

# INTRODUCTION TO SCREW PLUG IMMERSION HEATERS



Screw plug immersion heaters consist of hairpin bent tubular elements brazed or welded into a screw plug and provided with wiring boxes for electrical connections. Screw plug immersion heaters are screwed directly through a threaded opening in a tank wall or through matching pipe coupling, half coupling or welding flange. Sizes of screw plug heaters are available with ½", ¾" 1", 1¼", 2" and 2½" pipe threads. A wide selection of screw plug sizes, kilowatt ratings, voltages, sheath materials, terminal housings, and thermostats makes these compact heaters ideal for all types of applications.

Screw plug immersion heaters are used for heating liquids and gases in a variety of processes. Those heaters are ideal for process water heating and freeze protection. All types of oils and heat transfer solutions can also be heated using these compact easily controlled units. The direct immersion method is energy efficient and well suited for many applications.

Application	Screw Plug Size	Sheath Material	Screw Plug Material	Heater Type	Integral Thermostat
Clean water	1"	Copper	Brass	ARTM	Yes
	1¼"	Copper	Brass	MT	No
	2"	Copper	Brass	EMT	No
	2"	Copper	Brass	ARMT	Yes
	2"	Copper	Brass	MT	No
	2"	Incoloy	Brass	CH-SD	No
	2½"	Copper	Brass	ARMT	Yes
	2½"	Copper	Brass	MT	No
Process water	1"	SS	SS	ARTMS	Yes
	2"	SS	SS	ARMTS	Yes
	2"	SS	SS	MTS	No
	2"	SS	SS	EMTS	No
	2½"	SS	SS	ARMTS	Yes
	2½"	SS	SS	MTS	No
Solution water	2"	Incoloy	SS	ARMTI	Yes
	2"	Incoloy	SS	MTI	No
	2½"	Incoloy	SS	ARMTI	Yes
	2½"	Incoloy	SS	MTI	No
Light weight oil	1"	Steel	Steel	ARTMO	Yes
	1¼"	Steel	Steel	MTO	No
	2"	Steel	Steel	ARMTO	Yes
	2"	Steel	Steel	MTO	No
	2½"	Steel	Steel	ARMTO	Yes
	2½"	Steel	Steel	MTO	No
Medium weight oil	2"	Steel	Steel	ARTMO	Yes
	2"	Steel	Steel	MTO	No
	2½"	Steel	Steel	ARTMO	Yes
	2½"	Steel	Steel	MTO	Yes
Heavy weight oil	2"	Steel	Steel	ARTMO	Yes
	2"	Steel	Steel	MTO	No
	2½"	Steel	Steel	ARTMO	Yes
	2½"	Steel	Steel	MTO	No
Specialty Heaters—water, oil & corrosion fluids	½"	Incoloy	Steel	RI	No
	½"	SS	Steel	RIO	No
	½"	Incoloy	Brass	RIN	No
	½"	SS	Brass	RINO	No
	½"	SS	SS	RIS	No
	½"	Hasteloy	Hasteloy	RIH	No
	¾"	Incoloy	Steel	RI	No
	¾"	SS	Steel	RIO	No
	¾"	Incoloy	Brass	RIN	No
	¾"	SS	Brass	RINO	No
	1"	Copper	Brass	TMW	No
	1"	SS	SS	TMWS	No
	1"	Steel	Steel	TMO	No
	1"	Incoloy	Brass	CJ	Yes
	1¼"	Copper	Brass	TMW	No
	2"	Incoloy	Brass	DWH	Yes

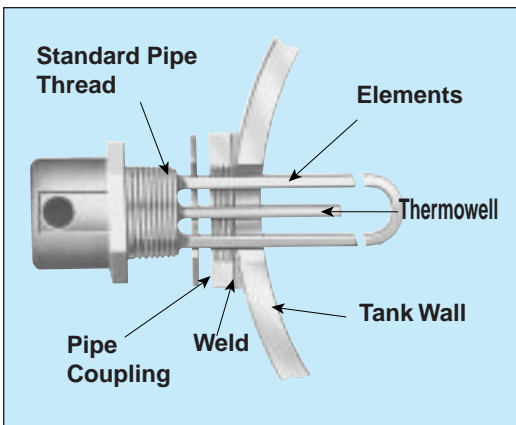
SS denotes Stainless Steel

## PRODUCT DESCRIPTION

OMEGALUX® heavy duty tubular elements are welded or brazed to a screw plug. Uniform heat distribution and repressed element bends provide long element life. For heaters with built-in thermostats, a thermowell (hollow tube sealed at one end) is welded or brazed to the screw plug and allows thermostat sensing element replacement without draining the tank.

Screw plug heaters are equipped with a steel enclosure, and are also available with a combination moisture resistant/explosion resistant enclosure.

Screw plug type heaters are screwed directly through a threaded opening in tank wall. Heavy tank walls may be drilled and tapped if thickness is sufficient to engage ¾ of threads. Lighter tank walls should be equipped with suitable pipe half-coupling attached with proper braze or weld material.



## CONSTRUCTION FEATURES

**Material** — copper, steel, Incoloy and stainless steel.

**Number of elements in screw plugs** — one, two or three depending on screw plug size.

**Element diameters** — 0.315", 0.375", and 0.475".

**Watt densities** — 6.5, 15, 23, 45 and 75 watts per square inch typical.

## SCREW PLUG

**Material** — carbon steel, brass and stainless steel.

**Sizes** — ½", ¾", 1", 1¼", 2", 2½", nominal.

## TERMINAL ENCLOSURES

**General Purpose** sheet metal, painted with red enamel.

**Type E-2** Combination moisture resistant/explosion resistant.

Type E-2 explosion resistant enclosure involve the use of a wiring enclosure for use Class I Groups C & D, Division 1 & 2. Class II, Groups E, F & G, Division 1 & 2. Class III, Division 1 & 2. Not intended for use in hazardous areas.

Safe operation of heaters equipped with these enclosures depends upon employment of electrical wiring meeting National Electric Code for hazardous locations and limiting maximum operating temperatures (including temperature on outside of vessel, piping, flanges, screw plugs, enclosures and other heat conducting parts) as directed by flammable liquids, vapors or gases present. Approved pressure and /or temperature limiting controls must be used to assure safe operation in the event of system malfunctions.

## TEMPERATURE CONTROL

Many screw plug type heaters are available with built-in thermostatic controls. In some installations, where there is more than one heater in a tank, you may consider one heater with a built-in control that will control the other heaters by wiring thermostat into the holding coil circuit of a magnetic contactor. If the thermostat is separate from the heater, the thermostat sensing element should be located approximately 4 to 6 inches above the heater.

## ARTM, ATMO AND ARTMS SERIES

The ARTM, ARTMO and ATTMS automatic thermostat has a temperature range range of 60°-180°F. Also available with alternate

60°F to 240°F thermostat (TH) and 0° to 127°F(TL). the temperature adjustment screw and scale are inside requiring the removal of cover to change temperature setting.

## ARTM, ATMTI ARTMS AND ARMTO SERIES

The integral thermostat is available with temperature ranges at 60° to 250°F or 0° to 100°F for ARMT, ARMTI and ARMTS heaters. ARMTO heaters are available with three different temperature ranges: 200° to 550°F, 60° to 250°F and 0° to 100°F. This control is wired in as a line thermostat for loads up to 4.2 kW on 240 volts. For high wattage rating, 3 phase operation and 480 Volts, this control is for pilot duty only and should be wired to operate the holding coil of a magnetic contactor by customer.

**Note:** The integral thermostat functions as a temperature control only. this is not a fail safe device so an approved pressure and/or temperature limit control should be used with these heaters to assure safe operation.

**Caution:** Explosion resistant Type E-2 construction refers to heater design features which provide explosion resisting containment of electrical wiring according to National Electric Code. abnormal application or use of heaters which results in excessive temperature can crete hazardous conditions which can lead to fire.

## Corrosion Policy

OMEGALUX cannot warrant any electric immersion heater against failure is the result of operating conditions beyond the control of the heater manufactures. It is the responsibility of the purchaser to make the ultimate choice of sheath material based on his knowledge of the chemical composition of the corrosive solution, character of materials entering the solution, and controls which he maintains on the process.

# SCREW PLUG IMMERSION HEATER FOR PROCESS WATER

- ✓ 1", 2", 2½" Stainless Steel Screwplug
- ✓ Stainless Steel Sheath
- ✓ 0.75 to 18 kW
- ✓ With or Without Thermostat

## APPLICATIONS

**For process water pH 5-9** — Use with industrial or municipal water with mild or alkaline conditions, which require heater sheath more resistant to corrosive influences or where a pH factor range of pH 5 to 9 exists.

**For very weak 2-3% corrosive solutions** — For very weak solutions with alkaline or acid content of up to 3% by volume, such as soap and detergent solutions, soluble cutting oils and rinsing applications where carryover from prior chemical processes causes solution contamination buildup.

**For temperature ranges to 180°F** — Dependable operation at those temperatures normal to the plating or other chemical treating or severe process cleaning applications.

**For industrial tanks, vessels, & process piping** — Or any application where a screw plug heater can be used or is necessary for a physical connection to an industrial process.

## FEATURES

**Rugged construction** — Sturdy elements welded to stainless steel screwplugs provide superior rigidity and strength. Heavy duty jumper straps and terminal posts assure permanent tightness of connection's carrying capacity.

**Long life metal sheath** — High grade 300 Series stainless steel outer sheath provides the benefits of strength and durability in those applications where stainless performance is required.

**High conductivity elements** — Filled with highest purity blends of magnesium oxide refractory (MgO) compacted to a rock hard density to insure maximum electrical resistance, and assure long life.

**Heavy coil construction** — Watt density on the heating coil is designed for low watt density operation by increasing the coil diameter and length to give maximum coil surface area and limit coil surface temperature, providing longer coil life.

**Liberal electrical clearances** — are provided in all terminal enclosures in accordance with the NEC insuring that proper arcing and creepage clearances are maintained. Termination insulators provide electrical isolation between terminations and grounded metal sheaths — all to insure personnel safety and equipment service life.

**Easy access to terminal wiring** — Superior performances at element bends — with all bent elements repressed in hydraulic presses after bending to assure recompaction of refractory material to eliminate hot spots and electrical insulation voids.

**Grounding connector standard** — A solid terminal connector is standard on all OMEGALUX® immersion heaters insuring positive ground and personal safety.

**Precise temperature** — Standard heaters provided with built-in temperature controls. For those units not provided with controls, see OMEGA® controllers. Standard temperature ranges are:

Type	Temp. Range ° F	Type	Temp. Range ° F
1" NPT Screw Plug		2 & 2½" NPT Screw Plug	
TL	0-127	T1	0-100
TH	60-240	T2	60-250
Standard	60-180	T3	200-550

**Note:** The integral thermostat functions as a temperature control only. This is not a fail-safe device so an approved pressure and/or temperature limit control should be used with these heaters to assure safe operation.

To set the control temperature of heaters equipped with the standard general purpose enclosure, adjust the knob on the outside of the terminal enclosure. For those heaters equipped with E-2 enclosures, (explosion resistant/moisture tight)\* remove the terminal enclosure lid to expose the temperature adjusting knob. For safety reasons, power to heater and pilot duty power must be turned off before removing enclosure lid.

This control is wired in as a line thermostat for loads up to 4.2 kW on 120 Volts and up to 6 kW on 240 Volts. For high wattage rating, 3 phase operation and 480 Volts, this control is for pilot duty only and should be wired to operate the holding coil of a magnetic contractor by customer.

## Terminal Enclosures

Specify type enclosure required when ordering.

**General purpose** -- Sheet metal, NEMA 1.

**E-2** -- Combination moisture tight explosion resistant\*

**Caution:** Explosion resistant type E-2 construction refers to heater design features which provide explosion resisting containment of electrical wiring according to National Electric Code. Abnormal application or use of heaters which results in excessive temperatures can create hazardous conditions which can lead to fire.

*\*Not intended for use in hazardous areas.*

# SCREW PLUG IMMERSION HEATER FOR SOLUTION WATER

- ✓ 2", 2½" Stainless Steel
- ✓ Incoloy Sheath
- ✓ 2 to 18 kW
- ✓ With or Without Thermostat

## APPLICATIONS

**For severe hard water pH5 to 9** — For use with industrial severe hard water containing minerals, scale and salts or with acid or alkaline conditions where the highest quality, high nickel bearing Incoloy sheath or more durability than copper or stainless is required.

**For weak 5 to 6% corrosive solution** — For weak and reclaimed water solutions with an alkaline or acid contents up to 6% by volume; or solutions with high mineral content containing heavy detergents; soluble cutting oils or caustic cleaning applications.

**For temperature ranges at 180°F** — This type Screw Plug Immersion Heater will provide dependable operation at the normal temperatures commonly encountered in the plating, chemical treating, or severe process cleaning applications.

**For industrial tanks, vessels, & process piping** — Or any applications where a screw plug heater can be used or is necessary for a physical connection to an industrial process.

## FEATURES

**Rugged construction** — Sturdy 0.475" diameter elements welded to stainless steel screw plugs provide superior rigidity and strength. Heavy duty jumper straps and terminal posts assure permanent tightness of connection's carrying capacity.

**Long life metal sheath** — Superior grade Incoloy outer sheath provides the highest practical protection available against most corrosive chemical solutions. It resists stress corrosion, cracking, sulfur attack, scaling, oxidation, and carburization at elevated temperatures.

**High conductivity elements** — Filled with highest purity blend of magnesium oxide refractory (MgO) compacted to a rock hard density to insure maximum thermal conductivity, maximum electrical resistance, and assure long element life.

**Heavy coil construction** — Watt density on the heating coil is designated for low watt density operation by increasing the coil diameter and length to give maximum coil surface area and limit coil surface temperature, providing longer coil life.

**Liberal electrical clearances** — are provided in all terminal enclosures in accordance with the NEC insuring that proper arcing and creepage clearances are maintained. Termination insulators provide electrical isolation between terminations and grounded metal sheaths — all to insure personnel safety and equipment service life.

**Superior performance at element bends** — with all bent elements repressed in hydraulic presses after bending to assure recompaction of refractory material to eliminate hot spots and electrical insulation voids.

**Easy access to terminal wiring** — with a large terminal enclosure providing ample wiring and termination space insuring cool terminations and making installation easy.

**Precise Temperature Control** — Standard heaters provided with built-in temperature controls. For those units not provided with control, see section P of catalog. Standard temperature ranges are:

2 and 2½" NPT Screw Plug Type	Temp. Range°F
T1	0-100
T2	60-250

**Note:** The integral thermostat functions as a temperature control only. This is not a fail-safe device so an approved pressure and/or temperature limit control should be used with these heaters to assure safe operation.

To set the control temperature of heaters equipped with the standard general purpose enclosure adjust the knob on the outside of the terminal enclosure. For those heaters equipped with an E-2 enclosure (explosion resistant/moisture resistant)\* remove the terminal enclosure lid to expose the temperature adjusting knob. For safety reasons, power to heater and pilot duty power must be turned off before removing enclosure lid.

This control is wired in a line thermostat for loads up to 4.2 kW on 120 Volts and up to 6 kW on 240 Volts. For high wattage ratings and 480 Volts, this control is for pilot duty only and should be wired to operate the holding coil of a magnetic contactor by customer.

**Terminal enclosures** Specify type enclosure required when ordering.

**E1:** General purpose, sheet metal NEMA 1.

**E2:** Combination moisture resistant/explosion resistant.\*

\* **Caution:** Explosion resistant type E-2 construction refers to heater design features which provide explosion resisting containment of electrical wiring according to National Electrical Code. Abnormal application or use of heaters which results in excessive temperatures can create hazardous conditions which can lead to fire. \* *Not intended for use in hazardous areas.*





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