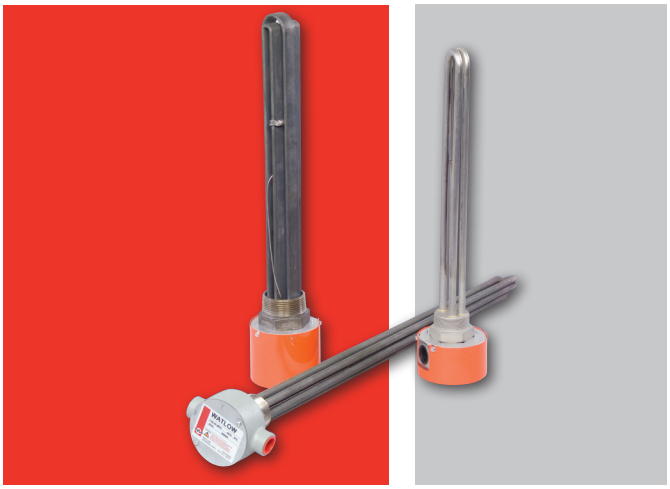
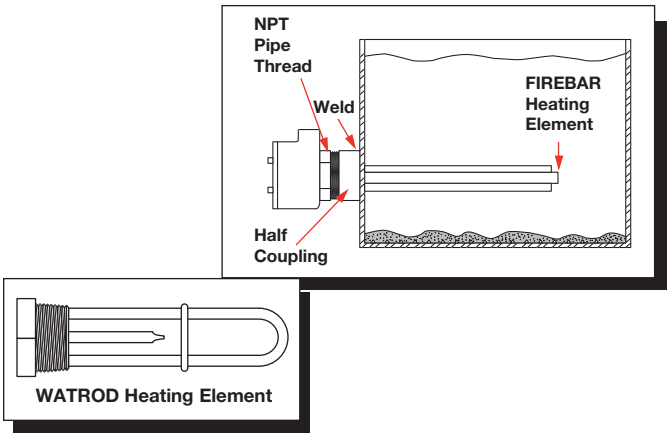
Screw Plug Immersion Heaters

Ideal for Direct Immersion Heating of Liquids





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 120 W/in^2 (18.6 W/cm^2)
- 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)

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

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

WATLOW®

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 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 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.

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 or corrosion-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, add the suffix letter(s) to the screw plug heater's base part number. Also, 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 and heater **mounting orientation** (horizontal or vertical) and **screw plug size**.

ASME Pressure Vessel Code Welding

Screw plug assemblies can be provided with an ASME Section VIII, Div. I pressure vessel stamp upon request.

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.

Unless otherwise specified, thermostats are mounted inside the terminal enclosure. Please verify that the thermostat's sensing bulb O.D. is compatible with the screw plug's thermowell I.D.

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 (longer lead lengths available). 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 and lead length. 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 housing 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 Characteristics Positive	Conductor Characteristics Negative	Recommended Temperature Range °F	Recommended Temperature Range (°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 800/840 316 SS Steel
FIREBAR	Alloy 800

Extended Sheath Materials

WATROD	304 and 321 SS Alloy 400 and 600 Titanium Hastelloy C276
FIREBAR	304 SS Alloy 800

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	316 SS Steel Brass
FIREBAR	304 SS

Extended Screw Plug Materials

WATROD	304, 304H, 316H, 321 SS Titanium Alloy 400 and 600 Hastelloy C276 Alloy 800/840

Screw Plug Sizes

Including European

- **NPT**– ¾, 1, 1¼, 2, 2½ in.

To order, specify **size**, **style** (NPT) and material.

- **Gas (Gas Pipe Standard)** – G1¼, G1½, G2 in. (brass only)
- **BSP (British Standard Pipe)** – 1½, 2 in. (stainless steel only)

Contact a Watlow representative for sizes and materials not listed.

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 Wt. lbs	Estimated Shipping Wt. (kg)	Delivery	Part Number
1¼ to 3 in.-150#	Steel	13	(5.9)	RS	**125X3SA**
2½ to 3 in.-150#	Steel	11	(5.0)	RS	**250X3SA**
2½ to 4 in.-150#	Steel	16	(7.3)	RS	**250X4SA**
2½ to 5 in.-150#	Steel	25	(11.3)	RS	**250X5SA**
2½ to 6 in.-150#	Steel	33	(15.0)	RS	**250X6SA**

RAPID SHIP

- **RS** - Next day shipment up to 3 pieces

To be automatically connected to the nearest North American Technical Sales Office:

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