SMART ONE

by PROCESS TECHNOLOGY

PTC Electric Immersion Heaters

SMART ONE® by PROCESS TECHNOLOGY

State of the Art SMART

Process Technology proudly introduces the latest in innovative heating technology - the SmartOne® self-limiting PTC electric immersion heater. With this technology, thermal overtemperature protectors are no longer required to ensure safe operation. SmartOne® heaters are more dependable with extended service life and will not burn out in air, scale or sludge like traditional resistance heaters.

As the trusted industry leader for nearly 35 years, Process Technology continues its precedent-setting tradition of providing the highest quality wet process heating and cooling equipment.

SmartOne® - the new international standard in process heating.

SmartOne® PTC Electric Immersion Heaters - State of the Art Smart

PTC Element Technology

SmartOne heaters utilize Positive Temperature Coefficient (PTC) semiconductors as the heating element. Unlike traditional heating elements, they are SELF-LIMITING. As PTC elements heat up, their resistance to electrical current increases. You may already be familiar with PTC technology as it is used in hair dryers, curling irons, and car seat heaters.

Features and Benefits

Increased Safety

- SmartOne heaters can only reach a set maximum sheath temperature which is below the ignition point of most combustible materials (such as plastic tanks, see chart below).
- Unlike traditional immersion heaters with external thermal protectors, the safety of thermal protection is built *into* the design of the PTC chips. Therefore, it is impossible to bypass thermal protection.

Longer Lasting

- SmartOne heaters are not affected by low solution level conditions, scaling solutions, or sludge buildup.
- Unlike traditional heaters, SmartOne heaters limit their heat output so they will not overheat or burn out.

Versatility

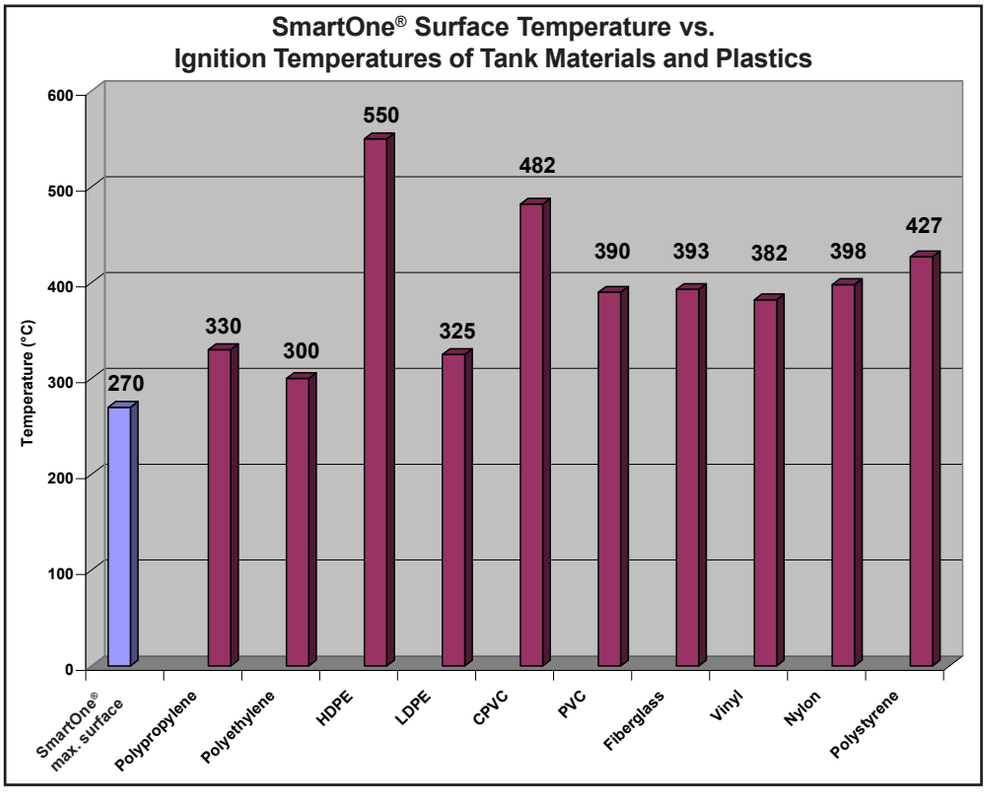
- Three voltage ranges are available: 100-120 volts, 200-240 volts, and 380-480 volts.
- The need for derated heaters for viscous solutions is eliminated because SmartOne heaters internally regulate heat output to match the environment.
- Available in 304 stainless steel, 316 stainless steel and titanium.

Easy Installation & Maintenance

- No external thermal protection device required.
- No additional wiring needed for thermal protection devices.
- No equipment downtime due to thermal protection maintenance.

Notes:

1. *Temperature control is required to regulate process temperature.*
2. *Liquid level shut-off device recommended.*
3. *As with any heater, periodic cleaning is recommended. Scale and sludge can increase the rate of chemical corrosion on the heater sheath.*



7010 Lindsay Dr. • Mentor, OH 44060 U.S.A. • **US/CN: 800-621-1998** • 440-974-1300 • Fax: 440-974-9561
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SmartOne® Heater Solution Guide

SOLUTION	TYPE OF HEATER
Alkaline Cleaners (Electrified)	304 Stainless Steel
Alkaline Soaking Cleaners	304 Stainless Steel
Alodine (most formulas)	316 Stainless Steel
Alstan	304 Stainless Steel
Aluminum Cleaners	***304 Stainless Steel***
Aluminum Sulfate	304 Stainless Steel
Ammonia	304 Stainless Steel
Ammonium Chloride	Titanium
Ammonium Nitrate	316 Stainless Steel
Arsenic	304 Stainless Steel
Barium Chloride	Titanium
Benzoic Acid	Titanium
Black Oxide (Low-Temp)	Titanium
Bonderizing	***316 Stainless Steel***
Boric Acid	Titanium
Brass Cyanide	304 Stainless Steel
Bright Copper Cyanide	304 Stainless Steel
Bronze (Alkaline)	304 Stainless Steel
Brown Oxide	Titanium
Butyric Acid	Titanium
Cadmium (Alkaline)	304 Stainless Steel
Calcium Chloride	Titanium
Calcium Hypochlorite	Titanium
Carbonic Acid	Titanium
Caustic Etch	***304 Stainless Steel***
Caustics	304 Stainless Steel
Caustics (highly concentrated 20% and over)	***304 Stainless Steel***
Chloride	Titanium
Chlorosulfuric Acid	Titanium
Chromium (No Fluorides)	Titanium
Citric Acid	Titanium
Cobalt Nickel	Titanium
Cobalt Plating	304 Stainless Steel
Copper Cyanide	304 Stainless Steel
Copper Pyrophosphate	304 Stainless Steel
Copper Strike	304 Stainless Steel
Cyanide	304 Stainless Steel
Deionized Water	316 Stainless Steel or Titanium
Deoxidizer Non-Chromated	316 Stainless Steel
Dichromic Seal	304 Stainless Steel
Diethylene Glycol	304 Stainless Steel
Dow Therm	***316 Stainless Steel***
Dye Solutions	304 Stainless Steel
Ebonal C	Titanium
Electroless Nickel	***Titanium***
Electroless Tin (Alkaline)	316 Stainless Steel
Electro Cleaner	304 Stainless Steel
Ethylene Glycol	***316 Stainless Steel***
Ferric Ammonium Oxide	316 Stainless Steel
Ferric Chloride	Titanium
Ferric Nitrate	304 Stainless Steel
Ferric Sulfate	304 Stainless Steel
Formic Acid	316 Stainless Steel

SOLUTION	TYPE OF HEATER
Glycerol	***304 Stainless Steel***
Immersion Gold	304 Stainless Steel
Gold-Acid	Titanium
Gold Cyanide	304 Stainless Steel
Grey Nickel	Titanium
Hot Seal Dichromate	316 Stainless Steel
Iridite (4-75,4-73,14,14-2,14-9)	316 Stainless Steel
Iron Phosphate	***316 Stainless Steel***
Isoprep (186,187,188)	316 Stainless Steel
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***
Manganese Phosphate	***316 Stainless Steel***
Mercuric Chloride	Titanium
Nickel (Plating Solution) (Watts)	Titanium
Nickel Acetate Seal	316 Stainless Steel
Nickel Chloride	Titanium
Oil	***304 Stainless Steel***
Paint Stripper (Alkaline)	***304 Stainless Steel***
Perchlorethylene	***316 Stainless Steel***
Phosphate Cleaner	***304 Stainless Steel***
Phosphate	***316 Stainless Steel***
Potassium Cyanide	304 Stainless Steel
Potassium Hydroxide	304 Stainless Steel
Potassium Permanganate	***Titanium***
Rochelle Salt Cyanide	304 Stainless Steel
Sea Water	Titanium
Silver Bromide	316 Stainless Steel
Silver Cyanide	304 Stainless Steel
Silver Lume	304 Stainless Steel
Silver Nitrate	316 Stainless Steel
Sodium Carbonate	Titanium
Sodium Chlorate	Titanium
Sodium Chloride	Titanium
Sodium Cyanide	304 Stainless Steel
Sodium Dichromate (Hot Seal)	316 Stainless Steel
Sodium Hydroxide	316 Stainless Steel
Stannate	304 Stainless Steel
Sulfamate Nickel	Titanium
Tannic Acid	Titanium
Tin Plating (Alkaline)	304 Stainless Steel
Trichlorethylene	316 Stainless Steel
Turco (4181, 4338)	316 Stainless Steel
Water	316 Stainless Steel
Wood's Nickel Strike	Titanium
Zinc Acid	Titanium
Zinc Ammonium Chloride	Titanium
Zinc Cyanide	304 Stainless Steel
Zinc Phosphate	***316 Stainless Steel***
Zincate	304 Stainless Steel

Solutions in which the SmartOne® derates itself in the application are indicated by bold, italicized red type - contact factory for sizing assistance.

THE DATA LISTED IS PROVIDED GRATIS 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. PROCESS TECHNOLOGY ASSUMES NO OBLIGATION OR LIABILITY FOR ANY ADVICE FURNISHED BY IT OR FOR RESULTS OBTAINED FROM 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.

PLEASE ENSURE 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.
- High pressures.
- Vacuum conditions.

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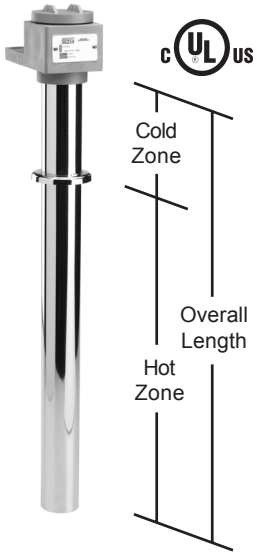

S1 SERIES, METAL OVER-THE-SIDE HEATERS

WATTS	VOLTS	HOT ZONE In./(mm)	OVERALL LENGTH In./(mm)	304 STAINLESS MODEL NUMBER	316 STAINLESS MODEL NUMBER	TITANIUM MODEL NUMBER	SHIP WEIGHT Lbs./(kg)
1000	100-120	7	11	S1F1111	S1S1111	S1T1111	7
	200-240	(178)	(279)	S1F1211	S1S1211	S1T1211	(3.2)
2000	100-120	13	17	S1F2117	S1S2117	S1T2117	10
	200-240	(330)	(432)	S1F2217	S1S2217	S1T2217	(4.5)
3000	200-240	18 (457)	23 (584)	S1F3223	S1S3223	S1T3223	11 (5)
4000	200-240	24 (610)	29 (737)	S1F4229	S1S4229	S1T4229	13 (5.9)
5000	200-240	30 (762)	35 (889)	S1F5235	S1S5235	S1T5235	15 (6.8)
6000	200-240	35 (889)	41 (1041)	S1F6241	S1S6241	S1T6241	17 (7.7)
1600	380-480	13 (330)	17 (432)	S1F1.6417	S1S1.6417	S1T1.6417	10 (4.5)
2400	380-480	18 (457)	23 (584)	S1F2.4423	S1S2.4423	S1T2.4423	11 (5)
3200	380-480	24 (610)	29 (737)	S1F3.2429	S1S3.2429	S1T3.2429	13 (5.9)
4000	380-480	30 (762)	35 (889)	S1F4435	S1S4435	S1T4435	15 (6.8)
4800	380-480	35 (889)	41 (1041)	S1F4.8441	S1S4.8441	S1T4.8441	17 (7.7)
5600	380-480	41 (1041)	47 (1194)	S1F5.6447	S1S5.6447	S1T5.6447	23 (10.4)

Single phase standard, add -3 for three phase.

Product Features and Benefits:

LONG LIFE ELEMENT:
- Patented PTC heater element lasts longer than conventional heaters.
- Will not burn out if run in air.
- Will not burn out due to scale or sludge buildup.

SAFE DESIGN:
- Heater self limits its maximum operating temperature to 482°F (250°C). This is lower than the ignition point of most plastics.
- Will not melt tanks when a ½" (12mm) minimum distance is maintained.
- Overtemperature protection devices are not required.
- Safety is built-in, not added on.
- Metal-grounded construction (earth ground).
- Non-floating construction.

SIZES: 1,000 watts (1kW) to 6,000 watts (6kW).

VOLTAGES:
- Three voltage ranges available: 100-120 volt, 200-240 volt, and 380-480 volt.
- Heater is available in single or three phase power.

CORROSION RESISTANT HEADS: Vapor resistant, flame retardant polypropylene terminal enclosures each with 3-foot (.9m) flexible PVC liquid tight conduits.

OUTSTANDING PERFORMANCE:
- Watt densities of 26 watts per square inch (4 watts/cm^2) ensure long service life.
- Auto-stabilizing solid state element prevents hot spots and ensures uniform heating.
- Heater derates itself in highly viscous and high temperature solutions. Consult factory for sizing assistance.

CHEMICALLY RESISTANT: For use in most aqueous alkaline, electroplating and rinse solutions. Check our Solution Guide or with your chemical supplier for recommended sheath material. Available in:
- 304 stainless steel
- 316 stainless steel
- Titanium

CERTIFICATIONS: cULus and CE.

OPTIONS (consult factory):
- Longer wire and conduit lengths.
- Extended cold zones.
- Temperature controls and level controls sized to match the heater.

NOTE: Should be installed with C or D rated branch fusing.

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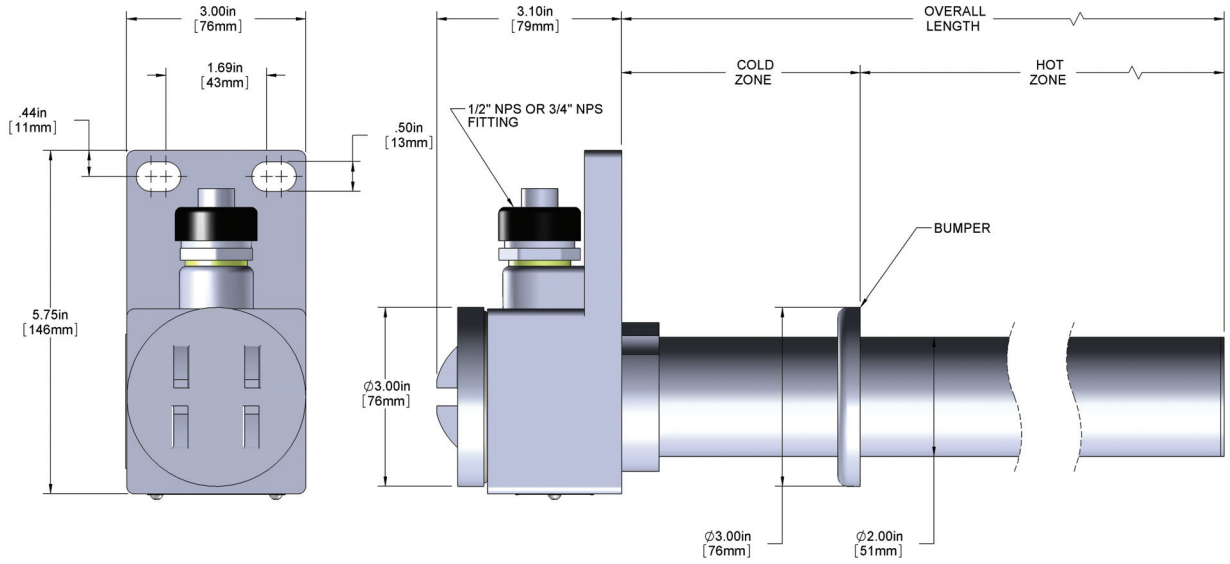
DIMENSIONS



SINGLE TUBE METAL OVER THE SIDE HEATER ORDERING INFORMATION

Series	Wattage	Voltage	Overall Length	Phase Options	Wire and Conduit Length
S1F = 304 stainless steel S1S = 316 stainless steel S1T = titanium	***100-240V:*** 1 = 1000 2 = 2000 3 = 3000 4 = 4000 6 = 6000 ***380-480V:*** 1.6 = 1600 2.4 = 2400 3.2 = 3200 4 = 4000 4.8 = 4800 5.6 = 5600	1 = 100-120 2 = 200-240 4 = 380-480	***100-240V:*** 11 = 1kW 17 = 2kW 23 = 3kW 29 = 4kW 35 = 5kW 41 = 6kW ***380-480V:*** 17 = 1.6kW 23 = 2.4kW 29 = 3.2kW 35 = 4kW 41 = 4.8kW 47 = 5.6kW (custom lengths available)	no designator = single phase -3 = three phase	no designator = 36" (1m) length standard specify variations from standard Ex: -X240 = 240" (6m)

U.S. and International Patents

ORDERING EXAMPLE:

S1T3.2429

Single tube titanium over-the-side, 3200 watts, 380-480 volt, 29” overall length, 36” wire and conduit

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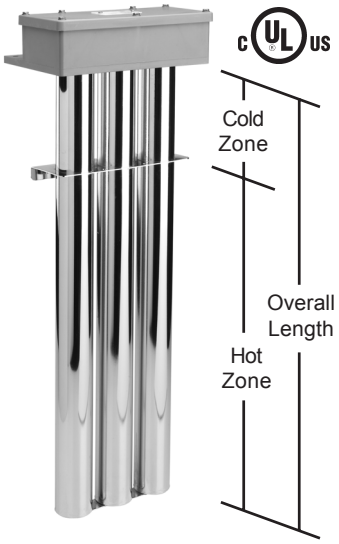

S13 SERIES, TRIPLE METAL OVER-THE-SIDE HEATERS

WATTS	VOLTS	HOT ZONE In./(mm)	OVERALL LENGTH In./(mm)	304 STAINLESS MODEL NUMBER	316 STAINLESS MODEL NUMBER	TITANIUM MODEL NUMBER	SHIP WEIGHT Lbs./(kg)
3000	200-240	7 (178)	11 (279)	S13F3211	S13S3211	S13T3211	21 (9.5)
6000	200-240	13 (330)	17 (432)	S13F6217	S13S6217	S13T6217	30 (13.6)
9000	200-240	18 (457)	23 (584)	S13F9223	S13S9223	S13T9223	33 (15)
12000	200-240	24 (610)	29 (737)	S13F12229	S13S12229	S13T12229	39 (17.7)
15000	200-240	30 (762)	35 (889)	S13F15235	S13S15235	S13T15235	45 (20.4)
18000	200-240	35 (889)	41 (1041)	S13F18241	S13S18241	S13T18241	51 (23.1)
2400	380-480	7 (178)	11 (279)	S13F2.4411	S13S2.4411	S13T2.4411	21 (9.5)
4800	380-480	13 (330)	17 (432)	S13F4.8417	S13S4.8417	S13T4.8417	30 (13.6)
7200	380-480	18 (457)	23 (584)	S13F7.2423	S13S7.2423	S13T7.2423	33 (15)
9600	380-480	24 (610)	29 (737)	S13F9.6429	S13S9.6429	S13T9.6429	39 (17.7)
12000	380-480	30 (762)	35 (889)	S13F12435	S13S12435	S13T12435	45 (20.4)
14400	380-480	35 (889)	41 (1041)	S13F14.4441	S13S14.4441	S13T14.4441	51 (23.1)
16800	380-480	41 (1041)	47 (1194)	S13F16.8447	S13S16.8447	S13T16.8447	70 (31.8)

Three phase standard, insert "-1" for single phase.

Product Features and Benefits:

LONG LIFE ELEMENT:
- Patented PTC heater element lasts longer than conventional heaters.
- Will not burn out if run in air.
- Will not burn out due to scale or sludge buildup.

SAFE DESIGN:
- Heater self limits its maximum operating temperature to 482°F (250°C). This is lower than the ignition point of most plastics.
- Will not melt tanks when a ½" (12mm) minimum distance is maintained.
- Overtemperature protection devices are not required.
- Safety is built-in, not added on.
- Metal-grounded construction (earth ground).
- Non-floating construction.

SIZES: 2,400 watts (2.4kW) to 18,000 watts (18kW).

VOLTAGES:
- Three voltage ranges available: 100-120 volt, 200-240 volt, and 380-480 volt.
- Heater is available in single or three phase power.

CORROSION RESISTANT HEADS: Vapor resistant, flame retardant polypropylene terminal enclosures each with 3-foot (.9m) flexible PVC liquid tight conduits.

OUTSTANDING PERFORMANCE:
- Watt densities of 26 watts per square inch (4 watts/cm^2) ensure long service life.
- Auto-stabilizing solid state element prevents hot spots and ensures uniform heating.
- Heater derates itself in highly viscous and high temperature solutions. Consult factory for sizing assistance.

CHEMICALLY RESISTANT: For use in most aqueous alkaline, electroplating and rinse solutions. Check our Solution Guide or with your chemical supplier for recommended sheath material. Available in:
- 304 stainless steel
- 316 stainless steel
- Titanium

CERTIFICATIONS: cULus and CE.

OPTIONS (consult factory):
- Individual, single element heaters each with its own junction box and wire and conduit.
- Longer electrical wire and conduit lengths.
- Extended cold zones.
- Temperature controls and level controls sized to match the heater.

NOTE: Should be installed with C or D rated branch fusing.

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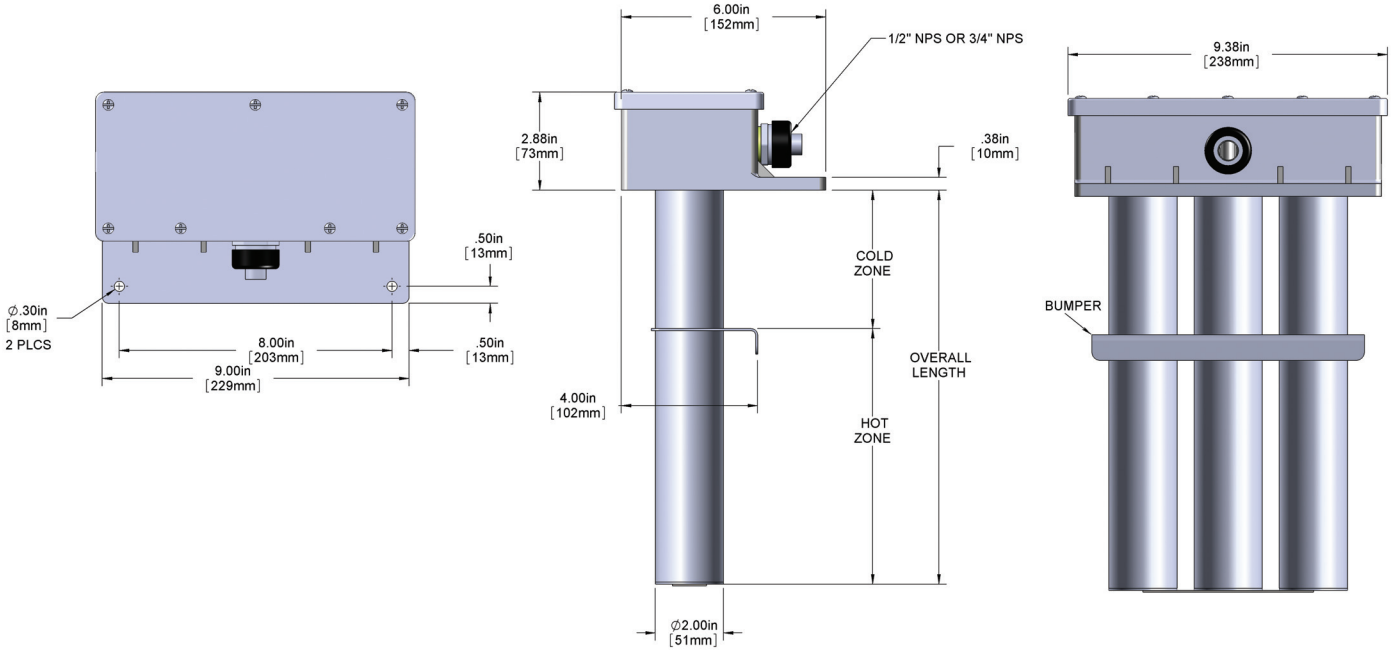
DIMENSIONS



TRIPLE TUBE METAL OVER THE SIDE HEATER ORDERING INFORMATION

Series	Wattage	Voltage	Overall Length	Phase Options	Wire and Conduit Length
S13F = 304 stainless steel S13S = 316 stainless steel S13T = titanium	***100-240V:*** 3 = 3000 6 = 6000 9 = 9000 12 = 12000 15 = 15000 18 = 18000 ***380-480V:*** 2.4 = 2400 4.8 = 4800 7.2 = 7200 9.6 = 9600 12 = 12,000 14.4 = 14,400 16.8 = 16,800	1 = 100-120 2 = 200-240 4 = 380-480	***100-240V:*** 11 = 3kW 17 = 6kW 23 = 9kW 29 = 12kW 35 = 15kW 41 = 18kW ***380-480V:*** 11 = 2.4kW 17 = 4.8kW 23 = 7.2kW 29 = 9.6kW 35 = 12kW 41 = 14.4kW 47 = 16.8kW (custom lengths available)	no designator = three phase -1 = single phase	no designator = 36" (1m) length standard specify variations from standard Ex: -X240 = 240" (6m)

U.S. and International Patents

ORDERING EXAMPLE:

S13T9.6429

Triple tube titanium over-the-side, 9600 watts, 380-480 volt, 29” overall length, 36” wire and conduit

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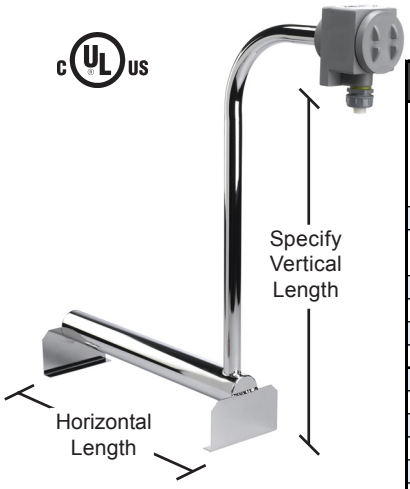

S1L SERIES, METAL BOTTOM HEATERS

WATTS	VOLTS	HORI-ZONTAL LENGTH In./(mm)	VER-TICAL LENGTH In./(mm)	304 STAINLESS MODEL NUMBER	316 STAINLESS MODEL NUMBER	TITANIUM MODEL NUMBER	SHIP WEIGHT Lbs./(kg)
1000	100-120	13 (330)	15 (381)	S1LF1113-R**	S1LS1113-R**	S1LT1113-R**	10 (4.5)
2000	100-120 200-240	17 (432)	19 (483)	S1LF2117-R** S1LF2217-R**	S1LS2117-R** S1LS2217-R**	S1LT2117-R** S1LT2217-R**	11 (5)
3000	200-240	23 (584)	25 (635)	S1LF3223-R**	S1LS3223-R**	S1LT3223-R**	12 (5.4)
4000	200-240	29 (737)	25 (635)	S1LF4229-R**	S1LS4229-R**	S1LT4229-R**	13 (5.9)
5000	200-240	35 (889)	37 (940)	S1LF5235-R**	S1LS5235-R**	S1LT5235-R**	14 (6.4)
6000	200-240	41 (1041)	50 (1270)	S1LF6241-R**	S1LS6241-R**	S1LT6241-R**	15 (6.8)
1600	380-480	17 (432)	19 (483)	S1LF1.6417-R**	S1LS1.6417-R**	S1LT1.6417-R**	11 (5)
2400	380-480	23 (584)	25 (635)	S1LF2.4423-R**	S1LS2.4423-R**	S1LT2.4423-R**	12 (5.4)
3200	380-480	29 (737)	25 (635)	S1LF3.2429-R**	S1LS3.2429-R**	S1LT3.2429-R**	13 (5.9)
4000	380-480	35 (889)	37 (940)	S1LF4435-R**	S1LS4435-R**	S1LT4435-R**	14 (6.4)
4800	380-480	41 (1041)	50 (1270)	S1LF4.8441-R**	S1LS4.8441-R**	S1LT4.8441-R**	15 (6.8)
5600	380-480	47 (1194)	50 (1270)	S1LF5.6447-R**	S1LS5.6447-R**	S1LT5.6447-R**	18 (8.2)

Single phase standard, insert "-3" for three phase before riser designator.
** Specify riser length.

Product Features and Benefits:

LONG LIFE ELEMENT:
- Patented PTC heater element lasts longer than conventional heaters.
- Will not burn out if run in air.
- Will not burn out due to scale or sludge buildup.

SAFE DESIGN:
- Heater self limits its maximum operating temperature to 482°F (250°C). This is lower than the ignition point of most plastics.
- 1" (25mm) sludge legs. Will not melt tanks when a ½" (12mm) minimum distance is maintained.
- Overtemperature protection devices are not required.
- Safety is built-in, not added on.
- Metal-grounded construction (earth ground).
- Non-floating construction.

SIZES: 1,000 watts (1kW) to 6,000 watts (6kW).

VOLTAGES:
- Three voltage ranges available: 100-120 volt, 200-240 volt, and 380-480 volt.
- Heater is available in single or three phase power.

CORROSION RESISTANT HEADS: Vapor resistant, flame retardant polypropylene terminal enclosures each with 3-foot (.9m) flexible PVC liquid tight conduits.

OUTSTANDING PERFORMANCE:
- Watt densities of 26 watts per square inch (4 watts/cm^2) ensure long service life.
- Auto-stabilizing solid state element prevents hot spots and ensures uniform heating.
- Heater derates itself in highly viscous and high temperature solutions. Consult factory for sizing assistance.

CHEMICALLY RESISTANT: For use in most aqueous alkaline, electroplating and rinse solutions. Check our Solution Guide or with your chemical supplier for recommended sheath material. Available in:
- 304 stainless steel
- 316 stainless steel
- Titanium

CERTIFICATIONS: cULus and CE.

OPTIONS (consult factory):
- Longer wire and conduit lengths.
- Temperature controls and level controls sized to match the heater.

NOTE: Should be installed with C or D rated branch fusing.

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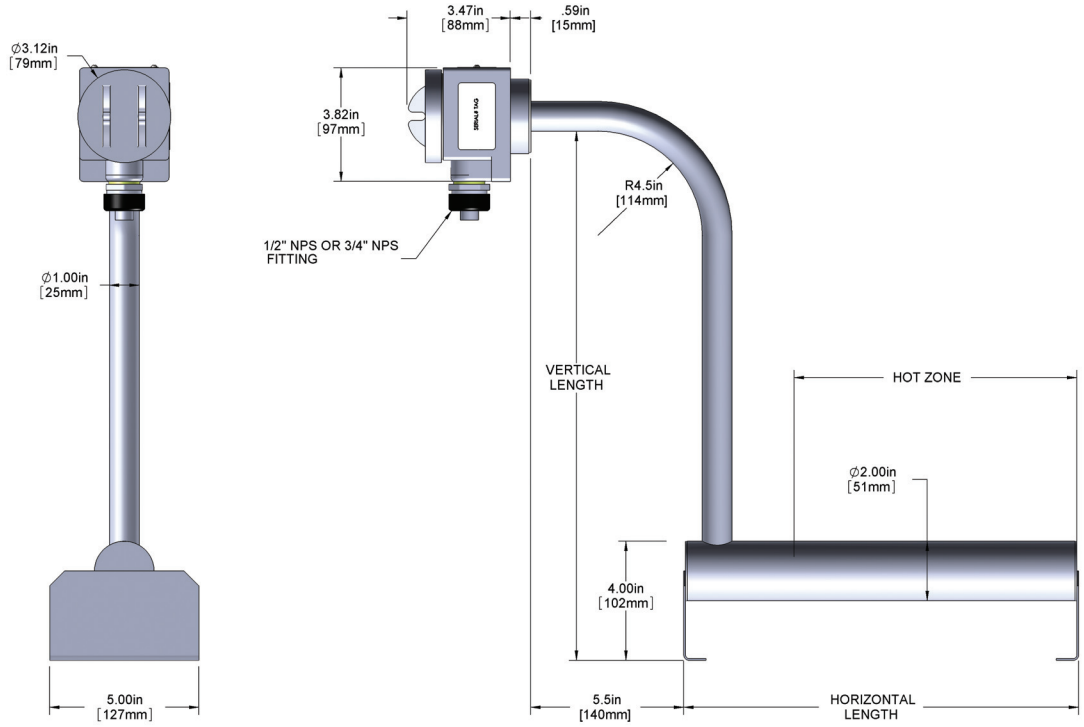
DIMENSIONS



SINGLE TUBE METAL BOTTOM HEATER ORDERING INFORMATION

Series	Wattage	Voltage	Horizontal Length	Vertical Length	Phase Options	Riser Options	Wire and Conduit Length
S1LF = 304 stainless steel S1LS = 316 stainless steel S1LT = titanium	***100-240V:*** 1 = 1000 2 = 2000 3 = 3000 4 = 4000 6 = 6000 ***380-480V:*** 1.6 = 1600 2.4 = 2400 3.2 = 3200 4 = 4000 4.8 = 4800 5.6 = 5600	1 = 100-120 2 = 200-240 4 = 380-480	***100-240V:*** 13 = 1kW 17 = 2kW 23 = 3kW 29 = 4kW 35 = 5kW 41 = 6kW ***380-480V:*** 17 = 1.6kW 23 = 2.4kW 29 = 3.2kW 35 = 4kW 41 = 4.8kW 47 = 5.6kW	***100-240V:*** -R15 = 1kW -R19 = 2kW -R25 = 3kW -R25 = 4kW -R37 = 5kW -R50 = 6kW ***380-480V:*** -R19 = 1.6kW -R25 = 2.4kW -R25 = 3.2kW -R37 = 4kW -R50 = 4.8kW -R50 = 5.6kW (custom lengths available)	no designator = single phase -3 = three phase no designator = 90° horizontal bend (standard) -S = straight riser no designator = 36" (1m) length standard specify variations from standard Ex: -X240 = 240" (6m)		

U.S. and International Patents

ORDERING EXAMPLE:

S1LT3.2429-R25

Single tube titanium bottom, 3200 watts, 380-480 volt, 29” horizontal length, 25” riser, 36” wire and conduit

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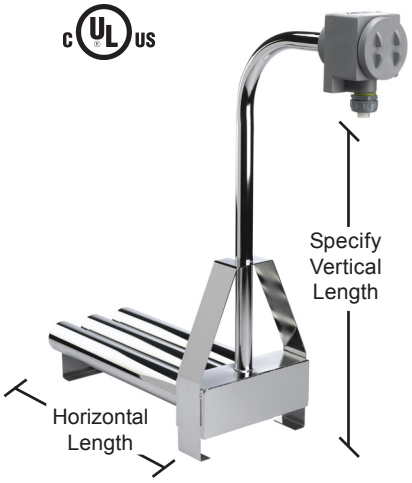

S13L SERIES, TRIPLE METAL BOTTOM HEATERS

WATTS	VOLTS	HORI-ZONTAL LENGTH In./(mm)	VER-TICAL LENGTH In./(mm)	304 STAINLESS MODEL NUMBER	316 STAINLESS MODEL NUMBER	TITANIUM MODEL NUMBER	SHIP WEIGHT Lbs./(kg)
3000	200-240	13 (330)	15 (381)	S13LF3213-R**	S13LS3213-R**	S13LT3213-R**	30 (13.6)
6000	200-240	17 (432)	37 (940)	S13LF6217-R**	S13LS6217-R**	S13LT6217-R**	33 (15)
9000	200-240	23 (584)	37 (940)	S13LF9223-R**	S13LS9223-R**	S13LT9223-R**	36 (16.3)
12000	200-240	29 (737)	37 (940)	S13LF12229-R**	S13LS12229-R**	S13LT12229-R**	39 (17.7)
15000	200-240	35 (889)	37 (940)	S13LF15235-R**	S13LS15235-R**	S13LT15235-R**	42 (19)
18000	200-240	41 (1041)	50 (1270)	S13LF18241-R**	S13LS18241-R**	S13LT18241-R**	45 (20.4)
2400	380-480	13 (330)	15 (381)	S13LF2.4413-R**	S13LS2.4413-R**	S13LT2.4413-R**	30 (13.6)
4800	380-480	17 (432)	37 (940)	S13LF4.8417-R**	S13LS4.8417-R**	S13LT4.8417-R**	33 (15)
7200	380-480	23 (584)	37 (940)	S13LF7.2423-R**	S13LS7.2423-R**	S13LT7.2423-R**	36 (16.3)
9600	380-480	29 (737)	37 (940)	S13LF9.6429-R**	S13LS9.6429-R**	S13LT9.6429-R**	39 (17.7)
12000	380-480	35 (889)	37 (940)	S13LF12435-R**	S13LS12435-R**	S13LT12435-R**	42 (19)
14400	380-480	41 (1041)	50 (1270)	S13LF14.4441-R**	S13LS14.4441-R**	S13LT14.4441-R**	45 (20.4)
16800	380-480	47 (1194)	50 (1270)	S13LF16.8447-R**	S13LS16.8447-R**	S13LT16.8447-R**	67 (30.4)

Three phase standard, add "-1" for single phase before riser designator.
** Specify riser length.

Product Features and Benefits:

LONG LIFE ELEMENT:
- Patented PTC heater element lasts longer than conventional heaters.
- Will not burn out if run in air.
- Will not burn out due to scale or sludge buildup.

SAFE DESIGN:
- Heater self limits its maximum operating temperature to 482°F (250°C). This is lower than the ignition point of most plastics.
- 2" (50mm) sludge legs. Will not melt tanks when a ½" (12mm) minimum distance is maintained.
- Overtemperature protection devices are not required.
- Safety is built-in, not added on.
- Metal-grounded construction (earth ground).
- Non-floating construction.

SIZES: 2,400 watts (2.4kW) to 18,000 watts (18kW).

VOLTAGES:
- Three voltage ranges available: 100-120 volt, 200-240 volt, and 380-480 volt.
- Heater is available in single or three phase power.

CORROSION RESISTANT HEADS: Vapor resistant, flame retardant polypropylene terminal enclosures each with 3-foot (.9m) flexible PVC liquid tight conduits.

OUTSTANDING PERFORMANCE:
- Watt densities of 26 watts per square inch (4 watts/cm^2) ensure long service life.
- Auto-stabilizing solid state element prevents hot spots and ensures uniform heating.
- Heater derates itself in highly viscous and high temperature solutions. Consult factory for sizing assistance.

CHEMICALLY RESISTANT: For use in most aqueous alkaline, electroplating and rinse solutions. Check our Solution Guide or with your chemical supplier for recommended sheath material. Available in:
- 304 stainless steel
- 316 stainless steel
- Titanium

CERTIFICATIONS: cULus and CE.

OPTIONS (consult factory):
- Longer wire and conduit engths.
- Temperature controls and level controls sized to match the heater.

NOTE: Should be installed with C or D rated branch fusing.

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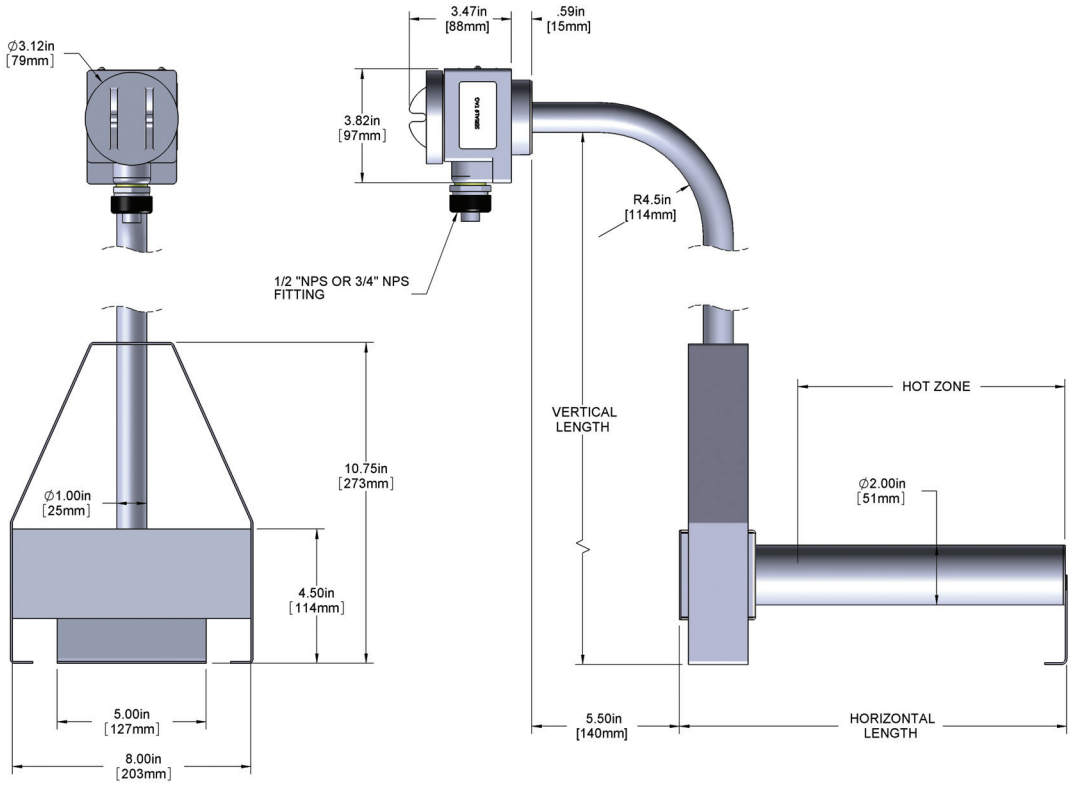
DIMENSIONS



TRIPLE TUBE METAL BOTTOM HEATER ORDERING INFORMATION

Series	Wattage	Voltage	Horizontal Length	Vertical Length	Phase Options	Riser Options	Wire and Conduit Length
S13LF = 304 stainless steel S13LS = 316 stainless steel S13LT = titanium	***100-240V:*** 3 = 3000 6 = 6000 9 = 9000 12 = 12000 15 = 15000 18 = 18000 ***380-480V:*** 2.4 = 2400 4.8 = 4800 7.2 = 7200 9.6 = 9600 12 = 12,000 14.4 = 14,400 16.8 = 16,800	1 = 100-120 2 = 200-240 4 = 380-480	***100-240V:*** 13 = 3kW 17 = 6kW 23 = 9kW 29 = 12kW 35 = 15kW 41 = 18kW ***380-480V:*** 13 = 2.4kW 17 = 4.8kW 23 = 7.2kW 29 = 9.6kW 35 = 12kW 41 = 14.4kW 47 = 16.8kW	***100-240V:*** -R15 = 3kW -R37 = 6kW -R37 = 9kW -R37 = 12kW -R37 = 15kW -R50 = 18kW ***380-480V:*** -R15 = 2.4kW -R37 = 4.8kW -R37 = 7.2kW -R37 = 9.6kW -R37 = 12kW -R50 = 14.4kW -R50 = 16.8kW (custom lengths available)	no designator = three phase -1 = single phase no designator = 90° horizontal bend (standard) -S = straight riser no designator = 36" (1m) length standard specify variations from standard Ex: -X240 = 240" (6m)		

U.S. and International Patents

ORDERING EXAMPLE:

S13LT9.6429-R37

Triple tube titanium bottom, 9600 watts, 380-480 volt, 29” horizontal length, 37” riser, 36” wire and conduit

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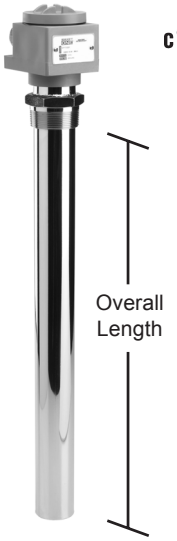

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S1T SERIES, 2" TUBULAR SCREW PLUG HEATERS

WATTS	VOLTS	PIPE THREAD	OVERALL LENGTH In./(mm)	304 STAINLESS MODEL NUMBER	316 STAINLESS MODEL NUMBER	TITANIUM MODEL NUMBER	SHIP WEIGHT Lbs./(kg)
1000	100-120	2" NPT	10 (254)	S1FT1110	S1ST1110	S1TT1110	11 (5)
2000	100-120 200-240	2" NPT	14 (356)	S1FT2114 S1FT2214	S1ST2114 S1ST2214	S1TT2114 S1TT2214	14 (6.4)
3000	200-240	2" NPT	20 (508)	S1FT3220	S1ST3220	S1TT3220	16 (7.3)
4000	200-240	2" NPT	26 (660)	S1FT4226	S1ST4226	S1TT4226	20 (9.1)
5000	200-240	2" NPT	31 (787)	S1FT5231	S1ST5231	S1TT5231	26 (11.8)
6000	200-240	2" NPT	37 (940)	S1FT6237	S1ST6237	S1TT6237	29 (13.2)
1600	380-480	2" NPT	14 (356)	S1FT1.6414	S1ST1.6414	S1TT1.6414	14 (6.4)
2400	380-480	2" NPT	20 (508)	S1FT2.4420	S1ST2.4420	S1TT2.4420	16 (7.3)
3200	380-480	2" NPT	26 (660)	S1FT3.2426	S1ST3.2426	S1TT3.2426	20 (9.1)
4000	380-480	2" NPT	31 (787)	S1FT4431	S1ST4431	S1TT4431	26 (11.8)
4800	380-480	2" NPT	37 (940)	S1FT4.8437	S1ST4.8437	S1TT4.8437	29 (13.2)
5600	380-480	2" NPT	43 (1092)	S1FT5.6443	S1ST5.6443	S1TT5.6443	32 (14.5)

Single phase standard, add "-3" for three phase.

Product Features and Benefits:

LONG LIFE ELEMENT:
- Patented PTC heater element lasts longer than conventional heaters.
- Will not burn out if run in air.
- Will not burn out due to scale or sludge buildup.

SAFE DESIGN:
- Heater self limits its maximum operating temperature to 482°F (250°C). This is lower than the ignition point of most plastics.
- Will not melt tanks when a ½" (12mm) minimum distance is maintained.
- Overtemperature protection devices are not required.
- Safety is built-in, not added on.
- Metal-grounded construction (earth ground).
- Non-floating construction.

SIZES: 1,000 watts (1kW) to 6,000 watts (6kW).

VOLTAGES:
- Three voltage ranges available: 100-120 volt, 200-240 volt, and 380-480 volt.
- Heater is available in single or three phase power.

CORROSION RESISTANT HEADS: Vapor resistant, flame retardant polypropylene terminal enclosures each with 3-foot (.9m) flexible PVC liquid tight conduits.

OUTSTANDING PERFORMANCE:
- Watt densities of 26 watts per square inch (4 watts/cm^2) ensure long service life.
- Auto-stabilizing solid state element prevents hot spots and ensures uniform heating.
- Heater derates itself in highly viscous and high temperature solutions. Consult factory for sizing assistance.

CHEMICALLY RESISTANT: For use in most aqueous alkaline, electroplating and rinse solutions. Check our Solution Guide or with your chemical supplier for recommended sheath material. Available in:
- 304 stainless steel
- 316 stainless steel
- Titanium

CERTIFICATIONS: cULus and CE.

OPTIONS (consult factory):
- Longer wire and conduit lengths.
- Temperature controls and level controls sized to match the heater.

NOTE: Should be installed with C or D rated branch fusing.

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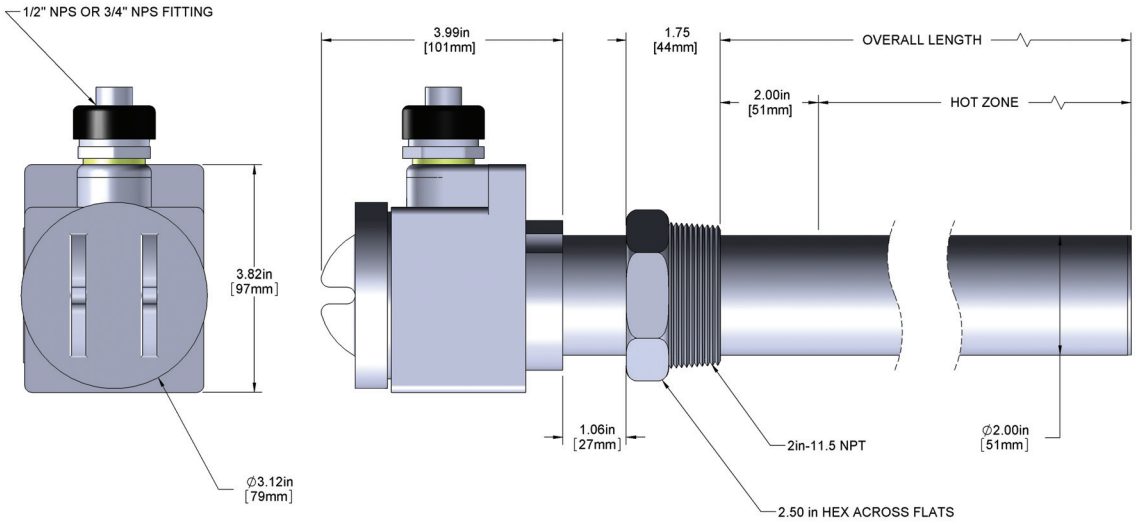
DIMENSIONS



2" TUBULAR SCREW PLUG HEATER ORDERING INFORMATION

Series	Wattage	Voltage	Overall Length	Phase Options	Wire and Conduit Length
S1FT = 304 stainless steel S1ST = 316 stainless steel S1TT = titanium	***100-240V:*** 1 = 1000 2 = 2000 3 = 3000 4 = 4000 6 = 6000 ***380-480V:*** 1.6 = 1600 2.4 = 2400 3.2 = 3200 4 = 4000 4.8 = 4800 5.6 = 5600	1 = 100-120 2 = 200-240 4 = 380-480	***100-240V:*** 10 = 1kW 14 = 2kW 20 = 3kW 26 = 4kW 31 = 5kW 37 = 6kW ***380-480V:*** 14 = 1.6kW 20 = 2.4kW 26 = 3.2kW 31 = 4kW 37 = 4.8kW 43 = 5.6kW (custom lengths available)	no designator = single phase -3 = three phase	no designator = 36" (1m) length standard specify variations from standard Ex: -X240 = 240" (6m)

U.S. and International Patents

ORDERING EXAMPLE:

S1FT4431

2” titanium screw plug, 4000 watts, 380-480 volt, 31” overall length, 36” wire and conduit

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