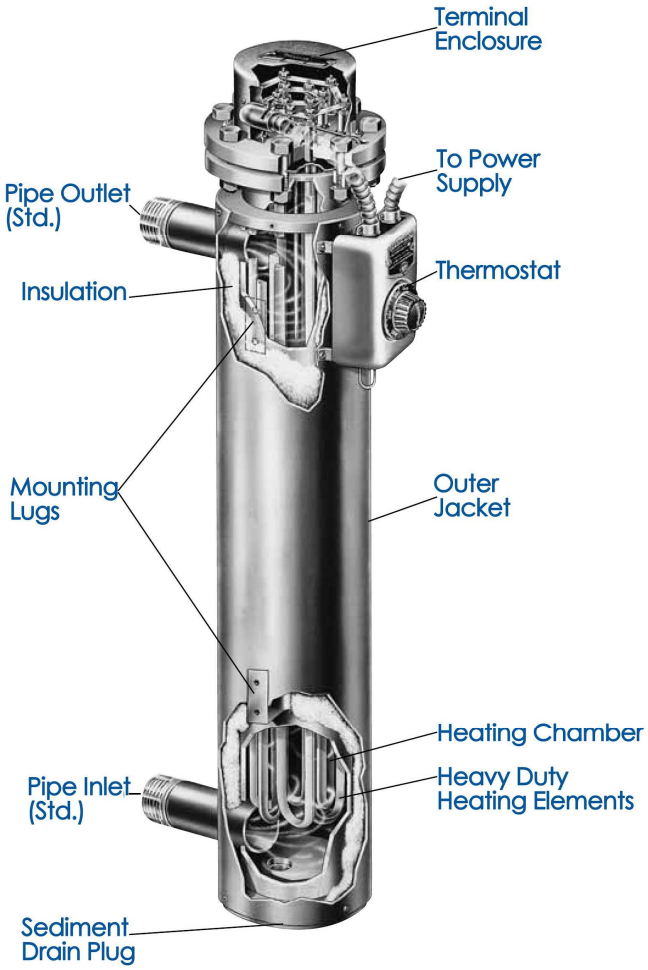
Thermal Solutions of Texas

Circulation Heaters

Designed to Heat Forced-Circulation Air, Gases or Liquids

Circulation heaters provide a ready-made means to install electric heating with a minimal amount of time and labor. This is accomplished by combining heating elements, vessel, insulation, terminal enclosure, mounting brackets and inlet and outlet connections into a complete assembly.

Made from National Pipe Thread (NPT) screw plug or ANSI flange heater assemblies combined with a pressure vessel, circulation heaters are designed to heat forced-circulation air, gases or liquids. Ideal for either in-line or side-arm operations, these assemblies direct fluids past the heating elements, to deliver fast response and even heat distribution.



Thermal Solutions of Texas meets virtually all circulation heater assembly needs. Thermal Solutions circulation heaters can be made from a wide range of heating element sheath materials, wattages, vessel sizes and materials, pressure ratings, terminal enclosures and controls.

Performance Capabilities

- Watt densities up to 120 W/in² (18.6 W/cm²)
- Wattages to three megawatts
- UL® and CSA component recognition up to 480VAC and 600VAC
- Ratings to ANSI Class 600 pressure class
- Incoloy® sheath temperatures are rated up to 1600°F (870°C)
- Passivated 316 Stainless Steel sheath temperatures are rated up to 1200°F (650°C)
- Steel sheath temperatures are rated to 750°F (400°C)
- Copper sheath temperatures are rated to 350°F (175°C)
- Up to 3000psi design pressure

14306 Mary Jane Lane ■ Tomball, TX 77377
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Features and Benefits

- Varieties of screw plug and flange units are available to meet your specific application requirements
- ANSI B16.5 Class 150 on 4 or 6 inch FIREBAR element flanges and 30 inches or above on WATROD element flanges meet recognized agency standards
- Maximum available nozzle connection is approximately 15 feet end-to-end (WATROD only) to minimize vessel diameter and wall thickness.
- FIREBAR assemblies pack more wattage in a smaller heater bundle which replaces larger flanges with round tubular elements with a smaller package.
- 1 inch (25 mm) thermal insulation is rated to 750°F (400°C), reducing heat loss from the vessel
- A heavy-gauge steel jacket (shroud) protects thermal insulation and heating vessel and comes with protective primer coating.
- All catalog units are rated to ANSI pressure Class 150 and provide pressure vessels (tanks) that are either carbon or 316 Stainless Steel.
- Pressure vessels are rated for up to and including ANSI pressure class 2500 (application review required). This provides pressure vessels (tanks) available in carbon steel, 304 or 316 Stainless Steel materials and includes schedule 40, standard and 80 pipe used in the pressure vessel construction.
- Heaters are provided with NPT or ANSI Class 150 nozzle connections, making installation easy.
- Inlet and outlet nozzle connections are threaded MNPT on 8 in. (203 mm) and smaller tanks.
- Class 150 flanged connections on 10 in. (254 mm) and larger tanks
- Mounting lugs are welded onto the tank wall of all 21⁄2 in. (64 mm) NPT and larger units to provide mounting support
- General purpose, moisture resistant, moisture/explosion resistant enclosures are available and offer easy access to terminal wiring
- Flange mounting holes straddle centerline to comply with industry standards UL® and CSA component recognition under file numbers E52951 and 31388 respectively

Typical Applications

- Water:
  - *Deionized*
  - *Demineralized*
  - *Clean*
  - *Potable*
- Process
  - *Industrial water rinse tanks*
  - *Hydraulic oil, crude, asphalt*
  - *Lubricating oils at API specified watt densities*
  - *Heat transfer oil and Paraffin*
  - *Caustic cleaners*
  - *Nitrogen, hydrogen and other air/gas systems*
  - *Superheating steam*

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Options

Stand-off Terminal Enclosures

Stand-off terminal enclosures help protect the enclosure against excessive temperatures.

ASME Pressure Vessel Code Welding

Flange or screw plug assemblies can be provided with an ASME Section VIII or Section I, Division I pressure vessel stamp upon request.

Branch Circuits

Branch circuits are designed for 48 amperes per circuit maximum. Contact a Thermal Solutions of Texas representative for circuit requirements other than those listed in the stock charts.

Thermostats (Electro-mechanical Type)

To provide process temperature control, Thermal Solutions of Texas offers optional single- and double-pole thermostats. Thermostats are typically mounted in the terminal enclosure. Optional side mounting on vessels are also available.

Certified Assemblies

CSA, ATEX or IEC Ex certified moisture and/or explosion resistant terminal enclosures protect wiring in hazardous gas environments. These terminal enclosures, covered under CSA file number 61707, ATEX certificate # KEMA 07ATEX0172X or IEC Ex certificate # IEC Ex CSA 09.0010 are available on WATROD flange heaters. To order, specify CSA or ATEX or IEC Ex certified enclosure, process temperature (°F), maximum ambient temperature, maximum working pressure of application (psig), media being heated and heater mounting orientation (horizontal or vertical) and flange size.

Baffles

Baffles mounted on the heating element bundle enhance and/or modify liquid or gas flow for better heat transfer. For critical sheath temperature and low flow conditions, baffles may be required.

Thermocouples

To sense process or element sheath temperature, ANSI Type J or K thermocouples are available.

Screw Plug and Flange Standard Sizes

Type	Sizes (in.)
NPT Screw Plugs	1¼, 2½
ANSI flanges	3, 4, 5, 6, 8, 10, 12, 14

Sheath Materials

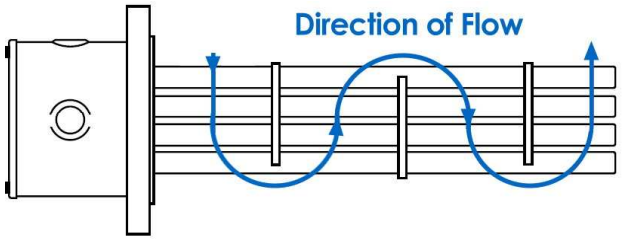
The following sheath materials are available on WATROD and FIREBAR heating elements:

Standard Sheath Materials

WATROD	Incoloy® 316 Stainless Steel Steel Copper
FIREBAR	Incoloy®

Made to Order Sheath Materials

WATROD	304 Stainless Steel Monel®
FIREBAR	304 Stainless Steel



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Options (*continued*)

Wattages and Voltages

Thermal Solutions of Texas routinely supplies circulation heaters from 120 to 600VAC (WATROD to 600VAC) as well as wattages from 500 watts to three megawatts. If required, Thermal Solutions will configure circulation heaters with voltages and wattages outside these parameters. For more information on special voltage and wattage configurations, contact a Thermal Solutions representative.

Weatherproof Protective Steel Jacket (Shroud)

To protect circulation heaters from weather or wash-down conditions, fully welded (weatherproof) or partially welded (standard) outer protective steel jackets are available. Standard steel or made-to-order 304 or 316 stainless steel can be supplied. Jacket diameter is dependent upon thermal insulation thickness. To order, specify protective steel jacket, material type and weatherproof, if desired.

Pressure Vessels

All catalog pressure vessel (tank) materials consist of schedule 40 pipe and 150# class forged fittings and are made from either Carbon steel or 316 stainless steel. All catalog pressure vessels (tanks) are steel unless otherwise noted. 316 stainless steel pressure vessels (tanks) are passivated on all wetted surfaces. They are available from Assembly Stock on 2½ inch NPT and 4 or 6 inch ANSI flange circulation heaters. Made-to-order units can be made in a variety of materials, flange sizes and pressure classes. To order, specify pressure vessel size, material and pressure class.

Support Saddles

To mate with an existing installation, customized support saddle(s) and/or mounting lugs are available for horizontal or vertical mounting. To order, specify mounting lugs or support saddles and supply a dimensional drawing.

Passivated Finish

For critical applications, passivation will remove free iron from all wetted surfaces. Contact a Thermal Solutions representative for details.

Gaskets

Rubber, asbestos-free and spiral wound gaskets are available for all heater flange, and inlet and outlet flange sizes. Thermal Solutions recommends ordering spares in case replacement becomes necessary. To order, specify gasket type, flange size/rating and process operating temperature.

Inlet and Outlet Nozzle Connections

All inlet and outlet materials are compatible with the pressure vessel material and pressure class rating. Vessel sizes from 1 1/4 to 8 inches are typically configured with Male National Pipe Thread (MNPT) nozzles. Optional NPT and flange sizes can be supplied to mate with existing piping.

10 inch and larger vessels are supplied with Class 150 inlet and outlet flanges. Optional flanges up to Class 2500 can be provided. To order, specify type, size and pressure class rating for both inlet and outlet nozzle/flange connections.

High-Temperature Thermal Insulation

To further minimize heat loss, the pressure vessel's standard one inch thermal insulation wrap may be replaced with thicker and/or higher temperature insulation. For more information, contact your Thermal Solutions representative. To order, specify insulation thickness, standard or high temperature insulation and temperature rating. Vessels may be supplied with a primer coating without insulation. To order, specify no insulation.

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Ordering Information

① Stock Plug or ANSI Flange Part Number	② Optional Terminal Enclosure	③ Optional Process Sensor	④ Sheath Limit Sensor

① Stock Plug or ANSI Flange Part Number	
Insert Part Number	
Note: Catalog part numbers include optional enclosures and process sensors. To order optional enclosures or sensors, substitute the appropriate suffix.	

② Optional Terminal Enclosure		
S	=	General purpose enclosure
W	=	Moisture resistant enclosure
E	=	Explosion resistant enclosure
C	=	Moisture / Explosion resistant enclosure

Note: Catalog part numbers include optional enclosures and process sensors. To order optional enclosures or sensors, substitute the appropriate suffix.

③ Optional Process Sensor		
1	=	30 to 110°F (-1 to 43°C), SPST
2	=	30 to 250°F (-1 to 121°C), SPST
3	=	175 to 550°F (79 to 288°C), SPST
4	=	40 to 110°F (-1 to 43°C), DPST
5A	=	60 to 250°F (16 to 121°C), DPST (FIREBAR)
7A	=	100 to 500°F (38 to 288°C), DPST (FIREBAR)
J	=	Type J process thermocouple in thermowell
K	=	Type K process thermocouple in thermowell

④ Sheath Limit Sensor (Thermocouple)		
HJ	=	Type J high-limit T/C, horizontal mount
TJ	=	Type J high-limit T/C, vertical/housing at top
BJ	=	Type J high-limit T/C, vertical/housing at bottom
HK	=	Type K high-limit T/C, horizontal mount
TK	=	Type K high-limit T/C, vertical/housing at top
BK	=	Type K high-limit T/C, vertical/housing at bottom

Note: Heater orientation is critical to accurate sensing of limit conditioners. Use the appropriate code to indicate heater mounting orientations.

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