

Cast-In Cross Head Die Heaters for Plastics Extrusion Processing Equipment

Maximize Service Life on Difficult Extrusion Die Applications

Extrusion Cross Head and related extrusion dies present extremely challenging operating parameters to most conventional heating elements. This is primarily due to the presence of excessive contamination, high watt densities and high temperature as well as unusual physical and dimensional requirements.

Many processors continue to use ceramic and mica band heaters on this application, with frequently marginal results. In these instances, Cast-In Aluminum or Bronze heaters are recommended to substantially improve heater life expectancy and performance.

Cast-In Heaters are less susceptible to contamination problems, and can operate at higher temperatures with higher watt densities. In addition, the design is structurally better suited to accommodate holes and cutouts without compromising the heater's electrical and mechanical integrity.

As a standard, Cross Head Die Heaters are typically designed in aluminum as a one-piece band with a single slot that can be slid over the die and clamped with stainless steel clamping straps. For higher temperature or high watt density requirements, bronze or brass alloys can be used.

CUSTOM Manufactured

For sizes and ratings not listed, **TEMPCO** will design and manufacture a Cross Head Die Heater to meet your requirements.

Specify the following:

- Inside Diameter
- Outside Diameter
- Thickness
- Wattage and Voltage
- Termination Type (see pages 3-54 and 3-55)
- Alloy (Aluminum or Bronze)
- Special Features
- Machining Specifications
- Detailed Drawing



Standard Cross Head Die Heaters Design Features and Options:

- * Computer designed, precisely formed tubular heating element, optimizing the heat transfer pattern.
- * Variety of termination options, including terminal enclosure housings.
- * Optional 1/4", 3/8" or 1/2" cooling tubes cast into the cross head die body for liquid cool function.
- * Variety of shapes and sizes.
- * Aluminum and bronze alloys.
- * Through holes, tap holes or cutouts to facilitate mounting or obstructions.
- * Precision machining of one or all surfaces of casting – specify your individual requirements.



Note: Part numbers are for aluminum heaters unless otherwise specified.

Stock and Standard (Non-Stock) Cross Head Die Cast-In Heaters (Stock Items Are Shown In RED)

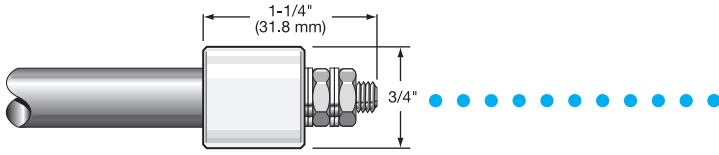
I.D. in	O.D. in	Length in	Thickness in	Watts	Volts	Special Features	Part Number
2.500	4.000	2.625	0.750	750	240	Bronze, (3) 5/8" dia. holes, C7 terminal box	CBH01913
3.000	4.500	4.000	0.750	1200	240	Bronze, (3) 3/4" dia. holes, 2" dia. cutout, R1 cable 70", 72" leads	CBH02634
3.248	5.248	3.000	1.000	750	230	(3) 3/4" dia. holes, P2 plug, 92" cable, 102" leads	CBH05491
3.248	5.25	3.000	1.000	750	230	(3) 3/4" dia. holes, EP box	CBH03741
3.248	5.25	3.000	1.000	750	230	(3) 3/4" dia. holes, EP box, 72" cable, 78" leads	CBH09274
3.250	5.250	3.000	1.000	1000	240	Bronze, (2) 3/8" and (1) 7/8" dia. hole, (1) 1 1/4" Lg. cutout EP box	CBH04153
3.250	5.25	5.625	1.000	1200	230	(2) 3/4" & (2) 7/8" dia holes, 1" slot, EP box, 72" cable, 84" leads	CBH09275
4.000	6.000	3.100	1.000	1200	240	EP Terminal box, (3) 3/4" dia. holes	CBH03979
5.000	6.500	2.250	0.750	700	240	Bronze, bolt clamp, (4) 3/4" dia. holes	CBH03753
5.000	6.500	5.875	0.750	2400	240	Bronze, (1) 2 1/2" dia. hole, (2) 7/8" dia. holes	CBH01382
5.000	7.000	6.500	1.000	3000	460	Brass, CT, EP box, 2.125 x 1.688 cutout	CBH09123
5.687	7.750	8.500	1.031	3000	230	Bronze, CT, EP box, 2.375 x 1.562 cutout	CBH09150
5.998	8.000	4.313	1.000	2400	230	Brass, EP box, (1) 3/4" dia. hole, 2.125 x 1.688 cutout	CBH09180
6.000	8.000	4.313	1.000	2400	240	C2 box, (2) 3/4" dia holes	CBH06161
6.000	8.000	4.313	1.000	2400	460	EP Terminal box, (1) 2 3/8" Lg. cutout, (2) 3/4" dia. holes	CBH04030
7.500	9.500	8.875	1.000	4000	460	Brass, CT, EP box, 2.750 x 1.875 cutout	CBH09124

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

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Standard Tubular Heater Terminations for Cast-In Heaters

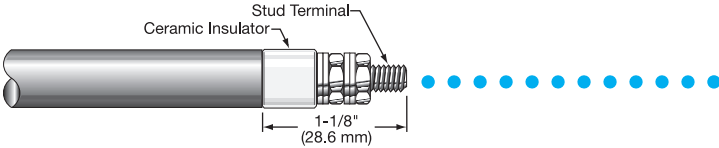
Select the termination style that meets your requirements for space, accessibility and reliability.



Type S Standard Unless Otherwise Specified

Heavy Duty Ceramic Insulators.

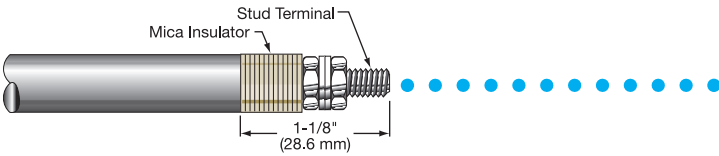
- .315" diameter heater has 8-32 screw terminals.
- .430" diameter heater has 10-32 screw terminals.



Type T7

Ceramic insulator is the same diameter as the heating element.

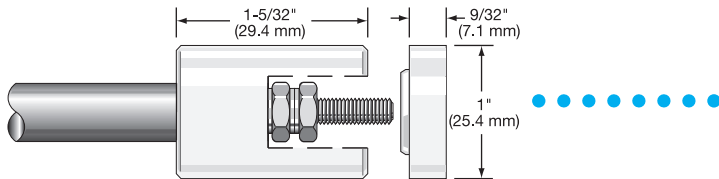
- .260" diameter heater has 6-32 screw terminals.
- .315" diameter heater has 8-32 screw terminals.
- .430" diameter heater has 10-32 screw terminals.



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.

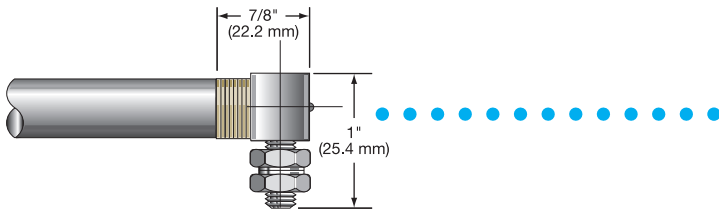
- .315" diameter heater has 10-32 screw terminals.
- .430" diameter heater has 10-32 screw terminals.



TYPE P—Plain Pin

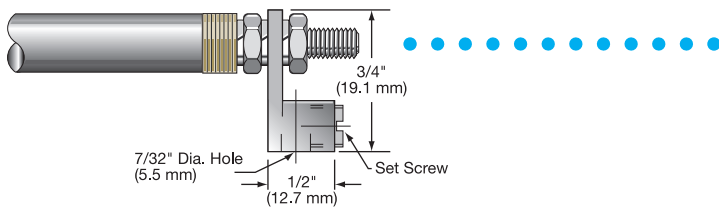
Plain terminal pin. Specify Length "L." Standard 1/2" (12.7 mm) pin length.

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



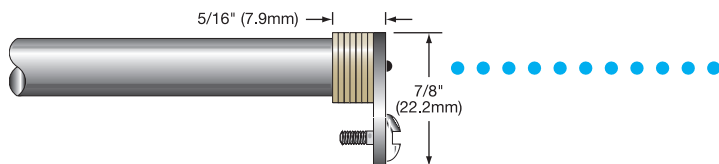
Type R

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

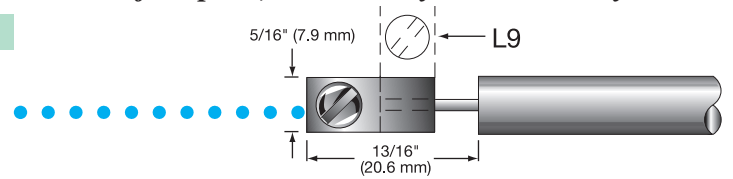
Right-angle lug welded to pin with mica washer insulators and 10-32 binding head screw. Available for .260", .315" and .430" diameter heaters.

Standard Tubular Heater Terminations for Cast-In Heaters

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

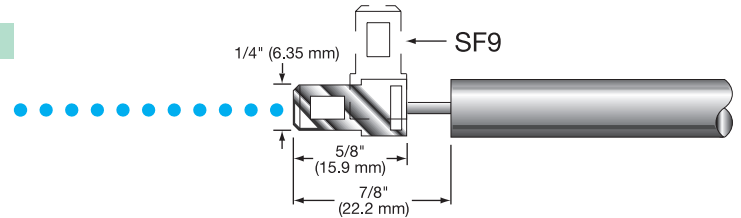
Type L & L9

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.



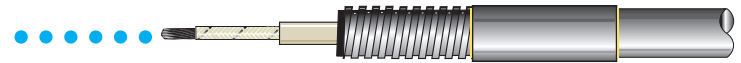
Type F

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.



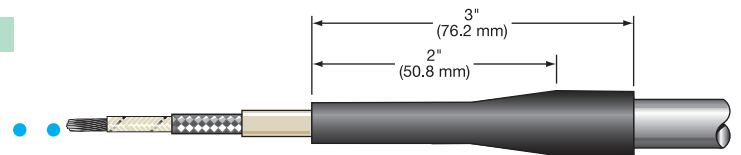
Type R1A

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.



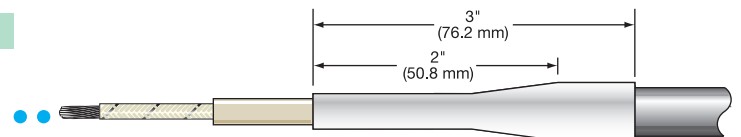
Type MR

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" and 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

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