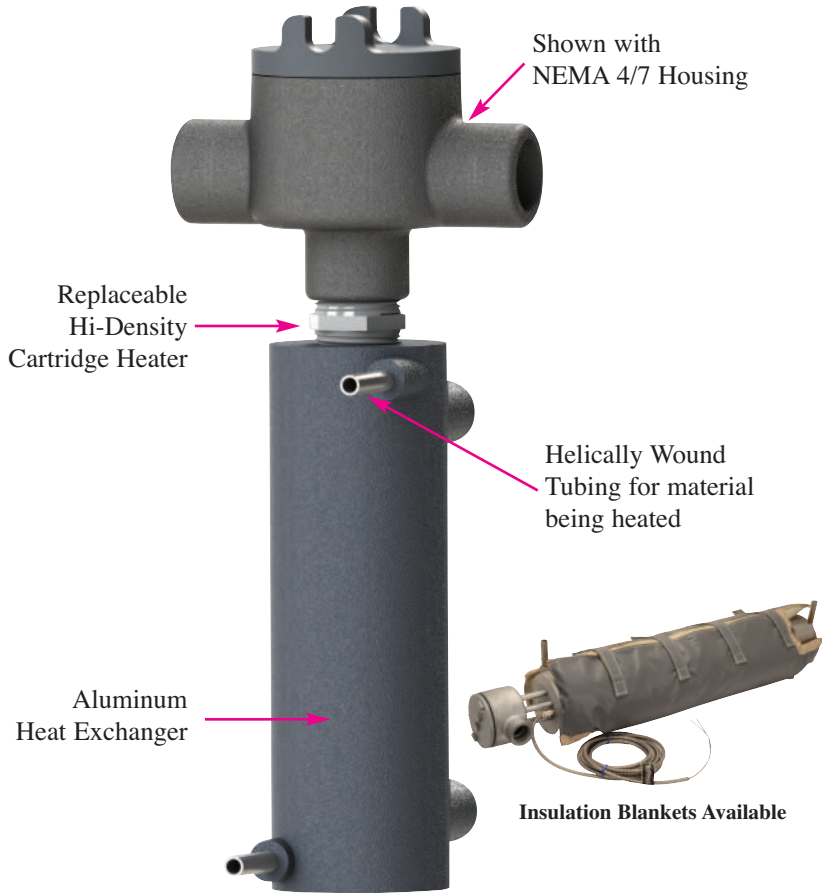


### CHX-100 Series Circulation Heater



#### Standard Design Features

- \* Seamless 316 SS Tubing for fluid flow
- \* Replaceable 5/8" diameter Hi-Density Cartridge Heater
- \* Cast Aluminum heat exchanger body
- \* Operating pressure up to 3200 PSI
- \* Operating temperature up to 650°F (343°C)
- \* NEMA 4/7 enclosure with standoff standard

#### Optional Design Features

- \* Process Thermocouple
- \* Overtemperature Thermocouple
- \* High Limit Thermostat
- \* Incoloy Tubing
- \* Cast Bronze Heat Exchanger Body: Operating pressure up to 1400 psi @ 1200°F (649°C)

#### Typical Applications

- Solvent heating (MEK, NMP, ACT, EKC, others)
- Heating of Air, CO<sub>2</sub>, Nitrogen and similar gases
- Heating of non-flammable gases
- De-ionized water heating
- Steam generation
- Glycol heating
- Heating ink in printing
- Diesel and Fuel heating
- Packaging sterilization
- Analytical instrumentation
- Food and beverage heating
- Coating and Paint heating

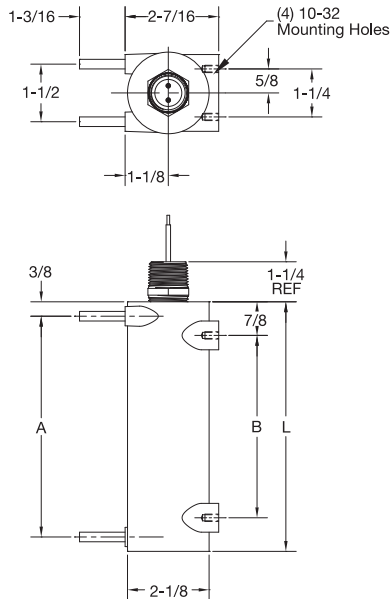
#### Construction

The CHX-100 circulation heater is a compact lightweight unit used for heating gases or liquids. The material being heated is pumped through the coiled seamless 316 SS tubing which has been cast into an aluminum body that acts as the heat exchanger. A replaceable Hi-Density cartridge set into a hole bored into the aluminum is the heat source. The material being heated never comes into contact with the HD cartridge heater.

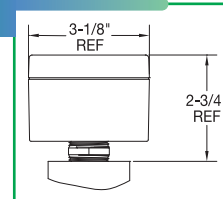
#### Standard (Non-Stock) Sizes and Ratings

Heater Length (in)	Watts	Volts	Terminal Box Type	Tube Fitting Type	Thermocouple				Thermostat	Part Number
					Calibration Type	Style	Termination Type	Lead Length (in)		
6.5	300	120	Nema 4/7	—	J	Spring Adjustable	Std. Plug	60	—	CHX10010
6.5	300	208	—	—	—	—	—	—	Yes	CHX10070
6.5	300	240	Nema 4	—	K	Armor Cable Adjustable	Std. Plug	48	—	CHX10085
6.5	500	240	Nema 4	—	J	Spring Adjustable	Spade Lugs	48	—	CHX10135
6.5	500	208	Nema 4/7	—	—	—	—	—	Yes	CHX10148
6.5	750	208	—	—	J	Spring Adjustable	Spade Lugs	36	—	CHX10165
6.5	750	240	Nema 4	—	K	Armor Cable Adjustable	Std. Plug	60	—	CHX10182
12.5	900	240	Nema 4/7	HS	—	—	—	—	Yes	CHX10210
12.5	1000	240	Nema 4/7	—	K	Armor Cable Adjustable	Std. Plug	60	—	CHX10220
12.5	1200	240	Nema 4/7	HS	J	Spring Adjustable	Spade Lugs	36	—	CHX10235
12.5	1500	240	Nema 4/7	—	K	Armor Cable Adjustable	Std. Plug	48	—	CHX10242
12.5	1500	120	Nema 4/7	HS	K	Armor Cable Adjustable	Std. Plug	60	—	CHX10248

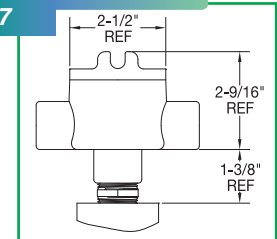
### CHX-100 Series Circulation Heater



NEMA 4



NEMA 7



### Ordering Information

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

Length "L"	Inlet-to-Outlet Centerline "A"	Mounting Holes "B"	Flow Tube OD	Flow Tube Material	Used with Insulation Blanket
6.5	5.75	4.75	1/4	316 SS Seamless	BLK50001
12.5	11.75	10.75			BLK50002

#### Heater Specifications:

##### Dimensions

Length "L":  6.5"  12.5"  Custom \_\_\_\_\_

##### Electrical Specifications

Watts \_\_\_\_\_ (3,000W Max.) Volts \_\_\_\_\_ (240V Max., Single Phase only)

##### Termination Type

Type CN – NPT Fitting with 10" Leads

##### Terminal Protection Box

NEMA 4  NEMA 7

##### Flow Tube Fittings

None  "FF" Flared Seal Fitting  "HS" Hi-Seal Fitting  
(See page 3-52 for complete details.)

#### Optional Temperature Sensor Specifications:

##### Calibration

Type J  Type K

##### Bayonet Style T/C

None  "Style 1" Spring Adjustable  "Style 2" Armor Cable Adjustable  
(See page 14-3 for complete details.)

##### Termination

"Style B" 2-1/2" Split Leads  "Style S" Spade Lugs  "Style P" Standard Plug  
(See page 14-9 for details.)

##### Length

36"  48"  60"  72"  96"  120"  144"

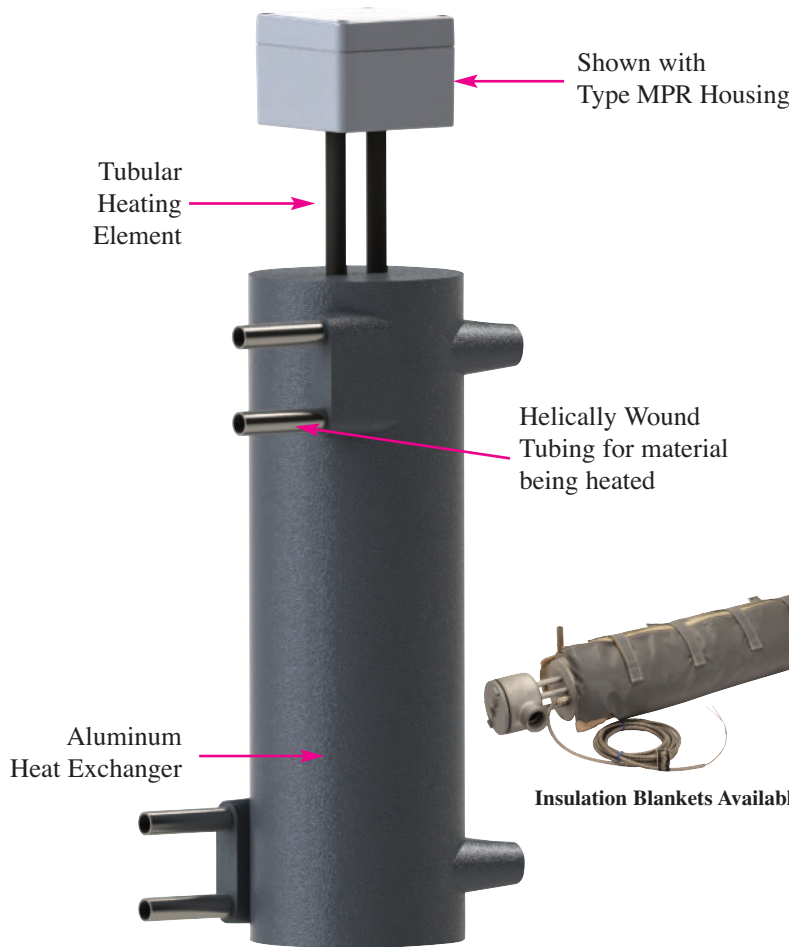
#### Optional Thermostat:

##### Thermostat

High Limit Manual Reset (Standard)  High Limit Automatic Reset (Optional)  
(See page 13-76 through 13-79 for details.)

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

### CHX-200 Series Circulation Heater



#### Standard Design Features

- \* Seamless 316 SS Tubing for fluid flow
- \* Cast-In Tubular Heater
- \* Cast Aluminum heat exchanger body
- \* Operating pressure up to 3000 PSI
- \* Operating temperature up to 650°F (343°C)
- \* Type C2 (General Purpose) housing with standoff

#### Optional Design Features

- \* Process Thermocouple
- \* Overtemperature Thermocouple
- \* Type MPR (Moisture Resistant) or Type EP (Explosion Resistant) Housings
- \* Incoloy Tubing
- \* Cast Bronze Heat Exchanger Body: Operating pressure up to 1400 psi @ 1200°F (649°C)

#### Typical Applications

- ♦ Solvent heating (MEK, NMP, ACT, EKC, others)
- ♦ Heating of Air, CO<sub>2</sub>, Nitrogen and similar gases
- ♦ Heating of non-flammable gases
- ♦ De-ionized water heating
- ♦ Steam generation
- ♦ Glycol heating
- ♦ Heating ink in printing
- ♦ Diesel and Fuel heating
- ♦ Packaging sterilization
- ♦ Analytical instrumentation
- ♦ Food and beverage heating
- ♦ Coating and Paint heating

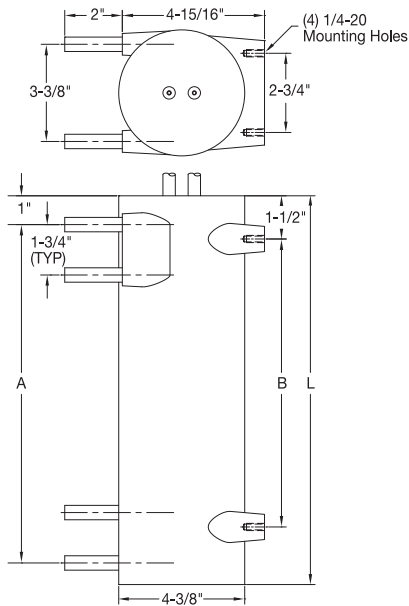
#### Construction

The CHX-200 circulation heater is a compact lightweight unit used for heating gases or liquids. The material being heated is pumped through the coiled seamless 316 SS tubing which has been cast into an aluminum body that acts as the heat exchanger. A tubular heating element is the heat source. The material being heated never comes into contact with the heating element.

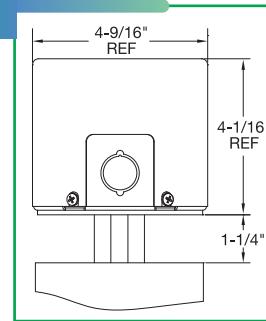
#### Standard (Non-Stock) Sizes and Ratings

Heater Length (in)	Watts	Volts	Phase	Termination Type	Terminal Box Type	Tube Config.	Tube Fitting Type	Thermocouple			T-Stat	Part Number	
								Calibration Type	Style	Termination Type			Lead Length (in)
13.5	1500	240	1	T7	Type EP	Single	—	J	Spring Adjustable	Std. Plug	48	—	CHX20015
13.5	1500	480	1	T7	—	Single	—	—	—	—	—	—	CHX20022
13.5	2250	240	1	T	Type C2	Single	—	K	Armor Cable Adjustable	Std. Plug	60	—	CHX20037
13.5	1500	208	1	T	Type C2	Single	—	J	Spring Adjustable	Spade Lugs	48	—	CHX20042
13.5	3000	240	1	T7	Type MPR	Single	—	—	—	—	—	—	CHX20065
19.5	3000	240	1	T7	—	Single	—	J	Spring Adjustable	Spade Lugs	60	—	CHX20072
19.5	3000	208	1	T	Type C2	Single	—	K	Armor Cable Adjustable	Std. Plug	48	Yes	CHX20084
19.5	4500	240	3	T7	Type MPR	Single	HS	—	—	—	—	—	CHX20086
19.5	3000	240	1	T	Type C2	Dual	—	K	Armor Cable Adjustable	Std. Plug	48	—	CHX20094
19.5	4500	240	1	T	Type C2	Single	HS	J	Spring Adjustable	Spade Lugs	60	Yes	CHX20098
25.5	6000	480	1	T7	Type MPR	Dual	—	K	Armor Cable Adjustable	Std. Plug	48	—	CHX20105
25.5	7500	480	1	T7	Type MPR	Single	HS	K	Armor Cable Adjustable	Std. Plug	60	—	CHX20112
25.5	9000	240	3	T7	Type EP	Dual	—	K	Armor Cable Adjustable	Std. Plug	60	—	CHX20118
25.5	12000	240	3	T7	Type EP	Dual	—	K	Spring Adjustable	Std. Plug	60	—	CHX20122
25.5	12000	480	3	T7	Type EP	Single	—	K	Armor Cable Adjustable	Std. Plug	48	—	CHX20132

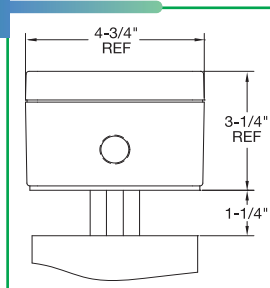
### CHX-200 Series Circulation Heater



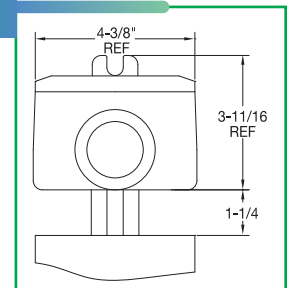
Type C2



Type MPR



Type EP



Length "L"	Inlet-to-Outlet Centerline "A"	Mounting Holes "B"	Flow Tube OD	Flow Tube Material	Used with Insulation Blanket
13.5	11.75	10	1/2	316 SS Seamless	BLK50003
19.5	17.75	16			BLK50004
25.5	23.75	22			BLK50005

### Ordering Information

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

#### Heater Specifications:

##### Dimensions

Length "L":  13.5"  19.5"  25.5"  Custom \_\_\_\_\_

##### Electrical Specifications

Watts \_\_\_\_\_ (12,000W Max.) Volts \_\_\_\_\_ (480V Max.)

Single-Phase  Three-Phase

##### Termination Type

Type "T"  Type "T7" (See page 3-54 for details.)

##### Terminal Protection Box

Type C2  Type MPR  Type EP (See pages 3-56 & 3-57 for details)

##### Flow Tube Configuration

Single  Dual

##### Flow Tube Fittings

None  "FF" Flared Seal Fitting  "HS" Hi-Seal Fitting  
(See page 3-52 for details.)

#### Optional Temperature Sensor Specifications:

##### Calibration

Type J  Type K

##### Bayonet Style T/C

None  "Style 1" Spring Adjustable  "Style 2" Armor Cable Adjustable  
(See page 14-3 for complete details.)

##### Termination

"Style B" 2-1/2" Split Leads  "Style S" Spade Lugs  "Style P" Standard Plug  
(See page 14-9 for details.)

##### Length

36"  48"  60"  72"  96"  120"  144"

#### Optional Thermostat:

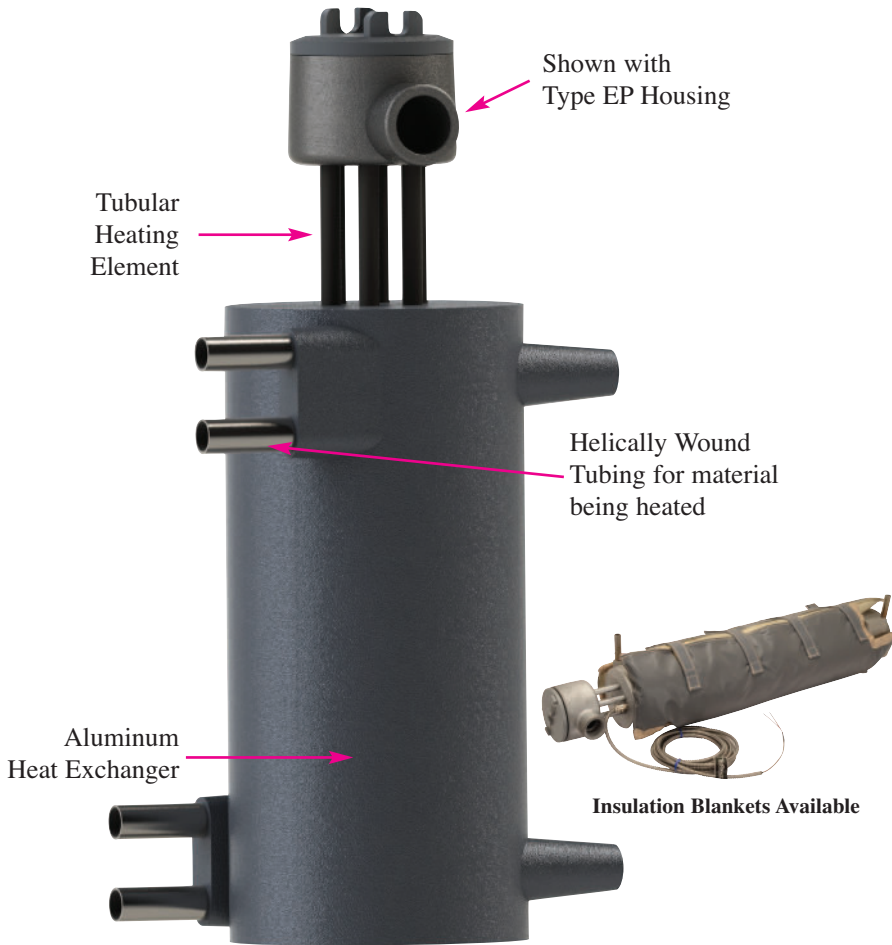
##### Thermostat

SPST  DPST

**NOTE:** DPST requires larger Type C2 enclosure. Specify when ordering.  
(See page 13-76 through 13-79 for details.)

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

### CHX-300 Series Circulation Heater



#### Standard Design Features

- \* Seamless 316 SS Tubing for fluid flow
- \* Cast-In Tubular Heater
- \* Cast Aluminum heat exchanger body
- \* Operating pressure up to 2600 PSI
- \* Operating temperature up to 650°F (343°C)
- \* Type C2 (General Purpose) housing with standoff

#### Optional Design Features

- \* Process Thermocouple
- \* Overtemperature Thermocouple
- \* Type MPR (Moisture Resistant) or Type EP (Explosion Resistant) Housings
- \* Incoloy Tubing
- \* Cast Bronze Heat Exchanger Body: Operating pressure up to 1400 psi @ 1200°F (649°C)

#### Typical Applications

- ♦ Solvent heating (MEK, NMP, ACT, EKC, others)
- ♦ Heating of Air, CO<sub>2</sub>, Nitrogen and similar gases
- ♦ Heating of non-flammable gases
- ♦ De-ionized water heating
- ♦ Steam generation
- ♦ Glycol heating
- ♦ Heating ink in printing
- ♦ Diesel and Fuel heating
- ♦ Packaging sterilization
- ♦ Analytical instrumentation
- ♦ Food and beverage heating
- ♦ Coating and Paint heating

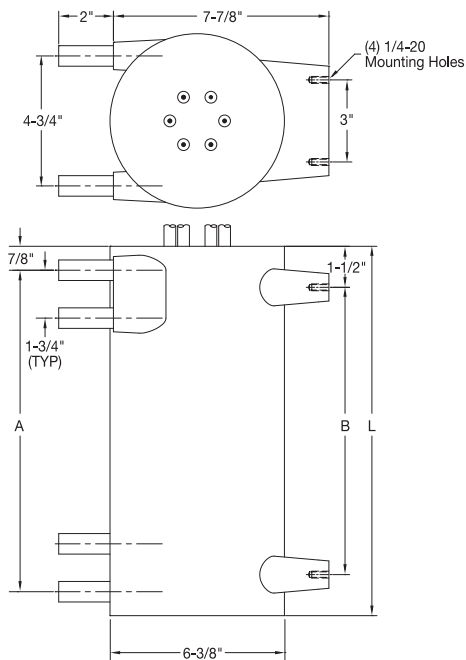
#### Construction

The CHX-300 circulation heater is a compact lightweight unit used for heating gases or liquids. The material being heated is pumped through the coiled seamless 316 SS tubing which has been cast into an aluminum body that acts as the heat exchanger. A tubular heating element is the heat source. The material being heated never comes into contact with the heating element.

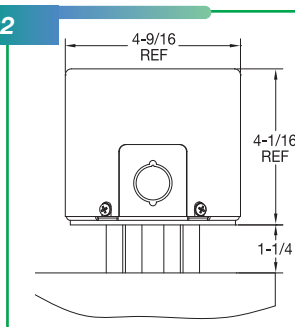
#### Standard (Non-Stock) Sizes and Ratings

Heater Length (in)	Watts	Volts	Phase	Termination Type	Terminal Box Type	Tube Config.	Tube Fitting Type	Thermocouple			T-Stat	Part Number	
								Calibration Type	Style	Termination Type			Length (in)
13.5	3000	240	1	T7	Type EP	Single	—	J	Spring Adjustable	Std. Plug	48	—	CHX30012
13.5	3000	480	1	T7	—	Single	—	—	—	—	—	—	CHX30016
13.5	4500	240	1	T	Type C2	Single	—	K	Armor Cable Adjustable	Std. Plug	36	—	CHX30022
13.5	3000	208	1	T	Type C2	Single	—	J	Spring Adjustable	Spade Lugs	48	—	CHX30028
13.5	4500	240	1	T7	Type MPR	Single	HS	—	—	—	60	Yes	CHX30036
19.5	6000	240	1	T7	—	Single	—	J	Armor Cable Adjustable	Spade Lugs	60	—	CHX30044
19.5	6000	480	1	T	Type C2	Dual	—	K	Spring Adjustable	Std. Plug	48	Yes	CHX30048
19.5	7500	240	3	T7	Type MPR	Single	HS	—	—	—	—	—	CHX30054
19.5	7500	480	3	T	Type C2	Dual	—	K	Armor Cable Adjustable	Std. Plug	60	—	CHX30056
19.5	9000	480	3	T	Type C2	Single	HS	J	Spring Adjustable	Spade Lugs	48	—	CHX30062
25.5	12000	480	3	T7	Type MPR	Dual	—	K	Armor Cable Adjustable	Std. Plug	36	—	CHX30068
25.5	12000	480	3	T7	Type MPR	Dual	HS	K	Spring Adjustable	Std. Plug	60	—	CHX30071
25.5	12000	240	3	T7	Type EP	Dual	—	K	Armor Cable Adjustable	Std. Plug	48	—	CHX30075
25.5	18000	240	3	T7	Type EP	Dual	—	K	Spring Adjustable	Std. Plug	60	—	CHX30078
25.5	18000	480	3	T7	Type EP	Dual	—	K	Armor Cable Adjustable	Std. Plug	48	—	CHX30084

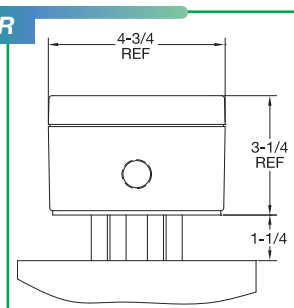
### CHX-300 Series Circulation Heater



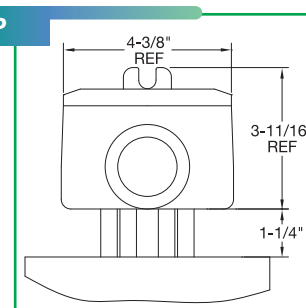
Type C2



Type MPR



Type EP



Length "L"	Inlet-to-Outlet Centerline "A"	Mounting Holes "B"	Flow Tube OD	Flow Tube Material	Used with Insulation Blanket
13.5	11.75	10	3/4	316 SS Seamless	BLK50006
19.5	17.75	16			BLK50007
25.5	23.75	22			BLK50008

### Ordering Information

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

#### Heater Specifications:

##### Dimensions

Length "L":  13.5"  19.5"  25.5"  Custom \_\_\_\_\_

##### Electrical Specifications

Watts \_\_\_\_\_ (30,000W Max.) Volts \_\_\_\_\_ (480V Max.)

Single-Phase  Three-Phase

##### Termination Type

Type "T"  Type "T7" (See page 3-54 for details.)

##### Terminal Protection Box

Type C2  Type MPR  Type EP (See pages 3-56 & 3-57 for details)

##### Flow Tube Configuration

Single  Dual

##### Flow Tube Fittings

None  "FF" Flared Seal Fitting  "HS" Hi-Seal Fitting (See page 3-52 for details.)

#### Optional Temperature Sensor Specifications:

##### Calibration

Type J  Type K

##### Bayonet Style T/C

None  "Style 1" Spring Adjustable  "Style 2" Armor Cable Adjustable  
(See page 14-3 for complete details.)

##### Termination

"Style B" 2-1/2" Split Leads  "Style S" Spade Lugs  "Style P" Standard Plug  
(See page 14-9 for details.)

##### Length

36"  48"  60"  72"  96"  120"  144"

#### Optional Thermostat:

##### Thermostat

SPST  DPST

**NOTE:** DPST requires larger Type C2 enclosure. Specify when ordering.  
(See page 13-76 through 13-79 for details.)

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

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

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

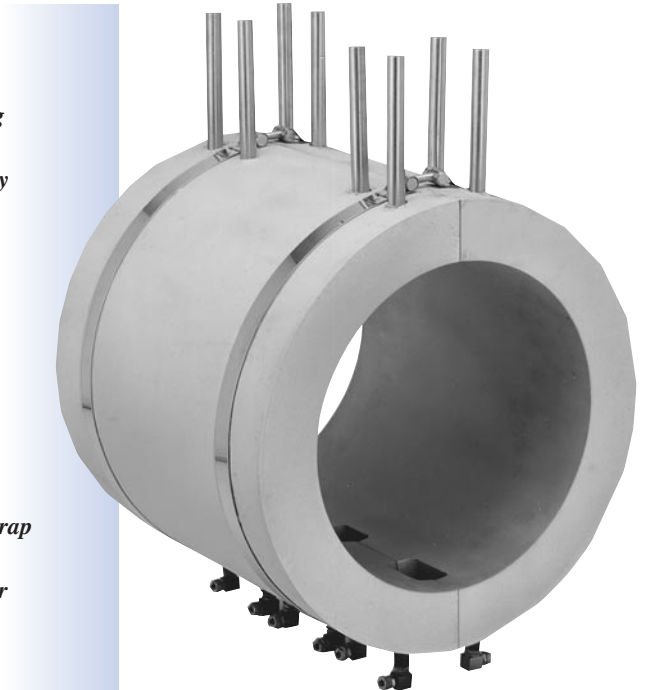
The Dual cooling tube design incorporates two sets of 3/8" or 1/2" diameter tubing formed into a serpentine or any other suitable shape within the same Cast-In Heater. Dual cooling tubes will actually double the operating life of a Cast-In Heater with liquid-cool function, since cooling tube failures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



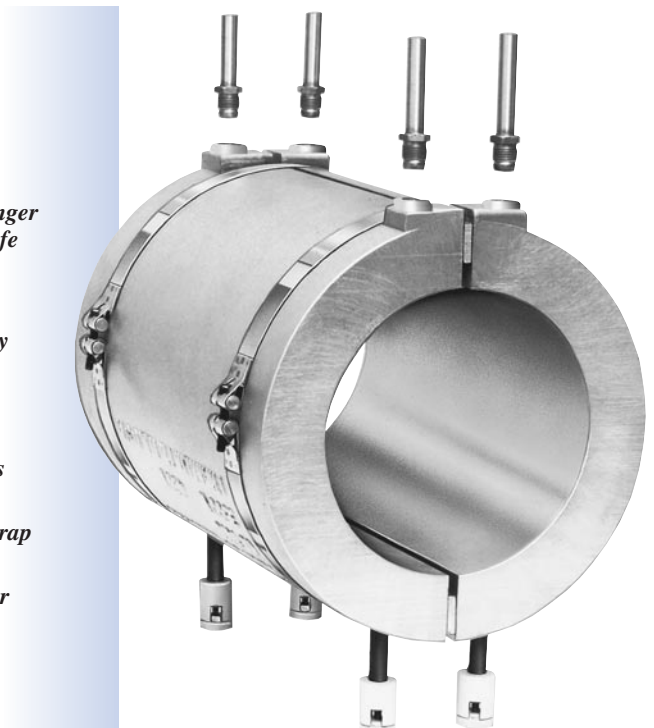
#### Type RC — Non-Exposed Cooling Tubes Recessed NPT Fittings

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



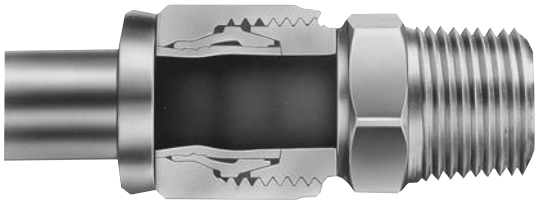
### Cooling Tube Termination Options for Liquid-Cooled Cast-In Band Heaters



#### 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

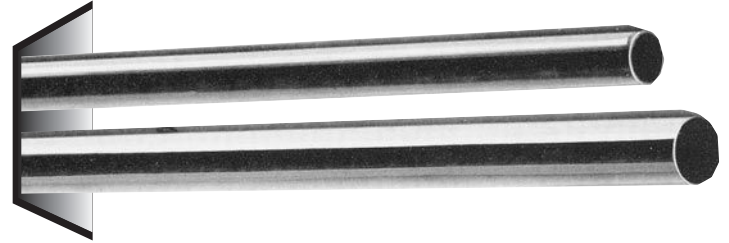
Straight threaded fitting is brazed to the cooling tube extensions, providing an easy and quick method for connecting cooling lines. Recommended to be factory installed to assure good braze seals. Available for 3/8" and 1/2" diameter tubing with internal threads. If required, specify.

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).

### General Purpose Terminal Protection Boxes For Cast-In Heaters

#### Standard Box Type C2

Terminal Boxes provide a simple and economical means to eliminate exposed heater terminals and live electrical wiring, protecting employees from potential electrical shock. They also eliminate electrical shorts that can result from exposed wiring on Cast-In Heater installations.

Type C2 is an individual terminal box for protecting the terminals on each Cast-In Band Heater half. It is also used on many other Cast-In Heater designs with one set of heater terminals. The C2 box design requires a flat pad on half-round castings or a flat surface on other casting designs for mounting. It is made from heavy gauge, rust-resistant sheet metal. The cover is removable for easy access to terminals. The box has two 7/8" diameter knockouts opposite each other for standard 1/2" BX connectors.

To simplify installation, Cast-In Heaters fitted with boxes can be factory pre-wired with high temperature lead wire that can be protected with armor cable. If one of these options is required, **specify terminal box type, lead wire and cable length**. Satisfies NEMA 1 requirements.

Standard C2 box size: L = 4" W = 2-1/2" H = 2-1/8"



#### Terminal Protection for Both Heater Halves Type C7

Type C7 terminal boxes are made from rust-resistant sheet metal. The C7 base is fixed to the clamping straps. The box has two 7/8" diameter knockouts opposite each other for standard 1/2" BX connectors. The cover is removable, providing easy access to the screw terminals for electrical wiring.

To simplify installation, Cast-In Heaters fitted with boxes can be factory pre-wired with high temperature lead wire, protected with armor cable. If either one of these options is required, **specify terminal box type, lead wire and cable length**. Satisfies NEMA 1 requirements.

C7 Terminal Box Size varies with dimensions of casting.



#### Quick-Disconnect High Temperature Cup and Box Assembly Type P2

Quick-Disconnect Cup assemblies provide the simplest and safest means for applying power to any type of Cast-In Heater installation. The box extends over the screw terminals on both Cast-In Band Heater halves. The combination of prewired cup and box assembly, along with factory prewired high temperature lead wire protected with armor cable, eliminates live exposed heater terminals and electrical wiring, protecting employees from electrical shock and the possibility of electrical shorts due to exposed wiring.

If prewired plugs are required, **specify length of lead wire and cable**.

Rated 250V maximum, 15 Amp maximum

Terminal Box Size varies with dimensions of casting.



### Terminal Protection Boxes for Cast-In Heaters



#### Type EP Explosion and Moisture Resistant Box

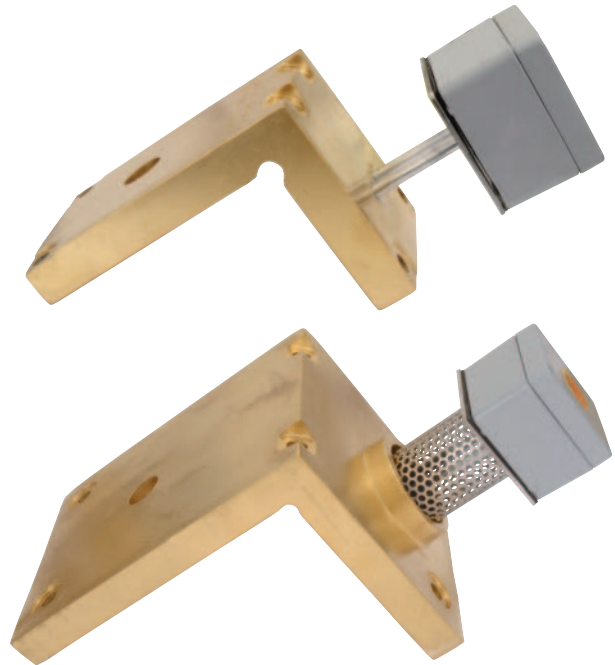
Cast iron explosion and moisture resistant boxes should be used in areas where the surrounding air may become contaminated with combustible gases or a high humidity level may exist. Installation requires one box per Cast-In Heater half and they are brazed to the tubular heater. The standard box has one 1/2" NPT hub.

**Optional:** Two hubs per box available. Cast-In Heater fitted with boxes can be factory prewired with high temperature lead wire, protected with special armor cable. If either of these options is required, please specify the following:

- Number of hubs
- Cable type
- Lead wire length
- Cable length

#### Type MPR Moisture Resistant Box

This design has a moisture resistant die cast aluminum box with a non-removable polyurethane gasket in the lid. Lid is secured with captive stainless steel screws. Body and lid are painted in basic industrial gray; interior contains copper ground screw. Box is mounted to a plate that is brazed to the element. Available in a wide variety of sizes.



#### Type MR1 Moisture Resistant Box with Perforated Shield

This design incorporates the MPR housing style along with a perforated tube shielding unheated extensions of the tubular heating elements. This feature provides mechanical strength to the element extension and prevents overheating of the terminals, reducing possible premature failure from corrosion and oxidation.



#### Type CB

A cast box mounted directly on the casting is used to protect the termination.

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

## 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** .....  
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* 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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