

The TF Series fluoropolymer immersion heaters are designed for the most demanding chemical applications and to provide years of trouble-free performance. The heaters are ideal for the Semiconductor, FPD, MEMS, and Biomedical industries, as well as other similar demanding applications.

A complete heater and control system package should include all of the following components:

- Immersion heater
- Temperature control with safety interlocks
- Power module
- Gas purge flow regulator module

SPECIFICATIONS:

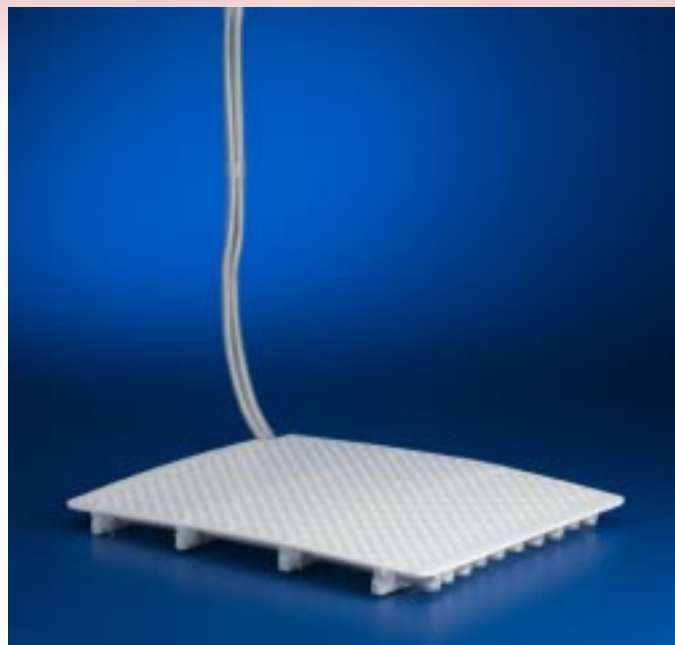
Service: Immersion chemical heater with 100% fluoropolymer wetted surfaces for virtually any non-flammable process solution including HF and KOH.

Standard Features:

- PTFE immersion heater element with .015 inch (38mm) thick fluoropolymer sheath for safety and long service life (see Options section)
- Patented “gas purged” element design: Low flow gas purge inside heater element ensures maximum element life by removing any chemical permeation through the sheath
- Braid between the coiled resistance wire and the outer sheath ensures even coil separation and eliminates the potential for hot spots
- Low profile design: Single layer bottom heaters are less than one inch (25mm) thick
- Two basic configurations available:
 - TFB: bottom style (full bottom surface coverage)
 - TFW: inside wall style (hugs inside walls)
- Perforated PTFE fluoropolymer guard (TFB style heater):
 - Provides protection against physical damage of the heater
 - False bottom on which carriers rest

Heater Sizes: From 500 watts up to 12,000 watts

Temperature Range: Up to 130° Celsius (266° F). For higher temperatures, see Options section.



TFB Series heater pictured.

Safety Features:

- Heater element over-temperature sensor (J-type thermocouple standard)
- Heater element over-temperature thermal fuse or thermal cutoff device (TCO)
- Heater gas purge pressure monitor (part of optional control package) with back pressure switch to alert operator of sheath breach
- Standard safety circuit for typical installation should consist of all of the following:
 - Liquid level control
 - Process temperature sensor
 - Process over-temperature alarm
 - Gas purge verification and interlock
 - Heater element over temperature control

Warranty: One year

Watt density:

- Up to 10 watts per square inch (1.5w/cm²)
- **NOTE:** Highly viscous chemistry and high temperature applications may require a lower watt density heater than standard

Heater Voltages Available: 120 to 600 volts, single or three phase. (For heaters larger than 6kW, three phase power is recommended.)

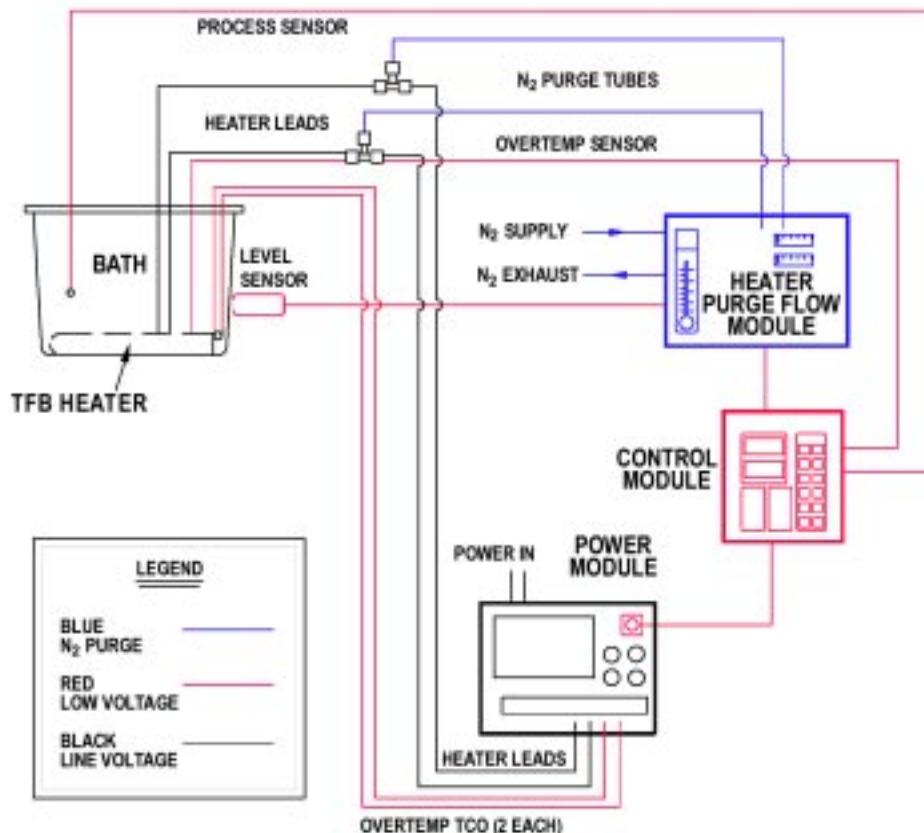
FEATURES AND BENEFITS:

- **Faster heat-up:** Single heater sizes up to 12kW. The heater is in direct contact with the process solution, which results in faster heat-up, more efficient and uniform heating, and faster recovery rates.
- **Exceptionally clean performance:** Thick fluoropolymer sheath minimizes permeation. Purge monitoring helps protect against process contamination.
- **Long heater life for reduced cost of ownership (COO):** Patented heater gas purge system continuously removes chemical permeation and ensures exceptionally long element life.
- **Rugged construction:** Thick walled construction provides extremely long life expectancy in even the harshest applications.
- **Rapid installation:** Direct immersion heaters are much easier and less expensive to replace than other style heaters.
- **Outstanding chemical compatibility:** All wetted parts are fluoropolymer and compatible with virtually any chemistry for unlimited process options. (Not to be used with flammable solutions.)
- **Excellent temperature stability:** Low watt density design promotes process temperature uniformity.

Options:

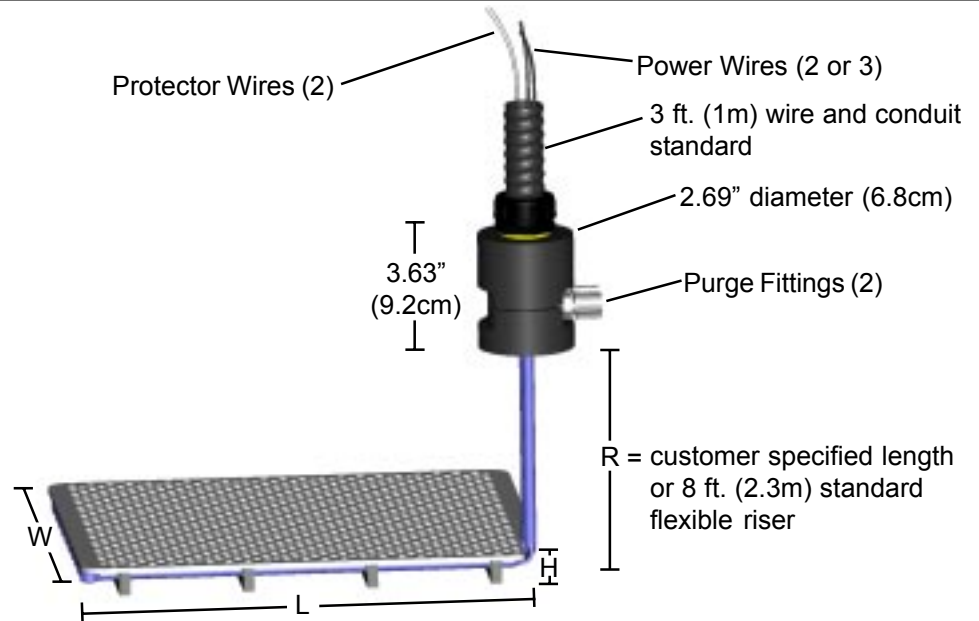
- Custom heater configurations built to customer specifications
- .030 inch (76mm) thick sheath available for applications above 130°C or for use with certain chemistries such as nitride etch or HF
- PID temperature control module
 - +/- .5° C control (depending on conditions)
 - Process J-type thermocouple standard
 - Membrane style switch panel with countdown process timer
 - Low voltage panel mount control with separate power module
 - Safety device and alarm display monitors the following:
 - Level sensor
 - Purge back pressure
 - Element over-temperature sensor(s)
 - Process over-temperature sensor
- Element gas purge flow regulator panel including:
 - Flow regulator
 - Flow meter
 - Back pressure switch
- PLC temperature control
- Lower watt density heaters for special applications
- Customized process and over-temperature control sensors
- Bolt down feature

HEATER AND CONTROL SYSTEM DIAGRAM



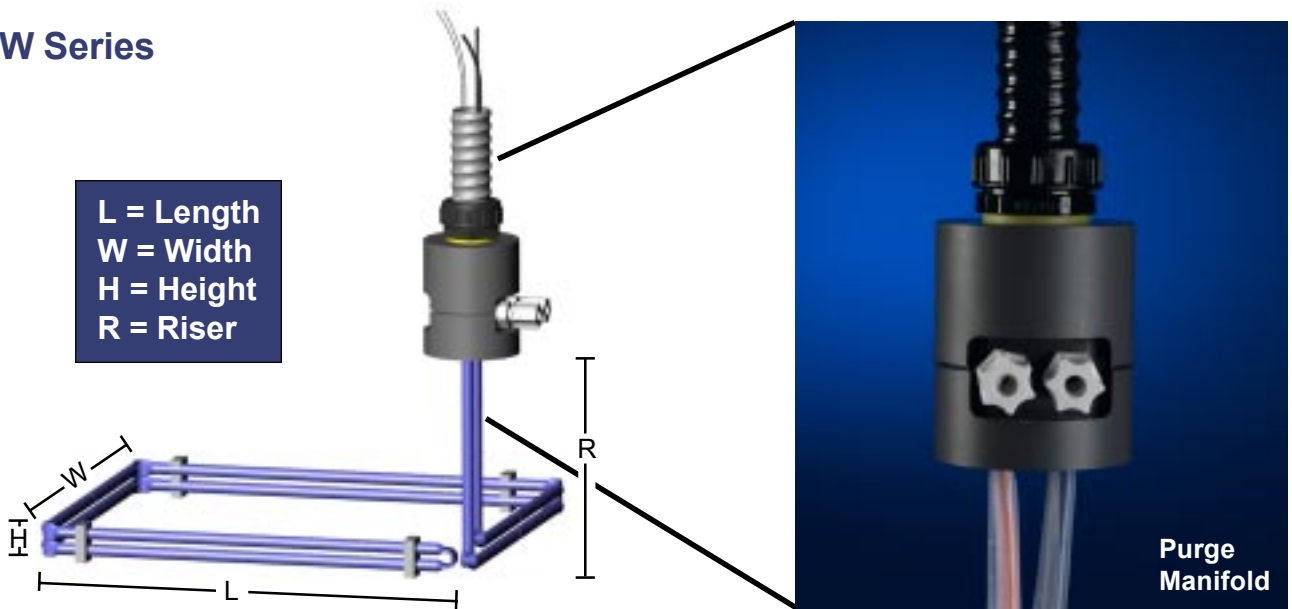
TFB Series

L = Length
W = Width
H = Height
R = Riser

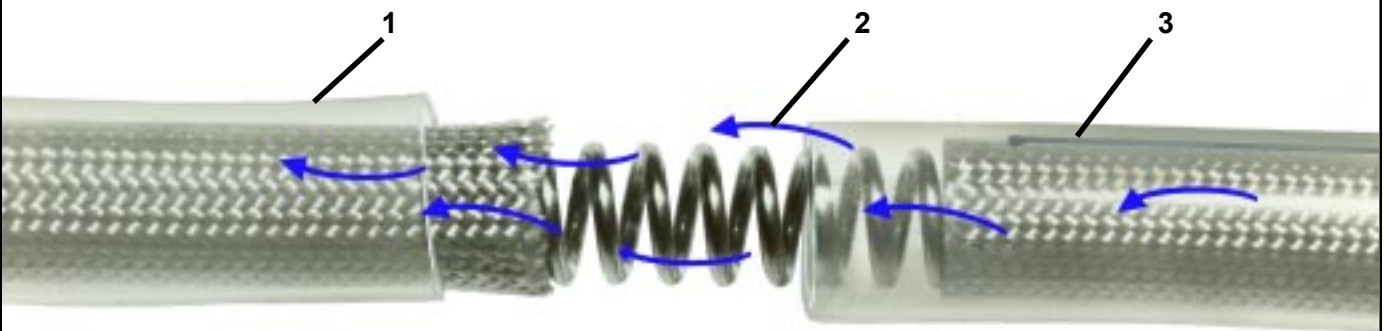


TFW Series

L = Length
W = Width
H = Height
R = Riser



Heater Element Construction



1. Fluoropolymer Sleeve Heating Element
Quality resistance element is sleeved in braided material for even coil separation. The entire element is given an outer sleeving of pretested and pre-extruded fluoropolymer tubing. THIS IS NOT A COATED PRODUCT.

2. N₂ Purge System
The N₂ Purge monitors heater integrity and prevents condensation or diffusion of corrosive gases by purging nitrogen or clean dry air through the tubing.

3. Over-temperature Thermocouple
The over-temperature cutoff device protects the integrity of the fluoropolymer heater. If an operator should leave the heater on while draining or aspirating a tank, when used in conjunction with a temperature control device, it will automatically shut off the heater when it is exposed to air.

TFB/TFW SERIES

SAMPLE TFB SERIES DIMENSIONS (for SB Series tanks)				
MODEL NUMBER	WATTAGE	LENGTH In./(mm)	WIDTH In./(mm)	HEIGHT In./(mm)
1TFB-500	500	7.5 (191)	5 (127)	1 (25)
1TFB-750	750	9 (229)	7 (178)	1 (25)
2TFB-1000	1000	7.5 (191)	5 (127)	1.5 (38)
1TFB-1500	1500	10.5 (267)	8.5 (216)	1 (25)
2TFB-1500	1500	9 (229)	7 (178)	1.5 (38)
2TFB-1500	1500	11 (279)	7 (178)	1.5 (38)
1TFB-2000	2000	14 (356)	9 (229)	1 (25)
2TFB-2000	2000	13 (330)	7 (178)	1.5 (38)
2TFB-2000	2000	14.5 (368)	6.5 (165)	1.5 (38)
3TFB-2000	2000	7.5 (191)	7.5 (191)	2 (51)
2TFB-2500	2500	10 (254)	10 (254)	1.5 (38)
2TFB-3000	3000	10.5 (267)	8.5 (216)	1.5 (38)
3TFB-3000	3000	11 (279)	7 (178)	2 (51)
2TFB-4000	4000	14 (356)	9 (229)	1.5 (38)
3TFB-4000	4000	13 (330)	7 (178)	2 (51)
2TFB-4500	4500	20 (508)	10 (254)	1.5 (38)
3TFB-4500	4500	14.5 (368)	6.5 (165)	2 (51)

NOTE: Heater dimensions, wattages and voltages can vary to meet your specific application.
These dimensions represent heaters to fit standard sized tanks.

SAMPLE TFW SERIES DIMENSIONS				
MODEL NUMBER	WATTAGE	LENGTH In./(mm)	WIDTH In./(mm)	HEIGHT In./(mm)
1TFW-3000	3000	9 (229)	14 (356)	3.5 (89)
1TFW-3000	3000	10 (254)	10 (254)	4 (102)
1TFW-3000	3000	7 (178)	11 (279)	5 (127)
1TFW-3000	3000	7 (178)	13 (330)	5 (127)
1TFW-3000	3000	8.5 (216)	10.5 (267)	5 (127)

The above example shows available dimensions for a 3000 watt heater. Each of our fluoropolymer wall heaters has this flexibility in design. Dependant upon tank size, we can custom fit a heater for most needs, please consult factory.

