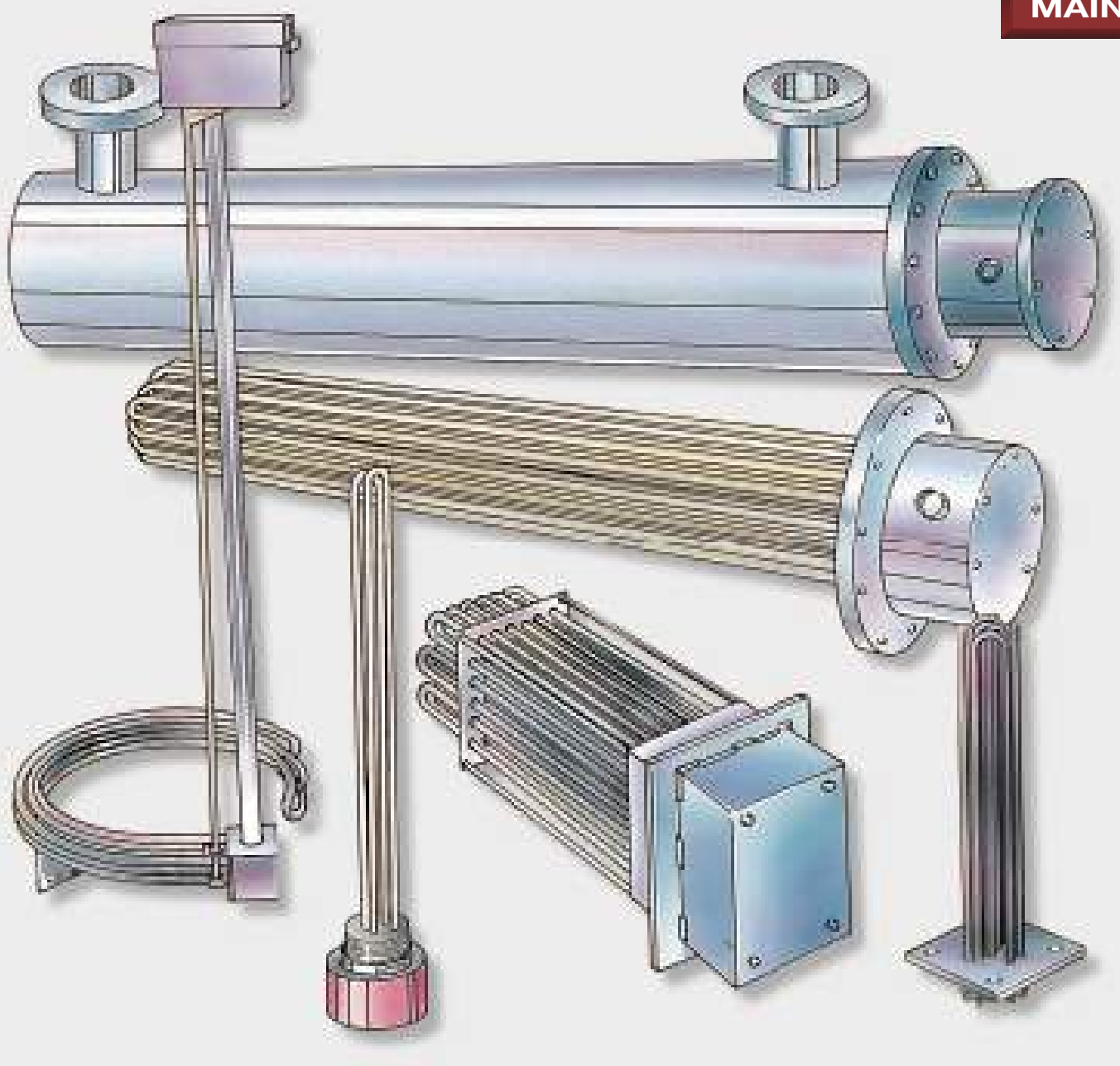


SECTION 11

TUBULAR INDUSTRIAL PROCESS HEATERS

Tempco Offers One-Stop Shopping for Process Heaters

Tempco offers you the most complete selection of quality engineered and built heaters extending from basic products for liquid immersion heating to highly engineered process circulating heating systems including power and temperature control instrumentation.

Your every need has been anticipated in the variety of designs and large selection of standard physical sizes, watt densities (watts/in^2) and electrical ratings available. Electric Process heaters are the most efficient method for heating water, light to heavy oils, heat transfer fluids, air and other gases, and for generating superheated steam. Depending upon the sheath material some corrosive solutions may be heated as well.

We realize not every process heating application can be solved with one of our standard products. But it is our engineering talent and vast application knowledge that provide us a winning combination for solving specific problems with the right process heater and/or system. Our solutions help our customers and create new opportunities for Tempco.

Tempco believes that if we are going to be your supplier tomorrow—we've got to roll up our sleeves and take care of your requirements today!

Screw Plug Immersion Heaters

(See pages 11-6 through 11-15)

Screw Plug Immersion Heater designs consist of tubular heating elements formed into a hairpin, and a thermowell for a thermostat sensing bulb. Both are welded or silver brazed to the screw plug depending upon the sheath and screw plug material. The number of heating elements varies from 1 to 3 depending on the screw plug size.

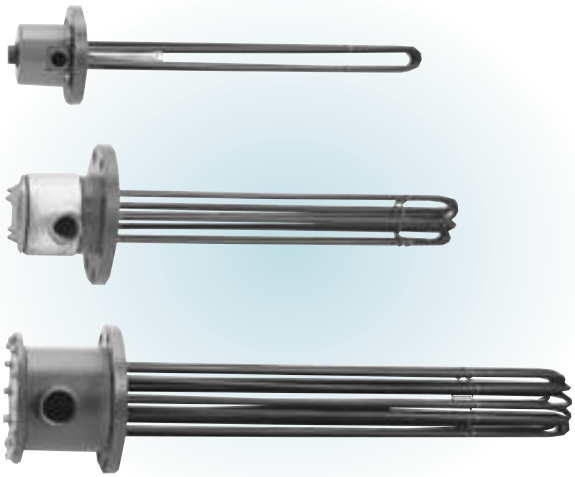
Screw Plug— Brass Steel and Stainless Steel in 1", 1¼", 2" and 2½" NPT sizes.

Sheath material—Copper, Steel, Incoloy® and Stainless Steel.

Terminal Housing—Heater terminals are sealed against moisture and protected by a NEMA 1 general purpose housing. Moisture and explosion resistant housings are optional.

Temperature control—Optional single and double thermostats in a wide selection of temperature ranges available.

Self-Contained immersion heaters are used for commercial dishwashers and sterilizing equipment. Easily engineered into new equipment for water heating applications. Supplied Turnkey ready—2" NPT brass screw plug, Incoloy® elements, thermostat, high limit cut-out with manual reset, magnetic contactor, pilot light and spray resistant housings.



Flanged Immersion Heaters

(See pages 11-16 through 11-29)

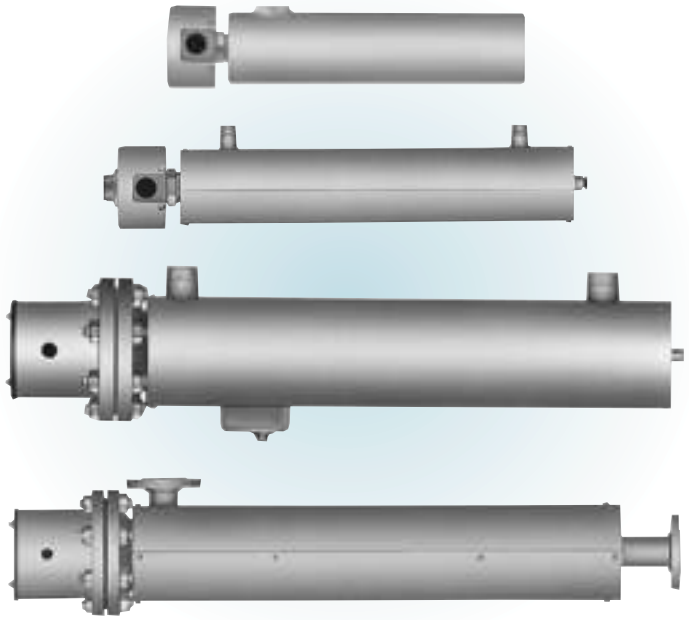
Flanged Immersion Heaters consist of multiple tubular heating elements formed into hairpins that are welded or brazed to a pressure rated flange. Typical 150 lb Flange Sizes are 3", 4", 5", 6", 8", 10", 12" and 14". The number of elements and electrical circuits vary depending on the size and electrical rating of the heater.

Flanged Immersion Heaters are installed by bolting the heater flange to a mating flange of equal pressure rating. The mating flange can be welded directly to a tank or vessel, or to a pipe extension. Use a flange gasket of a suitable material for the pressure, temperature and material being heated.

Terminal Housing— Heater terminals are sealed against moisture and protected by a NEMA 1 general purpose housing. Moisture and explosion resistant housings are optional.

Temperature control— A thermowell for a ⅜" diameter thermostat sensing bulb is standard. For applications requiring a more efficient and precise means of temperature control, Tempco offers a complete line of solid state power and temperature control instrumentation using thermocouple sensors.

Pictorial Index



Circulation Heaters (See pages 11-30 through 11-51)

Mightybooster™ In-Line Heaters

Mightybooster™ in-line heaters consist of a thermostatically controlled 1¼" steel or brass screw plug heater mounted in a pressure vessel and are ideal for low kilowatt applications.

Circulation Heaters

Circulation Heaters consist of Screw Plug or Flanged Immersion Heaters, depending on kilowatt rating and size, mated to a pressure vessel. Standard design features include thermal insulation wrapped around the vessel to reduce heat losses, protected by an outer sheet metal jacket and a NEMA 1 terminal housing. Inlet and outlet connections for 3", 5" and 8" flange sizes are pipe nipple extensions with NPT threads. For 10", 12" and 14" flange sizes 150 lb. slip-on flanges are welded to pipe extensions. All welded joints on the vessel and heater are hydrostatic pressure tested.

Circulation Heaters are extremely efficient, supplied turnkey ready for process in-line heating of numerous substances, solutions, air and other gases and for generating super heated steam. They can be connected as booster heaters, into closed loop systems or mounted on the side of storage tanks. Mounting brackets provide easy and quick installation.

TEMPCO Circulation Systems include a circulation heater and power control panel skid mounted in a compact package to use minimal floor space. Heater can be vertical mounted (shown) or horizontal mounted.

The pre-wired panel contains a process temperature control and a manual reset overtemperature control. The Zero Voltage Fired SCR power controller provides proportional power to the heater load for precise temperature control.

Flanged Immersion Heaters for Plastics Processing and Other Industries

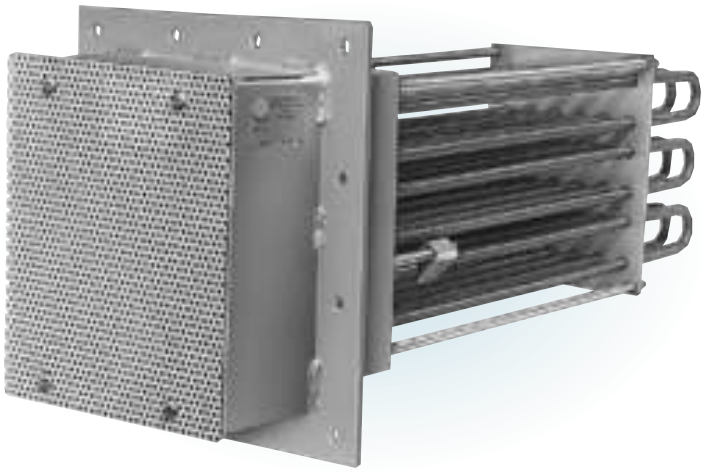
(See pages 11-52 through 11-55)

This design consists of tubular heating elements silver brazed or TIG welded to a flange cut from steel or stainless steel plate. Flange plate size, thickness and shape are determined by the application. A fiber gasket is supplied with each heater.

The various style heaters listed in stock are direct replacements for heaters in many OEM applications.

This type construction also lends itself to be easily and economically engineered into new equipment.

Pictorial Index



Process Air Duct Heaters (See pages 11-56 through 11-61)

Duct Heater designs consist of heavy duty .430 diameter tubular heaters formed into a hairpin and mounted to a heavy gauge steel frame. The elements are held in place by a quick-release removable bracket, providing easy field replacement of failed elements.

A NEMA 1 terminal housing with a steel perforated cover provides element wiring protection and aids cooling.

Terminals and electrical wiring are insulated from the process temperature by 4" of mineral insulation located at the retainer box between the heated element section and the terminal housing. A built-in thermowell for a ¼" diameter thermocouple provides element sheath temperature surveillance to prevent over-temperature conditions.

Duct Heaters are rugged, compact and dependable, providing cleaner and safer low pressure heated air through forced air ducts at maximum temperatures of 750°F (399°C). Typical applications are ovens, curing and drying processes.

Power Control Panels for Process Heaters

(See pages 11-62 through 11-63)

Power and Temperature Control Panels are essential for controlling and maintaining set point temperatures. For applications requiring highly accurate process controls.

Features include: NEMA 12 enclosure-NEMA 1 construction, Manual disconnect switch, Solid state time proportioning or on-off temperature controllers, Solid state high limit control with manual reset, Over-temperature thermocouple control circuit, Step down transformer, Magnetic contactor, Mercury relay or SCR power controller, Pilot and alarm light, Power and thermocouple terminal blocks.

Panel is Turnkey ready for field wiring to line voltage, heater circuit and thermocouples.

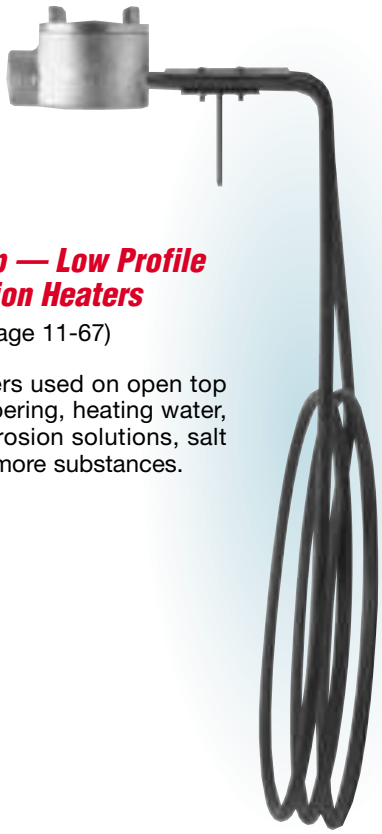
Drum Heaters (See pages 11-64 through 11-66)

These heaters complete with thermostat control are inserted through the bung opening of fifty-five gallon drums. Used to improve the flow of lard, tar, oil and other high viscosity solutions.

Silicone rubber Drum Heaters are long lasting and resistant to chemicals. The heater comes with a six foot cord and plug (120V only).

Durable Metal Drum Heaters feature thermostat or infinite/variable heat control and are equipped with indicator lamps for power on and heater on.

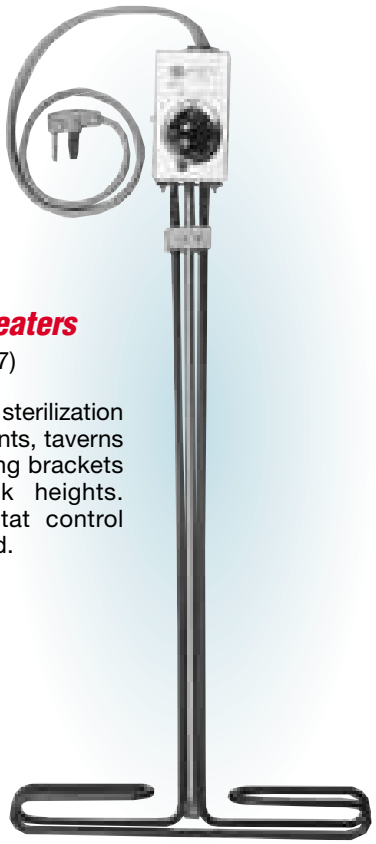
Pictorial Index



Vertical Loop — Low Profile Immersion Heaters

(See page 11-67)

Low profile heaters used on open top tanks for oil tempering, heating water, citrus juices, corrosion solutions, salt baths and many more substances.



Sanitizing Sink Heaters

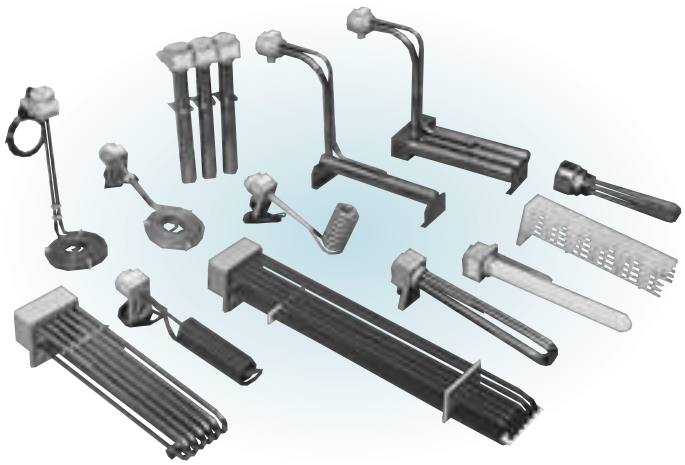
(See page 11-67)

Sink Heaters are used for sterilization of water tanks in restaurants, taverns and laboratories. Mounting brackets adjust to different sink heights. Complete with thermostat control and three-foot power cord.

Portable Over-the-Side Immersion Heaters

(See pages 11-68 through 11-69)

Portable heaters used on open tank tops. Lightweight, no special mounting required. Used for freeze protection, heating oils, degreasing fluids, water base or mild corrosive solutions and many more substances.



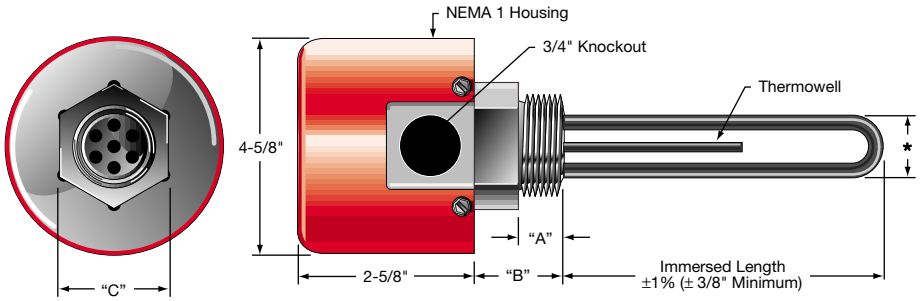
Chemical Bath Immersion Heaters

(See pages 11-70 through 11-90)

Tempco over-the-side immersion heaters offer a wide variety of sheath materials and heater configurations to cover the widest possible spectrum of chemical heating applications. From plain steel to Teflon® covered, Tempco is sure to have the correct heater for even the most difficult solution. Built-in thermal overload protection prevents premature heater burnout in low liquid level conditions.

Screw Plug Immersion Heaters consist of tubular elements welded or brazed into a threaded screw plug which can then be inserted into a threaded opening in a tank wall or through a mating full or half coupling.

For detailed information on the tubular elements used in Screw Plug Immersion Heaters, see section 10.



Screw Plug NPT	*Minimum Hole Diameter in	mm	"A" in	mm	"B" in	mm	"C" in	mm	Thermowell Bulb Size in	mm
1"	1⅛	29	⅞	22	1¼	32	1⅜	35	¼	6.4
1¼"	1⅜	35	15/16	24	1⅝	33	1¾	44	¼	6.4
2"	2¼	57	1 1/16	27	1 9/16	40	2½	64	⅜	9.5
2½"	2½	64	1⅝	33	2 1/16	52	3	76	⅜	9.5

Standard Construction Features include...

- Stainless Steel, Brass or Steel Screw Plugs
- Four Standard NPT Screw Plug Sizes—1",1¼", 2", 2½"
- Recompacted element bends restore insulation resistance after forming
- Thermowell for thermostat bulb
- Corrosion-Resistant electrical wiring hardware
- Four standard sheath materials— Copper, Stainless Steel, Incoloy® and Steel
- NEMA 1 round terminal housing

Optional Features include...

- NEMA 4 Moisture-Proof and/or NEMA 7 Explosion-Resistant terminal housings
- Integral Single or Double Pole Thermostats in several temperature ranges
- Passivation or Electro-Polishing of Stainless Steel and Incoloy® heaters to remove free iron from the sheath
- Type "J" or "K" Thermocouples for extremely accurate sensing of process temperatures, or when attached to the sheath, for over-temperature protection
- Special sheath materials
- Special or European thread fittings

Typical Applications

Copper Sheath—Process water, water with very weak chemical solutions, demineralized, deionized or pure water, hot water storage for washrooms, showers, cleaning and rinsing parts, for freeze protection of cooling towers and sprinkler systems and other aqueous solutions not corrosive to copper sheath. Sheath temperatures to 350°F (177°C).

Incoloy® Sheath—Weak chemical solutions, oils, tar, caustic soda, detergent, alkaline solutions, molten salts, demineralized, deionized or pure water (sheath passivation is recommended), and other aqueous solutions not corrosive to Incoloy® sheath. Air, gas mixtures and super-heated steam. Sheath temperatures to 1600°F (871°C).

Steel Sheath—Fluid heat transfer media, tar, high to low viscosity petroleum oils, asphalt, wax, paraffin, degreasing solvents, alcohol, molten salt, and other solutions not corrosive to steel sheath. Sheath temperatures to 750°F (399°C).

Selecting the proper Screw Plug Heater

Tempco Screw Plug Immersion Heaters will provide long life and dependable trouble free service—provided the sheath materials, watt densities and operating temperatures are properly matched for the medium being heated.

Observe the following guidelines:

1. Match your process to the most suitable heater alloy sheath material. See Section 16 of this catalog for the recommended sheath materials for many common materials.
2. Do not exceed the maximum allowable heater watt density (w/in^2) and recommended operating temperature for the material being heated.
3. Select the proper terminal enclosure to protect the heater wiring and provide safety to personnel and equipment.

Need Help? We are proud of our record in working with customers to develop the right heater for the job.
Call Tempco with your requirements.

Screw Plug Immersion Heaters

Catalog screw plug immersion heaters are supplied with a general purpose (NEMA 1) terminal housing as shown on page 11-6. Additional housings with and without a thermostat include:

Moisture Resistant (NEMA 4)

Explosion Resistant (NEMA 7)

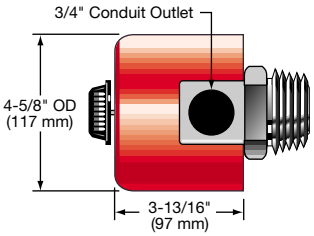
Moisture/Explosion Resistant (NEMA 4/7)

If the housings on this page do not meet the size, construction or other criteria of your application, consult Tempco with your requirements.

CAUTION

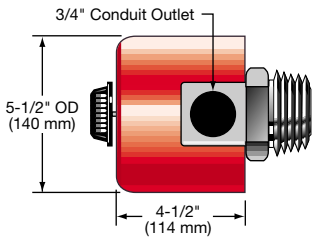
Explosion resistant terminal housings are intended to provide containment of an explosion in the enclosure only. No portion of the heater assembly outside the enclosure is covered under this NEMA rating. Abnormal use of a heater which results in excessive temperature can create hazardous conditions such as a fire. Never perform any type of service nor remove the housing cover prior to disconnecting all electrical power to the heater.

NEMA 1 Housings



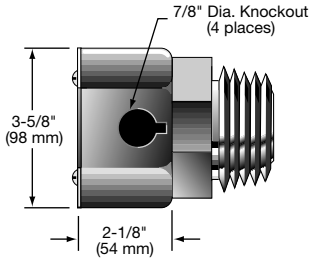
Type 1T

Standard NEMA 1 housing for 1", 1¼", 2" and 2½" Screw Plug Heaters with a single-pole thermostat.



Type 6T

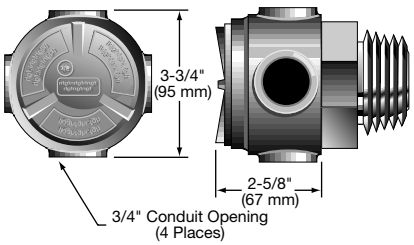
Standard NEMA 1 housing for 1", 1¼", 2" and 2½" Screw Plug Heaters with a double-pole thermostat.



Type 3N

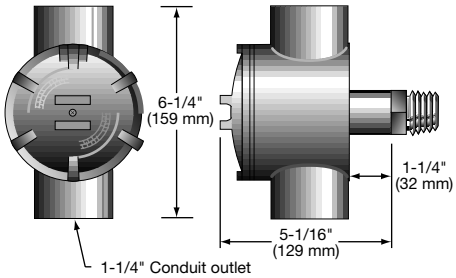
Optional NEMA 1 housing for 1", 1¼", 2" and 2½" Screw Plug Heaters having no thermostat.

Standard NEMA 4 and/or 7 Housings



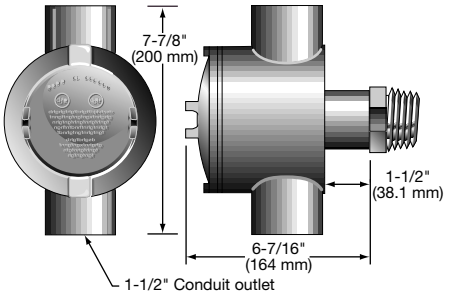
Type 2N

Standard NEMA 4 and/or 7 for 1", 1¼", 2" and 2½" Screw Plug Heaters having no thermostat. NEMA 4 rating requires the use of the cover gasket.



Type 2T

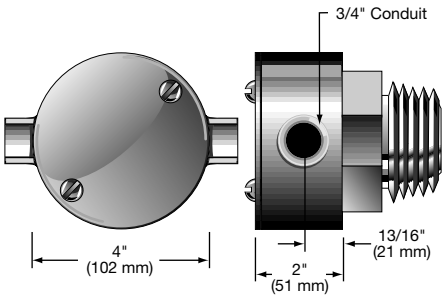
Standard NEMA 4 and/or 7 for 1" and 1¼" Screw Plug Heaters with a single pole-thermostat. NEMA 4 rating requires the use of the cover gasket.



Type 3T

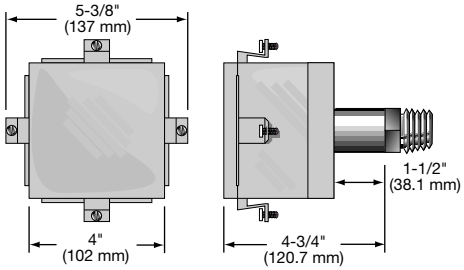
Standard NEMA 4 and/or 7 for 2" and 2½" Screw Plug Heaters with a double- pole thermostat. NEMA 4 rating requires the use of the cover gasket.

Optional NEMA 4 Housings



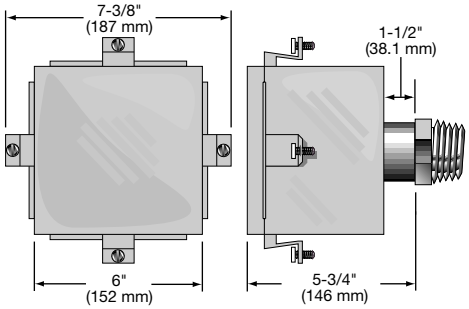
Type 4N

For 1", 1¼", 2" and 2½" Screw Plug Heaters having no thermostat.



Type 4T

For 1" and 1¼" Screw Plug Heaters with a single-pole thermostat.



Type 5T

For 2" and 2½" Screw Plug Heaters with a single-pole or double-pole thermostat.

Thermostat Description and Selection

Thermostats are an optional feature on screw plug and flanged immersion heaters. This type of control operates by expansion and contraction of a liquid in response to temperature change. Liquid contained within the sensing bulb and capillary flexes a diaphragm, causing the opening and closing of a snap action switch. For heating applications the contacts are normally closed and open on temperature rise.

CAUTION

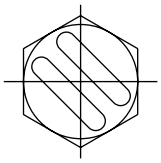
Do not use the thermostat as a power switch. Use some other means of disconnecting power to the heater for servicing. Thermostats are not a fail-safe device. Use an approved high temperature limit control and/or pressure limit control for safe operation.

Thermostat Physical and Electrical Ratings

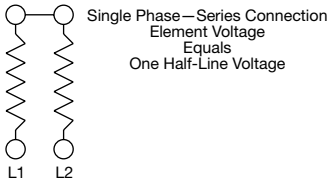
Control Type	Temperature Range °F	Temperature Range °C	Ampacity at Line Voltage 120V	240V	277V	480V	480V (2 poles)	Bulb Diameter in	Bulb Diameter mm	Bulb Length in	Bulb Length mm	Capillary Length in	Capillary Length mm	Part Number
Single Pole Single Throw (SPST)	20 to 120	-7 to 49	22	22	18	—	—	.260	7	4⅛	105	24	610	TST-101-109
	60 to 250	15 to 120	25	25	25	20	—	.250	6	4	102	12	305	TST-101-112
	47 to 107	8 to 40	25	25	25	—	—	.312	8	2¾	70	8	203	TST-101-106
	150 to 560	65 to 300	25	25	25	20	—	.312	8	5⅝	143	12	305	TST-101-113
Double Pole Single Throw (DPST)	30 to 110	0 to 40	30	30	30	10	21	.375	10	6¼	159	36	914	TST-110-101
	60 to 250	15 to 120	30	30	30	10	21	.375	10	4	102	48	1219	TST-110-102
	100 to 550	40 to 290	30	30	30	10	21	.375	10	4	102	48	1219	TST-110-103

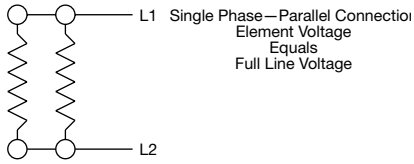
Note: Thermostats, knobs, bezels, pilot lamps and enclosures can be ordered separately. See page 13-49 in the Temperature Control Section.

Screw Plug Immersion Heater Typical Wiring Diagrams

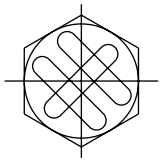


Two Element
1-1/4" and 2" NPT Plugs

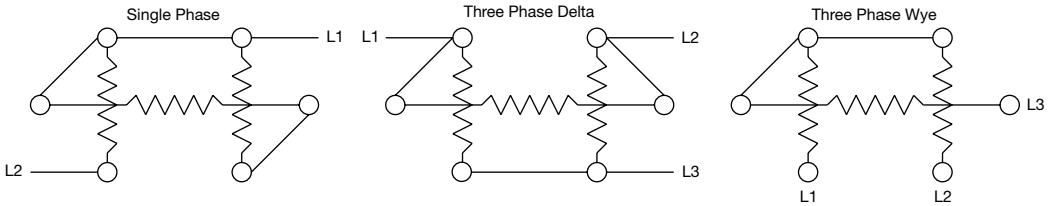


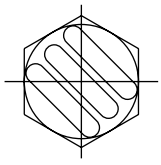


Two element (Dual Voltage) heaters are factory wired for the higher voltage (series connection) unless otherwise specified. Easily rewired for lower voltage operation (parallel connection).

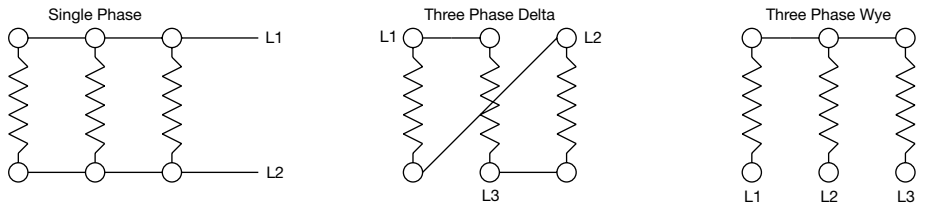


Three Element
2" and 2-1/2" NPT Plugs





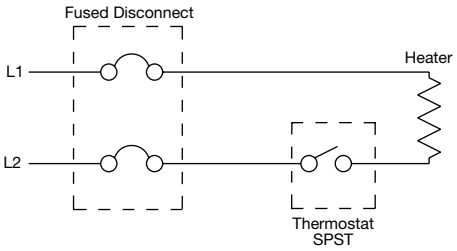
Three Element
2-1/2" NPT Plugs



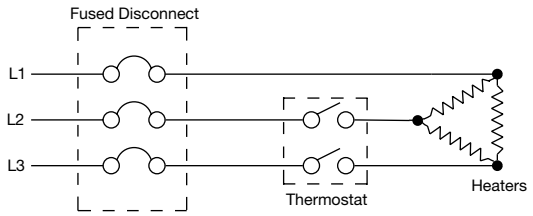
Standard screw plug immersion heaters with three elements, factory wired for three phase delta, can be rewired for single phase operation with no wattage change. Wattage can be reduced to one third of the designed wattage by switching from three phase delta to wye connection.

Heaters wired for three phase wye should not be changed to single phase or three phase delta connection, since this will increase wattage and watt density on the elements by three times the original designed wattage, causing premature heater failure.

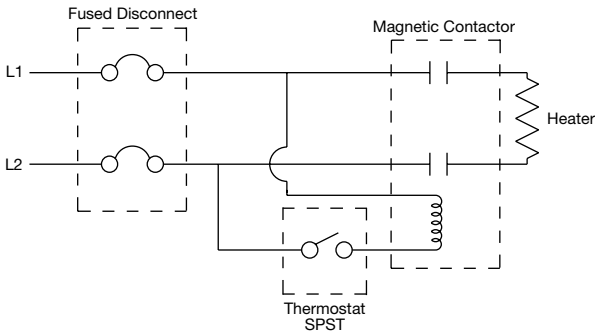
Typical Wiring Diagrams for Heaters with Thermostats



120V Single Phase Heater when heater amperage does not exceed maximum amperage rating of thermostat.

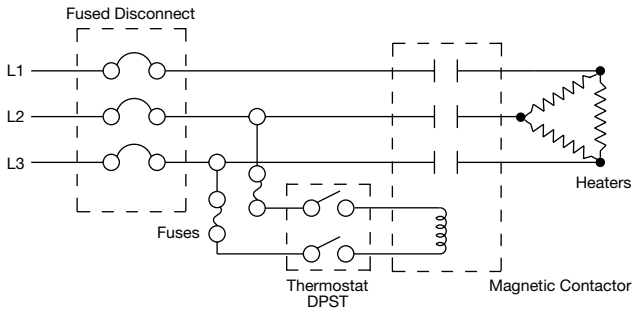


Three Phase Heater when heater voltage and amperage do not exceed ratings of the thermostat.



Any voltage Single Phase Heater when the heater amperage exceeds the maximum amperage rating of the thermostat.

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



Three Phase Heater when heater voltage and/or amperage exceeds maximum ratings of the thermostat.

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

Thermowells

Thermowells provide protection for bulb and capillary sensors.

They are supplied with a ½" NPT male thread for mounting and a ⅜" NPT internal thread that can be used with the Stuffing Box Assembly to secure the capillary to the well.

See pages 14-32 through 14-39 for other style thermowells.

Immersed Length		Part Number	
in	mm	Steel	Stainless Steel
12	305	MPT-120-101	MPT-121-101
18	457	MPT-120-102	MPT-121-102
24	610	MPT-120-103	MPT-121-103
36	914	MPT-120-104	MPT-121-104

Stuffing Box Assembly

The Stuffing Box Assembly is used to seal the thermostat capillary when the sensing bulb is immersed directly in a liquid rather than in a thermowell. The Stuffing Box consists of six slotted washers used to compress a graphite packing into a ⅜" NPT male pipe thread fitting.

Assembly Instructions

Feed Sensing Bulb through hole in upper and lower fitting. Insert Washers and packing into top cavity of lower fitting. Upper fitting then screws into lower fitting, creating the seal.

Order Part Number TST-109-101

Applications: Fuel Oils (Bunker C and Number 6)

- *Steel Screw Plug*
- *NEMA 1 Terminal Housing*
- *Three-Phase Wye only*
- *Steel sheath heating elements*
- *Watt Density of 8 watts/in² (1.3 watts/cm²)*

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	120/240V	240V-3Ph	240/480V	480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
2½" NPT 3 elements	17¼	438	1	—	—	*TSP01600	—	*TSP01601	8	4
	24¾	629	1.5	—	—	*TSP01602	—	*TSP01603	9	4
	32¼	819	2	—	—	*TSP01604	—	*TSP01605	11	5
	39¾	1010	2.5	—	—	*TSP01606	—	*TSP01607	12	5
	47¼	1200	3	—	—	*TSP01608	—	*TSP01609	13	6
	63¾	1619	4	—	—	*TSP01610	—	*TSP01611	16	7
	76¼	1937	5	—	—	*TSP01612	—	*TSP01613	18	8

Applications: Medium Weight Oils, Heat Transfer Oils

- *Steel Screw Plug*
- *NEMA 1 Terminal Housing*
- *Three-Phase convertible to Single Phase unless otherwise noted*
- *Steel Sheath Heating Elements*
- *Watt Density of 15 watts/in² (2.3 watts/cm²)*

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	120/240V	240V-3Ph	240/480V	480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
2" NPT 3 elements	13¼	337	1.5	—	—	TSP01614	—	①TSP01615	6	3
	17½	445	2	—	—	TSP01616	—	TSP01617	7	3
	20½	521	2.5	—	—	TSP01618	—	TSP01619	7	3
	25	635	3	—	—	TSP01620	—	TSP01621	8	4
	32½	826	4	—	—	TSP01622	—	TSP01623	9	4
	40	1016	5	—	—	TSP01624	—	TSP01625	10	5
	47½	1207	6	—	—	TSP01626	—	TSP01627	11	5
	58½	1486	7.5	—	—	TSP01628	—	TSP01629	12	5
	69¾	1772	9	—	—	TSP01630	—	TSP01631	14	6

① *3 Phase Wye only*

Applications: Lightweight Oils, Degreasing Solutions, Heat Transfer Oils

- *Steel Screw Plug*
- *NEMA 1 Terminal Housing*
- *Steel sheath heating elements*
- *Watt Density of 23 watts/in² (3.6 watts/cm²)*

Single Phase only

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	240V	Approximate Net Weight lbs	Approximate Net Weight kgs
1" NPT 1 element	6½	165	0.25	TSP01632	TSP01633	2	1
	7⅞	200	0.3	TSP01634	TSP01635	2	1
	9¼	235	0.35	TSP01636	TSP01637	2	1
	9⅜	238	0.5	TSP01638	TSP01639	2	1
	13½	343	0.75	TSP01640	TSP01641	3	1
	16¾	425	1	TSP01642	TSP01643	3	1
	23¾	603	1.5	TSP01644	TSP01645	3	1

CONTINUED

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Applications: Lightweight Oils, Degreasing Solutions, Heat Transfer Oils (continued)

120V and Dual Voltage heaters are Single Phase. Dual Voltage heaters are wired for the higher voltage unless otherwise specified.

Three-Phase convertible to Single Phase unless otherwise noted.

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	120/240V	240V-3Ph	240/480V	480V-3Ph	Approximate Net Weight lbs	kgs
1¼" NPT 2 elements	6⅜	162	0.5	—	TSP01646	—	—	—	3	1
	8⅞	225	0.7	—	TSP01647	—	—	—	3	1
	10 1/16	256	0.75	—	TSP01648	—	—	—	4	2
	12¾	324	1	—	TSP01649	—	—	—	4	2
	19⅜	492	1.5	—	TSP01650	—	—	—	4	2
	25⅜	645	2	—	TSP01651	—	—	—	5	2
	36⅞	937	3	—	TSP01652	—	—	—	5	2
2" NPT 2 elements	9½	241	1	—	TSP01653	—	TSP01654	—	5	2
	13½	343	1.5	—	TSP01655	—	TSP01656	—	5	2
	17½	445	2	—	TSP01657	—	TSP01658	—	6	3
	20½	521	2.5	—	TSP01659	—	TSP01660	—	6	3
	25	635	3	—	TSP01661	—	TSP01662	—	6	3
	32½	826	4	—	TSP01663	—	TSP01664	—	7	3
	40	1016	5	—	TSP01665	—	TSP01666	—	8	4
	47½	1207	6	—	—	—	TSP01667	—	8	4
2" NPT 3 elements	9½	241	1.5	TSP01668	—	TSP01669	—	①TSP01670	5	2
	17½	445	3	TSP01671	—	TSP01672	—	TSP01673	6	3
	22	559	3.75	TSP01674	—	TSP01675	—	TSP01676	7	3
	25	635	4.5	TSP01677	—	TSP01678	—	TSP01679	7	3
	32½	826	6	—	—	TSP01680	—	TSP01681	8	4
	40	1016	7.5	—	—	TSP01682	—	TSP01683	9	4
	47½	1207	9	—	—	TSP01684	—	TSP01685	10	5
	64	1626	12.5	—	—	TSP01686	—	TSP01687	12	5
2½" NPT 3 elements	17¼	438	3	*TSP01688	—	*TSP01689	—	*TSP01690	8	4
	19 1/16	484	3.75	TSP01691	—	TSP01692	—	TSP01693	8	4
	24¾	629	4.5	*TSP01694	—	*TSP01695	—	*TSP01696	9	4
	32¼	819	6	—	—	*TSP01697	—	*TSP01698	11	5
	39¾	1010	7.5	—	—	*TSP01699	—	*TSP01700	12	5
	47¼	1200	9	—	—	*TSP01701	—	*TSP01702	13	6
	63¾	1619	12.5	—	—	*TSP01703	—	*TSP01704	16	7
	76¼	1937	15	—	—	*TSP01705	—	*TSP01706	18	8

① ***3 Phase Wye only***

Applications: Medium Weight Oils, Heat Transfer Oils, Liquid Paraffin

- ***304 Stainless Steel Screw Plug***
- ***NEMA 1 Terminal Housing***
- ***Three-Phase Wye only***
- ***Incoloy® Sheath Heating Elements***
- ***Watt Density of 16 watts/in² (2.5 watts/cm²)***

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	120/240V	240V-3Ph	240/480V	480V-3Ph	Approximate Net Weight lbs	kgs
2" NPT 3 elements	9¾	248	1	—	—	TSP01707	—	TSP01708	4	2
	13¼	337	1.5	—	—	TSP01709	—	TSP01710	5	2
	17¾	451	2	—	—	TSP01711	—	TSP01712	6	3
	20¼	514	2.5	—	—	TSP01713	—	TSP01714	6	3
	25¼	641	3	—	—	TSP01715	—	TSP01716	7	3
	32¾	832	4	—	—	TSP01717	—	TSP01718	8	4
	40¼	1022	5	—	—	TSP01719	—	TSP01720	9	4
	47¾	1213	6	—	—	TSP01721	—	TSP01722	10	5
2½" NPT 3 elements	9⅜	238	1	—	—	*TSP01723	—	*TSP01724	7	3
	12⅞	327	1.5	—	—	*TSP01725	—	*TSP01726	8	4
	17⅜	441	2	—	—	*TSP01727	—	*TSP01728	8	4
	19⅞	505	2.5	—	—	*TSP01729	—	*TSP01730	9	4
	24⅞	632	3	—	—	*TSP01731	—	*TSP01732	10	5
	32⅜	822	4	—	—	*TSP01733	—	*TSP01734	11	5
	39⅞	1013	5	—	—	*TSP01735	—	*TSP01736	12	5
	47⅜	1203	6	—	—	*TSP01737	—	*TSP01738	13	6

Application: Forced Air and Gases, Caustic Solutions, Degreasing Solutions

- *304 Stainless Steel Screw Plug*
- *NEMA 1 Terminal Housing*
- *Incoloy® Sheath Heating Elements*
- *Watt Density of 23 watts/in² (3.6 watts/cm²)*

120V and Dual Voltage heaters are Single Phase. Dual Voltage heaters are wired for the higher voltage unless otherwise specified.

Three-Phase convertible to Single Phase.

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	120/240V	240V-3Ph	240/480V	480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
1¼" NPT 2 elements	13⅜	340	1	—	TSP01739	—	—	—	3	1
	19	483	1.5	—	TSP01740	—	—	—	3	1
	24⅜	619	2	—	TSP01741	—	—	—	4	2
2" NPT 3 elements	17¾	451	3	*TSP01742	—	TSP01743	—	TSP01744	5	2
	25¼	641	4.5	*TSP01745	—	TSP01746	—	TSP01747	6	3
	32¾	832	6	—	—	TSP01748	—	TSP01749	7	3
	40¼	1022	7.5	—	—	TSP01750	—	TSP01751	9	4
	47¾	1213	9	—	—	TSP01752	—	TSP01753	10	5
	64¼	1632	12.5	—	—	TSP01754	—	TSP01755	12	5
	76¾	1950	15	—	—	TSP01756	—	TSP01757	13	6
2½" NPT 3 elements	17⅜	441	3	*TSP01758	—	*TSP01759	—	*TSP01760	8	4
	24⅞	632	4.5	*TSP01761	—	*TSP01762	—	*TSP01763	9	4
	32⅜	822	6	—	—	*TSP01764	—	*TSP01765	11	5
	39⅞	1013	7.5	—	—	*TSP01766	—	*TSP01767	12	5
	47⅜	1203	9	—	—	*TSP01768	—	*TSP01769	13	6
	63⅞	1622	12.5	—	—	*TSP01770	—	*TSP01771	16	7
	76⅜	1940	15	—	—	*TSP01772	—	*TSP01773	18	8

Application: Process Water

- *304 Stainless Steel Screw Plug*
- *NEMA 1 Terminal Housing*
- *Incoloy® Sheath Heating Elements*
- *Watt Density of 48 watts/in² (7.5 watts/cm²)*

120V and Dual Voltage heaters are Single Phase. Dual Voltage heaters are wired for the higher voltage unless otherwise specified.

Three-Phase convertible to Single Phase.

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	120/240V	240V-3Ph	240/480V	480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
2" NPT 2 elements	9¾	248	2	—	TSP01774	—	TSP01775	—	4	2
	13¼	337	3	—	TSP01776	—	TSP01777	—	4	2
	17¾	451	4	—	TSP01778	—	TSP01779	—	5	2
	20¼	514	5	—	TSP01780	—	TSP01781	—	5	2
	25¼	641	6	—	—	—	TSP01783	—	6	3
	32¾	832	8	—	—	—	TSP01784	—	6	3
	40¼	1022	10	—	—	—	TSP01785	—	7	3
2" NPT 3 elements	9¾	248	3	TSP01786	—	TSP01787	—	TSP01788	5	2
	13¼	337	4.5	TSP01789	—	TSP01790	—	TSP01791	5	2
	17¾	451	6	—	—	TSP01792	—	TSP01793	6	3
	20¼	514	7.5	—	—	TSP01794	—	TSP01795	6	3
	25¼	641	9	—	—	TSP01796	—	TSP01797	7	3
	32¾	832	12	—	—	TSP01798	—	TSP01799	8	4
	40¼	1022	15	—	—	TSP01800	—	TSP01801	9	4
	47¾	1213	18	—	—	TSP01802	—	TSP01803	10	5
2½"NPT 3 elements	9⅜	238	3	*TSP01804	—	*TSP01805	—	*TSP01806	7	3
	12⅞	327	4.5	TSP01807	—	*TSP01808	—	*TSP01809	8	4
	17⅜	441	6	—	—	*TSP01810	—	*TSP01811	8	4
	19⅞	505	7.5	—	—	*TSP01812	—	*TSP01813	9	4
	24⅞	632	9	—	—	*TSP01814	—	*TSP01815	10	5
	32⅜	822	12	—	—	*TSP01816	—	*TSP01817	11	5
	39⅞	1013	15	—	—	*TSP01818	—	*TSP01819	12	5
	47⅜	1203	18	—	—	*TSP01820	—	*TSP01821	13	6

Screw Immersion Plug Heaters

Application: Clean Water

- *Brass Screw Plug*
- *NEMA 1 Terminal Housing*
- *Copper Sheath Heating Elements*
- *Watt Density of 60 watts/in² (9.3 watts/cm²)*

Single Phase

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	Part Number 120/240V	Part Number 240V	Approximate Net Weight lbs	Approximate Net Weight kgs
1" NPT 1 element	4½	114	.5	TSP01840	—	TSP01841	2	1
	6½	165	.75	TSP01842	—	TSP01843	2	1
	6⅝	168	1	TSP01844	—	TSP01845	2	1
	8	203	1.25	TSP01846	—	TSP01847	2	1
	9¼	235	1.5	TSP01848	—	TSP01849	3	1
	12½	318	2	TSP01850	—	TSP01851	3	1
	14¾	375	2.5	TSP01852	—	TSP01853	3	1
	16¾	426	3	TSP01854	—	TSP01855	3	1
	21	533	4	—	—	TSP01856	3	1
1¼" NPT 1 element	4⅜	111	.5	TSP01857	—	TSP01858	3	1
	6⅜	162	.75	TSP01859	—	TSP01860	3	1
1¼" NPT 2 elements	4⅜	111	1	—	TSP01861	—	3	1
	6⅜	162	1.5	—	TSP01862	—	3	1
	8½	216	2	—	TSP01863	—	3	1
	10¾	273	2.5	—	TSP01864	—	4	2
	15	381	3	—	TSP01865	—	4	2
	19	483	4	—	—	TSP01866	4	2
	23½	597	5	—	—	TSP01867	4	2
	27½	699	6	—	—	TSP01868	5	2

120V and Dual Voltage heaters are Single Phase. Dual Voltage heaters are wired for the higher voltage unless otherwise specified.

Three-Phase convertible to Single Phase unless otherwise noted.

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	Part Number 120/240V	Part Number 240V-3Ph	Part Number 240/480V	Part Number 480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
2" NPT 2 elements	8⅛	206	2	—	TSP01869	—	TSP01870	—	4	2
	11⅛	283	3	—	TSP01871	—	TSP01872	—	4	2
	15⅛	384	4	—	TSP01873	—	TSP01874	—	5	2
	18⅛	460	5	—	TSP01875	—	TSP01876	—	5	2
	21⅛	537	6	—	—	—	TSP01877	—	6	3
	26⅝	676	8	—	—	—	TSP01878	—	6	3
	32⅛	816	10	—	—	—	TSP01879	—	6	3
2" NPT 3 elements	8⅛	206	3	TSP01880	—	TSP01881	—	①TSP01882	4	2
	11⅛	283	4.5	TSP01883	—	TSP01884	—	TSP01885	5	2
	15⅛	384	6	—	—	TSP01886	—	TSP01887	5	2
	18⅛	460	7.5	—	—	TSP01888	—	TSP01889	6	3
	21⅛	537	9	—	—	TSP01890	—	TSP01891	6	3
	26⅝	676	12	—	—	TSP01892	—	TSP01893	7	3
	32⅛	816	15	—	—	TSP01894	—	TSP01895	8	4
2½" NPT 3 elements	7⅝	194	3	*TSP01896	—	*TSP01897	—	*TSP01898	4	2
	8⅞	225	3.75	—	—	TSP01899	—	TSP01900	5	2
	10⅝	270	4.5	*TSP01901	—	*TSP01902	—	*TSP01903	5	2
	14⅝	371	6	—	—	*TSP01904	—	*TSP01905	6	3
	17⅝	448	7.5	—	—	*TSP01906	—	*TSP01907	6	3
	20⅝	524	9	—	—	*TSP01908	—	*TSP01909	7	3
	26⅛	664	12	—	—	*TSP01910	—	*TSP01911	8	4
	31⅝	803	15	—	—	*TSP01912	—	*TSP01913	9	4
	37⅛	943	18	—	—	*TSP01914	—	*TSP01915	10	5

① ***Three Phase Wye only***

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Screw Plug Immersion Heaters

Applications: Deionized Water, Demineralized Water

- ***316 Stainless Steel Screw Plug***
- ***NEMA 1 Terminal Housing***
- ***316 Stainless Steel Sheath Heating Elements***
- ***Watt Density of 60 watts/in² (9.3 watts/cm²)***

120V and Dual Voltage heaters are Single Phase. Dual Voltage heaters are wired for the higher voltage unless otherwise specified.

Three-Phase convertible to Single Phase.

Nominal Pipe Size	Immersed Length in	Immersed Length mm	KW	Part Number 120V	120/240V	240V-3Ph	240/480V	480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
2½" NPT 3 elements	7⅝	194	3	*TSP01822	—	TSP01823	—	TSP01824	7	3
	10⅝	270	4.5	*TSP01825	—	TSP01826	—	TSP01827	7	3
	14⅝	372	6	—	—	TSP01828	—	TSP01829	8	4
	17⅝	448	7.5	—	—	TSP01830	—	TSP01831	8	4
	20⅝	524	9	—	—	TSP01832	—	TSP01833	9	4
	26⅛	664	12	—	—	TSP01834	—	TSP01835	10	5
	31⅝	803	15	—	—	TSP01836	—	TSP01837	11	5
	37⅛	943	18	—	—	TSP01838	—	TSP01839	12	5

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an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

How to Order

Catalog Heaters

Screw Plug Immersion Heaters whose Part Numbers are preceded by an asterisk (*) are Guaranteed in Stock for immediate delivery.

Part Numbers with no asterisk (*) are stocked as sub-assemblies for 2-3 week delivery.

Custom Engineered/Manufactured Heaters

Understanding that an electric heater can be very application specific, for sizes and ratings not listed, **TEMPCO** will design and manufacture a Screw Plug Immersion Heater to meet your requirements. ***Standard lead time is 4 weeks.***

Please Specify the following:

- ❑ Wattage, Voltage and Phase
- ❑ Screw Plug Size and Material
- ❑ Element Sheath Material
- ❑ Element Watt Density
- ❑ Element Immersion Length
- ❑ Electrical Enclosure Type
- ❑ Thermostat— if required
- ❑ Optional Features

Self-Contained Immersion Heater

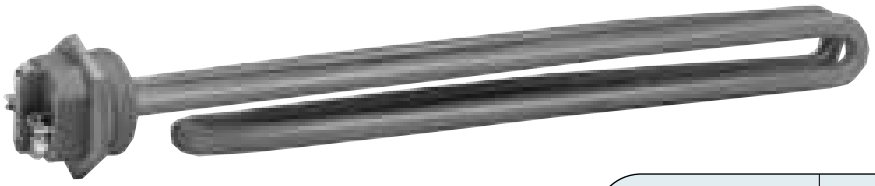
Design Features

This immersion heater is specifically designed for commercial dishwashers and sterilizing equipment. However, due to the unique construction characteristics of these heaters, they are readily adaptable for use in other water heating applications. The heating elements are prewired to a Definite Purpose contactor, thermostat and high limit cutout. The thermowell is located at the top of the element bundle for fast shut-off response, preventing overheating due to low water level conditions.

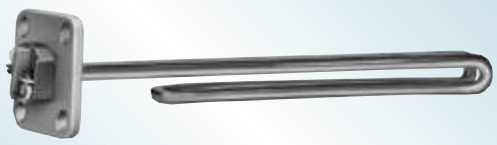
- 2" NPT Brass screw plug
- Three Incoloy® 800 tubular elements
- Thermostat— 60°F (15°C) to 250°F (120°C) range
- Over-temperature cutout with manual reset
- Internal Definite Purpose contactor with 120V holding coil
- NEMA 4 housing (Moisture resistant)
- Optional clamping nut, flat washer and gasket for mounting in thin wall tanks with a 2⅜" (60 mm) diameter opening

Immersed Length in	Immersed Length mm	KW	Part Number 208-1Ph	208-3Ph	240V-1Ph	240V-3Ph	480V-3Ph	Approximate Net Weight lbs	kgs
13⅛	333	5	TSP01550	TSP01551	TSP01552	TSP01553	TSP01554	3	1
18¾	476	7.5	TSP01555	TSP01556	TSP01557	TSP01558	TSP01559	3	1
23⅞	606	10	TSP01560	TSP01561	TSP01562	TSP01563	TSP01564	4	2
30¼	768	12	—	TSP01566	—	TSP01568	TSP01569	5	2
32½	826	15	—	TSP01570	—	TSP01571	TSP01572	6	3
35¾	908	16	—	TSP01573	—	TSP01574	TSP01575	7	3
45¾	1162	20	—	—	—	TSP01576	TSP01577	9	4

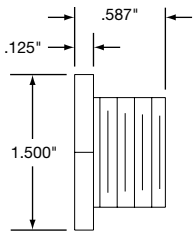
Hot Water Tank Heaters



- *1"-11½ NPSM Plug*
- *Incoloy® Element*
- *Gasket*
- *70 w/in²*



For 2½" Square Flange Type Hot Water Tank Heaters see page 11-53.



Immersed Length in	Immersed Length mm	KW	Part Number 120V	240V
9¼	235	1.0	—	TSP01578
11	279	1.25	TSP01579	TSP01580
7⅜	187	1.5	TSP01581	TSP01193
9	229	2.0	TSP01582	TSP01292
10¾	273	2.5	—	TSP01320
12⅝	313	3.0	—	TSP01249
13¾	349	3.5	—	TSP01583
15¾	400	4.0	—	TSP01584
16¼	413	4.5	—	TSP01248
19	483	5.0	—	TSP01379

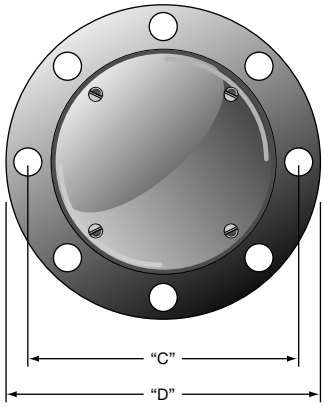
Flanged Immersion Heaters are designed for use in tanks and pressurized vessels to heat both liquids and gases. They mate to a companion flange that is either welded to a tank wall or, for circulating type heaters, to a pipe. See pages 11-30 through 11-49 for TEMPCO circulation heaters, which consist of a flange heater and a pipebody pressure vessel assembly.

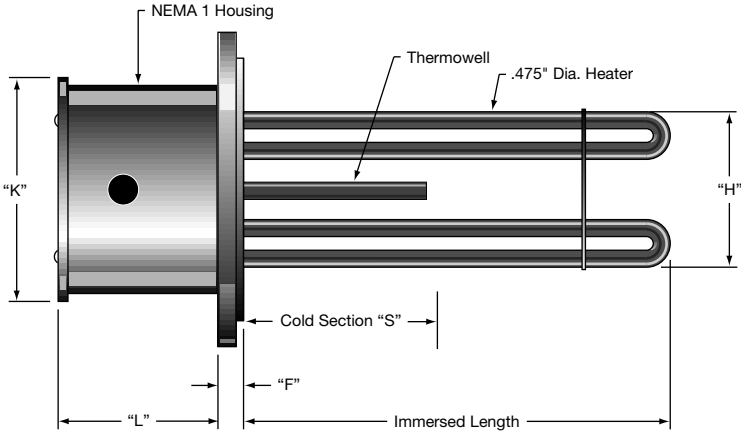
Standard Features

The catalog items listed on pages 11-21 through 11-29 have the following features, making them suitable for many applications:

- 150-lb forged steel or 316 stainless steel flanges
- Incoloy® 800, 316 stainless steel, steel or copper elements
- ½" OD thermowell for a ⅜" diameter sensing bulb
- NEMA 1 electrical enclosure

The items listed in this catalog are only a small sample of the heaters that can be supplied by TEMPCO. The next few pages will describe both standard and optional materials and features available to meet the requirements of your application.





Flange size	Flange Mounting Hole Size		No.	Flange Thickness "F"		Mounting Bolt Circle "C"		Flange Diameter "D"		Cold Section "S"		Bundle Diameter "H"		NEMA 1 Housing "K"		"L"		Number of Elements	
in	in	mm		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	Std.	Max.
3	¾	19	4	15/16	24	6	152	7½	191	4	102	2¾	70	4⅝	117	3⅛	79	3	6
4	¾	19	8	15/16	24	7½	191	9	229	4	102	3⅞	98	6	152	4	102	6	6
5	⅞	22	8	15/16	24	8½	216	10	254	4	102	5	127	7	178	4	102	6	9
6	⅞	22	8	1	25	9½	241	11	279	4	102	6	152	8	203	6	152	12	15
8	⅞	22	8	1⅛	29	11¾	298	13½	343	6	152	7 13/16	198	10	254	6	152	18	24
10	1	25	12	1 3/16	30	14¼	362	16	406	6	152	9¾	248	11⅝	295	6	152	27	36
12	1	25	12	1¼	32	17	432	19	483	6	152	11¾	298	13½	343	6	152	36	54
14	1⅛	29	12	1⅜	35	18¾	476	21	533	6	152	12¾	324	15⅛	384	6	152	45	72

Construction

Flanged Immersion Heaters are constructed with tubular heating elements that have a compacted MgO powder insulation to insure excellent dielectric strength and heat transfer properties.

To maintain the integrity of this insulation after the elements are formed, the hairpin bends are spanked in specially designed dies to re-compact the MgO powder. The elements are then TIG welded or Silver Brazed to a pipe flange and pressure tested. Electrical wiring is enclosed in a protective housing.

All heaters must pass the following factory tests prior to shipment:

1. Resistance test— to verify wattage
2. Insulation test— to measure leakage current resistance
3. High voltage test— to "proof-test" the insulation against grounds and short circuits
4. Hydrostatic or air pressure testing— to leakproof test all welding of the elements to the flange

Branch Circuit Wiring

Flanged heater elements are wired into branch circuits having a maximum current of 48 Amps. The number of circuits are listed next to the heater's voltage and phase in the standard sizes and ratings chart. For different circuit wiring configurations consult Tempco.

A technician is doing electrical tests on a 14" 300 lb Stainless Steel flange heater rated at 110 KW, 480V-3PH.

Selecting the proper Flanged Heater

Tempco Flanged Immersion Heaters will provide long life and dependable trouble free service provided the sheath materials, watt densities and operating temperatures are properly matched for the medium being heated.

Observe the following guidelines:

1. Match your process to the most suitable heater alloy sheath material. See Section 16 of this catalog for the recommended sheath materials for many common materials.
2. Do not exceed the maximum allowable heater watt density (w/in^2) and recommended operating temperature for the material being heated.
3. Select the proper terminal enclosure to protect the heater wiring and provide safety to personnel and equipment.
4. On large tanks, use several smaller KW rated heaters rather than one large heater for uniform heat and watt density distribution.

Need Help? We are proud of our record in working with customers to develop the right heater for the job. ***Call Tempco with your requirements.***

Watt Density

Element Watt Density is the wattage dissipated per square inch of the element sheath surface and is calculated with the following formula.

$$\text{Watt Density} = \frac{\text{element wattage}}{\pi \times \text{element dia.} \times \text{element heated length}}$$

For a particular application element watt density will govern element sheath temperature. Factors to consider when choosing a suitable watt density are:

1. Many materials are heat sensitive and can decompose or be damaged if the element is running too hot.
2. Air and other gases that are poor conductors of heat require watt densities matched to the velocity of the gas flow to prevent element overheating.
3. Mineral deposits when heating hard water and cleaning solutions can build up on the element sheath, acting as a heat insulator and raising the internal element temperature. If these deposits cannot be periodically removed, use a lower watt density element to increase heater life expectancy.

Element Sheath Material

Sheath Material Selection

CORROSION. In addition to selecting a sheath material that is compatible with the heated medium, other factors that affect corrosion need to be considered.

1. The temperature of the corrodent. As temperature increases the degree of corrosion increases. Also remember that usually the element temperature is higher than the material it is heating.
2. The degree of aeration to which a corrodent is exposed. Stagnant conditions can deprive the stainless steels of oxygen, which is required to maintain their corrosive resistant surface.
3. Velocity of the corrodent. Increased velocity can increase the corrosion rate.

See pages 16-12 through 16-20 for the recommended sheath materials for many immersion heating applications. If you are purchasing the material you are heating, check with the supplier for their recommendations.

Standard Element Sheath Materials

Incoloy® 800— A Nickel (30-35%), Chromium (19-23%), Iron alloy. The high nickel content of this alloy contributes to its resistance to scaling and corrosion. Used in air heating (also see Incoloy® 840 on page 10-3) and immersion heating of potable water and other liquids that are not corrosive to an Incoloy® 800 sheath.

Low Carbon Steel— Applications include fluid heat transfer media, tar, high to low viscosity petroleum oils, asphalt, wax, molten salt, and other solutions not corrosive to a steel sheath.

316 Stainless Steel— A Chromium (16-18%), Nickel (11-14%), Iron Alloy with Molybdenum (2-3%) added to improve corrosion resistance in certain environments, especially those that would tend to cause pitting due to the presence of chlorides. Applications include deionized water.

Copper— Mainly used in clean water heating for washrooms, showers, rinse tanks and freeze protection of storage tanks.

Optional Element Sheath Materials

304 Stainless Steel— A Chromium (18-20%), Nickel (8-11%), Iron Alloy used in the food industry, sterilizing solutions, air heating and many organic and inorganic chemicals.

321 Stainless Steel— A Chromium (17-20%), Nickel (9-13%), Iron Alloy modified with the addition of titanium to prevent carbide precipitation and the resulting intergranular corrosion that can take place in certain mediums when operating in the 800-1200°F (427-649°C) temperature range.

Surface Metal Treatments

Flanged Immersion Heater surfaces in contact with the material being heated can be passivated or electro-polished to improve their resistance to corrosion.

Passivation removes surface contamination, usually iron, so that the optimum corrosion resistance of the stainless steel is maintained. Surface contamination would come from the small amount of steel that may be worn off a tool during the manufacturing process. Passivating is accomplished by dipping the heater in a warm solution of nitric acid.

Electro-Polishing is an electrochemical process that removes surface imperfections and contaminants, enhancing the corrosion resisting ability of the stainless steels. The resultant surface is clean, smooth and bright. Many medical and food applications require this finish.

Standard Flanges

Catalog heaters have Forged Steel or 316 Stainless Steel flanges, depending on application. Flanges are Class 150-lb Pressure-Temperature rated per ASME/ANSI Standard B16.5.

A compressed fiber ring gasket is supplied with each heater.

The following table lists the maximum operating pressure at various temperatures for these flange materials. For higher operating pressures requiring Class 300-lb and higher construction, consult Tempco.

Pressure-Temperature Ratings CLASS 150-LB

(Pressure in PSIG)

Flange Material	Temperature °F (°C) -20 to 100 (-28.9 to 37.8)	200 (93.3)	300 (148.9)	400 (204.4)	500 (260.0)	600 (315.6)	650 (343.3)	700 (371.1)	750 (398.9)	800 (426.7)	850 (454.4)	900 (482.2)	950 (510.0)	1000 (537.8)
A105 Steel	285	260	230	200	170	140	125	110	95	80	—	—	—	—
316 Stainless	275	240	215	195	170	140	125	110	95	80	65	50	35	20
304 Stainless	275	235	205	180	170	140	125	110	95	80	65	50	35	20

Optional Flanges and Flange Gaskets

Optional flange materials include:

- ***304, 304L Stainless Steel***
- ***316L Stainless Steel***
- ***Incoloy® 800***

Gaskets of different types, including spiral wound metal with non-metallic filler are available to properly seal any flanged heater. Gasket material choice depends on operating conditions and fluid compatibility. Consult TEMPCO for help with your selection.

Terminal Housings

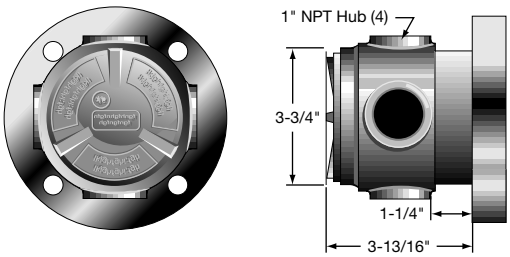
Catalog flanged immersion heaters are supplied with a general purpose (NEMA 1) terminal housing as shown on page 11-16. Additional housings with and without a thermostat include:

Moisture Resistant (NEMA 4)

Explosion Resistant (NEMA 7)

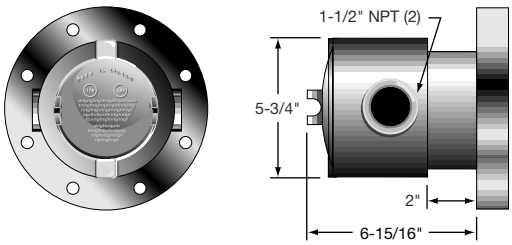
Moisture/Explosion Resistant (NEMA 4/7).

If the housings on this and the following page do not meet the size, construction or other criteria of your application consult Tempco with your requirements.



TYPE 2N

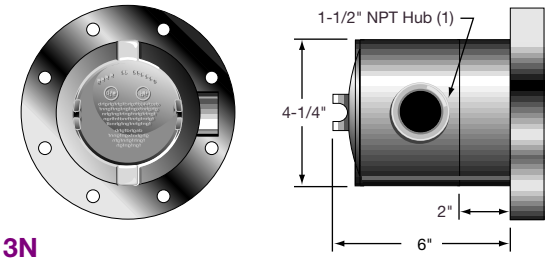
Standard NEMA 4 and/or 7 housing for 3" Flanged Immersion Heaters having no thermostat . NEMA 4 rating requires the use of the cover gasket.



TYPE 2T

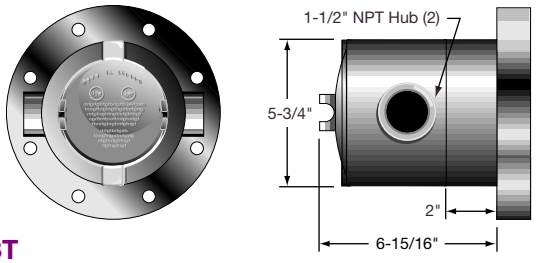
Standard NEMA 4 and/or 7 housing for 3" Flanged Immersion Heaters with a thermostat . NEMA 4 rating requires the use of the cover gasket.

Flange Immersion Heaters



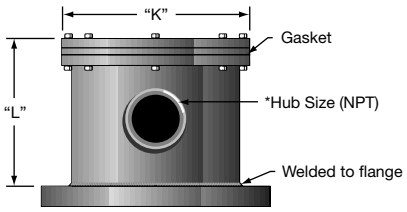
TYPE 3N

Standard NEMA 4 and/or 7 housing for 4" and 5" Flanged Immersion Heaters having no thermostat. NEMA 4 rating requires the use of the cover gasket.



TYPE 3T

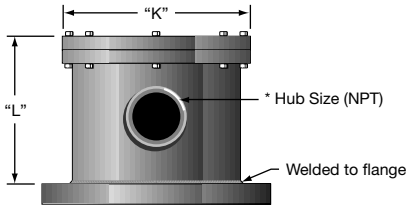
Standard NEMA 4 and/or 7 housing for 4" and 5" Flanged Immersion Heaters with a thermostat. NEMA 4 rating requires the use of the cover gasket.



TYPE 4N w/o thermostat; TYPE 4T with thermostat

Standard NEMA 4 housing with and without thermostat for 6" through 14" Flanged Immersion Heaters.

Flange Size	"K" in	"K" mm	without thermostat "L" in	without thermostat "L" mm	with thermostat "L" in	with thermostat "L" mm	Hub Size (NPT)
6	8	203	6	152	6	152	2
8	10	254	6	152	6	152	2
10	13¾	349	6	152	7½	191	2½
12	15⅝	397	6	152	7½	191	2½
14	17¼	438	6	152	7½	191	2½



TYPE 5N w/o thermostat; TYPE 5T with thermostat

Standard NEMA 7 housing with and without thermostat for 6" through 14" Flanged Immersion Heaters.

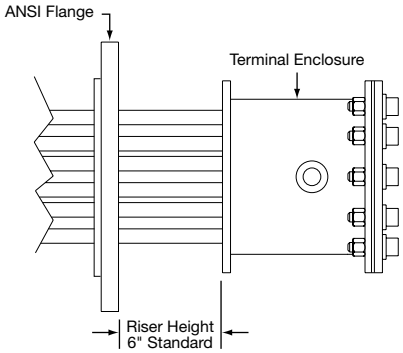
Flange Size	"K" in	"K" mm	without thermostat "L" in	without thermostat "L" mm	with thermostat "L" in	with thermostat "L" mm	Hub Size (NPT)
6	9⅜	238	6	152	7½	191	2
8	11½	292	6	152	7½	191	2
10	13¾	349	6	152	7½	191	2½
12	15⅝	397	6	152	7½	191	2½
14	17½	445	6	152	7½	191	2½

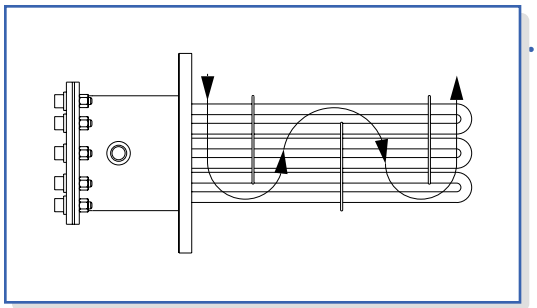
CAUTION

Explosion resistant terminal housings are intended to provide containment of an explosion in the enclosure only. No portion of the heater assembly outside the enclosure is covered under this NEMA rating. Abnormal use of a heater which results in excessive temperature can create hazardous conditions such as a fire. Never perform any type of service nor remove the housing cover prior to disconnecting all electrical power to the heater.

Terminal Enclosure Riser Option

The electrical housing is separated from the flange by a six-inch air gap to lower the ambient temperature of the electrical wiring. This option is used on flanged immersion heaters where the flange temperature exceeds 450°F (232°C).





Flow Control Baffles

For flange heaters used in circulation tanks, to aid heat transfer by forcing the liquid or gas back and forth across the elements. Baffles can be custom designed and positioned for your application.

Temperature Control

Thermostats

Thermostats are an optional feature for flanged immersion heaters. This type of control operates by expansion and contraction of a liquid in response to temperature change. Liquid contained within the sensing bulb and capillary flexes a diaphragm causing the opening and closing of a snap action switch. For heating applications the contacts are normally closed, and open on temperature rise.

CAUTION

Do not use the thermostat as a power switch. Use some other means of disconnecting power to the heater for servicing. Thermostats are not a failsafe device. Use an approved high temperature limit control and/or pressure limit control for safe operation.

Thermocouples

Type J or Type K thermocouples can be supplied for process temperature or over-temperature control. Type J is reliable and accurate for temperatures up to 1000°F (537.8°C). Type K should be used for higher temperatures.

For measuring process temperatures, the thermocouple can be mounted in a thermowell in the center of the element bundle. Note that a location somewhere away from the heater may give a more accurate measurement of process temperature.

For over-temperature protection, the thermocouple is usually attached to one of the elements and any unusual rise in element temperature would shut the heater down. This thermocouple may also be mounted in a thermowell, which is then attached to one of the heating elements if desired. This protects the thermocouple from the solution being heated and allows you to replace it without removing the heater, but does increase its response time.

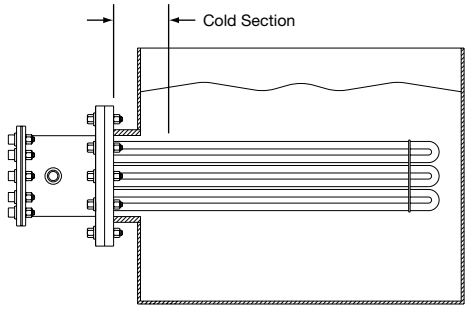
Temperature and over-temperature controls and how to pick the best control for your application can be found in Section 14.

Installation and Maintenance

1. Immersion heaters should be positioned to insure they are completely covered with the liquid they are heating. However, do not position the unit too low in structures where sludge buildup could cover it. Either of these conditions could cause overheating and subsequent premature failure of the elements.
2. Heated section should start sufficiently inside tank to assure good heat transfer.
3. Install adequate controls and safety devices to prevent build-up of temperature and/or pressure.
4. Make sure gasket surface is clean and dry before seating the heater.
5. Do not operate heater at a voltage in excess of that stamped on the heater. A heater can be run at a reduced voltage, remembering that this will decrease the heater's output wattage.
6. A wiring diagram is supplied in the electrical enclosure and as required, circuits on the heater are labeled.
7. All heater terminal connections should be wrench or screwdriver-tight with maximum torque consistent with terminal strength. To prevent twisting heater terminals when tightening connections, use backup wrench for countertorque. Periodically check that electrical connections are clean and tight.
8. The electrical insulating material used in electric heaters is hygroscopic and may absorb moisture when subjected to a humid environment during shipping, while in storage or during long equipment shutdowns. This moisture may lower the insulation resistance enough to cause heater failure.

   A meg-ohmmeter should be used to check the insulation resistance before applying power to any questionable heater.

   If a moisture condition exists it can be corrected by baking the heater in an oven at approximately 350°F (176.7°C) until the moisture is expelled and the meg-ohms have risen to an acceptable level.
9. For heaters supplied with an integral thermostat, this thermostat functions as a temperature control only and is not a failsafe device.



Applications: Fuel Oils (Bunker C and Number 6)

- *150-lb Raised Face Forged Carbon Steel Flange*
- *NEMA 1 Terminal Housing*
- *Compressed Fiber Ring Gasket*
- *Steel Sheath Heating Elements*
- *Watt Density of 8 watts/in² (1.3 watts/cm²)*
- *Three Phase only*

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
3"—150lb 3 elements	33	838	2	—		TFP02001	(1)	—		TFP02002	(1)	18	8
	48	1219	3	—		TFP02003	(1)	—		TFP02004	(1)	21	10
	64½	1638	4	—		TFP02005	(1)	—		TFP02006	(1)	24	11
	77	1956	5	—		TFP02007	(1)	—		TFP02008	(1)	26	12
4"—150lb 6 elements	40½	1029	5	—		TFP02009	(1)	—		TFP02010	(1)	35	16
	48	1219	6	—		TFP02011	(1)	—		TFP02012	(1)	38	17
	64½	1638	8	—		TFP02013	(1)	—		TFP02014	(1)	44	20
	77	1956	10	—		TFP02015	(1)	—		TFP02016	(1)	48	22
5"—150lb 6 elements	40½	1029	5	—		TFP02017	(1)	—		TFP02018	(1)	39	18
	48	1219	6	—		TFP02019	(1)	—		TFP02020	(1)	42	19
	64½	1638	8	—		TFP02021	(1)	—		TFP02022	(1)	48	22
	77	1956	10	—		TFP02023	(1)	—		TFP02024	(1)	52	24
5"—150lb 9 elements	40½	1029	7.5	—		TFP02025	(1)	—		TFP02026	(1)	46	21
	48	1219	9	—		TFP02027	(1)	—		TFP02028	(1)	50	23
	64½	1638	12	—		TFP02029	(1)	—		TFP02030	(1)	59	27
	77	1956	15	—		TFP02031	(1)	—		TFP02032	(1)	65	29
6"—150lb 12 elements	32⅞	835	8	—		TFP02033	(1)	—		TFP02034	(1)	56	25
	40⅜	1026	10	—		TFP02035	(1)	—		TFP02036	(1)	61	28
	47⅞	1216	12	—		TFP02037	(1)	—		TFP02038	(1)	66	30
	64⅜	1635	16.5	—		TFP02039	(1)	—		TFP02040	(1)	78	35
	76⅞	1953	20	—		TFP02041	(1)	—		TFP02042	(1)	86	39
6"—150lb 15 elements	32⅞	835	10	—		TFP02043	(1)	—		TFP02044	(1)	62	28
	40⅜	1026	12.5	—		TFP02045	(1)	—		TFP02046	(1)	68	31
	47⅞	1216	15	—		TFP02047	(1)	—		TFP02048	(1)	75	34
	64⅜	1635	21	—		TFP02049	(5)	—		TFP02050	(1)	89	40
	76⅞	1953	25	—		TFP02051	(5)	—		TFP02052	(1)	99	45
8"—150lb 18 elements	43¼	1099	12.5	—		TFP02053	(1)	—		TFP02054	(1)	99	45
	51¼	1302	16.5	—		TFP02055	(1)	—		TFP02056	(1)	107	49
	61¾	1569	20	—		TFP02057	(1)	—		TFP02058	(1)	117	53
	70¼	1784	24	—		TFP02059	(2)	—		TFP02060	(1)	126	57
	79¼	2013	27	—		TFP02061	(2)	—		TFP02062	(1)	136	62
8"—150lb 24 elements	43¼	1099	17	—		TFP02063	(1)	—		TFP02064	(1)	114	52
	51¼	1302	22	—		TFP02065	(2)	—		TFP02066	(1)	125	57
	61¾	1569	27	—		TFP02067	(2)	—		TFP02068	(1)	139	63
	70¼	1784	32	—		TFP02069	(2)	—		TFP02070	(1)	151	68
	79¼	2013	36	—		TFP02071	(2)	—		TFP02072	(1)	162	73
10"—150lb 27 elements	51¾	1314	25	—		TFP02073	(3)	—		TFP02074	(1)	155	70
	62¼	1581	30	—		TFP02075	(3)	—		TFP02076	(1)	171	78
	70¾	1797	35	—		TFP02077	(3)	—		TFP02078	(1)	184	83
	78¾	2000	40	—		TFP02079	(3)	—		TFP02080	(1)	196	89
12"—150lb 36 elements	51⅝	1311	34	—		TFP02081	(2)	—		TFP02082	(1)	216	98
	62⅛	1578	40	—		TFP02083	(2)	—		TFP02084	(1)	239	108
	70⅝	1794	47	—		TFP02085	(3)	—		TFP02086	(2)	267	121
	78⅝	1997	54	—		TFP02087	(3)	—		TFP02088	(2)	273	124
14"—150lb 45 elements	51½	1308	42	—		TFP02089	(3)	—		TFP02090	(3)	282	128
	62	1575	50	—		TFP02091	(3)	—		TFP02092	(3)	309	140
	70½	1791	60	—		TFP02093	(3)	—		TFP02094	(3)	330	150
	78½	1994	67	—		TFP02095	(5)	—		TFP02096	(3)	351	159

(C*) = Number of Branch Circuits per heater.

How To Order
See page 11-29

Applications: Fuel Oils (Number 4 and 5)

- *150-lb Raised Face Forged Carbon Steel Flange*
- *NEMA 1 Terminal Housing*
- *Compressed Fiber Ring Gasket*
- *Steel Sheath Heating Elements*
- *Watt Density of 15 watts/in² (2.3 watts/cm²)*

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
3"—150lb 3 elements	25 3/16	640	3	TFP02097	(1)	TFP02098	(1)	TFP02099	(1)	TFP02100	(1)	17	8
	33 1/16	840	4	TFP02101	(1)	TFP02102	(1)	TFP02103	(1)	TFP02104	(1)	18	8
	48 1/16	1221	6	TFP02105	(1)	TFP02106	(1)	TFP02107	(1)	TFP02108	(1)	21	10
5"—150lb 6 elements	33 1/16	840	8	—		TFP02109	(1)	—		TFP02110	(1)	37	17
	40 9/16	1030	10	—		TFP02111	(1)	—		TFP02112	(1)	39	18
	48 1/16	1221	12	—		TFP02113	(1)	—		TFP02114	(1)	42	19
	57 1/16	1449	15	—		TFP02115	(1)	—		TFP02116	(1)	45	20
	68 1/16	1729	18	—		TFP02117	(1)	—		TFP02118	(1)	49	22
8"—150lb 18 elements	32 7/8	835	20	—		TFP02119	(1)	—		TFP02120	(1)	89	40
	43 1/16	1110	25	—		TFP02121	(2)	—		TFP02122	(1)	100	45
	51 7/8	1318	30	—		TFP02123	(2)	—		TFP02124	(1)	108	49
	61 3/8	1559	35	—		TFP02125	(2)	—		TFP02126	(1)	118	54
	69 7/8	1775	40	—		TFP02127	(2)	—		TFP02128	(1)	125	57
	78 7/8	2003	45	—		TFP02129	(3)	—		TFP02130	(2)	135	61

(C) = Number of Branch Circuits per heater.*

Applications: Lightweight Oils, Heat Transfer Oils, Degreasing Solutions

- *150-lb Raised Face Forged Carbon Steel Flange*
- *NEMA 1 Terminal Housing*
- *Compressed Fiber Ring Gasket*
- *Steel Sheath Heating Elements*
- *Watt Density of 23 watts/in² (3.6 watts/cm²)*

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
3"—150lb 3 elements	18	457	3	TFP02131	(1)	TFP02132	(1)	TFP02133	(1)	TFP02134	(1)	16	7
	25½	648	4.5	TFP02135	(1)	TFP02136	(1)	TFP02137	(1)	TFP02138	(1)	17	8
	33	838	6	TFP02139	(1)	TFP02140	(1)	TFP02141	(1)	*TFP02142	(1)	18	8
	40½	1029	7.5	TFP02143	(1)	TFP02144	(1)	TFP02145	(1)	TFP02146	(1)	19	9
	48	1219	9	TFP02147	(1)	TFP02148	(1)	TFP02149	(1)	TFP02150	(1)	21	10
	64½	1638	12.5	—		TFP02151	(1)	TFP02152	(1)	TFP02153	(1)	24	11
	77	1956	15	—		TFP02154	(1)	TFP02155	(1)	TFP02156	(1)	26	12
4"—150lb 6 elements	18	457	6	TFP02157	(1)	TFP02158	(1)	TFP02159	(1)	TFP02160	(1)	28	13
	25½	648	9	TFP02161	(1)	TFP02162	(1)	TFP02163	(1)	TFP02164	(1)	30	14
	33	838	12	TFP02165	(2)	TFP02166	(1)	TFP02167	(1)	TFP02168	(1)	33	15
	40½	1029	15	TFP02169	(2)	TFP02170	(1)	TFP02171	(1)	TFP02172	(1)	35	16
	48	1219	18	TFP02173	(2)	TFP02174	(1)	TFP02175	(1)	TFP02176	(1)	38	17
	64½	1638	25	—		TFP02177	(2)	TFP02178	(2)	TFP02179	(1)	44	20
	77	1956	30	—		TFP02180	(2)	TFP02181	(2)	TFP02182	(1)	48	22
5"—150lb 6 elements	18	457	6	TFP02183	(1)	TFP02184	(1)	TFP02185	(1)	TFP02186	(1)	32	15
	25½	648	9	TFP02187	(1)	TFP02188	(1)	TFP02189	(1)	TFP02190	(1)	34	15
	33	838	12	TFP02191	(2)	TFP02192	(1)	TFP02193	(1)	TFP02194	(1)	37	17
	40½	1029	15	TFP02195	(2)	TFP02196	(1)	TFP02197	(1)	TFP02198	(1)	39	18
	48	1219	18	TFP02199	(2)	TFP02200	(1)	TFP02201	(1)	*TFP02202	(1)	42	19
	52 1/16	1322	20	TFP02203	(2)	TFP02204	(1)	TFP02205	(1)	TFP02206	(1)	43	20
	64½	1638	25	—		TFP02207	(2)	TFP02208	(2)	TFP02209	(1)	48	22
	77	1956	30	—		TFP02210	(2)	TFP02211	(2)	TFP02212	(1)	52	24

(C) = Number of Branch Circuits per heater.*

Flanged Immersion Heaters

Applications: Lightweight Oils, Heat Transfer Oils, Degreasing Solutions

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	kgs
5"—150lb 9 elements	18	457	9	TFP02213	(1)	TFP02214	(1)	TFP02215	(1)	TFP02216	(1)	35	16
	25½	648	14	TFP02217	(3)	TFP02218	(1)	TFP02219	(1)	TFP02220	(1)	39	18
	33	838	18	TFP02221	(3)	TFP02222	(1)	TFP02223	(1)	TFP02224	(1)	43	20
	40½	1029	23	TFP02225	(3)	TFP02226	(3)	TFP02227	(1)	TFP02228	(1)	46	21
	48	1219	27	TFP02229	(3)	TFP02230	(3)	TFP02231	(3)	TFP02232	(1)	50	23
	64½	1638	38	—		TFP02233	(3)	TFP02234	(3)	TFP02235	(1)	59	27
	77	1956	45	—		TFP02236	(3)	TFP02237	(3)	TFP02238	(3)	65	30
6"—150lb 12 elements	17⅞	454	12	TFP02239	(1)	TFP02240	(1)	TFP02241	(1)	TFP02242	(1)	46	21
	25⅜	645	18	TFP02243	(2)	TFP02244	(1)	TFP02245	(1)	TFP02246	(1)	51	23
	32⅞	835	24	TFP02247	(2)	TFP02248	(2)	TFP02249	(1)	TFP02250	(1)	56	25
	40⅜	1026	30	TFP02251	(2)	TFP02252	(2)	TFP02253	(2)	TFP02254	(1)	61	28
	47⅞	1216	36	TFP02255	(3)	TFP02256	(2)	TFP02257	(2)	TFP02258	(1)	66	30
	64⅜	1635	50	—		TFP02259	(4)	TFP02260	(4)	TFP02261	(2)	78	35
	76⅞	1953	60	—		TFP02262	(4)	TFP02263	(4)	TFP02264	(2)	86	39
6"—150lb 15 elements	17⅞	454	15	TFP02265	(3)	TFP02266	(1)	TFP02267	(1)	TFP02268	(1)	49	22
	25⅜	645	23	TFP02269	(3)	TFP02270	(5)	TFP02271	(1)	TFP02272	(1)	55	25
	32⅞	835	30	TFP02273	(3)	TFP02274	(5)	TFP02275	(3)	TFP02276	(1)	62	28
	40⅜	1026	38	TFP02277	(5)	TFP02278	(5)	TFP02279	(3)	TFP02280	(1)	68	31
	47⅞	1216	45	TFP02281	(5)	TFP02282	(5)	TFP02283	(3)	TFP02284	(5)	75	34
	64⅜	1635	63	—		TFP02285	(5)	TFP02286	(3)	TFP02287	(5)	89	40
	76⅞	1953	75	—		TFP02288	(5)	TFP02289	(5)	TFP02290	(5)	99	45
8"—150lb 18 elements	32¾	832	30	TFP02291	(3)	TFP02292	(2)	TFP02293	(2)	TFP02294	(1)	88	40
	43¼	1099	40	—		TFP02295	(2)	TFP02296	(2)	TFP02297	(1)	99	45
	51¼	1302	50	—		TFP02298	(3)	TFP02299	(3)	TFP02300	(2)	107	49
	61¾	1568	60	—		TFP02301	(3)	TFP02302	(3)	TFP02303	(2)	117	53
	70¼	1784	70	—		TFP02304	(6)	TFP02305	(3)	TFP02306	(2)	126	57
	79¼	2013	80	—		TFP02307	(6)	—		TFP02308	(2)	136	62
8"—150lb 24 elements	32¾	832	40	TFP02309	(4)	TFP02310	(2)	TFP02311	(2)	TFP02312	(1)	100	45
	43¼	1099	53	—		TFP02313	(4)	TFP02314	(3)	TFP02315	(2)	114	52
	51¼	1302	67	—		TFP02316	(4)	TFP02317	(3)	TFP02318	(2)	125	57
	61¾	1568	80	—		TFP02319	(4)	TFP02320	(4)	TFP02321	(2)	139	63
	70¼	1784	93	—		TFP02322	(8)	TFP02323	(6)	TFP02324	(4)	151	68
	79¼	2013	107	—		TFP02325	(8)	—		TFP02326	(4)	162	73
10"—150lb 27elements	33¼	845	45	—		TFP02327	(3)	—		TFP02328	(3)	127	58
	43¾	1111	60	—		TFP02329	(3)	—		TFP02330	(3)	143	65
	51¾	1314	75	—		TFP02331	(9)	—		TFP02332	(3)	155	70
	62¼	1581	90	—		—		—		TFP02333	(3)	171	78
	70¾	1797	105	—		—		—		TFP02334	(3)	184	83
	78¾	2000	120	—		—		—		TFP02335	(3)	196	89
12"—150lb 36elements	33⅛	841	60	—		—		—		TFP02336	(3)	180	82
	43⅝	1108	80	—		—		—		TFP02337	(3)	201	91
	51⅝	1311	100	—		—		—		TFP02338	(3)	216	98
	62⅛	1578	120	—		—		—		TFP02339	(3)	239	108
	70⅝	1794	140	—		—		—		TFP02340	(4)	267	121
	78⅝	1997	160	—		—		—		TFP02341	(4)	273	124
14"—150lb 45elements	33	838	75	—		—		—		TFP02342	(3)	235	107
	43½	1105	100	—		—		—		TFP02343	(3)	262	119
	51½	1308	125	—		—		—		TFP02344	(5)	282	128
	62	1575	150	—		—		—		TFP02345	(5)	309	140
	70½	1791	175	—		—		—		TFP02346	(5)	330	150
	78½	1994	200	—		—		—		TFP02347	(5)	351	159

(C*) = Number of Branch Circuits per heater.

STOCK ITEMS ORDER NOW!®

an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

Applications: Heat Transfer Oils, Liquid Paraffin

- *150-lb Raised Face Forged Carbon Steel Flange*
- *NEMA 1 Terminal Housing*
- *Compressed Fiber Ring Gasket*
- *Incoloy® sheath heating elements*
- *Watt Density of 16 watts/in² (2.5 watts/cm²)*
- *Three Phase only*

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
3"—150lb 3 elements	13½	343	1.5	—		TFP02348	(1)	—		TFP02349	(1)	15	7
	18	457	2	—		TFP02350	(1)	—		TFP02351	(1)	16	7
	20½	521	2.5	—		TFP02352	(1)	—		TFP02353	(1)	16	7
	25½	648	3	—		TFP02354	(1)	—		TFP02355	(1)	17	8
	33	838	4	—		TFP02356	(1)	—		TFP02357	(1)	18	8
	40½	1029	5	—		TFP02358	(1)	—		TFP02359	(1)	19	9
	48	1219	6	—		TFP02360	(1)	—		TFP02361	(1)	21	10
4"—150lb 6 elements	13½	343	3	—		TFP02362	(1)	—		TFP02363	(1)	26	12
	18	457	4	—		TFP02364	(1)	—		TFP02365	(1)	28	13
	20½	521	5	—		TFP02366	(1)	—		TFP02367	(1)	29	13
	25½	648	6	—		TFP02368	(1)	—		TFP02369	(1)	30	14
	33	838	8	—		TFP02370	(1)	—		TFP02371	(1)	33	15
	40½	1029	10	—		TFP02372	(1)	—		TFP02373	(1)	35	16
	48	1219	12	—		TFP02374	(1)	—		TFP02375	(1)	38	17
5"—150lb 6 elements	13½	343	3	—		TFP02376	(1)	—		TFP02377	(1)	30	14
	18	457	4	—		TFP02378	(1)	—		TFP02379	(1)	32	15
	20½	521	5	—		TFP02380	(1)	—		TFP02381	(1)	33	15
	25½	648	6	—		TFP02382	(1)	—		TFP02383	(1)	34	15
	33	838	8	—		TFP02384	(1)	—		TFP02385	(1)	37	17
	40½	1029	10	—		TFP02386	(1)	—		TFP02387	(1)	39	18
	48	1219	12	—		TFP02388	(1)	—		TFP02389	(1)	42	19
5"—150lb 9 elements	13½	343	4.5	—		TFP02390	(1)	—		TFP02391	(1)	33	15
	18	457	6	—		TFP02392	(1)	—		TFP02393	(1)	35	16
	20½	521	7.5	—		TFP02394	(1)	—		TFP02395	(1)	36	16
	25½	648	9	—		TFP02396	(1)	—		TFP02397	(1)	39	18
	33	838	12	—		TFP02398	(1)	—		TFP02399	(1)	43	20
	40½	1029	15	—		TFP02400	(1)	—		TFP02401	(1)	46	21
	48	1219	18	—		TFP02402	(1)	—		TFP02403	(1)	50	23
6"—150lb 12 elements	13⅜	340	6	—		TFP02404	(1)	—		TFP02405	(1)	43	20
	17⅞	454	8	—		TFP02406	(1)	—		TFP02407	(1)	46	21
	20⅜	518	10	—		TFP02408	(1)	—		TFP02409	(1)	48	22
	25⅜	645	12	—		TFP02410	(1)	—		TFP02411	(1)	51	23
	32⅞	835	16	—		TFP02412	(1)	—		TFP02413	(1)	56	25
	40⅜	1026	20	—		TFP02414	(1)	—		TFP02415	(1)	61	28
	47⅞	1216	24	—		TFP02416	(2)	—		TFP02417	(1)	66	30
6"—150lb 15 elements	13⅜	340	7.5	—		TFP02418	(1)	—		TFP02419	(1)	45	20
	17⅞	454	10	—		TFP02420	(1)	—		TFP02421	(1)	49	22
	20⅜	518	12.5	—		TFP02422	(1)	—		TFP02423	(1)	51	23
	25⅜	645	15	—		TFP02424	(1)	—		TFP02425	(1)	55	25
	32⅞	835	20	—		TFP02426	(1)	—		TFP02427	(1)	62	28
	40⅜	1026	25	—		TFP02428	(5)	—		TFP02429	(1)	68	31
	47⅞	1216	30	—		TFP02430	(5)	—		TFP02431	(1)	75	34
8"—150lb 18 elements	25¾	654	17	—		TFP02432	(1)	—		TFP02433	(1)	81	37
	35¾	908	25	—		TFP02434	(2)	—		TFP02435	(1)	91	41
	44¼	1124	33	—		TFP02436	(2)	—		TFP02437	(1)	100	45
	54¼	1378	42	—		TFP02438	(3)	—		TFP02439	(2)	110	50
	63¼	1607	50	—		—		—		TFP02440	(2)	119	54
	72¾	1848	58	—		—		—		TFP02441	(2)	129	59
	82¼	2089	67	—		—		—		TFP02442	(2)	139	63
8"—150lb 24 elements	25¾	654	23	—		TFP02443	(2)	—		TFP02444	(1)	90	41
	35¾	908	33	—		TFP02445	(2)	—		TFP02446	(1)	104	47
	44¼	1124	44	—		TFP02447	(4)	—		TFP02448	(2)	115	52
	54¼	1378	56	—		TFP02449	(4)	—		TFP02450	(2)	129	59
	63¼	1607	67	—		—		—		TFP02451	(2)	141	64
	72¾	1848	77	—		—		—		TFP02452	(2)	154	70
	82¼	2089	89	—		—		—		TFP02453	(4)	167	76

(C) = Number of Branch Circuits per heater.*

Applications: Heat Transfer Oils, Liquid Paraffin

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
10"—150lb 27 elements	54¾	1391	63	—		—		—		TFP02454	(3)	160	73
	63¾	1619	75	—		—		—		TFP02455	(3)	173	78
	73¼	1861	87	—		—		—		TFP02456	(3)	188	85
12"—150lb 36 elements	54⅝	1387	83	—		—		—		TFP02457	(3)	224	102
	63¾	1619	100	—		—		—		TFP02458	(3)	242	110
	73⅛	1857	117	—		—		—		TFP02459	(3)	262	119
14"—150lb 45 elements	54½	1384	105	—		—		—		TFP02460	(3)	290	132
	63½	1613	125	—		—		—		TFP02461	(5)	313	142

(C*) = Number of Branch Circuits per heater.

Applications: Forced Air, Caustic Solutions, Degreasing Solutions

- ***150-lb Raised Face Forged Carbon Steel Flange***
- ***NEMA 1 Terminal Housing***
- ***Compressed Fiber Ring Gasket***
- ***Incoloy® Sheath Heating Elements***
- ***Watt Density of 23 watts/in² (3.6 watts/cm²)***

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
3"—150lb 3 elements	18	457	3	TFP02462	(1)	TFP02463	(1)	TFP02464	(1)	TFP02465	(1)	16	7
	25½	648	4.5	TFP02466	(1)	TFP02467	(1)	TFP02468	(1)	TFP02469	(1)	17	8
	33	838	6	TFP02470	(1)	TFP02471	(1)	TFP02472	(1)	TFP02473	(1)	18	8
	40½	1029	7.5	TFP02474	(1)	TFP02475	(1)	TFP02476	(1)	TFP02477	(1)	19	9
	48	1219	9	TFP02478	(1)	TFP02479	(1)	TFP02480	(1)	TFP02481	(1)	21	10
	64½	1638	12.5	—		TFP02482	(1)	TFP02483	(1)	TFP02484	(1)	24	11
	77	1956	15	—		TFP02485	(1)	TFP02486	(1)	TFP02487	(1)	26	12
4"—150lb 6 elements	18	457	6	TFP02488	(1)	TFP02489	(1)	TFP02490	(1)	TFP02491	(1)	28	13
	25½	648	9	TFP02492	(1)	TFP02493	(1)	TFP02494	(1)	TFP02495	(1)	30	14
	33	838	12	TFP02496	(2)	TFP02497	(1)	TFP02498	(1)	TFP02499	(1)	33	15
	40½	1029	15	TFP02500	(2)	TFP02501	(1)	TFP02502	(1)	TFP02503	(1)	35	16
	48	1219	18	TFP02504	(2)	TFP02505	(1)	TFP02506	(1)	TFP02507	(1)	38	17
	64½	1638	25	—		TFP02508	(2)	TFP02509	(2)	TFP02510	(1)	44	20
	77	1956	30	—		TFP02511	(2)	TFP02512	(2)	TFP02513	(1)	48	22
5"—150lb 6 elements	18	457	6	TFP02514	(1)	TFP02515	(1)	TFP02516	(1)	TFP02517	(1)	32	15
	25½	648	9	TFP02518	(1)	TFP02519	(1)	TFP02520	(1)	TFP02521	(1)	34	15
	33	838	12	TFP02522	(2)	TFP02523	(1)	TFP02524	(1)	TFP02525	(1)	37	17
	40½	1029	15	TFP02526	(2)	TFP02527	(1)	TFP02528	(1)	*TFP02529	(1)	39	18
	48	1219	18	TFP02530	(2)	TFP02531	(1)	TFP02532	(1)	*TFP02533	(1)	42	19
	64½	1638	25	—		TFP02534	(2)	TFP02535	(2)	TFP02536	(1)	48	22
	77	1956	30	—		TFP02537	(2)	TFP02538	(2)	TFP02539	(1)	52	24
5"—150lb 9 elements	18	457	9	TFP02540	(1)	TFP02541	(1)	TFP02542	(1)	TFP02543	(1)	35	16
	25½	648	14	TFP02544	(3)	TFP02545	(1)	TFP02546	(1)	TFP02547	(1)	39	18
	33	838	18	TFP02548	(3)	TFP02549	(1)	TFP02550	(1)	TFP02551	(1)	43	20
	40½	1029	23	TFP02552	(3)	TFP02553	(3)	TFP02554	(1)	TFP02555	(1)	46	21
	48	1219	27	TFP02556	(3)	TFP02557	(3)	TFP02558	(3)	TFP02559	(1)	50	23
	64½	1638	38	—		TFP02560	(3)	TFP02561	(3)	TFP02562	(1)	59	27
	77	1956	45	—		TFP02563	(3)	TFP02564	(3)	TFP02565	(3)	65	30

(C*) = Number of Branch Circuits per heater.

CONTINUED

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Applications: Forced Air, Caustic Solutions, Degreasing Solutions (continued)

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	kgs
6"—150lb 12 elements	17⅞	454	12	TFP02566	(2)	TFP02567	(1)	TFP02568	(1)	TFP02569	(1)	46	21
	25⅜	645	18	TFP02570	(2)	TFP02571	(1)	TFP02572	(1)	TFP02573	(1)	51	23
	32⅞	835	24	TFP02574	(2)	TFP02575	(2)	TFP02576	(2)	TFP02577	(1)	56	25
	40⅜	1026	30	TFP02578	(3)	TFP02579	(2)	TFP02580	(2)	TFP02581	(1)	61	28
	47⅞	1216	36	TFP02582	(3)	TFP02583	(2)	TFP02584	(2)	TFP02585	(1)	66	30
	64⅜	1635	50	—		TFP02586	(4)	TFP02587	(3)	TFP02588	(2)	78	35
	76⅞	1953	60	—		TFP02589	(4)	TFP02590	(3)	TFP02591	(2)	86	39
6"—150lb 15 elements	17⅞	454	15	TFP02592	(3)	TFP02593	(1)	TFP02594	(1)	TFP02595	(1)	49	22
	25⅜	645	23	TFP02596	(3)	TFP02597	(5)	TFP02598	(1)	TFP02599	(1)	55	25
	32⅞	835	30	TFP02600	(3)	TFP02601	(5)	TFP02602	(3)	TFP02603	(1)	62	28
	40⅜	1026	38	TFP02604	(5)	TFP02605	(5)	TFP02606	(3)	TFP02607	(1)	68	31
	47⅞	1216	45	TFP02608	(5)	TFP02609	(5)	TFP02610	(3)	TFP02611	(5)	75	34
	64⅜	1635	63	—		TFP02612	(5)	TFP02613	(3)	TFP02614	(5)	89	40
	76⅞	1953	75	—		TFP02615	(5)	TFP02616	(5)	TFP02617	(5)	99	45
8"—150lb 18 elements	32¾	832	30	TFP02618	(3)	TFP02619	(2)	TFP02620	(2)	TFP02621	(1)	88	40
	43¼	1099	40	—		TFP02622	(2)	TFP02623	(2)	TFP02624	(1)	99	45
	51¼	1302	50	—		TFP02625	(3)	TFP02626	(3)	TFP02627	(2)	107	49
8"—150lb 24 elements	32¾	832	40	TFP02628	(4)	TFP02629	(2)	TFP02630	(2)	TFP02631	(1)	100	45
	43¼	1099	53	—		TFP02632	(4)	TFP02633	(3)	TFP02634	(2)	115	52
	51¼	1302	67	—		TFP02635	(4)	TFP02636	(3)	TFP02637	(2)	125	57
10"—150lb 27 elements	33¼	845	45	—		TFP02638	(3)	—		TFP02639	(3)	127	58
	43¾	1111	60	—		TFP02640	(3)	—		TFP02641	(3)	143	65
	51¾	1314	75	—		TFP02642	(9)	—		TFP02643	(3)	155	70
12"—150lb 36 elements	33⅛	841	60	—		—		—		TFP02644	(3)	180	82
	43⅝	1108	80	—		—		—		TFP02645	(3)	201	91
	51⅝	1311	100	—		—		—		TFP02646	(3)	216	98
14"—150lb 45 elements	33	838	75	—		—		—		TFP02647	(3)	235	107
	43½	1105	100	—		—		—		TFP02648	(3)	262	119
	51½	1308	125	—		—		—		TFP02649	(5)	282	128

(C*) = Number of Branch Circuits per heater.

Application: Process Water

- ***150-lb Raised Face Forged Carbon Steel Flange***
- ***NEMA 1 Terminal Housing***
- ***Compressed Fiber Ring Gasket***
- ***Incoloy® Sheath Heating Elements***
- ***Watt Density of 48 watts/in² (7.4 watts/cm²)***

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	kgs
3"—150lb 3 elements	13½	343	4.5	TFP02650	(1)	TFP02651	(1)	TFP02652	(1)	TFP02653	(1)	15	7
	18	457	6	TFP02654	(1)	TFP02655	(1)	TFP02656	(1)	TFP02657	(1)	16	7
	20½	521	7.5	TFP02658	(1)	TFP02659	(1)	TFP02660	(1)	TFP02661	(1)	16	7
	25½	648	9	TFP02662	(1)	TFP02663	(1)	TFP02664	(1)	*TFP02665	(1)	17	8
	33	838	12	—		TFP02666	(1)	TFP02667	(1)	TFP02668	(1)	18	8
	40½	1029	15	—		TFP02669	(1)	TFP02670	(1)	TFP02671	(1)	19	9
	48	1219	18	—		TFP02672	(1)	TFP02673	(1)	*TFP02674	(1)	21	10
4"—150lb 6 elements	13½	343	9	TFP02675	(1)	TFP02676	(1)	TFP02677	(1)	TFP02678	(1)	26	12
	18	457	12	TFP02679	(2)	TFP02680	(1)	TFP02681	(1)	TFP02682	(1)	28	13
	20½	521	15	TFP02683	(2)	TFP02684	(1)	TFP02685	(1)	TFP02686	(1)	29	13
	25½	648	18	TFP02687	(2)	TFP02688	(1)	TFP02689	(1)	TFP02690	(1)	30	14
	33	838	24	TFP02691	(2)	TFP02692	(2)	TFP02693	(2)	TFP02694	(1)	33	15
	40½	1029	30	—		TFP02695	(2)	TFP02696	(2)	TFP02697	(1)	35	16
	48	1219	36	—		TFP02698	(2)	TFP02699	(2)	TFP02700	(1)	38	17

(C*) = Number of Branch Circuits per heater.

CONTINUED

Applications: Process Water (continued)

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
5"—150lb 6 elements	13½	343	9	TFP02701	(1)	TFP02702	(1)	TFP02703	(1)	TFP02704	(1)	30	14
	18	457	12	TFP02705	(2)	TFP02706	(1)	TFP02707	(1)	TFP02708	(1)	32	15
	20½	521	15	TFP02709	(2)	TFP02710	(1)	TFP02711	(1)	TFP02712	(1)	33	15
	25½	648	18	TFP02713	(2)	TFP02714	(1)	TFP02715	(1)	TFP02716	(1)	34	15
	33	838	24	TFP02717	(2)	TFP02718	(2)	TFP02719	(2)	*TFP02720	(1)	37	17
	40½	1029	30	—		TFP02721	(2)	TFP02722	(2)	*TFP02723	(1)	39	18
	48	1219	36	—		TFP02724	(2)	TFP02725	(2)	*TFP02726	(1)	42	19
5"—150lb 9 elements	13½	343	14	TFP02727	(3)	TFP02728	(1)	TFP02729	(1)	TFP02730	(1)	33	15
	18	457	18	TFP02731	(3)	TFP02732	(1)	TFP02733	(1)	TFP02734	(1)	35	16
	20½	521	23	TFP02735	(3)	TFP02736	(3)	TFP02737	(1)	TFP02738	(1)	36	16
	25½	648	27	TFP02739	(3)	TFP02740	(3)	TFP02741	(3)	TFP02742	(1)	39	18
	33	838	36	—		TFP02743	(3)	TFP02744	(3)	*TFP02745	(1)	43	20
	40½	1029	45	—		TFP02746	(3)	TFP02747	(3)	*TFP02748	(3)	46	21
	48	1219	54	—		TFP02749	(3)	TFP02750	(3)	*TFP02751	(3)	50	23
6"—150lb 12 elements	13⅜	340	18	TFP02752	(2)	TFP02753	(1)	TFP02754	(1)	TFP02755	(1)	43	20
	17⅞	454	24	TFP02756	(2)	TFP02757	(2)	TFP02758	(2)	TFP02759	(1)	46	21
	20⅜	518	30	TFP02760	(3)	TFP02761	(2)	TFP02762	(2)	TFP02763	(1)	48	22
	25⅜	645	36	TFP02764	(3)	TFP02765	(2)	TFP02766	(2)	TFP02767	(1)	51	23
	32⅞	835	48	—		TFP02768	(4)	TFP02769	(3)	TFP02770	(2)	56	25
	40⅜	1026	60	—		TFP02771	(4)	TFP02772	(3)	TFP02773	(2)	61	28
	47⅞	1216	72	—		TFP02774	(4)	—		TFP02775	(2)	66	30
6"—150lb 15 elements	13⅜	340	23	TFP02776	(3)	TFP02777	(5)	TFP02778	(1)	TFP02779	(1)	45	20
	17⅞	454	30	TFP02780	(3)	TFP02781	(5)	TFP02782	(3)	TFP02783	(1)	49	22
	20⅜	518	38	TFP02784	(5)	TFP02785	(5)	TFP02786	(3)	TFP02787	(1)	51	23
	25⅜	645	45	TFP02788	(5)	TFP02789	(5)	TFP02790	(3)	TFP02791	(5)	55	25
	32⅞	835	60	—		TFP02792	(5)	TFP02793	(3)	TFP02794	(5)	62	28
	40⅜	1026	75	—		TFP02795	(5)	TFP02796	(5)	TFP02797	(5)	68	31
	47⅞	1216	90	—		TFP02798	(5)	—		TFP02799	(5)	75	34
8"—150lb 18 elements	25¾	654	50	—		TFP02800	(3)	TFP02801	(3)	TFP02802	(2)	81	37
	35¾	908	75	—		TFP02803	(6)	—		TFP02804	(2)	91	41
	44¼	1124	100	—		TFP02805	(6)	—		TFP02806	(3)	100	45
	54¼	1378	125	—		TFP02807	(6)	—		TFP02808	(6)	110	50
	63¼	1607	150	—		—		—		TFP02809	(6)	119	54
	72¾	1848	175	—		—		—		TFP02810	(6)	129	59
	82¼	2089	200	—		—		—		TFP02811	(6)	139	63
8"—150lb 24 elements	25¾	654	67	—		TFP02812	(4)	TFP02813	(3)	TFP02814	(2)	90	41
	35¾	908	100	—		TFP02815	(8)	—		TFP02816	(4)	104	47
	44¼	1124	133	—		TFP02817	(8)	—		TFP02818	(4)	115	52
	54¼	1378	167	—		TFP02819	(8)	—		TFP02820	(8)	129	59
	63¼	1607	200	—		—		—		TFP02821	(8)	141	64
	72¾	1848	233	—		—		—		TFP02822	(8)	154	70
	82¼	2089	267	—		—		—		TFP02823	(8)	167	76
10"—150lb 27 elements	54¾	1391	190	—		—		—		TFP02824	(9)	160	73
	63¾	1619	225	—		—		—		TFP02825	(9)	173	78
	73¼	1861	262	—		—		—		TFP02826	(9)	188	85
12"—150lb 36 elements	54⅝	1387	250	—		—		—		TFP02827	(6)	224	102
	63⅝	1616	300	—		—		—		TFP02828	(12)	242	110
	73⅛	1857	350	—		—		—		TFP02829	(12)	262	119
14"—150lb 45 elements	54½	1384	315	—		—		—		TFP02830	(15)	290	132
	63⅛	1603	375	—		—		—		TFP02831	(15)	312	142

(C*) = Number of Branch Circuits per heater.

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Flanged Immersion Heaters

Application: Clean Water

- *150-lb Raised Face Forged Carbon Steel Flange*
- *NEMA 1 Terminal Housing*
- *Compressed Fiber Ring Gasket*
- *Copper sheath heating elements*
- *Watt Density of 60 watts/in² (9.3 watts/cm²)*

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	kgs
3"—150lb 3 elements	15½	394	6	TFP02832	(1)	*TFP02833	(1)	TFP02834	(1)	*TFP02835	(1)	15	7
	21½	546	9	TFP02836	(1)	*TFP02837	(1)	TFP02838	(1)	*TFP02839	(1)	16	7
	27	686	12	—		TFP02840	(1)	TFP02841	(1)	*TFP02842	(1)	17	8
	32½	826	15	—		*TFP02843	(1)	TFP02844	(1)	TFP02845	(1)	18	8
	38	965	18	—		TFP02846	(1)	TFP02847	(1)	*TFP02848	(1)	19	9
	51	1295	25	—		—		TFP02849	(1)	TFP02850	(1)	21	10
	60½	1537	30	—		—		TFP02851	(1)	TFP02852	(1)	23	10
4"—150lb 6 elements	15½	394	12	TFP02853	(2)	TFP02854	(1)	TFP02855	(1)	TFP02856	(1)	27	12
	21½	546	18	TFP02857	(2)	TFP02858	(1)	TFP02859	(1)	TFP02860	(1)	29	13
	27	686	24	TFP02861	(2)	TFP02862	(2)	TFP02863	(2)	TFP02864	(1)	31	14
	32½	826	30	—		TFP02865	(2)	TFP02866	(2)	TFP02867	(1)	33	15
	38	965	36	—		TFP02868	(2)	TFP02869	(2)	TFP02870	(1)	35	16
	51	1295	50	—		—		—		TFP02871	(2)	39	18
	60½	1537	60	—		—		—		TFP02872	(2)	42	19
5"—150lb 6 elements	15½	394	12	TFP02873	(2)	TFP02874	(1)	TFP02875	(1)	TFP02876	(1)	31	14
	21½	546	18	TFP02877	(2)	TFP02878	(1)	TFP02879	(1)	TFP02880	(1)	33	15
	27	686	24	TFP02881	(2)	TFP02882	(2)	TFP02883	(2)	*TFP02884	(1)	35	16
	32½	826	30	—		TFP02885	(2)	TFP02886	(2)	*TFP02887	(1)	37	17
	38	965	36	—		TFP02888	(2)	TFP02889	(2)	TFP02890	(1)	39	18
	51	1295	50	—		—		—		TFP02891	(2)	43	20
	60½	1537	60	—		—		—		TFP02892	(2)	46	21
5"—150lb 9 elements	15½	394	18	TFP02893	(3)	TFP02894	(1)	TFP02895	(1)	TFP02896	(1)	34	15
	21½	546	27	TFP02897	(3)	TFP02898	(3)	TFP02899	(3)	TFP02900	(3)	37	17
	27	686	36	—		TFP02901	(3)	TFP02902	(3)	TFP02903	(3)	40	18
	32½	826	45	—		TFP02904	(3)	TFP02905	(3)	TFP02906	(3)	42	19
	38	965	54	—		TFP02907	(3)	TFP02908	(3)	TFP02909	(3)	45	20
	51	1295	75	—		—		—		TFP02910	(3)	52	24
	60½	1537	90	—		—		—		TFP02911	(3)	57	26
6"—150lb 12 elements	15⅜	391	24	TFP02912	(2)	TFP02913	(2)	TFP02914	(2)	TFP02915	(1)	44	20
	21⅜	543	36	TFP02916	(3)	TFP02917	(2)	TFP02918	(2)	TFP02919	(1)	48	22
	26⅞	683	48	—		TFP02920	(4)	TFP02921	(4)	TFP02922	(2)	52	24
	32⅜	822	60	—		TFP02923	(4)	TFP02924	(4)	TFP02925	(2)	56	25
	37⅞	962	72	—		TFP02926	(4)	—		TFP02927	(2)	60	27
	50⅞	1292	100	—		—		—		TFP02928	(4)	68	31
	60⅜	1534	120	—		—		—		TFP02929	(4)	75	34
6"—150lb 15 elements	15⅜	391	30	TFP02930	(3)	TFP02931	(5)	TFP02932	(3)	TFP02933	(1)	47	21
	21⅜	543	45	TFP02934	(5)	TFP02935	(5)	TFP02936	(3)	TFP02937	(5)	52	24
	26⅞	683	60	—		TFP02938	(5)	TFP02939	(3)	TFP02940	(5)	57	26
	32⅜	822	75	—		TFP02941	(5)	TFP02942	(5)	TFP02943	(5)	61	28
	37⅞	962	90	—		TFP02944	(5)	—		TFP02945	(5)	66	30
	50⅞	1292	125	—		—		—		TFP02946	(5)	77	35
	60⅜	1534	150	—		—		—		TFP02947	(5)	85	39
8"—150lb 18 elements	21¾	553	50	—		TFP02948	(3)	TFP02949	(3)	TFP02950	(2)	77	35
	29¾	756	75	—		TFP02951	(6)	—		TFP02952	(2)	85	39
	37¼	946	100	—		TFP02953	(6)	—		TFP02954	(3)	93	42
	45¼	1149	125	—		TFP02955	(6)	—		TFP02956	(6)	101	46
	52¾	1340	150	—		—		—		TFP02957	(6)	109	49
	60¾	1543	175	—		—		—		TFP02958	(6)	117	53
	68¼	1734	200	—		—		—		TFP02959	(6)	125	57

(C*) = Number of Branch Circuits per heater.

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Application: Deionized Water

- *150-lb Raised Face 316 Stainless Steel Flange*
- *NEMA 1 Terminal Housing*
- *Compressed Fiber Ring Gasket*
- *316 Stainless Steel Sheath Heating Elements*
- *Watt Density of 60 watts/in² (9.3 watts/cm²)*

ANSI Flange Size	Immersed Length in	Immersed Length mm	KW	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	480V-1Ph	(C*)	480V-3Ph	(C*)	Approximate Net Weight lbs	Approximate Net Weight kgs
4"—150lb 6 elements	16	406	12	TFP02960	(2)	TFP02961	(1)	TFP02962	(1)	TFP02963	(1)	27	12
	22	559	18	TFP02964	(2)	TFP02965	(1)	TFP02966	(1)	TFP02967	(1)	29	13
	27½	699	24	TFP02968	(2)	TFP02969	(2)	TFP02970	(1)	TFP02971	(1)	31	14
	33	838	30	—		TFP02972	(2)	TFP02973	(2)	TFP02974	(1)	32	15
	38½	978	36	—		TFP02975	(2)	TFP02976	(2)	TFP02977	(1)	35	16
	51½	1308	50	—		—		—		TFP02978	(2)	39	18
	61	1549	60	—		—		—		TFP02979	(2)	42	19
6"—150lb 12 elements	15¾	400	24	TFP02980	(3)	TFP02981	(2)	TFP02982	(2)	TFP02983	(1)	45	20
	21¾	552	36	TFP02984	(3)	TFP02985	(2)	TFP02986	(2)	TFP02987	(1)	49	22
	27¼	692	48	—		TFP02988	(4)	TFP02989	(3)	TFP02990	(2)	52	24
	32¾	832	60	—		TFP02991	(4)	TFP02992	(3)	TFP02993	(2)	56	25
	38¼	972	72	—		TFP02994	(4)	—		TFP02995	(2)	60	27
	51¼	1302	100	—		—		—		TFP02996	(4)	69	31
	60¾	1543	120	—		—		—		TFP02997	(4)	75	34
6"—150lb 15 elements	15¾	400	30	TFP02998	(3)	TFP02999	(5)	TFP03000	(3)	TFP03001	(1)	47	21
	21¾	552	45	TFP03002	(5)	TFP03003	(5)	TFP03004	(3)	TFP03005	(5)	52	24
	27¼	692	60	—		TFP03006	(5)	TFP03007	(3)	TFP03008	(5)	57	26
	32¾	832	75	—		TFP03009	(5)	TFP03010	(5)	TFP03011	(5)	62	28
	38¼	972	90	—		TFP03012	(5)	—		TFP03013	(5)	66	30
	51¼	1302	125	—		—		—		TFP03014	(5)	77	35
	60¾	1543	150	—		—		—		TFP03015	(5)	86	39

(C*) = Number of Branch Circuits per heater.

How to Order

Catalog Heaters

Flanged Immersion Heaters whose Part Numbers are preceded by an asterisk (*) are Guaranteed in Stock for immediate delivery.

Part Numbers with no asterisk (*) are stocked as sub-assemblies for 2-3 week delivery.

Custom Engineered/Manufactured Heaters

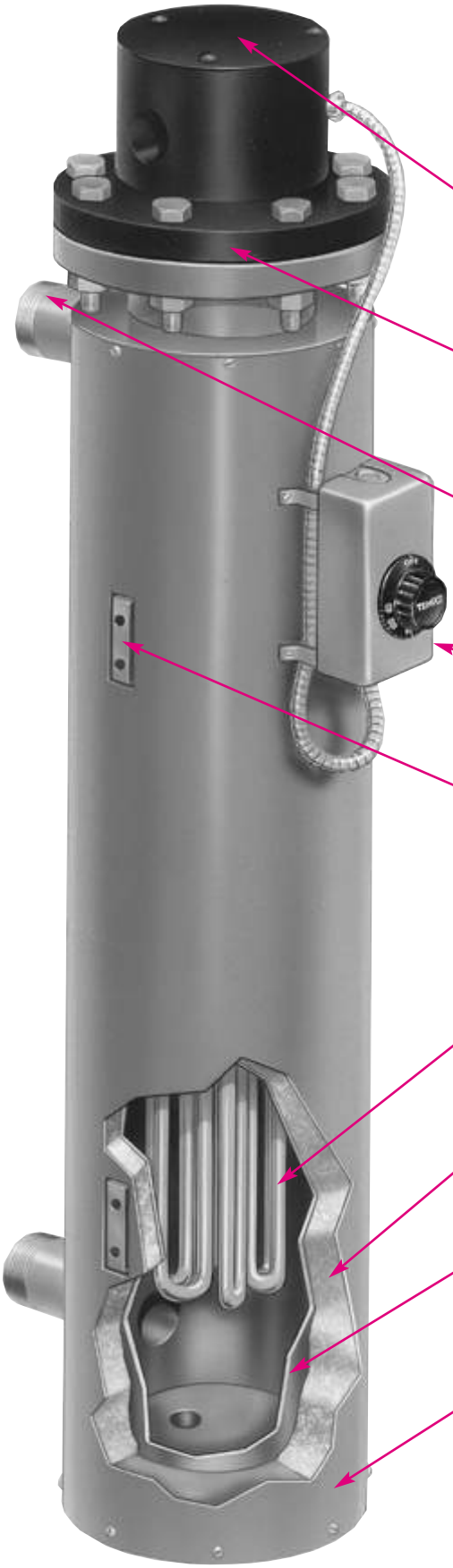
Understanding that an electric heater can be very application specific, for sizes and ratings not listed, **TEMPCO** will design and manufacture a Flanged Immersion Heater to meet your requirements. ***Standard lead time is 4 weeks.***

Please Specify the following:

- ❑ Wattage, Voltage and Phase
- ❑ Flange Size and Material
- ❑ Element Sheath Material
- ❑ Element Watt Density
- ❑ Element Immersion Length
- ❑ Electrical Enclosure Type
- ❑ Thermostat— if required
- ❑ Optional Features

Power Control Panels for Process Heaters

Power Control Panels featuring mechanical or solid state controls with all other necessary components can be provided by TEMPCO for any size flanged heater. See pages 11-62 and 11-63 for more information.



Circulation Heaters

Self-contained heating units designed for optimum operating efficiency and performance—
Providing *trouble free service* and *application flexibility*!

All of the heat generated by the elements is immediately transferred to the medium being processed with minimal losses.

Standard and optional features include...

A General purpose (NEMA 1) terminal housing is standard. Moisture proof (NEMA 4) and/or explosion resistant (NEMA 7) housings are optional. A set of installation and maintenance instructions along with a wiring diagram can be found inside the terminal housing of each unit.

B Heating source—1¼" and 2½" Screw Plug Heaters are used on smaller units. 3" to 14" size heaters use Flanged Immersion Heaters. The flanges are made from forged steel rated for 150 lbs with raised face. Supplied with threaded eyebolts for ease of handling and installation. Optional stainless steel flanges or 300 lb ratings available.

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

D Double-pole non-indicating bulb and capillary type thermostat is an optional feature and can be located in the terminal box or attached to the insulation jacket as pictured. Solid state temperature controllers and indicating thermostats are available. Over-temperature protection can be provided by attaching a thermocouple to one of the elements.

E Threaded mounting lugs to support the unit are welded to the steel vessel. Custom supports can be designed to fit your structure.

F Wide selection of heating element sheath materials for maximum corrosion resistance to the medium being processed. On smaller circulation units with screw plug heaters, the element diameter is .315" or .475". On larger units with flanged heaters, the element diameter is .475".

G The vessel is surrounded with 1" thick insulation rated to 750°F (399°C) to minimize heat loss. Additional insulation or a high temperature ceramic fiber insulation is optional. Vessels can also be supplied uninsulated.

H Vessel material is SA53B or SA106B steel. Good for up to 750°F (399°C) operating temperature. For drainage and cleaning purposes, a drain plug is located in the base of the tank. Optional: Stainless steel vessel.

I Outer steel sheet metal jacket protects and keeps the insulation dry from the environment. It is painted with rust and corrosion resistant paint. Optional: Stainless steel outer jacket and rain-tight seal.

Selecting the proper Circulation Heater

Tempco Circulation Heaters will provide long life and dependable trouble free service—provided the sheath materials, watt densities and operating temperatures are properly matched for the medium being heated.

Observe the following guidelines:

1. Match your process to the most suitable heater alloy sheath material. See pages 16-12 through 16-20 for the recommended sheath materials for many common materials.
2. Do not exceed the maximum allowable heater watt density (w/in^2) and recommended operating temperature for the material being heated. Refer to the engineering section (16) of this catalog or consult TEMPCO with your requirements.
3. Pressure–Temperature Rating. See page 11-18.
4. Select the proper terminal enclosure to protect the heater wiring and provide safety to personnel and equipment.
5. For uniform heat distribution and reduction of power in large storage tank applications, several smaller circulation heaters are recommended rather than a single large unit.

Need Help? We are proud of our record in working with customers to develop the right heater for the job. Call Tempco with your requirements.

Wetted Surface Metal Treatments

Circulation Heater surfaces in contact with the material being heated can be passivated or electro-polished to improve their resistance to corrosion.

Passivation removes surface contamination, usually iron, so that the optimum corrosion resistance of the stainless steel is maintained. Surface contamination would come from the small amount of steel that may be worn off a tool during the manufacturing process.

Electro-Polishing is an electrochemical process that removes surface imperfections and contaminants, enhancing the corrosion resisting ability of the stainless steels. The resultant surface is clean, smooth and bright. Many medical and food applications require this type finish.

Vessel Construction

Catalog heaters have Class 150lb rated carbon steel pressure vessels. For higher pressures and/or temperatures, vessel construction to Class 600lb is available in steel and stainless steel.

Flanges are Forged Steel or 316 Stainless Steel, depending on the application.

Sheath Material Selection

CORROSION. In addition to selecting a sheath material that is compatible with the heated medium, other factors that affect corrosion need to be considered.

1. The temperature of the corrodent. As temperature increases the degree of corrosion increases. Also remember that the element temperature is usually higher than the material it is heating.
2. Velocity of the corrodent. Increased velocity can increase the corrosion rate.

See pages 16-13 through16-20 for recommended sheath materials for many immersion heating applications. If you are purchasing the material you are heating, check with the supplier on their recommendations.

Standard Element Sheath Materials

Incoloy® 800— A Nickel (30-35%), Chromium (19-23%), Iron alloy. The high nickel content of this alloy contributes to its resistance to scaling and corrosion. Used in air heating (also see Incoloy 840 on page 10-3) and immersion heating of potable water and other liquids that are not corrosive to an Incoloy 800 sheath.

Sheath temperatures to 1600°F (871°C).

Low Carbon Steel— Applications include fluid heat transfer media, tar, high to low viscosity petroleum oils, asphalt, wax, molten salt, and other solutions not corrosive to a steel sheath.

Sheath temperatures to 750°F (399°C).

316 Stainless Steel— A Chromium (16-18%), Nickel (11-14%), Iron Alloy with Molybdenum (2-3%) added to improve corrosion resistance in certain environments, especially those which would tend to cause pitting due to the presence of chlorides. Applications include deionized water.

Sheath temperatures to 1200°F (649°C).

Copper— Mainly used in clean water heating for washrooms, showers, rinse tanks and freeze protection of storage tanks.

Sheath temperatures to 350°F (177°C)

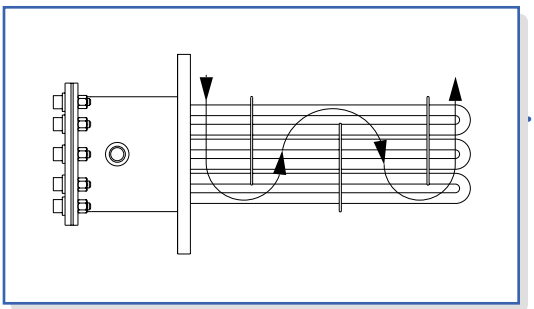
Optional Element Sheath Materials

304 Stainless Steel— A Chromium (18-20%), Nickel (8-11%), Iron Alloy used in the food industry, sterilizing solutions, air heating, and many organic and inorganic chemicals.

Sheath temperatures to 1200°F (649°C).

321 Stainless Steel— A Chromium (17-20%), Nickel (9-13%), Iron Alloy modified with the addition of titanium to prevent carbide precipitation and resulting intergranular corrosion that can take place in certain mediums when operating in the 800-1200°F (427-649°C) temperature range.

Sheath temperatures to 1200°F (649°C).



Optional Flow Control Baffles

Used on circulation tank heaters to aid heat transfer by forcing the liquid or gas back and forth across the elements. Baffles can be custom designed and positioned for you application.

Terminal Housings

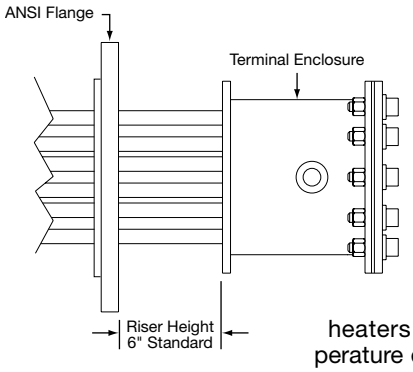
Tempco Circulation Heaters are supplied with a NEMA 1 general purpose housing as standard unless otherwise specified. Moisture Resistant (NEMA 4) and/or Explosion Resistant (NEMA 7) housings are optional.

Descriptions and dimensions of housings for circulation heaters with screw plug heaters can be found on on page 11-7, and for flange heaters on pages 11-18 and 11-19. If none of these housings meet the size, construction or other criteria of your application—consult Tempco with your requirements.

CAUTION

Explosion resistant terminal housings are intended to provide containment of an explosion in the enclosure only. No portion of the heater assembly outside the enclosure is covered under this NEMA rating. Abnormal use of a heater which results in excessive temperature can create hazardous conditions such as a fire. Never perform any type of service nor remove the housing cover prior to disconnecting all electrical power to the heater.

Terminal Enclosure Riser Option



The electrical housing is separated from the flange by a six-inch air gap to lower the ambient temperature of the electrical wiring. This option is used on flanged immersion heaters where the flange temperature exceeds 450°F (232°C).

Temperature Control

Thermostats

Thermostats are an optional feature on flanged immersion heaters. This type of control operates by expansion and contraction of a liquid in response to temperature change. Liquid contained within the sensing bulb and capillary flexes a diaphragm, causing the opening and closing of a snap action switch. For heating applications the contacts are normally closed and open on temperature rise.

CAUTION

Do not use the thermostat as a power switch. Use some other means of disconnecting power to the heater for servicing. Thermostats are not a failsafe device. Use an approved high temperature limit control and/or pressure limit control for safe operation.

Branch Circuit Wiring

Flange heater elements are wired into branch circuits having a maximum current of 48 Amps. The number of circuits is listed next to the heater's voltage and phase in the standard sizes and ratings chart. For different circuit wiring configurations, consult Tempco.

Thermocouples

Type J or Type K thermocouples can be supplied for process temperature or over-temperature control. Type J is reliable and accurate for temperatures up to 1000°F (539°C). Type K should be used for higher temperatures.

For measuring process temperatures the thermocouple can be mounted in a thermowell in the center of the element bundle. Note that a location somewhere away from the heater may give a more accurate measurement of process temperature.

For over-temperature protection the thermocouple is usually attached to one of the elements (Figure A) and any unusual rise in element temperature would shut the heater down. This thermocouple may also be mounted in a thermowell (Figure B), which is then attached to one of the heating elements if desired. This protects the thermocouple from the solution being heated and allows you to replace it without removing the heater but does increase its response time.

Temperature and over-temperature controls for using the signal generated by thermocouples and how to select the best control for your application can be found in Section 13.

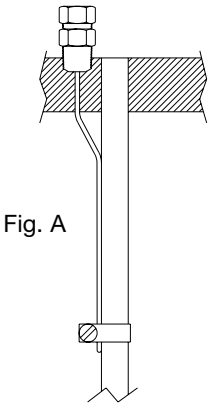


Fig. A

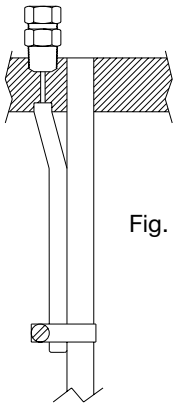


Fig. B

Circulation Heaters Installation Recommendations

Tempco Circulation heaters will provide long life and dependable, troublefree service if properly installed, operated and maintained as per the following recommendations:

Installation

1. Flange heaters are supplied with two drilled and tapped holes for threaded eye bolts, providing ease of handling during installation and flange removal during maintenance cleaning or heater replacement.
2. Replacement of heater is inevitable. Therefore, provide adequate space for installation, allowing ample room to remove the flange heater for cleaning or replacement.
3. In applications requiring the circulation heater to be fed by an inline pump, install the pump at the inlet end.
4. To maintain the lowest possible temperature at the terminal box, place the outlet at the end opposite to the terminal box. If your process temperature is circulating at 450°F (232°C) or above (at the nozzle closest to the flange), stand-off terminal box construction is recommended.
5. To prevent temperature and/or pressure buildup on closed loop circulation heater systems, adequate and strategically located thermocouples for temperature controllers and pressure relief valves should be installed. Never over-rate pressure relief valves beyond the pressure temperature rating of the flange being used.
6. During the process cycle, flow rate of the medium being heated should never be interrupted or reduced, thus creating an overheating condition. Excess temperature can result in damage to the medium being processed and premature heater failure.
7. Make sure that your circulation heater is equipped with the proper terminal housing for the environment in which the heater is being used. NEMA 1—General purpose, NEMA 4—Moisture resistant, and NEMA 7—Explosion resistant.

Wiring

1. All heater installations must be properly earth grounded to eliminate electric shock hazard. Electrical wiring must be in accordance with LOCAL AND/OR NATIONAL ELECTRICAL CODES.
2. Circulation heaters are supplied standard with NEMA 1 terminal housings. All power to heaters must be disconnected before removing the terminal housing cover and performing any type of service.
3. Electrical connections on heater terminals must be kept tight. Loose connections will create arcing, over-heating, and eventually will destroy the heater terminal and cause premature heater failure.
4. If the amperage rating of your circulation heater exceeds the amperage capacity of the supplied thermostat, mercury relays or magnetic contactors should be used with the thermostat. See page 15-3 through 15-5.
5. Over-temperature protection thermocouples require a separate conduit to the control panel for the thermocouple wire.
6. TEMPCO offers a large selection of Power Control Panels for circulation heaters. See page 11-62 and 11-63.

Maintenance

1. Never perform any type of service on the unit prior to disconnecting all electrical power and shutting off all intake lines.
2. Remove sludge deposits through the drain plug.
3. Check flange bolts for tightness.
4. Check terminal connections for tightness.
5. Check thermocouple or thermostat bulb for response to temperature changes. If defective, replace immediately.
6. Check for leaks.
7. Depending on operating conditions and medium being processed, the flange or screw plug heater should be periodically removed for physical inspection and cleaning of the element bundle.

Vertical Mounting—Liquids

With terminal housing up and inlet pipe on the bottom, the heating elements will be immersed at all times to prevent premature failure.

Horizontal Mounting

Always mount heater with inlet-outlet pipes facing up to ensure the heating elements will be immersed at all times to prevent premature failure. For liquid heating outlet may be at either end. When heating gases the inlet should be closest to the terminal enclosure to minimize terminal box wiring temperatures.

Vertical Mounting—Gases

Mount with terminal enclosure and inlet pipe at bottom of tank to minimize terminal box wiring temperatures.

Mightybooster™ Water Heater

Application: Aqueous Solutions

Standard Construction Features

- Integral 60°F (15°C) to 180°F (82°C) Thermostat
- NEMA 1 Terminal Housing
- Insulated Carbon Steel or Bronze Vessel
- 1" NPT Inlet and Outlet
- Copper Sheath Heating Elements
- Watt Density of 60 watts/in² (9.3 watts/cm²)

STOCK ITEMS ORDER NOW!

Pipebody Material	KW	OAL in	OAL mm	Inlet-Outlet in	Inlet-Outlet mm	Part Number 120/240V	Approximate Net Weight lbs	Approximate Net Weight kgs
Carbon steel	1.5	18	457	12 3/8	314	CHF02097	8	3.6
	2.0	18	457	12 3/8	314	CHF02098	8	3.6
	2.5	22	559	16 3/8	416	CHF02099	11	5.0
	3.0	22	559	16 3/8	416	CHF02100	11	5.0
Bronze	1.5	18	457	12 3/8	314	CHF02101	12.5	5.7
	2.0	18	457	12 3/8	314	CHF02102	12.5	5.7
	2.5	22	559	16 3/8	416	CHF02103	14.5	6.6
	3.0	22	559	16 3/8	416	CHF02104	14.5	6.6

Application: Lubricating Oils

Standard Construction Features

- Integral 150°F (65°C) to 560°F (300°C) Thermostat
- NEMA 1 Terminal Housing
- Insulated Carbon Steel Vessel
- 1" NPT Inlet and Outlet
- Steel Sheath Heating Elements
- Watt Density of 23 watts/in² (3.6 watts/cm²)

SAME DAY SHIPMENT on stock items ORDERED BY 2 PM CST

Pipebody Material	KW	OAL in	OAL mm	Inlet-Outlet in	Inlet-Outlet mm	Part Number 120/240V	Approximate Net Weight lbs	Approximate Net Weight kgs
Carbon Steel	0.5	22	559	16 3/8	416	CHF02105	11	5.0
	0.75	22	559	16 3/8	416	CHF02106	11	5.0
	1.0	22	559	16 3/8	416	CHF02107	11	5.0

How to Order

Catalog Heaters

Order by Part Number for catalog heaters listed above.

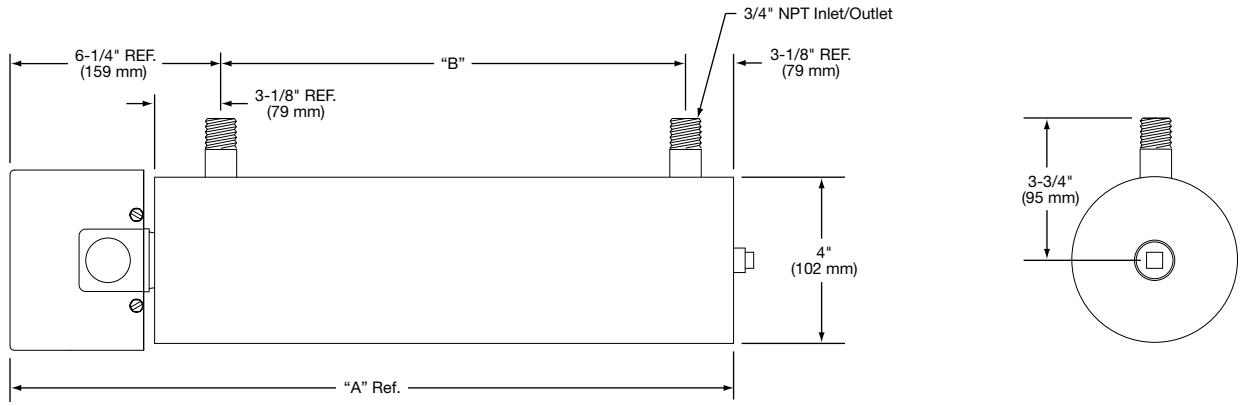
Custom Engineered/Manufactured Heaters

For ratings not listed, **TEMPCO** will design and manufacture a Mightybooster™ Heater to meet your requirements. ***Standard lead time is 3-4 weeks.***

Please Specify the following:

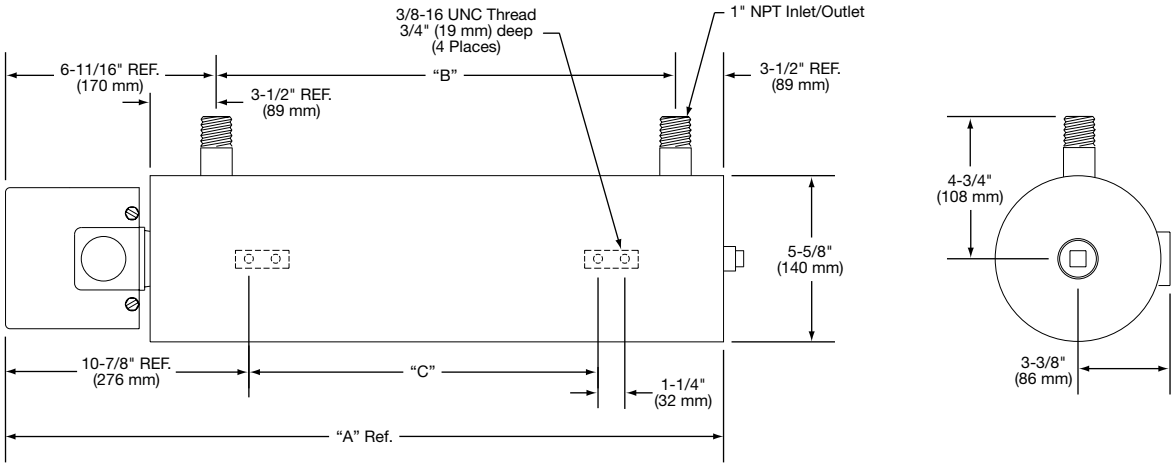
- ❑ Application, including operating temperature/pressure
- ❑ Wattage and Voltage
- ❑ Screw Plug Material
- ❑ Element Sheath Material
- ❑ Element Watt Density
- ❑ Element Immersion Length
- ❑ Electrical Enclosure Type
- ❑ Thermostat— if required
- ❑ Vessel Material
- ❑ Additional insulation
- ❑ Other Optional Features

Standard 1-1/4 NPT Screw Plug Circulation Heater Dimensions

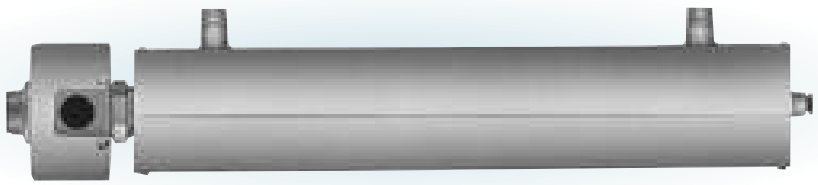


Dimensions Reference Number	"A"		"B"	
	in	mm	in	mm
1.1	24⅜	619	15	381
1.2	32⅜	822	23	584

Standard 2-1/2 NPT Screw Plug Circulation Heater Dimensions

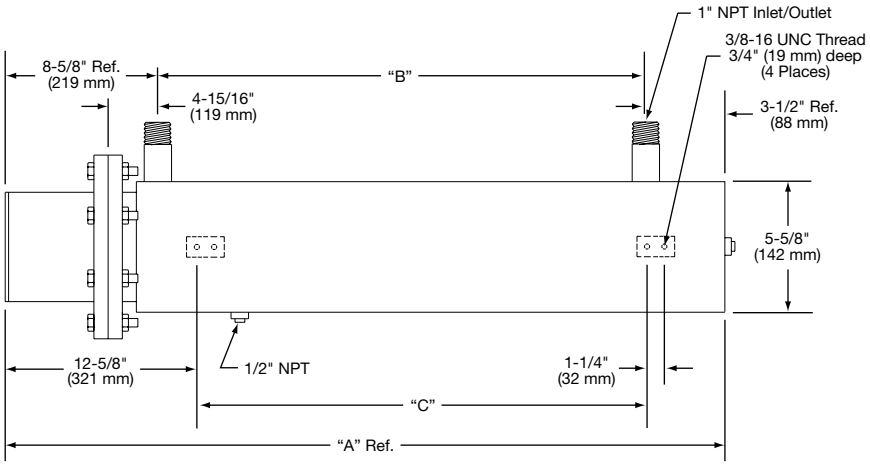


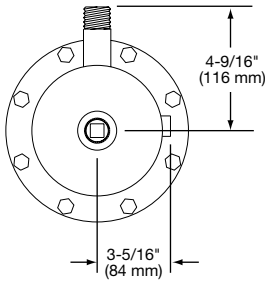
Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
2.1	32 11/16	830	22½	572	16½	419
2.2	42 11/16	1084	32½	826	26½	673
2.3	55 3/16	1402	45	1143	39	991



Circulation Heater pictured has optional thermostat mounted in terminal box.

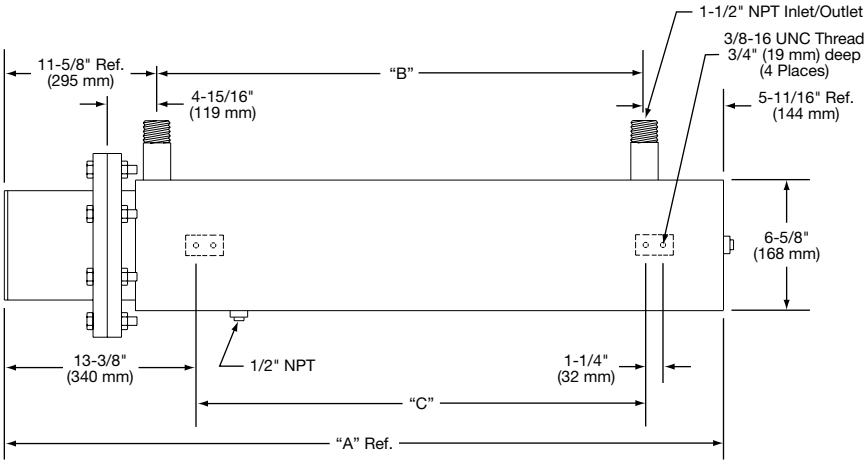
Standard 3" Flanged Circulation Heater Dimensions

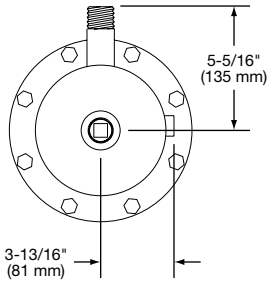




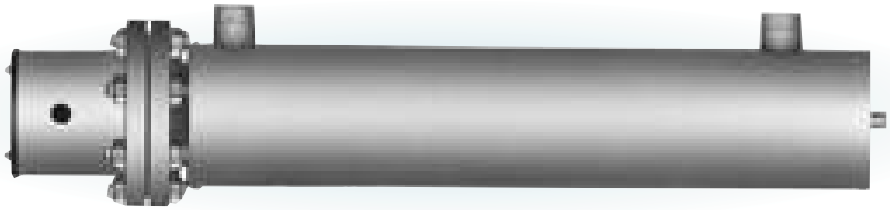
Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
3.1	34⅝	879	22½	572	16½	419
3.2	44⅝	1133	32½	826	26½	673
3.3	57⅛	1451	45	1143	39	991

Standard 4" Flanged Circulation Heater Dimensions

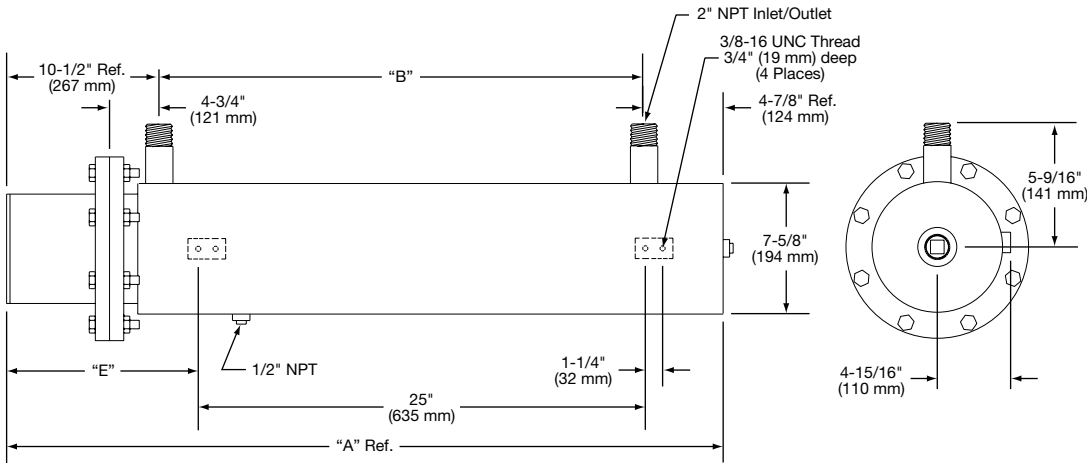


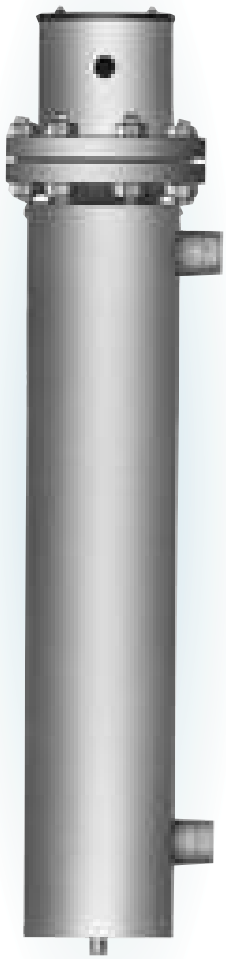


Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
4.1	37 13/16	960	20½	521	17	432
4.2	48 5/16	1227	31	787	27½	699
4.3	69 5/16	1761	52	1321	48½	1232
4.4	90 5/16	2294	73	1854	69½	1765



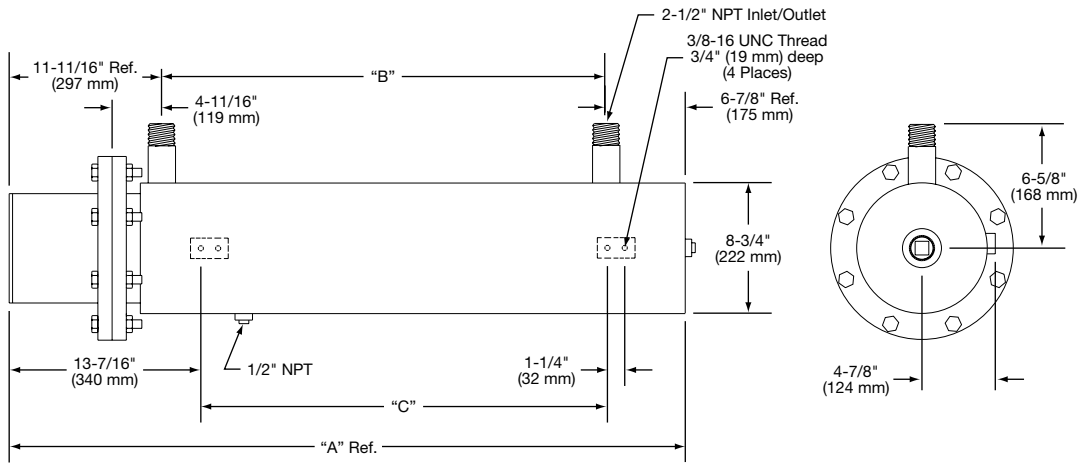
Standard 5" Flanged Circulation Heater Dimensions





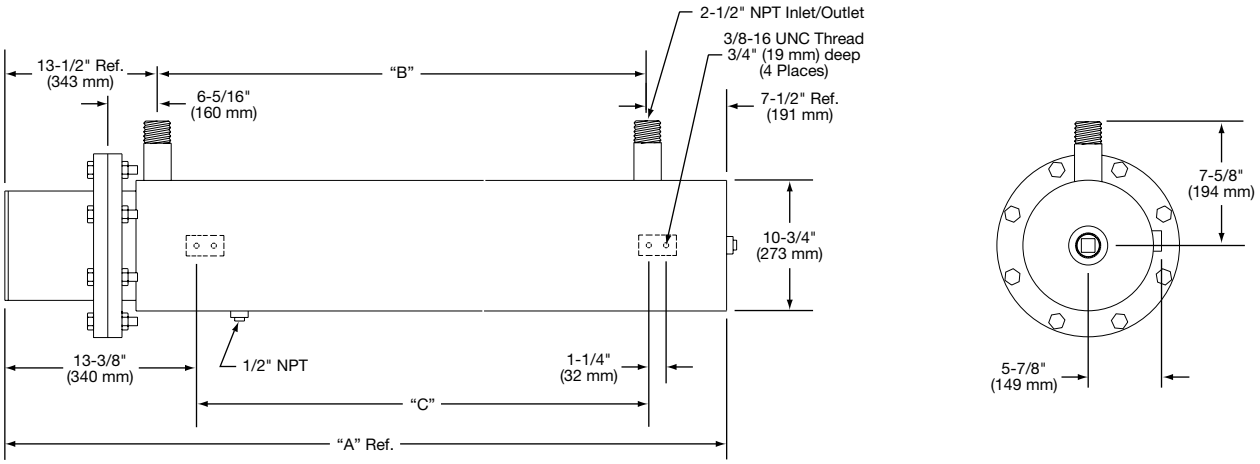
Dimensions Reference Number	"A"		"B"		"E"	
	in	mm	in	mm	in	mm
5.1	45⅜	1153	30	762	11½	292
5.2	52⅜	1330	37	940	15¼	387
5.3	63⅞	1622	48½	1232	21	533
5.4	77¼	1962	61⅞	1572	27½	698
5.5	90¼	2292	74⅞	1902	34¼	870

Standard 6" Flanged Circulation Heater Dimensions

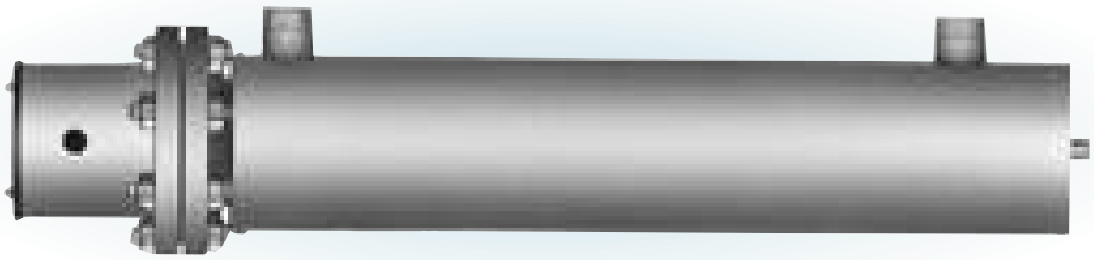


Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
6.1	39 1/16	992	20½	521	17	432
6.2	49 9/16	1259	31	787	27½	699
6.3	70 9/16	1792	52	1321	48½	1232
6.4	91 9/16	2326	73	1854	69½	1765

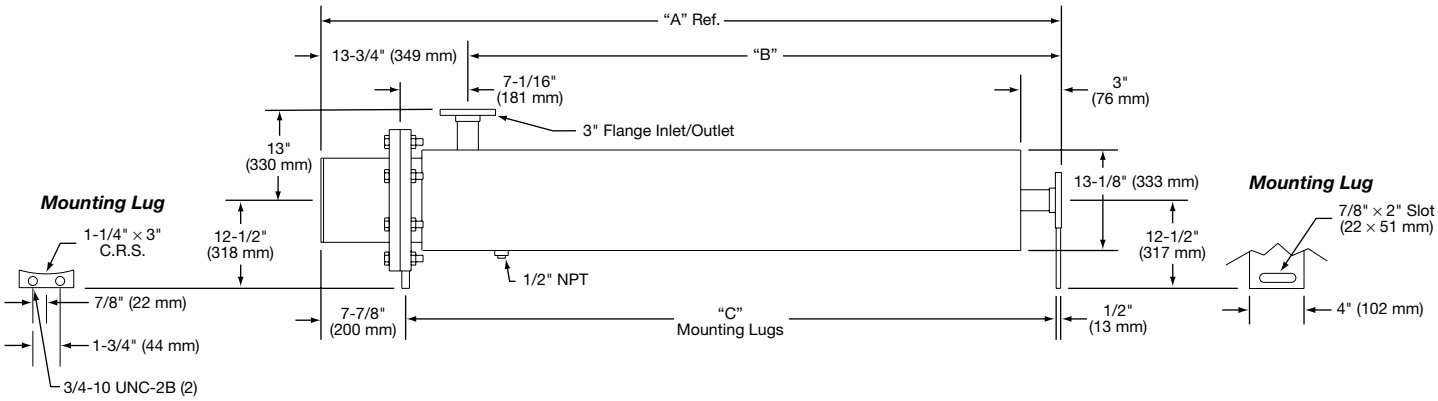
Standard 8" Flanged Circulation Heater Dimensions



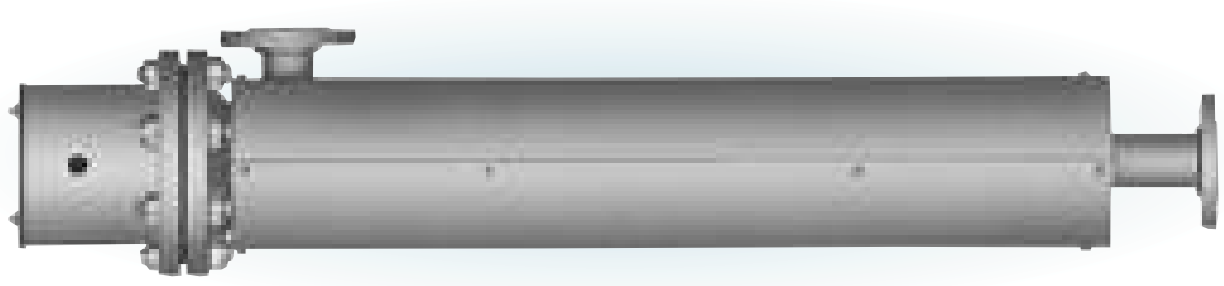
Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
8.1	46	1168	24 1/16	627	21 3/16	538
8.2	53 3/4	1365	32 1/16	830	29 3/16	741
8.3	60 3/4	1543	39 1/16	1008	36 3/16	919
8.4	68 3/4	1746	47 5/16	1202	43 13/16	1113
8.5	77 7/8	1978	56 13/16	1443	53 5/16	1354
8.6	86 7/8	2207	65 13/16	1672	62 5/16	1583
8.7	96 7/8	2461	75 13/16	1926	72 5/16	1837



Standard 10" Flanged Circulation Heater Dimensions

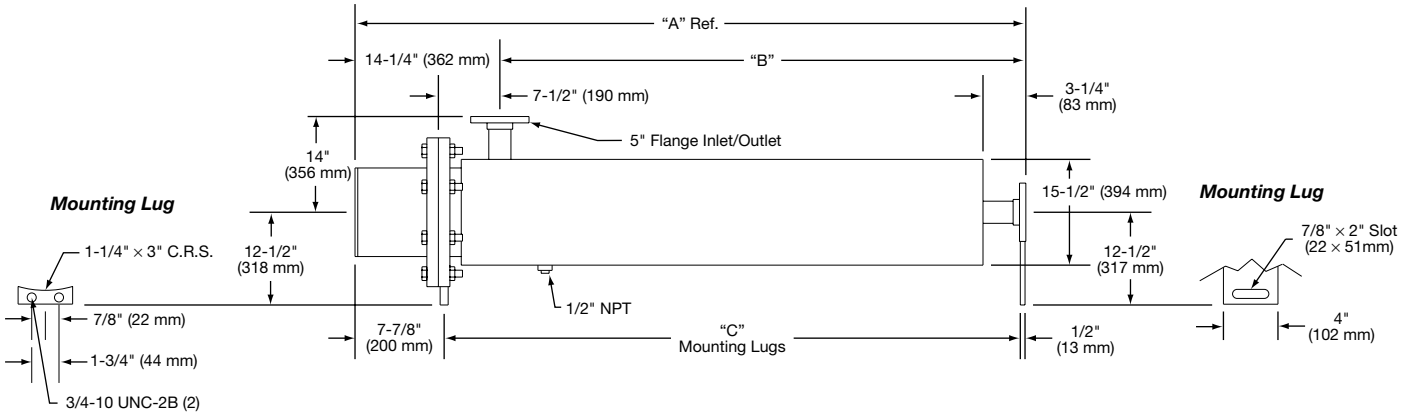


Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
10.1	74	1880	60¼	1531	66	1676
10.2	81½	2070	67¾	1721	73½	1867
10.3	89	2261	75¼	1911	81	2057
10.4	96½	2451	82¾	2102	88½	2248
10.5	104	2642	90¼	2292	96	2438



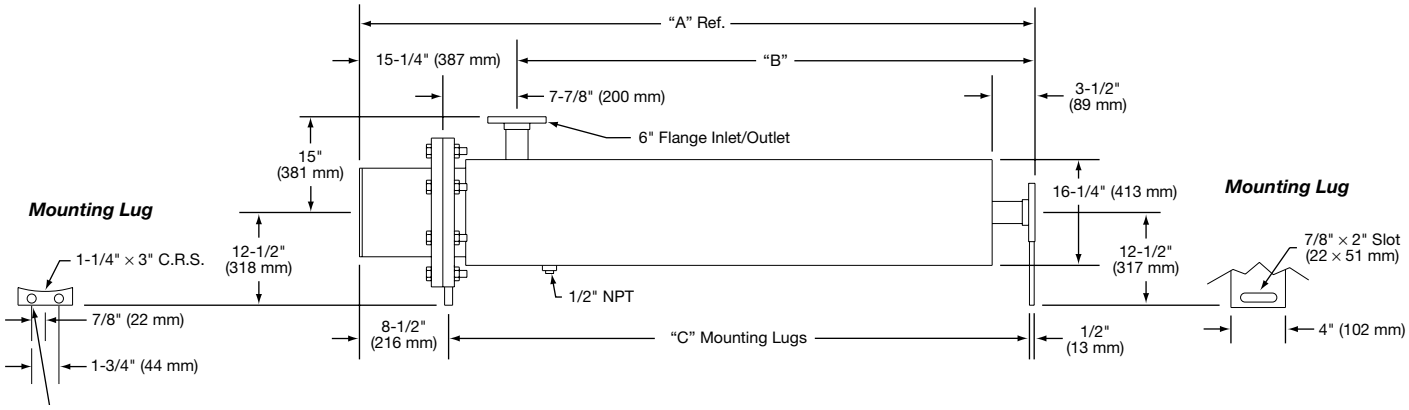
Mounting lugs not shown.

Standard 12" Flanged Circulation Heater Dimensions

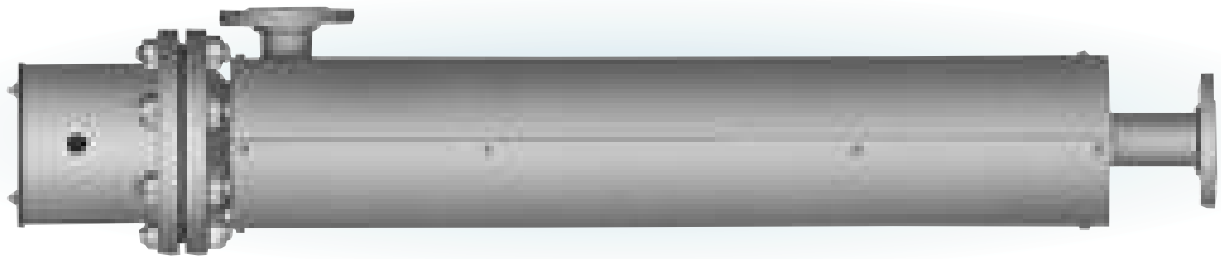


Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
12.1	74¼	1886	60	1524	66⅛	1680
12.2	81¾	2076	67½	1715	73⅝	1870
12.3	89¼	2267	75	1905	81⅛	2061
12.4	96¾	2457	82½	2096	88⅝	2251
12.5	104¼	2648	90	2286	96⅛	2442

Standard 14" Flanged Circulation Heater Dimensions



Dimensions Reference Number	"A"		"B"		"C"	
	in	mm	in	mm	in	mm
14.1	74⅝	1895	59⅜	1508	66¼	1683
14.2	82⅛	2086	66⅞	1699	73¾	1873
14.3	89⅝	2276	74⅜	1889	81¼	2064
14.4	97⅛	2467	81⅞	2080	88¾	2254
14.5	104⅝	2657	89⅜	2270	96¼	2445



Mounting lugs not shown.

Applications: Fuel Oils (Bunker C and Number 6)

- *Steel Screw Plug and Steel 150-lb Flanged Heater Sizes*
- *NEMA 1 Terminal Housing*
- *Steel Tank*
- *Steel Sheath Heating Elements*
- *Watt Density of 8 watts/in² (1.3 watts/cm²)*
- *Three Phase only*

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
2½" NPT	2.2	2	—	—	CHF01100 (1)	—	CHF01101 (1)	37	17
	2.3	3	—	—	CHF01102 (1)	—	CHF01103 (1)	46	21
3"—150lb 3 elements	3.2	2	—	—	CHF01104 (1)	—	CHF01105 (1)	62	28
	3.3	3	—	—	CHF01106 (1)	—	CHF01107 (1)	76	34
4"—150lb 6 elements	4.3	5	—	—	CHF01108 (1)	—	CHF01109 (1)	117	53
	4.3	6	—	—	CHF01110 (1)	—	CHF01111 (1)	120	54
	4.4	8	—	—	CHF01112 (1)	—	CHF01113 (1)	147	67
	4.4	10	—	—	CHF01114 (1)	—	CHF01115 (1)	151	68
5"—150lb 6 elements	5.2	5	—	—	CHF01116 (1)	—	CHF01117 (1)	128	58
	5.3	6	—	—	CHF01118 (1)	—	CHF01119 (1)	146	66
	5.4	8	—	—	CHF01120 (1)	—	CHF01121 (1)	172	78
	5.5	10	—	—	CHF01122 (1)	—	CHF01123 (1)	192	87
5"—150lb 9 elements	5.2	7.5	—	—	CHF01124 (1)	—	CHF01125 (1)	135	61
	5.3	9	—	—	CHF01126 (1)	—	CHF01127 (1)	154	70
	5.4	12	—	—	CHF01128 (1)	—	CHF01129 (1)	183	83
	5.5	15	—	—	CHF01130 (1)	—	CHF01131 (1)	205	93
6"—150lb 12 elements	6.2	8	—	—	CHF01132 (1)	—	CHF01133 (1)	157	71
	6.3	10	—	—	CHF01134 (1)	—	CHF01135 (1)	197	80
	6.3	12	—	—	CHF01136 (1)	—	CHF01137 (1)	202	92
	6.4	16.5	—	—	CHF01138 (1)	—	CHF01139 (1)	249	113
	6.4	20	—	—	CHF01140 (1)	—	CHF01141 (1)	257	117
6"—150lb 15 elements	6.2	10	—	—	CHF01142 (1)	—	CHF01143 (1)	163	74
	6.3	12.5	—	—	CHF01144 (1)	—	CHF01145 (1)	204	93
	6.3	15	—	—	CHF01146 (1)	—	CHF01147 (1)	211	96
	6.4	21	—	—	CHF01148 (5)	—	CHF01149 (1)	260	118
	6.4	25	—	—	CHF01150 (5)	—	CHF01151 (1)	273	124
8"—150lb 18 elements	8.3	12.5	—	—	CHF01152 (1)	—	CHF01153 (1)	272	123
	8.4	16.5	—	—	CHF01154 (1)	—	CHF01155 (1)	300	136
	8.5	20	—	—	CHF01156 (1)	—	CHF01157 (1)	334	151
	8.6	24	—	—	CHF01158 (2)	—	CHF01159 (1)	367	166
	8.7	27	—	—	CHF01160 (2)	—	CHF01161 (1)	402	182
8"—150lb 24 elements	8.3	17	—	—	CHF01162 (1)	—	CHF01163 (1)	287	130
	8.4	22	—	—	CHF01164 (2)	—	CHF01165 (1)	318	144
	8.5	27	—	—	CHF01166 (2)	—	CHF01167 (1)	356	161
	8.6	32	—	—	CHF01168 (2)	—	CHF01169 (1)	386	175
	8.7	36	—	—	CHF01170 (2)	—	CHF01171 (1)	428	194
10"—150lb 27 elements	10.3	30	—	—	CHF01172 (3)	—	CHF01173 (1)	537	244
	10.4	35	—	—	CHF01174 (3)	—	CHF01175 (1)	580	263
	10.5	40	—	—	CHF01176 (3)	—	CHF01177 (1)	623	283
12"—150lb 36 elements	12.4	47	—	—	CHF01178 (3)	—	CHF01179 (2)	751	341
	12.5	54	—	—	CHF01180 (3)	—	CHF01181 (2)	793	360
14"—150lb 45 elements	14.4	60	—	—	CHF01182 (3)	—	CHF01183 (3)	885	401
	14.5	67	—	—	CHF01184 (5)	—	CHF01185 (3)	941	427

(C*) = Number of Branch Circuits per heater.

How To Order
See page 11-48

Applications: Lightweight Oils, Heat Transfer Oils, Degreasing Solutions

- ***Steel Screw Plug and Steel 150-lb Flanged Heater Sizes***
- ***NEMA 1 Terminal Housing***
- ***Steel Tank***
- ***Steel Sheath Heating Elements***
- ***Watt Density of 23 watts/in² (3.6 watts/cm²)***

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
1¼" NPT	1.1	1.5	CHF01186	CHF01187 (1)	—	—	—	14	6
	1.2	2	CHF01188	CHF01189 (1)	—	—	—	18	8
2½" NPT	2.1	3	—	CHF01190 (1)	CHF01191 (1)	CHF01192 (1)	CHF01193 (1)	28	13
	2.1	4.5	—	CHF01194 (1)	CHF01195 (1)	CHF01196 (1)	CHF01197 (1)	29	13
	2.2	6	—	CHF01198 (1)	CHF01199 (1)	CHF01200 (1)	CHF01201 (1)	37	17
	2.3	7.5	—	CHF01202 (1)	CHF01203 (1)	CHF01204 (1)	CHF01205 (1)	45	20
	2.3	9	—	CHF01206 (1)	CHF01207 (1)	CHF01208 (1)	CHF01209 (1)	46	21
3"—150lb 3 elements	3.1	3	—	CHF01210 (1)	CHF01211 (1)	CHF01212 (1)	CHF01213 (1)	53	24
	3.1	4.5	—	CHF01214 (1)	CHF01215 (1)	CHF01216 (1)	CHF01217 (1)	54	24
	3.2	6	—	CHF01218 (1)	CHF01219 (1)	CHF01220 (1)	CHF01221 (1)	62	28
	3.3	7.5	—	CHF01222 (1)	CHF01223 (1)	CHF01224 (1)	CHF01225 (1)	74	34
	3.3	9	—	CHF01226 (1)	CHF01227 (1)	CHF01228 (1)	CHF01229 (1)	76	34
4"—150lb 6 elements	4.1	6	—	CHF01230 (1)	CHF01231 (1)	CHF01232 (1)	CHF01233 (1)	78	35
	4.2	9	—	CHF01234 (1)	CHF01235 (1)	CHF01236 (1)	CHF01237 (1)	91	41
	4.2	12	—	CHF01238 (2)	CHF01239 (1)	CHF01240 (1)	CHF01241 (1)	94	43
	4.3	15	—	CHF01242 (2)	CHF01243 (1)	CHF01244 (1)	CHF01245 (1)	117	53
	4.3	18	—	CHF01246 (2)	CHF01247 (1)	CHF01248 (1)	CHF01249 (1)	120	54
	4.4	25	—	—	CHF01250 (2)	CHF01251 (2)	CHF01252 (1)	147	67
	4.4	30	—	—	CHF01253 (2)	CHF01254 (2)	CHF01255 (1)	151	68
5"—150lb 6 elements	5.2	12	—	CHF01256 (2)	CHF01257 (1)	CHF01258 (1)	CHF01259 (1)	126	57
	5.2	15	—	CHF01260 (2)	CHF01261 (1)	CHF01262 (1)	CHF01263 (1)	128	58
	5.3	18	—	CHF01264 (2)	CHF01265 (1)	CHF01266 (1)	CHF01267 (1)	146	66
	5.3	20	—	CHF01268 (2)	CHF01269 (1)	CHF01270 (1)	CHF01271 (1)	147	67
	5.4	25	—	—	CHF01272 (2)	CHF01273 (2)	CHF01274 (1)	172	78
	5.5	30	—	—	CHF01275 (2)	CHF01276 (2)	CHF01277 (1)	192	87
5"—150lb 9 elements	5.2	18	—	CHF01278 (3)	CHF01279 (1)	CHF01280 (1)	CHF01281 (1)	132	60
	5.2	23	—	CHF01282 (3)	CHF01283 (3)	CHF01284 (1)	CHF01285 (1)	135	61
	5.3	27	—	CHF01286 (3)	CHF01287 (3)	CHF01288 (3)	CHF01289 (1)	154	70
	5.4	38	—	—	CHF01290 (3)	CHF01291 (3)	CHF01292 (1)	183	83
	5.5	45	—	—	CHF01293 (3)	CHF01294 (3)	CHF01295 (3)	205	93
6"—150lb 12 elements	6.1	12	—	CHF01296 (1)	CHF01297 (1)	CHF01298 (1)	CHF01299 (1)	127	58
	6.2	18	—	CHF01300 (2)	CHF01301 (1)	CHF01302 (1)	CHF01303 (1)	152	69
	6.2	24	—	CHF01304 (2)	CHF01305 (2)	CHF01306 (1)	CHF01307 (1)	157	71
	6.3	30	—	CHF01308 (2)	CHF01309 (2)	CHF01310 (2)	CHF01311 (1)	197	89
	6.3	36	—	CHF01312 (3)	CHF01313 (2)	CHF01314 (2)	CHF01315 (1)	202	92
	6.4	50	—	—	CHF01316 (4)	CHF01317 (3)	CHF01318 (2)	249	113
	6.4	60	—	—	CHF01319 (4)	CHF01320 (3)	CHF01321 (2)	257	117
6"—150lb 15 elements	6.1	15	—	CHF01322 (3)	CHF01323 (1)	CHF01324 (1)	CHF01325 (1)	130	59
	6.2	23	—	CHF01326 (3)	CHF01327 (5)	CHF01328 (1)	CHF01329 (1)	156	71
	6.2	30	—	CHF01330 (3)	CHF01331 (5)	CHF01332 (3)	CHF01333 (1)	163	74
	6.3	38	—	CHF01334 (5)	CHF01335 (5)	CHF01336 (3)	CHF01337 (1)	204	93
	6.3	45	—	CHF01338 (5)	CHF01339 (5)	CHF01340 (3)	CHF01341 (5)	211	96
	6.4	63	—	—	CHF01342 (5)	CHF01343 (3)	CHF01344 (5)	260	118
	6.4	75	—	—	CHF01345 (5)	CHF01346 (5)	CHF01347 (5)	270	122
8"—150lb 18 elements	8.2	30	—	CHF01348 (3)	CHF01349 (2)	CHF01350 (2)	CHF01351 (1)	241	109
	8.3	40	—	—	CHF01352 (2)	CHF01353 (2)	CHF01354 (1)	272	123
	8.4	50	—	—	CHF01355 (3)	CHF01356 (3)	CHF01357 (2)	300	136
	8.5	60	—	—	CHF01358 (3)	CHF01359 (3)	CHF01360 (2)	334	151
	8.6	70	—	—	CHF01361 (6)	CHF01362 (3)	CHF01363 (2)	367	166
	8.7	80	—	—	CHF01364 (6)	—	CHF01365 (2)	402	182

(C*) = Number of Branch Circuits per heater.

CONTINUED

Applications: Lightweight Oils, Heat Transfer Oils, Degreasing Solutions (continued)

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
8"—150lb 24 elements	8.2	40	—	CHF01366 (4)	CHF01367 (2)	CHF01368 (2)	CHF01369 (1)	253	115
	8.3	53	—	—	CHF01370 (4)	CHF01371 (3)	CHF01372 (2)	287	130
	8.4	67	—	—	CHF01373 (4)	CHF01374 (3)	CHF01375 (2)	318	144
	8.5	80	—	—	CHF01376 (4)	CHF01377 (4)	CHF01378 (2)	356	161
	8.6	93	—	—	CHF01379 (8)	CHF01380 (6)	CHF01381 (4)	392	178
	8.7	107	—	—	CHF01382 (8)	—	CHF01383 (4)	428	194
10"-150lb 27 elements	10.3	90	—	—	—	—	CHF01384 (3)	537	244
	10.4	105	—	—	—	—	CHF01385 (3)	580	263
	10.5	120	—	—	—	—	CHF01386 (3)	623	283
12"-150lb 36 elements	12.4	140	—	—	—	—	CHF01387 (4)	751	341
	12.5	160	—	—	—	—	CHF01388 (4)	793	360
14"-150lb 45 elements	14.3	150	—	—	—	—	CHF01389 (5)	824	374
	14.4	175	—	—	—	—	CHF01390 (5)	885	401
	14.5	200	—	—	—	—	CHF01391 (5)	941	427

(C*) = Number of Branch Circuits per heater.

Applications: Medium Weight Oils, Heat Transfer Oils, Liquid Paraffin

- ***304 Stainless Steel Screw Plug and Steel 150-lb Flanged Heater Sizes***
- ***NEMA 1 Terminal Housing***
- ***Steel Tank***
- ***Incoloy® Sheath Heating Elements***
- ***Watt Density of 16 watts/in² (2.5 watts/cm²)***
- ***Three Phase only***

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
2½" NPT	2.1	2	—	—	CHF01392 (1)	—	CHF01393 (1)	28	13
	2.1	2.5	—	—	CHF01394 (1)	—	CHF01395 (1)	29	13
	2.1	3	—	—	CHF01396 (1)	—	CHF01397 (1)	30	14
	2.2	4	—	—	CHF01398 (1)	—	CHF01399 (1)	37	17
	2.3	5	—	—	CHF01400 (1)	—	CHF01401 (1)	45	20
	2.3	6	—	—	CHF01402 (1)	—	CHF01403 (1)	46	21
3"-150lb 3 elements	3.1	2	—	—	CHF01404 (1)	—	CHF01405 (1)	53	24
	3.1	2.5	—	—	CHF01406 (1)	—	CHF01407 (1)	53	24
	3.2	3	—	—	CHF01408 (1)	—	CHF01409 (1)	61	28
	3.2	4	—	—	CHF01410 (1)	—	CHF01411 (1)	62	28
	3.3	5	—	—	CHF01412 (1)	—	CHF01413 (1)	74	34
	3.3	6	—	—	CHF01414 (1)	—	CHF01415 (1)	76	34
4"-150lb 6 elements	4.1	3	—	—	CHF01416 (1)	—	CHF01417 (1)	76	34
	4.1	4	—	—	CHF01418 (1)	—	CHF01419 (1)	78	35
	4.1	5	—	—	CHF01420 (1)	—	CHF01421 (1)	79	36
	4.2	6	—	—	CHF01422 (1)	—	CHF01423 (1)	91	41
	4.2	8	—	—	CHF01424 (1)	—	CHF01425 (1)	94	43
	4.3	10	—	—	CHF01426 (1)	—	CHF01427 (1)	117	53
	4.3	12	—	—	CHF01428 (1)	—	CHF01429 (1)	120	54
5"-150lb 6 elements	5.1	8	—	—	CHF01430 (1)	—	CHF01431 (1)	117	53
	5.2	10	—	—	CHF01432 (1)	—	CHF01433 (1)	128	58
	5.3	12	—	—	CHF01434 (1)	—	CHF01435 (1)	146	66

(C*) = Number of Branch Circuits per heater.

CONTINUED

How To Order
See page 11-48

Applications: Medium Weight Oils, Heat Transfer Oils, Liquid Paraffin (continued)

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
5"-150lb 9 elements	5.1	12	—	—	CHF01436 (1)	—	CHF01437 (1)	123	56
	5.2	15	—	—	CHF01438 (1)	—	CHF01439 (1)	135	61
	5.3	18	—	—	CHF01440 (1)	—	CHF01441 (1)	154	70
6"-150lb 12 elements	6.1	6	—	—	CHF01442 (1)	—	CHF01443 (1)	124	56
	6.1	8	—	—	CHF01444 (1)	—	CHF01445 (1)	127	58
	6.1	10	—	—	CHF01446 (1)	—	CHF01447 (1)	129	59
	6.2	12	—	—	CHF01448 (1)	—	CHF01449 (1)	152	69
	6.2	16	—	—	CHF01450 (1)	—	CHF01451 (1)	157	71
	6.3	20	—	—	CHF01452 (1)	—	CHF01453 (1)	197	89
	6.3	24	—	—	CHF01454 (2)	—	CHF01455 (1)	202	92
6"-150lb 15 elements	6.1	7.5	—	—	CHF01456 (1)	—	CHF01457 (1)	126	57
	6.1	10	—	—	CHF01458 (1)	—	CHF01459 (1)	130	59
	6.1	12.5	—	—	CHF01460 (1)	—	CHF01461 (1)	133	60
	6.2	15	—	—	CHF01462 (1)	—	CHF01463 (1)	156	71
	6.2	20	—	—	CHF01464 (1)	—	CHF01465 (1)	163	74
	6.3	25	—	—	CHF01466 (5)	—	CHF01467 (1)	164	74
	6.3	30	—	—	CHF01468 (5)	—	CHF01469 (1)	211	96
8"-150lb 18 elements	8.2	17	—	—	CHF01470 (1)	—	CHF01471 (1)	234	106
	8.3	25	—	—	CHF01472 (2)	—	CHF01473 (1)	264	120
	8.4	33	—	—	CHF01474 (2)	—	CHF01475 (1)	293	133
	8.5	42	—	—	CHF01476 (3)	—	CHF01477 (2)	327	148
	8.6	50	—	—	—	—	CHF01478 (2)	360	163
	8.7	58	—	—	—	—	CHF01479 (2)	395	179
	8.7	67	—	—	—	—	CHF01480 (2)	405	184
8"-150lb 24 elements	8.2	23	—	—	CHF01481 (2)	—	CHF01482 (1)	243	110
	8.3	33	—	—	CHF01483 (2)	—	CHF01484 (1)	277	126
	8.4	44	—	—	CHF01485 (4)	—	CHF01486 (2)	308	140
	8.5	56	—	—	CHF01487 (4)	—	CHF01488 (2)	346	157
	8.6	67	—	—	—	—	CHF01489 (2)	382	173
	8.7	77	—	—	—	—	CHF01490 (2)	420	191
	8.7	89	—	—	—	—	CHF01491 (4)	433	196
10"-150lb 27 elements	10.3	75	—	—	—	—	CHF01492 (3)	539	244
	10.5	87	—	—	—	—	CHF01493 (3)	615	279
12"-150lb 36 elements	12.3	100	—	—	—	—	CHF01494 (3)	694	315
	12.5	117	—	—	—	—	CHF01495 (3)	782	355
14"-150lb 45 elements	14.2	105	—	—	—	—	CHF01496 (3)	771	350
	14.3	125	—	—	—	—	CHF01497 (5)	828	376

(C*) = Number of Branch Circuits per heater.

Applications: Forced Air, Caustic Solutions, Degreasing Solutions

- ***304 Stainless Steel Screw Plug and Steel 150-lb Flanged Heater Sizes***
- ***NEMA 1 Terminal Housing***
- ***Steel Tank***
- ***Incoloy® Sheath Heating Elements***
- ***Watt Density of 23 watts/in² (3.6 watts/cm²)***

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
1¼" NPT	1.1	1	CHF01498	CHF01499 (1)	—	—	—	13	6
	1.1	1.5	CHF01500	CHF01501 (1)	—	—	—	13	6
	1.2	2	CHF01502	CHF01503 (1)	—	—	—	17	8
2½" NPT	2.1	3	—	CHF01504 (1)	CHF01505 (1)	CHF01506 (1)	CHF01507 (1)	28	13
	2.2	4.5	—	CHF01508 (1)	CHF01509 (1)	CHF01510 (1)	CHF01511 (1)	35	16
	2.2	6	—	CHF01512 (1)	CHF01513 (1)	CHF01514 (1)	CHF01515 (1)	37	17
	2.3	7.5	—	CHF01516 (1)	CHF01517 (1)	CHF01518 (1)	CHF01519 (1)	45	20
	2.3	9	—	CHF01520 (1)	CHF01521 (1)	CHF01522 (1)	CHF01523 (1)	46	21

(C*) = Number of Branch Circuits per heater.

CONTINUED

Applications: Forced Air, Caustic Solutions, Degreasing Solutions (continued)

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
3"-150lb 3 elements	3.1	3	—	CHF01524 (1)	CHF01525 (1)	CHF01526 (1)	CHF01527 (1)	53	24
	3.2	4.5	—	CHF01528 (1)	CHF01529 (1)	CHF01530 (1)	CHF01531 (1)	61	28
	3.2	6	—	CHF01532 (1)	CHF01533 (1)	CHF01534 (1)	CHF01535 (1)	62	28
	3.3	7.5	—	CHF01536 (1)	CHF01537 (1)	CHF01538 (1)	CHF01539 (1)	74	34
	3.3	9	—	CHF01540 (1)	CHF01541 (1)	CHF01542 (1)	CHF01543 (1)	76	34
4"-150lb 6 elements	4.1	6	—	CHF01544 (1)	CHF01545 (1)	CHF01546 (1)	CHF01547 (1)	78	35
	4.2	9	—	CHF01548 (1)	CHF01549 (1)	CHF01550 (1)	CHF01551 (1)	91	41
	4.2	12	—	CHF01552 (2)	CHF01553 (1)	CHF01554 (1)	CHF01555 (1)	94	43
	4.3	15	—	CHF01556 (2)	CHF01557 (1)	CHF01558 (1)	CHF01559 (1)	117	53
	4.3	18	—	CHF01560 (2)	CHF01561 (1)	CHF01562 (1)	CHF01563 (1)	120	54
	4.4	25	—	—	CHF01564 (2)	CHF01565 (2)	CHF01566 (1)	147	67
	4.4	30	—	—	CHF01567 (2)	CHF01568 (2)	CHF01569 (1)	151	68
5"-150lb 6 elements	5.1	9	—	CHF01570 (1)	CHF01571 (1)	CHF01572 (1)	CHF01573 (1)	114	52
	5.2	12	—	CHF01574 (2)	CHF01575 (1)	CHF01576 (1)	CHF01577 (1)	126	57
	5.2	15	—	CHF01578 (2)	CHF01579 (1)	CHF01580 (1)	CHF01581 (1)	128	58
	5.3	18	—	CHF01582 (2)	CHF01583 (1)	CHF01584 (1)	CHF01585 (1)	146	66
	5.4	25	—	—	CHF01586 (2)	CHF01587 (2)	CHF01588 (1)	172	78
	5.5	30	—	—	CHF01589 (2)	CHF01590 (2)	CHF01591 (1)	192	87
5"-150lb 9 elements	5.1	14	—	CHF01592 (3)	CHF01593 (1)	CHF01594 (1)	CHF01595 (1)	119	54
	5.2	18	—	CHF01596 (3)	CHF01597 (1)	CHF01598 (1)	CHF01599 (1)	132	60
	5.2	23	—	CHF01600 (3)	CHF01601 (3)	CHF01602 (1)	CHF01603 (1)	135	61
	5.3	27	—	CHF01604 (3)	CHF01605 (3)	CHF01606 (3)	CHF01607 (1)	150	68
	5.4	38	—	—	CHF01608 (3)	CHF01609 (3)	CHF01610 (1)	183	83
	5.5	45	—	—	CHF01611 (3)	CHF01612 (3)	CHF01613 (3)	205	93
6"-150lb 12 elements	6.1	12	—	CHF01614 (2)	CHF01615 (1)	CHF01616 (1)	CHF01617 (1)	127	58
	6.2	18	—	CHF01618 (2)	CHF01619 (1)	CHF01620 (1)	CHF01621 (1)	152	69
	6.2	24	—	CHF01622 (2)	CHF01623 (2)	CHF01624 (2)	CHF01625 (1)	157	71
	6.3	30	—	CHF01626 (3)	CHF01627 (2)	CHF01628 (2)	CHF01629 (1)	197	89
	6.3	36	—	CHF01630 (3)	CHF01631 (2)	CHF01632 (2)	CHF01633 (1)	202	92
	6.4	50	—	—	CHF01634 (4)	CHF01635 (4)	CHF01636 (2)	249	113
	6.4	60	—	—	CHF01637 (4)	CHF01638 (4)	CHF01639 (2)	257	117
6"-150lb 15 elements	6.1	15	—	CHF01640 (3)	CHF01641 (1)	CHF01642 (1)	CHF01643 (1)	130	59
	6.2	23	—	CHF01644 (3)	CHF01645 (5)	CHF01646 (1)	CHF01647 (1)	156	71
	6.2	30	—	CHF01648 (3)	CHF01649 (5)	CHF01650 (3)	CHF01651 (1)	163	74
	6.3	38	—	CHF01652 (5)	CHF01653 (5)	CHF01654 (3)	CHF01655 (1)	204	93
	6.3	45	—	CHF01656 (5)	CHF01657 (5)	CHF01658 (3)	CHF01659 (5)	211	96
	6.4	63	—	—	CHF01660 (5)	CHF01661 (3)	CHF01662 (5)	260	118
	6.4	75	—	—	CHF01663 (5)	CHF01664 (5)	CHF01665 (5)	270	122
8"-150lb 18 elements	8.2	30	—	CHF01666 (3)	CHF01667 (2)	CHF01668 (2)	CHF01669 (1)	244	111
	8.3	40	—	—	CHF01670 (2)	CHF01671 (2)	CHF01672 (1)	274	124
	8.4	50	—	—	CHF01673 (3)	CHF01674 (3)	CHF01675 (2)	303	137
8"-150lb 24 elements	8.2	40	—	CHF01676 (4)	CHF01677 (2)	CHF01678 (2)	CHF01679 (1)	253	115
	8.3	53	—	—	CHF01680 (4)	CHF01681 (3)	CHF01682 (2)	287	130
	8.4	67	—	—	CHF01683 (4)	CHF01684 (3)	CHF01685 (2)	318	144
10"-150lb 27 elements	10.1	60	—	—	CHF01686 (3)	—	CHF01687 (3)	204	93
	10.2	75	—	—	CHF01688 (9)	—	CHF01689 (3)	223	101
12"-150lb 36 elements	12.1	80	—	—	—	—	CHF01690 (3)	265	120
	12.2	100	—	—	—	—	CHF01691 (3)	287	130
14"-150lb 45 elements	14.1	100	—	—	—	—	CHF01692 (3)	319	145
	14.2	125	—	—	—	—	CHF01693 (5)	346	157

(C*) = Number of Branch Circuits per heater.

How To Order
See page 11-48

Applications: Process Water

- *304 Stainless Steel Screw Plug and Steel 150-lb Flanged Heater Sizes*
- *NEMA 1 Terminal Housing*
- *Steel Tank*
- *Incoloy® Sheath Heating Elements*
- *Watt Density of 48 watts/in² (7.4 watts/cm²)*

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
2½" NPT	2.1	6	—	CHF01694 (1)	CHF01695 (1)	CHF01696 (1)	CHF01697 (1)	28	13
	2.1	7.5	—	CHF01698 (1)	CHF01699 (1)	CHF01700 (1)	CHF01701 (1)	29	13
	2.1	9	—	CHF01702 (1)	CHF01703 (1)	CHF01704 (1)	CHF01705 (1)	30	14
	2.2	12	—	—	CHF01706 (1)	CHF01707 (1)	CHF01708 (1)	37	17
	2.3	15	—	—	CHF01709 (1)	CHF01710 (1)	CHF01711 (1)	45	20
	2.3	18	—	—	CHF01712 (1)	CHF01713 (1)	CHF01714 (1)	46	21
3"-150lb 3 elements	3.1	6	—	CHF01715 (1)	CHF01716 (1)	CHF01717 (1)	CHF01718 (1)	53	24
	3.1	7.5	—	CHF01719 (1)	CHF01720 (1)	CHF01721 (1)	CHF01722 (1)	53	24
	3.2	9	—	CHF01723 (1)	CHF01724 (1)	CHF01725 (1)	CHF01726 (1)	61	28
	3.2	12	—	—	CHF01727 (1)	CHF01728 (1)	CHF01729 (1)	62	28
	3.3	15	—	—	CHF01730 (1)	CHF01731 (1)	CHF01732 (1)	74	34
	3.3	18	—	—	CHF01733 (1)	CHF01734 (1)	CHF01735 (1)	76	34
4"-150lb 6 elements	4.1	9	—	CHF01736 (1)	CHF01737 (1)	CHF01738 (1)	CHF01739 (1)	76	34
	4.1	12	—	CHF01740 (2)	CHF01741 (1)	CHF01742 (1)	CHF01743 (1)	78	35
	4.1	15	—	CHF01744 (2)	CHF01745 (1)	CHF01746 (1)	CHF01747 (1)	79	36
	4.2	18	—	CHF01748 (2)	CHF01749 (1)	CHF01750 (1)	CHF01751 (1)	91	41
	4.2	24	—	CHF01752 (2)	CHF01753 (2)	CHF01754 (2)	CHF01755 (1)	94	43
	4.3	30	—	—	CHF01756 (2)	CHF01757 (2)	CHF01758 (1)	117	53
	4.3	36	—	—	CHF01759 (2)	CHF01760 (2)	CHF01761 (1)	120	54
5"-150lb 6 elements	5.1	24	—	CHF01762 (2)	CHF01763 (2)	CHF01764 (2)	CHF01765 (1)	117	53
	5.2	30	—	—	CHF01766 (2)	CHF01767 (2)	CHF01768 (1)	128	58
	5.3	36	—	—	CHF01769 (2)	CHF01770 (2)	CHF01771 (1)	146	66
5"-150lb 9 elements	5.1	36	—	—	CHF01772 (3)	CHF01773 (3)	CHF01774 (1)	123	56
	5.2	45	—	—	CHF01775 (3)	CHF01776 (3)	CHF01777 (3)	135	61
	5.3	54	—	—	CHF01778 (3)	CHF01779 (3)	CHF01780 (3)	154	70
6"-150lb 12 elements	6.1	18	—	CHF01781 (2)	CHF01782 (1)	CHF01783 (1)	CHF01784 (1)	124	56
	6.1	24	—	CHF01785 (2)	CHF01786 (2)	CHF01787 (2)	CHF01788 (1)	127	58
	6.1	30	—	CHF01789 (3)	CHF01790 (2)	CHF01791 (2)	CHF01792 (1)	129	59
	6.2	36	—	CHF01793 (3)	CHF01794 (2)	CHF01795 (2)	CHF01796 (1)	152	69
	6.2	48	—	—	CHF01797 (4)	CHF01798 (3)	CHF01799 (2)	157	71
	6.3	60	—	—	CHF01800 (4)	CHF01801 (3)	CHF01802 (2)	197	89
	6.3	72	—	—	CHF01803 (4)	—	CHF01804 (2)	202	92
6"-150lb 15 elements	6.1	23	—	CHF01805 (3)	CHF01806 (5)	CHF01807 (1)	CHF01808 (1)	126	57
	6.1	30	—	CHF01809 (3)	CHF01810 (5)	CHF01811 (3)	CHF01812 (1)	130	59
	6.1	38	—	CHF01813 (5)	CHF01814 (5)	CHF01815 (3)	CHF01816 (1)	132	60
	6.2	45	—	CHF01817 (5)	CHF01818 (5)	CHF01819 (3)	CHF01820 (5)	156	71
	6.2	60	—	—	CHF01821 (5)	CHF01822 (3)	CHF01823 (5)	163	74
	6.3	75	—	—	CHF01824 (5)	CHF01825 (5)	CHF01826 (5)	204	93
	6.3	90	—	—	CHF01827 (5)	—	CHF01828 (5)	211	96
8"-150lb 18 elements	8.2	50	—	—	CHF01829 (3)	CHF01830 (3)	CHF01831 (2)	234	106
	8.3	75	—	—	CHF01832 (6)	—	CHF01833 (2)	264	120
	8.4	100	—	—	CHF01834 (6)	—	CHF01835 (3)	293	133
	8.5	125	—	—	CHF01836 (6)	—	CHF01837 (6)	327	148
	8.6	150	—	—	—	—	CHF01838 (6)	360	163
	8.7	175	—	—	—	—	CHF01839 (6)	395	179
	8.7	200	—	—	—	—	CHF01840 (6)	405	184
8"-150lb 24 elements	8.2	67	—	—	CHF01841 (4)	CHF01842 (3)	CHF01843 (2)	243	110
	8.3	100	—	—	CHF01844 (8)	—	CHF01845 (4)	277	126
	8.4	133	—	—	CHF01846 (8)	—	CHF01847 (4)	308	140
	8.5	167	—	—	CHF01848 (8)	—	CHF01849 (8)	346	157
	8.6	200	—	—	—	—	CHF01850 (8)	382	173
	8.7	233	—	—	—	—	CHF01851 (8)	420	191
	8.7	267	—	—	—	—	CHF01852 (8)	433	196
10"-150lb 27 elements	10.3	225	—	—	—	—	CHF01853 (9)	539	244
	10.5	262	—	—	—	—	CHF01854 (9)	615	279
12"-150lb 36 elements	12.3	300	—	—	—	—	CHF01855 (12)	694	315
	12.5	350	—	—	—	—	CHF01856 (12)	782	355
14"-150lb 45 elements	14.2	315	—	—	—	—	CHF01857 (15)	771	350
	14.3	375	—	—	—	—	CHF01858 (15)	827	375

(C*) = Number of Branch Circuits per heater.

Applications: Clean Water

- *Brass Screw Plug and Steel 150-lb Flanged Heater Sizes*
- *NEMA 1 Terminal Housing*
- *Steel Tank*
- *Copper Sheath Heating Elements*
- *Watt Density of 60 watts/in² (9.3 watts/cm²)*

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
1¼" NPT	1.1	3	CHF01859	CHF01860 (1)	—	—	—	14	6
	1.1	4	—	CHF01861 (1)	—	—	—	14	6
	1.2	5	—	CHF01862 (1)	—	—	—	17	8
	1.2	6	—	CHF01863 (1)	—	—	—	18	8
2½" NPT	2.1	6	—	CHF01864 (1)	CHF01865 (1)	CHF01866 (1)	CHF01867 (1)	26	12
	2.1	7.5	—	CHF01868 (1)	CHF01869 (1)	CHF01870 (1)	CHF01871 (1)	26	12
	2.1	9	—	CHF01872 (1)	CHF01873 (1)	CHF01874 (1)	CHF01875 (1)	27	12
	2.2	12	—	CHF01876 (1)	CHF01877 (1)	CHF01878 (1)	CHF01879 (1)	34	15
	2.2	15	—	CHF01880 (1)	CHF01881 (1)	CHF01882 (1)	CHF01883 (1)	35	16
	2.3	18	—	CHF01884 (1)	CHF01885 (1)	CHF01886 (1)	CHF01887 (1)	43	20
3"-150lb 3 elements	3.1	6	—	CHF01888 (1)	CHF01889 (1)	CHF01890 (1)	CHF01891 (1)	52	24
	3.1	9	—	CHF01892 (1)	CHF01893 (1)	CHF01894 (1)	CHF01895 (1)	53	24
	3.2	12	—	—	CHF01896 (1)	CHF01897 (1)	CHF01898 (1)	61	28
	3.2	15	—	—	CHF01899 (1)	CHF01900 (1)	CHF01901 (1)	67	30
	3.3	18	—	—	CHF01902 (1)	CHF01903 (1)	CHF01904 (1)	74	34
4"-150lb 6 elements	4.1	12	—	CHF01905 (2)	CHF01906 (1)	CHF01907 (1)	CHF01908 (1)	77	35
	4.1	18	—	CHF01909 (2)	CHF01910 (1)	CHF01911 (1)	CHF01912 (1)	79	36
	4.2	24	—	CHF01913 (2)	CHF01914 (2)	CHF01915 (2)	CHF01916 (1)	92	42
	4.2	30	—	—	CHF01917 (2)	CHF01918 (2)	CHF01919 (1)	94	43
	4.3	36	—	—	CHF01920 (2)	CHF01921 (2)	CHF01922 (1)	117	53
	4.3	50	—	—	—	—	CHF01923 (2)	121	55
	4.4	60	—	—	—	—	CHF01924 (2)	145	66
5"-150lb 6 elements	5.1	24	—	CHF01925 (2)	CHF01926 (2)	CHF01927 (2)	CHF01928 (1)	115	52
	5.1	30	—	—	CHF01929 (2)	CHF01930 (2)	CHF01931 (1)	117	53
	5.2	36	—	—	CHF01932 (2)	CHF01933 (2)	CHF01934 (1)	128	58
	5.3	50	—	—	—	—	CHF01935 (2)	167	76
	5.4	60	—	—	—	—	CHF01936 (2)	196	89
5"-150lb 9 elements	5.1	36	—	—	CHF01937 (3)	CHF01938 (3)	CHF01939 (3)	120	54
	5.1	45	—	—	CHF01940 (3)	CHF01941 (3)	CHF01942 (3)	122	55
	5.2	54	—	—	CHF01943 (3)	CHF01944 (3)	CHF01945 (3)	134	61
	5.3	75	—	—	—	—	CHF01946 (3)	176	80
	5.4	90	—	—	—	—	CHF01947 (3)	197	89
6"-150lb 12 elements	6.1	24	—	CHF01948 (2)	CHF01949 (2)	CHF01950 (2)	CHF01951 (1)	125	57
	6.1	36	—	CHF01952 (3)	CHF01953 (2)	CHF01954 (2)	CHF01955 (1)	129	59
	6.2	48	—	—	CHF01956 (4)	CHF01957 (3)	CHF01958 (2)	153	69
	6.2	60	—	—	CHF01959 (4)	CHF01960 (3)	CHF01961 (2)	157	71
	6.3	72	—	—	CHF01962 (4)	—	CHF01963 (2)	196	89
	6.3	100	—	—	—	—	CHF01964 (2)	204	93
	6.4	120	—	—	—	—	CHF01965 (4)	246	112
6"-150lb 15 elements	6.1	30	—	CHF01966 (3)	CHF01967 (5)	CHF01968 (3)	CHF01969 (1)	128	58
	6.1	45	—	CHF01970 (5)	CHF01971 (5)	CHF01972 (3)	CHF01973 (5)	133	60
	6.2	60	—	—	CHF01974 (5)	CHF01975 (3)	CHF01976 (5)	158	72
	6.2	75	—	—	CHF01977 (5)	CHF01978 (5)	CHF01979 (5)	163	74
	6.3	90	—	—	CHF01980 (5)	—	CHF01981 (5)	202	92
	6.3	125	—	—	—	—	CHF01982 (5)	213	97
	6.4	150	—	—	—	—	CHF01983 (5)	257	117
8"-150lb 18 elements	8.1	50	—	—	CHF01984 (3)	CHF01985 (3)	CHF01986 (2)	210	95
	8.2	75	—	—	CHF01987 (6)	—	CHF01988 (2)	238	108
	8.3	100	—	—	CHF01989 (6)	—	CHF01990 (3)	266	121
	8.4	125	—	—	CHF01991 (6)	—	CHF01992 (6)	294	133
	8.5	150	—	—	—	—	CHF01993 (6)	326	148
	8.6	175	—	—	—	—	CHF01994 (6)	358	162
	8.7	200	—	—	—	—	CHF01995 (6)	391	177

(C*) = Number of Branch Circuits per heater.

How To Order

See page 11-48

Application: Deionized Water

- *316 Stainless Steel Screw Plug and 316 Stainless Steel 150-lb Flanged Heater Sizes*
- *NEMA 1 Terminal Housing*
- *316 Stainless Steel Tank*
- *316 Stainless Steel Sheath Heating Elements*
- *Watt Density of 60 watts/in² (9.3 watts/cm²)*

Nominal Pipe Size	Dimensions Reference Number	KW	Part Number 120V	240V-1Ph (C*)	240V-3Ph (C*)	480V-1Ph (C*)	480V-3Ph (C*)	Approximate Net Weight lbs	kgs
2½" NPT	2.1	6	—	CHF01996 (1)	CHF01997 (1)	CHF01998 (1)	CHF01999 (1)	28	13
	2.1	7.5	—	CHF02000 (1)	CHF02001 (1)	CHF02002 (1)	CHF02003 (1)	28	13
	2.1	9	—	CHF02004 (1)	CHF02005 (1)	CHF02006 (1)	CHF02007 (1)	29	13
	2.2	12	—	CHF02008 (1)	CHF02009 (1)	CHF02010 (1)	CHF02011 (1)	36	16
	2.2	15	—	CHF02012 (1)	CHF02013 (1)	CHF02014 (1)	CHF02015 (1)	37	17
	2.3	18	—	CHF02016 (1)	CHF02017 (1)	CHF02018 (1)	CHF02019 (1)	38	17
4"-150lb 6 elements	4.1	12	—	CHF02020 (2)	CHF02021 (1)	CHF02022 (1)	CHF02023 (1)	77	35
	4.1	18	—	CHF02024 (2)	CHF02025 (1)	CHF02026 (1)	CHF02027 (1)	79	36
	4.2	24	—	CHF02028 (2)	CHF02029 (2)	CHF02030 (2)	CHF02031 (1)	92	42
	4.2	30	—	—	CHF02032 (2)	CHF02033 (2)	CHF02034 (1)	94	42
	4.3	36	—	—	CHF02035 (2)	CHF02036 (2)	CHF02037 (1)	117	53
	4.3	50	—	—	—	—	CHF02038 (2)	121	55
	4.4	60	—	—	—	—	CHF02039 (2)	145	66
6"-150lb 12 elements	6.1	24	—	CHF02040 (3)	CHF02041 (2)	CHF02042 (2)	CHF02043 (1)	126	57
	6.1	36	—	CHF02044 (3)	CHF02045 (2)	CHF02046 (2)	CHF02047 (1)	130	59
	6.2	48	—	—	CHF02048 (4)	CHF02049 (3)	CHF02050 (2)	153	69
	6.2	60	—	—	CHF02051 (4)	CHF02052 (3)	CHF02053 (2)	157	71
	6.3	72	—	—	CHF02054 (4)	—	CHF02055 (2)	196	89
	6.3	100	—	—	—	—	CHF02056 (4)	205	93
	6.4	120	—	—	—	—	CHF02057 (4)	246	112
6"-150lb 15 elements	6.1	30	—	CHF02058 (3)	CHF02059 (5)	CHF02060 (3)	CHF02061 (1)	128	58
	6.1	45	—	CHF02062 (5)	CHF02063 (5)	CHF02064 (3)	CHF02065 (5)	133	60
	6.2	60	—	—	CHF02066 (5)	CHF02067 (3)	CHF02068 (5)	158	72
	6.2	75	—	—	CHF02069 (5)	CHF02070 (5)	CHF02071 (5)	163	74
	6.3	90	—	—	CHF02072 (5)	—	CHF02073 (5)	202	92
	6.3	125	—	—	—	—	CHF02074 (5)	213	97
	6.4	150	—	—	—	—	CHF02075 (5)	257	117

(C*) = Number of Branch Circuits per heater.

How to Order

Catalog Heaters

Order by Part Number for catalog heaters listed on pages 41 through 48.

Standard lead time is 4-5 weeks.

Custom Engineered/Manufactured Heaters

For sizes and ratings not listed, **TEMPCO** will design and manufacture a Circulation Heater to meet your requirements. ***Please Specify*** the following:

- ❑ Application, including operating temperature/pressure
- ❑ Wattage and Voltage and Phase
- ❑ Screw Plug or Flange Size and Material
- ❑ Element Sheath Material
- ❑ Element Watt Density
- ❑ Element Immersion Length
- ❑ Electrical Enclosure Type
- ❑ Thermostat— if required
- ❑ Vessel Material
- ❑ Additional Insulation
- ❑ Flow Control Baffles
- ❑ Other Optional Features

Power Control Panels for Process Heaters

Power Control Panels featuring mechanical or solid state controls with all other necessary components can be provided by TEMPCO for any size circulation heater. See pages 11-62 through 11-63 for more information.

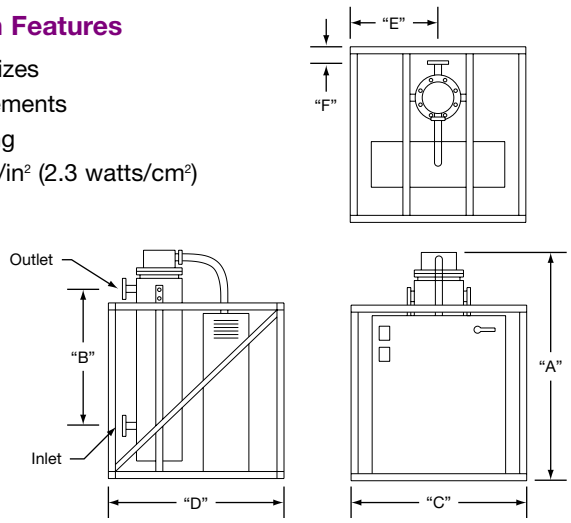
Circulation Heater System

TEMPCO Circulation Systems include a circulation heater and power control panel skid mounted in a compact package to use minimal floor space. Heater vessel is carbon steel and can be vertically mounted (shown) or horizontally mounted.

The pre-wired panel contains a process temperature control and a manual reset over-temperature control. The Zero Voltage Fired SCR power controller provides proportional power to the heater load for precise temperature control.

Standard Construction Features

- 150-lb Flanged Heater Sizes
- Steel Sheath Heating Elements
- NEMA 1 Terminal Housing
- Watt Density of 15 watts/in² (2.3 watts/cm²)



Applications: Medium Weight Oils, Heat Transfer Oils

KW	Heater Flange Size	In-Out Pipe Size	"A"		"B"		"C"		"D"		"E"		"F"		Part Number	
			in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	240V-3Ph	480V-3Ph
10	5"	2"	46	1168	25	635	39	991	13	330	8	203	43	1092	CHS02076	CHS02077
15	5"	2"	58	1473	37	940	39	991	13	330	8	203	57	1448	CHS02078	CHS02079
20	5"	2"	71	1803	50	1270	39	991	13	330	8	203	70	1778	CHS02080	CHS02081
25	5"	2"	83	2102	62	1575	39	991	13	330	8	203	82	2083	CHS02082	CHS02083
30	8"	2½"	52	1321	25	635	42	1067	14	356	13	330	45	1143	CHS02084	CHS02085
40	8"	2½"	65	1651	37	940	42	1067	14	356	13	330	59	1499	CHS02086	CHS02087
55	8"	2½"	77	1956	50	1270	42	1067	14	356	13	330	72	1829	CHS02088	CHS02089
70	8"	2½"	90	2286	62	1575	42	1067	14	356	13	330	84	2134	CHS02090	CHS02091
90	10"	4"	108	2743	75	1905	44	1118	19	483	14	356	102	2591	CHS02092	CHS02093
110	12"	5"	96	2438	62	1575	46	1168	19	483	15	381	89	2261	—	CHS02094
150	14"	6"	97	2464	62	1575	48	1219	19	483	16	406	89	2261	—	CHS02095
180	14"	6"	110	2794	75	1905	48	1219	19	483	16	406	102	2591	—	CHS02096

How to Order

Catalog Heaters

Order by Part Number for catalog heaters.

Standard lead time is 6-7 weeks.

Custom Engineered/Manufactured Heaters

For sizes and ratings not listed, **TEMPCO** will design and manufacture a Circulation System to meet your requirements. ***Please Specify*** the following:

- ❑ Maximum temperature rise and operating pressure
- ❑ Inlet-Outlet size and type
- ❑ Vertical or horizontal mounting
- ❑ Element sheath material (Steel, Incoloy® or Copper)
- ❑ Vessel material (carbon steel or stainless steel)
- ❑ Element Watt density
- ❑ Wattage (up to 600KW), Voltage, Phase

Electric Instantaneous Deionized Water Heaters

- ✳ *Space-saving compact design*
- ✳ *No storage tank required*
- ✳ *No ionic contamination*
- ✳ *100% self-contained*
- ✳ *Available in Titanium or Stainless Steel*
- ✳ *Energy efficient point-of-use service*

- ✳ *Easy installation— wall mountable, preassembled*
- ✳ *Grounded for safety*
- ✳ *Dual display, self tuning PID temperature control*
- ✳ *Safety circuit monitors flow, system differential pressure, fluid temperature and element temperature*

The instantaneous DI water heater utilizes a unique axial flow element to maximize heat transfer and thereby minimize holdup volume and residence time.

Due to this design, fluid velocities are relatively high, eliminating stagnant zones and potential sites for biological growth. Physical size of the system is extremely compact: 48 KW units require just three cubic feet for installation, about as much space as a typical electrical disconnect enclosure. In most instances, this unit can be mounted directly on the process station requiring heated DI water.

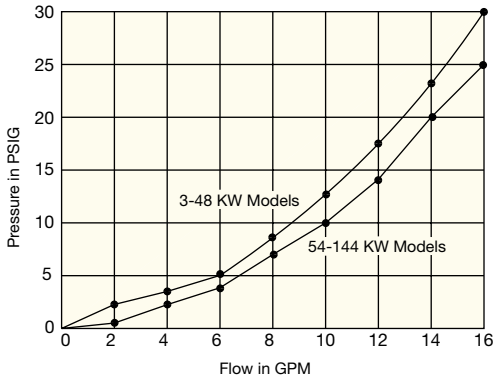
TEMPCO values product safety and has incorporated many proven safety systems as standard into the DI water heater line. Each system has grounded heating elements and control circuitry. The complete system is housed in NEMA 12 rated electrical enclosures with lockouts. To ensure product and personnel safety, the following systems are standard:

- **Solid State Relay Power Control** to provide safe power switching and accurate, precise control.
- **Failsafe Power Relay** is a heavy duty mechanical safety contactor that disconnects all power legs during a fault condition.
- **Multiple Bi-Metallic Thermostats** are located on the heat exchanger and are wired to the safety contactors.
- **Fluid Over-Temperature** is continuously monitored. If the outlet fluid temperature exceeds the pre-programmed value, the safety contactor is tripped.
- **Emergency Stop Push Button** is included so that the operator can remove power from the heater in an emergency.
- **Flow Verification** must be satisfied or the heating elements won't be energized.
- **Overcurrent Protection** is provided by a circuit breaker. Also included is a lockout mechanism to prevent unauthorized use.
- **Control Fusing** on both the primary and secondary of the control circuit power to provide maximum protection.
- **Surge/Transient Protection** is provided against electrical noise and spikes.

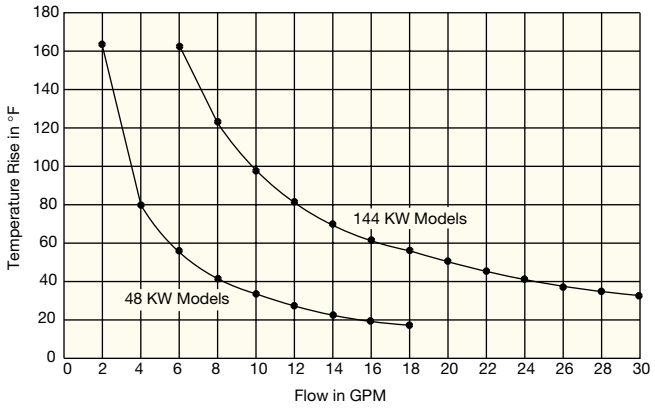
S A F E T Y

Deionized Water Heaters

Pressure vs. Flow



Flow vs. Temperature Rise



Applications

Inline Heating—This is the most common application. Ambient temperature water is supplied to the heater "inline" to a process requiring hot water, such as a spray rinse tank, counter flow rinse system, batch chemical mixing, parts washers, etc.

Indirect Heating—Indirect heating is used where precise temperature control must be maintained in a heat exchange system, as in heating temperature-sensitive compounds or process chemistry such as electroless nickel, which cannot be recirculated directly through the element.

Sizing

To determine the overall wattage required for your operation, use the following equation:

GPM × Temperature Rise × 0.147 = KW Required

Where: GPM = Gallons Per Minute of flow
Temperature Rise = input vs. output water temp in °F

Example: The application requires 2 GPM, input temp is 70°F, and process temp is 180°F.

2 GPM × 110°F × 0.147 = 32.3 KW (use 36 KW unit)

Deionized Water Heaters Standard Sizes

	Stainless Steel		Titanium	
Watts	240 VAC	480 VAC	240 VAC	480 VAC
3000	CHP01012	CHP01014	CHP02012	CHP02014
6000	CHP01022	CHP01024	CHP02022	CHP02024
12000	CHP01032	CHP01034	CHP02032	CHP02034
18000	CHP01042	CHP01044	CHP02042	CHP02044
24000	CHP01052	CHP01054	CHP02052	CHP02054
36000	CHP01062	CHP01064	CHP02062	CHP02064
48000	CHP01072	CHP01074	CHP02072	CHP02074
54000	CHP01082	CHP01084	CHP02082	CHP02084
72000	CHP01092	CHP01094	CHP02092	CHP02094
108000	CHP01102	CHP01104	CHP02102	CHP02104
144000	CHP01112	CHP01114	CHP02112	CHP02114

How to Order

Deionized Water Heater

Simply choose the model from the above listing that fills your requirements. ***Standard lead time is 3-4 weeks.***

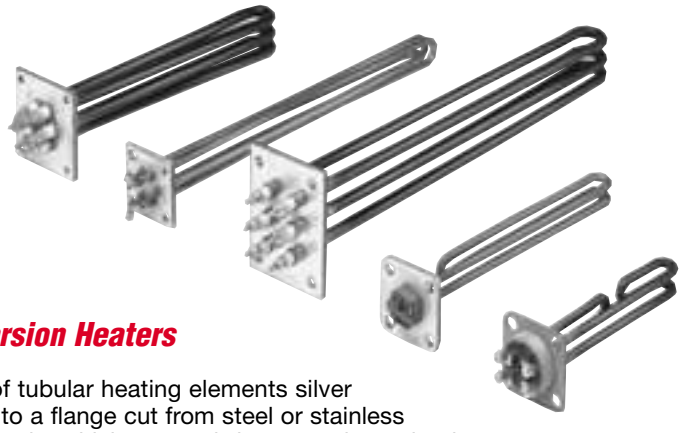
Please provide the following information with your order:

- ❑ Outlet water temperature required
- ❑ Ambient water temperature
- ❑ Flow rate
- ❑ On-off cycle times
- ❑ Minimum and maximum water pressure

Notes:

1. Three phase AC power input is standard; single phase is available as an option.
2. UL listed sizes through 48KW
3. Ground fault circuit interrupter available as an option (standard on 3-48KW units).
4. Overall Dimensions: 32.125"H × 20.0"W × 8.75"D

Flange Immersion Heaters
With Custom Size And Shape Flanges



Typical Applications

- *Hot Air Dryers*
- *Dehumidifying Dryers*
- *Heat Exchange Systems*
- *Water and Water Solutions*
- *Steam Tables*
- *Air Heating*

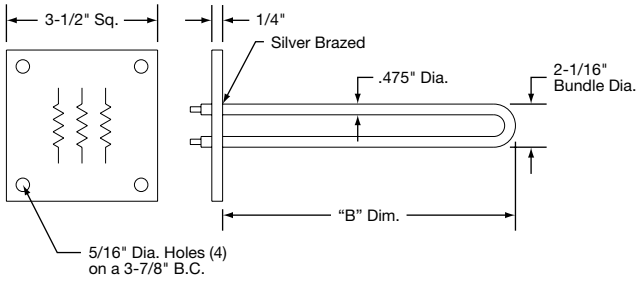
Custom Immersion Heaters

This design consists of tubular heating elements silver brazed or TIG welded to a flange cut from steel or stainless steel plate. Flange plate size, thickness and shape are determined by the application. A fiber gasket is supplied with each heater.

The various style heaters in the Stock Lists on pages 11-52 through 11-55 are direct replacements for heaters in many OEM applications.

This type construction also lends itself to be easily and economically engineered into new equipment.

Steel Flange • 3 Elements



Standard Sizes and Ratings

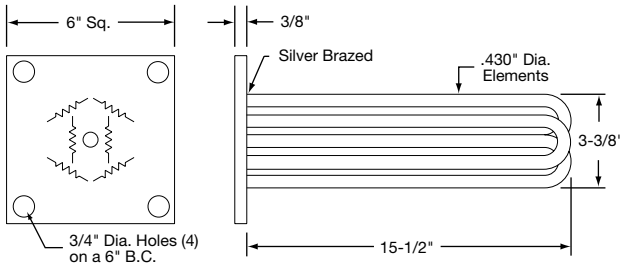
Element Sheath Material	KW	Watt Density W/in²	Watt Density W/cm²	"B" in	"B" mm	Part Number 240V-3Ph Y	Part Number 480V-3Ph Y	Part Number 575V-3Ph Y	Approximate Net Weight lbs	Approximate Net Weight kgs
Incoloy®	1.5	15	2.3	12 7/16	316	TPN01400	*TPN01401	—	3	1.4
	2.5	24	3.7	12 7/16	316	*TPN01173	TPN01174	*TPN01402	3	1.4
	3	31	4.8	12 7/16	316	*TPN01403	*TPN01404	*TPN01405	3	1.4
	3.5	24	3.7	17 7/8	454	*TPN01175	*TPN01201	*TPN01406	4	1.8
	4	27	4.2	17 7/8	454	*TPN01407	*TPN01176	*TPN01408	4	1.8
	5	34	5.3	17 7/8	454	*TPN01409	*TPN01410	*TPN01411	4	1.8
Steel	2.5	24	3.7	12 7/16	316	TPN01351	TPN01373	—	3	1.4
	3.5	24	3.7	17 7/8	454	TPN01311	TPN01412	—	4	1.8

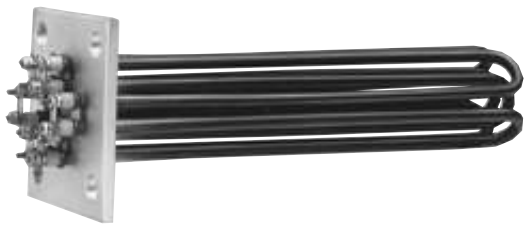
STOCK ITEMS ORDER NOW!®

an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

OEM Replacement Flanged Heaters

Steel Flange • 6 Elements • 2 Circuits

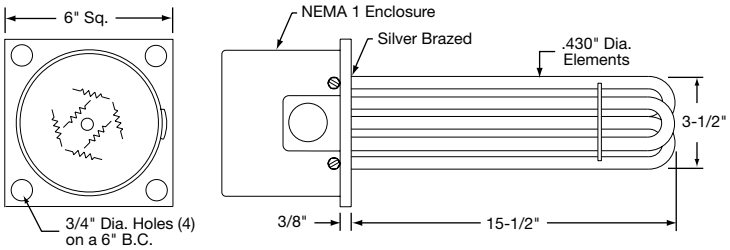


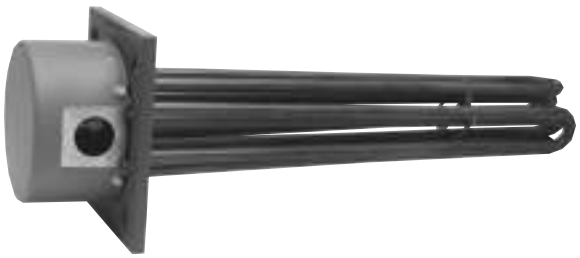


Standard Sizes and Ratings

Element Sheath Material	KW	Watt Density W/in²	Watt Density W/cm²	Part Number 208V-3Ph	230V-3Ph	460V-3Ph	575V-3Ph	Approximate Net Weight lbs	kgs
Incoloy®	9	44	6.8	*TPN01168	*TPN01169	*TPN01170	*TPN01424	8	3.6
	10.5	52	8.1	TPN01425	TPN01426	TPN01427	TPN01428	8	3.6
	12	60	9.3	*TPN01171	TPN01429	*TPN01172	TPN01430	8	3.6
	15	70	10.9	TPN01431	TPN01432	TPN01433	TPN01434	8	3.6

Steel Flange • 6 Elements



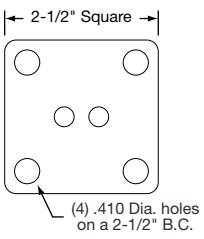


Standard Sizes and Ratings

Element Sheath Material	KW	Watt Density W/in²	Watt Density W/cm²	Part Number 208V-3Ph	240/480V-3Ph	575V-3Ph	Approximate Net Weight lbs	kgs
Incoloy®	4.5	20	3.1	TPN01413	TPN01414	—	9	4.1
	9	40	6.2	TPN01415	*TPN01416	TPN01417	9	4.1
	10.5	47	7.3	TPN01418	TPN01419	TPN01420	9	4.1
	12	54	8.4	*TPN01421	*TPN01422	TPN01423	9	4.1

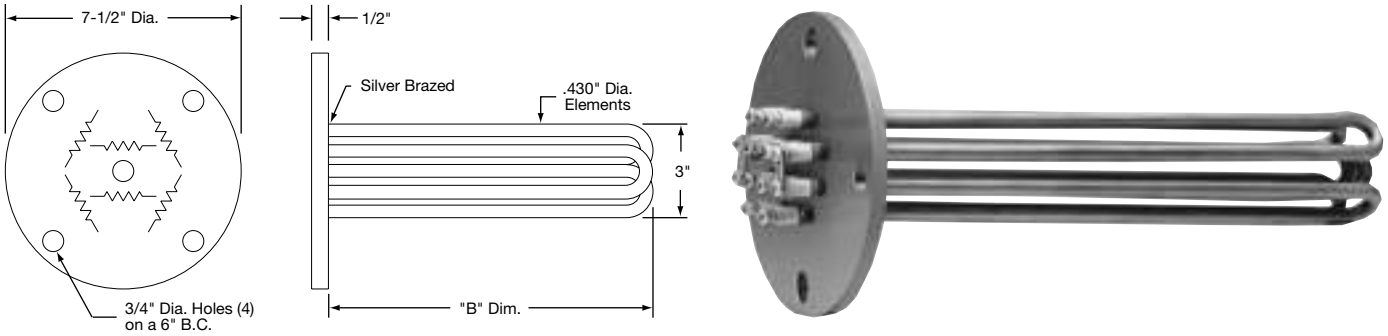
Hot Water Tank Heater

Immersed Length in	Immersed Length mm	KW	Part Number 120V	240V
9¼	235	1.0	—	TPN01484
11	279	1.25	TPN01485	TPN01486
7⅜	187	1.5	TPN01487	TPN01488
9	279	2.0	TPN01489	TPN01490
10¾	273	2.5	—	TPN01491
12 5/16	313	3.0	—	TPN01167
13¾	349	3.5	—	TPN01492
15¾	400	4.0	—	TPN01493
16¼	413	4.5	—	TPN01494
19	483	5.0	—	TPN01287



- *2½" Square Flange*
- *Incoloy® Element*
- *Gasket*
- *70 w/in²*

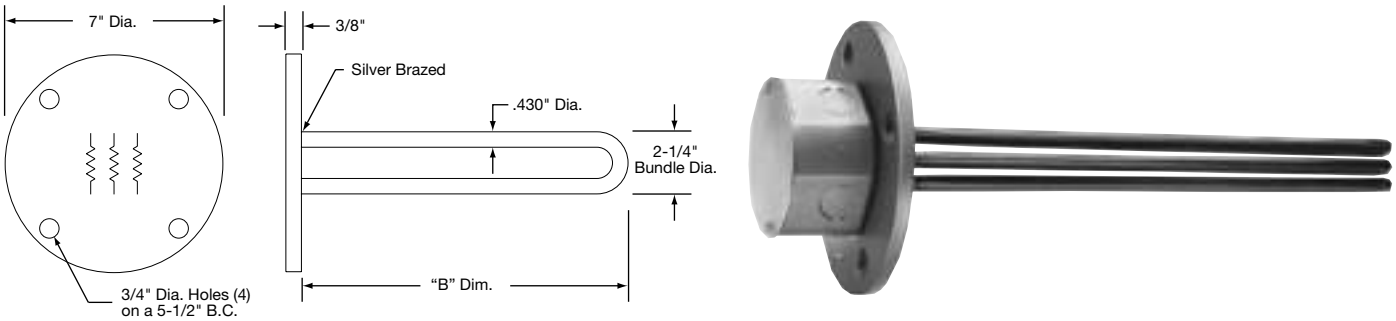
Steel Flange • 6 Elements



Standard Sizes and Ratings

Element Sheath Material	KW	Watt Density W/in²	Watt Density W/cm²	"B" in	"B" mm	Part Number 208V-3Ph	Part Number 240V-3Ph Y	Part Number 480V-3Ph Y	Approximate Net Weight lbs	Approximate Net Weight kgs
Incoloy®	7.5	50	7.8	12	305	TPN01468	TPN01165	TPN01469	12	5.5
	9	42	8.1	15⅞	403	TPN01470	TPN01350	TPN01211	14	6.4
	10	50	7.8	15⅞	403	TPN01471	TPN01472	TPN01473	14	6.4
	12	53	8.2	15⅞	403	TPN01474	TPN01475	TPN01476	14	6.4
Copper	9	42	8.1	15⅞	403	TPN01477	TPN01478	TPN01479	14	6.4
	10	50	7.8	15⅞	403	TPN01480	TPN01481	TPN01260	14	6.4
	12	53	8.2	15⅞	403	TPN01482	TPN01483	TPN01299	14	6.4

Steel Flange • 3 Elements



Standard Sizes and Ratings

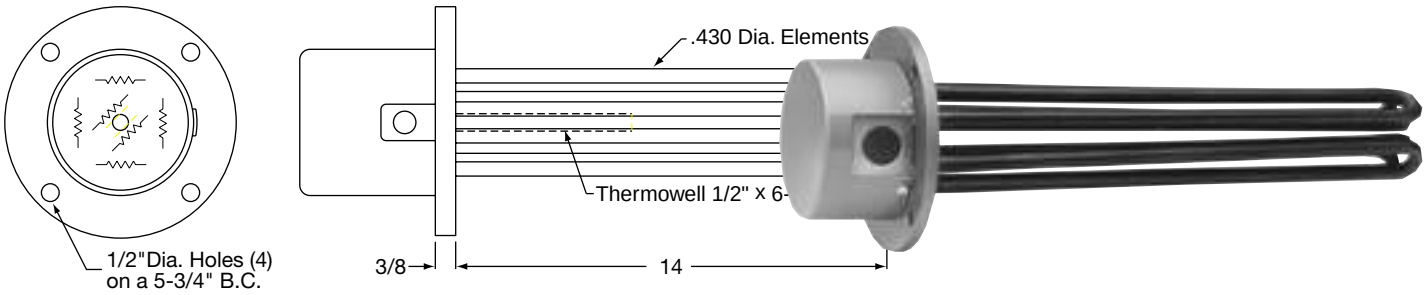
Element Sheath Material	KW	Watt Density W/in²	Watt Density W/cm²	"B" in	"B" mm	Part Number 240V-1Ph	Part Number 240V-3Ph	Part Number 480V-1Ph	Part Number 480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
Incoloy®	3	24	3.7	17⅝	448	TPN01460	TPN01461	TPN01462	TPN01463	6	2.7
	4.5	50	7.8	12⅜	314	TPN01347	TPN01339	TPN01464	TPN01465	5	2.3
	9	70	10.8	17⅞	454	TPN01348	TPN01198	TPN01349	TPN01223	6	2.7
	12	70	10.8	22⅞	581	—	TPN01304	TPN01466	TPN01467	6	2.7

STOCK ITEMS ORDER NOW!®

an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

OEM Replacement Flanged Heaters

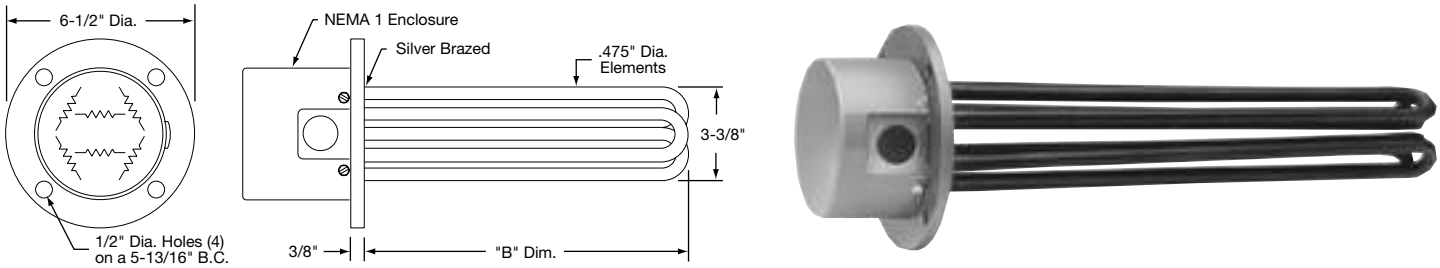
Steel Flange • 6 Elements • 1 Circuits



Standard Sizes and Ratings

Element Sheath Material	KW	Watt Density W/in²	Watt Density W/cm²	Part Number 230V-3Ph	Part Number 460V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
Incoloy	9	46	7.1	*TPN01706	—	10	4.5
	12	62	9.6	—	*TPN01707	10	4.5

Steel Flange • 6 Elements • 2 Circuits



Standard Sizes and Ratings

Element Sheath Material	KW	Watt Density W/in²	Watt Density W/cm²	B in	B mm	Part Number 208V-3Ph	Part Number 230V-3Ph	Part Number 460V-3Ph	Part Number 575V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kgs
Incoloy®	9	50	7.8	17	432	TPN01448	*TPN01177	*TPN01178	*TPN01449	10	4.5
	10.5	42	8.1	17	432	TPN01450	TPN01451	TPN01452	TPN01453	10	4.5
	12	50	7.8	17	432	TPN01454	TPN01204	*TPN01179	TPN01455	10	4.5
Copper	12	48	7.4	17	432	TPN01319	TPN01456	TPN01321	—	10	4.5
	15	70	10.9	28	711	TPN01457	TPN01458	TPN01459	—	12	5.4

How to Order

Catalog Heaters

Flanged Immersion Heaters whose Part Numbers are preceded by an asterisk (*) are Guaranteed in Stock for immediate delivery.

Part Numbers with no asterisk (*) are stocked as sub-assemblies for 2-3 week delivery.

Custom Engineered/Manufactured Heaters

Understanding that an electric heater can be very application specific, for sizes and ratings not listed, **TEMPCO** will design and manufacture a Flanged Immersion Heater to meet your requirements. ***Standard lead time is 4 weeks.***

Please Specify the following:

- ❑ Wattage, Voltage and Phase
- ❑ Flange Size and Material
- ❑ Element Sheath Material
- ❑ Element Watt Density
- ❑ Element Immersion Length
- ❑ Electrical Enclosure, if required
- ❑ Optional Features

DUCT HEATERS

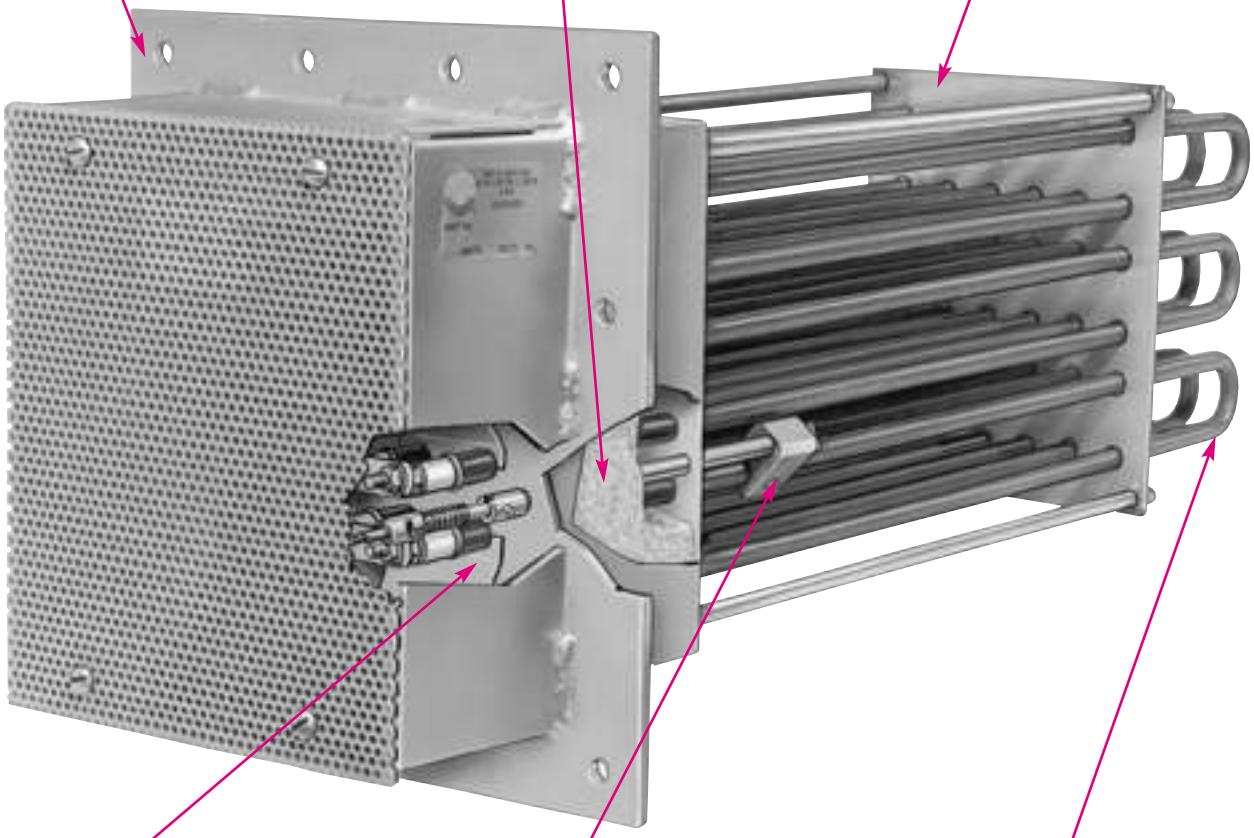
Typical Applications

- ✳ ***Heat Treating***
- ✳ ***Forced Air Comfort Heating***
- ✳ ***Booster Air Heater***
- ✳ ***Re-Heating***
- ✳ ***Air Drying/Curing Operations***
- ✳ ***Annealing***
- ✳ ***Core Drying***
- ✳ ***Resistor Load Banks***

A NEMA 1 terminal box enclosure with vented cover to help keep wiring cooler. Optional enclosures: NEMA 4 (moisture resistant), NEMA 7 (explosion resistant) and NEMA 12 (dust resistant).

B 3½ inches (89 mm) of mineral insulation in an aluminized steel enclosure minimizes heat losses while keeping the electrical wiring cooler.

C The heavy duty frame is composed of a ¼ inch (6 mm) thick steel mounting flange, stainless steel support plate and corner posts to securely hold the heating elements rigid in any mounting position.



D Field replaceable elements are held in place by a single screw quick release "V" clamp. Optional: Gas tight design using compression fittings to attach elements to the flange prevents leakage of ducted gas into terminal enclosure.

E ¼ inch (6 mm) inside diameter thermowell accessed through a ⅛" NPT tapped hole in the flange allows installation of an optional Type "J" or "K" thermocouple for sensing the element temperature. An excellent safeguard for your system.

F Elements are .430 inch (11 mm) diameter and have Incoloy® sheaths for excellent corrosion resistance and scaling resistance at high temperatures. Element hairpin bends are spanked in special dies to re-compact the MGO refractory to eliminate any electrical insulation voids and hot spots.

Selecting the proper Duct Heater

1. Establish the requirements of your process heating application. Select the heater assembly type, size, watt density, sheath material and electrical rating best suited for your application.
2. Match the heater watt density (w/in^2) to the medium being processed. If the watt density is too high for the application the heater will fail prematurely.
3. Match the sheath material and operating temperature to the medium being processed in order to avoid sheath corrosion.
4. Air flows must never be interrupted. Such events will cause over-heating and/or premature heater burnout. Your installation should include high limit temperature controls.
5. Be sure that the heaters are securely mounted and protected from mechanical damage.
6. Select the terminal housing that provides the best terminal protection from the environment surrounding the application.
7. Thermostats are optional. Select the type and temperature rating required for the application. See Section 13.
8. If practical, heaters should be cleaned periodically in order to extend heater life.
9. If you should encounter any problems in selecting and/or installing a process heater, consult Tempco for assistance.

Sizing a Duct Heater

To properly match a duct heater to an application, the wattage, air velocity and element watt density must be determined.

Formulas and graphs on the following pages that will aid you in your design include:

- Wattage calculation formulas and table
- Element Watt Density vs. Sheath Temperature and Air Velocity Graph
- Pressure Drop vs. Air Velocity Graph

Note that in most applications the following Design Limitations should be adhered to:

- Maximum watt density of 40 watts/in^2 (6.2 watts/cm^2)
- Maximum element sheath temperature of 1400°F (760°C)
- Minimum air velocity of 200 feet per minute (61 meters per minute)

Remember when calculating wattage to use the maximum anticipated air flow and to compensate for any heat losses.

For additional information or help with your application please CONSULT TEMPCO.

Amt. of Air	Temperature Rise (°F)										
CFM	50	100	150	200	250	300	350	400	450	500	600
	Kilowatt Hours to Heat Air										
100	1.7	3.3	5	6.7	8.3	10	11.7	13.3	15	16.7	20
200	3.3	6.7	10	13.3	16.7	20	23.3	26.7	30	33.3	40
300	5.0	10.0	15	20.0	25.0	30	35.0	40.0	45	50.0	60
400	6.7	13.3	20	26.7	33.3	40	46.7	53.3	60	66.7	80
500	8.3	16.7	25	33.3	41.7	50	58.3	66.7	75	83.3	100
600	10.0	20.0	30	40.0	50.0	60	70.0	80.0	90	100.0	120
700	11.7	23.3	35	46.7	58.3	70	81.7	93.3	105	116.7	140
800	13.3	26.7	40	53.3	66.7	80	93.3	106.7	120	133.3	160
900	15.0	30.0	45	60.0	75.0	90	105.0	120.0	135	150.0	180
1000	16.7	33.3	50	66.7	83.3	100	116.7	133.3	150	166.7	200
1100	18.3	36.7	55	73.3	91.7	110	128.3	146.7	165	183.3	220
1200	20.0	40.0	60	80.0	100.0	120	140.0	160.0	180	200.0	240

Calculating Minimum Wattage Requirement

Table is for quick-estimation purposes and is based on air under standard conditions (70°F inlet air temperature at 14.7 PSIA).

Note: If air flow is given in CFM at operating temperature and pressure it can be converted to SCFM (Standard Cubic Feet per Minute) with the following formula or use the equation to the right for compressed air.

$$SCFM = CFM \times \frac{P}{14.7} \times \frac{530}{T + 460}$$

P = operating pressure (gauge pressure + 14.7)

T = operating temperature

For free air use equations:

$$KW = \frac{SCFM \times \text{Temperature rise (°F)}}{3000}$$

or

$$KW = \frac{SCMM \times \text{Temperature rise (°C)}}{47}$$

For compressed air use equations:

$$KW = \frac{CFM^* \times \text{Density*(lbs/cu. ft.)} \times \text{Temperature rise (°F)}}{228}$$

or

$$KW = \frac{CMM^* \times \text{Density*(kgs/cu. m)} \times \text{Temperature rise (°C)}}{57.5}$$

*At heater inlet temperature and pressure

Element Watt Density vs. Sheath Temperature and Air Velocity

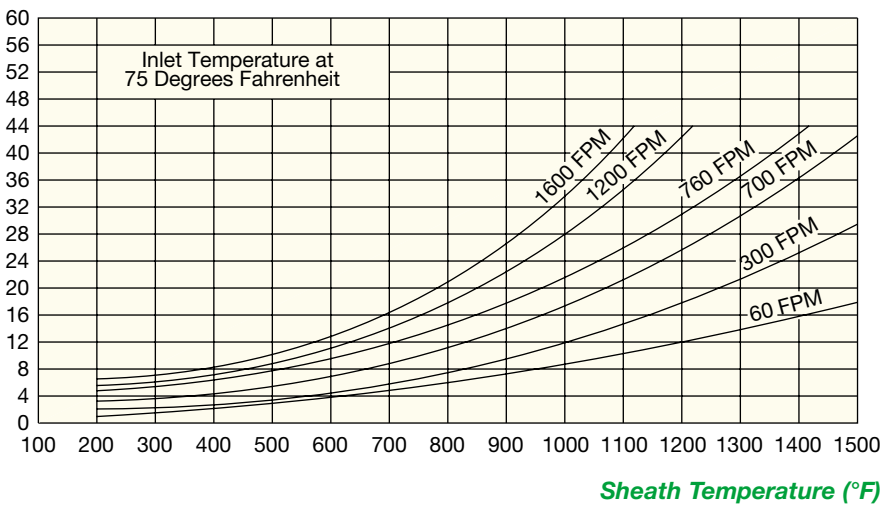
Use graph (English or Metric) to plot

Watt Density vs. **Air Velocity** to determine **Sheath Temperature**

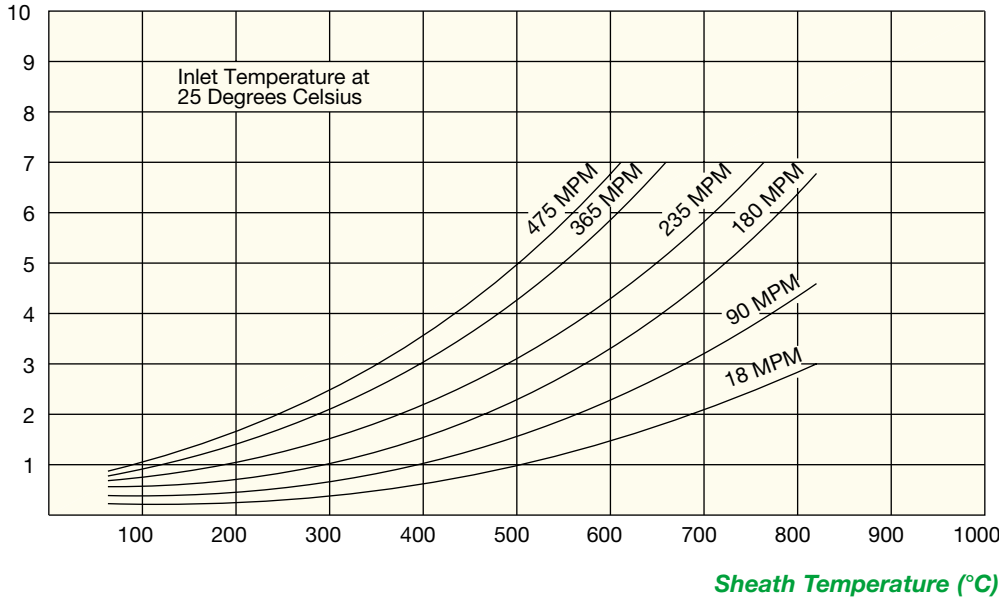
or

Watt Density vs. **Sheath Temperature** to determine the required **Air Velocity**

English



Metric



Installation Recommendations

1. TEMPCO Duct Heaters may be bolted to the ductwork through the side, bottom or top. Bottom and side mounting are preferred to minimize wiring/terminal enclosure temperatures.
2. Before mounting, consideration should be given to the strength of the ductwork required to support the weight of the heater. Add additional hangers or supports as required.
3. The inlet side of the unit should be at least 48 inches downstream from any change in duct size or duct direction.
4. To minimize pressure drop, mount in the duct with the narrow width of the heater perpendicular to the air flow.
5. Duct heaters may be mounted in tandem to increase the KW that can be installed.
6. Process temperature sensing should be located downstream from the duct heater.
7. All standard duct heaters have a thermowell attached to one element for installing a thermocouple to sense element temperature. Additional protection for the heater from low air flow can be achieved by installing an air flow switch or pressure switch on the inlet side.

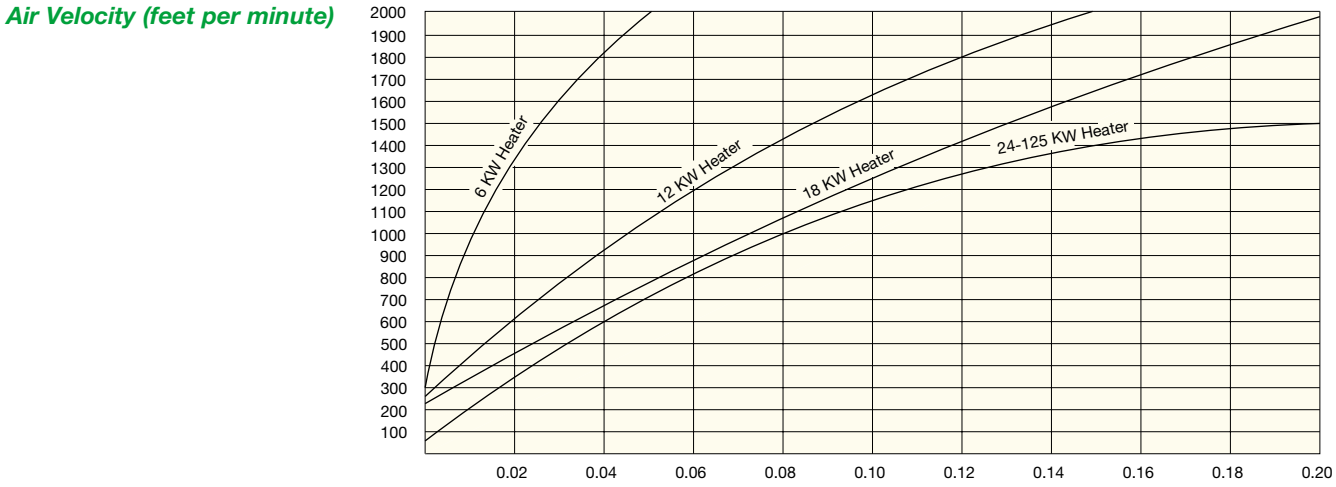
Wiring

1. Power supply conductors must have a minimum ampacity of 125% of the maximum heater load and be rated for the ambient temperature of the heater enclosure.
2. The air handler should run on a time delay after the heater is de-energized. This allows the elements to cool without overheating adjacent areas.
3. Duct heaters drawing more than 48 Amps are divided into smaller branch circuits each drawing 48 Amps or less. Please note that the number of circuits can be changed to accommodate any wiring requirements you may have.

Before you proceed to make any changes on factory prewired heaters check the heater wiring schematic or consult TEMPCO. All electrical wiring must be done in accordance with national and local electrical codes.

4. All wiring must be in accordance with the National Electrical Code and applicable local codes.

Pressure Drop vs. Air Velocity



Calculating Air Velocity

$$\text{Velocity (feet/minute)} = \frac{\text{SCFM (CFM measured at standard conditions)}}{\text{Duct cross sectional area at heater in square/feet}}$$

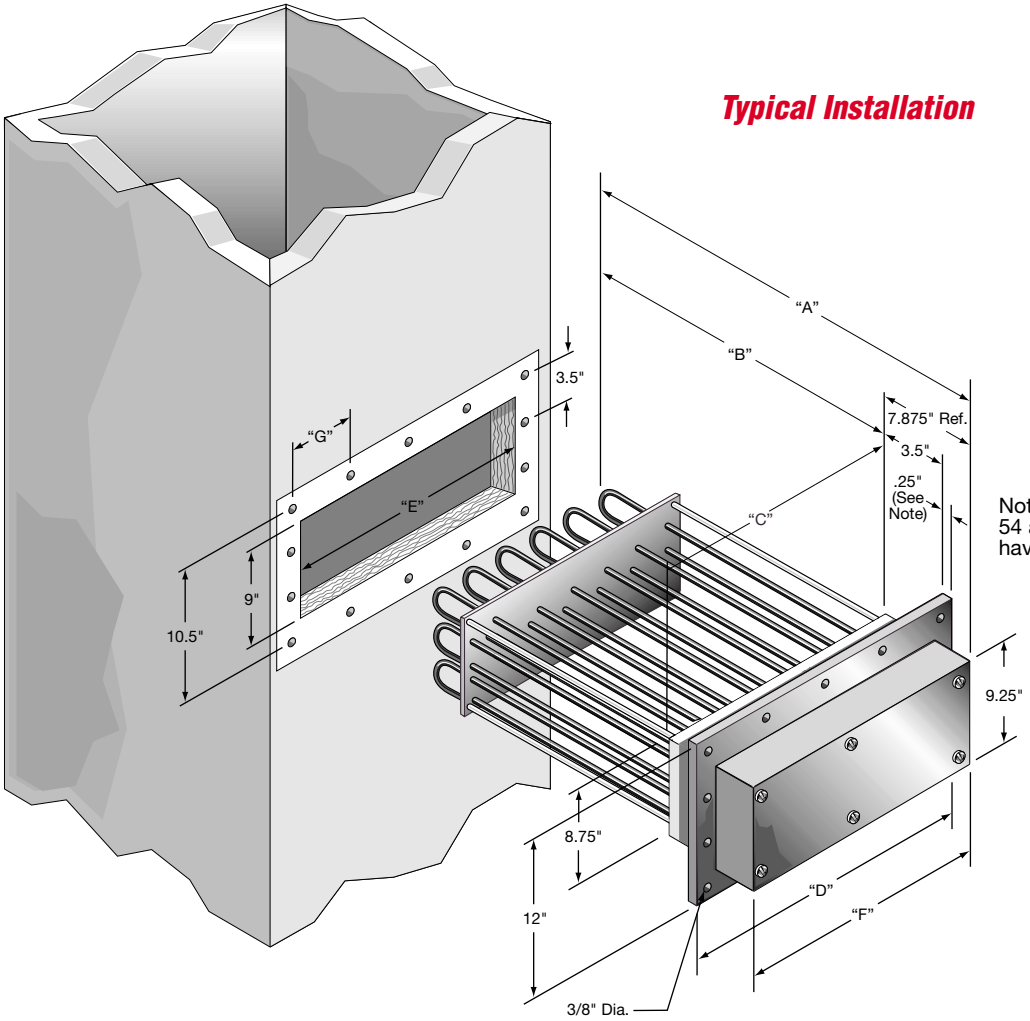
Maintenance

1. Never perform any type of service on duct heaters prior to cutting off all power supply lines.
2. Periodically check that mounting screws or bolts have not become loose from blower vibration.
3. Periodically check that electrical connections are clean and tight.
4. Failed elements are field replaceable, minimizing downtime and saving the cost of a complete new heater.

Standard Features

- NEMA 1 General Purpose Ventilated Enclosure
- Painted steel mounting flange
- Single and Three Phase wiring
- 3½ inches (89 mm) insulation
- Field replaceable Incoloy® 840 elements
- Element bends repressed
- ¼" (6 mm) inside diameter thermowell
- Stainless steel support plate and corner posts

Typical Installation



Note: Duct Heaters with 54 and 60 elements have .375" thick flanges.

Dimensions Reference Number	"A"		"B"		"C"		"D"		"E"		"F"		"G"		Number of Elements	Approximate Net Weight	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm		lbs	kgs
1	27⅞	708	20	508	2¾	70	6½	165	3	76	3⅝	92	2½	64	6	22	10
2	27⅞	708	20	508	4¾	121	8½	216	5	127	5⅝	143	3½	89	12	31	14
3	27⅞	708	20	508	6¾	171	10½	267	7	178	7⅝	194	3	76	18	41	19
4	27⅞	708	20	508	8¾	222	12½	318	9	229	9⅝	244	2¾	70	24	51	23
5	27⅞	708	20	508	10¾	273	14½	368	11	279	11⅝	295	3¼	83	30	62	28
6	27⅞	708	20	508	12¾	324	16½	419	13	330	13⅝	346	3¾	95	36	73	33
7	27⅞	708	20	508	14¾	375	18½	470	15	381	15⅝	397	4¼	108	42	84	38
8	27⅞	708	20	508	16¾	425	20½	521	17	432	17⅝	448	4¾	121	48	95	43
9	27⅞	708	20	508	18¾	476	22½	572	19	483	19⅝	498	5¼	133	54	106	48
10	27⅞	708	20	508	20¾	527	24½	622	21	533	21⅝	549	5¾	146	60	117	53
11	32⅞	835	25	635	20¾	527	24½	622	21	533	21⅝	549	5¾	146	60	130	59
12	40⅜	1026	32½	826	20¾	527	24½	622	21	533	21⅝	549	5¾	146	60	155	70
13	49⅜	1254	41½	1054	20¾	527	24½	622	21	533	21⅝	549	5¾	146	60	180	82

Duct Heaters

Watt Density W/in²	Watt Density W/cm²	KW	Dimensions Reference Number	Part Number 240V-1Ph	(C*)	240V-3Ph	(C*)	Replacement Elements	480V-1 Ph	(C*)	480V-3 Ph	(C*)	Replacement Elements
		6	1	◆TDH01002	(1)	◆TDH01003	(1)	THE03405	◆TDH01004	(1)	◆TDH01005	(1)	THE03819
		12	2	◆TDH01006	(1)	◆TDH01007	(1)	THE03405	◆TDH01008	(1)	◆TDH01009	(1)	THE03819
		18	3	◆TDH01010	(2)	◆TDH01011	(1)	THE03405	◆TDH01012	(1)	◆TDH01013	(1)	THE03819
		24	4	◆TDH01014	(2)	◆TDH01015	(2)	THE03405	◆TDH01016	(1)	◆TDH01017	(1)	THE03819
		30	5	—		◆TDH01018	(2)	THE03405	◆TDH01019	(2)	◆TDH01020	(1)	THE03819
		36	6	—		◆TDH01021	(2)	THE03405	◆TDH01022	(2)	◆TDH01023	(1)	THE03819
20	3.1	42	7	—		◆TDH01024	(2)	THE03405	◆TDH01025	(2)	◆TDH01026	(1)	THE03819
		48	8	—		◆TDH01027	(4)	THE03405	◆TDH01028	(2)	◆TDH01029	(2)	THE03819
		54	9	—		◆TDH01030	(3)	THE03405	◆TDH01031	(3)	◆TDH01032	(2)	THE03819
		60	10	—		◆TDH01033	(4)	THE03405	◆TDH01034	(4)	◆TDH01035	(2)	THE03819
		75	11	—		◆TDH01036	(4)	THE03845	◆TDH01037	(4)	◆TDH01038	(2)	THE03846
		100	12	—		—		—	—		◆TDH01039	(4)	THE03847
		125	13	—		—		—	—		◆TDH01040	(4)	THE03848
		9	1	TDH01072	(1)	TDH01073	(1)	THE03849	TDH01074	(1)	TDH01075	(1)	THE03851
		18	2	TDH01076	(2)	TDH01077	(1)	THE03849	TDH01078	(1)	TDH01079	(1)	THE03851
		27	3	TDH01080	(3)	TDH01081	(2)	THE03849	TDH01082	(2)	TDH01083	(1)	THE03851
		36	4	—		TDH01084	(2)	THE03849	TDH01085	(2)	TDH01086	(1)	THE03851
		45	5	—		TDH01087	(5)	THE03849	TDH01088	(2)	TDH01089	(2)	THE03851
		54	6	—		TDH01090	(3)	THE03849	TDH01091	(3)	TDH01092	(2)	THE03851
30	4.7	63	7	—		TDH01093	(7)	THE03849	TDH01094	(3)	TDH01095	(2)	THE03851
		72	8	—		TDH01096	(4)	THE03849	TDH01097	(4)	TDH01098	(2)	THE03851
		81	9	—		TDH01099	(6)	THE03849	TDH01100	(6)	TDH01101	(3)	THE03851
		90	10	—		TDH01102	(5)	THE03849	TDH01103	(4)	TDH01104	(4)	THE03851
		115	11	—		TDH01105	(10)	THE03850	TDH01106	(5)	TDH01107	(4)	THE03852
		150	12	—		—		—	—		TDH01108	(4)	THE03853
		190	13	—		—		—	—		TDH01109	(5)	THE03854

(C*) = Number of Branch Circuits per heater (48 amps each branch max). For different circuit wiring configurations consult Tempco.

How to Order

Catalog Heaters

Duct Heaters whose Part Numbers are preceded by a diamond (◆) are Stocked pre-assembled for two week delivery.

Part Numbers with no diamond (◆) are standard designs with 4-5 week delivery.

Specify if an optional housing, over-temperature sensing thermocouple or any other modifications are required. Note that Replacement Element Part Numbers for each heater are also listed.

Custom Engineered/Manufactured Heaters

For sizes and ratings not listed, **TEMPCO** will design and manufacture a Duct Heater to meet your requirements. ***Please Specify*** the following:

- ❑ Duct size
- ❑ Air flow velocity
- ❑ Inlet and outlet temperature
- ❑ Wattage, Voltage and Phase
- ❑ Number of Circuits
- ❑ Element watt density
- ❑ Element sheath material
- ❑ Mounting flange material
- ❑ Insulation thickness
- ❑ Electrical enclosure type
- ❑ Over-temperature thermocouple, if required
- ❑ Any other modifications

Power Control Panels for Process Heaters

Power Control Panels featuring mechanical or solid state controls with all other necessary components can be provided by TEMPCO for any size duct heater.
See pages 11-62 and 11-63 for more information.

Turnkey Ready to Power-Up Control Panels

Tempco offers three types of Control Panels designed for ease of installation and trouble free operation. All components are wired in accordance with the National Electrical Code and only require line voltage and temperature sensor connections by the customer. A wiring diagram, parts list and instruction books for all components are supplied with each panel.

Silicon Controlled Rectifier (SCR) Panels offer you numerous advantages over traditional control panels driven by mechanical contactors or mercury relays. An SCR Panel is a solid state device that provides infinitely variable power control to accurately maintain set-point temperature while also extending heater life. Since there are no mechanical contacts opening and closing to wear out or generate noise, SCR'S are virtually maintenance free.

Solid State Relays (SSRs) offer many of the same features of a SCR but at a somewhat lower cost and in a smaller package.

Mercury Displacement Relay (MDR) Power Control Panels use mercury contact action versus the button contacts of mechanical relays for quiet and trouble free operation. Mercury relays are capable of rapid on-off cycling in excess of 6 times, per minute providing good process temperature control.

We Offer:

- **Quick Service**
- **Free Design Engineering Services**
- **Quality Components and Workmanship**
- **One Year Warranty**
- **Competitive Price**

Standard Design Features

- Temperature Control
- Over-temperature Control— A second thermocouple senses for over-temperature, shutting down the system while activating a signal light or optional alarm horn. Solid State controls and mechanical contactors can fail in the on position so it is very important to have this safety backup feature.
- Control circuit transformer with primary and secondary fusing
- NEMA 12 enclosure— NEMA 1 construction
- Manual disconnect switch with interlocking operating mechanism so power must be off in order to open cabinet
- Cooling fan and filter for solid state units
- Wiring diagram, parts list and operating instructions

Optional Design Features

- ***NEMA 4 construction for placement outdoors***
- ***NEMA 7 construction for hazardous areas***
- ***Annunciation (Horn or Flashing light)***
- ***Auxiliary contacts***
- ***Internal heaters***
- ***Special Painting***
- ***Interlocks***
- ***Other special features available upon request***

Consult our team of professionals with your requirements.
No one can do it better than Tempco, your single source supplier...

STANDARD RATINGS

Control Panels with Silicon Controlled Rectifier Power Switching

Line Voltage	KW	Maximum Amps	Enclosure Dimensions Height in	Height mm	Width in	Width mm	Depth in	Depth mm	Part Number	Approximate Net Weight lbs	kgs
240/3	12	30	30	762	24	610	10	254	PCS01040	105	47
	24	60	36	914	30	762	12	305	PCS01041	150	68
	40	100	36	914	30	762	12	305	PCS01042	155	71
	60	150	48	1219	36	914	12	305	PCS01043	255	116
	80	200	48	1219	36	914	12	305	PCS01044	260	118
480/3	24	30	30	762	24	610	10	254	PCS01045	105	47
	48	60	36	914	30	762	12	305	PCS01046	150	68
	80	100	36	914	30	762	12	305	PCS01047	155	71
	120	150	48	1219	36	914	12	305	PCS01048	255	116
	160	200	48	1219	36	914	12	305	PCS01049	260	118

Control Panels with Solid State Relay Power Switching

Line Voltage	KW	Maximum Amps	Enclosure Dimensions Height in	Height mm	Width in	Width mm	Depth in	Depth mm	Part Number	Approximate Net Weight lbs	kgs
240/3	12	30	24	610	20	508	8	203	PCE01050	71	32
	24	60	30	762	24	610	8	203	PCE01051	94	43
	40	100	30	762	24	610	8	203	PCE01052	100	45
	60	150	36	914	30	762	8	203	PCE01053	142	64
	80	200	42	1067	36	914	8	203	PCE01054	194	88
480/3	24	30	24	610	20	508	8	203	PCE01055	71	32
	48	60	30	762	24	610	8	203	PCE01056	94	43
	80	100	30	762	24	610	8	203	PCE01057	100	45
	120	150	36	914	30	762	8	203	PCE01058	142	64
	160	200	42	1067	36	914	8	203	PCE01059	194	88

Control Panels with Mercury Displacement Relay Power Switching

Line Voltage	KW	Maximum Amps	Enclosure Dimensions Height in	Height mm	Width in	Width mm	Depth in	Depth mm	Part Number	Approximate Net Weight lbs	kgs
240/3	12	30	30	762	20	508	10	254	PCM01060	88	40
	24	60	36	914	30	762	10	254	PCM01061	94	43
	40	100	36	914	30	762	12	305	PCM01062	142	64
	60	150	48	1219	36	914	12	305	PCM01063	235	107
	80	200	60	1524	36	914	12	305	PCM01064	255	116
480/3	24	30	30	762	20	508	10	254	PCM01065	88	40
	48	60	36	914	30	762	10	254	PCM01066	94	43
	80	100	36	914	30	762	12	305	PCM01067	142	64
	120	150	48	1219	36	914	12	305	PCM01068	235	107
	160	200	48	1219	36	914	12	305	PCM01069	255	116

How to Order

Catalog Control Panels

Order by Part Number for catalog Control Panels. Delivery 3-4 weeks.

Custom Engineered/Manufactured Control Panels

If a catalog Power Control Panel does not meet your requirements **TEMPCO** will design and manufacture one to your specifications.
Standard lead time is 5-6 weeks.

Please Specify the following:

- ❑ Kilowatts
- ❑ Applied Voltage
- ❑ Sensor Types
- ❑ Power Control Type—SCR, SSR, MDR or Mechanical Contactor
- ❑ Optional Design Features

Speed Flow of Solid and Semi-Solid Viscous Materials With Tempco Electric Drum and Pail Heaters

Typical Drum Heater with Infinite/Variable control and Drip Guard

Typical Drum Heater with Thermostat control

Features

- ✶ *Rapid heat-up of drum*
- ✶ *Easy installation and removal*
- ✶ *Durable metal design*
- ✶ *Infinite switch or thermostat*
- ✶ *3-heat control*
- ✶ *6 ft. power cord*
- ✶ *Variety of sizes and ratings*
- ✶ *Stock to 1 week lead time!*

Standard Sizes and Ratings

Drum Size	Temp Control	Watts	Volts	Part Number
55 GAL. 22.5" Diameter	Infinite/Variable Heat Control	1750	120	*DHM00010
	60°-250° Thermostat	1920		*DHM00020
	200°-400° Thermostat	1920		DHM00030
	Infinite/Variable Heat Control	3000	240	*DHM00040
	60°-250° Thermostat			*DHM00050
	200°-400° Thermostat			DHM00060
	Optional Drip Guard	—	—	DHM00070
30 GAL. 18.5" Diameter	Infinite/Variable Heat Control	1750	120	DHM00080
	60°-250° Thermostat	1920		DHM00090
	200°-400° Thermostat	1920		DHM00100
16 GAL. 14.5" Diameter	Infinite/Variable Heat Control	1500	120	DHM00110
	60°-250° Thermostat			DHM00120
	200°-400° Thermostat			DHM00130
5 GAL. 11.25" Diameter	Infinite/Variable Heat Control	1500	120	DHM00140
	60°-250° Thermostat			DHM00150
	200°-400°Thermostat			DHM00160

The 1920 Watt/120V model is equipped with a special high amperage plug. If required the matching receptacle is:

EHD-103-108 Hubbel #5361 20A 125V

The 3000 Watt/240V is equipped with a standard 15A/240V straight blade type plug.

Thermostat Control models sense temperature in an area remote from the heating element and will automatically cycle heater to maintain set temperature. Three-heat switch allows three wattage ratings per thermostat setting and voltage rating.

Infinite/Variable Control models cycle the current ON and OFF. The ratio of ON time will increase as the the control is advanced. Three-heat switch allows the operator to control the heater output within a given 3 settings of high, medium, or low.

Heater controls are equipped with indicator lamps:

Green for Power Red for Heater ON

Typical Applications

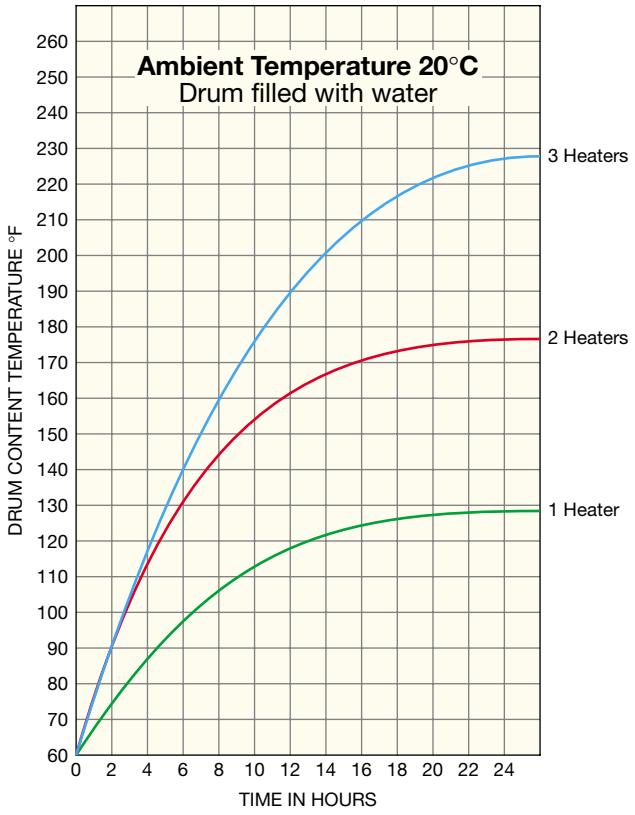
Industries	Applications
Mining Companies	Accelerate flow on viscous materials
Candle Makers	Heat wax to make candles
Food Processors	Heat food additives
Aircraft Mechanics	Heat aircraft grease during cold months
Farm Supply Distributors	Heat tallow to 140°F to mix with feed ration
Auto Mechanics/ Undercoaters	Accelerate flow of undercoating material
Beekeepers	Reliquefy honey after crystallizing
Roofers	Heat roofing material during cold weather
Chemical Manufacturers	Heat chemical components
Chemical Users	During the manufacturing process
Furniture Manufacturers	Heat adhesives
Pharmaceutical Repackagers	Heat additives
Oil Companies	Heat diesel fuel, grease, etc. in cold areas
Cosmetics	Heat material to be repackaged into consumer size bottles

STOCK ITEMS ORDER NOW!®

an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

Silicone Rubber Drum Heaters

- Built tough
- Resistant to chemicals
- Easy to clean
- Stock to 1 week lead time



The graph above shows the temperature rise from ambient—not drum content—temperature.

Standard Sizes and Ratings

Drum size	Watts	Volts	Length	Thermostat	Part Number
55 Gallon 22½" dia. ±1"	1000	120	64"	no	*DHR00010
	1000	120	64"	yes	*DHR00020
	1000	240	64"	no	*DHR00030
	1000	240	64"	yes	*DHR00040
	1500	120	64"	yes	DHR00050
	1500	240	64"	yes	DHR00055
30 Gallon 18" dia. ±1"	750	120	54"	no	DHR00060
	750	120	54"	yes	DHR00070
	750	240	54"	no	DHR00080
	750	240	54"	yes	DHR00090
15 Gallon 13½" dia. ±1"	500	120	40"	no	DHR00100
	500	120	40"	yes	DHR00110
	500	240	40"	no	DHR00120
	500	240	40"	yes	DHR00130
5 Gallon 11½" dia. ±1"	300	120	31"	no	DHR00140
	300	120	31"	yes	DHR00150

Design Features

- *All heaters have a standard width of 3" except 1500W 55 gallon, which are 4"*
- *120 Volt heaters have a 6-foot cord and plug*
- *240 Volt heaters have a 6-foot cord—NO PLUG*
- *B200 type thermostat used*

TEMPCO flexible drum heaters can save time by heating stored viscous fluid to a pourable temperature.

The heater is built to be tough, long lasting, and resistant to chemicals. Because few materials stick to its silicone rubber with fiberglass reinforced construction, it is easy to clean. The heater comes with a 6-foot cord and plug (120V only). When not in use, it folds for convenient storage.

The total wattage (number of heaters) and the material being heated inside of the drum must be considered when determining the actual temperature to which that specific material can be heated.

Specifications

- Maximum operating temperature of 400°F (205°C).
- Power cord is 6-foot long, SJO Type 16/3 complete with three-prong plug for 115 VAC models. Plug not included on 230 VAC models.
- Heating element made of Nichrome resistance wire.
- Surface grounded electrically with internal metal screen.
- 1250 volts dielectric tested.
- Vulcanized silicone rubber construction resistant to moisture, ozone, fungus, and radiation.

SAME DAY SHIPMENT on stock items ORDERED BY 2 PM CST

55 Gallon Drum Immersion Heaters

SAME DAY SHIPMENT on stock items ORDERED BY 2 PM CST

Design Features

- Used to improve the flow of lard, tar, oil and other high viscosity solutions
- Fits through the 2" bung opening in 55 gallon drums
- 60-250°F thermostat with over-temperature cutout
- Adjustable stainless steel mounting bracket
- Only 4" of riser is heated, allowing liquid level to fluctuate without damaging the heater
- Pilot light indicates whether heater is cycled on or off

Optional Features

- NEMA 4 (moisture resistant) and/or NEMA 7 (explosion resistant) terminal enclosures.

Installation Instructions

1. Match watt density and sheath material to application.
2. Ensure the heated portion of the heater, which extends 4" up the riser, is always fully immersed in liquid.
3. Use in metal drums or containers only.
4. Use wiring techniques safe for the environment the heater is in.
5. Use mounting brackets to position heater away from tank wall and above sludge buildup at bottom of tank.
6. Periodically remove the heater to inspect for damage.

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Sheath	Watt Density in²	Watt Density cm²	Watts	Volts	Part Number
Copper	8	1.2	1000	120	TAT30003
	32	5.0	4000	240	TAT30004
Stainless Steel	8	1.2	1000	120	TAT30002
	32	5.0	4000	240	TAT30001
Steel	8	1.2	1000	120	TAT30005
	32	5.0	4000	240	TAT30006

How to Order

Catalog Heaters

Order by Part Number for catalog heaters listed on pages 11-66 and 11-67.

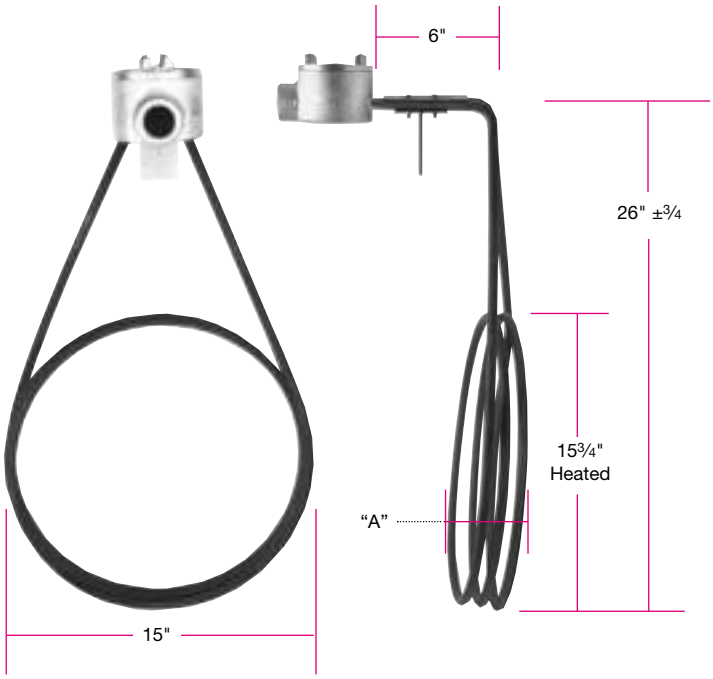
Custom Engineered/Manufactured Heaters

Understanding that an electric heater can be very application specific, for ratings not listed, **TEMPCO** will design and manufacture an Immersion Heater to meet your requirements. ***Standard lead time is 4 weeks.***

Please Specify the following:

- ❑ Application
- ❑ Wattage, Voltage
- ❑ Element Sheath Material
- ❑ Element Watt Density
- ❑ Height
- ❑ Unheated Section
- ❑ Optional Features
- ❑ Quantity

Vertical Loop – Low Profile Immersion Heaters



Design Features

- *Used on open top tanks for heating water, citrus juices, plating tanks, oil tempering, salt baths and corrosive solutions*
- *Low profile for minimum interference in open tank applications*
- *Grounding terminal lug in housing*
- *Cast iron NEMA 4 (moisture resistant) housing*
- *Optional Passivation to remove particles of free iron from stainless steel surfaces*

Standard Sizes and Ratings

Sheath	Watts/In²	Watts	Volts	"A"	Part Number
Copper	25	5000	240	2	TAT50011
	40	7500	240	2	TAT50012
Stainless Steel	25	5000	240	2¾	*TAT50013
	40	7500	240	2¾	*TAT50014
Steel	25	5000	240	2	TAT50015
	40	7500	240	2	TAT50016

How To Order
See page 11-66

Sanitizing Sink Immersion Heaters

Design Features

- *Used for sterilization of water tanks in restaurants, taverns and laboratories*
- *60°-250°F thermostat with over-temperature cutout*
- *4 ft. cord set with polarized plug*
- *Adjustable stainless steel mounting bracket*
- *Made to customer specifications*

Standard Sizes and Ratings

Sheath	Watts/In²	Watts	Volts	"A"	Part Number
Nickel Plated Copper	65	6000	240	17	TAT40001
	56	4000	240	13	TAT40002
	16	1500	120	17	TAT40003
	14	1000	120	13	TAT40004
Stainless Steel	65	6000	240	17	TAT40005
	56	4000	240	13	TAT40006
	16	1500	120	17	TAT40007
	14	1000	120	13	TAT40008

Note: Standard Nickel Plating is 1.5 mil thick. Specify if additional thickness is required.

STOCK ITEMS ORDER NOW!®

an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

Tank Immersion Heaters

Over-the-Side Immersion Heaters

Design Features

- Lightweight and Portable
- Easy Installation and Removal
- NEMA 4 Electrical Enclosure
- Single or Three Phase Wiring

STOCK ITEMS ORDER NOW!®

an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

Application

Tempco Over-the-Side Immersion Heaters are specifically designed for heating fluids in tanks. Depending on the tank shape, size, accessibility and working area inside the tank, choose a "Round" shaped or "L" shaped heater.

Standard sheath materials are Incoloy® 800 and steel with all wetted parts made with compatible alloys.

Construction

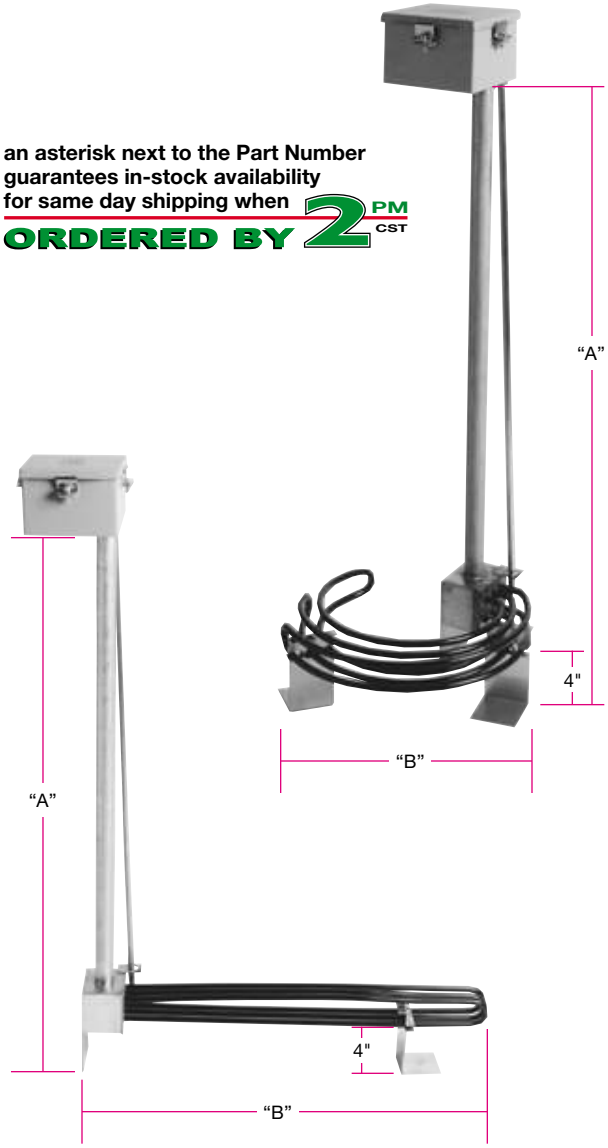
Tubular heating elements are welded into a liquid-tight junction box. Power leads for the elements travel up through the riser pipe and are connected to a terminal block in a NEMA 4 Housing. Unless otherwise specified, heaters are wired for three phase from the factory but can easily be converted to single phase.

A thermowell for a ⅜"diameter bulb is standard to accommodate an optional thermostat. A thermostat can be field installed to mounting lugs located in the electrical enclosure.

4" (102 mm) sludge legs keep the elements off the bottom of the tank and above any deposits that may accumulate there.

Optional Features

- ***304 or 316 Stainless Steel construction***
- ***Passivation of all wetted parts***
- ***Up to 9 elements in a heater***
- ***Special riser heights***
- ***Special sludge leg heights***
- ***Mounting flange on riser***
- ***Right-angle riser***
- ***Double-pole thermostats (see page 11-8 for available ranges)***



Applications: Lightweight Oils, Degreasing Solutions, Mineral Oil

- ***Steel sheath heating elements***
- ***NEMA 4 Terminal Housing***
- ***Watt Density of 23 watts/in² (3.6 watts/cm²)***

Element Shape	"A" in	"A" mm	"B" in	"B" mm	KW	Part Number 240V-3Ph	Part Number 480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kg
Round	39 5/16	999	13 1/2	343	3	TAT20001	TAT20002	17	8
	51 5/16	1303	18 1/2	470	6	TAT20003	*TAT20004	20	9
	51 5/16	1303	23 1/2	597	9	TAT20005	TAT20006	22	10
Straight	39 5/16	999	22 5/8	575	3	*TAT10001	*TAT10002	15	7
	51 5/16	1303	37 5/8	956	6	*TAT10003	*TAT10004	18	8
	51 5/16	1303	52 5/8	1337	9	*TAT10005	*TAT10006	20	9

Applications: Citric and Phosphoric Acid Solutions, Water Based Chemical Solutions

• *Incoloy® Sheath Heating Elements* • *NEMA 4 Terminal Housing* • *Watt Density of 23 watts/in² (3.6 watts/cm²)*

Element Shape	"A" in	"A" mm	"B" in	"B" mm	KW	Part Number 240V-3Ph	Part Number 480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kg
Round	39 5/16	999	13 1/2	343	3	TAT20007	TAT20008	17	8
	51 5/16	1303	18 1/2	470	6	TAT20009	TAT20010	20	9
	51 5/16	1303	23 1/2	597	9	TAT20011	*TAT20012	22	10
Straight	39 5/16	999	22 5/8	575	3	*TAT10007	*TAT10008	15	7
	51 5/16	1303	37 5/8	956	6	*TAT10009	*TAT10010	18	8
	51 5/16	1303	52 5/8	1337	9	*TAT10011	*TAT10012	20	9

Applications: Process Water, Mild Caustic Solutions (2% max.), Clean Water

• *Incoloy® Sheath Heating Elements* • *NEMA 4 Terminal Housing* • *Watt Density of 48 watts/in² (7.4 watts/cm²)*

Element Shape	"A" in	"A" mm	"B" in	"B" mm	KW	Part Number 240V-3Ph	Part Number 480V-3Ph	Approximate Net Weight lbs	Approximate Net Weight kg
Round	39 5/16	999	10 3/4	273	3	TAT20013	TAT20014	16	7
	39 5/16	999	13 1/2	343	6	TAT20015	TAT20016	17	8
	39 5/16	999	16	406	9	TAT20017	*TAT20018	18	8
	51 5/16	1303	18 1/2	470	12	TAT20019	TAT20020	20	9
	51 5/16	1303	21 1/4	540	15	TAT20021	TAT20022	21	10
	51 5/16	1303	23 1/2	597	18	TAT20023	TAT20024	22	10
Straight	39 5/16	999	14 5/8	371	3	*TAT10013	*TAT10014	14	6
	39 5/16	999	22 5/8	575	6	*TAT10015	*TAT10016	15	7
	39 5/16	999	30 1/8	765	9	*TAT10017	*TAT10018	16	7
	51 5/16	1303	37 5/8	956	12	*TAT10019	*TAT10020	18	8
	51 5/16	1303	45 1/8	1146	15	*TAT10021	*TAT10022	19	9
	51 5/16	1303	52 5/8	1337	18	*TAT10023	*TAT10024	20	9

STOCK ITEMS ORDER NOW!®

an asterisk next to the Part Number guarantees in-stock availability for same day shipping when ORDERED BY 2 PM CST

How to Order

Catalog Heaters

Over-the-Side Immersion Heaters whose Part Numbers are preceded by an asterisk (*) are Guaranteed in Stock for immediate delivery.

Part Numbers with no asterisk (*) are stocked as sub-assemblies for 2-3 week delivery.

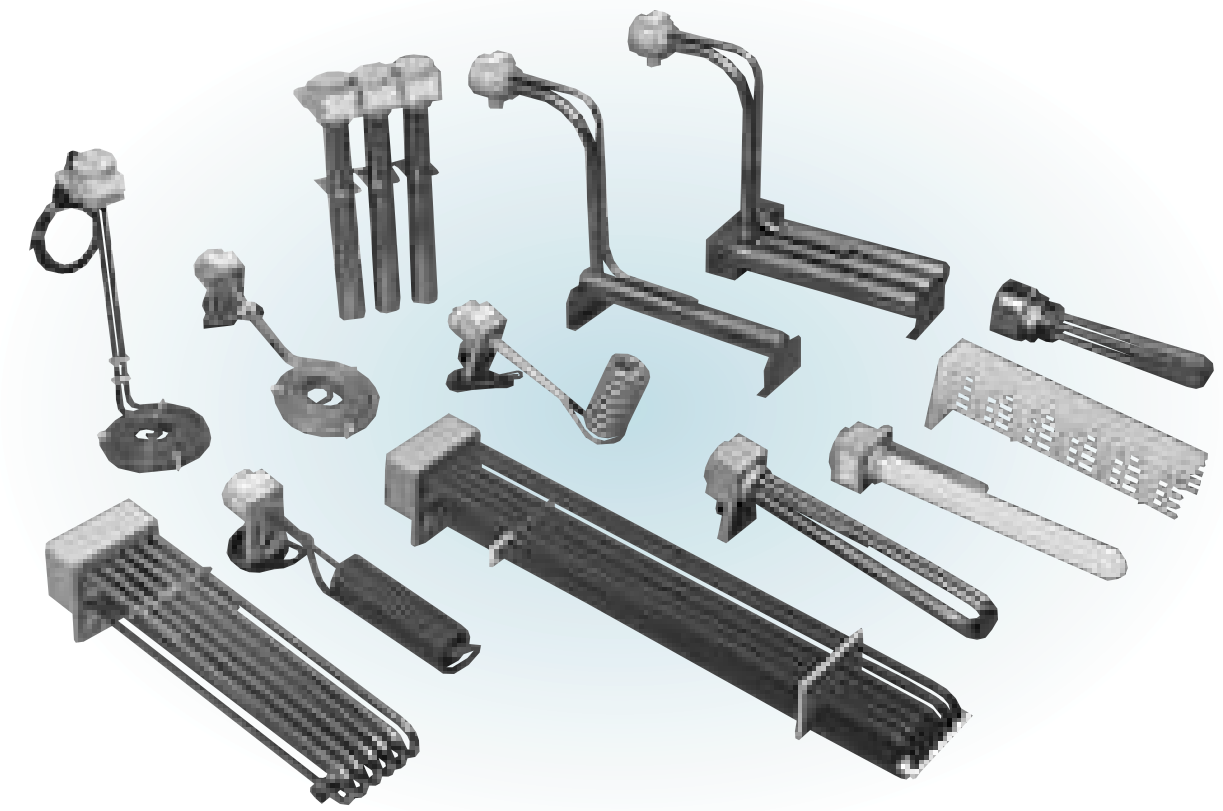
Custom Engineered/Manufactured Heaters

Understanding that an electric heater can be very application specific, for sizes and ratings not listed, **TEMPCO** will design and manufacture an Over-the-Side Immersion Heater to meet your requirements. ***Standard lead time is 4 weeks.***

Please Specify the following:

- ❑ Application
- ❑ Wattage, Voltage and Phase
- ❑ Element Sheath Material
- ❑ Number of Elements
- ❑ Element Watt Density
- ❑ "A" and "B" dimension
- ❑ Optional Features
- ❑ Quantity

Over-the-Side Chemical Bath Immersion Heaters



TEMPCO Over-the-Side Chemical Bath Immersion Heaters offer a wide variety of sheath materials and heater configurations to cover the widest possible spectrum of chemical heating applications. From plain steel to Teflon® covered, TEMPCO is sure to have the correct heater for even the most difficult solution. Built-in thermal overload protection prevents premature heater burnout in low liquid level conditions. This thermal protection also guards against a potentially hazardous situation should the heater be in close proximity to combustibles such as a plastic tank, or the medium being heated.

Overall Design Features

- ***Heavy duty, long lasting construction***
- ***Standard thermal protection***
  - ***T1 replaceable, standard***
  - ***T2 resettable, optional***
- ***Fully grounded for safety***
- ***Vapor-tight polypropylene terminal enclosure***
- ***Standard 3 ft. flexible PVC liquid-tight conduits and leads***

Tempco Over-the-Side Immersion Heaters are UL listed (except plain steel) under Classification KQGV, File Number E176527.

All catalog heaters are CSA certified under File Number LR 701748.

OVER THE SIDE

Typical Applications

Aqueous and semi-aqueous cleaning

Evaporation tanks

Chemical etching

Chemical mixing

Phosphatizing

Rinse tanks

Anodizing

Pickling

Plating

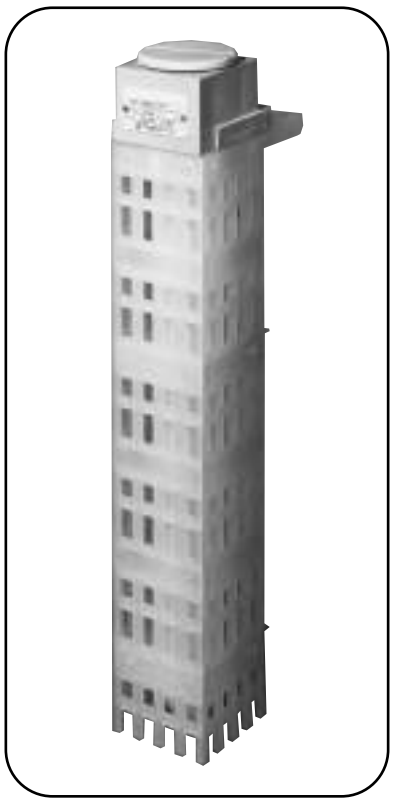
Dyeing

3 Construction Styles to select from...

OVER THE SIDE MODELS

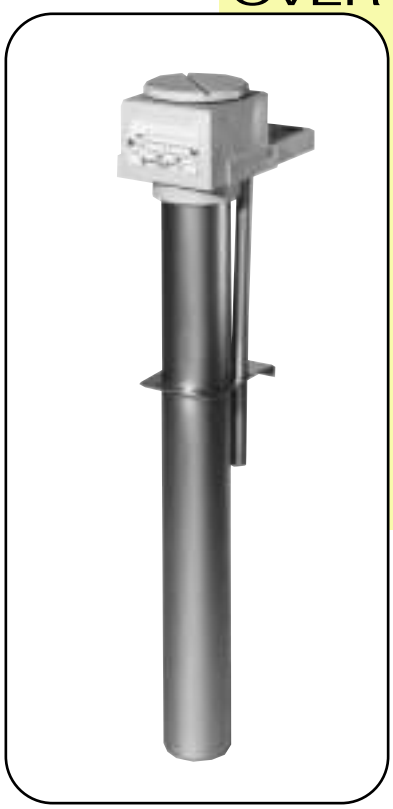
Teflon®

- Low watt density for long service life
- Non-contaminating .030 Teflon® covered stainless steel element
- Lightweight, non-floating construction
- Polypropylene guards (optional Teflon® guards for chromic acids or solutions exceeding 180°F)



Quartz

- Replaceable element and quartz tube
- Standard heater with polypropylene guard (optional Teflon® guards for chromic acids or solutions exceeding 180°F)



Metal Tube

- Variety of materials including steel, SS 304, SS 316, and titanium for chemical compatibility
- Rugged long lasting construction

Thermal Over-Temperature Protection

CAUTION

The realities of any plating, cleaning, anodizing, etching or pickling operation are that something could go wrong such as:

- An undetected tank leak
- Undetected evaporation losses
- Failure to refill the system

Any of these conditions creates a situation where the potential for fire or other hazard is increased.

Standard Setup— All Tempco Over-the-Side Teflon®, quartz and metal tube heaters come equipped with a replaceable thermal fuse placed in a thermowell and positioned at the top of the heater's hot zone. When wired into the heater circuit, it will instantly cut power to the heater when the preset temperature is reached. If the heater is over 15 amp, the thermal fuse would be wired into the control relay circuit. Also available is the T2 bi-metal switch which would be wired into the control relay circuit and used with additional components to form a resettable system.

We highly recommended the use of liquid level switches tied into control circuitry to provide a failsafe backup to the thermal fuse.

For Tempco's selection of liquid level switches see page 15-10.

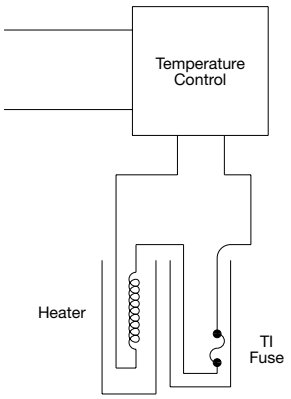
Application Guide for Thermal Over-Temperature Devices

T1 Thermal Fuse Devices

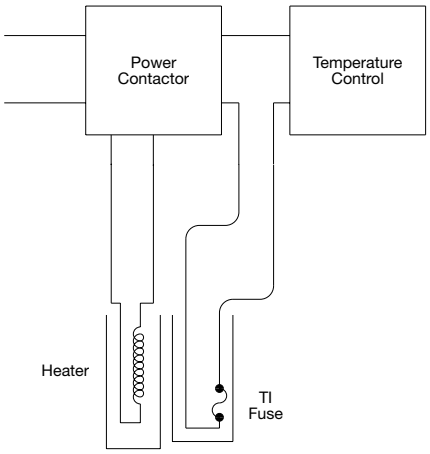
The T1 Over-Temperature Device is a eutectic switch with a pre-specified melt temperature. The "one shot" characteristic is useful in alerting operators to identify and remedy the cause of the over-temperature condition in the course of T1 fuse replacement.

UL/CSA listed rating of 15 amps up to 277 VAC

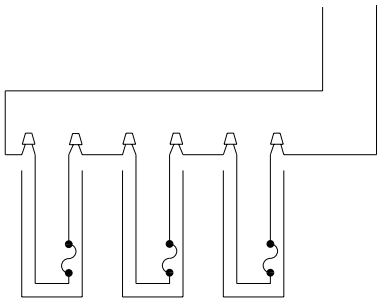
Single Phase



Power Contactor



Multi Phase



Multiple TI Fuse Installation (Wire in Series and then between Relay Coil and Control Device)

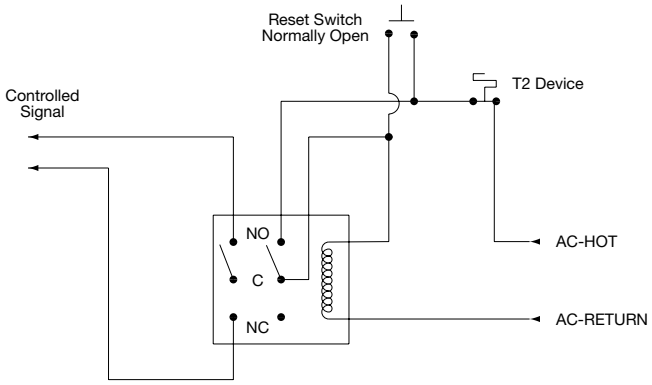
T2 Bi-Metal Switch

The T2 Over-Temperature Device is a slow make/slow break bimetallic thermostat with a pre-specified calibration temperature. The slow break characteristic coupled with the push button reset feature is extremely useful when a low liquid level occurs.

The T2 Over-Temperature Device is electrically installed with a holding circuit in conjunction with a power contactor to energize the heater. ***The T2 must never be used to directly switch heater power.***

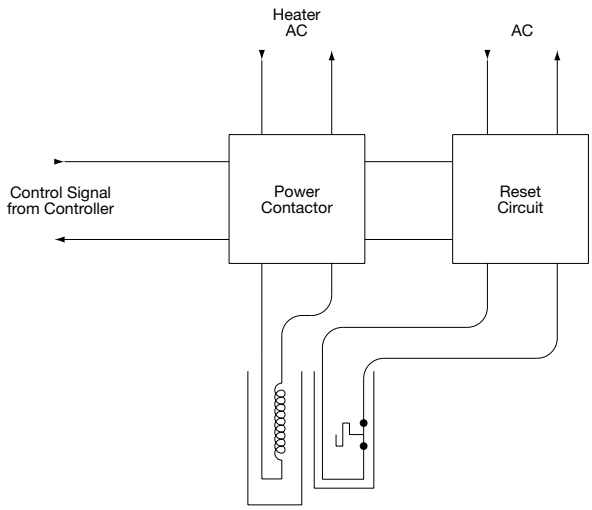
UL/CSA listed rating of 6 amps@120 VAC or 4 amps@240 VAC

Basic Relay Holding Circuit



Basic Relay Holding Circuit with T2 Over-Temperature Device

Typical Installation



Note: 1. Multiple heaters are hooked up according to standard electrical practices.
2. Multiple T2 devices are hooked up in series on one reset circuit.

Replacement Thermal Protection Accessories

Various construction methods are used in the manufacture of Teflon®, Quartz and Metal Tube Over-the-Side Immersion Heaters.

The T1 or T2 Thermal Protection Devices are matched to the item they protect for lead length and mounting style.

T1 Thermal Fuse Devices

Description	Catalog Number
T1 Thermal Fuse for Teflon® Over-the-Side Heaters (rated to 190°F)	TMC90001
T1 Thermal Fuse for Quartz Over-the-Side Heaters (w/SS Braid Sleeving)	
• Low Temperature Range	TMC90002
• Medium Temperature Range	TMC90003
T1 Thermal Fuse for Straight Metal Over-the-Side Heaters	
• Low Temperature Range	TMC90005
• Medium Temperature Range	TMC90006
• High Temperature Range	TMC90007
T1 Thermal Fuse for L-Shaped Metal Over-the-Side Heaters	
• Low Temperature Range	TMC90008
• Medium Temperature Range	TMC90009
• High Temperature Range	TMC90010

T2 Bi-Metal Switch

Description	Catalog Number
T2 Bi-Metal Switch for Teflon® Over-the-Side Heaters (rated to 190°F)	TMC90101
T2 Bi-Metal Switch for Quartz Over-the-Side Heaters (w/SS Braid Sleeving)	
• Low Temperature Range	TMC90102
• Medium Temperature Range	TMC90103
• High Temperature Range	TMC90104
T2 Bi-Metal Switch for Straight Metal Over-the-Side Heaters	
• Low Temperature Range	TMC90105
• Medium Temperature Range	TMC90106
• High Temperature Range	TMC90107
T2 Bi-Metal Switch for L-Shaped Metal Over-the-Side Heaters	
• Low Temperature Range	TMC90108
• Medium Temperature Range	TMC90109
• High Temperature Range	TMC90110

High Temperature Range— Solutions from 220°F to 300°F (104.4°C to 149.0°C)

Medium Temperature Range— Solutions from 180°F to 220°F (82.2°C to 104.4°C)

Low Temperature Range— Solutions up to 180°F (82.2°C)

Chemical Compatibility Guide

SOLUTION	TYPE OF HEATER
Acetic	Teflon® or Quartz
Acid Sulfate	Teflon® or Quartz
Actane 70, 80	Teflon®
Actane Salt	Teflon®
Alcorite	Teflon® or Quartz
Alkaline Cleaners (Electrified)	304 Stainless Steel
Alkaline Soaking Cleaners	304 Stainless Steel
Alodine	316 Stainless Steel
Alstan	304 Stainless Steel
Aluminum Anodizing	Teflon® or Quartz
Aluminum Bright Dip	Teflon® or Quartz
Aluminum Chloride	Teflon® or Quartz
Aluminum Cleaners	304 Stainless Steel*
Aluminum Sulfate	304 Stainless Steel
Ammonia	304 Stainless Steel
Ammonia Persulfate	Teflon® or Quartz
Ammonium Bi Fluoride	Teflon®
Ammonium Chloride	Titanium
Ammonium Nitrate	316 Stainless Steel
Anodizing	Teflon® or Quartz
ARP 28, 80 Blackening Salts	Teflon® or Quartz
Arsenic	304 Stainless Steel
Barium Chloride	Titanium
Benzoic Acid	Titanium
Black Nickel	Teflon® or Quartz
Black Oxide (High-Temp)	304 Stainless Steel*
Black Oxide (Low-Temp)	Titanium
Bonderizing	316 Stainless Steel*
Boric Acid	Titanium
Brass Cyanide	304 Stainless Steel
Bright Copper-Cyanide	304 Stainless Steel
Bright Nickel	Teflon®, Quartz or Titanium
Bronze	304 Stainless Steel
Brown Oxide	Titanium
Burnite	Teflon® or Quartz
Butyric Acid	Titanium
Cadmium (Alkaline)	304 Stainless Steel
Cadmium Black	Teflon® or Quartz
Calcium Chloride	Titanium
Cadmium Fluoborate	Teflon®
Calcium Hypochlorite	Titanium
Carbonic Acid	Titanium
Caustic Etch	Steel*
Caustics	Steel
Caustics (highly concentrated 20% & over)	Steel*
Chloride	Teflon® or Quartz
Chlorine/Wet	Teflon® or Quartz
Chlorosulfuric Acid	Titanium
Chromic Acetate	Teflon® or Quartz
Chromic Anodizing	Teflon® or Quartz

SOLUTION	TYPE OF HEATER
Chromic Nickel	Teflon® or Quartz
Chromium (Fluoride)	Teflon®
Chromium (No Fluorides)	Teflon®, Quartz or Titanium
Citric Acid	Titanium
Clear Chromate	Teflon® or Quartz
Cobalt Nickel	Teflon®, Quartz or Titanium
Cobalt Plating	304 Stainless Steel
Cobra Etch	Teflon®
Copper Acid	Teflon® or Quartz
Copper Bright Acid	Teflon® or Quartz
Copper Cyanide	304 Stainless Steel
Copper Fluoborate	Teflon®
Copper Pyrophosphate	304 Stainless Steel
Copper Strike	304 Stainless Steel
Copper Sulfate	Teflon® or Quartz
Cyanide	304 Stainless Steel
Deionized Water	316 Stainless Steel
Deoxidizer (Etching)	Quartz
Deoxidizer Non-Chromated	316 Stainless Steel
Dichromic Seal	Steel
Diethylene Glycol	304 Stainless Steel
Diversey, 511, 514	Teflon®
Dow Therm	316 Stainless Steel*
Dye Solutions	304 Stainless Steel
Ebonal C	Titanium
Electro Cleaner	304 Stainless Steel
Electro Polishing	Teflon® or Quartz
Electroless Copper	Teflon®
Electroless Nickel	Teflon® or Titanium*
Electroless Tin (Acid)	Teflon® or Quartz
Electroless Tin (Alkaline)	316 Stainless Steel
Enthone 80 Acid	Teflon®
Ethylene Glycol	Steel*
Ferric Ammonium Oxide	316 Stainless Steel
Ferric Chloride	Teflon®, Quartz or Titanium
Ferric Nitrate	304 Stainless Steel
Ferric Sulfate	304 Stainless Steel
Fluoborate	Teflon®
Formic Acid	316 Stainless Steel
Glycerol	304 Stainless Steel*
Gold-Acid	Teflon®, Quartz or Titanium
Gold Cyanide	304 Stainless Steel
Gold-Immersion	304 Stainless Steel
Grey Nickel	Teflon®, Quartz or Titanium
Hot Seal Dichromate	316 Stainless Steel
Hydrochloric Acid	Teflon® or Quartz
Hydrofluoric Acid	Teflon®
Hydrogen Peroxide	Teflon® or Quartz*
Indium	Teflon® or Quartz
Iridite (4-75, 4-73, 14, 14-2, 14-9)	316 Stainless Steel

Teflon® is a registered trademark of DuPont.

* Should use heater watt densities of 18 watts/sq.in.

Tank Immersion Heaters

SOLUTION	TYPE OF HEATER
Iridite (1, 2, 3, 4-C, 7, 8, 15)	Teflon® or Quartz
Iron Fluoborate	Teflon®
Iron Phosphate	316 Stainless Steel*
Isoprep (186, 187, 188)	316 Stainless Steel
Isoprep Acid Salts	Teflon®
Jetal	304 Stainless Steel
Lead Acetate	304 Stainless Steel
Lime Saturated Water (Alkaline)	316 Stainless Steel*
Linseed Oil	304 Stainless Steel
Magnesium Hydroxide	304 Stainless Steel*
Magnesium Nitrate	Teflon® or Quartz
Manganese Phosphate	316 Stainless Steel*
McDermid 629	Teflon®
Mercuric Chloride	Titanium
Muriatic Acid	Teflon® or Quartz
Nickel (Plating Solution)(Watts)	Teflon®, Quartz or Titanium
Nickel Acetate Seal	316 Stainless Steel
Nickel Chloride	Titanium
Nitric Acid	Teflon® or Quartz
Nitric Hydrochloric Acids	Teflon® or Quartz
Nitric Phosphoric	Quartz*
Oil	Steel*
Oleic Acid	Teflon® or Quartz
Paint Stripper (Alkaline)	304 Stainless Steel*
Perchlorethylene	316 Stainless Steel*
Phosphate Cleaner	304 Stainless Steel*
Phosphate	316 Stainless Steel*
Phosphoric Acid (No Fluoride)	Teflon® or Quartz*
Potassium Acid Sulfate	Teflon® or Quartz
Potassium Cyanide	304 Stainless Steel
Potassium Hydrochloric	Teflon® or Quartz
Potassium Hydroxide	304 Stainless Steel
Potassium Permanganate	Teflon® or Titanium*
Rhodium	Teflon® or Quartz
Rochelle Salt Cyanide	304 Stainless Steel
Ruthenium	Teflon® or Quartz
Salt (Actine)	Teflon®
Sea Water	Titanium
Silver Bromide	316 Stainless Steel

SOLUTION	TYPE OF HEATER
Silver Cyanide	304 Stainless Steel
Silver Lume	304 Stainless Steel
Silver Nitrate	316 Stainless Steel
Sodium Bisulfate	Teflon® or Quartz
Sodium Carbonate	Titanium
Sodium Chlorate	Titanium
Sodium Chloride	Titanium
Sodium Cyanide	304 Stainless Steel
Sodium Dichromate (Hot Seal)	316 Stainless Steel
Sodium Hydroxide	Steel
Sodium Hypochlorite	Teflon®
Sodium Persulfate	Teflon® or Quartz
Stannate	Steel
Stanostar	Teflon® or Quartz
Stearic Acid	Quartz
Sulfamate Nickel	Teflon®, Quartz or Titanium
Sulfur	Teflon® or Quartz
Sulfuric Acid	Teflon® or Quartz
Sulfur Peroxide	Teflon® or Quartz
Sulphamic Acid	Teflon® or Quartz
Tannic Acid	Titanium
Tin Nickel	Teflon®
Tin Plating (Acid) (Fluoborate)	Teflon®
Tin Plating (Acid)(Stanus/Sulphate)	Teflon® or Quartz
Tin Plating (Alkaline)	304 Stainless Steel
Trichlorethylene	316 Stainless Steel*
Trioxide (Pickle)	Teflon® or Quartz
Turco (4181, 4338)	316 Stainless Steel*
Unichrome	Teflon® or Quartz
Water	316 Stainless Steel or Quartz
Wood's Nickel Strike	Teflon® or Quartz
Yellow Dichromate	Teflon® or Quartz
Zinc Acid	Teflon® or Titanium
Zinc Ammonium Chloride	Quartz or Titanium
Zinc Cyanide	304 Stainless Steel
Zinc Phosphate	316 Stainless Steel*
Zincate	304 Stainless Steel

* Should use heater watt densities of 18 watts/sq.in.

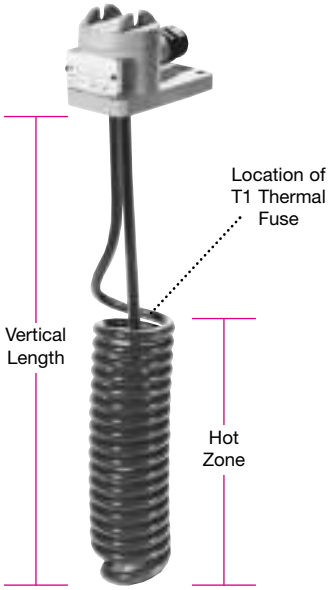
The data listed is provided as a reference and is offered as a guide only. It is not intended to be used as the sole basis of design or to establish specification limits. **Tempco Electric Heater Corporation** assumes no obligation or liability for any advice furnished by it or for results obtained from its use. Due to the complexities of solutions and applications, it is the customer's responsibility to contact their chemical supplier for heater material compatibility and recommendations.

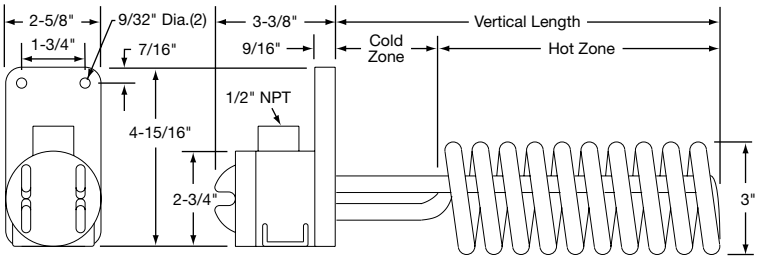
Do not use electric immersion heaters to heat flammable solutions!

CAUTION

Please insure applicability of heater before installation since we cannot guarantee heaters against premature failure due to corrosion or chemical destruction caused by unusual conditions over which we have no control such as:

- Excessively high solution temperatures
- The concentration of the solution
- The presence of inhibitors
- The presence of other acids causing a secondary reaction
- Stray electrical currents
- Flux floating on the surface
- The presence of dissolved gases
- Excessive sludge buildup
- Stagnant or turbulent flow of the solution
- Aeration
- Presence of oxygen or an oxidizing agent in the solution
- Erosion





Standard Sizes and Ratings

Watts	Part Number 120V	240V	480V	Hot Zone in	mm	Vertical Length in	mm
500	TMT01001	TMT01002	—	5	127	11	279
1000	TMT01003	TMT01004	—	7	178	11	279
2000	TMT01005	TMT01006	TMT01007	12	305	17	432
3000	—	TMT01008	TMT01009	16	406	23	584
4000	—	TMT01010	TMT01011	20	508	29	737
5000	—	TMT01012	TMT01013	25	635	35	889
6000	—	TMT01014	TMT01015	29	737	40	1016

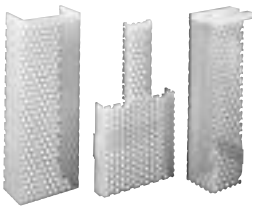
Teflon® Single Element Coil

Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Replaces more expensive alumina or graphite heaters.

Design Features

- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting flange.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Single phase only.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.



Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

How to Order

Catalog Heaters

The part numbers given in the chart above are for the complete assembly including the heater, poly guard, and T1 thermal protector.

Other optional assemblies may be ordered; consult Tempco for the catalog number.

Custom Engineered/Manufactured Heaters

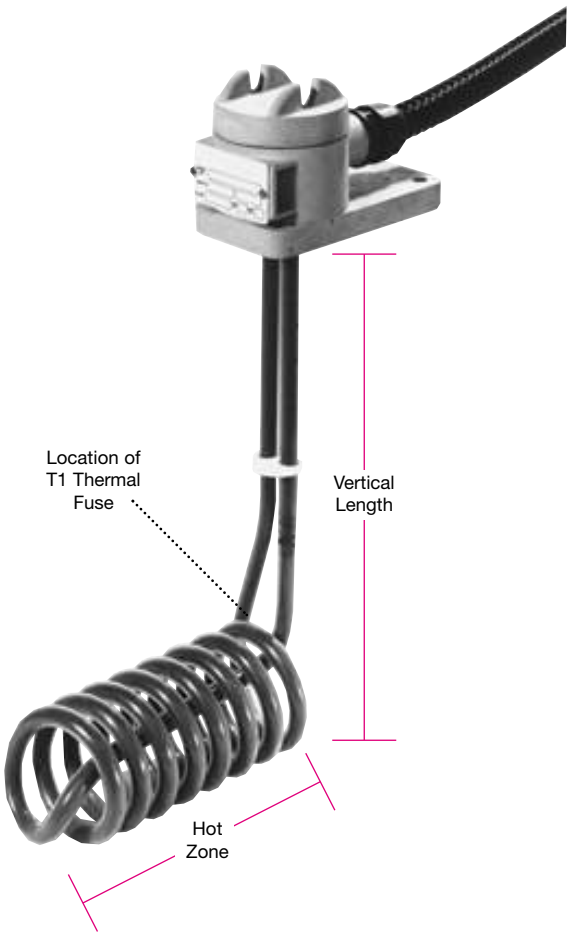
For sizes and ratings not listed, **TEMPCO** will design and manufacture a heater to meet your requirements. ***Standard lead time is 2 to 3 weeks.***

Please Specify the following:

- ❑ Hot Zone and Vertical Length per model
- ❑ Voltage and Wattage
- ❑ PVC liquid-tight conduit length (3 ft. standard)

Tank Immersion Heaters

Teflon® Single Element L-Shaped Coil

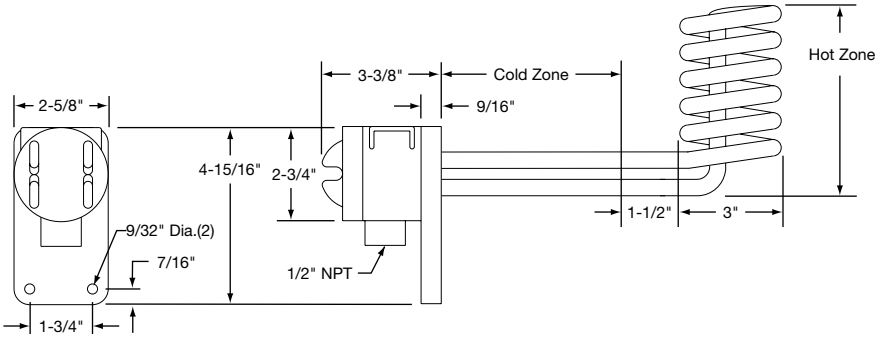


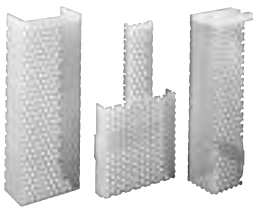
Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Replaces more expensive alumina or graphite heaters.

Design Features

- Bottom design for even heating and varying liquid levels.
- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting flange.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Single phase only.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.





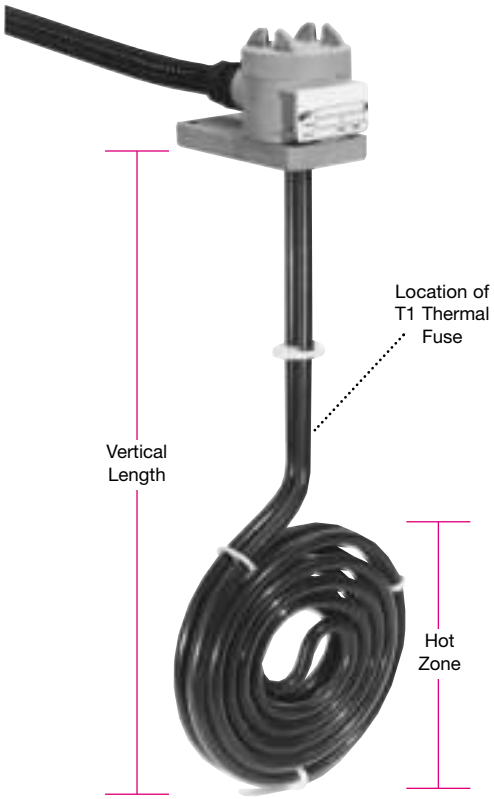
Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

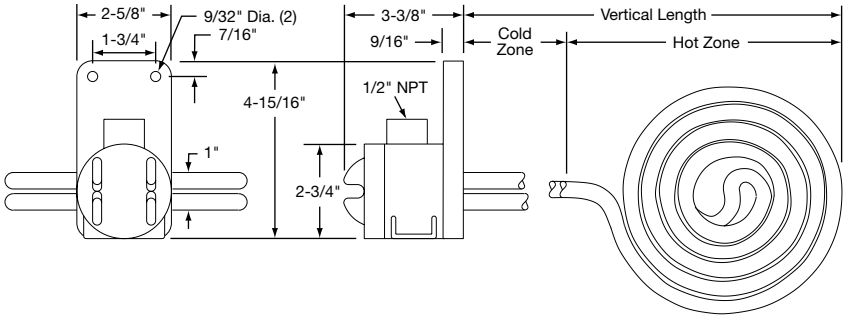
Standard Sizes and Ratings

Watts	Part Number 120V	240V	480V	Hot Zone in	Hot Zone mm	Vertical Length in	Vertical Length mm
500	TMT02001	TMT02002	—	6	152	12	305
1000	TMT02003	TMT02004	—	9	229	12	305
2000	TMT02005	TMT02006	TMT02007	12	305	18	457
3000	—	TMT02008	TMT02009	17	432	18	457
4000	—	TMT02010	TMT02011	20	508	18	457
5000	—	TMT02012	TMT02013	24	610	18	457
6000	—	TMT02014	TMT02015	29	737	18	457

How To Order

See page 11-76





Heater Shown Rotated 90°

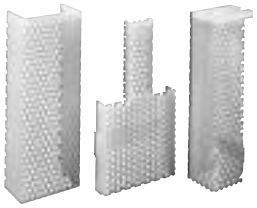
Teflon® Single Element Round

Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Replaces more expensive alumina or graphite heaters.

Design Features

- Flat, low profile design.
- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting flange.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Single phase only.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.



Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

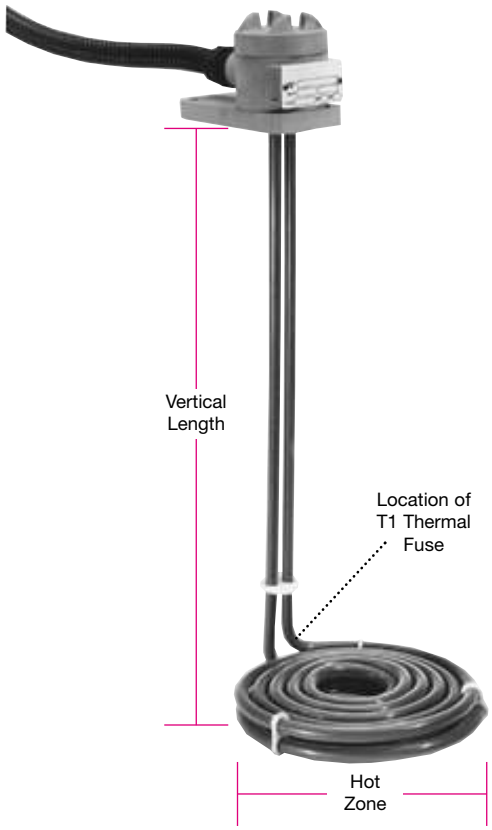
Standard Sizes and Ratings

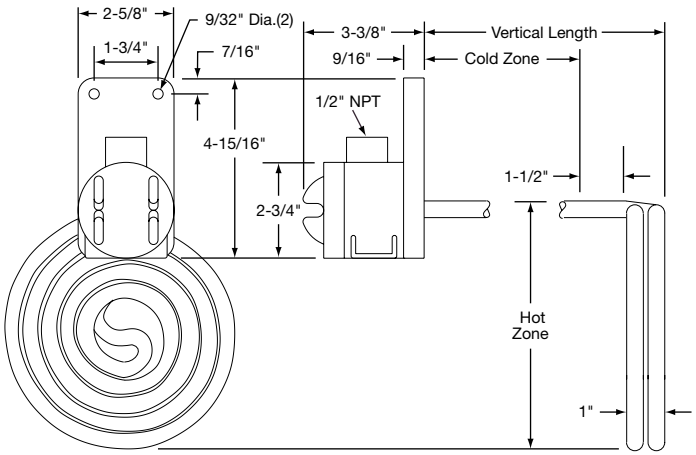
Watts	Part Number 120V	240V	480V	Hot Zone in	Hot Zone mm	Vertical Length in	Vertical Length mm	Diameter in	Diameter mm
500	TMT03001	TMT03002	—	6	152	14	356	5	127
1000	TMT03003	TMT03004	—	7	178	14	356	6	152
2000	TMT03005	TMT03006	TMT03007	9	229	17	432	8	203
3000	—	TMT03008	TMT03009	10	254	23	584	9	229
4000	—	TMT03010	TMT03011	12	305	29	737	11	279
5000	—	TMT03012	TMT03013	13	330	35	889	12	305
6000	—	TMT03014	TMT03015	14	356	40	1016	13	330

How To Order

See page 11-76

Tank Immersion Heaters





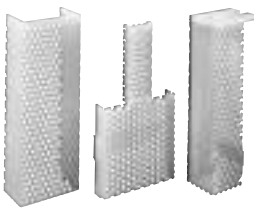
Teflon® Single Element L-Shaped Round

Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Replaces more expensive alumina or graphite heaters.

Design Features

- Low profile bottom design for even heating and varying liquid levels.
- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting flange.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Single phase only.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.



Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

Standard Sizes and Ratings

Watts	Part Number 120V	240V	480V	Hot Zone in	Hot Zone mm	Vertical Length in	Vertical Length mm	Diameter in	Diameter mm
500	TMT04001	TMT04002	—	6	152	12	305	5	127
1000	TMT04003	TMT04004	—	7	178	12	305	6	152
2000	TMT04005	TMT04006	TMT04007	9	229	18	457	8	203
3000	—	TMT04008	TMT04009	10	254	18	457	9	229
4000	—	TMT04010	TMT04011	12	305	18	457	11	279
5000	—	TMT04012	TMT04013	13	330	18	457	12	305
6000	—	TMT04014	TMT04015	14	356	18	457	13	330

How To Order

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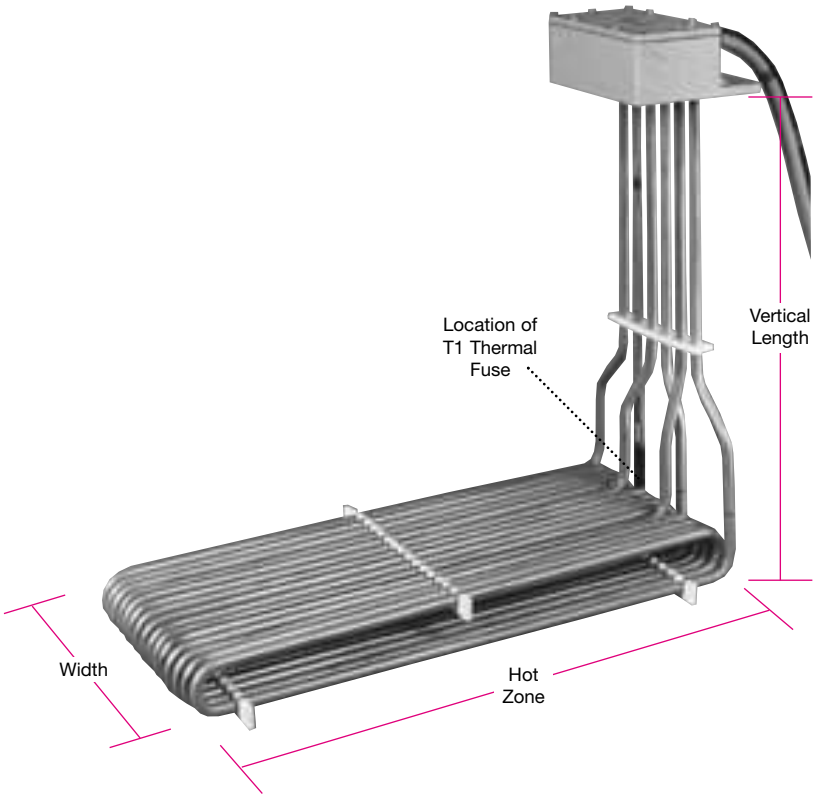
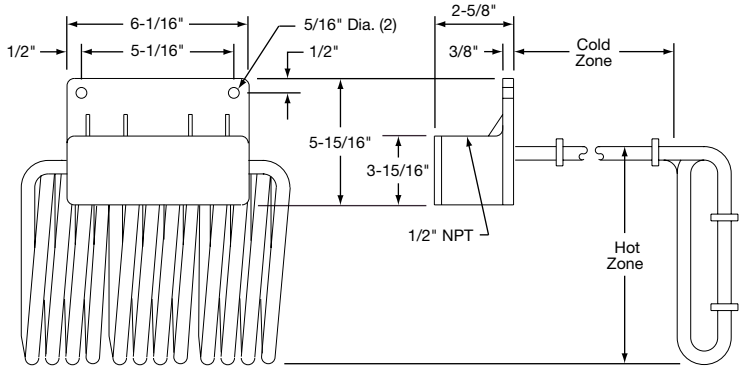
Teflon® Three Element L-Shaped



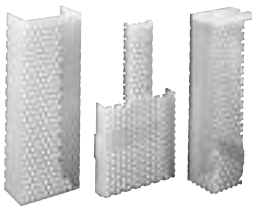


Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Replaces more expensive alumina or graphite heaters.

Design Features

- Low profile bottom design for even heating and varying liquid levels.
- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Standard three-phase wiring.
- 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.



Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

Standard Sizes and Ratings

Watts	Part Number 120V	240V	480V	Hot Zone in	Hot Zone mm	Vertical Length in	Vertical Length mm	Width in	Width mm
3000	—	TMT05001	TMT05002	13	330	18	457	7	178
6000	—	TMT05003	TMT05004	19	483	18	457	10	254
9000	—	TMT05005	TMT05006	23	584	18	457	10	254
12000	—	TMT05007	TMT05008	30	762	18	457	10	254
15000	—	TMT05009	TMT05010	36	914	18	457	10	254
18000	—	TMT05011	TMT05012	42	1067	18	457	10	254

How To Order

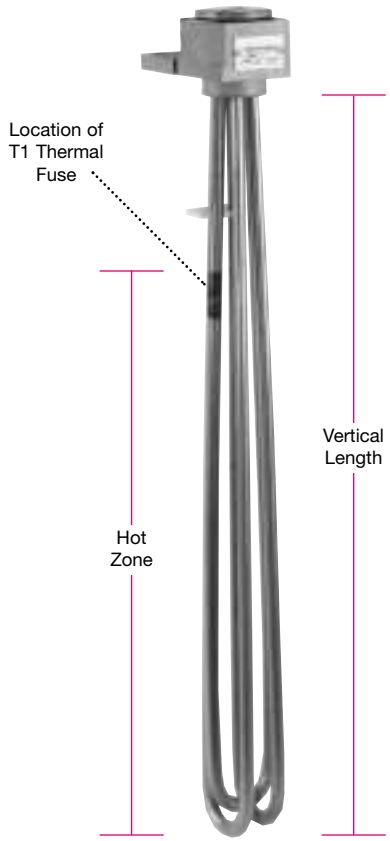
See page 11-76

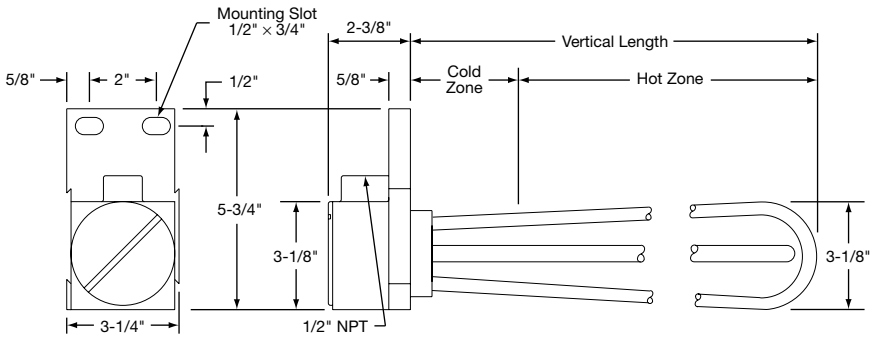
Tank Immersion Heaters

Teflon® Three Element Over-the-Side

Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

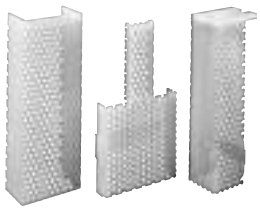
Replaces more expensive alumina or graphite heaters.





Design Features

- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Single phase for 120V, three-phase for 240V or 480V standard.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer lengths available. Consult **Tempco.**



Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

Standard Sizes and Ratings

Watts	Part Number 120V	240V	480V	Hot Zone in	Hot Zone mm	Vertical Length in	Vertical Length mm
1000	TMT06001	TMT06002	—	9	229	17	432
1500	TMT06003	TMT06004	TMT06005	15	381	23	584
2000	—	TMT06007	TMT06008	21	533	29	737
3000	—	TMT06009	TMT06010	28	711	35	889
4000	—	TMT06011	TMT06012	38	965	47	1194
5000	—	TMT06013	TMT06014	47	1194	59	1499
6000	—	TMT06015	TMT06016	55	1397	68	1727

How To Order

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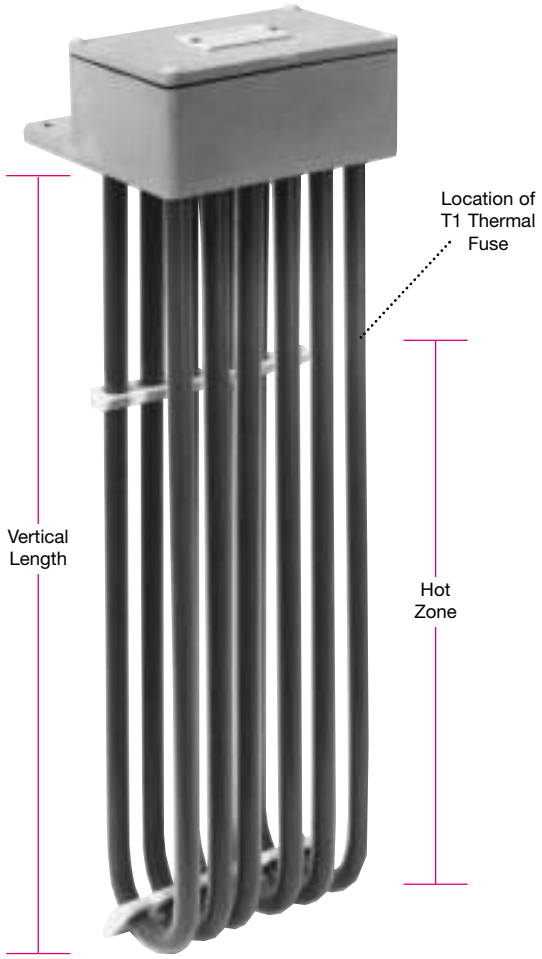
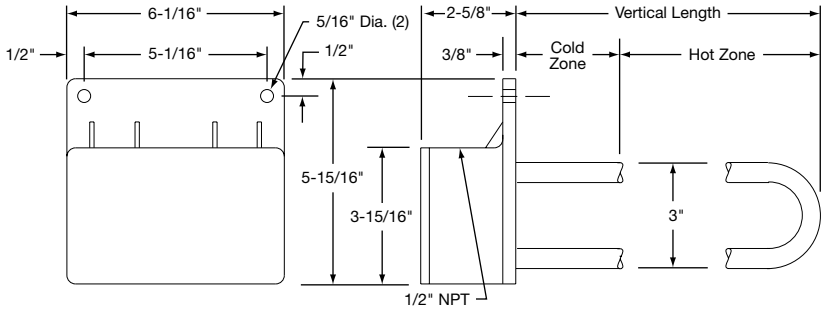




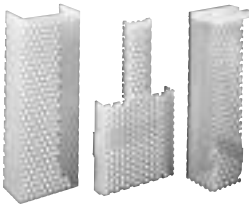
Teflon® Six Element Over-the-Side

Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Replaces more expensive alumina or graphite heaters.

Design Features

- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Single phase for 120V, three-phase for 240V or 480V standard.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer lengths available. Consult **Tempco.**



Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

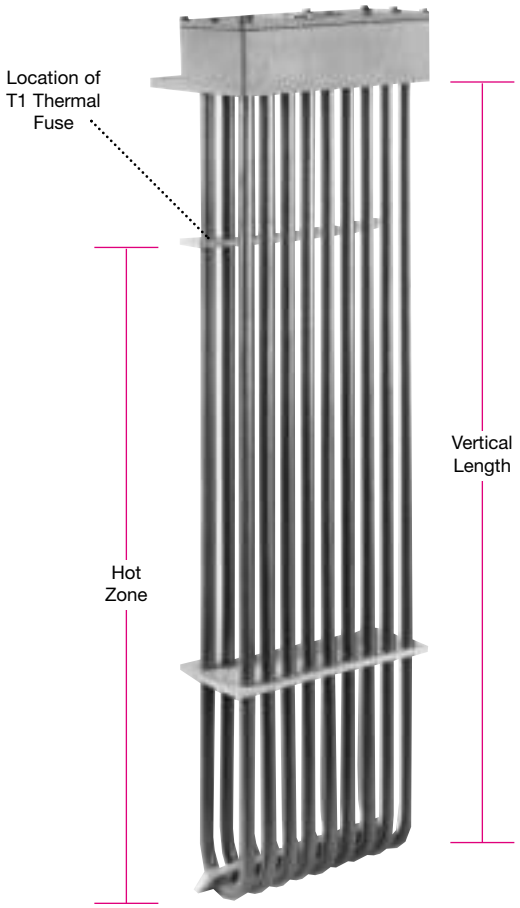
Standard Sizes and Ratings

Watts	Part Number 120V	240V	480V	Hot Zone in	Hot Zone mm	Vertical Length in	Vertical Length mm
2000	TMT07001	TMT07002	TMT07003	9	229	17	432
3000	—	TMT07004	TMT07005	15	381	23	584
4000	—	TMT07006	TMT07007	21	533	29	737
6000	—	TMT07008	TMT07009	28	711	35	889
8000	—	TMT07010	TMT07011	38	965	47	1194
10000	—	TMT07012	TMT07013	47	1194	59	1499
12000	—	TMT07014	TMT07015	55	1397	68	1727

How To Order

See page 11-76

Teflon® Nine Element Over-the-Side

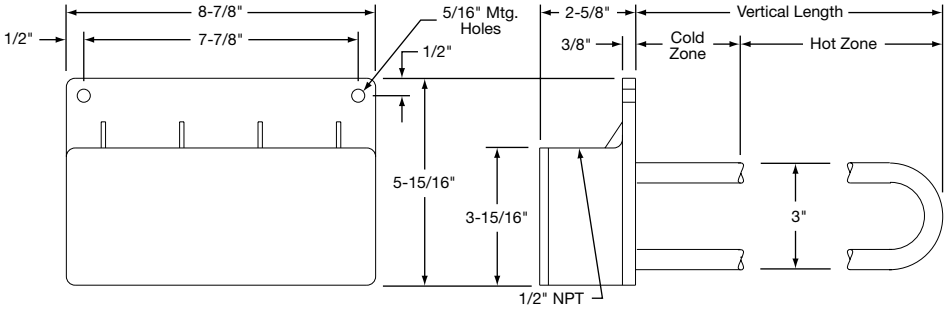


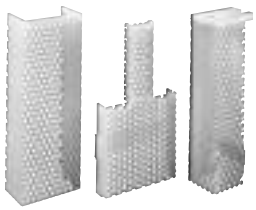
Compatible with most plating tank solutions; inert to acids, anodizing and pickling solutions up to 190°F (88°C). Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Replaces more expensive alumina or graphite heaters.

Design Features

- 10 watts/in² (1.6 watts/cm²) for long service life.
- Non-contaminating Teflon® covered stainless steel elements.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded internal metal element for safety.
- UL listed, CSA certified.
- Lightweight, non-floating construction.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 180°F or 82.2°C.)
- Standard three-phase wiring.
- 240, 480 volts standard as listed—other voltages available.
- Longer lengths available. Consult **Tempco.**



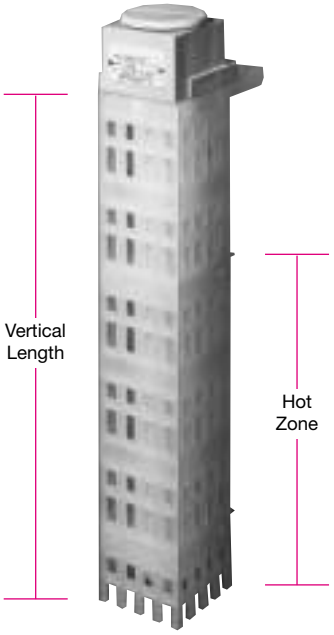


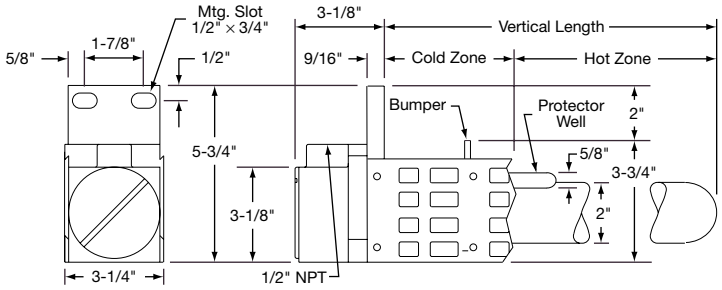
Guards are available and recommended for all Teflon® heaters. Standard guards are made of polypropylene; Teflon® guards are optional.

Standard Sizes and Ratings

Watts	Part Number 120V	240V	480V	Hot Zone in	Hot Zone mm	Vertical Length in	Vertical Length mm
3000	—	TMT08001	TMT08002	9	229	17	432
4500	—	TMT08003	TMT08004	15	381	23	584
6000	—	TMT08005	TMT08006	21	533	29	737
9000	—	TMT08007	TMT08008	28	711	35	889
12000	—	TMT08009	TMT08010	38	965	47	1194
15000	—	TMT08011	TMT08012	47	1194	59	1499
18000	—	TMT08013	TMT08014	55	1397	68	1727

How To Order
See page 11-76





Quartz Single Tube Style

For plating tanks, pickling and other acidic aqueous solutions. Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

CAUTION Not for use in hydrofluoric acid or alkaline solutions.

Design Features

- 26 watts/in² (4.0 watts/cm²) for long service life.
- Heavy duty, long lasting construction.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Replaceable element and quartz tube.
- Grounded for safety.
- UL listed, CSA certified.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 200°F or 95.3°C.) The Teflon® guard is supplied with the high temperature complete assembly.
- Single phase standard; three phase available as an option.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer lengths available. Consult **Tempco.**

How to Order

K M H 1

Type: KMH1

Length (in.)

Hot Zone (in.)

Watts ÷ 100

Voltage
1 – 120
2 – 240
4 – 480

Phase: 1 or 3

Thermal Over-Temperature Protection

Thermal Fuse	**Bi-Metal Switch**
1L – Solutions up to 180°F	2L – Solutions up to 180°F
1M – Solutions from 180°F to 220°F	2M – Solutions from 180°F to 220°F

Conduit Length (in.)
36" standard

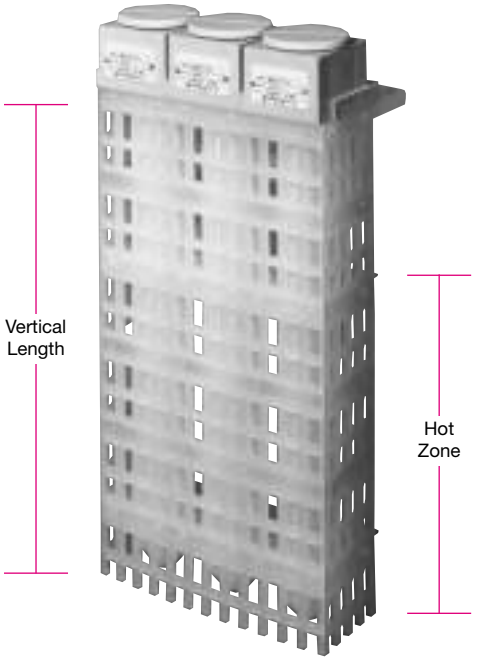
Style
C – Complete Assembly
H – Less Guard
E – Element Only
J – Tube Only

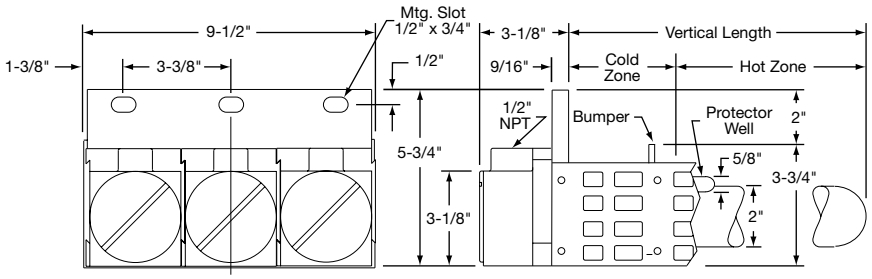
Use this reference number worksheet for constructing KMH1 **Quartz Immersion Heaters**. Choose the number or letter code that corresponds to your application needs for each worksheet category. When the order is placed a part number will be issued.

Standard Watts vs. Length and Hot Zone

Watts	Hot Zone in	Hot Zone mm	Length in	Length mm
500	6	152	10	254
1000	7	178	11	279
1000	7	178	17	432
2000	12	305	17	432
2000	12	305	23	584
3000	18	457	23	584
3000	18	457	29	737
3500	21	533	29	737
4000	28	711	35	889
4000	28	711	41	1041
5000	33	838	41	1041
5000	33	838	47	1194
6000	39	991	47	1194
6000	39	991	52	1321
8000	49	1245	59	1499
10000	62	1575	71	1803

Tank Immersion Heaters





Quartz Triple Tube Style

For plating tanks, pickling and other acidic aqueous solutions. Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

CAUTION Not for use in hydrofluoric acid or alkaline solutions.

Design Features

- 26 watts/in² (4.0 watts/cm²) for long service life.
- Heavy duty, long lasting construction.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Replaceable element(s) and quartz tube(s).
- Grounded for safety.
- UL listed, CSA certified.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Polypropylene guards (optional Teflon® guards recommended for chromic acid or solutions exceeding 200°F or 95.3°C.) The Teflon® guard is supplied with the high temperature complete assembly.
- Standard design consists of three individual single phase heaters, which can be wired delta in the field to achieve a three phase balanced operating system. Individual elements are field replaceable.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer lengths available. Consult **Tempco.**

How to Order

K M H 3

Type: KMH3

Length (in.)

Hot Zone (in.)

Voltage
1 – 120
2 – 240
4 – 480

Watts ÷ 100

Phase: 1

Thermal Over-Temperature Protection

Thermal Fuse	**Bi-Metal Switch**
1L – Solutions up to 180°F	2L – Solutions up to 180°F
1M – Solutions from 180°F to 220°F	2M – Solutions from 180°F to 220°F

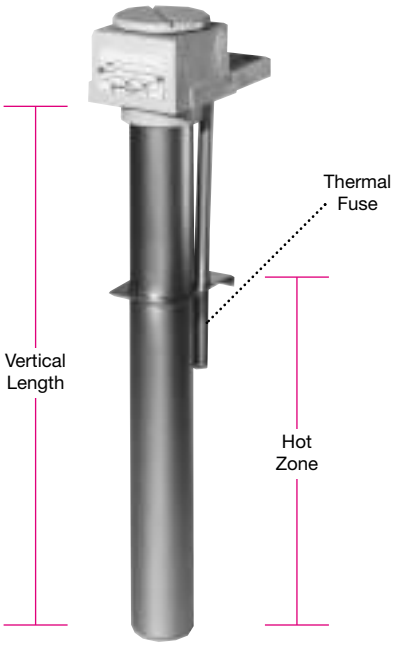
Conduit Length (in.)
36" standard

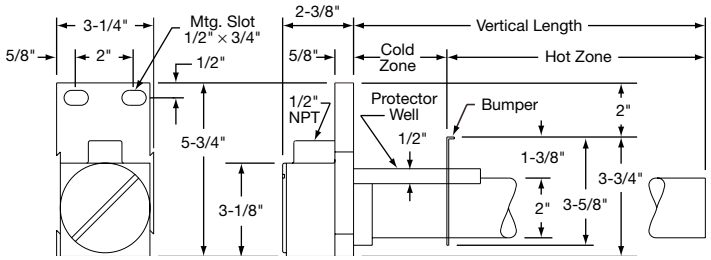
Style
C – Complete Assembly
H – Less Guard
E – Element Only
J – Tube Only

Use this reference number worksheet for constructing KMH3 **Quartz Immersion Heaters**. Choose the number or letter code that corresponds to your application needs for each worksheet category. When the order is placed a part number will be issued.

Standard Watts vs. Length and Hot Zone

Watts	Hot Zone in	Hot Zone mm	Length in	Length mm
1500	6	152	10	254
3000	7	178	11	279
3000	7	178	17	432
6000	12	305	17	432
6000	12	305	23	584
9000	18	457	23	584
9000	18	457	29	737
10500	21	533	29	737
12000	28	711	35	889
12000	28	711	41	1041
15000	33	838	41	1041
15000	33	838	47	1194
18000	39	991	47	1194
18000	39	991	52	1321
24000	49	1245	59	1499
30000	62	1575	71	1803





Metal Single Tube Style

For plating tanks, rinse tanks and other acidic aqueous solutions. Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Design Features

- 18 and 35 watts/in² (2.8 and 5.5 watts/cm²) for long service life.
- Heavy duty, long lasting construction.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded for safety.
- UL listed except Plain Steel; all CSA certified.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Single phase standard; three phase available as an option.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer lengths available. Consult **Tempco.**

How to Order

T M M 1

Type: TMM1

Length (in.)

Hot Zone (in.)

Material
A – Steel
B – 304 SS
C – 316 SS
T – Titanium

Watts ÷ 100

Voltage
1 – 120
2 – 240
4 – 480

Phase: 1 or 3

Thermal Over-Temperature Protection

Thermal Fuse
1L – Solutions up to 180°F
1M – Solutions from 180°F to 220°F
1H – Solutions from 220°F to 300°F

Bi-Metal Switch
2L – Solutions up to 180°F
2M – Solutions from 180°F to 220°F
2H – Solutions from 220°F to 300°F

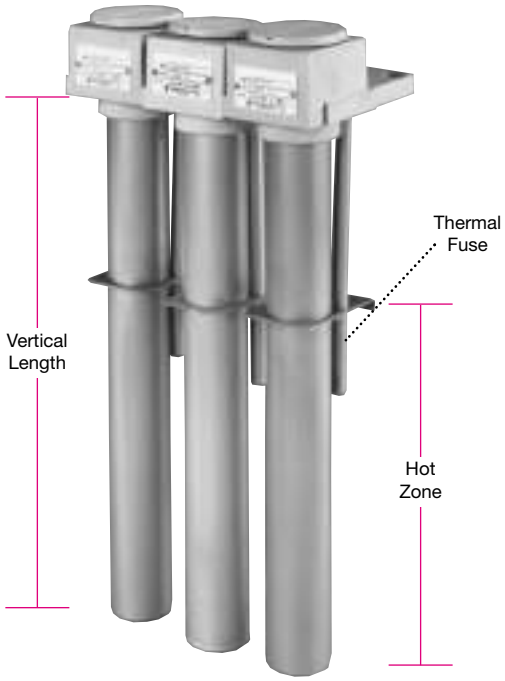
Conduit Length (in.)
36" standard

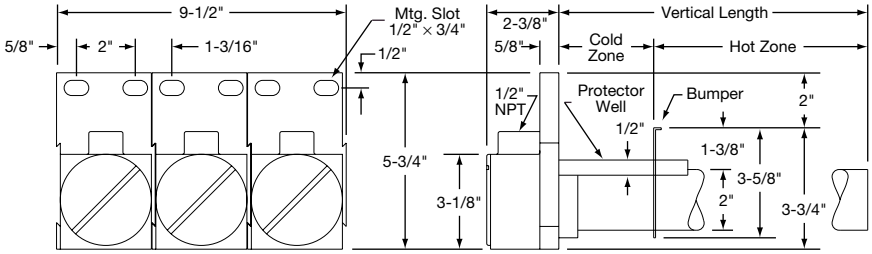
Use this reference number worksheet for constructing any style of **Single Tube Heater**. Choose the number or letter code that corresponds to your application needs for each worksheet category. When the order is placed a part number will be issued.

Standard Watts vs. Length and Hot Zone

Watts		Hot Zone		Length	
High	Low	in	mm	in	mm
1000	500	6	152	11	254
2000	1000	10	254	17	432
3000	1500	16	406	23	584
4000	2000	20	508	29	737
5000	2500	25	635	35	889
6000	3000	30	762	40	1016
8000	4000	37	940	47	1194
9000	4500	44	1118	54	1372
10000	5000	49	1245	59	1499
12000	6000	58	1473	68	1727

Tank Immersion Heaters





Metal Triple Tube Style

For plating tanks, phosphatizing and concentrated aqueous solutions. Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Design Features

- 18 and 35 watts/in² (2.8 and 5.5 watts/cm²) for long service life.
- Low watt density for extended service.
- Heavy duty, long lasting construction.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded for safety.
- UL listed except Plain Steel; all CSA certified.
- Vapor-tight polypropylene terminal enclosure with universal mounting bracket.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Standard design consists of three individual single phase heaters, which can be wired delta in the field to achieve a three-phase balanced operating system. Individual elements are field replaceable.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer lengths available. Consult **Tempco.**

How to Order

T M M 2

Type: TMM2

Length (in.)

Hot Zone (in.)

Material
A – Steel
B – 304 SS
C – 316 SS
T – Titanium

Watts ÷ 100

Voltage
1 – 120
2 – 240
4 – 480

Phase: 1

Thermal Over-Temperature Protection

Thermal Fuse
1L – Solutions up to 180°F
1M – Solutions from 180°F to 220°F
1H – Solutions from 220°F to 300°F

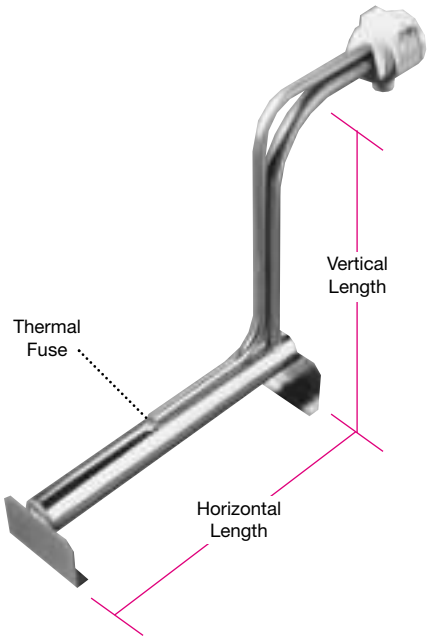
Bi-Metal Switch
2L – Solutions up to 180°F
2M – Solutions from 180°F to 220°F
2H – Solutions from 220°F to 300°F

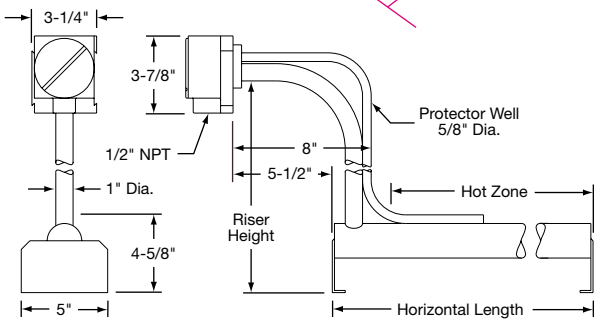
Conduit Length (in.)
36" standard

Use this reference number worksheet for constructing any style of **Triple Tube Heater**. Choose the number or letter code that corresponds to your application needs for each worksheet category. When the order is placed a part number will be issued.

Standard Watts vs. Length and Hot Zone

Watts		Hot Zone		Length	
High	Low	in	mm	in	mm
3000	1500	6	152	11	254
6000	3000	10	254	17	432
9000	4500	16	406	23	584
12000	6000	20	508	29	737
15000	7500	25	635	35	889
18000	9000	30	762	40	1016
24000	12000	37	940	47	1194
27000	13500	44	1118	54	1372
30000	15000	49	1245	59	1499
36000	18000	58	1473	68	1727





Metal Single Tube L-Shaped

For plating tanks, rinse tanks and other non-sludging aqueous solutions. Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Design Features

- 35 watts/in² (5.5 watts/cm²) for long service life.
- Bottom mount design for even heating and varying solution levels.
- Standard 2" sludge legs (longer available).
- Heavy duty, long lasting construction.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded for safety.
- UL listed except Plain Steel; all CSA certified.
- Vapor-tight polypropylene terminal enclosure.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Single phase standard; three phase available as an option.
- 120, 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.

How to Order

T M M 3

Type: TMM3

Vertical Length (in.)

Hot Zone (in.) Horizontal

Material
A – Steel
B – 304 SS
C – 316 SS
T – Titanium

Watts ÷ 100

Voltage
1 – 120
2 – 240
4 – 480

Phase: 1 or 3

Thermal Over-Temperature Protection

Thermal Fuse
1L – Solutions up to 180°F
1M – Solutions from 180°F to 220°F
1H – Solutions from 220°F to 300°F

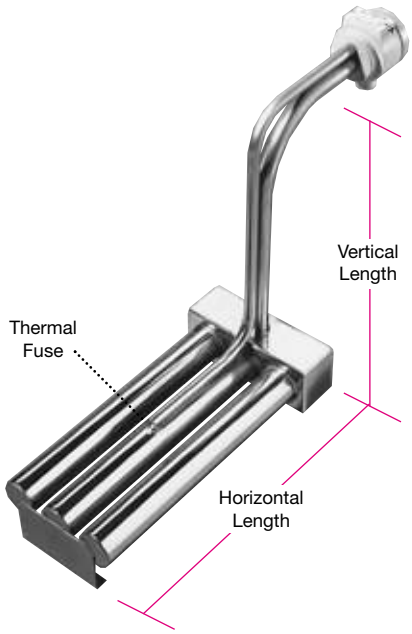
Bi-Metal Switch
2L – Solutions up to 180°F
2M – Solutions from 180°F to 220°F
2H – Solutions from 220°F to 300°F

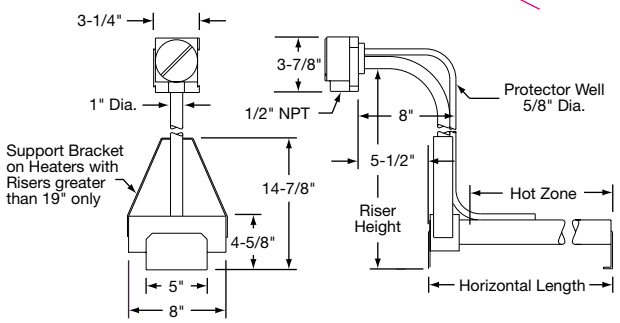
Conduit Length (in.)
36" standard

Use this reference number worksheet for constructing any style of **Single Tube L-Shaped Heater**. Choose the number or letter code that corresponds to your application needs for each worksheet category. When the order is placed a part number will be issued.

Standard Watts vs. Length

Watts	H. Length in	H. Length mm	V. Length in	V. Length mm
1000	13	330	15	381
2000	17	432	19	483
3000	22	559	25	635
4000	26	660	25	635
5000	31	787	37	940
6000	36	914	50	1270
8000	44	1118	50	1270
9000	50	1270	50	1270
10000	55	1397	50	1270
12000	64	1626	50	1270





Metal Triple Tube L-Shaped

For plating tanks, rinse tanks and other non-sludging aqueous solutions. Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Design Features

- 35 watts/in^2 (5.5 watts/cm^2) for long service life.
- Bottom mount design for even heating and varying solution levels.
- Standard 2" sludge legs (longer available).
- Heavy duty, long lasting construction.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded for safety.
- UL listed except Plain Steel; all CSA certified.
- Vapor-tight polypropylene terminal enclosure.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Three phase standard; single phase available as option.
- 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.

How to Order

T M M 4

Type: TMM4

Vertical Length (in.)

Hot Zone (in.) Horizontal

Material
A – Steel
B – 304 SS
C – 316 SS
T – Titanium

Watts ÷ 100

Voltage
1 – 120
2 – 240
4 – 480

Phase: 1 or 3

Thermal Over-Temperature Protection

Thermal Fuse
1L – Solutions up to 180°F
1M – Solutions from 180°F to 220°F
1H – Solutions from 220°F to 300°F

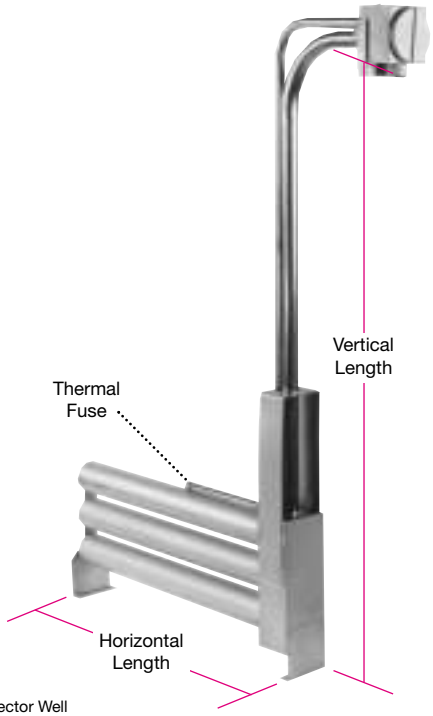
Bi-Metal Switch
2L – Solutions up to 180°F
2M – Solutions from 180°F to 220°F
2H – Solutions from 220°F to 300°F

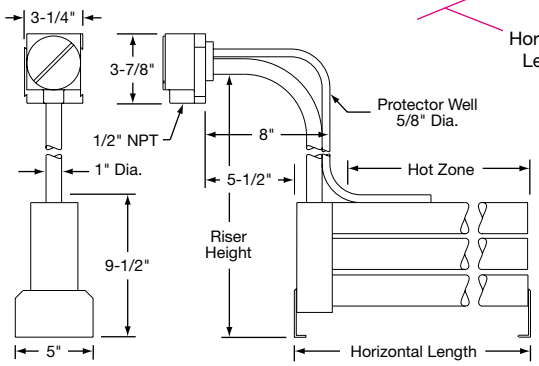
Conduit Length (in.)
36" standard

Use this reference number worksheet for constructing any style of **Triple Tube L-Shaped Heater**. Choose the number or letter code that corresponds to your application needs for each worksheet category. When the order is placed a part number will be issued.

Standard Watts vs. Length

Watts	H. Length in	H. Length mm	V. Length in	V. Length mm
3000	13	330	15	381
6000	17	432	37	940
9000	22	559	37	940
12000	26	660	37	940
15000	31	787	37	940
18000	36	914	50	1270
24000	44	1118	50	1270
27000	50	1270	50	1270
30000	55	1397	50	1270
36000	64	1626	50	1270





Triple Tube Vertical Stack L-Shape

For plating tanks, rinse tanks and other non-sludging aqueous solutions. Check recommendation guide on pages 11-74 and 11-75 and with chemical supplier for proper sheath material selection.

Design Features

- 35 watts/in² (5.5 watts/cm²) for long service life.
- Space saving vertical configuration.
- Bottom mount design for even heating and varying solution levels.
- Standard 2" sludge legs (longer available).
- Heavy duty, long lasting construction.
- T1 thermal fuse protection standard. T2 bi-metal switch optional.
- Grounded for safety.
- Vapor-tight polypropylene terminal enclosure.
- Standard 3 ft. flexible PVC liquid-tight conduit.
- Three phase standard; single phase available as option.
- 240, 480 volts standard as listed—other voltages available.
- Longer and shorter vertical lengths available. Consult **Tempco**.

How to Order

T M M 5 _ _ _ _ _ _ _ _ _

Type: TMM5

Vertical Length (in.)

Hot Zone (in.) Horizontal

Material
A – Steel
B – 304 SS
C – 316 SS
T – Titanium

Watts ÷ 100

Voltage
1 – 120
2 – 240
4 – 480

Phase: 1 or 3

Thermal Over-Temperature Protection

Thermal Fuse
1L – Solutions up to 180°F
1M – Solutions from 180°F to 220°F
1H – Solutions from 220°F to 300°F

Bi-Metal Switch
2L – Solutions up to 180°F
2M – Solutions from 180°F to 220°F
2H – Solutions from 220°F to 300°F

Conduit Length (in.)
36" standard

Use this reference number worksheet for constructing any style of **Triple Tube Vertical Stack L-Shaped Heater**. Choose the number or letter code that corresponds to your application needs for each worksheet category. When the order is placed a part number will be issued.

Standard Watts vs. Length

Watts	Hot Zone in	Hot Zone mm	V. Length in	V. Length mm
3000	13	330	19	483
6000	17	432	37	940
9000	22	559	37	940
12000	26	660	37	940
15000	31	787	37	940
18000	36	914	50	1270
24000	44	1118	50	1270
27000	50	1270	50	1270
30000	55	1397	50	1270
36000	64	1626	50	1270