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# 5

section

## Coil & Cable Heaters





## Mightyband™ Coil Heaters



### Design Features

- \* *Temperatures up to 1800°F (982°C)*
- \* *Precise temperature control*
- \* *Choice of lead orientation*
- \* *Built-in type J or K Thermocouple*
- \* *Round, square and rectangular cable*
- \* *Rugged, durable construction*
- \* *Unheated straight section*
- \* *Fast response time*
- \* *Choice of lead protection*
- \* *Longer heater life*
- \* *Higher watt densities*
- \* *Made to customer specifications*

### Applications

Tempco offers from stock a large selection of standard Mightyband coil heaters for plastic injection runnerless molding bushings and for internally heated injection machine nozzles. The inside diameter of a coiled heater is wound undersized for a screw-on fit. Therefore, hold-down straps are not usually required.

### Construction Characteristics

Tempco's dedication to quality and product improvement has led us to the development of a second generation of Mightyband heaters.

Manufactured for trouble-free performance in operations involving heating of cylindrical-shaped surfaces where precise temperature control is essential. Especially adapted as an alternate heat source for demanding and high temperature applications where other types of heaters have failed.

The design and manufacturing concept incorporates a built-in thermocouple, with a grounded junction terminating at the end of the cable opposite to the lead end. In some heaters, the thermocouple junction can be terminated anywhere within the coil section. Consult Tempco for the availability of this option on your specific heater.

The built-in thermocouple and the overall low mass construction provide quick response for positive temperature control. Incorporating the thermocouple into the heater construction eliminates the need for separate thermocouples, which have proven to be expensive, fragile and impractical.

Tempco Mightyband heaters have opened new frontiers and revolutionized the plastic injection runnerless molding industry since their introduction by Tempco in 1977. They provided the manufacturers of this type of equipment with a new and more effective heating element concept, thus allowing them to design and manufacture new, improved, and more efficient runnerless molding systems, with the capabilities required

to meet the ever-increasing demand for processing engineering resins and high production output requirements of today's industrial and consumer markets.

One specific way to improve the Mightyband heater design is to use a square or rectangular mineral insulated cable, which has a flat surface contact, allowing better heat conduction and a faster start-up time.

A  
REVOLUTIONARY  
CONCEPT  
IN  
HEATER  
DESIGN

Standard Type J thermocouple with 304 stainless steel heater sheath is recommended for temperatures up to 1500°F (815°C). An optional Type K thermocouple with Inconel® 600 heater sheath for temperatures up to 1800°F (982°C) is available upon request. In some applications, the built-in thermocouple may not be required. In this case, it can be omitted from the heater cable.

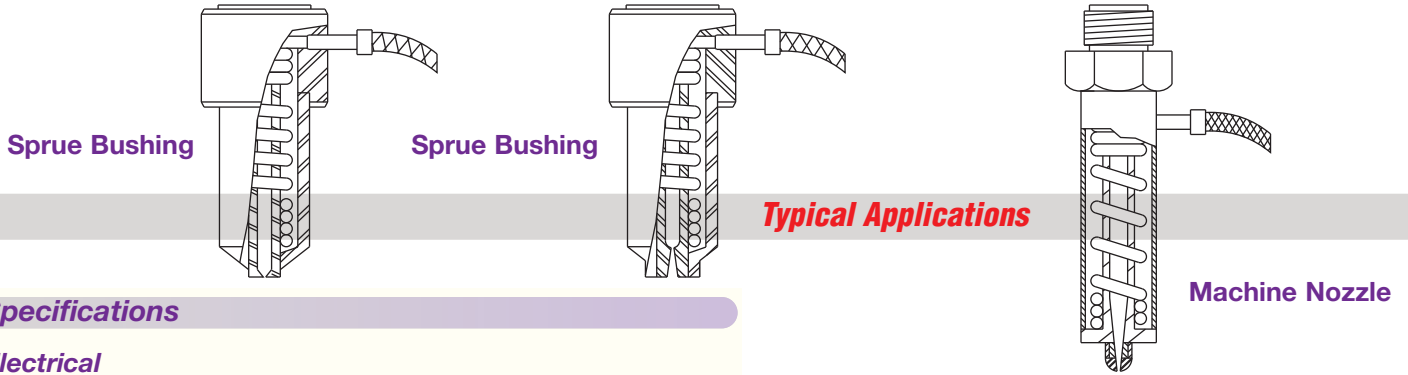
The heating source for the Mightyband heater is a resistance wire in straight form or wound into a miniature helical coil. Selecting the best-suited resistance wire configuration is predetermined by an engineering formula applied to the specific heater design.

On Mightyband heaters where wire wound resistance coils are used, the tail end of the heater cable is usually unheated. Optional unheated or cooler tail sections are available on straight resistance wire heater designs. Consult Tempco with your specific requirements.

The swaging and drawing process involved in manufacturing the heater cable for Mightyband heaters compacts the ceramic insulators that house the heating element and thermocouple wire into a solid mass, producing a rugged and durable heater cable, providing excellent thermal conductivity, dielectric strength and quick thermocouple response.



### Mightyband™ Coil Heater Specifications



### Specifications

#### Electrical

- Resistance Tolerance: ..... ±10%
  - Wattage Tolerance: ..... ±10%
  - Maximum Amperage: ..... 20 Amps
  - Standard Voltage: ..... 120 or 240 Volts
- Higher or lower voltages applicable for specific heater designs; consult Tempco with your requirements.*

#### Dimensional

- Standard square cable: ..... 0.125", 0.134" square
- Standard rectangular cable: ..... 0.110" × 0.160"
- Standard round cable diameters: ..... 0.115", 0.120", 0.125"  
0.132", 0.153", 0.163"  
*Others available upon request.*
- Cable diameter tolerance: ..... ±0.005
- Standard potting adapter: ..... 5/16" 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. Tolerance: ..... 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"
- Standard Sheath Material: ..... 304 stainless steel  
*For temperatures up to 1500°F (815°C)*
- Optional Sheath Material: ..... Inconel® 600  
*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

### Typical Configurations



Close Wound Coil



Distributed Wattage

By specifically arranging a coiling pattern on the heater cable, heat distribution can be concentrated where it is needed. Useful to compensate for heat losses along the edges of the part being heated. Specify concentration.



Clamping Straps

Mightybands normally do not require clamping straps as the inside diameter of the coil is wound undersize for a screw fit. At times because of differences in the expansion and contraction in materials a clamping strap may be required to ensure circumferential clamping forces. Clamping straps also provide additional protection of the heater coils from accidental damage. If optional clamping strap is required, specify.



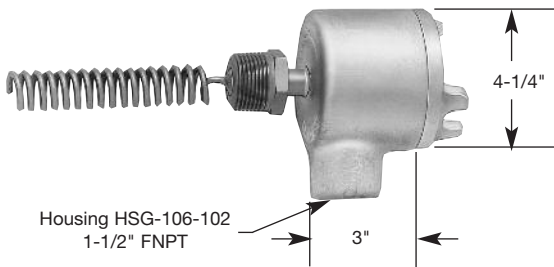
### Special Coil Heater Configurations

#### Star Wound Coil



Star wound formations are usually inserted into pipes or ducts and are used to heat moving air or liquids. The offset coils create a turbulent flow. This allows the flowing material to have better contact with the heater surface, resulting in more efficient heat transfer.

#### Explosion or Moisture Resistant Box



Mightyband coil heaters can be used for immersion heating and/or in-line heating of liquids, gases or air. The built-in thermocouple provides a self-contained heating unit, eliminating the need for separate thermowells, and is available with standard NPT or special fittings. The outside diameter (O.D.) of the coil must be smaller than the fitting being used for proper fit to the mating part. The wiring can be protected from hazardous environments by attaching explosion or moisture-proof boxes. Consult Tempco with your requirements.

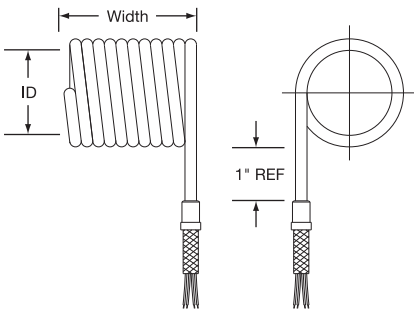
#### NPT Pipe Fittings



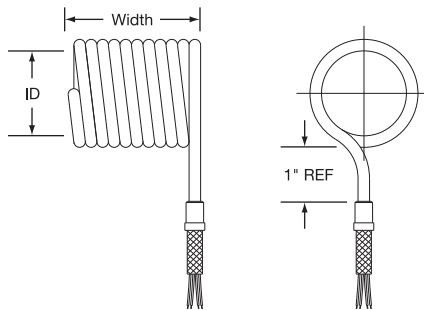
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### Lead Orientations

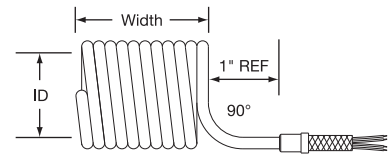
#### LO1 Standard



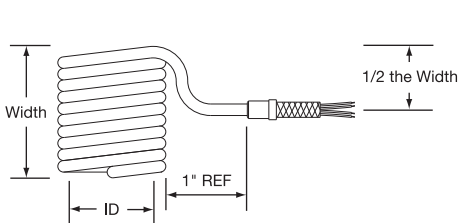
#### LO2



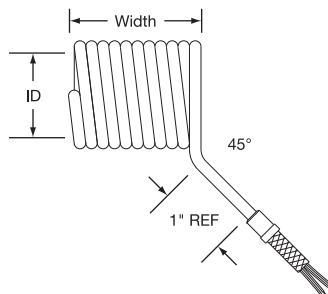
#### LO3



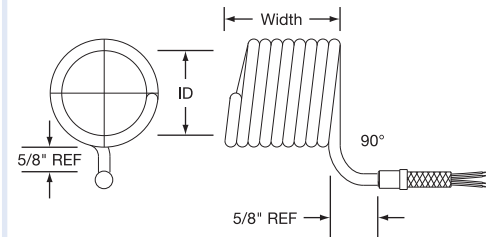
#### LO4



#### LO5



#### LO6



**Note:** Lead orientations can be custom formed. Consult Tempco with your requirements. We welcome your inquiries.



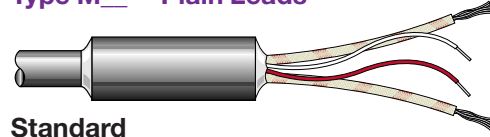




### Potting Adapter Lead Terminations

- The heating element wire to lead wire transition is done within the potting adapter. Potting adapter sizes are 5/16" O.D. × 1-1/2" long for heater cable diameters 0.188" and smaller and 1/2" × 1-1/2" long for diameters above 0.188". Other diameters and lengths are available, depending on design parameters.
- When the 1/2" × 1-1/2" long potting adapter is used for high temperature applications, a special heat sink collar is also used to help keep the transition from overheating.
- All transitions use 1150°F (621°C) braze joint between the heating element wire and the flexible lead wire.
- Normally the lead wire construction is a fiberglass braided insulation rated to 482°F (250°C). For high temperature applications an MGT (mica, fiberglass, Teflon® impregnation) insulation rated to 842°F (450°C) is used. All thermocouple leads use a fiberglass insulation rated to 900°F (482°C). Lead wires are selected to meet the amperage and temperature requirements of each specific heater.

#### Type M\_\_ – Plain Leads



##### Standard

**M1** — High temperature cement potting with TGGT (Teflon® tape, fiberglass, Teflon® treated fiberglass overbraid) insulated lead wire for 482°F (250°C) and silicone sealed is standard.

##### Optional

**M2** — High temperature epoxy potting rated 450°F (232°C) for a better moisture seal.

##### Optional

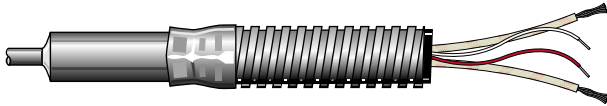
**M3** — High temperature cement potting with MGT (mica tape, Teflon® treated fiberglass overbraid) insulated lead wire for 842°F (450°C) and silicone sealed.



**Note:** Temperature at potting adapter should not exceed the specified limits.

### Lead Wire Abrasion Protection Terminations

#### Type A\_\_ – Stainless Steel Armor Cable



**Type A1** — Rated to 482°F (250°C)

**Type A2** — Rated to 450°F (232°C)

**Type A3** — Rated to 842°F (450°C)

Flexible SS armor cable protects the leads against abrasion and contamination. Special plugs can be attached to heater leads and thermocouple leads.

#### Type C\_\_ – Galvanized Armor Cable



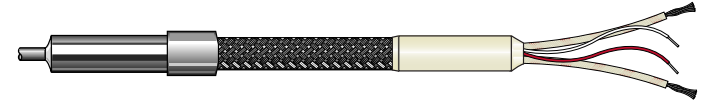
**Type C1** — Rated to 482°F (250°C)

**Type C2** — Rated to 450°F (232°C)

**Type C3** — Rated to 842°F (450°C)

Flexible galvanized armor cable protects the leads against abrasion and contamination. Special plugs can be attached to heater leads and thermocouple leads.

#### Type B\_\_ – Stainless Steel Overbraid



**Type B1** — Rated to 482°F (250°C)

**Type B2** — Rated to 450°F (232°C)

**Type B3** — Rated to 842°F (450°C)

SS overbraid protects the leads against abrasion and allows more aggressive bending, which is not possible with armor cable. Special plugs can be attached to heater and thermocouple leads.

#### Type S\_\_ – Fiberglass Sleeve



**Type S1** — Rated to 482°F (250°C)

**Type S2** — Rated to 450°F (232°C)

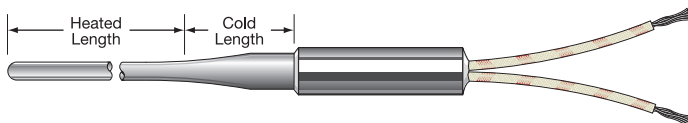
**Type S3** — Rated to 842°F (450°C)

Fiberglass sleeve protects the leads against abrasion and allows more flexibility of lead wires. Special plugs can be attached to heater and thermocouple leads.

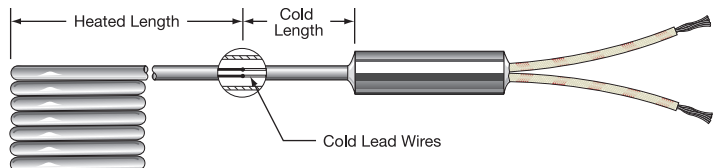
### Optional Heater Cable Cold End

The availability of Tempco-Pak heaters with optional cold heater cable end depends on the electrical ratings and materials used for each heater design. Consult Tempco for the availability of these options.

#### Type ND— Neck Down



#### Type NW— Built-in Cold Wire





## Mightyband™ Coil Heaters

### Mightyband™ Coil Heaters

Heater shown with Lead Protection Type B and Lead Orientation LO1.



### Standard (Non-Stock) Round Cable Heaters

Standard Cable Heaters have 304 Stainless Steel Sheath

Inside Diameter		Outside Diameter		Width		Watts	Volts	Distributed Wattage	Close Wound	Lead Protection	Lead Orientation	Part Number
in	mm	in	mm	in	mm							
½	12.7	0.808	20.5	2	50.8	340	240	yes		C1	LO2	MHC00001
½	12.7	0.808	20.5	2½	63.5	340	240	yes		C1	LO2	MHC00002
½	12.7	0.808	20.5	3	76.2	340	240	yes		C1	LO2	MHC00003
½	12.7	0.808	20.5	3½	88.9	340	240	yes		C1	LO2	MHC00004
½	12.7	0.808	20.5	3	76.2	380	240	yes		C1	LO2	MHC00005
½	12.7	0.808	20.5	3½	88.9	380	240	yes		C1	LO2	MHC00006
½	12.7	0.730	18.5	2½	63.5	450	240		yes	C1	LO1	MHC00007
½	12.7	0.764	19.4	4½	114.3	400	240	yes		C1	LO2	MHC00008
½	12.7	0.750	19.1	5½	139.7	400	240	yes		C1	LO2	MHC00009
½	12.7	0.750	19.1	6½	165.1	400	240	yes		C1	LO2	MHC00010
½	12.7	0.750	19.1	4¾	117.5	300	240		yes	C1	LO1	MHC00011
½	12.7	0.712	18.1	2	50.8	340	120		yes	C1	LO2	MHC00012
½	12.7	0.764	19.4	2½	63.5	340	120	yes		C1	LO2	MHC00013
½	12.7	0.764	19.4	3	76.2	380	120	yes		C1	LO2	MHC00014
½	12.7	0.764	19.4	3½	88.9	380	120	yes		C1	LO2	MHC00015
½	12.7	0.744	18.9	4½	114.3	400	120	yes		C1	LO2	MHC00016
½	12.7	0.744	18.9	5½	139.7	400	120	yes		C1	LO2	MHC00017
½	12.7	0.744	18.9	6½	165.1	400	120	yes		C1	LO2	MHC00018
½	12.7	0.750	19.1	4¾	117.5	300	120		yes	C1	LO1	MHC00019
❖ ⅜	15.9	0.931	23.6	2	50.8	300	240	yes		C1	LO2	MHC00020
❖ ⅜	15.9	0.931	23.6	2½	63.5	325	240	yes		C1	LO2	MHC00021
⅜	15.9	0.891	22.6	2	50.8	330	120		yes	B1	LO2	MHC00022
⅜	15.9	0.875	22.2	2	50.8	330	240		yes	B1	LO2	MHC00023
⅜	15.9	0.875	22.2	2½	63.5	330	240	yes		B1	LO2	MHC00024
⅜	15.9	0.875	22.2	3	76.2	330	240	yes		B1	LO2	MHC00025
⅜	15.9	0.875	22.2	3	76.2	380	240	yes		C1	LO2	MHC00026
⅜	15.9	0.875	22.2	3	76.2	360	240		yes	B1	LO2	MHC00027
⅜	15.9	0.875	22.2	4	101.6	360	240	yes		B1	LO2	MHC00028
⅜	15.9	0.875	22.2	4	101.6	500	240		yes	B1	LO2	MHC00029
⅜	15.9	0.875	22.2	5	127.0	500	240	yes		C1	LO2	MHC00030
❖ ⅜	15.9	0.875	22.2	6	152.4	550	240	yes		C1	LO2	MHC00031
¾	19.1	1.056	26.8	1¼	31.8	250	230		yes	M†	LO1	MHC00032
¾	19.1	1.056	26.8	1¼	31.8	125	230		yes	M†	LO1	MHC00033
¾	19.1	1.056	26.8	1¼	31.8	400	120		yes	B1	LO1	MHC00034
¾	19.1	1.000	25.4	2	50.8	365	120		yes	B1	LO1	MHC00035
¾	19.1	1.056	26.8	2	50.8	135	240		yes	B1	LO1	MHC00036
¾	19.1	1.000	25.4	3	76.2	750	240		yes	B1	LO1	MHC00037
¾	19.1	0.972	24.7	5	127.0	600	240		yes	B1	LO1	MHC00038
¾	19.1	0.992	25.2	8½	215.9	1300	240		yes	B1	LO1	MHC00039
⅞	22.2	1.181	30.0	1	25.4	400	120		yes	B1	LO1	MHC00040
⅞	22.2	1.181	30.0	1¼	31.8	250	240		yes	M†	LO2	MHC00041
❖ ⅞	22.2	1.181	30.0	2	50.8	400	240	yes		C1	LO2	MHC00042
⅞	22.2	1.181	30.0	2¾	66.7	480	240	yes		C1	LO2	MHC00043
⅞	22.2	1.181	30.0	3¾	79.4	480	240	yes		C1	LO2	MHC00044



**Note:** ❖ Denotes the Thermocouple Junction is located between third and fourth coil from the tip end, isolated from the sheath. † Cement Potted Teflon® insulated SPC wire. See page 5-5 for Lead Protection and page 5-4 for Lead Orientation descriptions.





### Mightyband™ Coil Heaters

#### Standard (Non-Stock) Round Cable Heaters

Standard Cable Heaters have 304 Stainless Steel Sheath

Inside Diameter		Outside Diameter		Width		Watts	Volts	Distributed Wattage	Close Wound	Lead Protection	Lead Orientation	Part Number
in	mm	in	mm	in	mm							
7/8	22.2	1.115	28.3	2	50.8	670	120		yes	B3	LO2	MHC00045
7/8	22.2	1.125	28.6	2	50.8	670	240		yes	B1	LO2	MHC00046
7/8	22.2	1.125	28.6	2½	63.5	670	240	yes		B1	LO2	MHC00047
7/8	22.2	1.125	28.6	3⅝	79.4	670	240	yes		B1	LO2	MHC00048
❖ 7/8	22.2	1.181	30.0	2½	63.5	450	240	yes		C1	LO2	MHC00049
7/8	22.2	1.181	30.0	3⅝	92.1	550	240	yes		C1	LO2	MHC00050
7/8	22.2	1.181	30.0	4⅞	109.5	550	240	yes		C1	LO2	MHC00051
7/8	22.2	1.181	30.0	5⅞	134.9	650	240	yes		C1	LO2	MHC00052
7/8	22.2	1.181	30.0	6⅞	160.3	650	240	yes		C1	LO2	MHC00053
7/8	22.2	1.181	30.0	7⅞	185.7	650	240	yes		C1	LO2	MHC00054
❖ 7/8	22.2	1.125	28.6	3	76.2	680	240	yes		C1	LO2	MHC00055
❖ 7/8	22.2	1.125	28.6	3½	88.9	700	240	yes		C1	LO2	MHC00056
7/8	22.2	1.125	28.6	3⅝	92.1	770	240	yes		B1	LO2	MHC00057
7/8	22.2	1.125	28.6	4⅞	109.5	770	240	yes		B1	LO2	MHC00058
7/8	22.2	1.125	28.6	5⅞	134.9	770	240	yes		B1	LO2	MHC00059
7/8	22.2	1.125	28.6	4	101.6	775	240	yes		C1	LO2	MHC00060
7/8	22.2	1.125	28.6	6⅞	160.3	730	240	yes		B1	LO2	MHC00061
7/8	22.2	1.125	28.6	7⅞	185.7	730	240	yes		B1	LO2	MHC00062
❖ 7/8	22.2	1.125	28.6	5	127.0	900	240	yes		C1	LO2	MHC00063
7/8	22.2	1.105	28.1	8⅞	211.1	730	240	yes		C1	LO2	MHC00064
7/8	22.2	1.105	28.1	9⅞	236.5	730	240	yes		C1	LO2	MHC00065
7/8	22.2	1.105	28.1	10⅞	261.9	730	240	yes		C1	LO2	MHC00066
❖ 7/8	22.2	1.125	28.6	6	152.4	1000	240	yes		C1	LO2	MHC00067
7/8	22.2	1.105	28.1	11⅞	287.3	850	240	yes		C1	LO2	MHC00068
7/8	22.2	1.105	28.1	12⅞	312.7	850	240	yes		C1	LO2	MHC00069
7/8	22.2	1.105	28.1	13⅞	338.1	850	240	yes		C1	LO2	MHC00070
7/8	22.2	1.105	28.1	14⅞	363.5	850	240	yes		C1	LO2	MHC00071
7/8	22.2	1.105	28.6	7	177.8	1100	240	yes		C1	LO2	MHC00072
1	25.4	1.250	31.8	1½	38.1	375	120		yes	B1	LO1	MHC00073
1	25.4	1.306	33.2	1½	38.1	375	240		yes	B1	LO1	MHC00074
1	25.4	1.240	31.5	2	50.8	400	120		yes	B1	LO1	MHC00075
1	25.4	1.266	32.2	2½	63.5	450	120		yes	B1	LO1	MHC00076
1	25.4	1.250	31.8	8	203.2	1250	240		yes	B3	LO1	MHC00077
1¼	31.8	1.556	39.5	1	25.4	340	240		yes	B1	LO1	MHC00078
1¼	31.8	1.556	39.5	1¼	31.8	375	120		yes	B1	LO1	MHC00079
1¼	31.8	1.480	37.6	1½	38.1	400	120		yes	B1	LO1	MHC00080
1¼	31.8	1.492	37.9	2	50.8	475	120		yes	B1	LO1	MHC00081
1¼	31.8	1.480	37.6	2½	63.5	750	240		yes	C1	LO2	MHC00082
1¼	31.8	1.514	38.5	4½	114.3	1250	240		yes	C3	LO2	MHC00083
1¼	31.8	1.534	39.0	6½	165.1	1800	240		yes	C3	LO2	MHC00084
1¼	31.8	1.548	39.3	7	177.8	2000	240		yes	B3	LO1	MHC00085
1¼	31.8	1.594	40.5	8½	215.9	2335	240		yes	C3	LO2	MHC00086
1¼	31.8	1.626	41.3	10½	266.7	2500	240		yes	C1	LO2	MHC00087



**Note:** ❖ Denotes the Thermocouple Junction is located between third and fourth coil from the tip end, isolated from the sheath. See page 5-5 for Lead Protection and page 5-4 for Lead Orientation descriptions.

### Ordering Information

See page 5-9

**CONTINUED**



### Mightyband™ Coil Heaters

Continued from previous page...

Heater shown with Lead Protection B and Lead Orientation LO1.



### Standard (Non-Stock) Round Cable Heaters

Standard Cable Heaters have 304 Stainless Steel Sheath

Inside Diameter		Outside Diameter		Width		Watts	Volts	Distributed Wattage	Close Wound	Lead Protection	Lead Orientation	Part Number
in	mm	in	mm	in	mm							
1½	38.1	1.806	45.9	1	25.4	400	120		yes	B1	LO1	MHC00088
		1.730	43.9	1¼	31.8	425	120		yes	B1	LO1	MHC00089
		1.742	44.2	1½	38.1	525	120		yes	B1	LO1	MHC00090
		1.742	44.2	2	50.8	475	120		yes	B1	LO1	MHC00091
		1.752	44.5	2	50.8	475	240		yes	B1	LO1	MHC00092
		1.754	44.6	2	50.8	550	240		yes	B1	LO1	MHC00093
		1.742	44.2	2½	63.5	600	120		yes	B3	LO1	MHC00094
		1.766	44.9	2½	63.5	600	240		yes	B3	LO1	MHC00095
		1.742	44.2	3	76.2	475	120		yes	B1	LO1	MHC00096
		1.732	44.0	3	76.2	875	240		yes	B1	LO2	MHC00097
		1.750	44.5	4¾	104.8	1000	240	yes		C3	LO2	MHC00098
		1.732	44.0	4	101.6	1000	240		yes	B3	LO2	MHC00099
		1.750	44.5	5½	130.2	1000	240	yes		C3	LO2	MHC00100
		1.742	44.2	5	127.0	1200	240		yes	B3	LO1	MHC00101
		1.766	44.9	6¾	155.6	1200	240	yes		B3	LO2	MHC00102
		1.750	44.5	7¾	181.0	1100	240	yes		C1	LO2	MHC00103
		1.806	45.9	6	152.4	675	120		yes	B3	LO1	MHC00104
		1.750	44.5	6	152.4	1200	240		yes	B3	LO2	MHC00105
1.766	44.8	8¾	206.4	1250	240	yes		B3	LO2	MHC00106		
1.796	45.6	9¾	231.8	1400	240	yes		B3	LO2	MHC00107		
1.826	46.4	10¾	257.2	1800	240	yes		B3	LO2	MHC00108		
1¼	44.5	1.982	50.3	1	25.4	475	120		yes	B1	LO1	MHC00109
		2.000	50.8	1½	38.1	625	240		yes	B1	LO1	MHC00110
		2.000	50.8	2	50.8	675	240		yes	B1	LO1	MHC00111
		1.982	50.3	2½	63.5	725	240		yes	B1	LO1	MHC00112
		2.056	52.2	7	177.8	2000	240		yes	B3	LO2	MHC00113
2	50.8	2.250	57.2	1¾	34.9	450	240		yes	B1	LO1	MHC00114
		2.326	59.1	6½	165.1	2400	240		yes	B3	LO1	MHC00115



**Note:** See page 5-5 for Lead Protection and page 5-4 for Lead Orientation descriptions.





### Standard (Non-Stock) Tempco Replacement Coil Heaters for OEM Hot Runner Bushings

Standard Cable Heaters have 304 Stainless Steel Sheath

Inside Diameter in mm	Outside Diameter		Width		Watts	Volts	Distributed Wattage	Close Wound	OEM Part Number	TEMPCO Part Number
	in	mm	in	mm						
½ 12.7	0.808	20.5	3	76.2	380	240	yes		KH-52030	MHC00005
	0.808	20.5	3½	88.9	380	240	yes		KH-52035	MHC00006
	0.764	19.4	4½	114.3	400	240	yes		KH-53045	MHC00008
	0.750	19.1	5½	139.7	400	240	yes		KH-53555	MHC00009
	0.750	19.1	6½	165.1	400	240	yes		KH-53565	MHC00010
	0.764	19.4	2	50.8	340	120		yes	KH-520	MHC00012
	0.764	19.4	2½	63.5	340	120	yes		KH-52025	MHC00013
	0.764	19.4	3	76.2	380	120	yes		KH-52030	MHC00014
	0.764	19.4	3½	88.9	380	120	yes		KH-52035	MHC00015
	0.744	18.9	4½	114.3	400	120	yes		KH-53045	MHC00016
	0.744	18.9	5½	139.7	400	120	yes		KH-53055	MHC00017
	0.744	18.9	6½	165.1	400	120	yes		KH-53065	MHC00018
¾ 22.2	1.181	30.0	2½	66.7	480	240	yes		KH-826	MHC00043
	1.181	30.0	3⅞	28.6	480	240	yes		KH-82630	MHC00044
	1.181	30.0	3¾	92.1	550	240	yes		KH-82636	MHC00050
	1.181	30.0	4⅞	109.5	550	240	yes		KH-82640	MHC00051
	1.181	30.0	5⅞	134.9	650	240	yes		KH-82650	MHC00052
	1.181	30.0	6⅞	160.3	650	240	yes		KH-82660	MHC00053
	1.181	30.0	7⅞	185.7	650	240	yes		KH-82670	MHC00054
	1.105	28.1	8⅞	211.1	730	240	yes		KH-84380	MHC00064
	1.105	28.1	9⅞	236.5	730	240	yes		KH-84390	MHC00065
	1.105	28.1	10⅞	261.9	850	240	yes		KH-84310	MHC00066
	1.105	28.1	11⅞	287.3	850	240	yes		KH-85311	MHC00068
	1.105	28.1	12⅞	312.7	850	240	yes		KH-85312	MHC00069
1.105	28.1	13⅞	338.1	850	240	yes		KH-85313	MHC00070	
1.105	28.1	14⅞	363.5	850	240	yes		KH-85314	MHC00071	
1¼ 31.8	1.480	37.6	2½	63.5	750	240		yes	KH-1225	MHC00082
	1.514	38.5	4½	114.3	1250	240		yes	KH-1245	MHC00083
	1.534	39.0	6½	165.1	1800	240		yes	KH-1265	MHC00084
	1.594	40.5	8½	215.9	2335	240		yes	KH-1285	MHC00086
	1.626	41.3	10½	266.7	2500	240		yes	KH-12105	MHC00087



**Note:** All OEM Replacement Heaters have round cable, Type "C" galvanized armor cable lead wire protection and LO2 lead orientation (see page 5-4).

### Ordering Information

#### Standard Heaters

Order by Part Number for standard heaters listed in Tables on pages 5-6 through 5-9.

#### Custom Engineered/Manufactured Heaters

An electric heater can be very application specific; for sizes, ratings and terminations not listed, **TEMPCO** will design and manufacture a Mightyband heater to meet your requirements. **Standard lead time is 3 weeks.**

**Please Specify** the following:

- Watts
- Volts
- Coil I.D.
- Coil width (length)
- Distributed wattage if required
- Sheath material— 304 stainless steel or Incoloy® 600
- Sheath Diameter if necessary
- Length of internal nickel cold, or if a neck down design, length of cold section. See page 5-5.
- Thermocouple if required— Type J or K
- Thermocouple Junction—Grounded or Ungrounded. If ungrounded, specify location.
- Transition type: M1, M2, M3, A1, A2, A3, B1, B2, B3, C1, C2, C3, S1, S2 or S3. See page 5-5.
- Lead orientation: LO1, LO2, LO3, LO4, LO5, or LO6. See page 5-4.
- Lead length if other than 24"
- Supply a sketch or drawing.

# Coil & Cable Heaters



## Mightyband™ (Square Cable)

### Mightyband™ Coil Heaters with Square/Rectangular MI Cable

TEMPCO offers a square sheathed, mineral insulated, coiled nozzle heater with a built-in-thermocouple. The unique feature of the 1/8" square sheath is a larger sheath contact area as compared to its round sheathed counterpart, allowing for faster start-up cycles. The ANSI Type J standard or optional Type K thermocouple normally has a grounded junction. However, an optional ungrounded junction is available. Heaters can be formed into a compact coiled nozzle heater supplying a full 360° of heat to the distributed wattage coil. The low mass of the heater allows quick response to both heating and cooling.

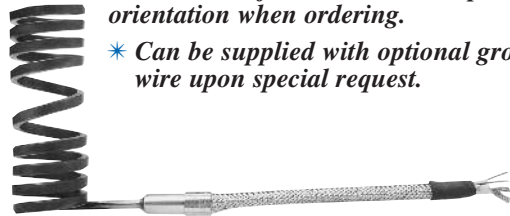


#### Specifications

- Resistance tolerance: ..... ±10%
- Wattage tolerance: ..... ±10%
- Maximum Wattage: ..... 720 watts (for 240 volt heaters)  
300 watts (for 120 volt heaters)
- Maximum operating temperature: ..... 1500°F (816°C)
- Maximum Watt density: ..... 134 watts/in<sup>2</sup> applied to nozzle
- Physical Dimensions: ..... 1/8" square  
(except non-heated tail section, which is 1/8" round)
- Length of non-heated section: ..... 1" to 6" (specify when ordering)
- Potting Adapter: ..... 5/16" O.D. × 1-1/2" long  
Standard Lead Length as specified in table below (if other than standard, specify)

#### Standard Features

- \* Standard lead wire construction is a fiberglass braided insulation with stainless steel overbraid suitable for 482°F (250°C). Optional constructions using Teflon® insulation or armor cable are available on request.
- \* The standard wire to M.I. cable transition area (potting adapter) is temperature rated to 450°F (232°C). High temperature 842°F (450°C) is optional.
- \* The ANSI Type J standard or optional Type K thermocouple junction can be grounded at the tip (the end farthest from transition area) or ungrounded anywhere along the length of the heater.
- \* Heaters can be supplied with optional stainless steel clamping straps, which provide additional circumferential clamping forces and protection of the heater coils from accidental damage.
- \* All Mightyband coil heaters are available with one (1) of six (6) different lead orientations (LO) as shown on Page 5-4. Other custom lead orientations can be manufactured to suit. Specify lead orientation when ordering.
- \* Can be supplied with optional grounding wire upon special request.



### Standard (Non-Stock) 1/8" Square Tempco-Pak Cable Heaters (Non-heated tail section is 1/8" round)

Standard Cable Heaters have 304 Stainless Steel Sheath

Coil I.D.		Closed Coil Width		Stretched Width		Built-In T/C	Voltage	Wattage	Standard Lead Length		Lead Protection	Lead Orientation	Part Number
in	mm	in	mm	in	mm				in	mm			
.500	12.7	2.00	50.8	2.5	63.5	yes	240	450	40	1016	C†	L01	MHC00116
.500	12.7	2.50	63.5	4.6	116.8	yes	240	300	48	1219	A†	L05	MHC00117
.750	19.1	1.25	31.8	—	—	yes	230	125	48	914	M†	L04	MHC00118
.750	19.1	1.25	31.8	—	—	yes	230	250	48	914	M†	L04	MHC00119
.750	19.1	1.25	31.8	1.5	38.1	yes	240	300	48	1219	S2	L05	MHC00120
.750	19.1	0.95	24.1	—	—	yes	240	250	72	1829	M1	L01	MHC00121
.968	24.6	0.95	24.1	—	—	yes	240	250	72	1829	M2	L01	MHC00122
.968	24.6	1.58	40.1	—	—	yes	240	300	72	1829	M2	L01	MHC00123

† Cement Potted Teflon® insulated SPC wire

#### Ordering Information

##### Standard Heaters

Order by Part number for standard heaters listed above for runnerless plastic injection molding, hot sprue bushings and nozzles.

If not otherwise specified, all Mightyband heaters are supplied with close wound coiling pattern, Type L01 lead orientation (see page 5-4), 24" of leads and 20" of stainless steel overbraid with Type J thermocouple. If longer leads are required, please specify.

##### Custom Engineered/Manufactured Heaters

An electric heater can be very application specific; for sizes, ratings and terminations not listed, TEMPCO will design and manufacture a Mightyband heater to meet your requirements. **Standard lead time is 3 weeks.**

**Please Specify** the following:

- Inside Diameter
- Width (Length)
- Specify width as closed or stretched
- Wattage
- Voltage
- Length of non-heated tail section
- Lead length
- Lead Orientation (see page 5-4)
- Lead Transition (see page 5-5)
- Lead protection (see page 5-5)
- Thermocouple Type—if required



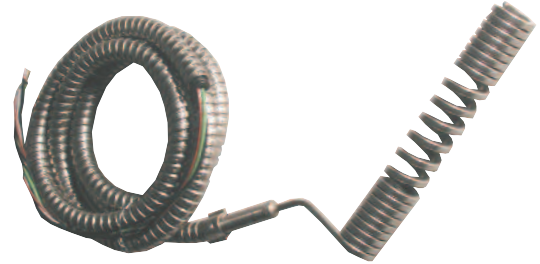


### Tempco Direct Replacement Heaters for OEM Hot Runner Systems Square & Rectangular Cable

#### Design Features

- \* 1/8" square 304 Stainless Steel M.I. cable
- \* Type J ungrounded thermocouple junction in the midsection of the coil heater
- \* 48" of leads and 44" of SS armored cable

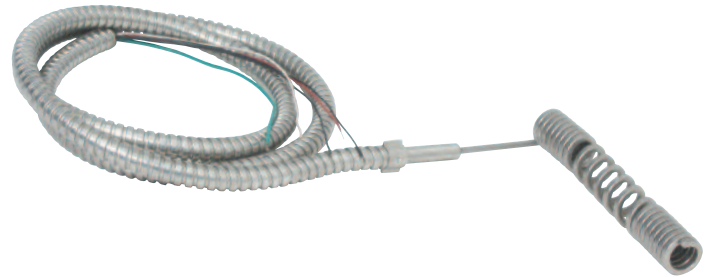
Coil I.D.		Coil Width		Watts	Volts	OEM	TEMPCO
in	mm	in	mm			Part Number	Part Number
.500	12.7	4.625	117.5	300	120	SSTC-31	MHC00124
.500	12.7	4.625	117.5	300	240	SSTC-32	MHC00125
.500	12.7	2.500	63.5	450	240	SSTC-42	MHC00126



#### Design Features

- \* 1/8" square 304 Stainless Steel M.I. cable
- \* Type J ungrounded thermocouple junction in the midsection of the coil heater
- \* 48" of leads and 44" of SS armored cable

Coil I.D.		Coil Width		Watts	Volts	OEM	TEMPCO
in	mm	in	mm			Part Number	Part Number
.500	12.7	4.625	117.5	300	120	SSTC-31-90	MHC00127
.500	12.7	4.625	117.5	300	240	SSTC-32-90	MHC00128
.500	12.7	2.500	63.5	450	240	SSTC-42-90	MHC00129

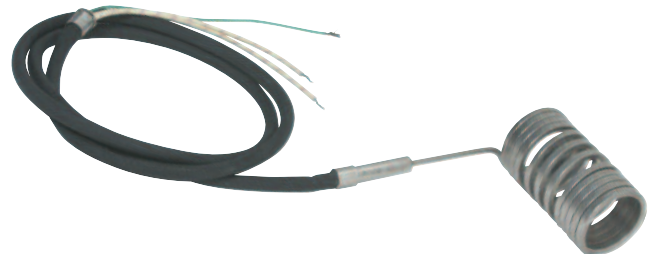


### Gated, Flow-Through Hot Sprue Bushing Heaters

#### Design Features

- \* .110" x .160" rectangular or 1/8" square 304 Stainless Steel M.I. cable
- \* No thermocouple
- \* 42" of leads and 38" of high temperature fiberglass sleeving

Coil I.D.		Coil Width		Watts	Volts	OEM	TEMPCO
in	mm	in	mm			Part Number	Part Number
1.250	31.8	2.625	66.7	800	240	SCH0001	HHC00001
1.250	31.8	1.750	44.5	600	240	SCH0002	HHC00002
.625	15.9	1.000	25.4	225	240	SCH0003	HHC00003
.750	19.1	1.750	44.5	315	240	SCH3142	HHC00004
.750	19.1	2.625	66.7	315	240	SCH3242	HHC00005

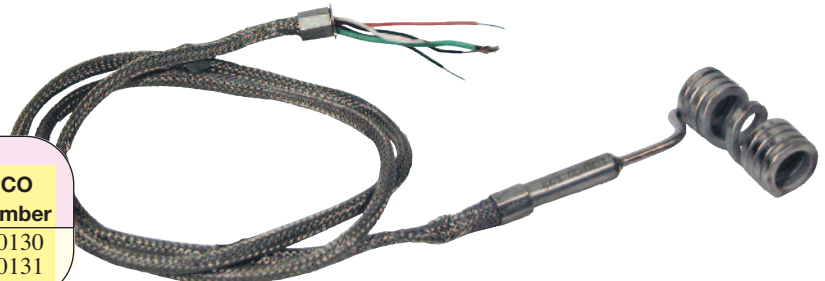


### Heated Nozzle Locator Heaters

#### Design Features

- \* 1/8" square 304 Stainless Steel M.I. cable
- \* Type J ungrounded thermocouple junction at tip of coil heater
- \* 36" of leads and 34" SS wire braid

Coil I.D.		Coil Width		Watts	Volts	OEM	TEMPCO
in	mm	in	mm			Part Number	Part Number
.500	12.7	1.450	36.8	250	240	SSTC-62-90	MHC00130
.500	12.7	1.950	49.5	250	240	SSTC-72-90	MHC00131





### OEM Replacement Heaters for Externally Heated Manifold Systems

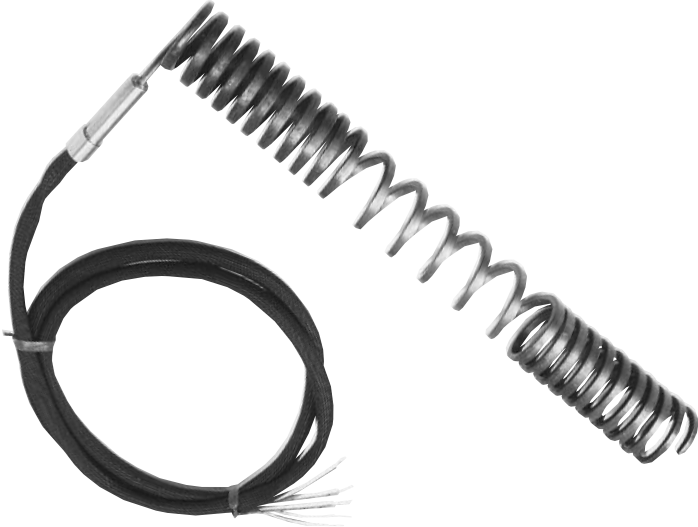
#### Rectangular Cable Heaters



##### Design Features

- \* Systems with .250" diameter flow path nozzle assemblies
- \* Rectangular (0.110" x 0.160") 304 Stainless Steel M.I. cable
- \* Ungrounded Type J thermocouple
- \* 36" of leads and 34" of high temperature fiberglass sleeving

Coil I.D. in mm	Coil Width		Watts	Volts	OEM		TEMPCO	
	in	mm			Part Number	Part Number		
.625 15.9	2.000	50.8	300	240	SCH0081	MHC00132		
	2.500	63.5	350	240	SCH0082	MHC00133		
	3.000	76.2	400	240	SCH0083	MHC00134		
	3.500	88.9	425	240	SCH0084	MHC00135		
	4.000	101.6	500	240	SCH0085	MHC00136		
	5.000	127.0	500	240	SCH0086	MHC00137		
	6.000	152.4	550	240	SCH0087	MHC00138		



##### Design Features

- \* Systems with .375" diameter flow path nozzle assemblies
- \* Rectangular (0.110" x 0.160") 304 Stainless Steel M.I. cable
- \* Ungrounded Type J thermocouple
- \* 36" of leads and 34" of high temperature fiberglass sleeving

Coil I.D. in mm	Coil Width		Watts	Volts	OEM		TEMPCO	
	in	mm			Part Number	Part Number		
.875 22.2	2.125	54.0	400	240	SCH0088	MHC00139		
	2.625	66.7	450	240	SCH0089	MHC00140		
	3.125	79.4	550	240	SCH0090	MHC00141		
	3.625	92.1	700	240	SCH0091	MHC00142		
	4.125	104.8	800	240	SCH0092	MHC00143		
	5.125	130.2	900	240	SCH0093	MHC00144		
	6.125	155.6	1000	240	SCH0094	MHC00145		
	7.125	181.0	1100	240	SCH0095	MHC00146		

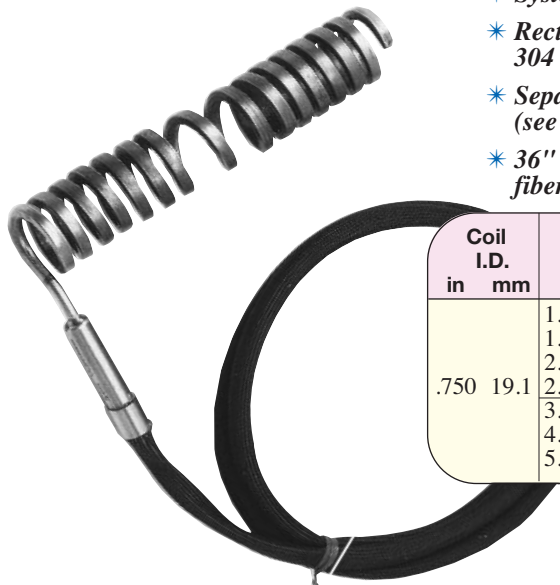
### Tempco Replacement Heaters and Thermocouples for OEM Hot Runner Nozzles

#### Design Features: Heater

- \* Systems with 0.024" nozzle gate diameter
- \* Rectangular (0.110" x 0.160") 304 Stainless Steel M.I. cable
- \* Separate thermocouple required (see table below for part number)
- \* 36" of leads and 34" of high temperature fiberglass sleeving

#### Design Features: Thermocouple

- \* Type J
- \* 1/16" OD, 304 Stainless Steel sheath
- \* See Section 14 page 14-44 for complete thermocouple details



Coil I.D. in mm	Coil Width		Watts	Volts	Heater		Thermocouple	
	in	mm			OEM Part Number	TEMPCO Part Number	OEM Part Number	TEMPCO Part Number
.750 19.1	1.437	36.5	250	240	SCH0060	HHC00006	TCG0060	TCR00017
	1.937	49.2	300	240	SCH0061	HHC00007	TCG0061	TCR00018
	2.437	61.9	350	240	SCH0062	HHC00008	TCG0062	TCR00019
	2.937	74.6	400	240	SCH0063	HHC00009	TCG0063	TCR00020
	3.437	87.3	425	240	SCH0064	HHC00010	TCG0064	TCR00021
	4.437	112.7	500	240	SCH0065	HHC00011	TCG0065	TCR00022
	5.437	138.1	500	240	SCH0066	HHC00012	TCG0066	TCR00023



### Tempco Replacement Heaters for OEM Hot Runner Systems

#### Rectangular Cable Heaters

##### Sprue Bushing Heaters



##### Design Features

- \* 5/8" ID Coil
- \* Rectangular (0.110" x 0.160")  
304 Stainless Steel M.I. cable
- \* 36" of leads and 32" of sleeving

Coil I.D. in mm	Coil Width		Watts	Volts	OEM	TEMPCO
	in	mm			Part Number	Part Number
.625 15.9	2.000	50.8	300	240	SF-620	MHC00267
	2.500	63.5	350	240	SF-625	MHC00268
	3.000	76.2	400	240	SF-630	MHC00269
	3.500	88.9	400	240	SF-635	MHC00270
	4.000	101.6	460	240	SF-640	MHC00271
	5.000	127.0	610	240	SF-650	MHC00273
	6.000	152.4	690	240	SF-660	MHC00274

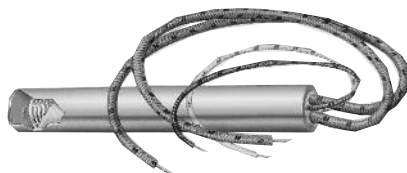
##### Design Features

- \* 7/8" ID Coil
- \* Rectangular (0.110" x 0.160")  
304 Stainless Steel M.I. cable
- \* 48" of leads and 44" of sleeving



Coil I.D. in mm	Coil Width		Watts	Volts	OEM	TEMPCO
	in	mm			Part Number	Part Number
.875 22.2	2.000	50.8	400	240	SF-820	MHC00275
	2.500	63.5	460	240	SF-825	MHC00276
	3.000	76.2	610	240	SF-830	MHC00277
	3.500	88.9	610	240	SF-835	MHC00278
	4.000	101.6	610	240	SF-840	MHC00279
	4.500	114.3	690	240	SF-845	MHC00280
	5.000	127.0	690	240	SF-850	MHC00281
	6.000	152.4	725	240	SF-860	MHC00282
	7.000	177.8	725	240	SF-870	MHC00283

#### Runnerless Mold Cartridge Heaters



OEM Replacement  
Runnerless Molding  
Pennybottom Cartridge Heaters

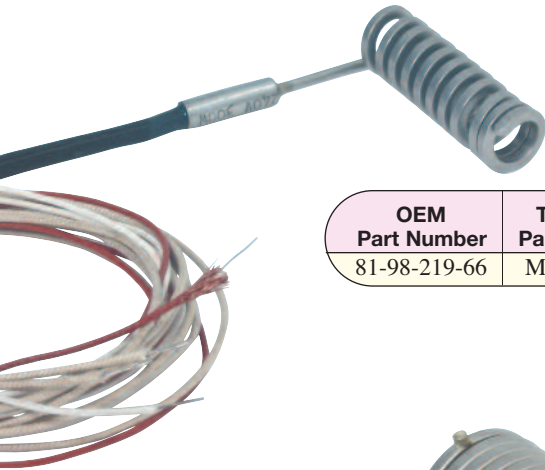
See Section 2 pages 2-24 through 2-26





### Tempco Replacement Heaters for OEM Hot Runner Systems

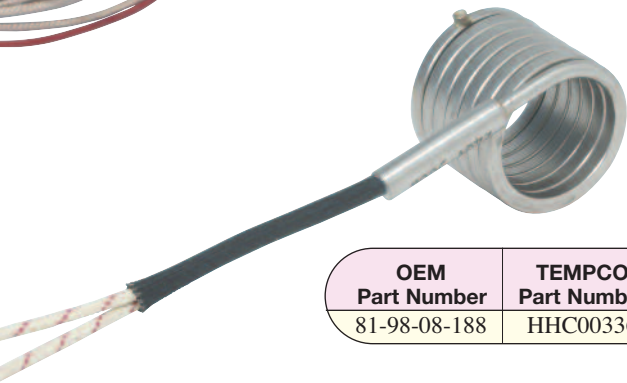
#### Square Cable Heaters



OEM Part Number	TEMPCO Part Number
81-98-219-66	MHC00457

#### Design Features

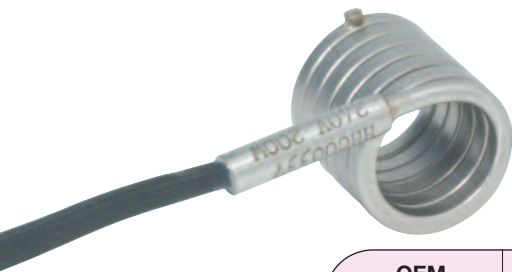
- \* 300 Watts, 240 Volts
- \* .100" square 304 Stainless Steel M.I. cable
- \* 3/8" ID x 2" stretched width
- \* Termination Type S1
- \* Lead Orientation LO1 with 3/4" reference cold length
- \* 48" of leads and 6" fiberglass sleeve
- \* Built-in Type J ungrounded thermocouple junction at tip of the heater
- \* Adapter Size: 1/4" O.D. x 7/8" long



OEM Part Number	TEMPCO Part Number
81-98-08-188	HHC00336

#### Design Features

- \* 300 Watts, 240 Volts
- \* .132" square 304 Stainless Steel M.I. cable
- \* .997" ID x 1.12" nominal closed width
- \* Termination Type S1
- \* Lead Orientation LO1 with zero reference length and 1" cold tail length
- \* 10 feet of leads and 2" fiberglass sleeve
- \* Adapter Size: 1/4" O.D. x 1" long



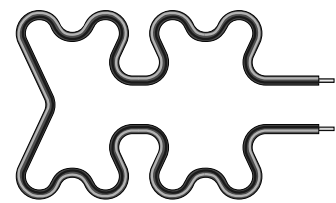
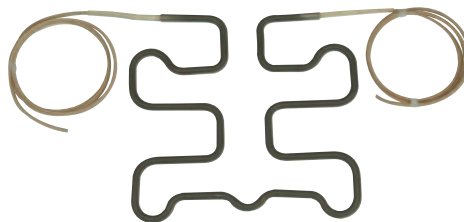
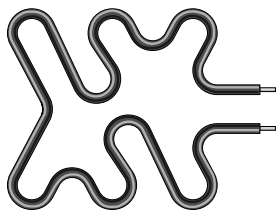
OEM Part Number	TEMPCO Part Number
81-98-06-182	HHC00337

#### Design Features

- \* 200 Watts, 240 Volts
- \* .132" square 304 Stainless Steel M.I. cable
- \* .747" ID x 1" nominal closed width
- \* Termination Type S1
- \* Lead Orientation LO1 with zero reference length and 1" cold tail length
- \* 10 feet of leads and 2" fiberglass sleeve
- \* Adapter Size: 1/4" O.D. x 1" long

### Tubular Hot Runner Mold Heaters

SEE PAGE 10-13 IN THE TUBULAR HEATER SECTION.



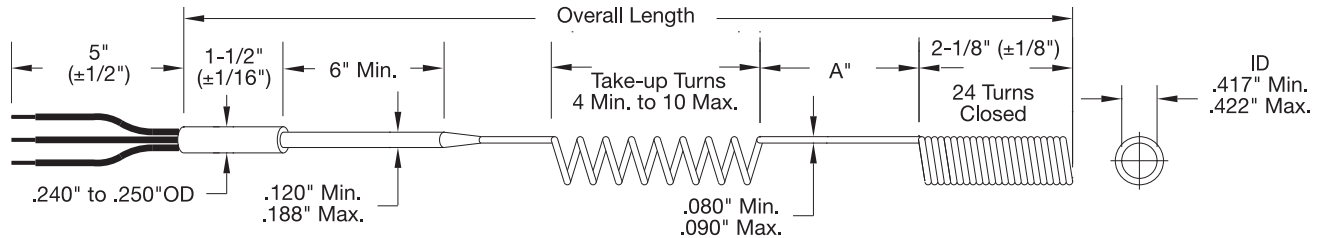


### OEM Replacement Oxygen Analyzer Heaters

#### Oxygen Analyzer Heaters (Westinghouse Probes)

##### Design Features

- \* Inconel® 600 Seamless Nickel Alloy Sheath Material for Process temperatures up to 1400°F (760°C)
- \* Minimum 99.4% purity compacted MgO Insulation Material
- \* 300 Series Stainless Steel Potting Adapter filled with Stycast epoxy for 500°F continuous use
- \* Standard heater lengths are 13", 18", 36" and 72" long. Longer length heaters such as 108" and 144" are also available.



"OA" Length		"A" Length		Watts	Volts	OEM Part Number	TEMPCO Part Number
in	mm	in	mm				
13.0	330	0	0	340	115	263C303HO-6	HHF00009*
18.5	470	4	102	340	115	263C303HO-1	HHF00004
36.5	927	4	102	340	115	263C303HO-2	HHF00005
72.5	1842	4	102	340	115	263C303HO-3	HHF00006

**Lead Wires:** Teflon® insulated 600 Volt 18 ga. Nickel or Silver Plated Copper Wire (Stranded with Black or Brown)

**Grounding Wire:** 18 ga. Nickel or Silver Plated Copper, Stranded with Green or Purple Teflon® insulation/600 Volt Rated

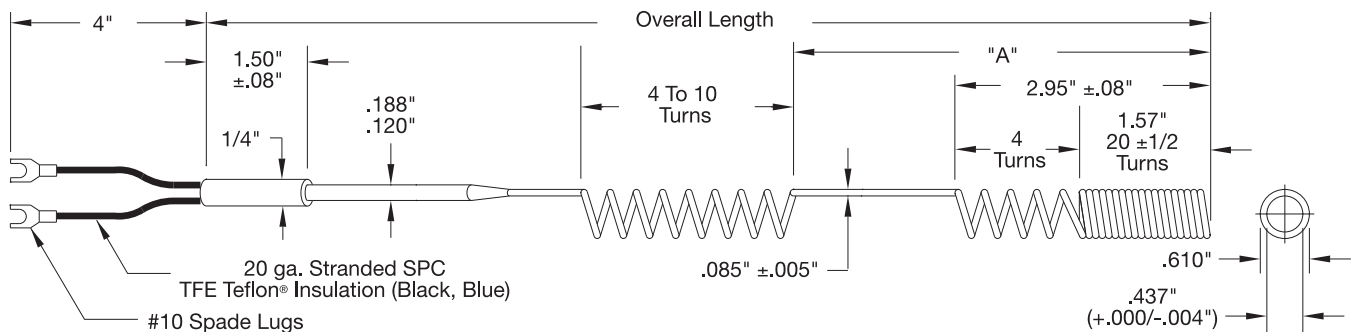


**Note:** \*Part Number HHF00009 does not have a straight length section "A." The .080"/.090" diameter heater cable is coiled to .417"/.422" ID all the way to the neck down and stretched except for the front 24 turns of coils.

#### Oxygen Analyzer Heaters (Enotec Probes)

##### Design Features

- \* Inconel® 600 Seamless Nickel Alloy Sheath Material for Process temperatures up to 1400°F (760°C)
- \* Minimum 99.4% purity compacted MgO Insulation Material
- \* 300 Series Stainless Steel Potting Adapter filled with Stycast epoxy for 500°F continuous use
- \* Standard heater lengths are 13", 18", 36" and 72" long.

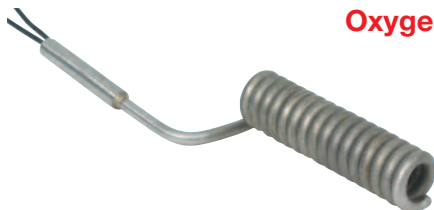


"OA" Length		"A" Length		Watts	Volts	OEM Part Number	TEMPCO Part Number
in	mm	in	mm				
13.15	334	4.23	107	340	115	HEI-132X	HHC00304
18.27	464	8.07	205	340	115	HEI-2001	HHC00199
36.50	927	8.07	205	340	115	HEI-2002	HHC00200
72.80	1849	8.07	205	340	115	HEI-2003	HHC00303

**Lead Wires:** Teflon® insulated 20 ga. Stranded Silver Plated Copper Wire (color coded one black and one blue)

**Termination:** #10 Uninsulated Spade Lug

#### Oxygen Analyzer Heaters with .153" Diameter Cable



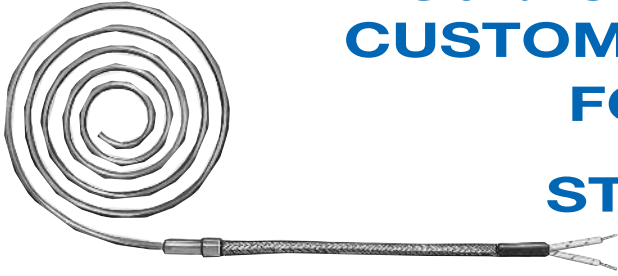
Tempco can also supply oxygen analyzer heaters for 240V, 520W with 0.153" diameter Inconel® 600 sheath, 0.394" ID x 2.75" coil width, with overall lengths of 6.29", 13.18", 17.12", 23.41", 32.86", 43.10", 62.39" and 80.11".  
**Consult Tempco with your requirements – we welcome your inquiries.**



# Cable HEATERS

## CUSTOM ENGINEERED

### FORMED & STRAIGHT



**Spiral-wound Tempco-Pak heater cables** are low profile and capable of generating high operating temperatures in restricted areas. The built-in thermocouple eliminates the need for a separate thermocouple. Works especially well as an alternative heat source for flat surface heating applications where other types of heaters cannot be used due to space restrictions. Consult Tempco with your requirements.



**Compression fittings** are available on straight cable heaters of various diameters (1/8", 3/16", 1/4", 5/16" and 3/8"). This fitting enables adjustment of the insertion length during installation. Compression fittings are available in Brass or Stainless Steel with standard male NPT threads. When ordering, specify heater sheath material, NPT size and material for compression fittings, insertion length, thermocouple type and type of junction (grounded or ungrounded), thermocouple and heater lead lengths, watts and volts. Optional—thermocouple location and cooler or unheated cable lengths. Consult Tempco with your requirements.

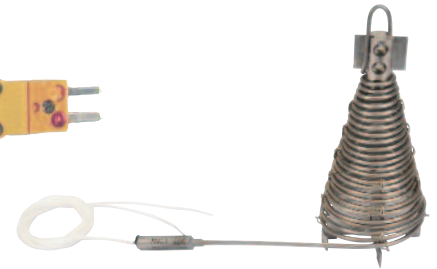


**Sinuated (formed) Tempco-Pak heater cables** are low profile and capable of generating high operating temperatures in restricted areas. The built-in thermocouple eliminates the need for a separate thermocouple. Works especially well as an alternative heat source for flat surface heating applications where other types of heaters cannot be used due to space restrictions. The sinuated cable can also be formed to conform to a cylindrical inside or outside surface. Consult Tempco with your requirements.



### Lab Equipment: Gas Analyzer Heaters

This heater heats gas analyzer samples quickly and uniformly. Low mass construction allows for a fast cool down, increasing cycle times. Adding a T/C or RTD to an assembly is not a problem. Straight lengths are also available for manual custom bending requirements.





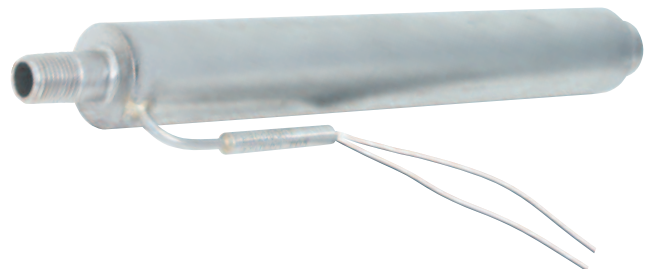
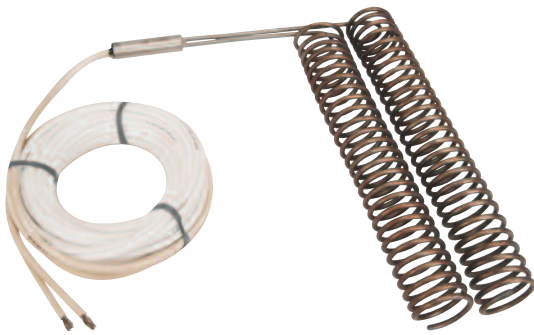


**Miniature-Coil heaters** are made for special applications. Cable diameter is less than .100". They work especially well as an alternative heat source for demanding and high temperature applications where other types of heaters have failed. Available with cooler or unheated cable section toward lead end. Consult Tempco with your requirements.

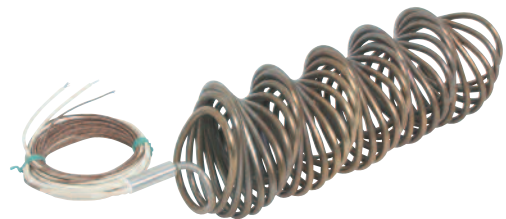


**Stainless steel mounting flange** is 1" diameter x .060" thick with two 1/4" holes on a 3/4" bolt circle. When ordering, specify location of mounting flange, cable diameter, length, sheath material, thermocouple type and type of junction (grounded or ungrounded), thermocouple and heater lead lengths, watts and volts—optional: thermocouple location and cooler or unheated cable lengths. Consult Tempco with your requirements.

**NOTE:** Mounting flange to be located over a cold or cooler section.



**Gas or Air Heaters** rated 1050 watts at 240 volts. One end has 1/4" MNPT and the other end has 1/4" FNPT so that you can have a series of the heaters for higher wattage requirements. It has 1-1/8" OD x 8" long stainless steel tubing body with 9-3/8" overall length.



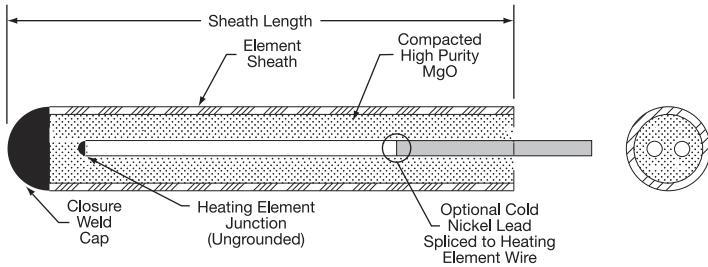
### Star-Wound Coil

Star wound formations are usually inserted into pipes or ducts and are used to heat moving air or liquids. The offset coils create a turbulent flow. This allows the flowing material to have better contact with the heater surface resulting in more efficient heat transfer.



### Tempco-Pak Heaters — Design Constructions

#### Tempco-Pak Heaters with Straight Wire



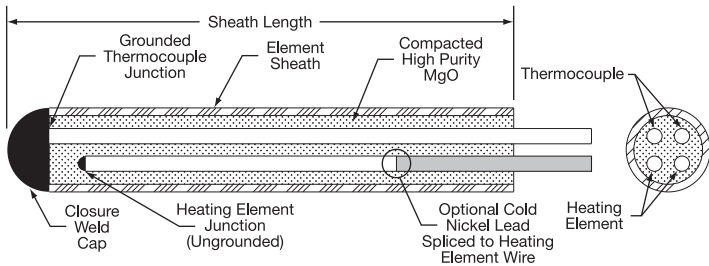
Tempco-Pak heaters are made from M.I. cable having 2 straight heating element wires insulated from the sheath by high purity MgO.

Available in nominal sheath diameters from 0.040" to 0.375" (1mm to 9.5mm) in 304 stainless steel and Inconel® 600 for Tempco-Pak heaters with straight wire. Optional cold nickel lead spliced to heating element wire is available in 0.125" diameter or larger depending on conductor material.

Nominal Sheath O.D.		Maximum Heater Length		Nominal Sheath O.D.		Maximum Heater Length	
in	mm	ft	meters	in	mm	ft	meters
.040	1.00	25	7.6	.188	4.77	100	30.5
.063	1.60	70	21.0	.250	6.35	59	18.0
.125	3.18	120	36.5	.312	7.93	38	11.5
.163	4.14	130	39.6	.375	9.53	26	8.0

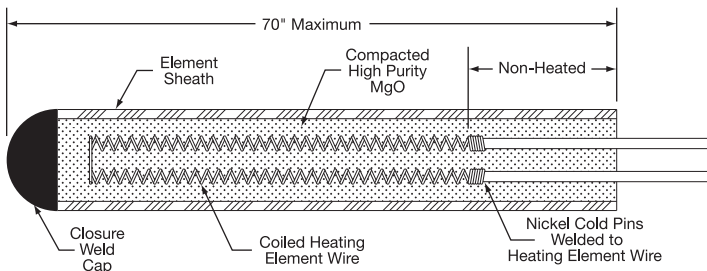


**Note:** Consult Tempco for diameters other than those listed above.



#### Tempco-Pak Heaters with Straight Wire and Built-In Thermocouple

Tempco-Pak heaters with 0.125" or larger diameter are also made from M.I. cable having 2 straight heating element wires and 2 straight thermocouple wires insulated from the sheath by high purity MgO. Optional cold nickel lead spliced to heating element wire is available in 0.125" diameter or larger depending on conductor material.



#### Tempco-Pak Heaters with Helically Coiled Wire

Hi-Density Tempco-Pak heaters are manufactured from sheathed M.I. cable having 2 coiled heating element wires or 2 coiled heating element wires and 2 straight thermocouple wires. The non-heated portion has the largest possible diameter solid nickel cold pins attached to the heating element wires, providing maximum current carrying capacity within the same continuous sheath.

Available in nominal sheath diameters from 0.120" to 0.153" (3.05 mm to 3.9 mm) including 0.125" O.D., 0.132" O.D. and 0.143" O.D. Tempco also manufactures 0.110" x 0.160" rectangular cable as well as 0.125" square cable.

Maximum sheath length including non-heated section is 70 inches (1778 mm).

Optional Built-in Thermocouple is ANSI Type J or Type K grounded at tip (end farthest from cold end) or ungrounded anywhere along heater length for .125" diameter and larger.



### Tempco-Pak Cable Heaters

The densely compacted MgO insulation used in Tempco-Pak heaters produces excellent high temperature insulation resistance and dielectric strength. Heaters can be manufactured with the optional cold nickel leads internally spliced to the heating element wires within the same continuous sheath.

Generally speaking, there is very little temperature difference between the sheath and heater wires. Tempco recommends not exceeding 150 watts per square inch of sheath surface area with the sheath operating temperature at 1000°F (537°C) or less. As temperature increases above 1000°F, the maximum watt density should be decreased.

The maximum recommended operating temperature is 1800°F (982°C) with Inconel® 600 sheath and ANSI Type K thermocouple if required. Heater life in any specific situation or application is impossible to predict. However, heater life generally decreases as temperature and/or the number of thermal cycles increases.

Tempco-Pak heaters are flexible and can be readily formed or bent by hand or production machinery, with the minimum bend radius equal to twice the sheath diameter. The heater sheath can be welded, brazed or soldered without changing its electrical characteristics.

#### Performance Ratings

- Watt Density:** . . . . . 75 watts per square inch of sheath surface area maximum with factory approval
- Maximum temperature:** . . . . 1500°F (815°C) for 304 stainless steel sheath  
1800°F (982°C) for Inconel® 600 sheath

#### Specifications

##### Electrical

- Resistance:** . . . . . ±10% unless otherwise specified
- Voltage:** . . . . . 120V and 240V standard
- Thermocouples:** . . . . . ANSI Type J to 1500°F (815°C)  
Type K to 1800°F (982°C)

All thermocouples and their junctions are internal to the heater sheath. A grounded junction at the heater tip is standard. An ungrounded junction anywhere along the heater's length is optional. Available in sheath diameters .125" and larger.

##### Dimensional

- Heater cable diameters:** . . . . . 0.040", 0.062", 0.115", 0.120",  
0.125", 0.132", 0.153", 0.163",  
0.174", 0.188", 0.220", 0.250".  
*Others available upon request.*
- Cable diameter tolerance:** . . . . . ±.005
- Heater length tolerance:** . . . . 0 to 6" (+1/8", -0), 6 to 18" (+1/4", -0)  
18 to 24" (+3/8", -0), 24 to 120" (+3/4", -0)  
120 to 300" (±1")

#### Transition and Termination Construction Specifications

**Transition (potting) adapters:** 5/16" O.D. × 1-1/2" long for heater cable 0.163" diameter and smaller. 1/2" O.D. × 1-1/2" long for heater cable diameters above 0.163"

**Transition Temperature Rating:** 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°C).

Optional high temperature insulation is MGT (mica, fiberglass, Teflon® impregnation) which is rated to 842°F (450°C).

**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 galvanized armor cable.

### Ordering Information

#### Standard Heaters

Order by Part Number for standard heaters listed in Tables on pages 5-21 through 5-23.

Part Numbers are for heaters with standard lead length of 24" unless otherwise specified. Longer lead length as well as stainless steel wire braid protection or armored cable protection are available upon request.

Heaters under 72" (1829 mm) will be shipped straight; longer heaters will be shipped in coils a minimum of 24" (610 mm) in diameter.

#### Custom Engineered/Manufactured Heaters

For sizes, ratings and terminations not listed, **TEMPCO** will design and manufacture a Tempco-Pak heater to meet your requirements. **Standard lead time is 3-4 weeks.**

**Please Specify** the following:

- Wattage and Voltage
- Sheath Diameter
- Heater length
- Sheath material— 304 stainless steel or Inconel® 600
- Length of internal nickel cold, or if a neck down design, length of cold section. See page 5-5.
- Thermocouple if required— Type J or K
- Thermocouple Junction— Grounded or Ungrounded. If ungrounded, specify location (.115" and larger).
- Transition type: M1, M2, M3, A1, A2, A3, B1, B2, B3, C1, C2, C3, S1, S2 or S3. See page 5-5.
- Lead length if other than 24"
- Supply a sketch or drawing.

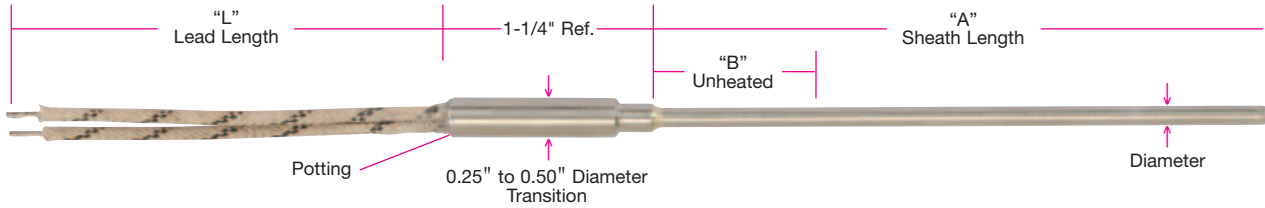


# Coil & Cable Heaters



## Tempco-Pak Heaters

### .125 & .153 Diameter Cable Heaters With and Without Thermocouples



#### Design Features

- \* For temperatures up to 1500°F (815°C) with 304 SS sheath or 1800°F (982°C) with Inconel 600 sheath.
- \* Heater can be formed into almost any shape.
- \* Available with optional type J or K thermocouples.
- \* Watt densities up to 40 watts /square inch and as high as 75 watts/square inch in certain applications.

#### Ordering Code:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

#### Heater Type BOX 1

**M** = With thermocouple  
**H** = Without thermocouple

#### Diameter BOX 2

**F** = .125"  
**G** = .153"

#### Thermocouple Type BOX 3

**0** = No Thermocouple  
**J** = Type J Thermocouple  
**K** = Type K Thermocouple

#### Thermocouple Junction BOX 4

**0** = No Thermocouple  
**G** = Grounded at Tip  
**U** = Ungrounded at Tip  
**M** = Ungrounded in the Middle

#### Sheath Material BOX 5

**B** = 304 SS  
**A** = Inconel® 600

#### "A" Dimension (Heater Length) BOX 6

Whole inches  
**00** to **99**

#### "A" Dimension (Heater Length) BOX 7

Fractional inches  
**0** = 0"    **4** = 1/2"

#### "B" Dimension (Unheated Length) BOX 8

Whole inches  
**0** to **9**

#### Wattage BOX 9

Examples: Enter **090** for 90 watts  
Enter **250** for 250 watts

#### Voltage BOX 10

**1** = 120 Volts  
**2** = 240 Volts

#### "L" Dimension BOX 11

Whole inches  
**001** to **999**

#### Lead Insulation BOX 12

**M** = Plain Leads  
**B** = Stainless Steel Overbraid  
**C** = Galvanized Armor Cable  
**A** = Stainless Steel Armor Cable  
**S** = Fiberglass Sleeve

#### Transition Temperature Rating BOX 13

**1** = 482°F (250°C) — TGGT Wire with High Temperature Cement Potting  
**2** = 392°F (200°C) — TFE Wire with Epoxy Potting  
**3** = 842°F (450°C) — MGT Wire with High Temperature Cement Potting

#### Special Requirement BOX 14

**X** = Specify  
**0** = None

#### Ordering Information

Cable Heaters are offered with the options listed in the worksheet. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements, and a part number will be assigned.



### Standard (Non-Stock) Round Straight Tempco-Pak Cable Heaters

Part numbers are for 304 SS sheath heaters (except HHS00003 with Inconel® 600) with 24" plain leads, and a type J thermocouple junction grounded at the tip of the cable, except those marked with a ⚡ (0.062" cable).

Longer lead length as well as optional stainless steel wire braid (B), fiberglass sleeve (S), stainless steel armored cable (A), or galvanized armored cable (C) protection is available upon request. See ordering code worksheet below for lead wire protection and lead length desired.

**NOTE:** Complete termination descriptions are on page 5-5.

Cable Diameter	Sheath Length		Watts	Watt Density		Volts	Part Number
	in	mm		W/in <sup>2</sup>	W/cm <sup>2</sup>		
⚡ .062" (1.57 mm)	34	863.6	400	60	9.30	120	HHS00001
	42	1066.8	400	49	7.59	120	HHS00002
	60	1524.0	200	19	2.94	120	HHS00003
	88	2235.2	450	26	4.03	120	HHS00004
.115" (2.92 mm)	49	1244.6	425	24	3.72	120	MHS00002
	73	1854.2	450	17	2.63	120	MHS00003
	87	2209.8	750	24	3.72	240	MHS00004
.125" (3.18 mm)	30	762.0	300	30	4.65	120	MHS00005
	35	889.0	330	24	3.72	240	MHS00006
	41	1041.4	365	23	3.56	120	MHS00007
	52	1320.8	400	20	3.10	240	MHS00008
	62	1574.8	780	32	4.96	240	MHS00009
	68	1727.2	300	11	1.70	120	MHS00010
	68	1727.2	300	11	1.70	240	MHS00011
	84	2133.6	780	24	3.72	120	MHS00012
	90	2286.0	660	19	2.94	120	MHS00013
.153" (3.89 mm)	17	431.8	200	24	3.72	240	MHS00014
	17	431.8	375	46	7.13	240	MHS00015
	18	457.2	250	29	4.49	240	MHS00016
	20	508.0	125	13	2.01	230	MHS00017
	20	508.0	250	26	4.03	230	MHS00018
	22	558.8	250	24	3.72	240	MHS00019
	25	635.0	380	32	4.96	240	MHS00020
	34	863.6	480	29	4.49	240	MHS00021
	40	1016.0	550	29	4.49	240	MHS00022
.174" (4.42 mm)	51	1295.4	650	27	4.18	240	MHS00023
	88	2235.2	1800	37	5.73	220	MHS00024
	93	2362.2	1700	33	5.11	220	MHS00025
	109	2768.6	1500	25	3.87	220	MHS00026
	166	4216.4	3350	37	5.73	220	MHS00027
.188" (4.78 mm)	220	5588.0	2850	24	3.72	220	MHS00028
	77	1955.8	1700	34	5.27	220	MHS00029 <sup>Ⓢ</sup>
	90	2286.0	2000	37	5.73	220	MHS00030
	105	2667.0	1800	29	4.49	220	MHS00031
	180	4572.0	3900	37	5.73	220	MHS00032
	191	4851.4	1000	9	1.39	220	MHS00033
	198	5029.2	3600	31	4.80	220	MHS00034
	146	3708.4	2850	31	4.80	380	MHS00035
	182	4622.8	3900	34	5.27	480	MHS00036
	200	5080.0	4300	34	5.27	220	MHS00037
.203" (5.16 mm)	223	5664.2	4000	28	4.34	220	MHS00038
	107	2717.8	2500	32	4.96	220	MHS00039
	123	3124.2	2100	31	4.80	220	MHS00040
	205	5207.0	4800	34	5.27	220	MHS00041
.220" (5.59 mm)	217	5511.8	3800	25	3.87	220	MHS00042
	109	2768.6	2700	34	5.27	220	MHS00043
	119	3022.6	2550	29	4.49	220	MHS00044
	204	5181.6	4500	30	4.65	480	MHS00045
	211	5359.4	5000	32	4.96	220	MHS00046
.232" (5.89 mm)	222	5638.8	4800	30	4.65	220	MHS00047
	89	2260.6	2600	37	5.73	220	MHS00048
	100	2540.0	2200	38	5.89	220	MHS00049
	103	2616.2	2750	34	5.27	220	MHS00050
	105	2667.0	2100	25	3.87	220	MHS00051
	115	2921.0	2450	27	4.18	220	MHS00052
	118	2997.2	2600	28	4.34	220	MHS00053
	123	3124.2	2700	28	4.34	220	MHS00054
	130	3302.0	2600	25	3.87	220	MHS00055
	138	3505.2	2300	21	3.25	220	MHS00056
	205	5207.0	4200	30	4.65	220	MHS00057
	215	5461.0	4000	28	4.34	220	MHS00058
	240	6096.0	5500	26	4.03	220	MHS00059
281	7137.4	4700	19	2.94	220	MHS00060	

**NOTE:** Ⓢ Maximum Operating Temperature 500°C.

#### Type A\_\_ – Stainless Steel Armor Cable



#### Type B\_\_ – Stainless Steel Overbraid



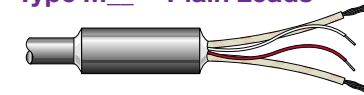
#### Type C\_\_ – Galvanized Armor Cable



#### Type S\_\_ – Fiberglass Sleeve



#### Type M\_\_ – Plain Leads



#### Potting Adapter Size without Crimping

5/16" O.D. × 1-1/2" long for 0.062" to 0.163" dia. cable

1/2" O.D. × 1-1/2" long for 0.174" to 0.250" dia. cable

### Ordering Information

Standard Straight Tempco-Pak heaters are offered with plain lead wires. Use the part numbers at the left for 24" plain lead wires. If you need other than standard 24" leads and/or wire protection use the following ordering codes and a part number will be assigned.

### Ordering Code:



#### Lead Length BOX 1

Whole inches 000 to 999

#### Termination Type BOX 2

- A = Stn. Stl. Cable
- B = Stn. Stl. Wire Braid
- C = Galvanized Cable
- S = Fiberglass Sleeve
- M = Plain Leads (Do not fill Box 3)

#### Length of Protection BOX 3

Whole inches 000 to 999



### Standard (Non-Stock) Square Straight Tempco-Pak Cable Heaters

Part Numbers are for heaters with 48" plain leads.

Longer lead length as well as optional stainless steel wire braid (B), fiberglass sleeve (S), stainless steel armored cable (A) or galvanized armored cable (C) protection is available upon request. See ordering code worksheet below for lead wire protection and lead length desired.

Standard Tempco-Pak Heaters are made with 304 Stainless Steel Sheath.

Cable Cross Section	Sheath Length		Cold Length		Watts	Watt Density		Volts	"J" T/C Junction	Part Number
	in	mm	in	mm		W/in <sup>2</sup>	W/cm <sup>2</sup>			
<b>.125" x .125" (Square)</b>	14 $\frac{1}{8}$	359	2	51	250	41.2	6.39	240	UG-T	MHS00128
	18 $\frac{1}{4}$	464	1 $\frac{3}{4}$	44	250	30.3	4.70	240	UG-T	MHS00129
	22 $\frac{1}{8}$	581	2 $\frac{1}{8}$	54	250	24.0	3.72	240	GRD	MHS00121
	23 $\frac{1}{4}$	591	1 $\frac{1}{2}$	38	450	41.3	6.40	240	UG-M	MHS00122
	26	660	4	101	300	27.2	4.22	240	GRD	MHS00123
	29	737	1 $\frac{1}{2}$	38	450	32.7	5.06	240	UG-N	MHS00124
	36 $\frac{1}{8}$	936	2	51	300	17.2	2.66	240	GRD	MHS00125
	41 $\frac{1}{8}$	1045	1 $\frac{7}{8}$	47	300	15.2	2.35	240	UG-M	MHS00126
	43 $\frac{3}{8}$	1108	1 $\frac{7}{8}$	47	300	14.3	2.21	240	UG-M	MHS00127
	20	508	2 $\frac{1}{2}$	64	315	36.0	5.58	240	N/A	HHS00167
	31 $\frac{1}{2}$	800	2 $\frac{1}{2}$	64	315	21.7	3.36	240	N/A	HHS00168
	31 $\frac{3}{4}$	806	2 $\frac{1}{2}$	64	600	41.0	6.36	240	N/A	HHS00169

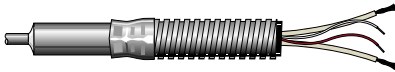
(UG-M) — Ungrounded T/C junction is at the middle of the hot section

(UG-T) — Ungrounded T/C junction is at the tip

(UG-N) — Ungrounded T/C junction is 7" from the tip

### Lead Wire Abrasion Protection Terminations

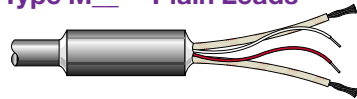
Type A — Stainless Steel Armor Cable



Type C — Galvanized Armor Cable



Type M — Plain Leads



Type B — Stainless Steel Overbraid



Type S — Fiberglass Sleeve



Potting Adapter Size without Crimping

5/16" O.D. x 1-1/2" long

NOTE: Complete termination descriptions are on page 5-5.

### Ordering Code:



### Ordering Information

Part Numbers above are for Square Rectangular Tempco-Pak heaters with 48" plain lead wires. If you need other than standard 48" leads and/or wire protection use the ordering codes at the right and a part number will be assigned.

**Lead Length** BOX 1  
Whole inches 000 to 999

**Termination Type** BOX 2  
A = Stn. Stl. Cable  
B = Stn. Stl. Wire Braid  
C = Galvanized Cable  
S = Fiberglass Sleeve  
M = Plain Leads (Do not fill Box 3)

**Length of Protection** BOX 3  
Whole inches 000 to 999





### Standard (Non-Stock) Rectangular Straight Tempco-Pak Cable Heaters

Part Numbers are for heaters with 48" plain leads.

Longer lead length as well as optional stainless steel wire braid (B), fiberglass sleeve (S), stainless steel armored cable (A) or galvanized armored cable (C) protection is available upon request.  
See ordering code worksheet below for lead wire protection and lead length desired.

Standard Tempco-Pak Heaters are made with 304 Stainless Steel Sheath.

Cable Cross Section	Sheath Length		Cold Length		Watts	Watt Density		Volts	"J" T/C Junction	Part Number
	in	mm	in	mm		W/in <sup>2</sup>	W/cm <sup>2</sup>			
<b>.110" x .160" (Rectangular)</b>	21 1/8	537	1 3/8	41	300	28.5	4.41	240	UG-M	MHS00107
	27 1/2	698	1 3/8	41	350	25.0	3.87	240	UG-M	MHS00108
	30 3/4	781	1 3/8	48	400	25.6	3.97	240	UG-M	MHS00109
	32 1/4	819	1 3/8	41	400	24.2	3.74	240	UG-M	MHS00110
	35 1/4	895	1 3/4	44	450	24.8	3.86	240	UG-M	MHS00111
	35 3/8	911	1 3/8	41	425	23.0	3.56	240	UG-M	MHS00112
	40 1/4	1022	1 1/4	32	550	26.0	4.03	240	UG-M	MHS00113
	44 1/4	1124	1 3/8	41	500	21.7	3.36	240	UG-M	MHS00114
	44 3/4	1137	1 1/4	32	700	29.8	4.62	240	UG-M	MHS00115
	53 1/2	1359	1 3/8	41	800	28.8	4.46	240	UG-M	MHS00116
	57	1448	1 3/8	41	500	16.7	2.58	240	UG-M	MHS00117
	57 3/8	1464	1 3/8	41	550	18.1	2.81	240	UG-M	MHS00118
	62 3/4	1594	1 3/8	41	900	27.2	4.22	240	UG-M	MHS00119
	72	1829	1 3/8	41	1000	26.3	4.07	240	UG-M	MHS00120
	13 3/4	349	1 3/8	48	225	35.0	5.42	240	No T/C	HHS00159
	20 1/2	521	1 3/8	41	250	24.5	3.79	240	No T/C	HHS00160
	24 3/8	619	1 3/8	41	300	24.4	3.78	240	No T/C	HHS00161
	32 3/8	822	1 3/8	41	350	21.0	3.25	240	No T/C	HHS00162
	40 1/4	1022	1 3/8	41	400	19.1	2.96	240	No T/C	HHS00163
	48 1/4	1226	1 3/8	41	425	16.8	2.60	240	No T/C	HHS00164
53 1/2	1359	1 3/8	41	800	28.5	4.41	240	No T/C	HHS00165	
64 1/8	1629	1 3/8	41	500	14.8	2.29	240	No T/C	HHS00166	

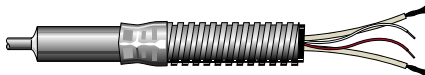
UG-M: — Ungrounded T/C junction is 8" to 11" from the tip

### Lead Wire Abrasion Protection Terminations

Type A\_\_ — Stainless Steel Armor Cable



Type C\_\_ — Galvanized Armor Cable



Type M\_\_ — Plain Leads



Type B\_\_ — Stainless Steel Overbraid



Type S\_\_ — Fiberglass Sleeve



Potting Adapter Size without Crimping

5/16" O.D. x 1-1/2" long

### Ordering Code:



NOTE: Complete termination descriptions are on page 5-5.

### Ordering Information

Part Numbers above are for Standard Rectangular Tempco-Pak heaters with 48" plain lead wires. If you need other than standard 48" leads and/or wire protection use the ordering codes at the right and a part number will be assigned.

#### Lead Length BOX 1

Whole inches 000 to 999

#### Termination Type BOX 2

- A = Stn. Stl. Cable
- B = Stn. Stl. Wire Braid
- C = Galvanized Cable
- S = Fiberglass Sleeve
- M = Plain Leads (Do not fill Box 3)

#### Length of Protection BOX 3

Whole inches 000 to 999



## Bulk Round Heater Cable

### Bulk Round Heater Cable



#### Typical Applications

- ◆ Blown Film Die Heaters
- ◆ Heat Tracing
- ◆ De-icing Car Wash Door Rails
- ◆ De-icing Outside Stairways

#### Design and Construction Specifications

#### Terminations

See page 5-5 for potted lead transitions. There are two choices of potting compounds. Either cement potting for a high temperature application or high temperature epoxy for 450°F (232°C) maximum temperature. Also, there are three major choices of lead wires:

- M1** — TGGT (Teflon® tape, fiberglass, Teflon® treated fiberglass overbraid) insulated lead wire for 482°F (250°C).
- M2** — Teflon® insulated lead wire, which is normally potted with a high temperature epoxy rated 450°F (232°C)
- M3** — MGT (mica tape, Teflon® treated fiberglass overbraid) insulated lead wire for 842°F (450°C).

#### Minimum Bending Radius

Minimum bending radius for all mineral insulated cable heaters is two times the sheath diameter.

#### Power Calculation

The required wattage can be calculated using the following formula:

$$\text{Wattage} = \frac{(\text{Voltage})^2}{\text{Cable length (in feet)} \times \text{Ohms/foot (from table)}}$$

### Standard Single Conductor Heater Cable

Sheath OD		Resistance (+/-10%)		Maximum Length		Sheath Material	Maximum Current Allowed (Amps)	Part Number
in	mm	ohms/ft.	ohms/mtr.	feet	meters			
.125	3.17	0.67	2.2	250	75	Inconel® 600	13.3	CAS01125
.125	3.17	0.72	2.4	250	75	Inconel® 600	12.5	CAS02125
.125	3.17	0.78	2.6	250	75	Inconel® 600	12.0	CAS03125



### Standard Double Conductor (Duplex) Heater Cable

Sheath OD		Resistance (+/-10%)		Maximum Length		Sheath Material	Maximum Current Allowed (Amps)	Part Number
in	mm	ohms/ft.	ohms/mtr.	feet	meters			
.040	1.00	37.0	122.0	500	152	Inconel® 600	1.5	CAW00040
.055	1.39	16.4	54.1	500	152	Inconel® 600	2.3	CAW00055
.062	1.59	13.7	45.2	400	121	Inconel® 600	2.9	CAW00062
.062	1.59	13.2	43.6	400	121	304 SS	3.0	CAW01062
.062	1.59	8.1	26.7	400	121	304 SS	4.0	CAW02062
.062	1.59	7.9	26.1	400	121	304 SS	4.1	CAW03062
.062	1.59	4.6	15.1	400	121	304 SS	5.8	CAW05062
.064	1.62	6.5	21.4	400	121	304 SS	4.7	CAW04064
.125	3.18	7.0	23.1	250	75	304 SS	4.7	CAC53125
.125	3.18	3.4	11.2	250	75	Inconel® 600	7.3	CAW00125
.147	3.73	4.8	15.8	200	60	304 SS	5.9	CAC53147
.147	3.73	2.5	8.2	200	60	Inconel® 600	9.0	CAW00147
.153	3.88	4.5	14.8	150	45	304 SS	6.0	CAC53153
.153	3.88	2.3	7.6	150	45	Inconel® 600	9.2	CAW00153
.153	3.88	1.9	6.3	150	45	304 SS	9.7	CAW01153
.153	3.88	1.6	5.3	150	45	304 SS	11.5	CAW02153
.153	3.88	1.4	4.6	150	45	304 SS	13.0	CAW03153
.163	4.14	4.0	13.2	130	39	304 SS	6.5	CAC53163
.163	4.14	2.1	6.9	130	39	Inconel® 600	9.6	CAW00163
.163	4.14	1.7	5.6	130	39	304 SS	10.5	CAW01163
.163	4.14	1.5	4.9	130	39	304 SS	12.5	CAW02163
.163	4.14	1.2	3.9	130	39	304 SS	14.0	CAW03163
.188	4.77	3.0	9.9	100	30	304 SS	7.0	CAC53188
.188	4.77	1.5	5.0	100	30	Inconel® 600	12.0	CAW00188
.188	4.77	1.3	4.3	100	30	304 SS	13.3	CAW01188
.188	4.77	1.06	3.5	100	30	304 SS	15.5	CAW02188
.188	4.77	0.86	2.8	100	30	304 SS	17.0	CAW03188
.210	5.33	1.18	3.9	80	24	Inconel® 600	15.4	CAW00210
.210	5.33	1.17	3.8	80	24	304 SS	15.5	CAW01210
.210	5.33	0.84	2.7	80	24	304 SS	18.3	CAW02210
.210	5.33	0.75	2.5	80	24	304 SS	20.0	CAW03210
.220	5.59	2.17	7.1	75	22	304 SS	9.5	CAC53220
.220	5.59	0.98	3.2	75	22	304 SS	16.5	CAW01220
.220	5.59	0.76	2.5	75	22	304 SS	19.5	CAW02220
.250	6.35	1.8	5.9	58	17	304 SS	11.3	CAC53250
.250	6.35	0.9	2.9	58	17	Inconel® 600	18.3	CAW00250
.250	6.35	0.87	2.9	58	17	304 SS	20.0	CAW01250
.250	6.35	0.59	1.9	58	17	304 SS	23.0	CAW02250
.250	6.35	0.48	1.6	58	17	304 SS	25.0	CAW03250



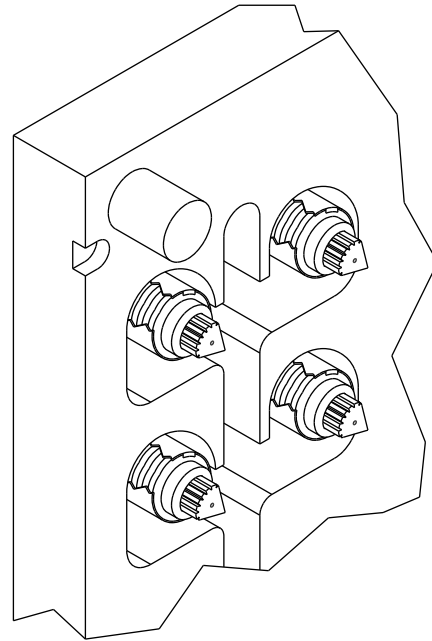
**Note:** Maximum lengths shown are manufactured lengths. Cable is shipped in random lengths unless specific lengths are ordered.



### Tempco Replacement Mini-Coil Heaters (Round Cable) for OEM Hot Runner Systems

Tempco's Mini-Coil Band Heaters are designed and manufactured under the tightest tolerances so that they may be used in hot runner/runnerless injection mold tooling with complete confidence on maintaining the manufacturer's original balanced heating when using a minimum of thermocouples and temperature control zones.

- ±2% Resistance Tolerance
- 5" and 7" Staggered Cold Lead Length
- 72" Insulated Lead Wire Length  
White/Black for 250W and White/Red for 125W



#### Clamping

Screw operated clamping for the traditional style.

#### Cam Operated Clamping

Cam operated axial clamping allows tool room personnel to replace the heating element or the thermocouple of the gate bushing without having to remove the bushing from the mold. This can even be done in emergencies while the mold is still in the press, saving hours of downtime. The hex head cam is accessed from the front, parallel to the bushing's shaft.

#### Clamp Screw

#### Specifications

##### Mechanical

- Coil Heater Diameter:** ..... 0.055", ±0.002"
- Thermocouple:** ..... Type J, 0.055" dia., ±0.002"
- Inner Diameter:** ..... ±0.002"
- Width/Length:** ..... ±0.020"
- Axial Clamp Hex:** ..... Tempered 416 series SS  
Hex size: 1/8"  
Rotation: 150 degrees
- Clamp Screw:** ..... (2) 6-32 × 1/2", SS,  
Hex size 7/64"
- Heater Leads:** ..... 18 ga. silver coated copper, Teflon®  
insulation, 200°C/392°F  
Staggered 5" and 7"
- Thermocouple Leads:** ..... Fiberglass insulation, 1000°F

##### Electrical

- Resistance Tolerance:** ..... ±2%
- Wattage Tolerance:** ..... ±2%
- Voltage:** ..... Standard voltages are 120 and 240VAC;  
other voltages can be designed.  
*Consult Tempco with your requirements.*





### Tempco Replacement Mini-Coil Heaters (Round Cable) for OEM Hot Runner Systems

#### Stock and Standard (Non-Stock) Cam Operated Clamping Round Cable with Thermocouple

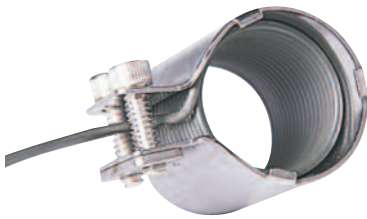
Stock Items Are Shown In **RED**



Clamp Style	ID		Length		Watts	Volts	Part Number Heater Only	Part Number With Type J T/C
	in	mm	in	mm				
Axial	.750	19.0	1.20	30.5	① 149	240	<b>HRN00100</b>	HRY00110
	.750	19.0	1.20	30.5	② 268	240	<b>HRN00101</b>	HRY00111
	.750	19.0	1.75	44.4	268	240	HRN00102	HRY00112
	.750	19.0	2.00	50.8	323	240	HRN00103	HRY00113
	.875	22.2	1.75	44.4	268	240	HRN00104	HRY00114
	1.000	25.4	1.20	30.5	300	240	HRN00105	HRY00115
	1.000	25.4	2.00	25.4	318	240	HRN00106	HRY00116
	1.000	25.4	1.20	30.5	350	240	HRN00107	HRY00117
	1.000	25.4	2.00	50.8	440	240	HRN00108	HRY00118
	.500	12.7	1.20	31.7	120	240	HRN00109	HRY00119

#### Stock and Standard (Non-Stock) Screw Operated Clamping Round Cable with Thermocouple

Stock Items Are Shown In **RED**



Clamp Style	ID		Length		Watts	Volts	Part Number Heater Only	Part Number With Type J T/C
	in	mm	in	mm				
Screw	.750	19.0	1.20	30.5	① 149	240	<b>HRN01100</b>	HRY01113
	.750	19.0	1.20	30.5	② 268	240	<b>HRN01101</b>	HRY01114
	.750	19.0	2.50	63.5	323	240	HRN01102	HRY01115
	.875	22.2	1.20	30.5	② 268	240	HRN01103	HRY01116
	.875	22.2	2.00	50.8	300	240	HRN01104	HRY01117
	.875	22.2	1.75	44.4	350	240	HRN01105	HRY01118
	.750	19.0	1.20	30.5	400	240	HRN01106	HRY01119
	.750	19.0	2.00	50.8	272	240	HRN01107	HRY01120
	.750	19.0	2.00	50.8	400	240	HRN01108	HRY01121
	.750	19.0	1.20	30.5	186	240	HRN01109	HRY01122
	1.500	38.1	2.50	63.5	675	240	HRN01110	HRY01123
	1.750	44.4	1.75	44.4	450	240	HRN01111	HRY01124
	2.500	63.5	1.50	38.1	380	240	HRN01112	HRY01125



**Notes:** ① It is the hot runner industry practice to refer to this heater as 125W even though the actual wattage will be dependent on the applied voltage. The resistance is 386.58 ohms.



**Notes:** ② It is the hot runner industry practice to refer to this heater as 250W even though the actual wattage will be dependent on the applied voltage. The resistance is 214.98 ohms.

#### Industry Cross Reference Part Numbers

Tempco Part Number	OEM Part Number	Rosemount Part Number
HRN00100	534234	904FE101
HRN01100	520156	904EJ101, 904EN101, 904FB101

Tempco Part Number	OEM Part Number	Rosemount Part Number
HRN00101	534233	904FE131
HRN01101	521334	904EJ131, 904EN131, 904FB131
HRN01103		904EJ141, 904EN141, 904FB141

#### Ordering Information

##### Stock Heaters

Select a Mini-Coil Heater from the standard sizes and ratings list.

##### Custom Engineered/Manufactured Heaters

An electric heater can be very application specific; for sizes, ratings and terminations not listed, **TEMPCO** will design and manufacture a Mini-Coil heater to meet your requirements. **Standard lead time is 3 weeks.**

**Please Specify** the following:

- Inner Diameter
- Width/Length
- Wattage
- Voltage
- Termination Type
- Cable/Braid Length
- Clamp Style
- Special Features



## Cast Nozzle Heater Bushings

### Cast Bronze Nozzle Heater Bushings

#### Typical Applications

- Hot Runner Systems
- Sprue Bushings
- Hot Melt Adhesive Systems



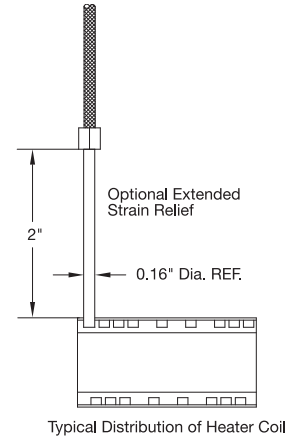
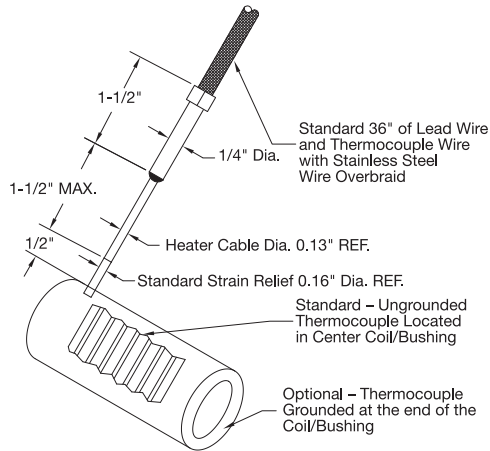
#### Typical Applications

- Plastic Injection Nozzles
- Medical, Laboratory and Pharmaceutical Equipment

#### Design Features

- Bronze Cast construction for excellent heat transfer and long life
- Operating Temperature to 1200°F (650°C)
- Built-in Type J or K Thermocouple for accurate temperature control
- Distributed wattage for even heat transfer
- Precision machining of the inside diameter
- Choice of leads and lead protection

Custom Engineered/Manufactured to meet customer specifications – we welcome your inquiries.



#### Construction Characteristics

Tempco's cast bronze nozzle heater bushings offer the latest in state-of-the-art technology to these innovative designs. They eliminate uneven temperature profiles and short heater life; their precision machining also eliminates poor fit and the need for clamping bands, while providing maximum heat transfer.

The casting is protected by a stainless steel tube. The maximum operating temperature for the bronze casting is 1200°F (650°C); the optional aluminum casting has a maximum operating temperature of 600°F (315°C). The built-in thermocouple in either Type J

or K gives exceptional temperature control when connected to a Tempco TEC controller. The thermocouple has as standard an ungrounded junction located in the center of the width, which helps eliminate stray EMFs caused by the heater. A grounded junction at the end is optional.

The heater and thermocouple have a standard termination of 36-inch fiberglass leads with a stainless steel overbraid. Options include Teflon® insulated leads and armor cable. All terminations are available with the optional 2-inch-long extended strain relief.

#### Standard (Non-Stock) Bronze Heater Bushings

ID		OD		Width		Volts	Watts	Part Number
in	mm	in	mm	in	mm			
1/2	13	1	25	2	51	240	300	NHB00002
5/8	16	1 1/8	29	2	51	240	300	NHB00003
5/8	16	1 1/8	29	3	76	240	500	NHB00004
5/8	16	1 1/8	29	4	102	240	750	NHB00005
3/4	19	1 1/4	32	1	25	240	250	NHB00006
3/4	19	1 1/4	32	2	51	240	350	NHB00007
7/8	22	1 3/8	35	2	51	240	500	NHB00008
7/8	22	1 3/8	35	3	76	240	750	NHB00009
7/8	22	1 3/8	35	4	102	240	1000	NHB00010



**Note:** Inside Diameter machined to a tolerance of ± 0.001". Width tolerance to 4" ± 0.02". Wattage and Resistance are ± 10%.

**Tabletop Point-of-Use Temperature Control Console Systems**

See Section 13, Page 13-52





### Custom Engineered/Manufactured Heater Bushings

#### Ordering Code:

NHB -

#### Inside Diameter BOX 1

- A = .375"
- B = .500"
- C = .563"
- D = .625"
- E = .750"
- F = .875"
- G = Other (Specify)

#### Nominal Outside Diameter BOX 2

- A = 1"
- B = 1-1/8"
- C = 1-1/4"
- D = 1-3/8"
- E = Other (Specify)

#### Width (Length) BOX 3

- A = 1"
- B = 2"
- C = 3"
- D = 4"
- X = Other (Specify)

#### Volts BOX 4

- A = 240 Standard
- B = 120 Optional

#### Wattage BOX 5

- X = (Specify)

#### Lead Length BOX 6

- Whole inches
- 01 to 999
- 36" Standard (036)

#### Lead Construction BOX 7

- A = Fiberglass, Heater and T/C with SS overbraid – Standard
  - B = Fiberglass, Heater and T/C
  - C = Teflon® Insulated, Heater and T/C
  - D = Teflon® Insulated with SS overbraid (no T/C)
  - E = Fiberglass Insulated with SS armor cable (no T/C)
  - F = Teflon® Insulated with SS armor cable (no T/C)
- NOTE: For A, D, E and F the cable or braid length will be 2" shorter than the lead wire length unless otherwise specified.

#### Extended Strain Relief (2" long) BOX 8

- 1 = Yes
- 2 = No

#### Thermocouple Type BOX 9

- J = Type J Iron/Constantan
- K = Type K Chromel/Alumel
- 0 = None Required

#### T/C Junction Location BOX 10

- A = Ungrounded (Standard)
- B = Grounded (Optional)
- 0 = None Required

#### Casting Construction BOX 11

- B = Bronze (Standard) 1200°F (650°C)
- A = Aluminum (Optional) 600°F (315°C)

#### Cold Length BOX 12

- Whole inches
- 02 to 18
- 2" Standard (02)

#### Special Requirements BOX 13

- X = Specify
  - 0 = None
- Example:* Set screws in bushing available upon request.

### Ordering Information

#### Standard (Non-Stock) Heaters

Order standard Heater Bushings by part number from the table on page 5-28.

#### Custom Engineered/Manufactured Heaters

An electric heater can be very application specific; for sizes, ratings and terminations not listed, **TEMPCO** will design and manufacture a Heater Bushing to meet your requirements. **Standard lead time is 4 weeks.**

To order a custom Heater Bushing **create an order code number** by filling in the boxes with the appropriate number and/or letter designation for your requirements. A product part number will be assigned at time of order.



### Gamma Series Dual Sleeve Mini-Coil Heater



**NOTE:** Caps Sold Separately

#### Design Features

- \* ID Tolerance:  $\pm .0005''$
- \* Wall Thickness: 0.130"
- \* Lead Wires: 72" long Teflon<sup>®</sup> insulated
- \* Cold leads: 5" and 7" standard
- \* Resistance Tolerance:  $\pm 2\%$
- \* Watt Density: Over 100 w/sq.in. possible

Gamma Series mini-coil heaters for hot runner tooling are constructed with the heating element tightly sandwiched between a nickel plated copper inner sleeve and a stainless steel outer sleeve. The differences in heat transfer characteristics of the sleeves direct the heat generated by the coil inward, toward the nozzle, increasing overall efficiency. The inner diameter of the assembly is very tightly controlled, allowing for a slip fit with no clamping required.

#### Stock and Standard (Non-Stock) Sizes and Ratings

**Stock Items Are Shown In RED**



For replacement threaded caps order Part Number HRN94999 (19.05 mm, 0.75" dia.).

ID	Length		Watts	Volts	OEM Part Number	Tempco Part Number
	mm	in				
19.05 mm (3/4")	30	1.181	220	240	534975	<b>HRN40001</b>
	40	1.575	220	240	534976	HRN40002
	50	1.969	220	240	534977	<b>HRN40003</b>
	60	2.362	220	240	534978	<b>HRN40004</b>
	70	2.756	220	240	534979	HRN40005
	80	3.150	220	240	534980	HRN40006
	90	3.543	220	240	534981	HRN40007
	100	3.937	220	240	534982	HRN40008
	110	4.331	220	240	534983	HRN40009
	30	1.181	350	240	—	HRN40010
	40	1.575	350	240	—	HRN40011
	50	1.969	350	240	—	HRN40012
	60	2.362	400	240	—	HRN40013
	70	2.756	400	240	—	HRN40014
	80	3.150	400	240	—	HRN40015
	90	3.543	400	240	—	HRN40016
	100	3.937	450	240	—	HRN40017
	110	4.331	400	240	—	HRN40018

#### Ordering Information

##### Stock Heaters

Select a Mini-Coil Heater from the standard sizes and ratings list.

##### Custom Engineered/Manufactured Heaters

An electric heater can be very application specific; for sizes, ratings and terminations not listed, **TEMPCO** will design and manufacture a Mini-Coil heater to meet your requirements. **Standard lead time is 3 weeks.**

**Please Specify** the following:

- Inner Diameter
- Width/Length
- Wattage
- Voltage
- Termination Type
- Cable/Braid Length
- Clamp Style
- Special Features