

Screw Plug Immersion Heaters



- Stainless Steel, Brass or Steel Screw Plugs
- Four Standard Screw Plug Sizes—25.4 mm (1"), 31.8 mm (1¼"), 50.8 mm (2"), 63.5 mm (2½")
- Recompacted Element Bends Restore Insulation Resistance after Forming
- Thermowell for Optional Bulb and Capillary Thermostat, RTD or Thermocouple Probe
- Corrosion-Resistant Electrical Wiring Hardware
- Four Standard Sheath Materials—Copper, Steel, 316 Stainless Steel and Incoloy® 800
- NEMA 1 Round Terminal Housing
- Silicone Resin Element Seal Standard

Optional Features

- NEMA 4 Moisture-Proof and/or NEMA 7 Explosion-Resistant Terminal Housings
- Integral Single or Double Pole Thermostats in Various Temperature Ranges to Suit the Application
- Passivation, Electropolishing or Bright Annealing Surface Treatments Available for Stainless Steel and Incoloy® Elements
- Type J and K Thermocouples or RTD Probes for Sensing Process Temperatures, or Over-Temperature Protection when Attached to the Sheath
- Special Sheath Materials
- Special Straight Bulkhead or European Thread Fittings

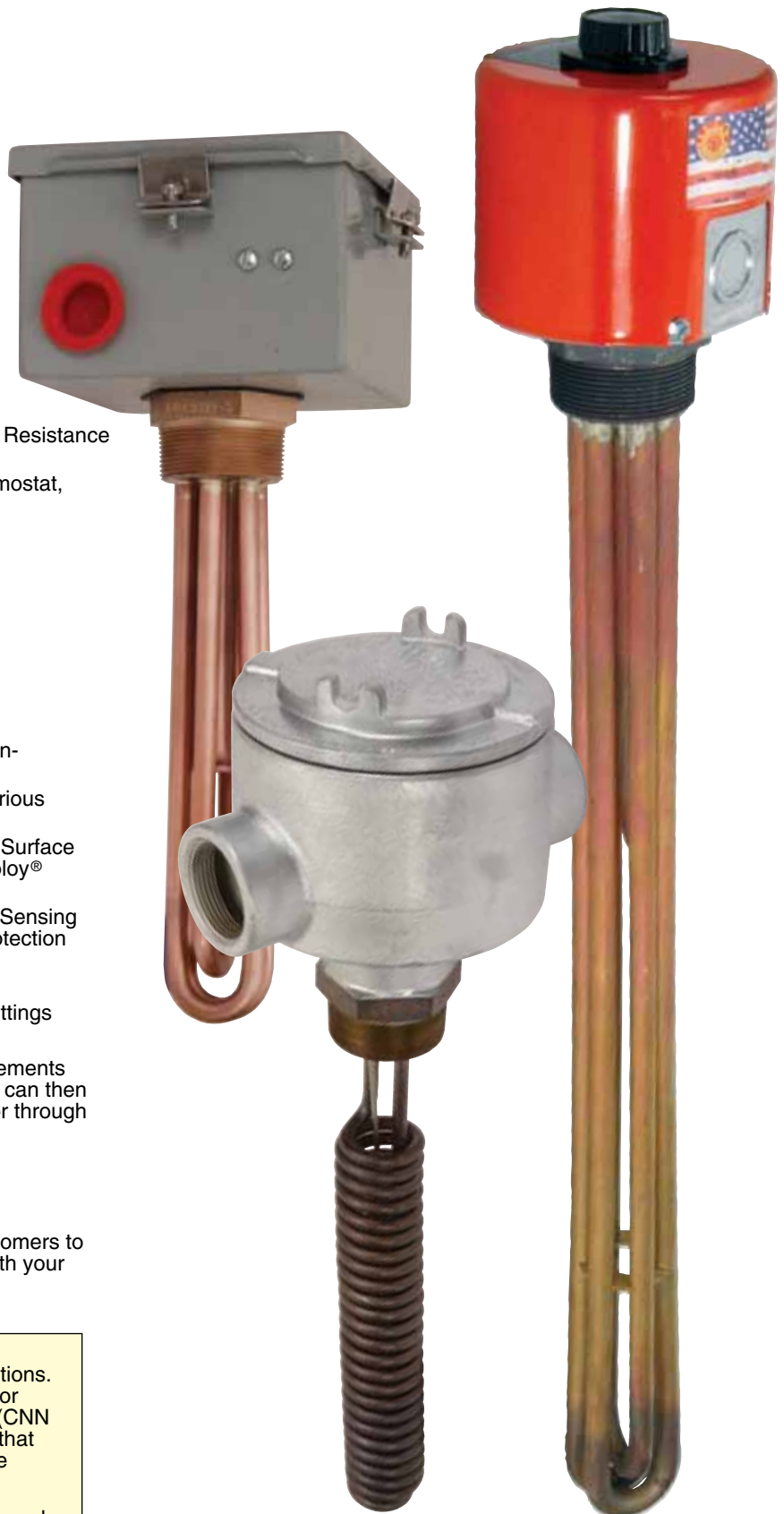
Screw plug immersion heaters consist of tubular elements welded or brazed into a threaded screw plug which can then be inserted into a threaded opening in a tank wall or through a mating full or half coupling.

Need Customer Assistance?

We take pride in our record of working with our customers to develop the right heater for the job. Call OMEGA with your requirements.

OMEGA screw plug immersion heaters are UL recognized and CSA certified in many design variations. The UL file numbers are E90771 (CCN UBJY2/8) for heaters not containing a thermostat and E234452 (CNN KSXF2) for heaters used in water based solutions that include a thermostat. OMEGA's equivalent CSA file number is 043099.

If you require UL, CSA, or other NRTL agency approvals, please specify when ordering.





Screw Plug Immersion Heaters

Checklist—Selecting the Proper Screw Plug Heater

✓ Determine a Safe and Efficient Element Watt Density

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

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

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. When heating hard water and cleaning solutions mineral deposits 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.

✓ Select the 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 corrosion resistant surface.
3. Velocity of the corrodent. Increased velocity can increase the corrosion rate.

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 177°C (350°F).

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

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 399°C (750°F).

Surface Treatments for Stainless Steel and Incoloy® Elements and Other Wetted Parts to Improve Corrosion Resistance

Screw Plug 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.

✓ Select the Terminal Housing Type

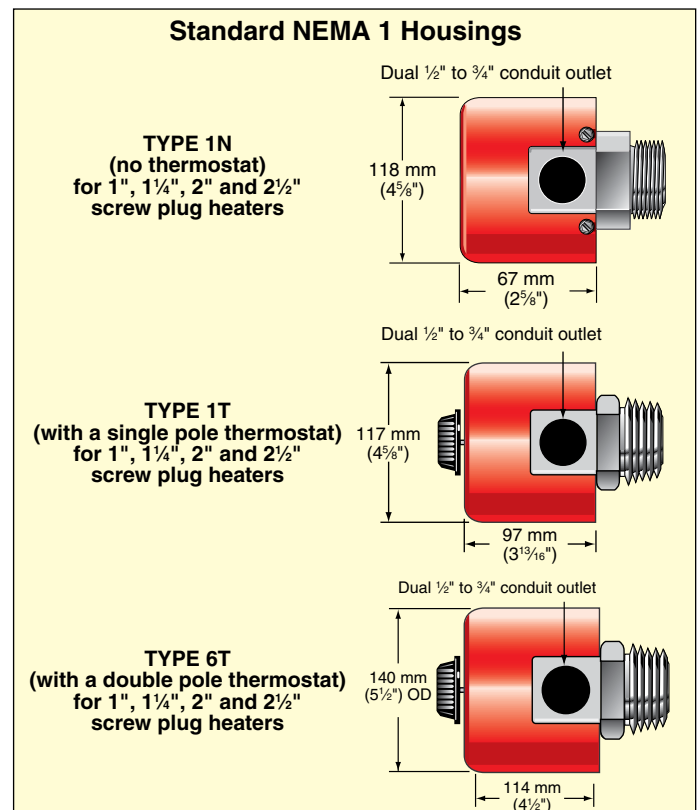
Standard catalog screw plug immersion heaters are supplied with the Type 1N general purpose (NEMA 1) terminal housing with a single Dual ½ to ¾ conduit knockout as shown on the previous page. Additional housings with and without a thermostat include:

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 OMEGA with your requirements.

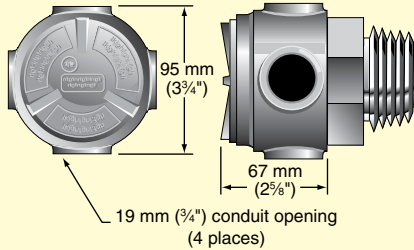


Screw Plug Immersion Heaters

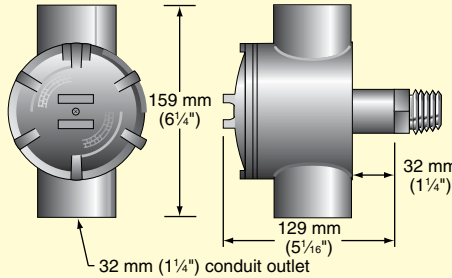
Standard NEMA 4 and/or 7 Housings

NEMA 4 rating requires the use of the cover gasket.

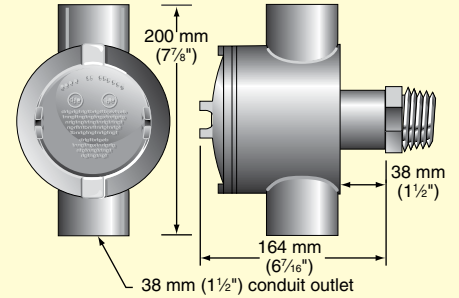
TYPE 2N
(no thermostat)
for 1", 1 1/4", 2" and 2 1/2"
screw plug heaters



TYPE 2T
(with a single pole thermostat)
for 1" and 1 1/4" screw plug heaters

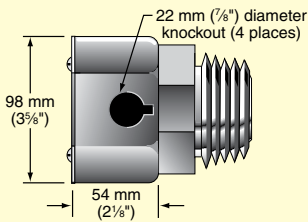


TYPE 3T
(with a double pole thermostat)
for 2" and 2 1/2" screw plug heaters



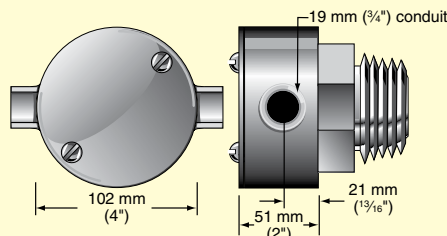
Alternate NEMA 1 Housing

Type 3N
(no thermostat)
for 1", 1 1/4", 2" and 2 1/2"
screw plug heaters



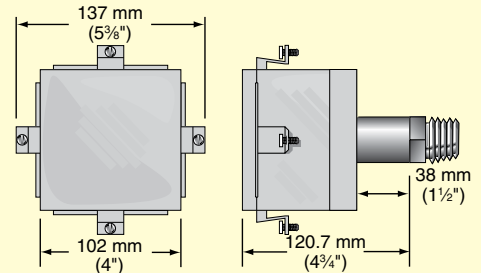
Alternate NEMA 4 Housing

TYPE 4N
(no thermostat)
for 1", 1 1/4", 2" and 2 1/2"
screw plug heaters



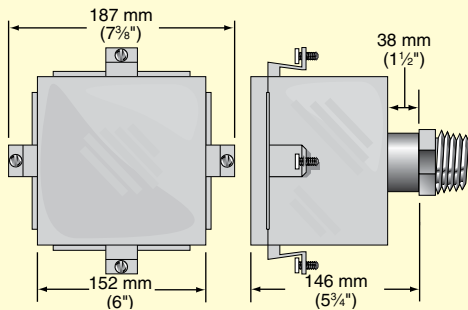
Alternate NEMA 4 Housing

TYPE 4T
(with a single pole thermostat)
for 1" and 1 1/4" screw plug heaters



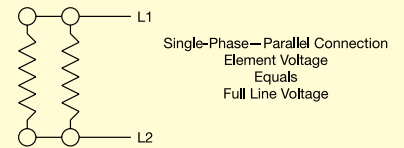
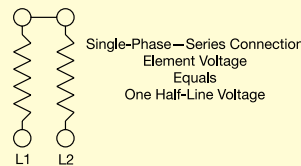
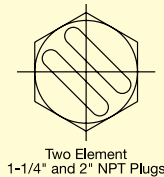
Alternate NEMA 4 Housing

TYPE 5T
(with a single or double pole thermostat)
for 2" and 2 1/2" screw plug heaters



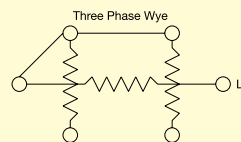
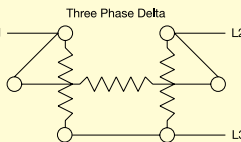
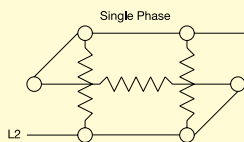
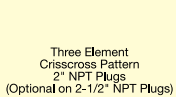
Explosion resistant terminal housings are intended to provide containment of an explosion in the enclosure only. No portion of the heater assembly outside the enclosure is covered under this NEMA rating. Abnormal use of a heater which results in excessive temperature can create hazardous conditions such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

Wiring Diagrams — Screw Plug Heaters with Two Elements

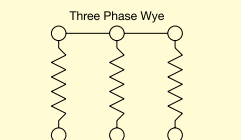
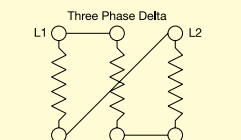
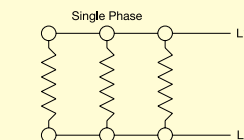
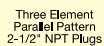


Note: Dual-Voltage heaters are factory wired for the higher voltage (series connection) unless otherwise specified. Easily rewired for lower voltage operation (parallel connection).

Wiring Diagrams — Screw Plug Heaters with Three Elements



Note: 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.



CAUTION: 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.



Screw Plug Immersion Heaters

TSP Series

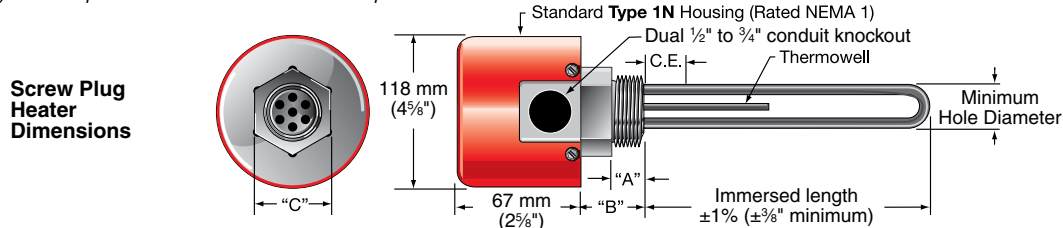
- Steel Screw Plug
- Steel Sheath Heating Elements
- NEMA 1 Terminal Housing

**23 watts/in² (3.6 watts/cm²)—Typical Applications:
Lightweight Oils, Degreasing Solutions and Heat Transfer Oils**

To Order Visit omega.com/tsp01632_series for Pricing and Details

Model Number						Nominal Pipe Size	Immersed Length		KW	Approximate Net Weight		
120V-1Ph	120/240V	240V-1Ph	240V-3Ph	240/480V	480V-3Ph		inch	mm		lbs	kgs	
TSP01632	—	TSP01633	—	—	—	1 NPT 1 element	6½	165	0.25	2	1	
TSP01634	—	TSP01635	—	—	—		7⅞	200	0.3	2	1	
TSP01636	—	TSP01637	—	—	—		9¼	235	0.35	2	1	
TSP01638	—	TSP01639	—	—	—		9⅝	238	0.5	2	1	
TSP01640	—	TSP01641	—	—	—		13½	343	0.75	3	1	
TSP01642	—	TSP01643	—	—	—		16¾	425	1	3	1	
TSP01644	—	TSP01645	—	—	—		23¾	603	1.5	3	1	
—	TSP01646	—	—	—	—		1¼ NPT 2 elements	6⅝	162	0.5	3	1
—	TSP01647	—	—	—	—			8⅞	225	0.7	3	1
—	TSP01648	—	—	—	—			10⅞	256	0.75	4	2
—	TSP01649	—	—	—	—	12¾		324	1	4	2	
—	TSP01650	—	—	—	—	19⅝		492	1.5	4	2	
—	TSP01651	—	—	—	—	25⅝	645	2	5	2		
—	TSP01652	—	—	—	—	36⅞	937	3	5	2		
—	TSP01653	—	—	TSP01654	—	2 NPT 2 elements	9½	241	1	5	2	
—	TSP01655	—	—	TSP01656	—		13½	343	1.5	5	2	
—	TSP01657	—	—	TSP01658	—		17½	445	2	6	3	
—	TSP01659	—	—	TSP01660	—		20½	521	2.5	6	3	
—	TSP01661	—	—	TSP01662	—		25	635	3	6	3	
—	TSP01663	—	—	TSP01664	—		32½	826	4	7	3	
—	TSP01665	—	—	TSP01666	—	40	1016	5	8	4		
—	—	—	—	TSP01667	—	47½	1207	6	8	4		
TSP01668	—	—	TSP01669	—	TSP01670*	2 NPT 3 elements	9½	241	1.5	5	2	
TSP01671	—	—	TSP01672	—	TSP01673*		17½	445	3	6	3	
TSP01674	—	—	TSP01675	—	TSP01676		22	559	3.75	7	3	
TSP01677	—	—	TSP01678	—	TSP01679		25	635	4.5	7	3	
—	—	—	TSP01680	—	TSP01681		32½	826	6	8	4	
—	—	—	TSP01682	—	TSP01683		40	1016	7.5	9	4	
—	—	—	TSP01684	—	TSP01685		47½	1207	9	10	5	
—	—	—	TSP01686	—	TSP01687		64	1626	12.5	12	5	
TSP01688	—	—	TSP01689	—	TSP01690*	2½ NPT 3 elements	17¼	438	3	8	4	
TSP01691	—	—	TSP01692	—	TSP01693		19⅞	484	3.75	8	4	
TSP01694	—	—	TSP01695	—	TSP01696		24¾	629	4.5	9	4	
—	—	—	TSP01697	—	TSP01698		32¼	819	6	11	5	
—	—	—	TSP01699	—	TSP01700		39¾	1010	7.5	12	5	
—	—	—	TSP01701	—	TSP01702	47¼	1200	9	13	6		
—	—	—	TSP01703	—	TSP01704	63¾	1619	12.5	16	7		
—	—	—	TSP01705	—	TSP01706	76¼	1937	15	18	8		

Note: Dual-voltage heaters are 1-phase and are wired for the higher voltage unless otherwise specified.
* 3-phase only. Other 3-phase heaters are convertible to 1-phase.



Screw Plug NPT	Minimum Hole Diameter		"A"		"B"		"C"		Thermowell Bulb Size		Standard Cold Ends (CE)		Element Diameter	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
1	29	1⅛	22	⅞	32	1¼	35	1⅜	6.4	¼	25	1	8	0.315
1¼	35	1⅜	24	1⅝	33	1⅝	44	1¾	6.4	¼	25	1	9	0.315
2	57	2¼	27	1⅞	40	1⅞	64	2½	9.5	⅜	50	2	11	0.430
2½	64	2½	33	1⅞	52	2⅞	76	3	9.5	⅜	50	2	12	0.475