

# Standard Screw Plug Immersion Heaters



- Five day or less lead time
- Premium same-day/next-day expedite available
- Dimensional drawing included (via Watlow's Visual Designer)

Watlow® standard screw plug heaters are designed for direct immersion into a wide variety of liquid and gas heating applications. All screw plug heaters ship in five-days or less with a premium same-day/next-day expedite available. You can custom configure your screw plug heater with Watlow's Visual Designer tool on Watlow.com. The tool will guide you through all of the steps required to quickly configure and order your heater.

Screw plug immersion heaters are ideal for direct immersion heating of liquids, including all types of oils and heat transfer solutions.

Available in a variety of sizes, Watlow screw plug immersion heaters feature both WATROD™ round and FIREBAR® flat tubular elements.

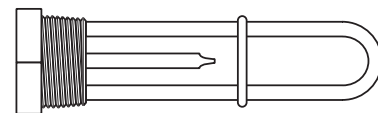
Heating elements are hairpin bent and either welded or brazed into the screw plug—depending on element sheath and plug material compatibility.

General purpose terminal enclosures are standard; with optional moisture resistant, explosion resistant and explosion/moisture resistant enclosures available to meet specific application needs.

Optional thermostats provide convenient process temperature regulation.

## Performance Capabilities

- Watt densities up to 120W/in<sup>2</sup> (18.6 W/cm<sup>2</sup>)
- Wattages up to 38 kilowatts
- UL® and CSA component recognition up to 480VAC and 600VAC respectively
- Alloy 800/840 sheath temperatures up to 1600°F (870°C)
- Passivated 316 stainless steel sheath temperatures up to 1200°F (650°C)
- 304 stainless steel sheath temperatures up to 1200°F (650°C)
- Steel sheath temperatures up to 750°F (400°C)



WATROD Heating Element

## Features and Benefits

### A variety of element sheath and screw plug materials

- Meets a variety of application needs

### Integral thermowells

- Provides convenient temperature sensor insertion and replacement without draining the fluid being heated

### Terminal enclosures

- Provides ability to be rotated to simplify connection with existing conduits (excludes explosion resistant and explosion/moisture resistant enclosures)

### Welding or brazing WATROD and FIREBAR elements to the screw plug

- Provides a pressure tight seal

### WATROD hairpins are repressed (recompacted)

- Maintains magnesium oxide density, dielectric strength, heat transfer and life

### 2-1/2 in. (64 mm) NPT screw plug assemblies feature element support(s)

- Ensures proper spacing for maximizing heater performance and life

## Typical Applications

- Water:
  - Deionized
  - Demineralized
  - Clean
  - Potable
  - Process
- Industrial water rinse tanks
- Vapor degreasers
- Hydraulic oil, crude, asphalt
- Lubricating oils at API specified watt densities
- Air and gas flow
- Caustic solutions
- Chemical baths
- Anti-freeze (glycol) solutions
- Paraffin

## Specifications

- **Screw plug and element sizes:**

|               |                                             |
|---------------|---------------------------------------------|
| 1 in. NPT     | 0.260 and 0.315 in. WATROD                  |
| 1 1/4 in. NPT | 0.260 and 0.315 in. WATROD<br>1 in. FIREBAR |
| 2 in. NPT     | 0.430 and 0.475 in. WATROD                  |
| 2 1/2 in. NPT | 0.430 and 0.475 in. WATROD<br>1 in. FIREBAR |

- **Phase capability:**

|                         |               |
|-------------------------|---------------|
| 1 in. NPT               | 1-Phase       |
| 1 1/4, 2, 2 1/2 in. NPT | 1- or 3-Phase |

UL® and CSA component recognition under File E52951 and 31388 respectively. Hazardous Location File 61707 for explosion and explosion/moisture resistant.

## Options

### Terminal Enclosures

General purpose terminal enclosures, without thermostats, are available on all screw plug immersion heaters. To meet specific application requirements, Watlow offers the following optional terminal enclosures:

- General purpose with single- or double-pole thermostat
- Moisture-resistant available with optional single- or double-pole thermostat
- Explosion-resistant Class 1, Groups B, C and D explosion resistant available with optional single- or double-pole thermostat
- Explosion and moisture-resistant combination available with optional single- or double-pole thermostat

**Note:** Unless otherwise stated on the accompanying illustrations, both WATROD and FIREBAR screw plugs are centered on the terminal enclosure. To order specify class and group, if applicable.

## CSA Certified Enclosures

CSA certified moisture and/or explosion-resistant terminal enclosures protect wiring in hazardous gas environments. These terminal enclosures, covered under CSA File number 61707, are available on all WATROD and FIREBAR screw plug immersion heaters. For additional information, contact a Watlow representative.

To order, specify **CSA certified enclosure**, **process temperature** (°F), **maximum working pressure** of application (psig), **media** being heated, **heater mounting orientation** (horizontal or vertical) and **screw plug size**.

## Pilot Light

The optional pilot light gives the operator visual indication of heater on or off power status.

The PL10 pilot light is configured to a maximum 250VAC and supplied with 6 in. (152 mm) leads.

The PL11 pilot light is rated for 480VAC and supplied with 4 in. (102 mm) leads.

Pilot lights may be attached to either single- or double-pole thermostats with general purpose enclosure only.

## Thermostats

To provide process temperature control, Watlow offers optional single-pole, single-throw (SPST) and double-pole, single-throw (DPST) thermostats.

## Thermocouples

Type J or K thermocouples offer extremely accurate sensing of process and/or sheath temperatures. A thermocouple may be inserted into the thermowell or attached to the heater's sheath.

Thermocouples are supplied with 120 in. (3048 mm) leads. Unless otherwise specified, thermocouples are supplied with temperature ranges detailed on the *Thermocouple Types* chart.

Using a thermocouple requires an appropriate temperature and power controller, these must be purchased separately. Watlow offers a wide variety of temperature and power controllers to meet virtually all applications. Temperature controllers can be configured to accept process variable inputs, too. Contact a Watlow representative for details.

To order, specify **Type J** or **K** thermocouple. Indicate if the thermocouple is for **process temperature sensing** or heater sheath **high-limit protection**. Please specify if the screw plug will be mounted **vertical** or **horizontal** in the tank. If **vertical**, **indicate if the enclosure is on top or bottom**.

If the screw plug heater is mounted in an in-line circulation heating application, indicate flow direction relative to the heater's enclosure.

## Options (Continued)

### Thermocouple Types

| ASTM Type | Conductor Positive      | Characteristics Negative  | Recommended Temperature Range °F °C |
|-----------|-------------------------|---------------------------|-------------------------------------|
| J         | Iron (Magnetic)         | Constantan (Non-Magnetic) | 0 to 1000 (-20 to 540)              |
| K         | Chromel® (Non-magnetic) | Alumel® (Magnetic)        | 0 to 2000 (-20 to 1100)             |

**Note:** Type J and Type K thermocouples are rated 32 to 1382°F and 32 to 2282°F (0-750°C and 0-1250°C), respectively. Watlow does not recommend exceeding temperature ranges shown on this chart for the tubular product line.

### Wattages and Voltages

Watlow routinely supplies screw plug immersion heaters with 120 to 480VAC as well as wattages from 250 watts to 38kW. If required, Watlow may configure heaters with voltages and wattages outside these parameters. For more information on special voltage and wattage configurations, contact a Watlow representative.

### Sheath Materials

The following sheath materials are available on WATROD and FIREBAR heating elements:

#### Standard Sheath Materials

|         |                                                                  |
|---------|------------------------------------------------------------------|
| WATROD  | Alloy 800/840<br>304 SS*<br>316 SS<br>Copper clad steel<br>Steel |
| FIREBAR | Alloy 800                                                        |

\* **Note:** 304 SS available in longer lead times.

### External Finishing

#### Passivation

During the manufacturing process, particles of iron or tool steel may become embedded in the stainless steel or alloy sheath. If not removed, these particles may corrode, produce rust spots and/or contaminate the process. For critical applications, passivation will remove free iron from the sheath. To order, specify **passivation**.

#### Other Finishes

Bright annealing available to meet cosmetic demands.

### Screw Plug Materials

The following screw plug materials are available:

To order, specify **screw plug size and material**.

#### Standard Screw Plug Materials

|         |                                    |
|---------|------------------------------------|
| WATROD  | 304 SS<br>316 SS<br>Steel<br>Brass |
| FIREBAR | 304 SS                             |

### Screw Plug Sizes

American National Standard Taper Pipe Thread form (NPT) plugs are standard and in sizes 1, 1 1/4, 2, and 2 1/2.

To order specify **size and material**.

### Screw Plug to Flange Adapters

Screw plug to flange adapters permit replacing flange heaters with screw plug heaters. To order, specify the appropriate part number.

| Screw Plug to Flange Adapter Sizes | Material | Estimated Shipping Weight lbs (kg) | Delivery                                                                              | Part Number |
|------------------------------------|----------|------------------------------------|---------------------------------------------------------------------------------------|-------------|
| 1 1/4 to 3 in. -150#               | Steel    | 13 (5.9)                           |    | 125X3SA     |
| 2 1/2 to 3 in. -150#               | Steel    | 11 (5.0)                           |  | 250X3SA     |
| 2 1/2 to 4 in. -150#               | Steel    | 16 (7.3)                           |  | 250X4SA     |
| 2 1/2 to 5 in. -150#               | Steel    | 25 (11.3)                          |  | 250X5SA     |
| 2 1/2 to 6 in. -150#               | Steel    | 33 (15.0)                          |  | 250X6SA     |

Configure your screw plug heater at:  
[www.watlow.com/design-a-product](http://www.watlow.com/design-a-product)

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