

**PROCESS
TECHNOLOGY**

TIH Series

In-Line Chemical Heater

The TIH Series in-line fluoropolymer heater is ruggedly designed for the most demanding recirculation or single pass chemical applications and can provide many years of trouble-free performance. The heater is typically used in conjunction with a chemical bath or spray system with an external pump/filter. The heater provides high purity heating of chemistry for the semiconductor, FPD, MEMS, biomedical and other industries.

TIH Series Applications Include:

- SC1: ammonium hydroxide (NH_4OH), and hydrogen peroxide (H_2O_2)*
- SC2: hydrochloric acid (HCL), and hydrogen peroxide
- Buffered oxide etch (BOE) process: hydrofluoric acid (HF) and ammonium fluoride (NH_4F)
- Nitride etch/strip: phosphoric acid (H_3PO_4)
- Various acids such as:
 - Hydrochloric (HCL)
 - Hydrofluoric (HF)
 - Acetic ($\text{C}_2\text{H}_4\text{O}_2$)*
 - Nitric (HNO_3)
 - Sulfuric (H_2SO_4)
- Sulfuric acid and hydrogen peroxide
- Sulfuric acid and ozone (O_3)
- Hydrofluoric acid and glycol ($\text{C}_2\text{H}_6\text{O}_2$)
- Potassium hydroxide (KOH)*
- Sodium hydroxide (NaOH)*
- Electroless nickel*
- Electroless copper*
- Electroless gold*
- Deionized water*
- Some solvents* (consult factory)

* Purged element option recommended but not required for these chemistries

SPECIFICATIONS:

Service: In-line chemical heater with all fluoropolymer wetted surfaces for virtually any wet chemistry application

Temperature Range: Up to 180° C chemistry

Maximum Working Pressure: 225 PSI (15 Bar) at 25°C, 60 PSI (4 Bar) at 180° C

Heater Sizes: 1,000 watts up to 18,000 watts



Heater Voltages Available: 120 to 600 volts, single or three phase (12kW and larger require three phase)

Watt Density: 10 watts per square inch (1.5w/cm²)

Fluid Connections Available:

- ½-inch (12mm) to 1-inch (25mm) flared connections
- ½-inch (12mm) to 1-inch (25mm) Super 300 Type Pillar® connections

Certifications: CE, UL, and Semi S2

Warranty: One year

Element Purge:

- Small amount of clean dry air (CDA) or nitrogen gas flows between the metal grounded element and the PTFE sheath
- Purge minimizes potential for ionic contamination
- Removes chemical permeation for longer service life

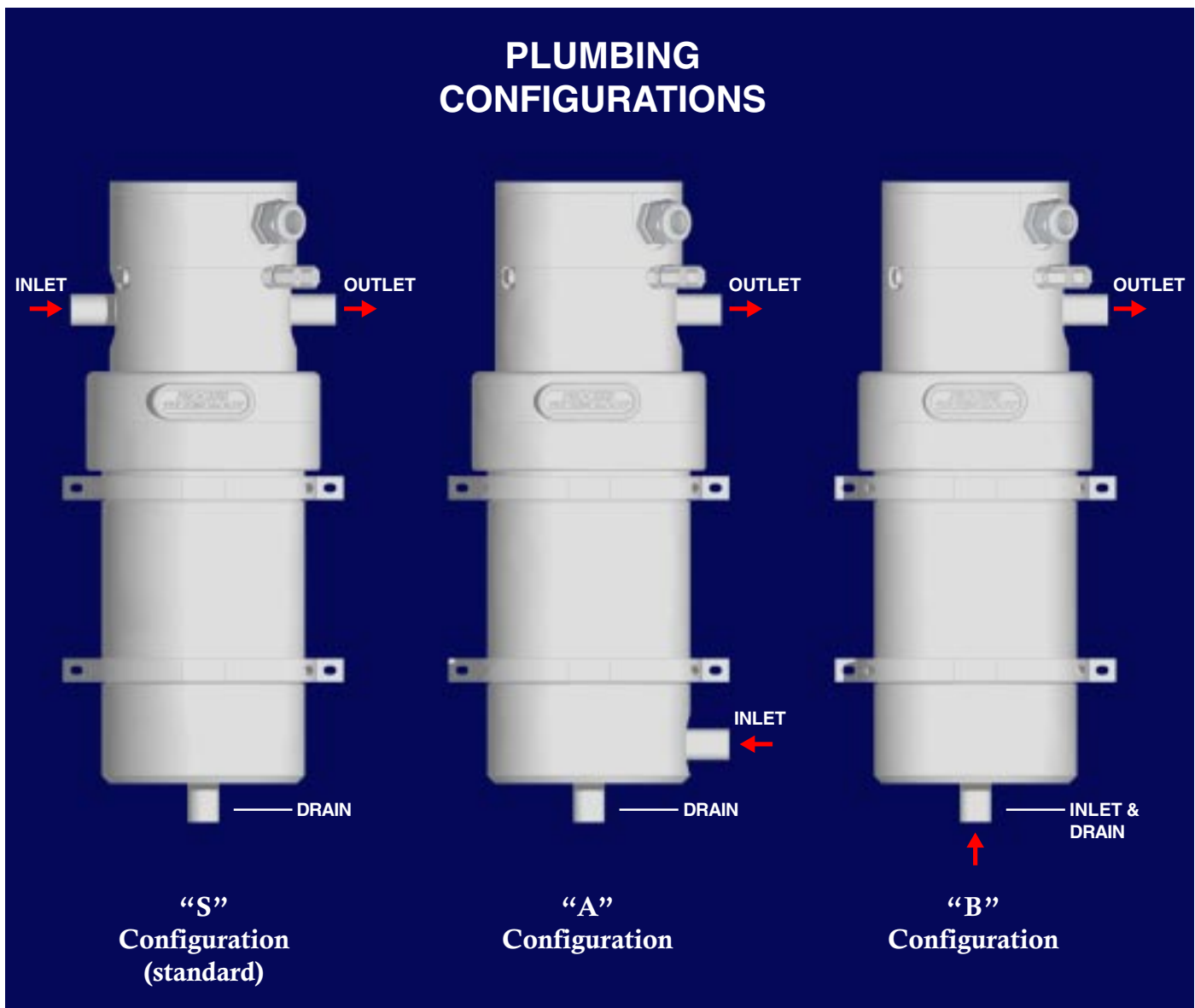
SPECIFICATIONS (continued):

Standard Features:

- .030" (.76mm) PTFE sheathed grounded heating element for long service life
- Patented gas-purged element design
- FM4910 compliant materials of construction
- Rugged, heavy-wall chamber construction (¾-inch (19mm) thickness)
- 10' (3m) FEP sleeved power and control cables
- Process temperature sensors (FEP sheathed 1000 ohm RTD)
- Heater element overtemperature sensors (FEP sheathed 1000 ohm RTD)
- Heater element thermal cutoff device (TCO)
- Corzan® CPVC junction box, flange cover and mounting brackets

Options:

- Alternate plumbing configurations
- "J", "K" or "E" type process and element thermocouples
- Lower watt density heaters for special applications
- PVDF high temperature mounting brackets
- Capacitive style liquid level verification
- PID temperature control module
- PLC temperature control module with patented Demand Anticipation Control (DAC™)
- Element purge flow regulator panel including:
 - Flow regulator
 - Flow meter
 - Back pressure switch



FEATURES AND BENEFITS:

Faster heatup: Single heater chamber sizes up to 18kW.

Exceptionally clean performance: Thick fluoropolymer sheath minimizes permeation. Element purge monitoring minimizes ionic contamination potential. Cleanroom assembly and testing ensures the highest manufacturing standards.

Long heater life for reduced cost of ownership (COO): Patented heater gas purge system continuously removes any chemical permeation and ensures long element life.

Long heater life and clean operating: Patented heater gas purge system continuously sweeps clean any chemical permeation and ensures exceptionally long element life. This system also protects against any potential ionic contamination of the chemistry.

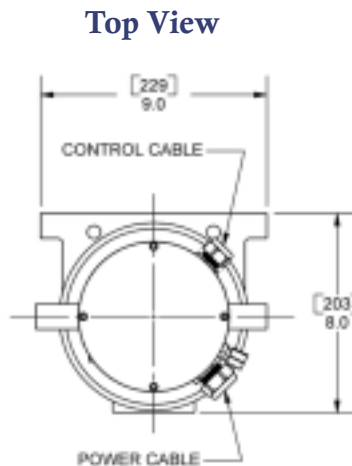
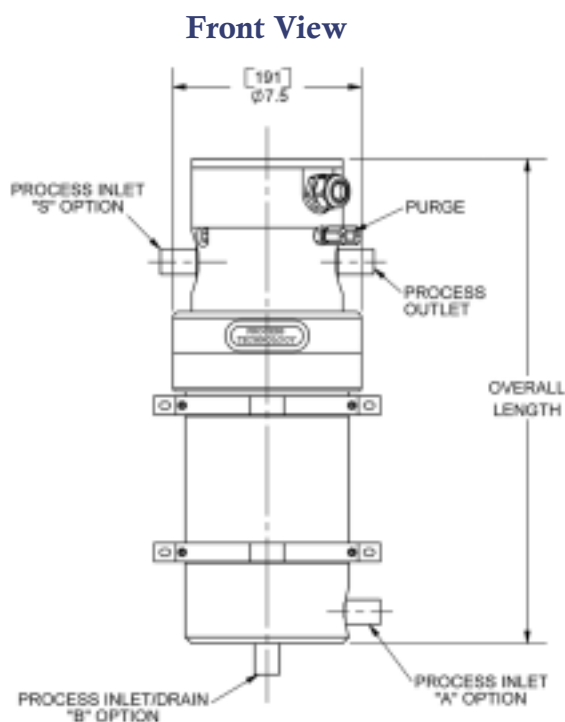
Rugged construction: Thick walled chamber provides long service life in the harshest high temperature applications.

Rapid installation: Customized plumbing connections available to match existing plumbing and ease installation.

Outstanding chemical compatibility: All fluoropolymer wetted parts compatible with virtually any chemistry.

Excellent temperature stability: Low watt density design enables accurate control of process temperature.

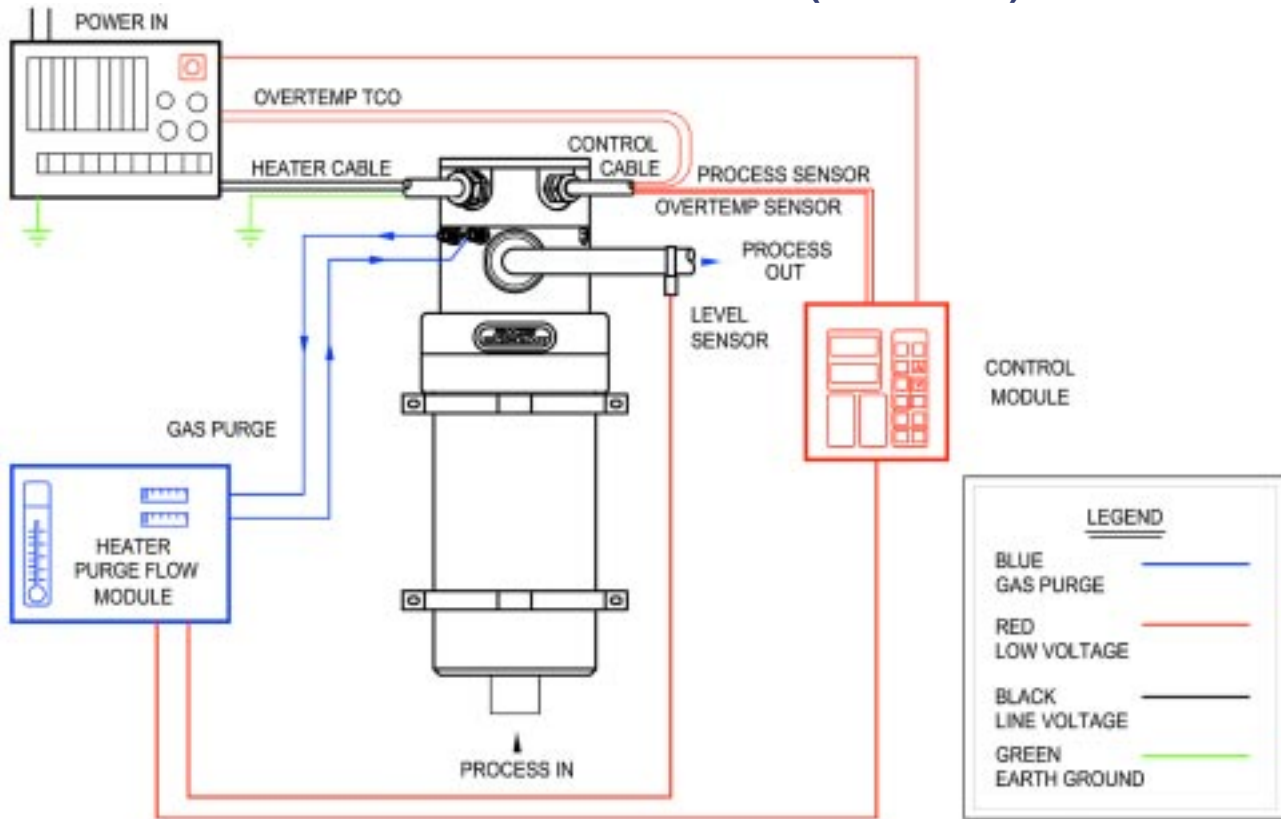
DIMENSIONS



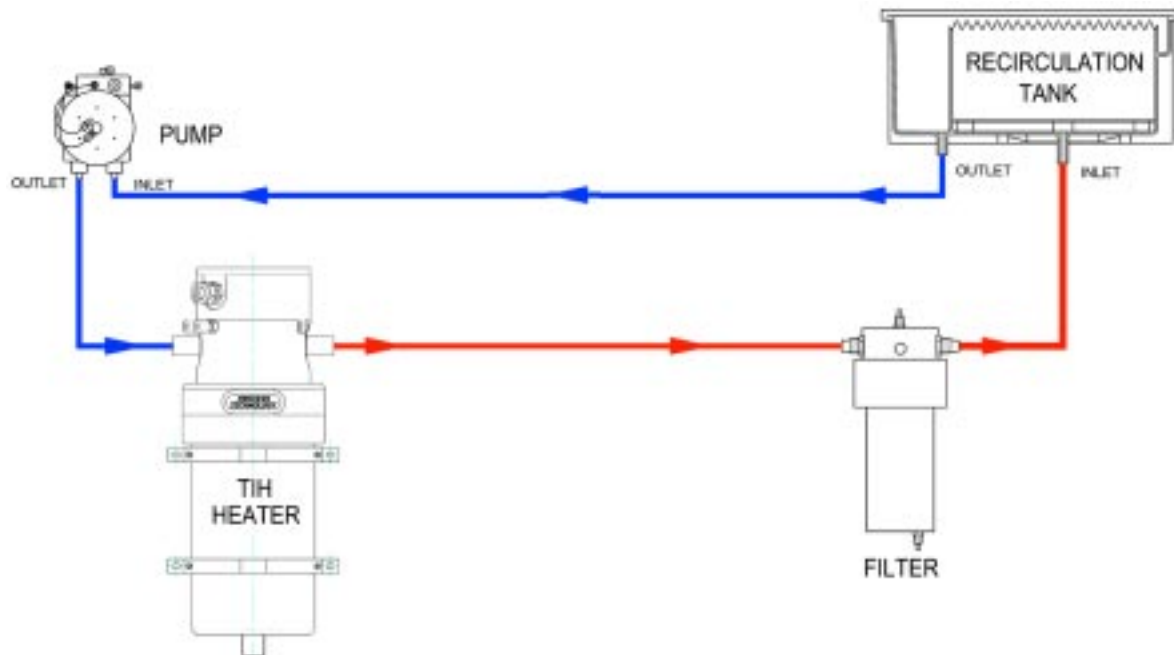
kW	OVERALL LENGTH
	In./(mm)
1	18.1 (460)
2	18.1 (460)
3	18.1 (460)
4.5	26.1 (663)
6	26.1 (663)
9	34.1 (866)
12	34.1 (866)
13.5*	40.1 (1019)
18*	46.1 (1171)

* These units have three mounting brackets (not shown, please consult factory)

TYPICAL INSTALLATION (Electrical)



TYPICAL RECIRCULATION LOOP



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