



BUCAN ELECTRIC HEATING DEVICES INC.

## SCREW PLUG IMMERSION HEATERS



### Applications:

- *PROCESS WATER HEATING*
- *HEATING OILS, WAX, TAR, ASPHALT, PARAFFIN*
- *MILD ALKALINE & ACID SOLUTIONS*
- *FREEZE PROTECTION*
- *EQUIPMENT WARM-UP*
- *HEATING GASES*
- *FOOD PROCESSING*

Bucan's screw plug immersion heaters are medium capacity heating units designed to provide heat inside tanks and pipes. They consist of a single or a set of tubular elements that are formed into hairpins and welded or brazed to a screw plug. The sheath material of the heating elements could be steel, copper, stainless steel or Incoloy. The standard screw plug sizes utilized are 1", 1 1/4", 2" and 2 1/2" and are either made of steel, brass or stainless steel. Various types of electrical protective enclosures, built-in thermostats, thermocouples and high limit switches can be incorporated.

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## Selection tips for screw plug heaters

Screw plug immersion heaters have a wide range of applications. It is essential to take several factors into consideration in order to select a heater that has features that match the requirements of a specific application and suitable to the environment where the heater will operate. The following are a number of criteria that should be taken into consideration:

- Besides the heating capacity required, a heater should operate at a temperature and a watt density that is adequate to the fluid heated. Tables 2 and 3 provide maximum sheath temperatures and watt densities that are recommended for heating various fluids.
- In order to select proper materials for screw plug heaters, general selection guides that are based on common experience in industrial usage could be used. However, this selection should always be based on a user's experience and knowledge in a specific application. Table 3 provides recommended sheath and screw plug materials for different mediums.
- It is important to note that at all times the temperature of the sheath material should not exceed the following temperatures:

Table 2

Sheath material	Maximum temperature
Copper	360° F (180° C)
Stainless steel	1200° F (650° C)
Steel	750° F (400° C)
Incoloy	1500° F (815° C)

- Taking the environment within which the heater will operate into account, safety issues should be taken into consideration.
- Adequate temperature controlling devices, temperature and pressure high limit switches, low liquid level and flow controllers and other control/safety devices should be used. These instruments will control the heating process and protect the heater from excessive heat.
- The classification of the electrical terminal box should match the application (NEMA 1, NEMA 4, NEMA 7, NEMA 12 etc...).
- The amount of contamination that the heater will be exposed to should be taken into account.
- Electrical safety codes should be considered.

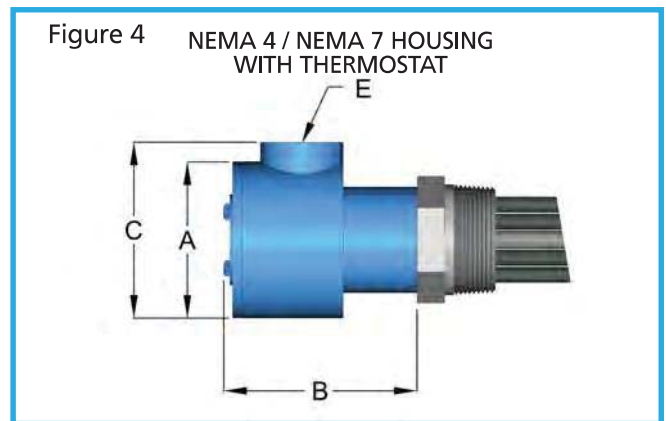
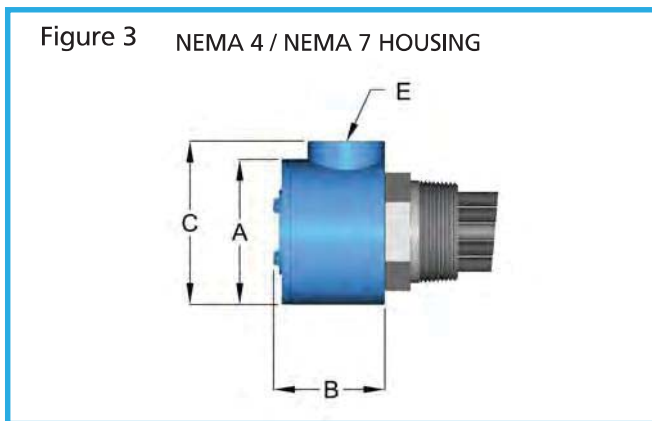
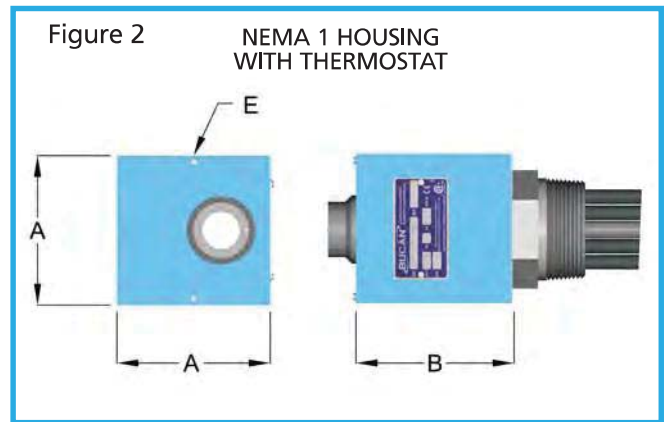
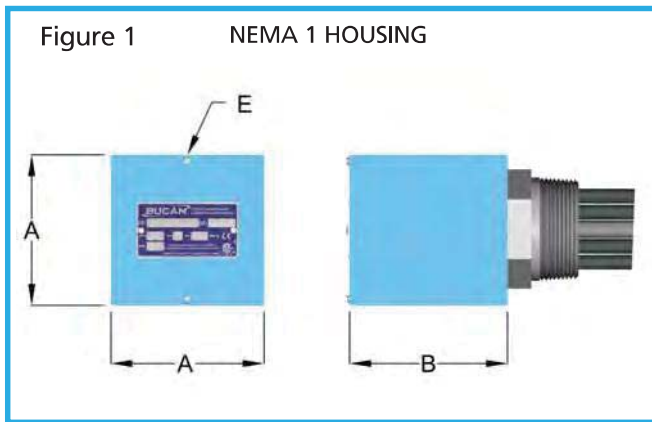
For more information, please contact our technical specialists.

Table 3

Application	Sheath material	Screw plug material	Typical watt density w/in <sup>2</sup>
Clean water	Copper	Brass	55-80
Process water	Stainless steel	Stainless steel	25-55
Oil light	Steel	Steel	20-25
Oil medium	Steel	steel	12-15
Corrosive solutions	Incoloy	Stainless steel	20-25
Vegetable oil	Stainless steel	Stainless steel	30-40
Asphalt, tar, wax	Steel	Steel	4-10
Air	Incoloy	Steel	25-30

# BUCAN SCREW PLUG IMMERSION HEATERS

## Terminal boxes



Terminal box type	Fig#	Dimensions			"E" Size hole
		A	B	C	
NEMA 1 Terminal box	Fig. 1	3 3/4" Dia.	2 3/4"	N/A	7/8" Knock-out
NEMA 1 Terminal box with built-in thermostat	Fig. 2	3 3/4" Dia.	3 3/4"	N/A	7/8" Knock-out
NEMA 4 Terminal box	Fig. 3	3 1/2" Dia.	3 1/8"	4 1/2"	1" NPT
NEMA 4 Terminal box with built-in thermostat	Fig. 4	4 1/4" Dia.	5 3/16"	5 1/4"	1 1/4" NPT

## Optional features

- Nema 4 (moisture proof) terminal box.
- Built-in thermowell.
- Built-in single or double pole thermostats.
- Passivation for stainless steel and Incoloy heaters.
- Built-in process or high limit thermocouples.
- Special screw plugs or non-standard thread sizes.

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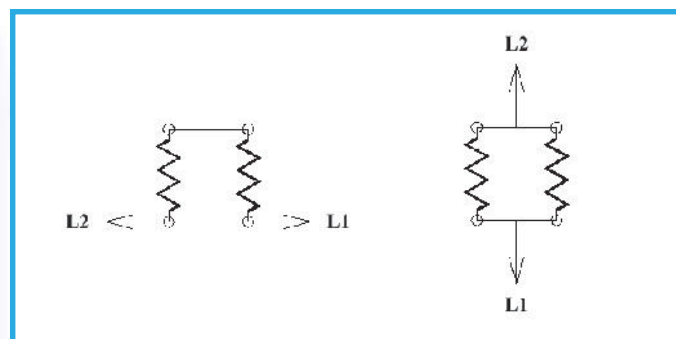
## Thermostats (Optional)

The thermostats that are utilized in screw plug heaters are the bulb and capillary style. These thermostats operate by the principle of expansion and contraction of a heat sensitive liquid found inside the bulb and capillary assembly, which controls the activation of an electrical switch inside the thermostat.

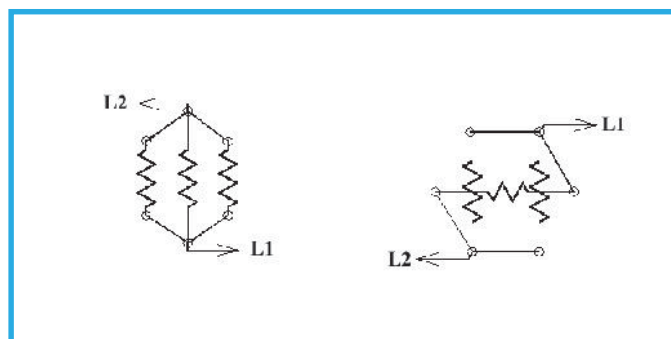
Thermostats in most cases open the electrical circuit when the desired temperature is attained (open on rise). The standard thermostat utilized is 25A max., up to 240V, single pole single throw style with a temperature range of 10-120°C. The table below shows other ranges of thermostats that are available.

Thermostat	Contact operation	Temperature range	Maximum amps	Maximum voltage
T	SPST	10 to 120 C	25 A	277 V
T1	SPST	-18 to 40 C	25 A	277 V
T2	SPST	70 to 280 C	25 A	277 V
T3	SPST	160 to 370 C	25 A	277 V
T4	DPST	10 to 120 C	15 A	600 V
T5	DPST	-18 to 40 C	15 A	600 V
T6	DPST	70 to 280 C	15 A	600 V
T7	DPST	160 to 370 C	15 A	600 V

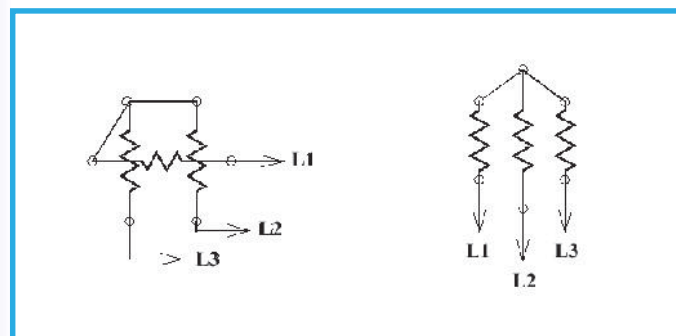
## Typical wiring diagrams for screw plug heaters



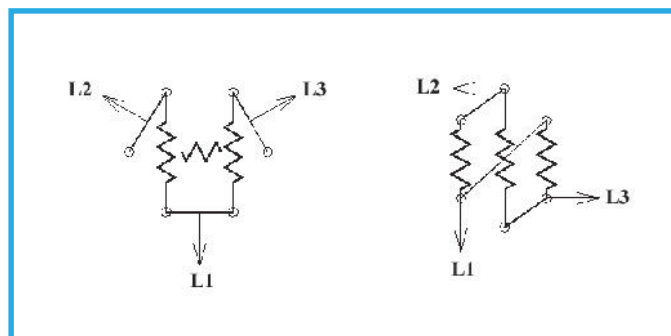
Typical wiring diagram for single phase, 2 elements



Typical wiring diagram for single phase, 3 elements



Typical wiring diagram for 3 phase wye, 3 elements



Typical wiring diagram for 3 phase delta, 3 elements