

## “L” Shaped

### “L” Shaped Bronze, Brass or Aluminum Cast-In Heaters for Square and Rectangular Extruder Barrels



#### Cast-In Heaters That Provide High Temperature and Maximum Processing Capabilities

The “L” Shaped Cast-In Heaters are typically used on square and rectangular twin screw extruder barrels in compounding and plastic resin manufacturing applications. Due to high shear rates, which are common in this process, extreme operating temperatures and high watt densities are frequently encountered. For these reasons Tempco manufactures “L” shaped heaters in bronze or brass alloys, which are capable of withstanding high temperatures at higher watt densities.

In the case of applications requiring lower temperatures and lower watt densities, aluminum alloys can be used. Aluminum castings are desirable as they have greater thermal conductivity and weigh substantially less than their bronze or brass counterparts, allowing for greater ease of installation.

For mounting purposes, the heaters can be designed with 45° flanged ear extensions that are bolted and drawn together, or can be made with through holes machined into the casting body to bolt directly onto the barrel itself. Thermocouple and transducer holes or other special features can be accommodated as well.

To enhance cooling capabilities, or to be used in place of integral feed screw cooling, “L” shaped heaters can be manufactured with cast-in cooling tubes to satisfy liquid cooling requirements. This feature allows processors the ease of changing a single unit at a time, thus representing a far less time-consuming and less expensive alternative should a cooling line become clogged or severely restricted.

#### Enhanced Features

To aid processors in reducing maintenance downtime, Tempco has introduced several optional construction features to the basic “L” shaped design.

- \* *Cast-In Aluminum Alloys for applications requiring lower temperatures and less watt density*
- \* *3/8" or 1/2" O.D. cooling tubes for liquid cooling*
- \* *Non-Exposed cooling tubes (Type RC—See page 3-51). Eliminates cracked and broken cooling tubes.*



**Note:** All of the options listed above are design enhancements that will provide value-added benefits to the basic “L” shape configuration, thereby extending the life and performance of your Cast-In Heaters.

#### Standard “L” Shaped Cast-In Heaters

##### Design Features

- \* *Cast-In Bronze or Brass Alloys for high temperature, high shear applications*
- \* *Flange bolt clamping arrangement or through holes in the heater body, allowing bolt mounting directly to the barrel*
- \* *High precision machining of the inner contact surface of the heater, yielding exceptional heat transfer to the process*
- \* *Choice of terminal protection housings*
- \* *Moisture resistant terminal housing which is available in a variety of different styles and mounting arrangements*
- \* *Elevated temperature terminations and enclosures. Prevents premature heater failure due to accelerated corrosion or oxidation of terminals caused by high heater surface temperature. See page 3-66 and 3-67 for details on how to order.*

### Standard (Non-Stock) "L" Shaped Cast-In Heaters



**"L" Shaped Bronze, Brass or Aluminum Cast-In Heaters** are sold as individual units. They are normally supplied with a moisture resistant junction box. Also available with explosion resistant or cast-on junction box, fitted with convoluted wire braided hose and high temperature lead wire. If required, specify. For additional terminations, see pages 3-54 and 3-55.

*The sizes and ratings listed are among the most commonly used. They will provide the shortest lead times.*

Long Leg (in)	Short Leg (in)	Width in	Thickness in	Watts	Volts	Special Features	Part Number
3.500	2.500	3.500	0.875	500	240	Cast terminal box, (3) .397" dia. holes, (1) 5/8" dia. cutout, Bronze	CBH05817
3.500	2.500	3.500	0.875	500	240	Cast terminal box, (3) .397" dia. holes, Bronze	CBH05818
3.500	2.500	7.000	0.875	1000	240	Cast terminal box, (6) .397" dia. holes, Bronze	CBH05819
2.500	1.550	1.750	0.500	300	120	(1) 1/2" long slot, R1, Hubbell® plug, Aluminum	CBH04036
2.500	1.550	1.750	0.500	300	120	(1) 1/8" NPT hole, (1) 1/2" long slot, Bronze	CBH04103
3.460	2.680	4.330	1.181	500	220	MPR terminal box, (1) 25 mm dia. hole, (4) 9 mm dia. holes, Aluminum	CBH04926
3.460	2.680	4.330	1.181	500	220	MPR terminal box, (1) 25 mm dia. hole, (4) 9 mm dia. holes, Aluminum	CBH04922
3.460	2.760	4.330	1.181	500	220	MPR terminal, (1) 25 mm dia. hole, (8) 9 mm dia. holes, Aluminum	CBH04929
3.937	3.465	4.331	1.181	500	230	MPR terminal, 3/8" NPT RA elbow C/T, Brass	CBH04045
4.173	3.071	4.310	1.000	900	240	Cast terminal box, (2) 1/2" dia. holes, (2) 1/2" dia. cutouts, Bronze	CBH01617
4.173	3.346	4.921	1.575	2000	230	MPR, (1) 25 mm dia. hole, Brass	CBH04295
4.724	3.248	4.921	1.575	1500	230	MPR terminal box, (1) 25 mm dia. hole, Brass	CBH04290
4.823	3.346	4.921	1.575	2000	230	MPR terminal box, (1) 25 mm dia. hole, Brass	CBH04294
6.000	4.449	6.417	1.000	2000	240	Cast terminal box, (4) 1/2" dia. holes, (2) 1" long cutouts, Bronze	CBH01618
6.140	4.311	7.480	0.750	2500	240	Cast terminal box, (5) 1/2" dia. holes, (2) 1/2" dia. cutouts, Bronze	CBH01971
6.180	4.215	6.690	1.000	3000	240	Cast terminal box, (5) 1/6" dia. holes, (2) 1" dia. cutouts, Bronze	CBH02140
6.188	4.313	1.000	1.000	1500	240	Cast terminal box, (1) 1" dia. hole, (4) 1/4" dia. holes, Bronze	CBH01619
7.756	11.693	14.961	1.970	4500	460	MPR terminal box, (6) .394" dia. holes, Aluminum	CBH05011
7.813	5.188	10.625	1.000	5250	480	Cast terminal box, (8) 1/6" dia. holes, Bronze	CBH03042
7.830	5.220	10.63	0.980	3500	480	Cast terminal box, (8) 1/6" dia. holes, Bronze	CBH02114
7.874	6.102	10.394	1.000	4200	480	Cast terminal box, (6) 1/6" dia. holes, Bronze	CBH01692
7.874	6.102	10.394	1.000	4200	480	Cast terminal box, (6) 1/6" dia. holes, Bronze	CBH01839
8.500	6.140	2.750	0.750	1200	240	Cast terminal cover, (1) 1" dia. hole, (2) 1/2" dia. holes, Bronze	CBH01725
8.500	6.140	7.480	0.750	5250	240	Cast terminal box, (6) 1/2" dia. holes, (2) 7/8" dia. holes, Bronze	CBH02124
8.890	5.945	6.420	1.000	3000	240	Cast terminal box, (6) 1/2" dia. holes, (1) 1" dia. hole, Bronze	CBH01550
9.055	4.684	2.362	0.591	750	240	13" Cable, 18" leads, (5) .413" dia. holes, Aluminum	CBH04591
9.134	6.000	7.480	1.000	3500	240	Cast terminal box, (4) 1/2" dia. holes, Bronze	CBH05352
9.173	6.181	10.630	1.772	5000	230	MPR terminal box, (8) .472" dia. holes, (1) 1" dia. hole, Brass	CBH03940
9.449	7.756	14.330	1.102	6800	277	Cast terminal box, 3-Ph, (8) 1/6" dia. holes, Bronze	CBH01667
9.449	7.756	14.330	1.102	6800	575	Cast terminal box, 3-Ph, (4) 1/2" dia. holes, (4) 1/6" dia. holes, Bronze	CBH01709
10.563	7.813	10.625	1.000	8800	480	Cast terminal box, 3-Ph, (8) 1/6" dia. holes, Bronze	CBH03041
10.590	7.830	10.630	1.000	5500	480	Cast terminal box, 3-Ph, (8) 1/6" dia. holes, Bronze	CBH02113
10.830	4.684	2.362	0.591	870	240	MPR terminal box, (5) .413" dia. holes, Aluminum	CBH04594
11.690	7.756	14.960	1.969	9000	460	MPR term. box, (8) .393" & (1) .984" dia holes, Al., Heat & Cool	CBH05012
11.690	7.756	14.960	1.968	N/A	N/A	(12) .393" dia. holes, (1) .984" dia. hole, Aluminum	CBH05013
11.690	7.760	14.960	1.969	9000	460	MPR terminal box, (10) .393" dia. holes, Aluminum	CBH05014
12.188	7.875	10.375	1.000	8100	480	Cast terminal box, (6) 1/6" dia. holes, Bronze	CBH04408
12.205	7.875	4.134	1.000	3000	240	Cast terminal box, (4) 1/6" dia. holes, (1) 7/8" dia. cutout, Bronze	CBH01756
12.205	7.875	10.394	1.000	6260	480	Cast terminal box, (6) 1/6" dia. holes, Bronze	CBH02144
15.712	13.000	9.250	1.250	5500	220	(6) 1/2" dia. holes, (1) 7/8" hole, Bronze	CBH05037
18.110	9.169	4.530	0.591	3030	240	(10) .493" dia. holes, 20" cable, 27" leads, Aluminum	CBH04593
18.110	9.169	4.530	0.591	3030	240	MPR terminal box, (10) .430" dia. holes, Aluminum	CBH04596

#### Key for Abbreviations found under the Features Column

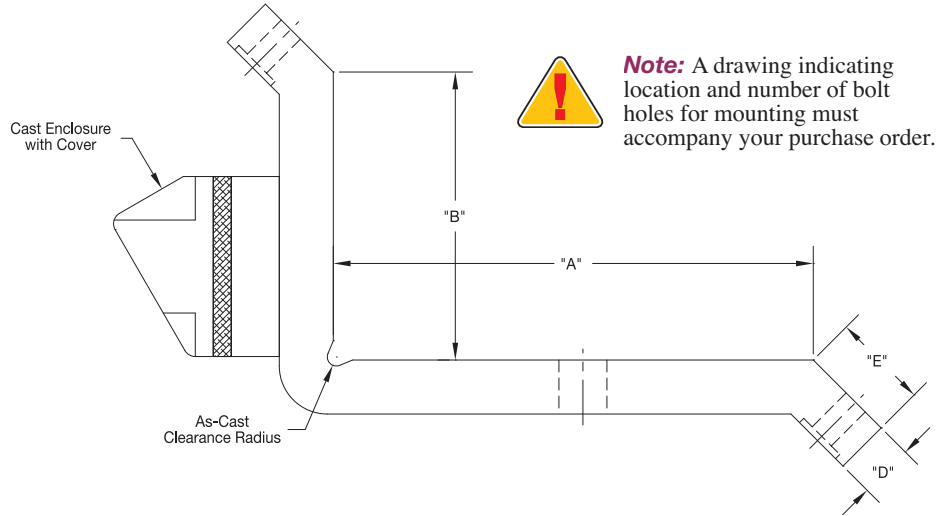
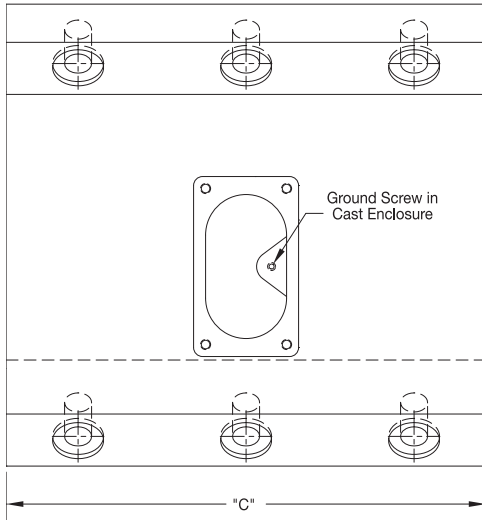
E/H = Each Half	C/T = Cooling Tubes
EP = Explosion Resistant Terminal Housing	CW = Single Set of Cooling Tubes
MR = Moisture Resistant Terminal Housing	CWW = Dual Set of Cooling Tubes
MPR = Moisture Proof Die Cast Aluminum Box	RC = Non-Exposed Cooling Tubes/Recessed NPT Fittings

# Cast-In Heaters



## Ordering Information

### "L" Shaped Cast-In Heaters – 45° Flange Mount Style Ordering Information



### "L" Shaped Cast-In Heaters — 45° Flange Mount Style

#### Dimensions

"A" \_\_\_\_\_ "B" \_\_\_\_\_ "C" \_\_\_\_\_  
"D" \_\_\_\_\_ "E" \_\_\_\_\_

#### Ordering Information

To process your order or quotation,  
please specify the following information.

#### Material Specifications

☐ Aluminum ☐ Bronze ☐ Brass

#### Electrical Specifications

Watts each piece \_\_\_\_\_ Volts each piece \_\_\_\_\_ Phase \_\_\_\_\_

#### Termination Style

☐ "S" Post Terminals ☐ "T7" Post Terminals ☐ "T" Post Terminals  
☐ "R1" Armor Cable Leads ☐ "E" Right Angle Lugs

#### Terminal Protection Box

☐ None ☐ "C2" Standard ☐ Cast on box as shown  
☐ "EP" Explosion Resistant ☐ "MR1" Rigid Moisture Resistant Box  
☐ "MPR" Moisture Resistant Box ☐ "P2" High Temperature Quick Disconnect

#### Clamping Style

☐ Bolt Clamp ☐ Other

#### Cooling Tube Specifications

☐ 1/4" O.D. SS ☐ 3/8" O.D. SS ☐ 1/2" O.D. SS  
☐ 3/8" O.D. Incoloy® ☐ 1/2" O.D. Incoloy® ☐ Dual Cooling Tubes  
☐ Standard Wall Thickness ☐ Other Wall Thickness, Specify \_\_\_\_\_  
(See page 3-5 for Standard Wall Thickness Information)

#### Cooling Tube Fittings

☐ Non-exposed 3/8" NPTF ☐ "HS" Hi-Seal Fitting ☐ "RA" 90° Copper Elbow  
☐ Non-exposed 1/2" NPTF ☐ "RT" 90° Threaded Elbow  
☐ "FF" Flared Seal ☐ "R3" Straight Threaded

#### Surface Finish

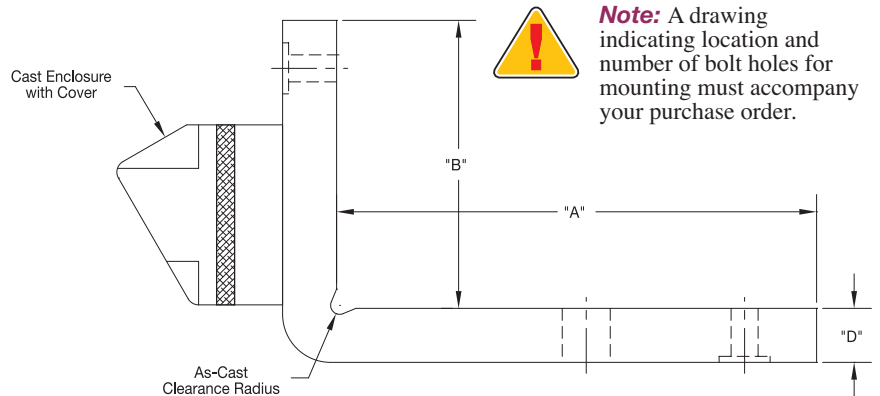
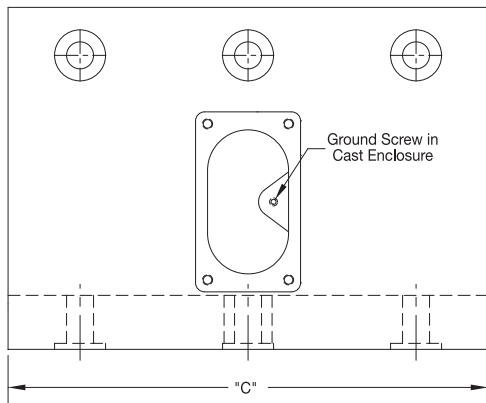
125 RMS Standard or to Customer Specifications

#### Special Cast-In Features

Holes, Cutouts, Slots, Bevels, Mounting Studs, Stand-Offs and Taper Angles.  
*For special features a detailed drawing is required.*

**WARNING:** Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

### "L" Shaped Cast-In Heaters Bolt Direct to Barrel Ordering Information



### "L" Shaped Cast-In Heaters Bolt Direct to Barrel Style

#### Dimensions

"A" \_\_\_\_\_ "B" \_\_\_\_\_ "C" \_\_\_\_\_  
 "D" \_\_\_\_\_

### Ordering Information

To process your order or quotation, please specify the following information.

#### Material Specifications

☐ Aluminum ☐ Bronze ☐ Brass

#### Electrical Specifications

Watts each piece \_\_\_\_\_ Volts each piece \_\_\_\_\_ Phase \_\_\_\_\_

#### Termination Style

☐ "S" Post Terminals ☐ "T7" Post Terminals ☐ "T" Mica Washers  
☐ "R1" Armor Cable Leads ☐ "E" Right-Angle Lugs

#### Terminal Protection Box

☐ None ☐ "C2" Standard ☐ Cast on box as shown  
☐ "EP" Explosion Resistant ☐ "MR1" Rigid Moisture Resistant Box  
☐ "MPR" Moisture Resistant Box ☐ "P2" High Temperature Quick Disconnect

#### Clamping Style

☐ Bolt Clamp ☐ Other

#### Cooling Tube Specifications

☐ 1/4" O.D. SS ☐ 3/8" O.D. SS ☐ 1/2" O.D. SS  
☐ 3/8" O.D. Incoloy® ☐ 1/2" O.D. Incoloy® ☐ Dual Cooling Tubes  
☐ Standard Wall Thickness ☐ Other Wall Thickness, Specify \_\_\_\_\_  
 (See page 3-5 for Standard Wall Thickness Information)

#### Cooling Tube Fittings

☐ Non-exposed 3/8" NPTF ☐ "HS" Hi-Seal Fitting ☐ "RA" 90° Copper Elbow  
☐ Non-exposed 1/2" NPTF ☐ "RT" 90° Threaded Elbow  
☐ "FF" Flared Seal ☐ "R3" Straight Threaded

#### Surface Finish

125 RMS Standard or to Customer Specifications

#### Special Cast-In Features

Holes, Cutouts, Slots, Bevels, Mounting Studs, Stand-Offs and Taper Angles.  
**For special features a detailed drawing is required.**

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**(800) 323-6859 • Email: [sales@tempco.com](mailto:sales@tempco.com)**



### Liquid-Cooled Cast-In Band Heaters for Extrusion Processing

#### Type CWW — Dual Set of Cooling Tubes within the Same Cast-In Heater

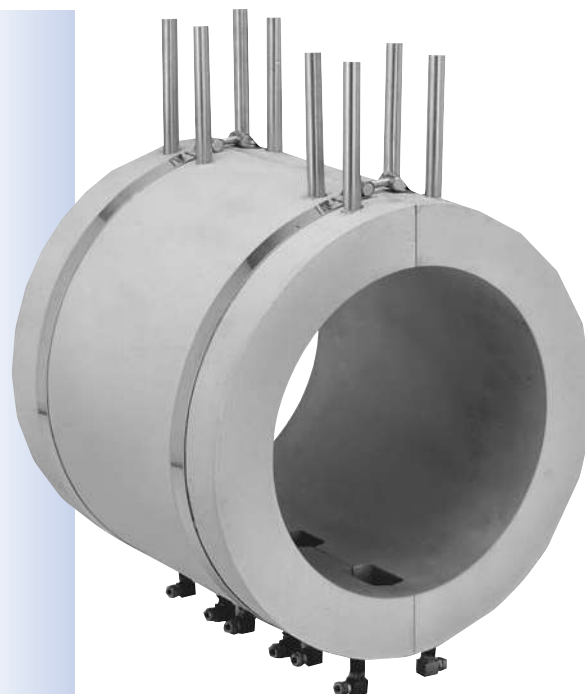
The Dual cooling tube design incorporates two sets of 3/8" or 1/2" diameter tubing formed into a serpentine or any other suitable shape within the same Cast-In Heater. Dual cooling tubes will actually double the operating life of a Cast-In Heater with liquid-cool function, since cooling tube failures usually occur before heating element failures.

There are two main causes for failure on liquid-cooled Cast-In Heaters: Stress corrosion cracking at the exiting point of the tube extensions and clogged lines due to scale build-up that reduces flow, decreasing cooling capacity and finally completely blocking the tube. Once the first set of cooling tubes has failed, reconnect to the spare set and you are back in operation, thus eliminating costly downtime and additional labor for heater replacement. Dual cooling tubes are also used when additional cooling capacity is required.

Cooling tube extensions can be factory equipped with your choice of fittings. Clamping styles are low thermal expansion alloy straps or bolt clamping. If not otherwise specified, supplied with Type S electrical screw termination, 3" long cooling tube extensions and straps for clamping. For a wide selection of electrical and cooling tube termination options, see pages 3-52 through 3-55. See page 3-63 for complete details on how to order.

#### Design Features

- \* Double operating life
- \* Greater reliability
- \* Reduces costly downtime
- \* Better cooling capacity
- \* Reduces heater replacement inventory
- \* Various heater terminations
- \* Available in Bolt Clamping and Strap Clamping
- \* Made to customer specifications



#### Type RC — Non-Exposed Cooling Tubes Recessed NPT Fittings

The recessed cooling tube design incorporates 3/8" or 1/2" diameter tubing formed into a serpentine or any other suitable shape with specially designed stainless steel NPT fittings that are welded to the tube ends and cast below the surface of the Cast-In Heater, thus eliminating the troublesome, commonly used tube extensions as they exit the casting for connection to the coolant lines.

Non-exposed fittings will drastically increase the operating life of a Cast-In Heater with liquid cool function, as this feature eliminates broken and/or damaged cooling tube extensions which are a major factor in premature heater failure. Type RC fittings are available in two female NPT thread sizes, 3/8"-18 and 1/2"-14. Standard clamping styles for Cast-In Band Heater sets are low thermal expansion alloy straps or bolt clamping. Specify fitting thread size and clamping style when ordering. If not otherwise specified, supplied with Type S electrical screw termination and straps for clamping. For fittings with special thread size, consult Tempco with your requirements. See page 3-63 for complete details on how to order.

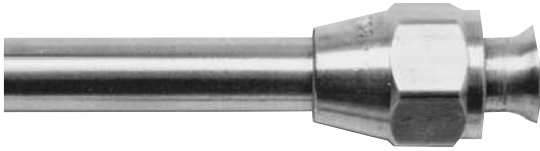
#### Design Features

- \* Quick and easy installation
- \* Exceptionally longer Cast-In Heater life
- \* Reduces costly downtime
- \* Greater reliability
- \* Rugged, durable construction
- \* Available on all cooling tube sizes
- \* Available in Bolt Clamping and Strap Clamping
- \* Made to customer specifications



## Cooling Tube Options

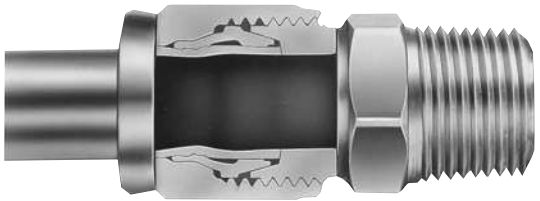
### Cooling Tube Termination Options for Liquid-Cooled Cast-In Band Heaters



#### Type FF Flared Seal Fittings

Brass flared seal fittings are well adapted for low to medium pressure and resistant to mechanical pullout. Available for 3/8" and 1/2" diameter tubing with SAE 45° flare.

Diameter Tubing	Thread	Part Number
3/8"	5/8"-18	FTG-124-101
1/2"	3/4"-16	FTG-124-104



#### Type HS Hi-Seal Fittings

Hi-seal brass fittings are highly dependable under the most adverse conditions. For reliable and trouble-free service with ease of installation, we strongly recommend hi-seal fittings. Available for 3/8" and 1/2" diameter tubing. Male thread is 1/2" NPT for 1/2" tube and 3/8" tube.

Diameter Tubing	Part Number
3/8"	FTG-118-124
1/2"	FTG-118-116



#### Type RA 90° Copper Elbow

90° copper elbow is brazed to the Cast-In Heater cooling tube extension with additional tube extension for connecting cooling lines with compression and/or flared fittings. Available for 3/8" and 1/2" diameter tubing. If required, specify.

Diameter Tubing	Part Number
3/8"	FTG-127-102
1/2"	FTG-127-103



#### Type RT Cast Brass 90° Threaded Elbow

90° threaded elbow is brazed to the cooling tube extension, providing an easy and quick method for connecting cooling lines. Recommended to be factory installed to assure good braze seals. Available for 3/8" and 1/2" NPT internal threads. If required, specify.

Diameter Tubing	NPT	Part Number
1/2"	3/8"	FTG-125-101
1/2"	1/2"	FTG-125-102



#### Type R3 Straight Threaded Copper Fitting

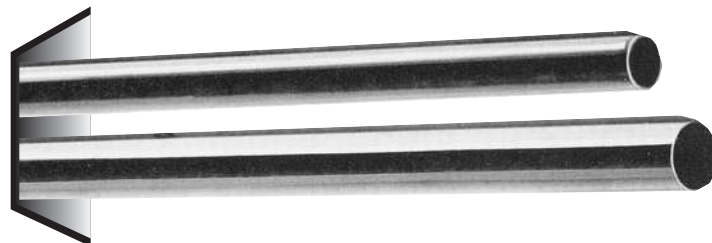
Straight threaded fitting is brazed to the cooling tube extensions, providing an easy and quick method for connecting cooling lines. Recommended to be factory installed to assure good braze seals. Available for 3/8" and 1/2" diameter tubing with internal threads. If required, specify.

Diameter Tubing	NPT	Part Number
3/8"	3/8"	FTG-131-103
1/2"	3/8"	FTG-131-102
1/2"	1/2"	FTG-131-101

### Installation Accessories for Liquid-Cooled Cast-In Band Heaters

#### Stock Tubing for Cooling Lines

Cooling Line Tubing can be used to connect the Tempco Cast-In heat/cool bands to the plumbing system of your extruder. Tubing is available in 6'8" lengths for U.P.S. shipments and up to 20' lengths for truck shipments. Barlow's formula below was used to calculate Working Pressure in the table.



$$\text{Maximum Working Pressure (PSIG)} = \frac{2 \times \text{Material Strength (PSI at Room Temperature)} \times \text{Wall Thickness of Tube (in)}}{\text{OD of Tube (in)} \times \text{SF (Safety Factor of 1.5 to 10 depending on application)}}$$

Tubing Diameter (in)	Material	Wall Thickness (in)	Burst Pressure (PSI)	Working Pressure (Safety Factor 4) (PSI)	Material Strength (PSI)	Volume (in <sup>3</sup> /ft)	Part Number
1/4	304 SS	0.028	11200	2800	75000	0.3547	TUB-101-130
3/8	304 SS	0.035	14000	3500	75000	0.8767	TUB-101-108
1/2	304 SS	0.049	14700	3675	75000	1.5231	TUB-101-110
1/2	304 SS	0.065	19500	4875	75000	1.2903	TUB-101-122
1/2	Incoloy	0.049	17052	4263	87000	1.5231	TUB-111-108

#### Flexible Teflon® Wire Braided Hose

Flexible Teflon® Wire Braided Hose provides an excellent means of connecting Cast-In Heaters to the extruder plumbing system. This style of hose meets the demands of medium to tight bending radius requirements. The stainless steel braid protects the Teflon® hose from any harsh mechanical conditions that may be present.

A variety of brass male and female threaded fittings can be incorporated onto the hose, making it a practical choice for use in conjunction with Tempco's Style RC Non-Exposed Fittings and other available fittings.

Rigid brass adapter fittings as listed below are used to mate the base hose assembly to your existing installation. This allows for the installation of the rigid NPT coupling into the plumbing system and then attaching the swivel fitting on the hose, making assembly relatively easy. Remember to use Teflon® tape or equivalent.

**Standard Hose:** Size 8 (1/2") .405" I.D., .549" O.D.

**Operating Pressure:** 2000 PSI

**Burst Pressure:** 8000 PSI



#### Ordering Information

The standard hose assemblies are supplied with 1/2" female 37° SAE flare swivel style crimped-on fittings. The hose assemblies can be ordered in 6" increments starting at 18" minimum. Fitting material is Brass.

#### Part Number\*

WHT05

\*Complete the Part Number with length of hose in 6" increments starting at 18" (018).

**Standard lead time is 2 weeks or less.**

#### Adapter Fittings for Flexible Teflon® Wire Braid Hose

Rigid brass adapter fittings are used to mate the base hose assembly to your existing installation.

T1	T2	Part Number
1/2" male 37° SAE flare	1/2"-14 NPT male	FTG-161-103
1/2" male 37° SAE flare	1/2"-14 NPT female	FTG-161-102
1/2" male 37° SAE flare	3/8"-18 NPT male	FTG-161-104
1/2" male 37° SAE flare	3/8"-18 NPT female	FTG-161-105

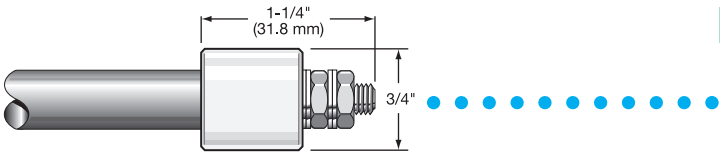


**⚠ WARNING:** Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## Electrical Termination Options

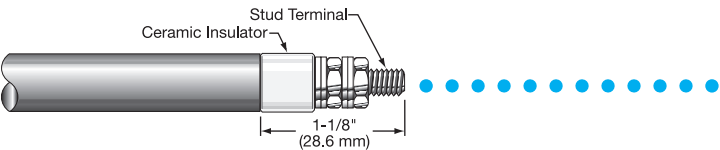
### Standard Tubular Heater Terminations for Cast-In Heaters

Select the termination style that meets your requirements for space, accessibility and reliability.



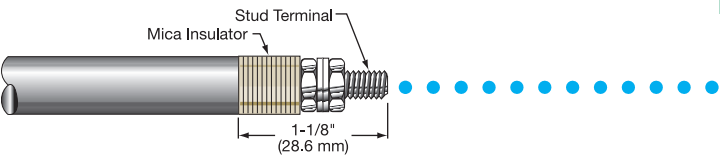
#### Type S Standard Unless Otherwise Specified

Heavy Duty Ceramic Insulators.  
.315" diameter heater has 8-32 screw terminals.  
.430" diameter heater has 10-32 screw terminals.



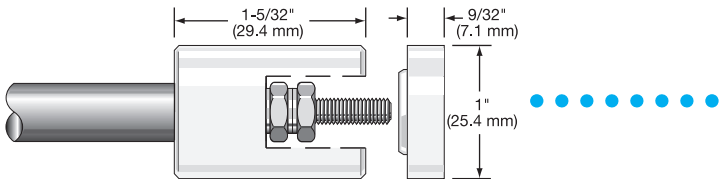
#### Type T7

Ceramic insulator is the same diameter as the heating element.  
.260" diameter heater has 6-32 screw terminals.  
.315" diameter heater has 8-32 screw terminals.  
.430" diameter heater has 10-32 screw terminals.



#### Type T

Mica insulator is the same diameter as the heating element.  
.260" diameter heater has 6-32 screw terminals.  
.315" diameter heater has 8-32 screw terminals.  
.430" diameter heater has 10-32 screw terminals.



#### Type C4

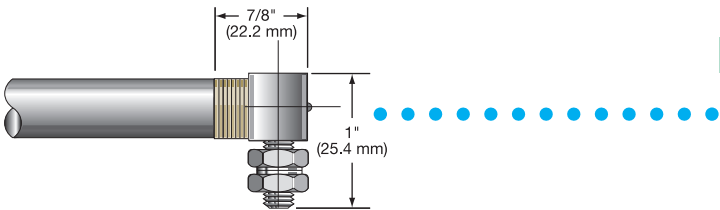
Heavy duty ceramic insulator with terminal cover.  
.315" diameter heater has 10-32 screw terminals.  
.430" diameter heater has 10-32 screw terminals.



#### TYPE P—Plain Pin

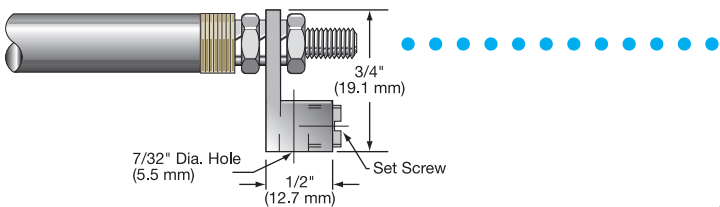
Plain terminal pin. Specify Length "L." Standard 1/2" (12.7 mm) pin length.

Element Diameter		Nominal Pin Diameter	
in	mm	in	mm
.260	6.6	.091	2.3
.315	8.0	.100	2.5
.430	10.9	.120	3.0



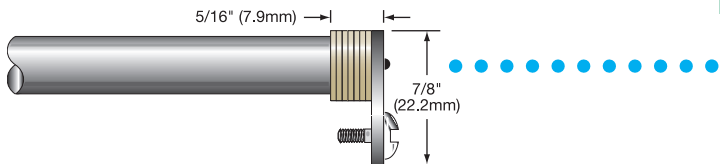
#### Type R

Mica washers with 90° blockhead screw terminal with 10-32 screw threads. Available for .315" and .430" diameter heaters.



#### Type R2

Mica washers with blockhead and through hole for lead wire connection. Eliminates the use of ring terminals. Available for .315" and .430" diameter heaters. Accepts 6-14 gauge wire.



#### Type E

Right-angle lug welded to pin with mica washer insulators and 10-32 binding head screw. Available for .260", .315" and .430" diameter heaters.

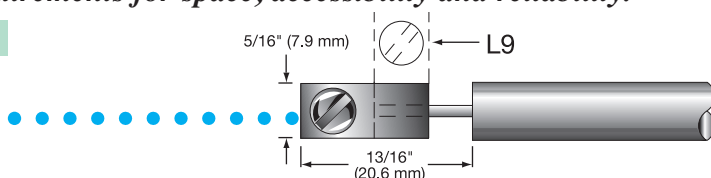


### Standard Tubular Heater Terminations for Cast-In Heaters

Select the termination style that meets your requirements for space, accessibility and reliability.

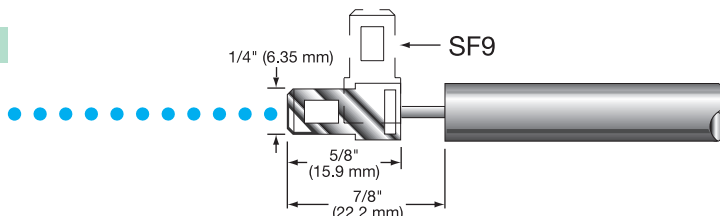
#### Type L & L9

Terminal lug spot welded to pin with 10-32 binding head screw. Available for .260", .315" and .430" diameter heaters. Type L represents straight; Type L9 represents 90° to pin. Specify lug orientation.



#### Type SF & SF9

Quick-disconnect spade tabs spot welded to pin. Available for .260", .315" and .430" diameter heaters. Type SF represents straight. Type SF9 represents 90° to pin. Specify tab orientation.



#### Type F

Flexible lead: insulated stranded wire crimped to cold pin. Crimp connection is insulated with fiberglass sleeving. Available for .260", .315" and .430" diameter heaters. Wire insulation rated to 250°C, 450°C optional. Specify lead length.



#### Type R1

Flexible Armor Cable provides excellent protection to lead wires against abrasion and contaminants. Available for .260", .315" and .430" diameter heaters. Specify cable length and lead length. Style may vary from depiction depending on heater diameter and cable diameter used.



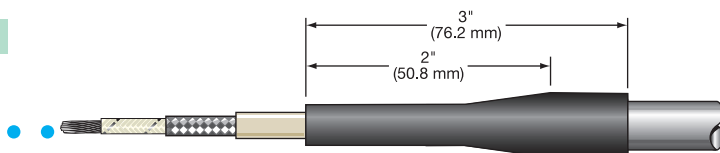
#### Type R1A

Stainless Steel Wire Overbraid provides flexibility and excellent protection to lead wires against abrasion. Available for .260", .315" and .430" diameter heaters. Specify stainless steel wire overbraid length and lead length. Style may vary from depiction depending on heater diameter and braid diameter used.



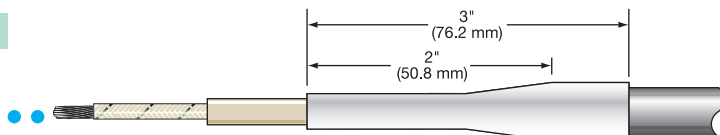
#### Type MR

Moisture resistant shrink strain relief and lead wire with or without stainless steel overbraid. Available for .260", .315" and .430" diameter heaters. Specify lead wire and overbraid length. Maximum operating temperature is 350°F (177°C).



#### Type TS

Contamination seal shrink-down Teflon® sleeving over the heater and lead wire splice. Provides a good moisture resistant seal. Maximum operating temperature 500°F (260°C). Available for .260", .315" and .430" diameter heaters. Specify lead length.



#### Type P1

Quick -disconnect plug, either mounted directly on casting or on elements ends offset a specified distance from casting. Rating: 16A-250VAC.





## Installation Recommendations

### Installation Recommendations for Cast-In Thermal Components

*Tempco Cast-In Heaters will provide long life and dependable, trouble-free service if properly installed, operated, and maintained as per the following recommendations:*

#### Installation

1. Allow sufficient space for thermal expansion. The amount of space required depends upon the Cast-In Heater size, operating temperature and alloy.
2. Surface being heated must be free of any foreign materials and have a smooth finish.
3. Make sure that the casting is properly seated. The clamping devices used should be tightened down to the correct recommended torque. After initial heat-up, retighten fasteners to the correct recommended torque.

#### Recommended Torque:

10 ft-lb for 1/4–5/16 bolts, 20 ft-lb for 7/16–5/8 bolts

5. Thermal insulation can be used to reduce heat losses.
6. Avoid mounting heaters in an atmosphere containing combustible gases and vapors unless specifically manufactured for use in such conditions.
7. Liquid Cooled Cast-In Heater fittings must be securely tightened to prevent leaks.
8. To prevent overheating and heater failure, adequate temperature controls should be installed. For assistance in selecting temperature controls and thermocouples, see Tempco's (in-stock) complete line of Plug-In type Proportional Temperature Controls for heating and cooling applications in Section 13. Also see the listing on standard and hot melt thermocouples in Section 14.

#### Wiring

1. For connections at the heater terminals, use high temperature nickel conductor or nickel clad copper lead wire or alloy bus bar. Keep all electrical connections properly protected to eliminate electric shock to machine operators.
2. Heaters of equal wattage and voltage can be connected in series for higher voltage.
3. Heater installations must be properly grounded to eliminate electric shock hazard, and wiring must comply with electrical codes.
4. Always have a qualified electrician perform all wiring and connection of heaters and control components. Terminals must be tightened to the correct torque (2.5 ft/lb for terminal connections).

**CAUTION:** Castings are not designed to be lifted or carried by the terminations or leads.

**Exposed electrical wiring on cast-in heater installations is a violation of Electrical Safety Codes including O.S.H.A.**



**Note:** See page 16-11 for Wiring Diagrams and page 15-2 for lead wire selection

#### Operation

1. It is recommended to slow start the process during first use.
2. Do not operate above rated voltage. Excess voltage will result in heater failure.
3. Do not operate Cast-In Heaters above recommended temperatures. Heater temperature must be monitored and controlled. Use of over-temperature T/C is strongly recommended for higher temperature applications. Excess temperatures will result in heater failure and/or melting.
4. Electrical terminals must be kept free of contaminants, as spillage of plastic, water, oils, and their vapors can cause electric shorts, resulting in heater failure.
5. Liquid Cooled Cast-In Heaters must not be cycled to operate simultaneously. Thermal stresses may result in shorter heater life.
6. The water used on Liquid Cooled Cast-In Heaters must be properly treated. Hard water contains corrosive media that will contaminate the tubing, producing stress corrosion cracks and resulting in shorter heater life. Presence of minerals in water can cause clogged tubes that can result in poor heat transfer and eventually heater failure.

#### Maintenance

1. Never perform any type of service on heaters prior to disconnecting all electrical power.
2. To ensure good surface contact, periodically check clamping. Retighten clamping to the correct torque when required.
3. Repeat cycling of temperature controls can indicate poor surface contact or a burned-out heater.
4. Heater terminals must be kept free of plastics, oil, water, and any other foreign matter. As these materials carbonize, they create electrical shorts.
5. Heater terminal electrical connections must be kept tight. Loose connections can overheat and eventual destroy the connection or the heater terminal.
6. Water lines must be periodically checked for leaks. Water on heater terminals can be detrimental to the entire heating system.
7. Thermocouples must be kept free of contaminants and be checked for good response to temperature changes. Our recommendation is to change them periodically, as a bad thermocouple can be the cause of destroying an entire heating zone.

..... **Complete Your Installation With** .....  
**Accessories Available From Stock**

Accessory	Catalog Section
* Stainless Steel Tubing and Fittings For Cooling Lines	3
* Pressure Transducers and Rupture Disks	12
* Temperature Controllers	13
* Temperature Sensors, Thermocouple Wire, Jacks & Plugs	14
* High Temperature Lead Wire & Fiberglass Tape, Ceramic Terminal Covers and Electric Plugs	15

**View Product Inventory @ [www.tempco.com](http://www.tempco.com)**