum Shield and Copper Drain Wire, PVC Jacket	220° F (105° C)	16	LKX-16-SL-PVC-PVCS	Standard	Solid
		20	LKX-20-SL-PVC-PVCS	Standard	Solid
		20	LKX-20-ST-PVC-PVCS	Standard	Stranded
Flexible PVC Plastic, 4 Twisted Pairs, PVC Jacket with Aluminum Shield and Copper Drain Wire	220° F (105° C)	20	LKX-20-SL-PVC-PVCS-4PR	Standard	Solid
Flexible PVC Plastic, 8 Twisted Pairs, PVC Jacket with Aluminum Shield and Copper Drain Wire	220° F (105° C)	20	LKX-20-SL-PVC-PVCS-8PR	STD	Solid
Flexible FEP Plastic, Duplex Parallel, FEP Jacket	400° F (204° C)	20	LKX-20-SL-FEP-FEP	Standard	Solid
Flexible FEP Plastic, Twisted Pair with Aluminum Shield and Copper Drain Wire, FEP jacket	400° F (204° C)	16	LKX-16-SL-FEP-FEPS	Standard	Solid
		20	LKX-20-SL-FEP-FEPS	Standard	Solid

INSULATED THERMOCOUPLE EXTENSION WIRE

TYPE "TX" THERMOCOUPLE EXTENSION WIRE

ANSI Color Code: Positive - Blue, Negative - Red, Overall - Brown

INSULATION	INSULATION TEMPERATURE RATING	GAUGE	PART NUMBER	LIMITS OF ERROR	SOLID / STRANDED
Flexible PVC Plastic, Duplex Parallel, PVC Jacket	220° F (105° C)	16	LTX-16-SL-PVC-PVC	Standard	Solid
		20	LTX-20-SL-PVC-PVC	Standard	Solid
		20	LTX-20-ST-PVC-PVC	Standard	Stranded
Flexible PVC Plastic, Twisted Pair with Aluminum Shield and Copper Drain Wire, PVC Jacket	220° F (105° C)	16	LTX-16-SL-PVC-PVCS	Standard	Solid
		20	LTX-20-SL-PVC-PVCS	Standard	Solid
		20	LTX-20-ST-PVC-PVCS	Standard	Strained
Flexible PVC Plastic, 4 Twisted Pairs, PVC Jacket with Aluminum Shield and Copper Drain Wire	220° F (105° C)	20	LTX-20-SL-PVC-PVCS-4PR	Standard	Solid
Flexible PVC Plastic, 8 Twisted Pairs, PVC Jacket with Aluminum Shield and Copper Drain Wire	220° F (105° C)	20	LTX-20-SL-PVC-PVCS-8PR	Standard	Solid
Flexible FEP Plastic, Duplex Parallel, FEP Jacket	400° F (204° C)	20	LTX-20-SL-FEP-FEP	Standard	Solid
Flexible FEP Plastic, Twisted Pair with Aluminum Shield and Copper Drain Wire, FEP Jacket	400° F (204° C)	16	LTX-16-SL-FEP-FEPS	Standard	Solid
		20	LTX-20-SL-FEP-FEPS	Standard	Solid

THERMOCOUPLE WIRE

INSULATED THERMOCOUPLE EXTENSION WIRE

TYPE "TX" THERMOCOUPLE EXTENSION WIRE
ANSI Color Code: Positive - Blue, Negative - Red, Overall - Blue

INSULATION	GA.	CODE	SOLID / STRANDED	NOMINAL SIZE	INSULATION TEMPERATURE RATING
PVC Duplex-Parallel Extruded Jacket	16	TX16-PP0	Solid	.115 x .190	221°F (105°C)
	20	TX20-PP0	Solid	.095 x .158	221°F (105°C)
	20	TXF20-PP0	Stranded	.113 x .182	221°F (105°C)
PVC Duplex Twisted Shield w/Drain Extruded Jacket	16	TX16-PTD0	Stranded	.070 x .120	221°F (105°C)
	20	TX20-PTD0	Solid	.045 x .080	221°F (105°C)
Extruded Teflon® FEP Duplex Twisted Shield w/Drain Extruded Jacket	16	TX16-ETD0	Solid	.075 x .120	400°F (204°C)
	20	TX20-ETD0	Stranded	.080 x .160	400°F (204°C)

TYPE "EX" THERMOCOUPLE EXTENSION WIRE
ANSI Color Code: Positive - Purple, Negative - Red, Overall - Purple

INSULATION	GA.	CODE	SOLID / STRANDED	NOMINAL SIZE	INSULATION TEMPERATURE RATING
PVC Duplex-Parallel Extruded Jacket	20	EX20-PP0	Solid	.095 x .158	221°F (105°C)
PVC Duplex Twisted Extruded Jacket	20	EXF20-PT0	Stranded	.180	221°F (105°C)
PVC Duplex Twisted Shield w/Drain Extruded Jacket	16	EX16-PTD0	Solid	.220	221°F (105°C)
	20	EX20-PTD0	Solid	.184	221°F (105°C)

TYPE "NX" THERMOCOUPLE EXTENSION WIRE
ANSI Color Code: Positive - Orange, Negative - Red, Overall - Orange

INSULATION	GA.	CODE	SOLID / STRANDED	NOMINAL SIZE	INSULATION TEMPERATURE RATING
PVC Duplex-Parallel Extruded Jacket	20	NX20-PP0	Solid	.095 x .158	221°F (105°C)

THERMOCOUPLE WIRE

INSULATED THERMOCOUPLE EXTENSION WIRE

TYPE "RX" or "SX" THERMOCOUPLE EXTENSION WIRE
ANSI Color Code: Positive - Black, Negative - Red, Overall - Green

INSULATION	GA.	CODE	SOLID / STRANDED	NOMINAL SIZE	INSULATION TEMPERATURE RATING
PVC Duplex-Parallel Extruded Jacket	16	R,SX16-PP0	Solid	.115 x .190	221°F (105°C)
	20	R,SX20-PP0	Solid	.095 x .158	221°F (105°C)
Glass Braid Duplex-Parallel Braided Jacket SS Protective Overbraid	16	R,SX16-PTD0	Solid	.220	221°F (105°C)
	20	R,SX20-PTD0	Solid	.184	221°F (105°C)
Extruded Teflon® FEP Duplex-Parallel Extruded Jacket	16	R,SX16-ET0	Solid	.085 x .155	400°F (204°C)
	20	R,SX20-ET0	Solid	.065 x .110	400°F (204°C)
Teflon® TFE Fused Tape Duplex-Parallel Fused Tape Jacket	16	R,SX16-TT0	Solid	.085 x .155	*500°F (260°C)
Extruded Teflon® FEP Duplex Twisted Shield w/ Drain Extruded Jacket	16	R,SX16-ETD0	Solid	.220	400°F (204°C)
	20	R,SX20-ETD0	Solid	.131	400°F (204°C)
Glass Braid Duplex-Parallel Braided Jacket	16	R,SX16-GG0	Solid	.110 x .160	*900°F (482°C)
	20	R,SX20-GG0	Solid	.060 x .100	*900°F (482°C)
	24	R,SX24-GG0	Solid	.045 x .080	*900°F (482°C)

* Extension wire limit is 400°F (204°C)

TYPE "BX" THERMOCOUPLE EXTENSION WIRE (Alloy PCLW630 vs Copper)
ANSI Color Code: Positive - Gray, Negative - Red, Overall - Gray

INSULATION	GA.	CODE	SOLID / STRANDED	NOMINAL SIZE	INSULATION TEMPERATURE RATING
Glass Braid Duplex-Parallel Braided Jacket	20	BX20-GG0	Solid	.060 x .100	*900°F (482°C)

* Extension wire limit is 400°F (204°C)

TYPE "CX" THERMOCOUPLE EXTENSION WIRE (Alloy 405 vs Alloy 426)
ANSI Color Code: Positive - Orange, Negative - Red, Overall - Orange/Black

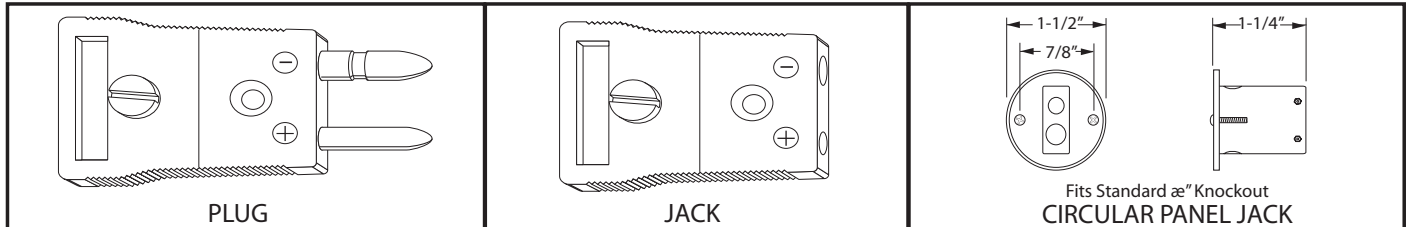
INSULATION	GA.	CODE	SOLID / STRANDED	NOMINAL SIZE	INSULATION TEMPERATURE RATING
Glass Braid Duplex-Parallel Braided Jacket	20	CX24-GG0	Solid	.050 x .090	*900°F (482°C)

* Extension wire limit is 400°F (204°C)



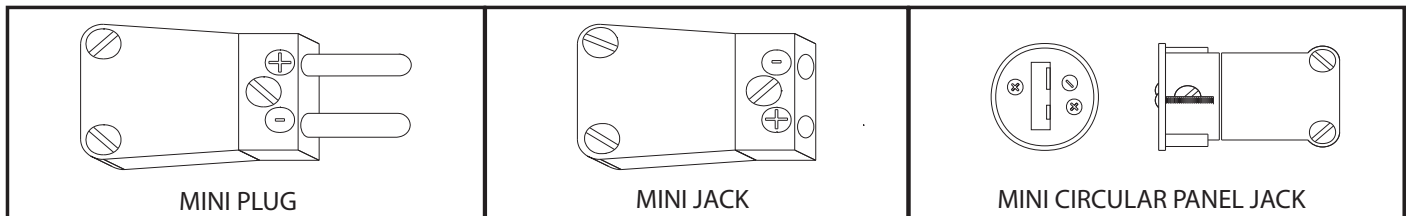
ACCESSORIES

THERMOCOUPLE CONNECTION



CALIBRATION	COLOR	PLUG NUMBER	JACK NUMBER	CIRCULAR JACK
J	BLACK	096005	106005	104017
K	YELLOW	096006	106006	104023
T	BLUE	096008	106008	104022
E	PURPLE	096007	106007	106040
R/S	GREEN	096009	106009	106041
CU	WHITE	096010	106010	104026

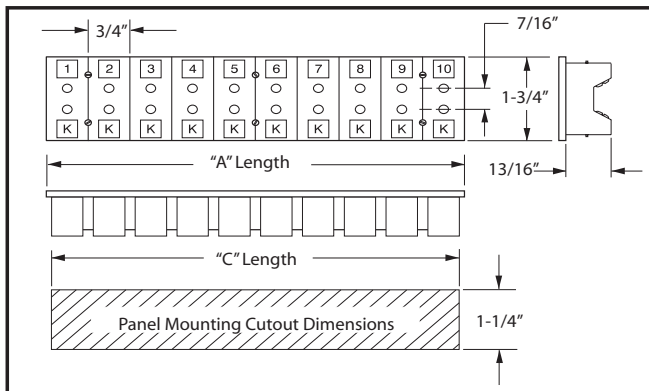
Note: Standard temperature rating is 400°F. High temperature available at 550°F.



CALIBRATION	COLOR	PLUG NUMBER	JACK NUMBER	CIRCULAR JACK
J	BLACK	096017	106017	104021
K	YELLOW	096018	106018	104018
T	BLUE	096020	106020	106042
E	PURPLE	096019	106019	106043
R/S	GREEN	096021	106021	106044
CU	WHITE	096022	106022	106023

Note: Standard temperature rating is 400°F. High temperature available at 550°F.

PANEL JACK STRIPS



PANEL LENGTH	NUMBER OF CIRCUITS	CUTOUT DIM. "C"
1-1/2"	2	1-5/16"
2-1/4"	3	2-1/16"
3"	4	2-13/16"
3-1/4"	5	3-9/16"
4-1/2"	6	4-5/16"
5-1/4"	7	5-1/16"
6"	8	5-13/16"
6-3/4"	9	6-9/16"
7-1/2"	10	7-5/16"
8-1/4"	11	8-1/16"
9"	12	8-13/16"

Enter CODE
i.e. PS K 9

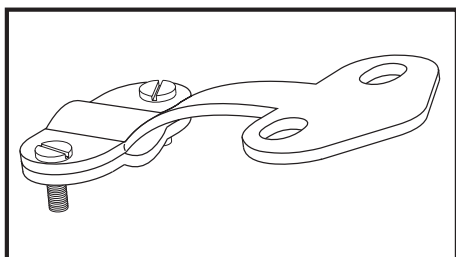
PS
Design No.
(After PS Enter calibration
Type: E, J, K, or T)

No. of Circuits
(Enter Number From
Table)



ACCESSORIES

THERMOCOUPLE ACCESSORIES



CABLE CLAMP

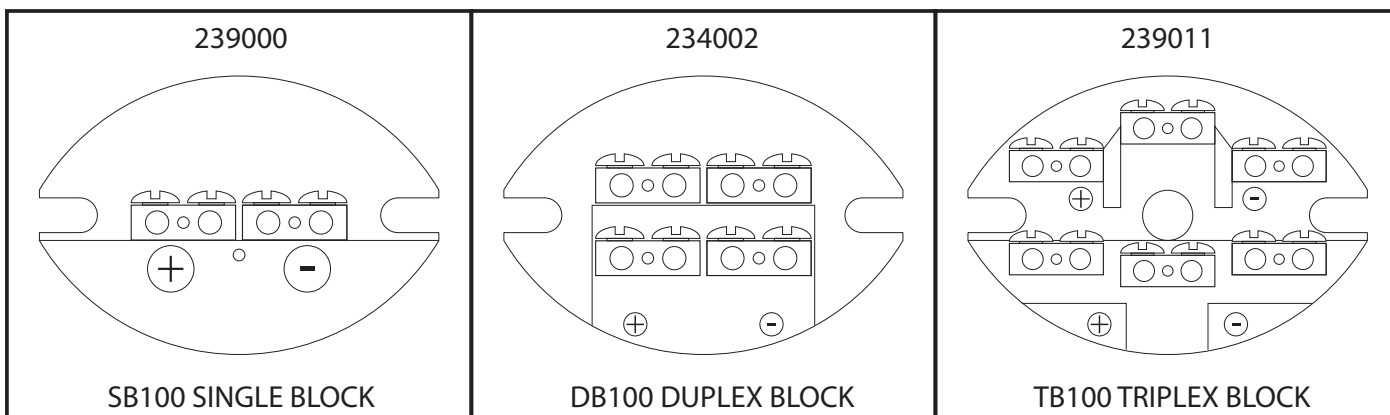
PART #	TYPE
116009	Overbraid or Armor Cable



STAINLESS STEEL ARMOR CABLE

PART NO.	SIZE
084001	1/8" ID x .210" OD
084007	5/32" ID x .234" OD
084002	3/16" ID x 9/32" OD
082002	1/4" ID x 11/32" OD
082004	3/8" ID x 1/2" OD
082006	1/2" ID x 5/8" OD

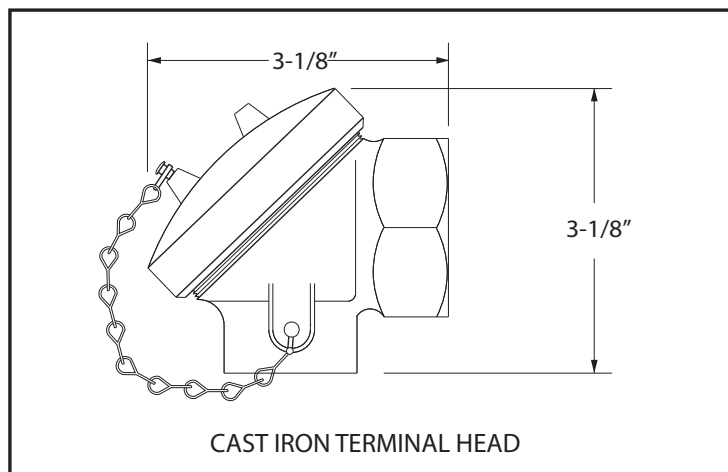
TERMINAL BLOCKS





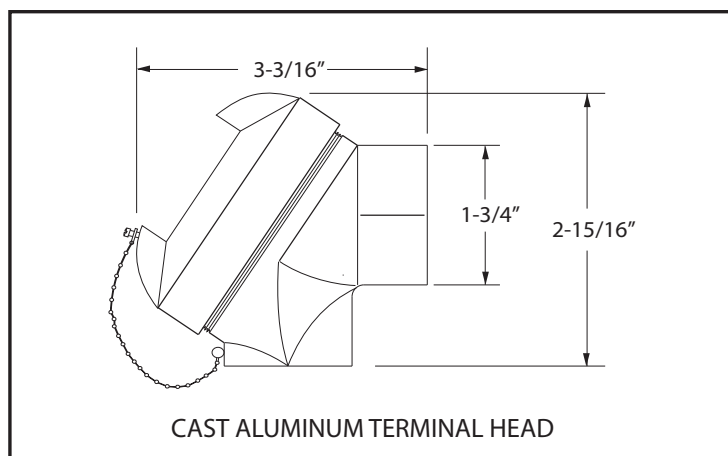
ACCESSORIES

TERMINAL HEADS



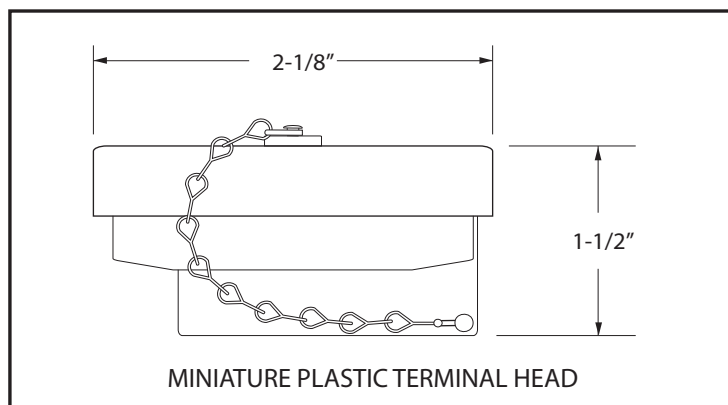
PART NO.	PROCESS CONN. x CONDUIT CONN.
229002	1/2" NPT x 3/4 NPT
229003	3/4 NPT x 3/4 NPT
229001	1" NPT x 3/4 NPT

Note: Reducing bushing can be supplied for 1/2 NPT conduit connection.



PART NO.	PROCESS CONN. x CONDUIT CONN.
224003	1/2" NPT x 3/4 NPT
226038	3/4 NPT x 3/4 NPT
229004	1" NPT x 3/4 NPT

Note: Reducing bushing can be supplied for 1/2 NPT conduit connection.



PART NO.	PROCESS CONN. x CONDUIT CONN.
224004	1/4" NPT x 1/4 NPT
226429	3/8 NPT x 1/4 NPT

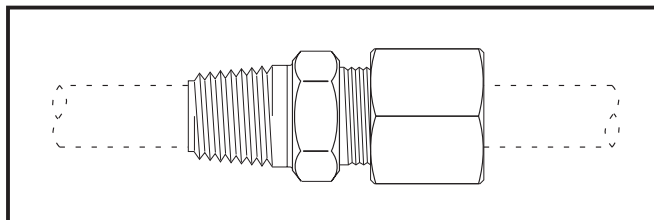
Note: Glass filled nylon terminal head rated to 350°F.

Note: Contact Durex Industries regarding Explosion Proof Terminal Heads.

ACCESSORIES

COMPRESSION FITTINGS

Compression fittings allow for the exact immersion depth to be set on the thermocouple during field installation. When ordered as part of a thermocouple assembly, the fittings will be assembled finger-tight to the sheath. The compression fittings are rated up to 10,000 psi. dependent upon the sheath diameter, thread size, material and temperature requirement.

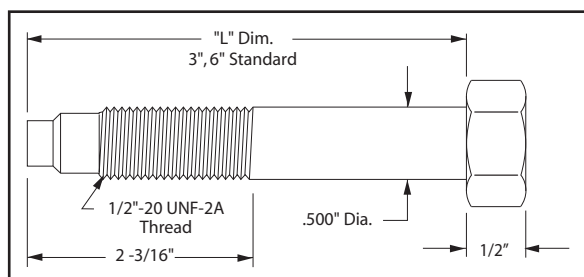


316 SS* CODE	BRASS* CODE	SHEATH DIA.	MALE NPT	FINGER TIGHT LENGTH	THREADED LENGTH
144001	144011	1/16"	1/16"	15/16"	3/8"
144002	144012	1/16"	1/8"	63/64"	3/8"
144003	144013	1/8"	1/8"	1-11/64"	3/8"
144004	144014	1/8"	1/4"	1-3/8"	9/16"
144005	144015	3/16"	1/8"	1-7/32"	3/8"
144006	144016	3/16"	1/4"	1-27/32"	9/16"
144007	144017	1/4"	1/4"	1-31/64"	9/16"
144008	144018	5/16"	1/4"	1-33/64"	9/16"
144009	144019	3/8"	1/4"	1-37/64"	9/16"
144010	144020	3/8"	1/2"	1-51/64"	3/4"

*Additional materials: Steel; Aluminum; Monel; Nylon; TPE

Adjustable compression fittings are available on request with 500°F (260°C) Telfon® sealant

BLANK BOLTS



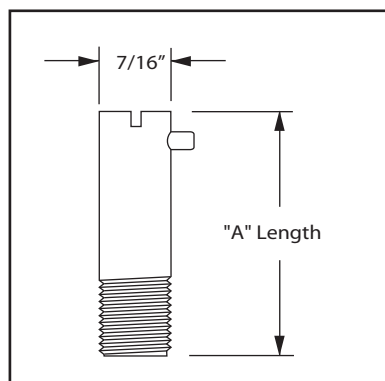
CATALOG #	"L" Dimension
244008	3"
244009	6"

Blank bolt occupies hole when melt bolt is removed.



ACCESSORIES

BAYONET ADAPTER

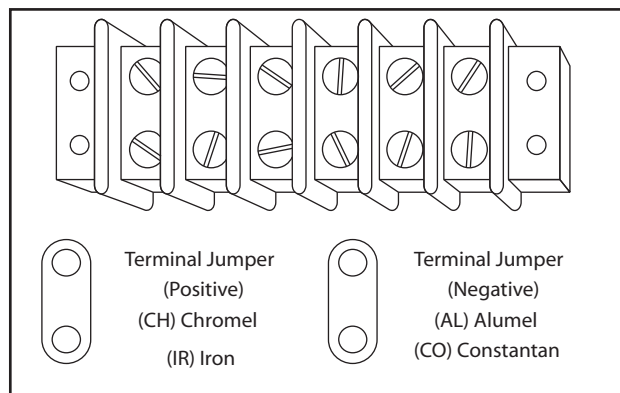


BAYONET #	"A" LENGTH	THREAD SIZE
194001	7/8"	1/8-27 N.P.T.
194032	1 1/8"	1/8-27 N.P.T.
194002	1 1/2"	1/8-27 N.P.T.
194031	2"	1/8-27 N.P.T.
194003	2 1/2"	1/8-27 N.P.T.
194004	3 1/4"	1/8-27 N.P.T.
194005	7/8"	3/8-24 NF
194007	2 1/2"	3/8-24 NF

TERMINAL BARRIER STRIPS

THERMOCOUPLE TYPE CODES				Limits of Error
E	J	K	T	Standard Limits
2	3	4	8	Special Limits

# OF SCREWS	2	4	6	8	10	12	14	16	18	20
-------------	---	---	---	---	----	----	----	----	----	----



NOTE: Add Design Number and Thermocouple Type CODE to # of screws for part number. Example: TRMS-J-4

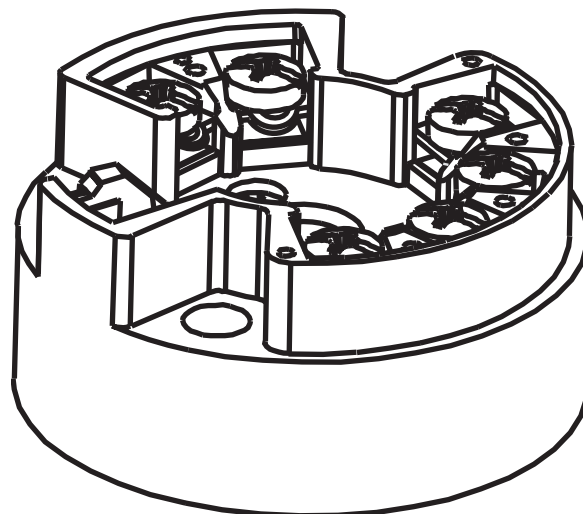
ENTER CODE

i.e. TRMS-J-6 $\frac{\text{TRMS Design Number}}{\text{Thermocouple Type CODE}} - \text{Number of Screws}$

TRANSMITTERS

TEMPERATURE HEAD TRANSMITTER

Durex offers a two-wire universal head transmitter for installation in our DIN B Terminal Heads. These transmitters are configured by Durex to convert the signal from any type Thermocouple or RTD (2, 3 or 4 wire) into a linearized and isolated 4-20 mA signal.



FEATURES:

- High accuracy with linearization curve match
- Long term stability with captive screws for ease of connection and fully potted electronics and gold plated terminals to allow humidity
- 3.75 kV AC galvanic isolation from the sensor input to the output
- Output simulation to check the loop quickly and easily
- Operation, visualization, and maintenance via PC and freeware
- Online configuration during measurement using configuraiton kit

TYPICAL APPLICATIONS:

- Suitable for RTD thermometer, thermocouples TC, Ohm and mV inputs
- 2-wire transmitter provides a linear temperature proportional analog output
- An economical and technical alternative to wiring directly to DCS or PLC
- PC programmable (PCP) temperature head transmitter for converting various input signals into a scalable 4 to 20 mA analog output signal

Part Number	181 -	-	-	-	R (	-	-	)	-
	Number of Wires (2, 3, or 4) use 2 for thermocouples	TC Type (J, K, T, N, E, R, S, or B) or RTD Ohms (100, 500, 1K, or 2K)	Upscale Burnout ≥ 21.0 mA (U) or Downscale Burnout ≤ 3.5 mA (D)	Lower Limit 3 Digit # i.e. 000	Upper Limit 3 Digit # i.e. 100	Units C or F			



TRANSMITTER TECHNICAL DATA

INPUT

Resistance thermometer (RTD)

Input	Designation	Measurement Range Limits	Min. Span
to IEC 751 ($\alpha = 0.00385$)	Pt100	-328 to 1562 °F (-200 to 850 °C)	18 °F (10 °C)
	Pt500	-328 to 482 °F (-200 to 250 °C)	18 °F (10 °C)
	Pt1000	-328 to 482 °F (-200 to 250 °C)	18 °F (10 °C)
to DIN 43760 ($\alpha = 0.00618$)	Ni100	-76 to 356 °F (-60 to 180 °C)	18 °F (10 °C)
	Ni500	-76 to 302 °F (-60 to 150 °C)	18 °F (10 °C)
	Ni1000	-76 to 302 °F (-60 to 150 °C)	18 °F (10 °C)
	Connection type	2-, 3- or 4-wire connection cable resistance compensation possible in the 2 wire system (0 to 20 Ω)	
	Sensor cable resistance	max. 11 Ω per cable	
	Sensor current	≤ 0.6 mA	

Resistance transmitter (Ω)

Designation	Measurement Range Limits	Min. Measurement Range
Resistance (Ω)	10 to 400 Ω 10 to 2000 Ω	10 Ω 100 Ω

Thermocouples (TC)

Input	Designation	Measurement Range Limits	Min. Measurement Range
to NIST Monograph 175, IEC 584	Type B (PtRh30-PtRh6) ^[1]	32 to 3308 °F (0 to +1820 °C)	900 °F (500 °C)
	Type E (NiCr-CuNi)	-328 to 1679 °F (-200 to + 915 °C)	90 °F (50 °C)
	Type J (Fe-CuNi)	-328 to 2192 °F (-200 to +1200 °C)	90 °F (50 °C)
	Type K (NiCr-Ni)	-328 to 2501 °F (-200 to +1372 °C)	90 °F (50 °C)
	Type N (NiCrSi-NiSi)	-454 to 2372 °F (-270 to +1300 °C)	90 °F (50 °C)
	Type R (PtRh13-Pt)	32 to 3214 °F (0 to +1768 °C)	900 °F (500 °C)
	Type S (PtRh10-Pt)	32 to 3214 °F (0 to +1768 °C)	900 °F (500 °C)
	Type T (Cu-CuNi)	-328 to 752 °F (-200 to + 400 °C)	90 °F (50 °C)
to ASTM E988	Type C (W5Re-W26Re)	32 to 4208 °F (0 to +2320 °C)	900 °F (500 °C)
	Type D (W3Re-W25Re)	32 to 4523 °F (0 to +2495 °C)	900 °F (500 °C)
to DIN 43710	Type L (Fe-CuNi)	-328 to 1652 °F (-200 to + 900 °C)	90 °F (50 °C)
	Type U (Cu-CuNi)	-328 to 1112 °F (-200 to + 600 °C)	90 °F (50 °C)
	Cold junction	internal (Pt100) or external, 32 to 176 °F (0 to 80 °C)	
	Accuracy of cold junction	± 1.8 °F (± 1 °C)	
	Sensor current	30 nA	

[1] High measuring error increase for temperature lower than 572 °F (300 °C)

Voltage transmitters (mV)

Designation	Measurement Range Limits	Min. Measurement Range
Millivolt transmitter (mV)	-10 to 100 mV	5 mV



TRANSMITTER TECHNICAL DATA

OUTPUT

Output (analogue)

Output Signal	4 to 20 mA, 20 to 4 mA
Transmission Behavior	Temperature linear, resistance linear, voltage linear
Source Impedance	$(V_{\text{power supply}} - 8 \text{ V}) / 0.025 \text{ A}$ (current output) e. g. $(24 \text{ V} - 8 \text{ V}) / 0.025 \text{ A} = 640 \Omega$
Digital Filter 1st Degree	0 to 8 s
Input Current Required	$\leq 3.5 \text{ mA}$
Current Limit	$\leq 25 \text{ mA}$
Switch On Delay	4 sec. (during power up $I_a = 3.8 \text{ mA}$)
Reply Time	1 sec.

Breakdown information to NAMUR NE 43

Breakdown information is created when the measuring information is invalid or not present anymore and gives a complete listing of all errors occurring in the measuring system.

		Signal (mA)
Under Ranging	Standard	3.8
Over Ranging	Standard	20.5
Sensor Break; Sensor Short Circuit Low	To NAMUR NE 43	≤ 3.6
Sensor Break; Sensor Short Circuit High	To NAMUR NE 43	≥ 21.5

Electrical connection

Power Supply	$U_b = 8 \text{ to } 35 \text{ V DC}$, polarity protected
Galvanic Isolation (In/Out)	$\dot{U} = 3.75 \text{ kV AC}$
Allowable ripple	$U_{ss} \leq 5 \text{ V}$ at $U_b \geq 13 \text{ V}$, $f_{\text{max.}} = 1 \text{ kHz}$

ACCURACY

Reference Conditions	Calibration temperature $73.4 \text{ }^{\circ}\text{F} \pm 9 \text{ }^{\circ}\text{F}$ ($23 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$)
----------------------	---

Resistance thermometer (RTD)

Type	Measurement Accuracy ^[1]
Pt100, Ni100	$0.36 \text{ }^{\circ}\text{F}$ ($0.2 \text{ }^{\circ}\text{C}$) or 0.08%
Pt500, Ni500	$0.9 \text{ }^{\circ}\text{F}$ ($0.5 \text{ }^{\circ}\text{C}$) or 0.20%
Pt1000, Ni1000	$0.54 \text{ }^{\circ}\text{F}$ ($0.3 \text{ }^{\circ}\text{C}$) or 0.12%

[1] % is related to the adjusted measurement range (the value to be applied is the greater)

TRANSMITTER TECHNICAL DATA

ACCURACY

Resistance transmitter (Ω)

Type	Measurement Accuracy ^[1]	Measurement Range
Resistance (Ω)	$\pm 0.1 \Omega$ or 0.08%	10 to 400 Ω
	$\pm 1.5 \Omega$ or 0.12%	10 to 2000 Ω

Thermocouple (TC)

Type	Measurement Accuracy ^[1]
K, J, T, E, L, U N, C, D S, B, R MoRe5-MoRe41	typ. 0.9 °F (0.5 °C) or 0.08% typ. 1.8 °F (1.0 °C) or 0.08% typ. 3.6 °F (2.0 °C) or 0.08%
Influence of the internal reference junction	Pt100 DIN IEC 751 Cl. B

Voltage transmitter (mV)

Type	Measurement Accuracy ^[1]	Measurement Range
Millivolt transmitter (mV)	$\pm 20 \mu\text{V}$ or 0.08%	-10 to 100 mV

Influence of power supply	$\leq \pm 0.01\%/V$ deviation from 24 V ^[2]
Load influence	$\leq \pm 0.02\%/100 \Omega$ ^[2]

[1] % is related to the adjusted measurement range (the value to be applied is the greater)

[2] Values refer to the full scale value

Temperature drift	Resistive thermometer (RTD): $T_d = \pm (8.3 \text{ ppm}/^\circ\text{F} * \text{max. meas. range} + 27.8 \text{ ppm}/^\circ\text{F} * \text{preset meas. range}) * \Delta\theta$ Resistive thermometer Pt100: $T_d = \pm (8.3 \text{ ppm}/^\circ\text{F} * (\text{range end value} + 200) + 27.8 \text{ ppm}/^\circ\text{F} * \text{preset meas. range}) * \Delta\theta$ Thermocouple (TC): $T_d = \pm (27.8 \text{ ppm}/^\circ\text{F} * \text{max. meas. range} + 27.8 \text{ ppm}/^\circ\text{F} * \text{preset meas. range}) * \Delta\theta$ $\Delta\theta =$ Deviation of the ambient temperature accord. to the reference condition (73.4 ° F $\pm$ 9 °F)
Long term stability	$\leq 0.18 \text{ }^\circ\text{F}/\text{Year}$ ($\leq 0.1 \text{ }^\circ\text{C}/\text{Year}$) ^[1] or $\leq 0.05\%/\text{Year}$ ^{[1][2]}

Installation conditions

Installation Angle	No limit
Installation Area	Connection head accord. to DIN 43 729 Form B; TAF 10 field housing



TRANSMITTER TECHNICAL DATA

APPLICATION CONDITIONS

Ambient conditions

Ambient Temperature	-40 to 185 °F (-40 to +85 °C), for Ex-areas see Ex-certification or control drawing
Storage Temperature	-40 to 212°F (-40 to +100°C)
Climatic Class	As per IEC 60 654-1, Class C
Moisture Condensation	Allowed
Ingress Protection	IP 00 / NEMA 4 (IP66) installed in TAF 10 field housing
Vibration Protection	4g / 2 to 150 Hz according to IEC 60 068-2-6

EMC IMMUNITY

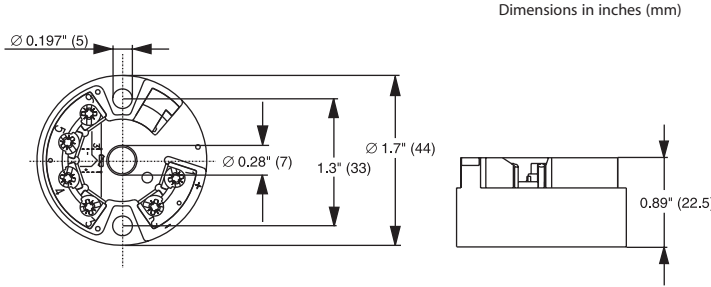
CE Electromagnetic Compatibility Compliance

The device meets all requirements listed under IEC 61326 Amendment 1, 1998 and NAMUR NE 21

This recommendation is an uniform and practical way of determining whether the devices used in laboratory and process control are immune to interference with an objective to increase its functional safety.

Discharge of Static Electricity	IEC 61000-4-2	6 kV cont., 8 kV air
Electromagnetic Fields	IEC 61000-4-3	80 to 1000 Hz, 10 V/m
Burst (Signal)	IEC 61000-4-4	1 kV; 2 kV (B) ^[3]
Transient Voltage	IEC 61000-4-5	1 kV unsym./ 0.5 kV sym.
HF Coupling	IEC 61000-4-6	0.15 to 80 Mhz, 10 V

MECHANICAL CONSTRUCTION

Dimensions	 Dimensions in inches (mm) Top view dimensions: $\varnothing 0.197''$ (5), $\varnothing 0.28''$ (7), 1.3" (33), $\varnothing 1.7''$ (44) Side view dimension: 0.89" (22.5)	
Weight	Approx. 1.4 oz (40g)	
Materials	Housing: PC Potting: PUR	
Terminals	Cable up to max. 16 AWG, secure screws	

[1] Values under reference operating conditions

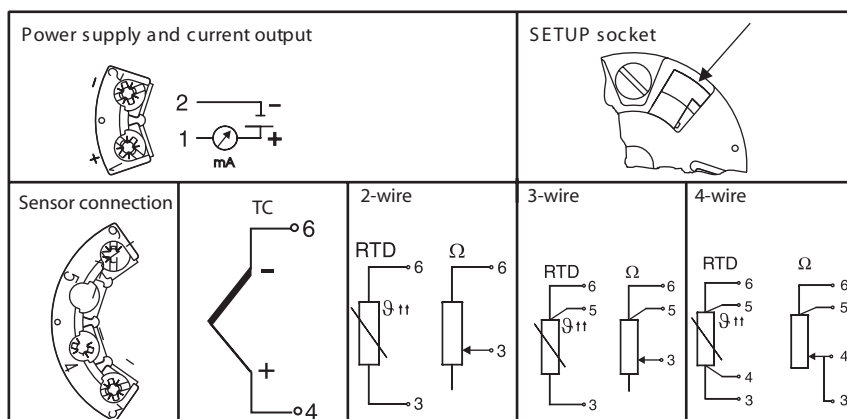
[2] % refer to the set span. The highest value is valid

[3] self recovery.

TRANSMITTER TECHNICAL DATA

MECHANICAL CONSTRUCTION

Terminal connections



DISPLAY AND OPERATING SYSTEM

Remote operation

Configuration Set	Configuration Kit TMT 181 A-VP
Configuration	Using PC program (ReadWin® 2000)
Interface	PC interface connection cable TTL +/- RS 232 with plug
Configuration Parameters	Sensor type and connection type, engineering units (°C/°F), measurement range, internal/external cold junction compensation, cable resistance compensation on 2 wire connection, fault conditioning, output signal (4 to 20 / 20 to 4 mA), digital filter (damping), offset, measurement point identification (8 characters), output simulation

CERTIFICATIONS

CE mark	This unit complies with the legal requirements laid out within the EU regulations.
GL	Ship building approval (Germanischer Lloyd)
UL	Recognized component to UL 3111-1
Hazardous Area Approvals	FM IS, Class I, Div 1+2, Group A, B, C, D CSA IS, Class I, Div 1+2, Group A, B, C, D ATEX II 1G EEx ia IIC T6/5/4 ATEX II 3G EEx nA IIC T4/T5/T6 ATEX II 3D in compliance with EN 50281-1
Other Standards and Guidelines	IEC 60529: Degrees of protection by housing (IP-Code)
	IEC 61010: Safety requirements for electrical measurement, control and laboratory instrumentation
	IEC 61326: Electromagnetic compatibility (EMC requirements)
	NAMUR: Standardization association for measurement and control in chemical and pharmaceutical industries. (www.namur.de)
	NEMA Standardization association for the electrical industry



ENGINEERING DATA

To maintain the highest degree of achievement in our manufacturing, our experienced engineers and skilled technical personnel work directly with you, our customers, to assure the best application of heat to your end product. The information in this section is intended primarily as a guide and we encourage you to work with our factory representatives in making your final heating element selection.





CONSTANTS and RATINGS

ENGINEERING CONSTANTS

1728 Cu. In. = 1 Cu. Ft. = 7.48 Gal.

1" = 2.54 Cm.

3412 Btu = 1Kwh = 1.34 Hp Hour

$491 \text{ Btu / Ft.}^2 = 1 \frac{\text{Watt Hour}}{\text{In.}^2} = \text{Heat Density}$

1 Btu / Lb. °F = 1 Gram-Cal. / Gram °C = Specific Heat

231 Cu. In. = 1 Gal.

1 Ampere = 1000 Milliamperes

1 Btu = 252 Calories = .293 Watt-Hours

1 Btu / Lb. = 1.8 Calories / Gram

1 Hp = 745.2 Watts

1 Kw = 1000 Watts

1 Megohm = 1,000,000 Ohms

1 Gal. Water = 8.3 lb.

1 Kw-Hr. will evaporate 3.5 lb. of water from and at 212°F

1 Kw-Hr. will raise 22.75 lb. of water from 62°F to 212°F

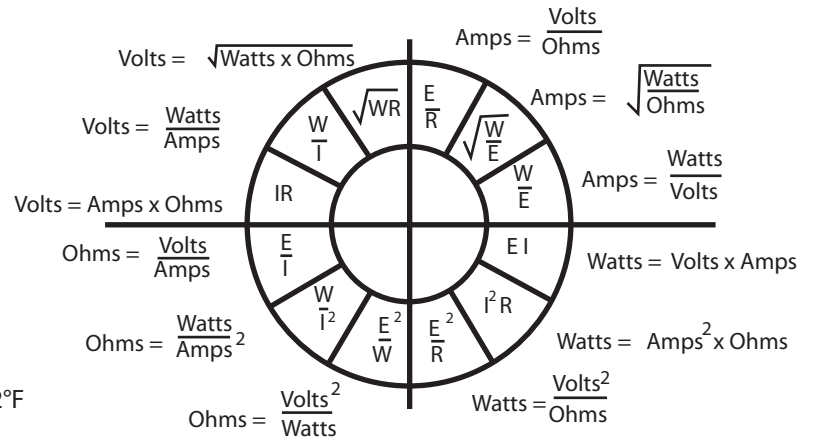
1 Gal. = 231 Cu. In. = 3.785 Litres = .1337 Cu. Ft.

1 Cu. Ft. = 1728 Cu. In. = .03704 Cu. Yd. = 7.481 Gal.

Wattage varies directly as ratio of voltages squared

$$W_2 = W_1 \times \left(\frac{E_2}{E_1} \right)^2$$

OHM'S LAW



RATINGS OF LISTED HEATERS ON OTHER VOLTAGES

Kw Rating of Heater	120 Volts		240 Volts			480 Volts	
	Output Kw of Heater When Operated On:						
	110 Volts	115 Volts	208 Volts	220 Volts	230 Volts	440 Volts	460 Volts
1	0.84	0.92	0.75	0.84	0.92	0.84	0.92
2	1.69	1.84	1.50	1.69	1.84	1.69	1.84
3	2.53	2.76	2.25	2.53	2.76	2.53	2.76
4	3.36	3.67	3.00	3.36	3.68	3.36	3.68
4.5	3.78	4.13	3.38	3.78	4.14	3.78	4.14
5	4.20	4.59	3.5	4.2	4.6	4.2	4.6
7.5	6.30	6.89	5.6	6.3	6.9	6.3	6.9
10	-----	-----	7.5	8.4	9.2	8.4	9.2
12.5	-----	-----	9.4	10.5	11.5	10.5	11.5
15	-----	-----	11.3	12.6	13.8	12.6	13.8
20	-----	-----	15.0	16.9	18.4	16.9	18.4
25	-----	-----	18.8	21.0	23.0	21.0	23.0
50	-----	-----	37.6	42.0	46.0	42.0	46.0
75	-----	-----	56.3	63.0	69.0	63.0	69.0
100	-----	-----	75.1	84.0	92.0	84.0	92.0

PROPERTIES of METALS and NON-METALLIC SOLIDS

MATERIAL	*DENSITY LBS. / IN. ³	DENSITY LBS. / FT. ³	AVERAGE SPECIFIC HEAT BTU / LB. / °F	THERMAL CONDUCTIVITY BTU / HR. FT. ² / IN. / °F	MELTING POINT °F LOWEST	LATENT HEAT OF FUSION BTU / LB.	THERMAL EXPANSION IN. / IN. /°F X10-6
ALUMINUM 2024-T3	.100	173	.24	840	935	167	12.6
ALUMINUM 1100-0	.098	169	.24	1540	1190	169	13.1
ANTIMONY	.245	423	.23	-----	1166	25	8.5
ASBESTOS CEMENT BOARD	.070	121	.25 ±	5.2	-----	-----	-----
ASPHALT	.076	131	.40	5.3	250	40	-----
BEESWAX	.035	60.5	-----	-----	144	75	-----
BISMUTH	.354	612	.031	-----	520	23	7.4
BRASS, 70%	.308	532	.096	840	1750	-----	11.2
BRICKWORK & MASONARY	.076	131	.220	3-7	-----	-----	3-6
CARBON	.080	138	.280	165	6700	-----	0.3-2.4
CELLULOSE ACETATE	.047	81.2	.3-5	1.2-2.3	-----	-----	61-83
CELLULOSE ACETATE BUTYRATE	.043	74.3	.3-4	1.2-2.3	-----	-----	61-94
COPPER	.322	556	.095	2680	1981	91.1	9.8
DELIRIN	.051	88.1	.350	1.6	-----	-----	45
GLASS	.095	164	.20	7.5	2200 ±	-----	5
GOLD	.698	1206	.032	2030	1945	29.0	7.9
GRAPHITE	.075	130	.20	-----	-----	-----	-----
ICE	.0324	56.0	.53	11	32	144	28.3
INCOLOY 800	.290	501	.13	97	2475-2525	-----	7.9
INCONEL 600	.304	525	.126	103	2500	-----	7.4
IRON CAST	.260	449	.12	346	2150	-----	6.0
IRON WROUGHT	.278	480	.12	346	2800	-----	-----
LEAD SOLID	.410	708	.032	240	620	11.3	16.4
LEAD LIQUID	.387	669	.037	108	-----	-----	-----
MAGNESIUM	.063	109	.27	1106	1202	160	14
MAGNESIUM, 85%	.011	19	.222	17.6	5070	-----	-----
MgO (COMPACTED)	.112	194	.209	20	-----	-----	7.7
MICA	.102	176	.21	3.0	-----	-----	18
MONEL 400	.319	551	.11	151	2370	-----	7.7
NICKEL 200	.321	555	.12	436	2615	133	7.4
NICHROME (80% Ni.-20% Cr.)	.302	522	.11	104	2550	-----	7.3
NYLON	.040	69.1	.4	1.5	-----	-----	61-83
PAPER	.034	58.8	.45	.82	-----	-----	-----
PARAFFIN	.032	55.3	.69	1.6	133	63	-----
PHENOLIC	.046	79.5	.40	6-1.2	-----	-----	44-61
PITCH (HARD)	.048	83	-----	-----	300 ±	-----	-----
PLATINUM	.775	1339	.035	480	3225	49	4.9
POLYETHYLENE I & II	.035	60.5	.55	2.3	176-235 (Vicat point soft)	-----	94
POLYSTYRENE	.038	65.7	.32	.7-1.0	-----	-----	33-44
RUBBER	.044	76.0	.44	1.1	-----	-----	340
SILVER	.379	655	.057	2900	1760	38	10.8
SOLDER (50% Pb. - 50% Sn.)	.323	558	.051	310	361	17	13.1
STEATITE	.094	162	.20	17.5-23	-----	-----	4.5-5.5
STEEL MILD	.284	491	.12	460	2760	-----	6.7
STEEL S. 304	.286	494	.12	105	2550	-----	9.6
STEEL S. 430	.275	475	.11	155	2650	-----	6.0
SULFUR	.075	130	.175	1.9	246	17	36
SUGAR	.061	105	.30	-----	320	-----	-----
TALLOW	.035	60.0	-----	-----	90 ±	-----	-----
TANTALUM	.60	104	.035	375	5425	-----	3.57
TEFLON	.078	135	.25	1.7	-----	-----	55
TIN, SOLID	.263	454	.065	455	450	261	13
TIN, LIQUID	.253	437	.052	218	-----	-----	-----
TITANIUM 99.0%	.164	283	.13	112	3035	-----	4.7
TYPE METAL (85 Pb.-13% Sb.)	.387	669	.040	-----	500	14 ±	-----
VINYL	.046	79.5	.3-5	.8-2.0	-----	-----	28-100
WOOD (PINE)	.020	34	.45 ±	-----	-----	-----	-----
WOOD (OAK)	.029	50	.57	1.1	-----	-----	-----
ZINC	.258	445	.096	740	787	43.3	22.1

* At or near room temperature

± Approximate



PROPERTIES of LIQUIDS

LIQUID	DENSITY LBS. / FT. ³	LBS. / GAL.	AVERAGE SPECIFIC HEAT BTU / LB. / °F	BOILING POINT °F	HEAT of VAPORIZATION BTU / LB.
ACETIC ACID 20%	64.1	8.57	.91	214 ±	810 ±
ACETIC ACID	66.0	8.81	.472	242	153
ALCOHOL (ETHYL)	49.6	6.63	.60	173	367
BENZINE	56	7.49	.45	175	166
BRINE (25% NaCl)	74	9.89	.81	221 ±	728 ±
CAUSTIC SODA (18% NaOH)	74.9	10.0	.84	221 ±	795 ±
DOWTHERM A	66.1	8.83	.44	496	42.2
ETHER	46	6.15	.503	95	160
FREON 12	82.7 @ 70 psig.	11.0	.23	—21.6	62
GLUE (2/3 WATER)	69	9.21	.895	-----	-----
GLYCERINE	78.7	10.5	.58	556	-----
MERCURY	845	112.9	.0333	675	117
NaK (78% K)	46.2 @ 1000 °F	6.17	.21 @ 1000 °F	1446	-----
NITRIC ACID, 7%	64.7	8.64	.92	220 ±	918 ±
OIL, COTTONSEED	60	8.01	.47	-----	-----
OIL, MACHINE	58	7.75	.40	-----	-----
OIL, OLIVE	58	7.75	.471	570 ±	-----
PARAFFIN (Melted)	47.1 ±	6.29	.71 ±	750 ±	-----
PETROLEUM	58.2	7.78	.43	-----	-----
POTASSIUM (K)	44.6 @ 1000 °F	5.96	.18 @ 1000 °F	1400	893
SODIUM (Na)	51.2 @ 1000 °F	6.84	.30 @ 1000 °F	1621	1810
SULFUR (Melted)	112	15.0	.22	832	652
THERMONOL FR-2	90.6	12.1	.30	648 ±	-----
TURPENTINE	54.3	7.25	.41	318	123
VEGETABLE OIL	57.5	7.68	.43 ±	-----	-----
WATER	62.3	8.34	1.0	212	970

* At or near room temperature

** Percent concentration by weight in H₂O solution

± Approximate

PROPERTIES of GASES

GAS	*DENSITY LBS. / FT. ³	*SPECIFIC HEAT BTU / LB. / °F
ACETYLENE	.073	.350
AIR at 70 °F	.080	.237
AIR at 400 °F	.046	.245
ALCOHOL	-----	.453
AMMONIA	.523	.044
ARGON	.102	.125
CARBON DIOXIDE	.113	.199
CARBON MONOXIDE	.072	.248
CHLORINE	.184	.115
ETHYLENE	.0728	.400
HELIUM	.0104	1.25
HYDROCHLORIC ACID	.094	.194
HYDROGEN	.0052	3.39
METHANE	.041	.528
METHYL CHLORIDE	.1309	.24
NITRIC OXIDE	.0779	.231
NITROGEN	.072	.248
OXYGEN	.082	.218
SULFUR DIOXIDE	.172	.152
WATER VAPOR at 212 °F (Steam)	.037	.482

* At or near room temperature and atmospheric pressure

CORROSION RESISTANCE of DIFFERENT MATERIALS

SUGGESTED METAL SHEATHS									
COMPOUND	IRON AND STEEL	CAST IRON NI RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY	COPPER	LEAD	ALUMINUM	NICKEL
Acetic Acid, Crude	X	C	F	F	C	F	X	F	F
Pure		X		A	C	F	F	A	F
Vapors		X		F	C	F	X	C	F
150 psi; 400°F.				F	C	F	X	C	F
Acetone	C	F	A						
Alboloy Process	A								
Alodine 200°F.			A-347 A-316						
Aluminum Sulphate	X	C	F	F		F	A	C	C
Ammonia Gas, Cold	A	A	A	A		C	A	A	
Hot	C	C	C	C		X	X		
Ammonia and Oil	A								
Ammonium Chloride	C	A	F	F		X	A	X	F
Ammonium Hydroxide	A	A	A	C	A	X	A	F	
Ammonium Nitrate	A	C	A	C		X	X	F	
Ammonium Sulphate	A	A	A	A		F	A		
Amyl Alcohol				A		A			
Anhydrous Ammonia	A					X			
Aniline, Aniline Oil	A		A	A		X		X	
Aniline, Dyes			A	A					
Anodizing Solutions 10% Chromic Acid 96°F.	C		A						
Sulphuric Acid 70°F.							A		
Sodium Hydroxide Alkaline	A								
Nigrosine Black Dye				A					F
Nickel Acetate				A			C		F
Barium Chloride			F-304 X-316					X	A
Barium Hydroxide			A			X	X	X	A
Barium Sulphide			A	A		X	A		
Bleaching Solution 1½ Lb. Oxalic Acid per Gallon of H ₂ O at 212°F.				A					F
Bonderizing	C	F	A						
Cadmium Plating					A				
Carbolic Acid, Phenol	C	C	A	A	A	X	A	A	
Carbon Dioxide, Dry	A	A	A	A	A	A	A	A	
Wet	F	C	A	A	A	F	X	F	
Carbon Tetrachloride	C	C	C	A	A	C	F	C	
Castor Oil	A		A	A	A			A	
Chloroacetic Acid	X		X			X	X	X	F
Cholorine, Dry	A	A	A	A		A	A	A	
Wet	X	X	X	X		X	F	X	
Chromic Acid	C	C	A	F	C	X	A	X	
Chrome Plating							A		
Citric Acid	X	C	A	A	A	A	A	A	
Cobalt Acetate 130°F				A	A				
Cocoanut Oil				F					A

RESISTANCE RATINGS:

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CORROSION RESISTANCE of DIFFERENT MATERIALS

SUGGESTED METAL SHEATHS									
COMPOUND	IRON AND STEEL	CAST IRON NI RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY	COPPER	LEAD	ALUMINUM	NICKEL
Copper Chloride	F		X	F		C	A	X	
Copper Cyanide	A								
Copper Plating	A								
Copper Sulphate	X	C	A	A	A	C	A	X	
Creosote	A	A	A	A		A		A	
Deoxidine			A						
Deoxyllyle			A						
Diphenyl 300°—350°	A								
Di Sodium Phosphate 25% 180°F.	A								
Diversey No. 99	A								
Dowtherm	A								
Ethers	A			A	A	A	A	A	
Ethyl Chloride	A		A	A		A			A
Ethylene Glycol 300°F.			A	A					
Ferric Chloride	X	X	X	X	X	X	X	X	X
Ferric Sulphate	X	X	F-304 A-316	X	C	X	A	X	X
Formaldehyde	F	F	A	A	A	F	X	F	
Formic Acid	X		F	C	C	F	X	X	C
Freon	C	A	C	A		A	A	A	
Fuel Oil	A		A	A		A	A		
Fuel Oil, Acid	C		C	A		C	A		
Gasoline, Sour	C	C	A	A	A	C	A	C	
Gasoline, Refined	A	A	A	A	A	A	A	A	
Glycerin, Glycerol	A	A	A	A		F	A	A	
Holdens 310A Tempering Bath									A
Houghtons Mar Tempering Salt	C								C
Hydrochloric Acid <150°F.	X	X	X	C		X	F	X	C
>150°F.	X		X	C		X	X	X	C
Hydrofluoric Acid, Cold <65%	X	X	X	F		C	F	X	X
>65%	F		X	A		F	C	X	
Hot <65%	X		X	C		X	X	X	X
>65%	C		X	A		F	X	X	
Hydrogen Peroxide	X	X	A	F	A	X	F	A	F
Iridite 1-Part and 5-Parts Water 200°F.							A		
Isopropanol	C			A		F			
Kerosene	A		A	A	A	A	A		
Kolene									A
Lacquer Solvents	C	A	A	A		C		A	
Lard	F								
Linseed Oil	A		A	A	A	A	A	A	
Magnesium Chloride	F	F	F	F		F	X	X	F
Magnesium Hydroxide	A	A	A	A		X		X	A
Magnesium Sulphate	A	A	A	A		A		C	
Mercuric Chloride	C	C	X	X	X	X		X	X
Mercury	A	A	A	A	A	X		X	
Methyl Alcohol, Methanol	A		A	A		A	A	A	

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CORROSION RESISTANCE of DIFFERENT MATERIALS

SUGGESTED METAL SHEATHS									
COMPOUND	IRON AND STEEL	CAST IRON NI RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY	COPPER	LEAD	ALUMINUM	NICKEL
Methyl Chloride	A			A		A	A		A
Mineral Oils	A		A	A	A	A	A	A	
Naphthalene	A								
Nickel Chloride			F	C		X		X	
Nickel Plating, Bright							A		
Nickel Plating, Dull							A		
Nickel Sulphate			A	C	X	X		X	
Nitric Acid, Crude	X		C	X	X	X	X	C	X
Concentrated	X		F	X	X	X	X	A	X
Diluted	X		A	X	X	X	X	X	X
Nitrobenzene	A		A			F			
Oakite No. 20	A								
Oakite No. 23	A								
Oakite No. 24	A								
Oakite No. 30	A								
Oakite No. 32									
Oakite No. 33			A-347						
Oakite No. 36									
Oakite No. 51	A								
Oakite No. 90 @ 180°F.	A								
Oleic Acid	C	C	A	A	A	X	X	A	A
Oxalic Acid	C	C	C	A		C	X	A	
Paraffin	A								
Parkerizing	C	F	A						
Perchlorethylene			A						
Permachlor			A						
Petroleum Oils, Crude <500°F.	A	A	A	C		C	C	A	C
>500°F.	A	A	A	X		X	X	A	X
>1000°F.	X		C A-347	X		X	X	X	X
Phenol 85%, 120°F.	C		A						A
Phosphoric Acid, Crude	C		C	X		X	C	X	X
Pure <45%	X		A	F		F	A	C	C
>45% Cold	X		A	F		F	A	X	C
Hot	X		X-304 C-316	C		C	X	X	
Photo Fixing Bath			A	C					
Picric Acid Water Solution	C		A	C		X	X	X	X
Potassium Chloride	A	A	A	A		A	A	C	A
Potassium Cyanide	A		A	A		X	X	X	
Potassium Dichromate 208°F.			A-347						
Potassium Hydroxide	C	A	F	A		X	X	X	A
Potassium Sulphate	A	A	F	A		A	A	A	A
Prestone 350°F.	A			A					
R5 Bright Dip for Copper Polish @ 180°F.			A-316						
Soap Solutions	A	A	A	A		C	A		
Sodium Carbonate <20%	A								

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CORROSION RESISTANCE of DIFFERENT MATERIALS

SUGGESTED METAL SHEATHS									
COMPOUND	IRON AND STEEL	CAST IRON NI RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY	COPPER	LEAD	ALUMINUM	NICKEL
Sodium Chloride	A	A	F-304 A-316	A	A	F	A	X	A
Sodium Cyanide	A	C	A-316	F		X	X	X	
Sodium Hydroxide	A	A	F	A	A	X	F	X	A
Sodium Hypochlorite	X	C	X	C		C	X	X	C
Sodium Nitrate	A	A	F-304 A-316	A	A	F	A	A	A
Sodium Peroxide	C	A	A	A				A	A
Sodium Silicate	A	A	A-316	A		C	X	X	A
Sodium Sulphate	A	A	A	A	A	A	A	C	A
Sodium Sulphide	A	A	A	F	A	X	A	X	F
Soybean Oil			A						
Steam <500°F.	A		A	A	A	A	C	A	A
500-1000°F.	C		A	C	A	C	X	C	C
>1000°F.	X		A	X	A	X		X	X
Stearic Acid	C	C	A	A	A	C	A	C	A
Sulphur	A	C	F	X	A	X		A	X
Sulphuric Acid <10% Cold	X		F	C		C	A	C	C
Hot	X		F-316 X-304	C		X	A	C	X
10-75% Cold	X		X-304 F-316	C		X	A	C	C
Hot	X		X	C		X	A	X	X
75-95% Cold	C		A	C		X	A	C	C
Hot	F		X	C		X	A	X	X
Fuming	C	F	C-304 F-316	X		X	A	C	X
Sulphurous Acid	A		C-316 X-304	X		C	A	C	X
Tannic Acid			F	A		A	X	X	A
Tar	A		A		A			A	
Tartaric Acid			C-304 A-316	C			A	A	C
Tetrachlorethylene	A								
Thermal Granodine	F								
Therminall Fr. 1— 8-12W/SQ. In. 640°F.	A								
Tin Plating									A
Toluene	A			A			A	A	
Triad Solvent	C								
Trichloroethylene	C	C	C	A		C	F	C	
Turco No. 2623	A								
Turpentine	C	A	A	A		C	A	A	
Urea Ammonia Liquor 48°F.	A								
Vegetable Oil			A						
Vinegar	C		F-304 A-316	A				C	

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CORROSION RESISTANCE of DIFFERENT MATERIALS

SUGGESTED METAL SHEATHS									
COMPOUND	IRON AND STEEL	CAST IRON NI RESIST	300 SERIES STAINLESS	MONEL	INCONEL INCOLOY	COPPER	LEAD	ALUMINUM	NICKEL
Water, Acid Mine Containing Oxidizing Salts	X	C	A	X		C	C	C	C
No Oxidizing Salts	C	A	X	A				A	
Water, Fresh	C	A	A	A	A	A	A	A	
Distilled, Lab. Grade	X	X	A	C	A	X	X	A	A
Return Condensate	A	A	A	A	A	A	A	A	
Water, Sea Water	C	A	F	A	F	C	A	X	
Whiskey and Wines	X	C	F-304 A-316	A	A	A			
X Ray Solution			A						
Zinc Chloride	C	C	X	A		X	A	X	
Zinc Plating	A								
Zinc Sulphate	C	A	A	A	A	X		C	

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PROCESS and APPLICATION INDEX

APPLICATION OR PROCESS	METHOD OF HEATING	TYPE OF HEATER
Acid Heating	Direct (For Solutions Listed) Liquid Jacket Clamped on or Air Jacket	Leaded Immersion Water or Oil Immersion Cast-In Tubular
Air Filtering	Immersion	Oil Immersion Tubular
Air Heating (Process)	Direct	Tubular Finned Tubular Cast-In Oven Heaters
(Comfort)	Direct	Natural or Forced Convection Air Heaters
Alkaline Baths	Direct	Immersion
Asphalt Tanks (See Also Pipe Heating)	Clamped on or Air Jacket Liquid Jacket	Cast-In Tubular Water or Oil Immersion
Automotive	Immersion Surface	Cartridge Tubular
Babbitt Melting	Direct	Cast-in Immersion Melting Pots
Baking Ovens (Paint, Enamel, etc.)	Air	Tubular Cast-In
Baseboard Heaters	Air	Tubular Finned Tubular
Bolt Heating	Direct	Insertion
Bottle Capping	Surface	Tubular Cartridge
Brass Plating Solution	Direct	Alkaline Immersion
Bronze Plating Solution	Direct	Alkaline Immersion
Cadmium Plating Solution	Direct	Alkaline Immersion
Can Soldering	Direct	Cast-in Immersion
Candy Coating	Liquid Jacket	Water or Oil Immersion
Cartoning Equipment	Surface	Tubular
Caustic Water Solution	Direct	Alkaline Immersion
Cellulose Dip Tanks	Liquid Jacket	Water or Oil Immersion
Chocolate Melting and Processing	Clamped on or Air Jacket Liquid Jacket	Cast-In Tubular Water Immersion
Chromium Plating Solution	Direct	Leaded Immersion
Cleaning Tanks	Direct	Water Immersion Alkaline Immersion



PROCESS and APPLICATION INDEX

APPLICATION OR PROCESS	METHOD OF HEATING	TYPE OF HEATER
Coal Spraying	Direct	Oil Immersion
Coffee Roasting	Air	Tubular
Comfort Heating		Cast-In
Component Heaters for: Electric Furnaces	Air	Finned Tubular Tubular
Air Conditioners	Air	Tubular Finned Tubular
Heat Pumps	Air	Tubular Finned Tubular
Wall Insert Heaters	Air, Radiant Radiant	Tubular Finned Tubular
Radiant-Industrial	Radiant	Tubular
Compound Melting	Air Jacket Liquid Jacket	Water or Oil Immersion Strip Tubular
Cooking (Food)	Immersion, Cast-in, Air	Tubular
Copper Plating Solution (Cyanide)	Direct	Alkaline Immersion
(Acid)		Leaded Immersion
Core Baking	Direct	Cast-In Tubular
Defrosting	Air, Surface, Radiant	Tubular Finned Tubular Cartridge
Degreasers	Direct Clamped on or Air Jacket	Oil Immersion Tubular Tubular Cast-In
Dehydrating	Air	Tubular Finned Tubular Cast-In
Deicing (Refrigeration)	Surface	Tubular
Die Heating	Surface	Tubular
Diesels (Starting Aids)	Fuel, Air, Surface, Immersion	Tubular Cartridge
Drying (Ovens and Processes)	Air Radiant	Tubular Finned Tubular Cast-In Air Heaters Tubular



PROCESS and APPLICATION INDEX

APPLICATION OR PROCESS	METHOD OF HEATING	TYPE OF HEATER
Duct Heating	Air	Tubular Finned Tubular Cast-In
Electroplating Baths	Direct Liquid Jacket Clamped on or Air Jacket	Lead or Alkaline Immersion (See Specific Plating Solutions) Water or Oil Immersion Cast-In Tubular
Electrotype Pots	Direct	Cast-in Immersion
Embossing	Surface	Cartridge Tubular
Extrusion (Metal or Plastic)	Surface	Tubular Insertion Cartridge
Fruit Ripening	Air	Tubular Finned Tubular
Fuel Oil and Furnace Oil Preheating	Direct (Also see Automotive)	Oil Immersion
Gelatin Heating	Liquid Jacket	Water Immersion
Glue Melting and Heating	Liquid Jacket	Water Immersion
Gold Plating Solution (Cyanide)	Direct	Leaded Immersion
Grease Melting	Direct Liquid Jacket	Tubular Water or Oil Immersion
Heat Exchangers	Air, Immersion	Immersion Tubular Finned Tubular
Hot Plates	Surface	Cartridge Tubular Cast-In
Humidifying	Direct	Water Immersion
Injection, Plastic	See Plastic Injection	
Labeling Equipment	Surface Liquid Jacket	Cast-In Tubular Cartridge Water Immersion
Lead Melting	See Metal Melting	
Lead Plating Solution	Direct	Leaded Immersion
Metal Extrusion	Surface	Tubular Insertion

PROCESS and APPLICATION INDEX

APPLICATION OR PROCESS	METHOD OF HEATING	TYPE OF HEATER
Metal Melting	Direct Clamped on or Air Jacket	Cast-in Immersion Cast-In Tubular
Molasses Heating (Tank)	Liquid Jacket	Water or Oil Immersion
Mold Heating	Surface	Tubular Cartridge
Molding Presses	Surface	Tubular Insertion Cartridge Cast-In
Molding (Vacuum) (Plastic Sheets)	Radiant	Tubular
Nickel Plating Solution	Direct	Leaded Immersion
Oil Heating, Reclaiming, Tempering	Direct	Oil Immersion
Oven Heating (1000° F. Max.)	Air	Tubular Oven
Oven Heating (800° F. Max.)	Air	Cast-In Oven
Packaging Equipment	Surface Liquid Jacket	Cartridge Cast-In Tubular Water or Oil Immersion
Paraffin Baths	Direct	Oil Immersion
Pipe Line Heating (Including Winter Protection)	Surface	Tubular
Plastic Extrusion or Injection	Surface	Tubular Insertion Cartridge
Plastic Molding	Radiant, Surface	Tubular Cartridge Insertion Cast-In
Platen Heating	Surface Liquid Jacket	Cartridge Tubular Insertion Cast-In Water or Oil Immersion
Plating Baths	Direct Liquid Jacket Clamped on or Air Jacket	Alkaline or Lead Immersion Water or Oil Immersion Cast-In Tubular
Recapping	Surface	Tubular



PROCESS and APPLICATION INDEX

APPLICATION OR PROCESS	METHOD OF HEATING	TYPE OF HEATER
Roll Heaters	Surface	Tubular Cast-In Oil Immersion
Sealers (Hand)	Cast-in, Surface	Tubular Cartridge Cast-In
Silver Plating Solution (Cyanide)	Direct	Alkaline Immersion
Snowmelters	Surface, Radiant	Tubular
Soldering (Industrial)		Soldering Irons
Space Heating (Motors, Generators, Control Cubicles, Switchgear, etc.)	Air	Tubular Cast-In
Steam Generators	Immersion	Flanged Immersion Tubular
Steam Superheating	Direct	Tubular
Tin Plating Solution	Direct	Alkaline Immersion
Vacuum Molding (Plastic Sheets)	Radiant	Tubular
Valve Warming	Surface Liquid Jacket	Cartridge Tubular Water or Oil Immersion
Vaporizers	Immersion	Immersion
Varnish Heating	Clamped on or Air Jacket Liquid Jacket	Cast-In Tubular Oil Immersion
Vulcanizing	Surface Liquid Jacket	Cartridge Tubular Cast-In Water or Oil Immersion
Warming Ovens	Air	Cast-In Tubular Finned Tubular
Water Heating	Direct	Water Immersion Tubular
Water Towers	Immersion, Surface	Tubular Cast-In Immersion
Wax Melting and Heating	Direct Liquid Jacket	Oil Immersion Water or Oil Immersion
Wood Processing	Air, Surface	Tubular Finned Tubular
Yarn Conditioning	Immersion	Water Immersion
Zinc Plating Solution	Direct	Alkaline Immersion

WATT DENSITY VALUE CHART

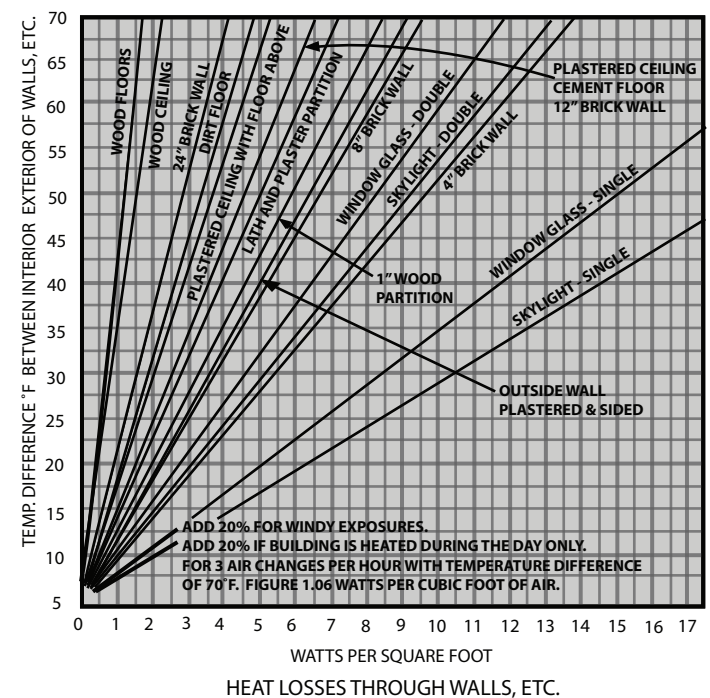
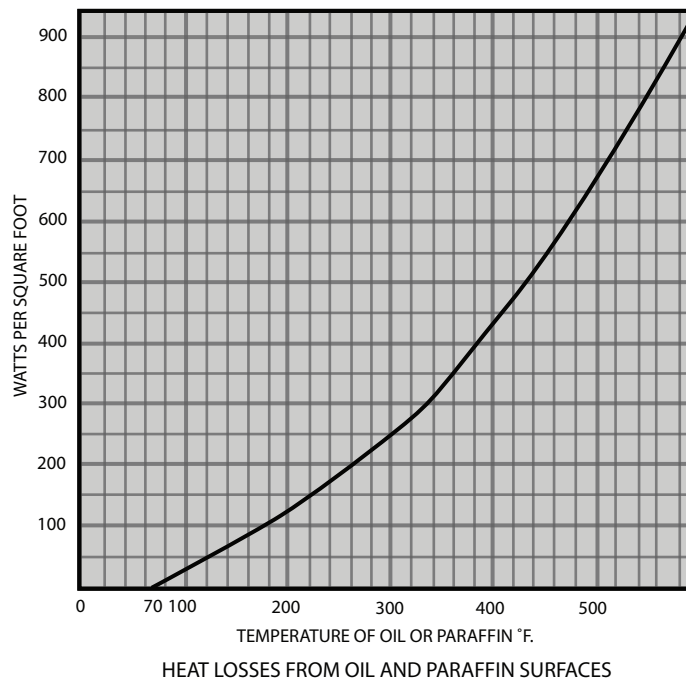
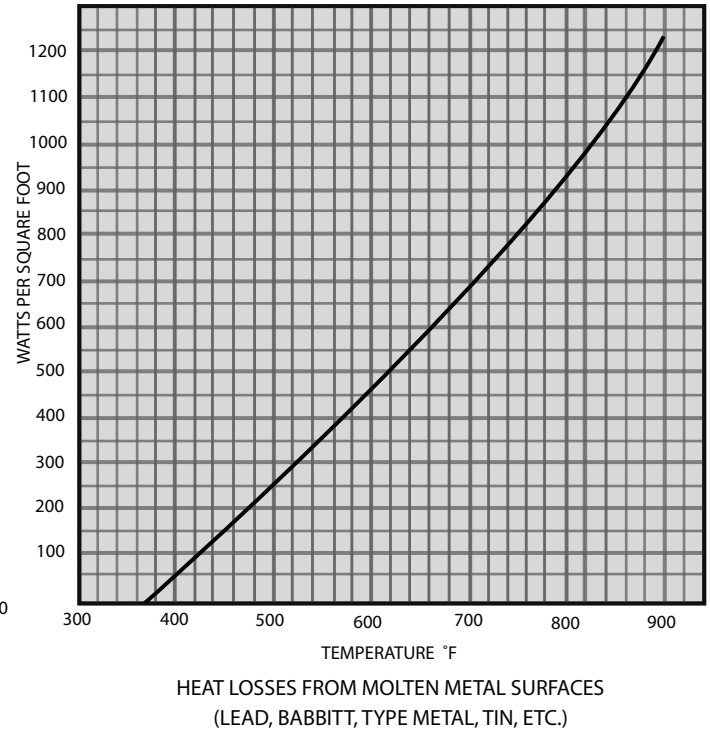
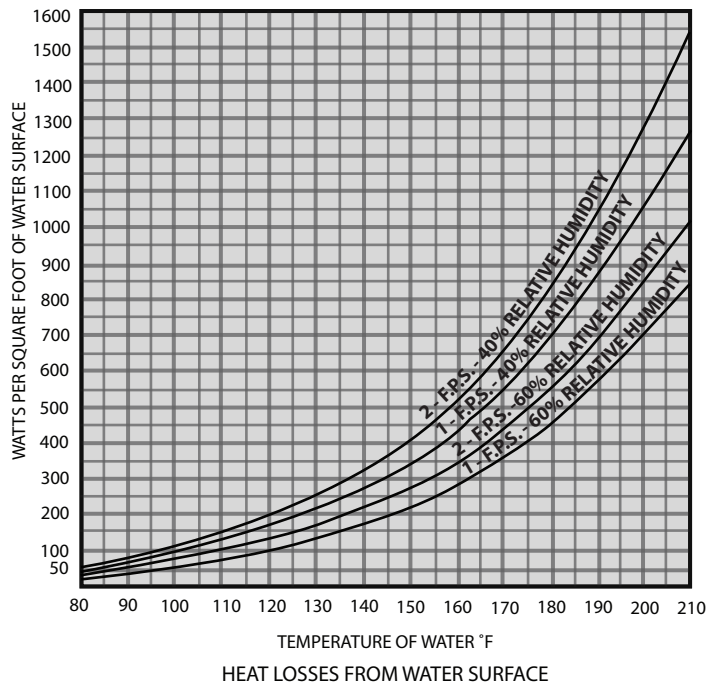
WATT DENSITY VALUE CHARTS		
MATERIAL	MAXIMUM OPERATING TEMPERATURE °F	MAXIMUM WATTS PER SQUARE INCH
ACID SOLUTIONS	180	40
ALKALINE SOLUTIONS AND OAKITE	212	40
AMMONIA PLTG. SOLUTIONS	50	25
AROCOR	600	20
ASPHALT, TAR OR HEAVY COMPOUNDS	200 300 400 500	10 circ. 5 non circ. 8 circ. 4 non circ. 7 circ. 4 non circ. 6 circ. 3 non circ.
BUNKER "C" FUEL OIL	160	10-15 fast circ. 4-7 non circ.
CAUSTIC	210	45
SODA	180	25 and down
CITRUS JUICES	185	20
DEGREASING SOLUTION VAPOR	275	20
DOWTHERM A LIQUID PHASE	750	18 and down
DOWTHERM A VAPOR PHASE	750	12 and down
DOWTHERM E	400	12
ELECTRO PLATING SOLUTIONS	180	40
ETHYLENE GLYCOL	300	30
FATTY ACIDS	150	20
FREON	300	3
FUEL OIL		
PREHEATING LIGHT GRADE	180+	25-30 Circulating
HEAVY (SEE BUNKER C)		
GASOLINE	300	2-5
GLYCERINE	50	40
HEAT TRANSFER OILS	500 600	20 15
LEAD STEREOTYPE POT	600	35 on casting
LINSEED OIL	150	50
MACHINE OIL SAE 30	250	20-25 circ. 15-20 non circ.
METAL MELTING POT	500-900	20-27
MINERAL OIL	200 400	20 16
MOLASSES	100	4-5

WATT DENSITY VALUE CHARTS		
MATERIAL	MAXIMUM OPERATING TEMPERATURE °F	MAXIMUM WATTS PER SQUARE INCH
MOLTEN SALT BATH	800-900	25-30
MOLTEN TIN	600	20
OAKITE (SEE ALKALINE SOLUTIONS)		
OIL DRAW BATH	600 400	20 24
OILS (SEE TYPE OF OIL)		
PARAFFIN OR WAX	SOLID 150	4 16
PERCHOLR-ETHYLENE	200	20
POTASSIUM HYDROXIDE	160	25
PROPYLENE GLYCOL	150	20
SODIUM CYANIDE	140	40
SODIUM HYDRIDE	720	28
STEEL TUBING CAST INTO ALUMINUM	500-750	50
STEEL TUBING CAST INTO IRON	750-1000	55
SOCONY VACUUM TYPE		
TRANSFER OIL	600	20
SULPHUR		
MOLTEN	600	10
THERMINOLS AND HEAT	500 600 650	20 20 15
TRANSFER OILS	150	20
TRICHLOROETHYLENE		
VAPOR DEGREASING SOLUTIONS	275	20
VEGETABLE OIL		
AND SHORTENING IN LIQUID STATE	400	30-40 circ. 15-25 non circ.
BELOW 100 °F		5
WATER (PROCESS)	35-150	100-125 circ. 75-100 non circ.
	212	75 circ. 50 non circ.
		low flow vol. 10 high flow vol. 25-30
		low flow 5-10 high flow 20-25
		low flow 5 high flow 15-20
STEAM	300 500 700	

NOTE: The above watt density values are suggested only. These values will vary with flow rates, densities and temperature. Caution must be used when applying these values in some circumstances.

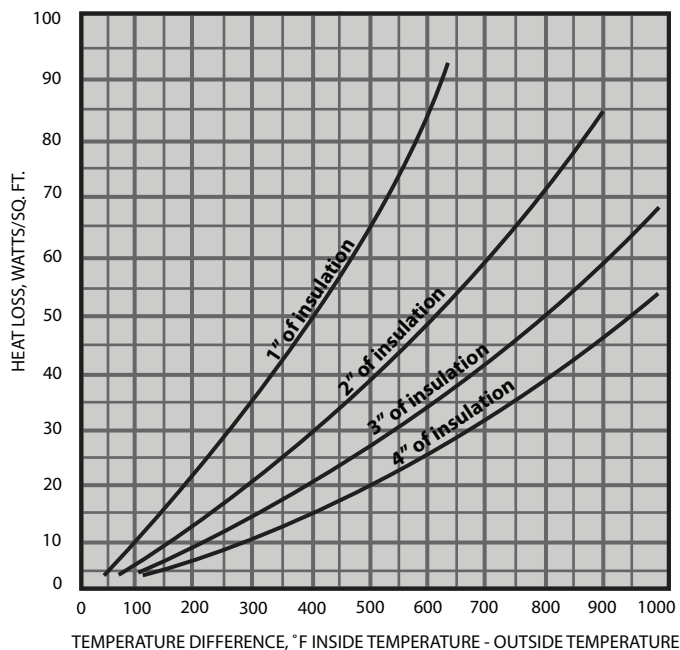


HEAT LOSS INFORMATION

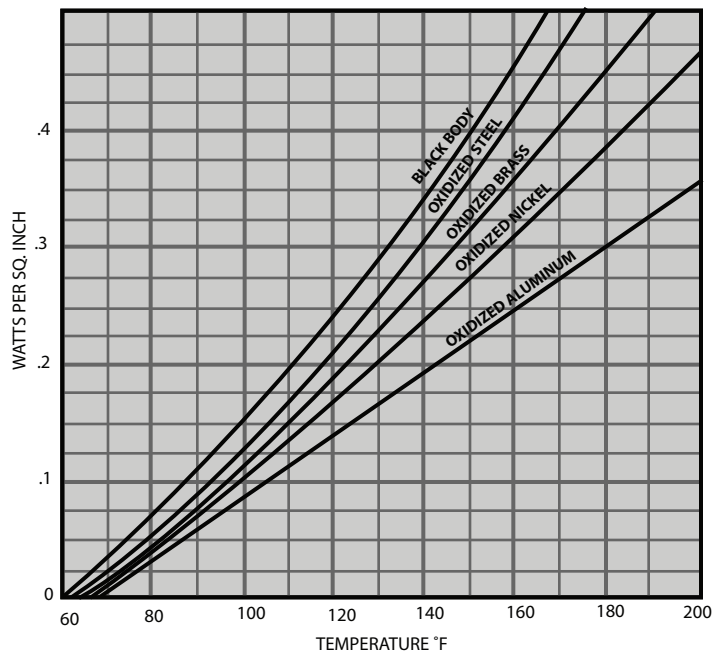




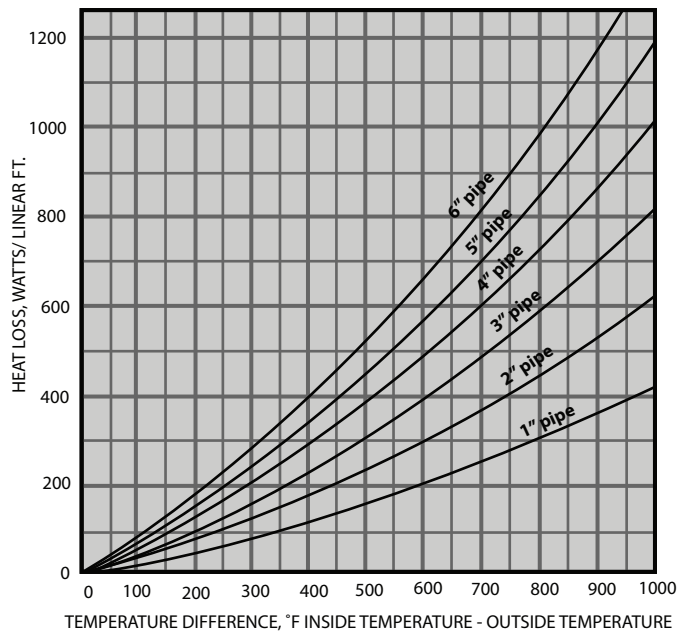
HEAT LOSS INFORMATION



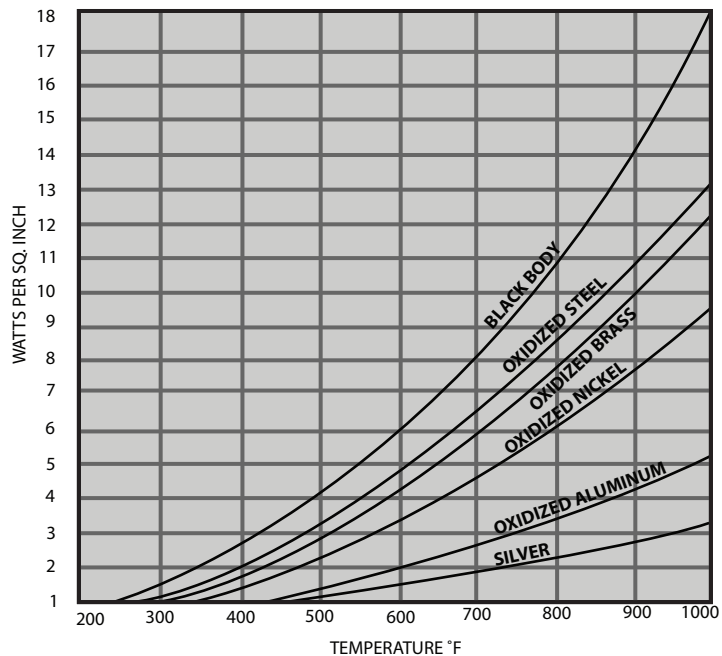
HEAT LOSSES FROM INSULATED WALLS
Curves are for standard high-grade material, such as 85% magnesia, Rockwood, etc.



HEAT LOSSES FROM UNINSULATED SMOOTH SOLID SURFACES
Assumed external ambient temperature of 70°F.
Temperaures from 60° to 200°F.



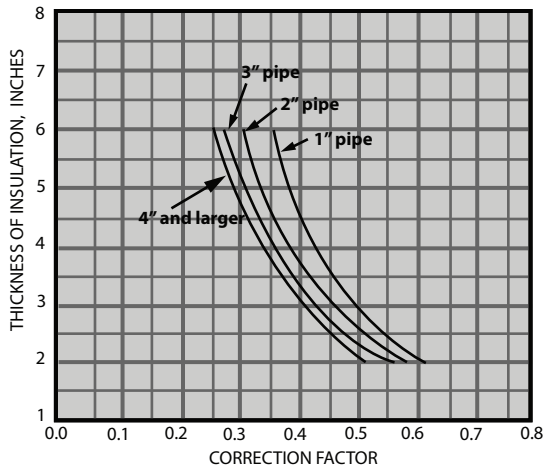
HEAT LOSSES FROM INSULATED PIPE LINES
Curves are for pipe lines covered with 1 inch of standard high-grade insulation.



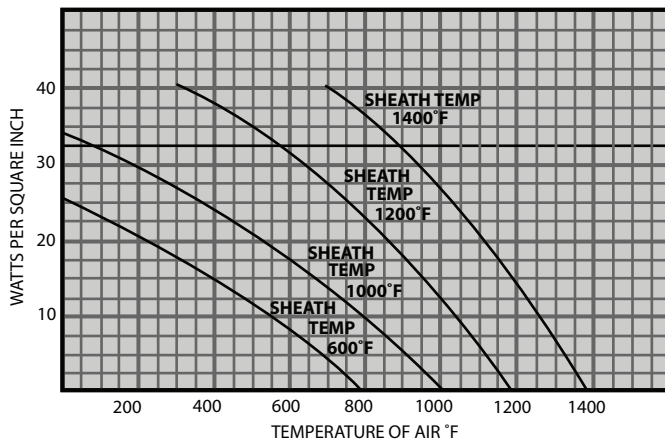
HEAT LOSSES FROM UNINSULATED SMOOTH SOLID SURFACES
Assumed external ambient temperature of 70°F.
Temperaures from 200° to 1000°F.



HEAT LOSS INFORMATION



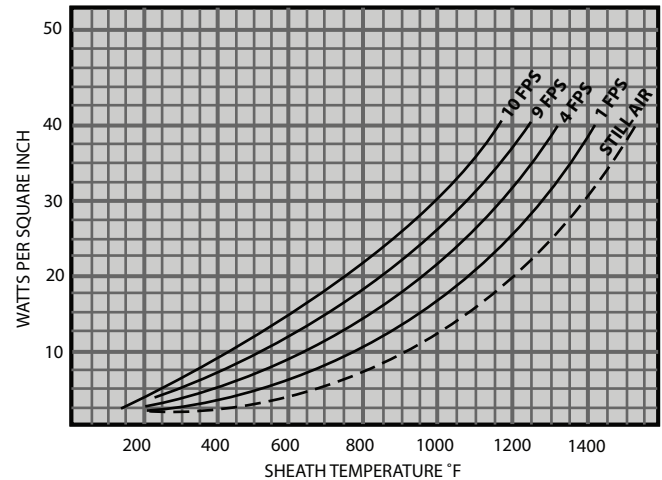
CORRECTION FACTORS FOR INSULATED PIPELINE HEAT LOSSES
where more than 1 inch of insulation is applied to pipe lines, obtain the heat loss from HEAT LOSSES FROM INSULATED PIPE LINES and multiply by the appropriate factor from the above curves to determine the proper heat loss.



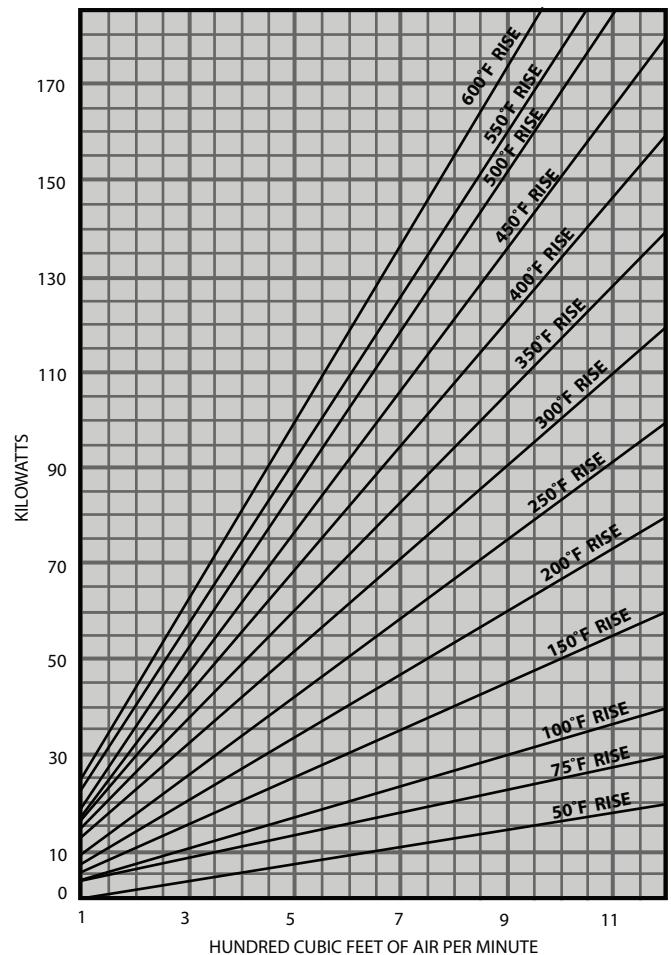
ALLOWABLE WATT DENSITY ON TUBULAR UNITS OPERATING AT 800°F TO 1400°F
Sheath temperature for various temperatures in distributed air velocity of 16 fps

NOTE:

Varying circumstances can effect the accuracy of any figures obtained from these charts. They should be used as a guide only in determining requirements for electrical heating elements.



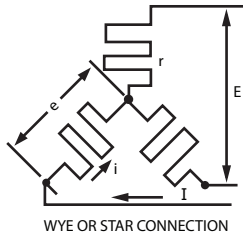
SHEATH TEMPERATURE OF TUBULAR UNITS
at various watt densities in free or forced air at 80°F



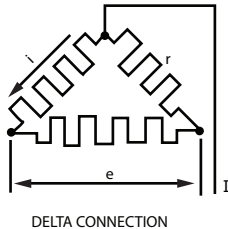
HEAT REQUIREMENTS FOR AIR (.08 LBS./CU. FT weight and specific heat .237 Btu/Lbs./°F)



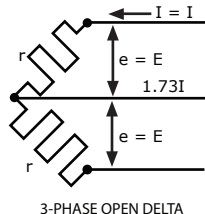
ELECTRICAL DATA



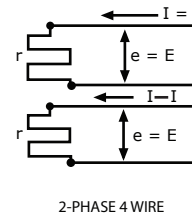
WYE OR STAR CONNECTION



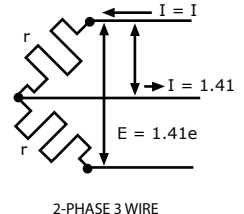
DELTA CONNECTION



3-PHASE OPEN DELTA



2-PHASE 4 WIRE



2-PHASE 3 WIRE

The energy put out by a heating unit is measured in watts.
The power factor is always unity.

Single phase, $W = I^2R = EI$

Three Phase Delta, $W = 3EI = 1.73 EI$

Three Phase Wye, $W = 3EI = 1.73 EI$

Two Phase 4 Wire, $W = 2I^2R = 2 EI$

Two Phase 3 Wire, $W = 2I^2R = 2 EI$

(Voltage between outside wires = $1.41e$)

$$\text{Amps} = I = \frac{W}{E} = \frac{E}{R}$$

$$1 \text{ Phase Amps} = I = \frac{W}{E \times PF}$$

$$\text{A.C., 3 Phase Amps} = I = \frac{W}{1.73 E \times PF}$$

A.C., 2 Phase 3 Wire: Middle Wire Amps = Amps in outside Wires x 1.41

W = Power, Watts

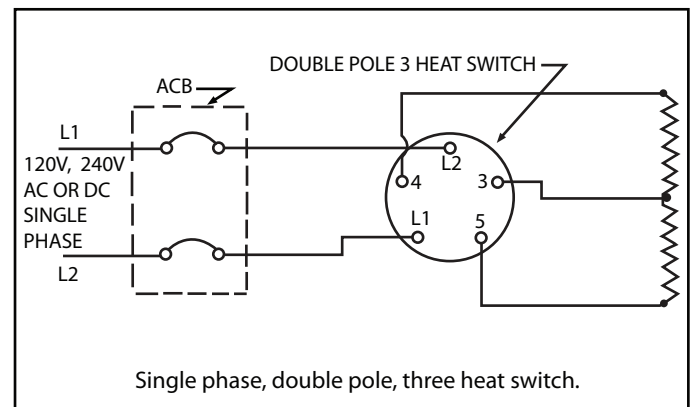
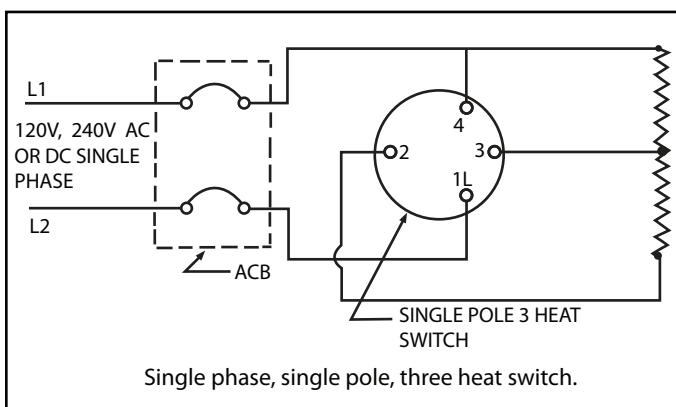
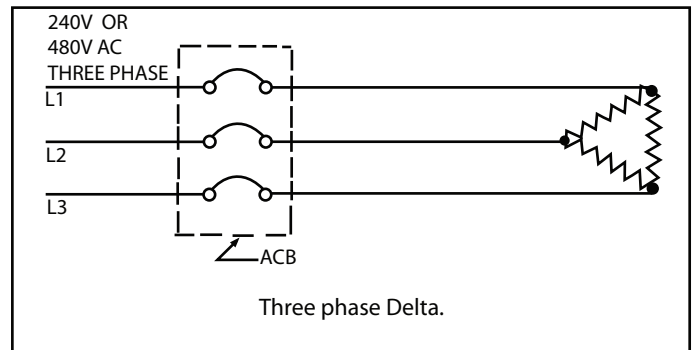
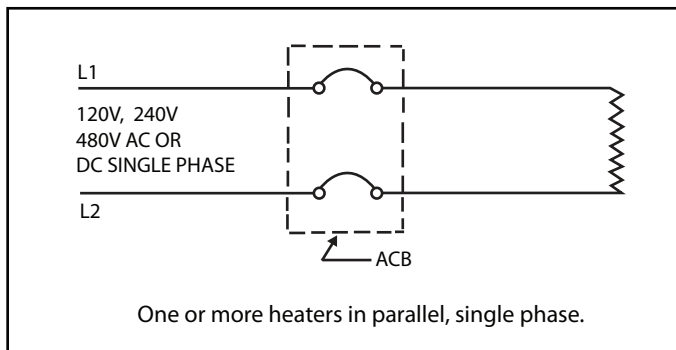
E = E.M.F. Volts

I = Current, Amperes

R = Resistance, Ohms

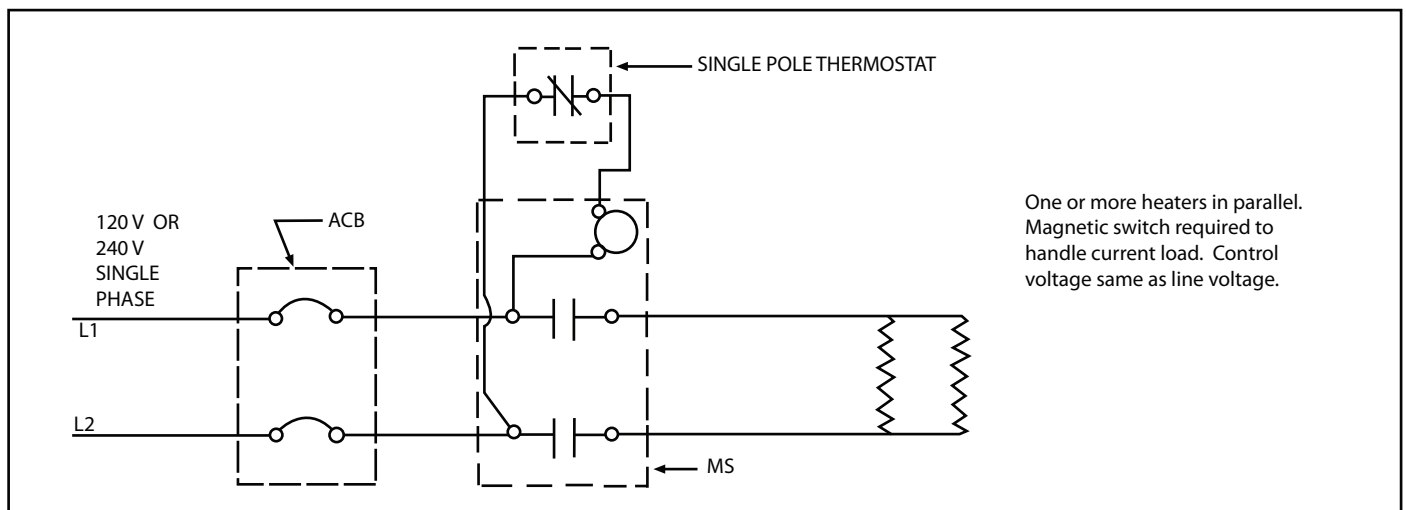
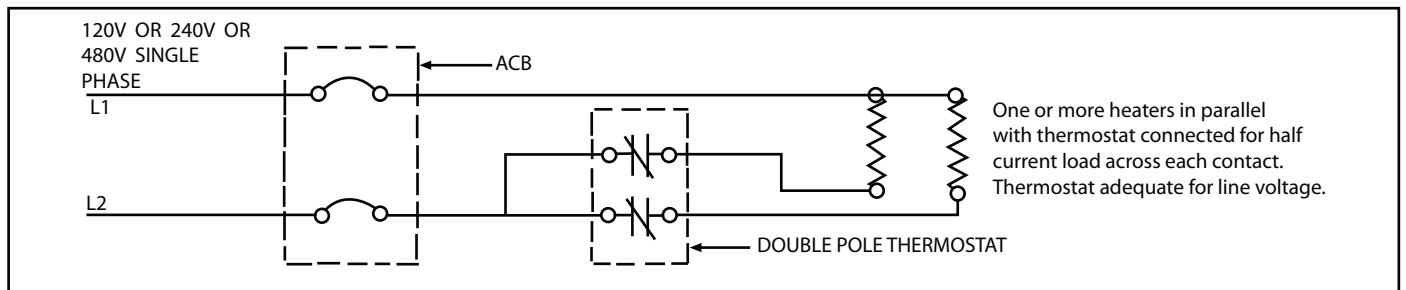
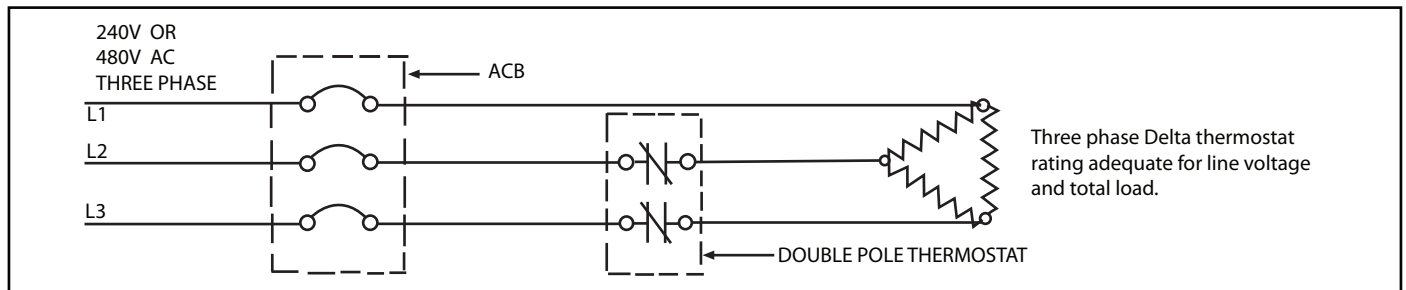
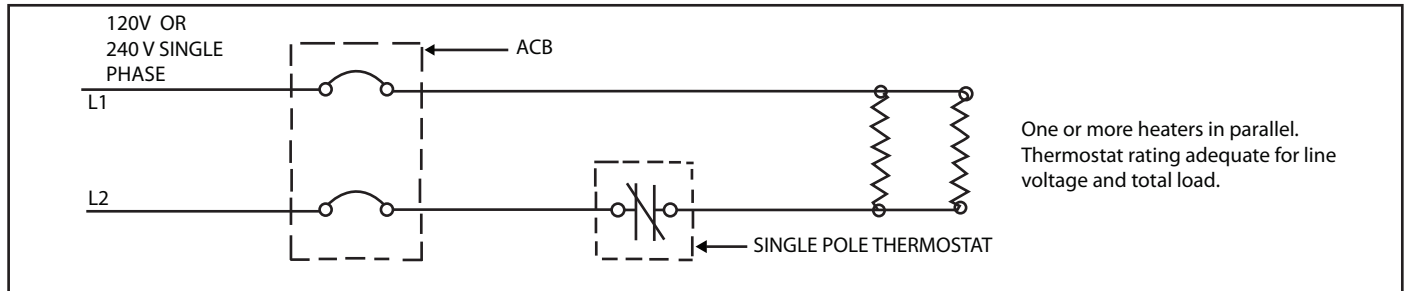
PF = Power Factor

WIRING DIAGRAMS



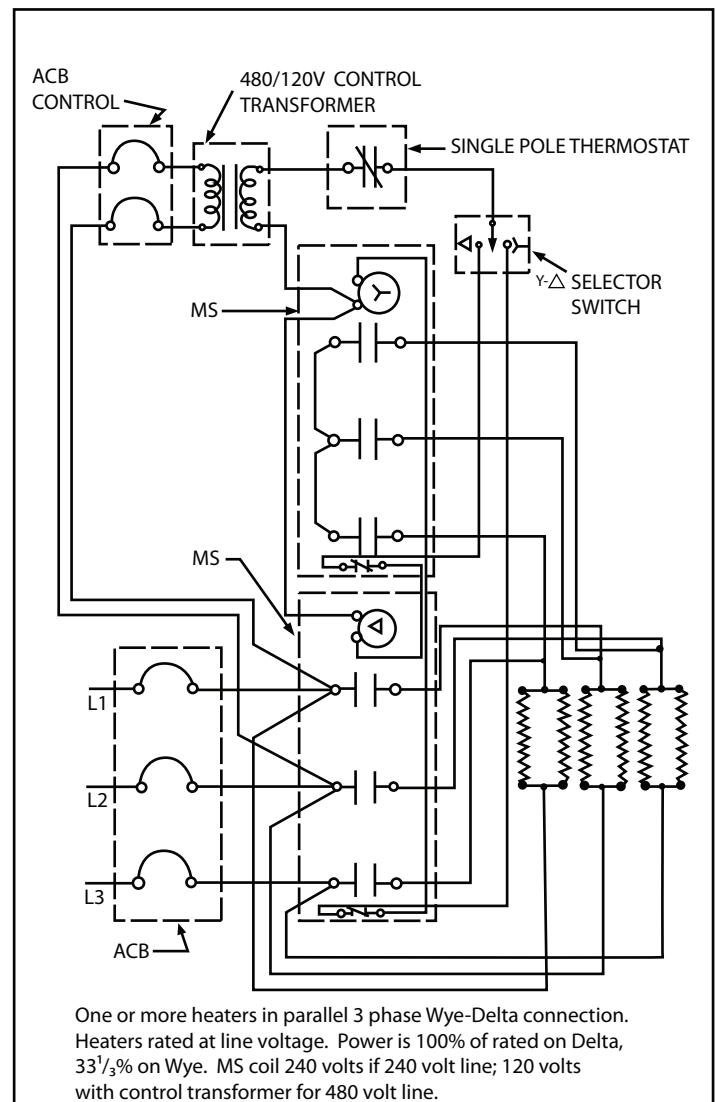
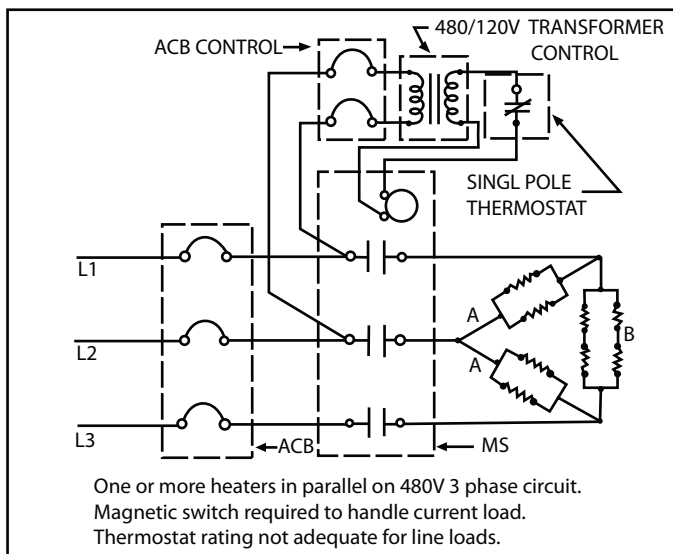
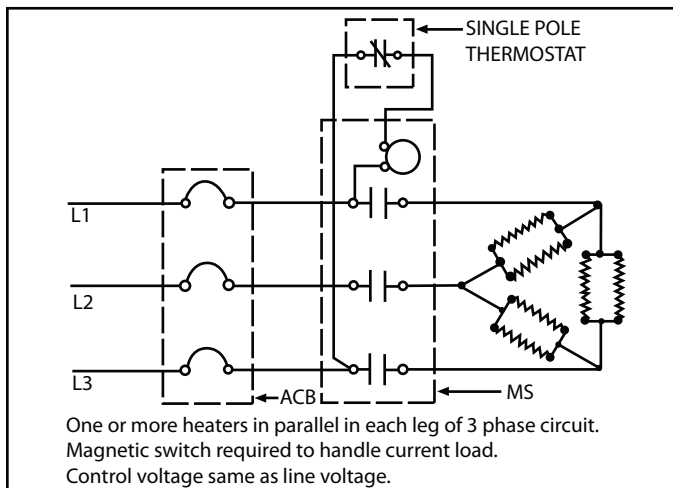
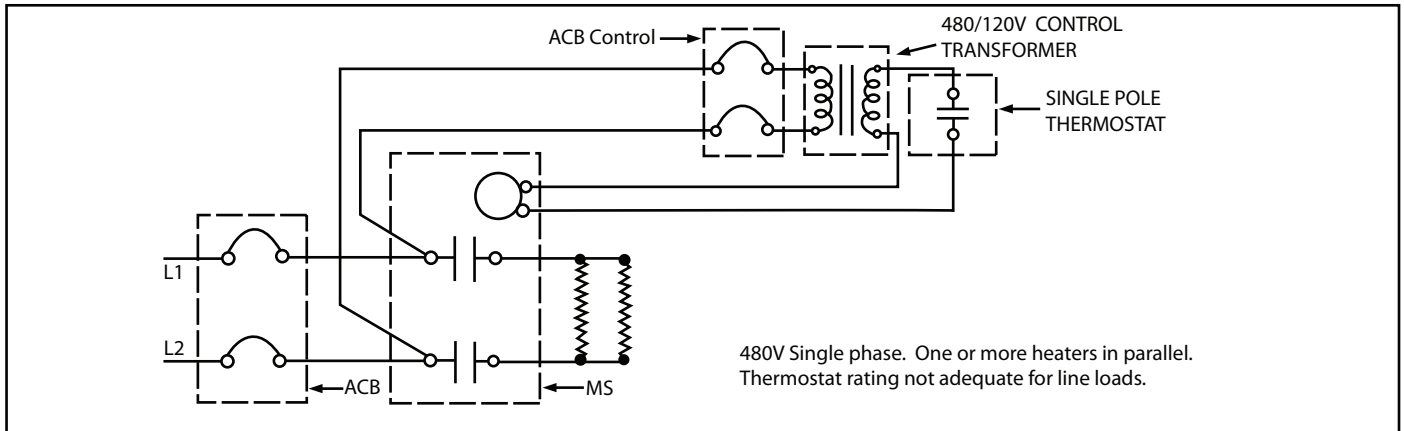


WIRING DIAGRAMS





WIRING DIAGRAMS



ANALYSIS OF SHEATH MATERIALS

1.) STAINLESS STEEL TYPE 304

Cr - 18-20%
Ni - 8-12%
Mn - 2% Max.
Si - 1% Max.
C - .08% Max.

2.) STAINLESS STEEL TYPE 321

Cr - 17-19%
Ni - 8-11%
Ti - 5% x C Min.
C - .08% Max.
Mn - 2% Max.
Si - 1% Max.

3.) STAINLESS STEEL TYPE 316L

Cr - 16-18%
Ni - 10-14%
Mo 2-3%
C - .03% Max.
Mn - 2% Max.
Si - 1% Max.

4.) INCOLOY 800

Ni + Co - 30-34%
Cr - 19-22%
C - .10%
Mn - 1.5%
S - .03%
Si - 1%
Fe - Remainder

5.) INCOLOY 840

Ni - 18-22%
Cr - 18-22%
Mn - 1%
Cu - .075% Max.
Si - 1.0% Max.
C - .08% Max.
S - .015%
Fe - Remainder

6.) COPPER-ALLOY #122

Cu. 99.9% Min.
P - .015-.040%
Ag. - Counted as Cu

MANUFACTURING LIMITS

WATTAGE TOLERANCE

In the manufacture of electric tubular heaters, wattage variation will result. This variation on most standard heaters is up to plus five percent (5%) and down to minus ten percent (-10%) of the listed wattage. Closer tolerances can be held but this requires special care and added cost.

DIMENSIONAL TOLERANCES

Always specify the largest acceptable tolerance permissible on element drawings. If tolerances are more rigid than necessary, it may require special tooling to maintain these tolerances which in turn raises costs. Be sure to specify all critical dimensions which will effect elements in their application.

RESISTANCE LIMITS

There are limits in wire size that can be used in the manufacture of tubular elements. Listed below are the minimum and maximum cold ohms per inch of heated length verses diameter. If in doubt as to whether the heater can be made you may use the following formula to check design.

$$\frac{\text{Hot Ohms minus 4\%}}{\text{FINISHED HEATED LENGTH}} = \text{COLD OHMS PER INCH (APPROXIMATE)}$$

RESISTANCE LIMIT CHART		
DIAMETER	COLD OHMS PER INCH OF HEATED LENGTH	
	MINIMUM	MAXIMUM
.260	.105	12.50
.315	.080	16.50
.430	.040	16.50

Consult Durex Industries for heater designs which do not fall within these limits for further information.



FAHRENHEIT CENTIGRADE TEMPERATURE CONVERSIONS

Temperature Conversion Formula: Fahrenheit = 9/5 Celsius + 32 and Celsius = 5/9 (Fahrenheit - 32)

0° to 99°						100° to 990°						1000° to 1990°						2000° to 3000°						
°F	Temp.	°C	°F	Temp.	°C	°F	Temp.	°C	°F	Temp.	°C	°F	Temp.	°C	°F	Temp.	°C	°F	Temp.	°C	°F	Temp.	°C	
32	0	-17.8	122	50	10	212	100	38	1094	590	310	1832	1000	538	2732	1500	816	3632	2000	1093	4532	2500	1371	
33.8	1	-17.2	123.8	51	10.6	230	110	43	1112	600	316	1850	1010	543	2750	1510	821	3650	2010	1099	4550	2510	1377	
35.6	2	-16.7	125.6	52	11.1	248	120	49	1130	610	321	1868	1020	549	2768	1520	827	3668	2020	1104	4568	2520	1382	
37.4	3	-16.1	127.4	53	11.7	266	130	54	1148	620	327	1886	1030	554	2786	1530	832	3686	2030	1110	4586	2530	1388	
39.2	4	-15.6	129.2	54	12.2	284	140	60	1166	630	332	1904	1040	560	2804	1540	838	3704	2040	1116	4604	2540	1393	
41	5	-15	131	55	12.8	302	150	66	1184	640	338	1922	1050	566	2822	1550	843	3722	2050	1121	4622	2550	1399	
42.8	6	-14.4	132.8	56	13.3	320	160	71	1202	650	343	1940	1060	571	2840	1560	849	3740	2060	1127	4640	2560	1404	
44.6	7	-13.9	134.6	57	13.9	338	170	77	1220	660	349	1958	1070	577	2858	1570	854	3758	2070	1132	4658	2570	1410	
46.4	8	-13.3	136.4	58	14.4	356	180	82	1238	670	354	1976	1080	582	2876	1580	860	3776	2080	1138	4676	2580	1416	
48.2	9	-12.8	138.2	59	15	374	190	88	1256	680	360	1944	1090	588	2894	1590	866	3794	2090	1143	4694	2590	1421	
50	10	-12.2	140	60	15.6	392	200	93	1274	690	366	2012	1100	593	2912	1600	871	3812	2100	1149	4712	2600	1427	
51.8	11	-11.7	141.8	61	16.1	410	210	99	1292	700	371	2030	1110	599	2930	1610	877	3830	2110	1154	4730	2610	1432	
53.6	12	-11.1	143.6	62	16.7	413	212	100	1310	710	377	2048	1120	604	2948	1620	882	3848	2120	1160	4748	2620	1438	
55.4	13	-10.6	145.4	63	17.2	428	220	104	1328	720	382	2066	1130	610	2966	1630	888	3866	2130	1166	4766	2630	1443	
57.2	14	-10	147.2	64	17.8	446	230	110	1346	730	388	2084	1140	616	2984	1640	893	3884	2140	1171	4784	2640	1449	
59	15	-9.44	149	65	18.3	464	240	116	1364	740	393	2102	1150	621	3002	1650	899	3902	2150	1177	4802	2650	1454	
60.8	16	-8.89	150.8	66	18.9	482	250	121	1382	750	399	2120	1160	627	3020	1660	904	3920	2160	1182	4820	2660	1460	
62.6	17	-8.33	152.6	67	19.4	500	260	127	1400	760	404	2138	1170	632	3038	1670	910	3938	2170	1188	4838	2670	1466	
64.4	18	-7.78	154.4	68	20	518	270	132	1418	770	410	2156	1180	638	3056	1680	916	3956	2180	1193	4856	2680	1471	
66.2	19	-7.22	156.2	69	20.5	536	280	138	1436	780	416	2174	1190	643	3074	1690	921	3974	2190	1199	4874	2690	1477	
68	20	-6.67	158	70	21.1	554	290	143	1454	790	421	2192	1200	649	3082	1700	927	3992	2200	1204	4892	2700	1482	
69.8	21	-6.11	159.8	71	21.7	572	300	149	1472	800	427	2210	1210	654	3110	1710	932	4010	2210	1210	4910	2710	1488	
71.6	22	-5.56	161.6	72	22.2	590	310	154	1490	810	432	2228	1220	660	3128	1720	938	4028	2220	1216	4928	2720	1493	
73.4	23	-5	163.4	73	22.8	608	320	160	1508	820	438	2246	1230	666	3146	1730	943	4046	2230	1221	4946	2730	1499	
75.2	24	-4.44	165.2	74	23.3	626	330	166	1526	830	443	2264	1240	671	3164	1740	949	4064	2240	1227	4964	2740	1504	
77	25	-3.89	167	75	23.9	644	340	171	1544	840	449	2282	1250	677	3182	1750	954	4082	2250	1232	4982	2750	1510	
78.8	26	-3.33	168.8	76	24.4	662	350	177	1562	850	454	2300	1260	682	3200	1760	960	4100	2260	1238	5000	2760	1516	
80.6	27	-2.78	170.6	77	25	680	360	182	1580	860	460	2318	1270	688	3218	1770	966	4118	2270	1243	5018	2770	1521	
82.4	28	-2.22	172.4	78	25.6	698	370	188	1598	870	466	2336	1280	693	3236	1780	971	4136	2280	1249	5036	2780	1527	
84.2	29	-1.67	174.2	79	26.1	716	380	193	1616	880	471	2354	1290	699	3254	1790	977	4154	2290	1254	5054	2790	1532	
86	30	-1.11	176	80	26.7	734	390	199	1634	890	477	2372	1300	704	3272	1800	982	4172	2300	1260	5072	2800	1538	
87.8	31	-0.56	177.8	81	27.2	752	400	204	1652	900	482	2390	1310	710	3290	1810	988	4190	2310	1266	5090	2810	1543	
89.6	32	0	179.6	82	27.8	770	410	210	1670	910	488	2408	1320	716	3308	1820	993	4208	2320	1271	5108	2820	1549	
91.4	33	0.56	181.4	83	28.3	788	420	215	1688	920	493	2426	1330	721	3326	1830	999	4226	2330	1277	5126	2830	1554	
93.2	34	1.11	183.2	84	28.9	806	430	221	1706	930	499	2444	1340	727	3344	1840	1004	4244	2340	1282	5144	2840	1560	
95	35	1.67	185	85	29.4	824	440	227	1724	940	504	2462	1350	732	3362	1850	1010	4262	2350	1288	5162	2850	1566	
96.8	36	2.22	186.8	86	30	842	450	232	1742	950	510	2480	1360	738	3380	1860	1016	4280	2360	1293	5180	2860	1571	
98.6	37	2.78	188.6	87	30.6	860	460	238	1760	960	516	2498	1370	743	3398	1870	1021	4298	2370	1299	5198	2870	1577	
100.4	38	3.33	190.4	88	31.1	878	470	243	1778	970	521	2516	1380	749	3416	1880	1027	4316	2380	1304	5216	2880	1582	
102.2	39	3.89	192.2	89	31.7	896	480	249	1796	980	527	2534	1390	754	3434	1890	1032	4334	2390	1310	5234	2890	1588	
104	40	4.44	194	90	32.2	914	490	254	1814	990	532	2552	1400	760	3452	1900	1038	4352	2400	1316	5252	2900	1593	
105.8	41	5	195.8	91	32.8	932	500	260				2570	1410	766	3470	1910	1043	4370	2410	1321	5270	2910	1599	
107.6	42	5.56	197.6	92	33.3	950	510	266				2588	1420	771	3488	1920	1049	4388	2420	1327	5288	2920	1604	
109.4	43	6.11	199.4	93	33.9	968	520	271				2606	1430	777	3506	1930	1054	4406	2430	1332	5306	2930	1610	
111.2	44	6.67	201.2	94	34.4	986	530	277				2624	1440	782	3524	1940	1060	4424	2440	1338	5324	2940	1616	
113	45	7.22	203	95	35	1004	540	282				2642	1450	788	3542	1950	1066	4442	2450	1343	5342	2950	1621	
114.8	46	7.78	204.8	96	35.6	1022	550	288				2660	1460	793	3560	1960	1071	4460	2460	1349	5360	2960	1627	
116.6	47	8.33	206.6	97	36.1	1040	560	293				2678	1470	799	3578	1970	1077	4478	2470	1354	5378	2970	1632	
118.4	48	8.89	208.4	98	36.7	1058	570	299				2696	1480	804	3596	1980	1082	4496	2480	1360	5396	2980	1638	
120.2	49	9.44	210.2	99	37.2	1075	580	304				2714	1490	810	3614	1990	1088	4514	2490	1366	5414	2990	1643	
																						5432	3000	1649



NOTES
