Trebor High Purity Liquid Heating

Thin Film Technology

TREBOR®

Trebor

For over 45 years, Trebor has served high purity markets with a focus on customers, relationships, and product innovation. Our customer is our priority.

We manufacture high purity quartz heaters for deionized water and chemical applications, in addition to high purity, non-corrosive plastic pumps for chemical applications. Our products can be used in multiple industries that require purity, process control, high temperatures, and small equipment footprints

- Ultra-Pure Water Heating
- Chemical Heating
- Chemical Pumping
- Global Service

Heating Element Details

Thin Film Technology

VERTICAL ORIENTATION
eliminates dead legs and overheating of residual liquid

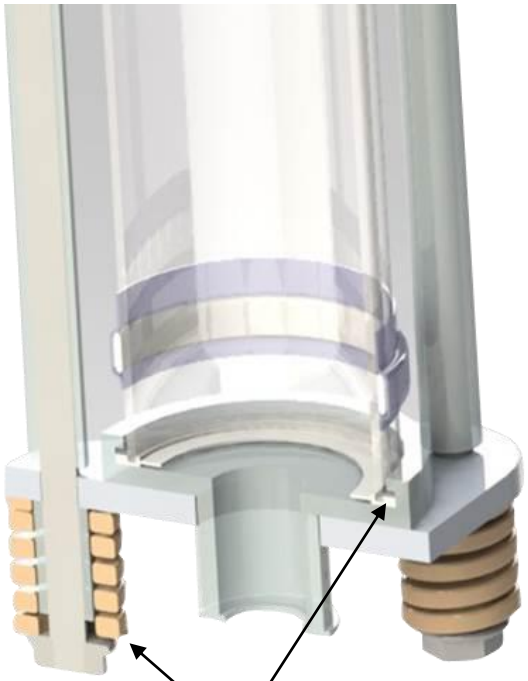
THIN FILM RESISTIVE MEDIA ON QUARTZ ELEMENT
Places the heat in close proximity to the fluid for faster response.

QUARTZ ELEMENT
No Lamps to replace & no coils to cause pressure drop

NO O-RINGS IN FLUID PATH
eliminates risk of process contamination

LOW THERMAL MASS
allows fast ramp to temperature; high heating efficiency of ~ 98%

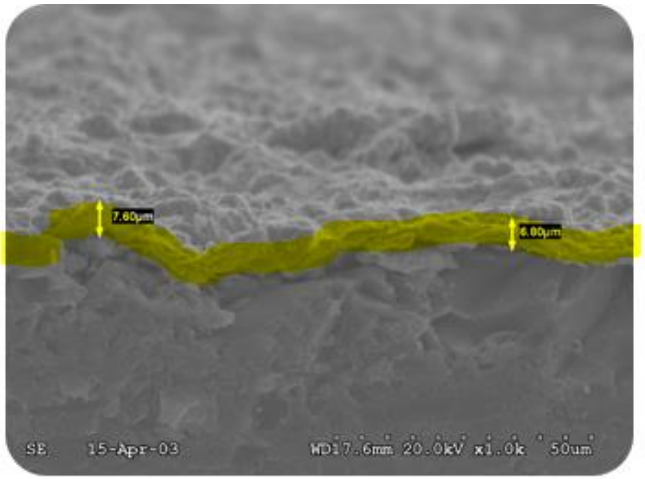
Sealing Technology



SEALING
Capable of handling thermal shock and thermal cycling without leaks or breaks

Element thickness

- Primary heated surface area of the element is < .1 micron thick
- Termination Area is ~7 microns thick
  - Highlighted below
- Quartz thickness is ~3mm



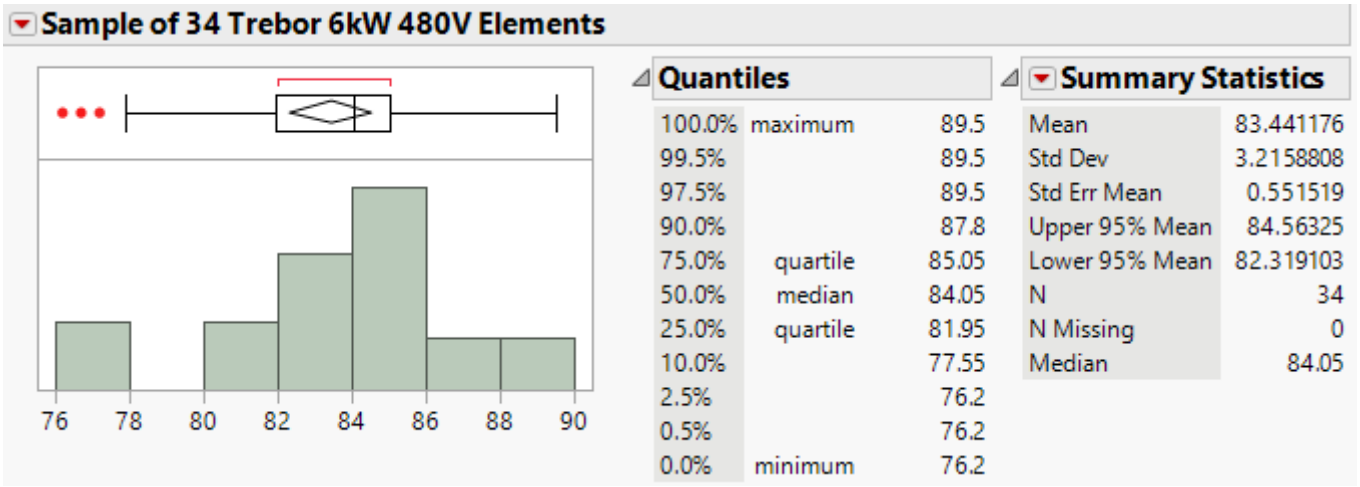
Thin Film Heating Elements

Thin Film Heating Elements are applied to the exterior (non-wetted side) of a GE214 Quartz tube. Liquid passes through the internal diameter of the tube and rapidly absorbs heat from the Quartz.

Thin Film Resistive Media on Quartz Heating Element →

Quartz Thickness ~ 3mm →

X-Ray Fluorescence Thickness Measurements



Mean Element Thickness is 83nm

Inline Heater Details

Heating technology

- Patented Thin-film on Quartz technology
- Patented Quartz Sealing Technology (No O-ring seals)
- No risk of metal contamination
- Models Available: 3, 4 & 6kW (Multiple Configurations Available)
- Voltage Available: 208V, 240V or 400V
- Phase Configurations: Single, Delta or Y (Voltage/Power Specific)

Temperature control

- Industry leading responsiveness
- Low thermal mass element provides agile performance
- Maximum Temperature: ICA = 100°C, ICB = 200°C

Cost of Ownership

- No consumable lamps
- Maintenance free

Maximum Flow & Pressure

- 28 lpm
- .55MPa

Wetted Materials

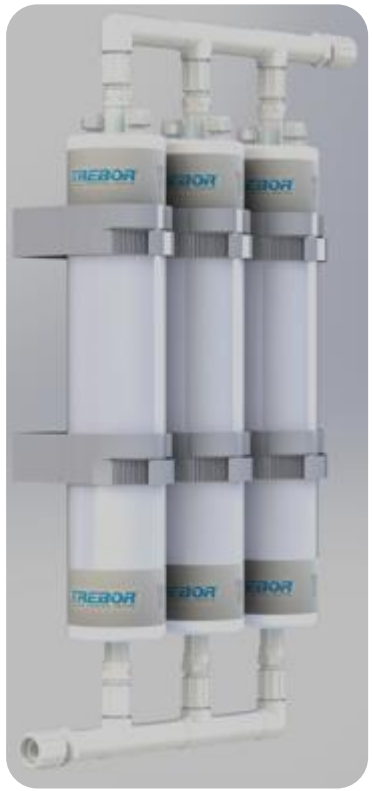
- Semiconductor Grade GE 214 Quartz, Virgin PTFE & Virgin PFA

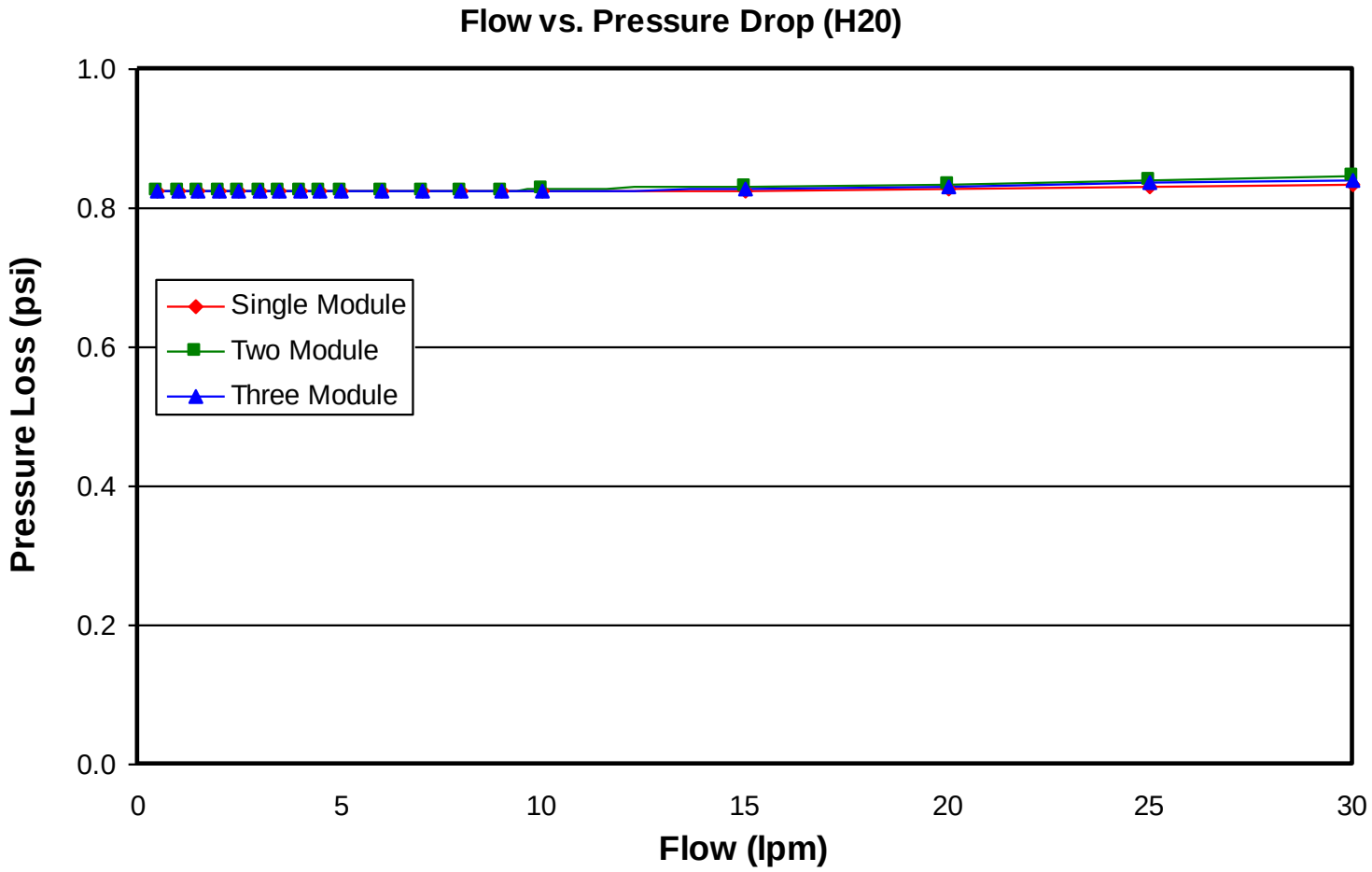
Certifications

- CE, Semi S2, S3, S8 & S14

Performance

Less than .0069MPa @ 30 lpm

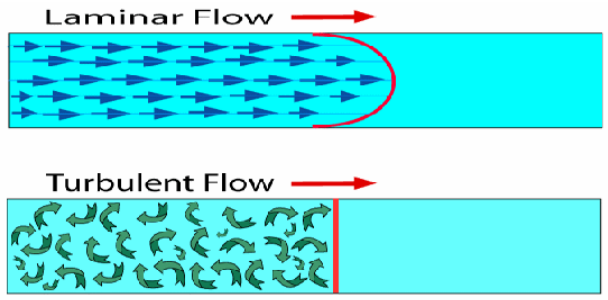


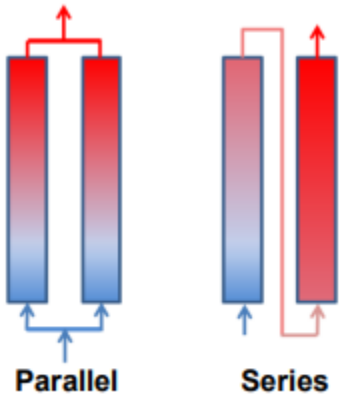


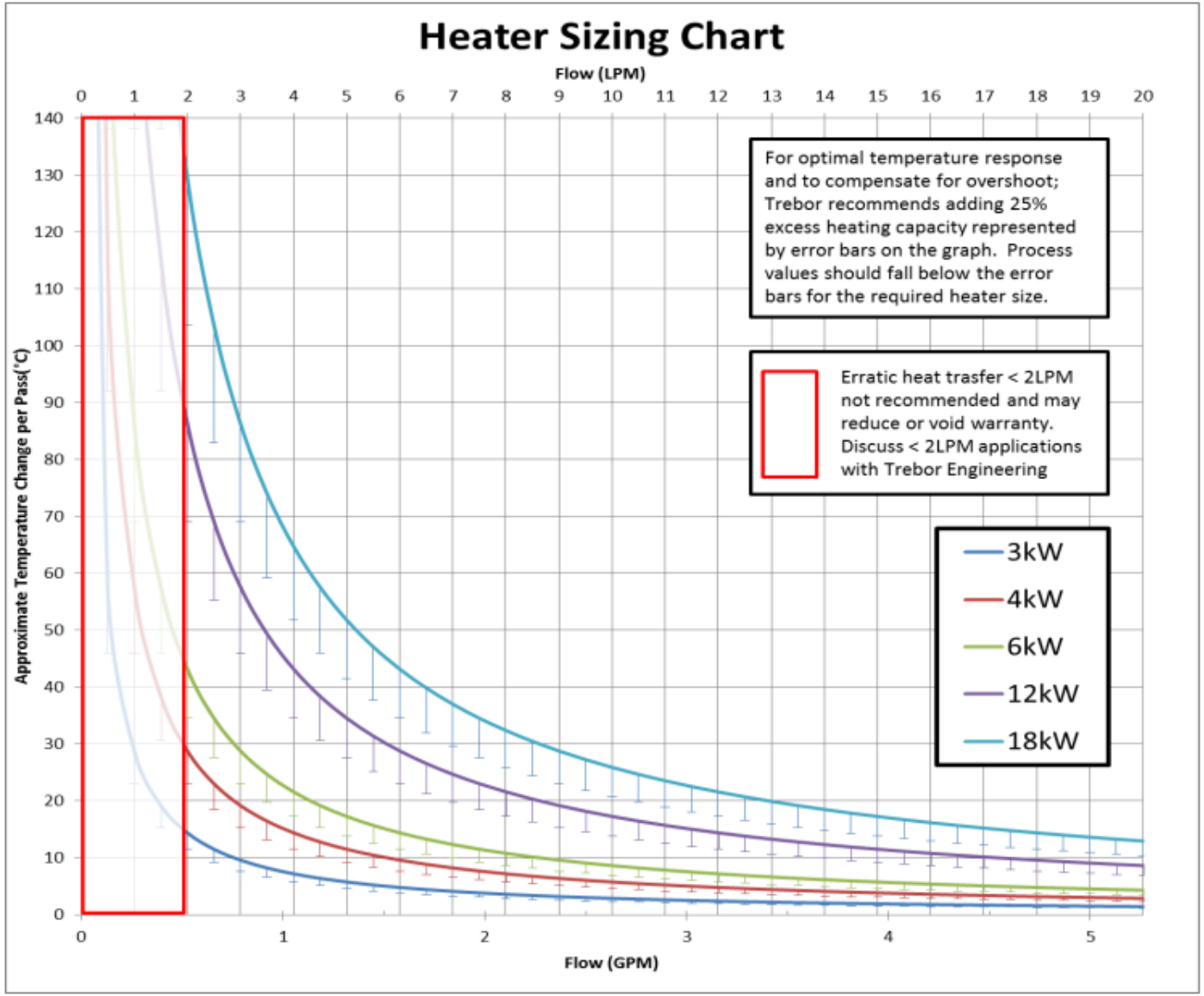
Performance

Inline Chemical Heater	Metric	English
*Minimum Pressure	1 Bar	15 psig
Environmental Temperature	5-40°C	41-104°F
Environmental Humidity	Max 80%	
Altitude	2,000 m	6,600 ft
ICA – 24 Mo Warranty		
Maximum Fluid Temperature	100 °C	212 °F
Maximum Pressure	5.5 Bar	80 psig
Minimum Flow Rate	2 LPM	.53 GPM
ICB — 12 Mo Warranty		
Maximum Fluid Temperature	200 °C	392 °F
Maximum Pressure	3.1 Bar	45 psig

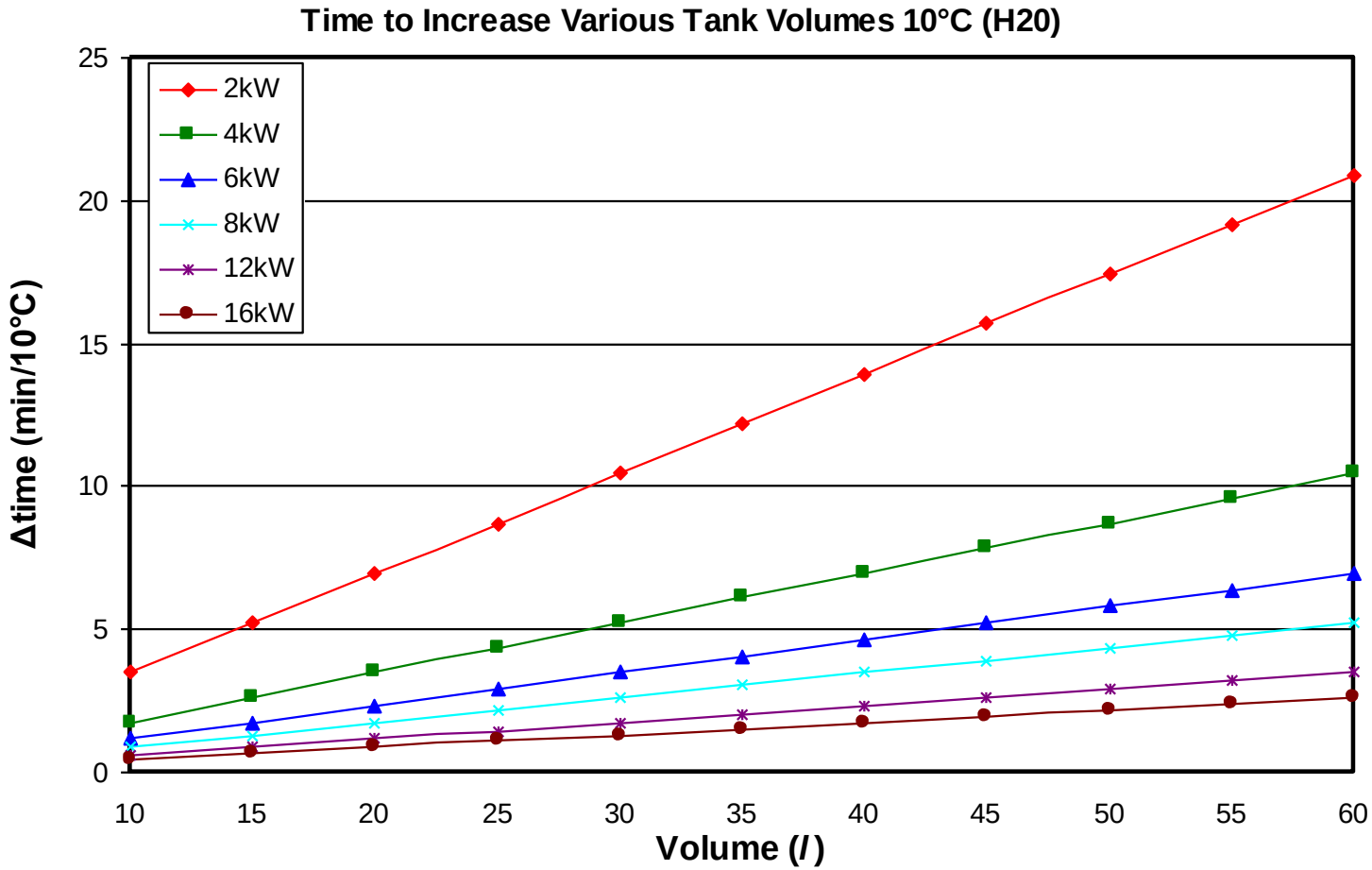
*Minimum pressure required to prevent film boiling with water. Can vary depending on process fluid.





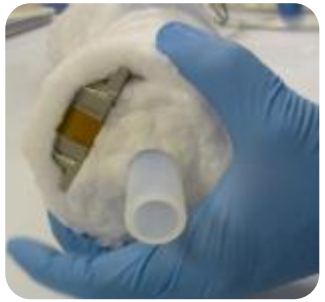


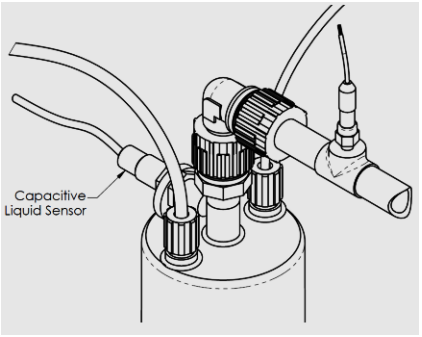
Performance

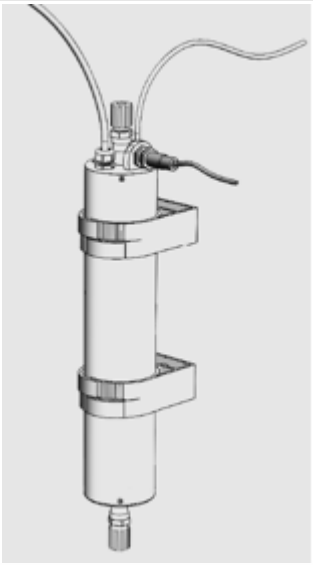


Interlocks

- Element Over-Temperature Sensor
  - 250°C limit
  - J- Type TC, 100 Ω or 1000 Ω RTD
- Quartz Substrate Temperature Sensor
  - 200°C limit
  - J- Type TC, 100 Ω or 1000 Ω RTD
- Leak Sensor
  - Normally Open or Normally Closed
- Liquid Level Sensor
  - Quoted separately



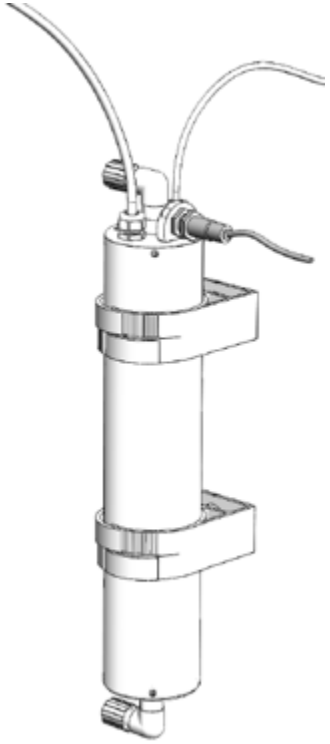


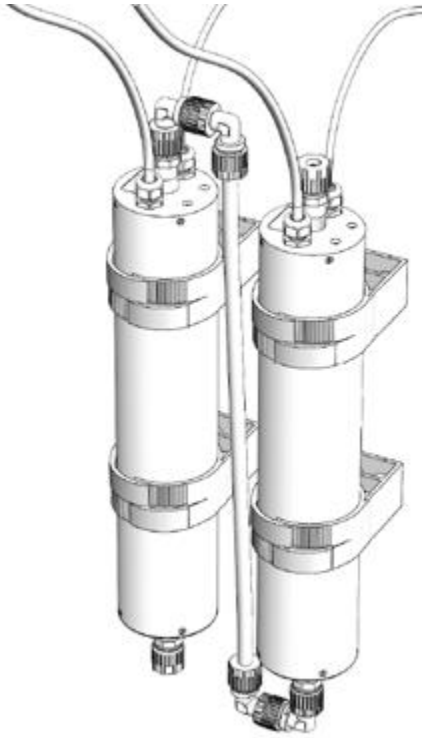


Features & Dimensions

Features

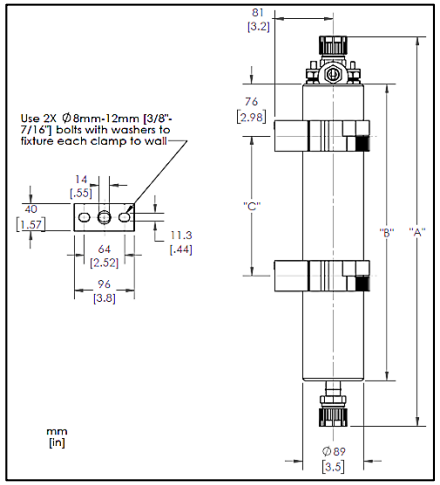
- No particle traps
- Fully Insulated Element
- Multiple Fluid Fitting Options
- Over Temperature Sticker (260°C Limit)
- Housing Drain



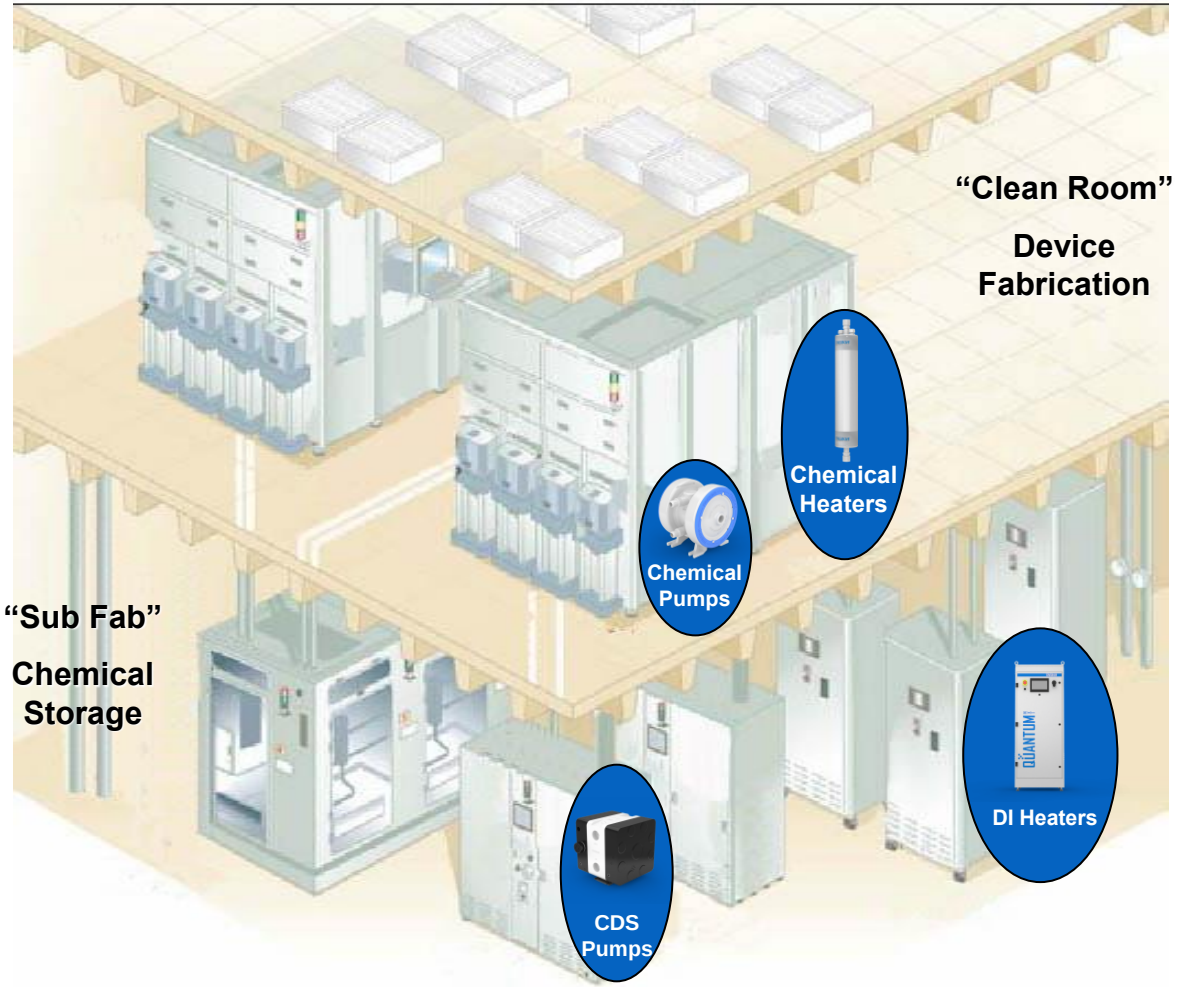


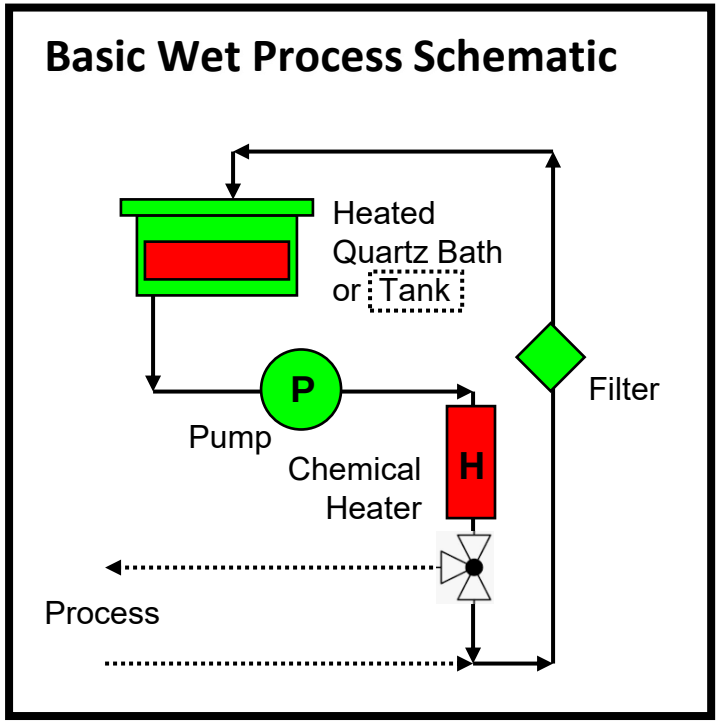
Dimensions

	*HEIGHT (mm [in])				WEIGHT (kg [lbs])
Power	Fitting	"A"	"B"	"C"	
6kW	1/4" Pillar	722 [28.4]	605 [23.8]	51-373 [2.0-14.7]	5.02 [11.07]
	1/2" Pillar	739 [29.1]			
	3/4" Pillar	758 [29.8]			
	1/4" Flare	755 [29.7]			
	1/2" Flare	764 [30.1]			
	3/4" Flare	772 [30.4]			
3kW & 4kW	1/4" Pillar	552 [21.7]	433 [17.0]	51-203 [2.0-8.0]	3.88 [8.55]
	1/2" Pillar	569 [22.4]			
	3/4" Pillar	588 [21.1]			
	1/4" Flare	585 [23.0]			
	1/2" Flare	594 [23.4]			
	3/4" Flare	602 [23.7]			
*Measurements are approximate, contact factory if dimensional accuracy is critical					



Inline Heater Fab Location



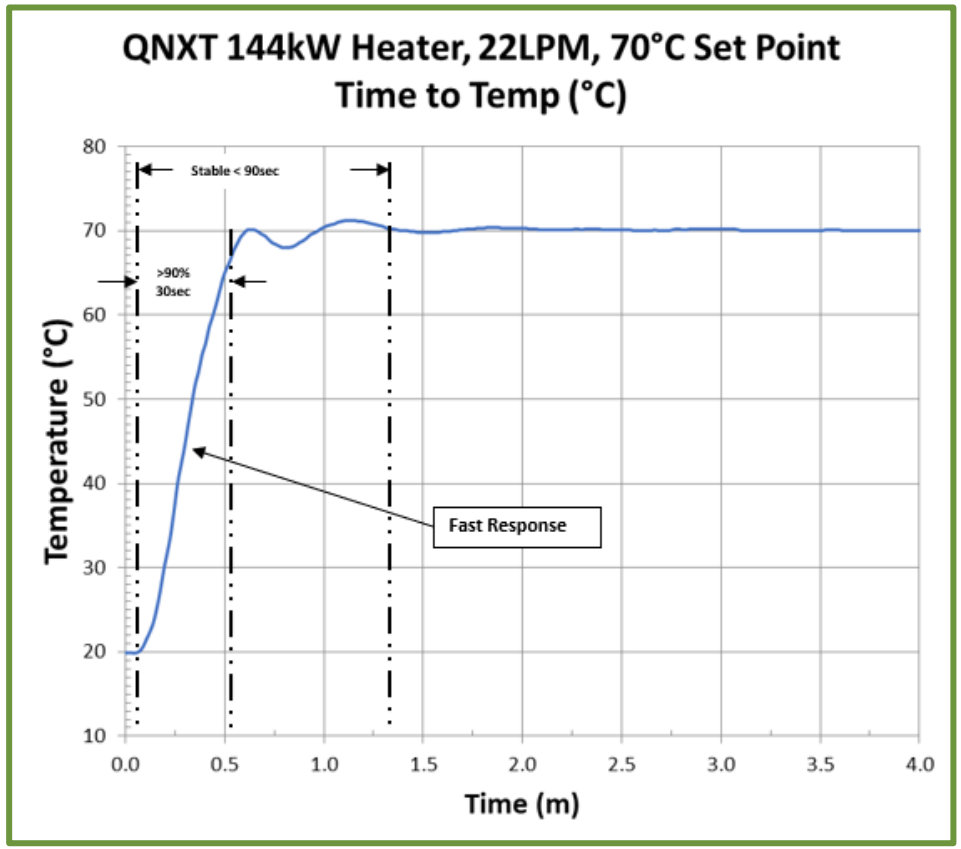


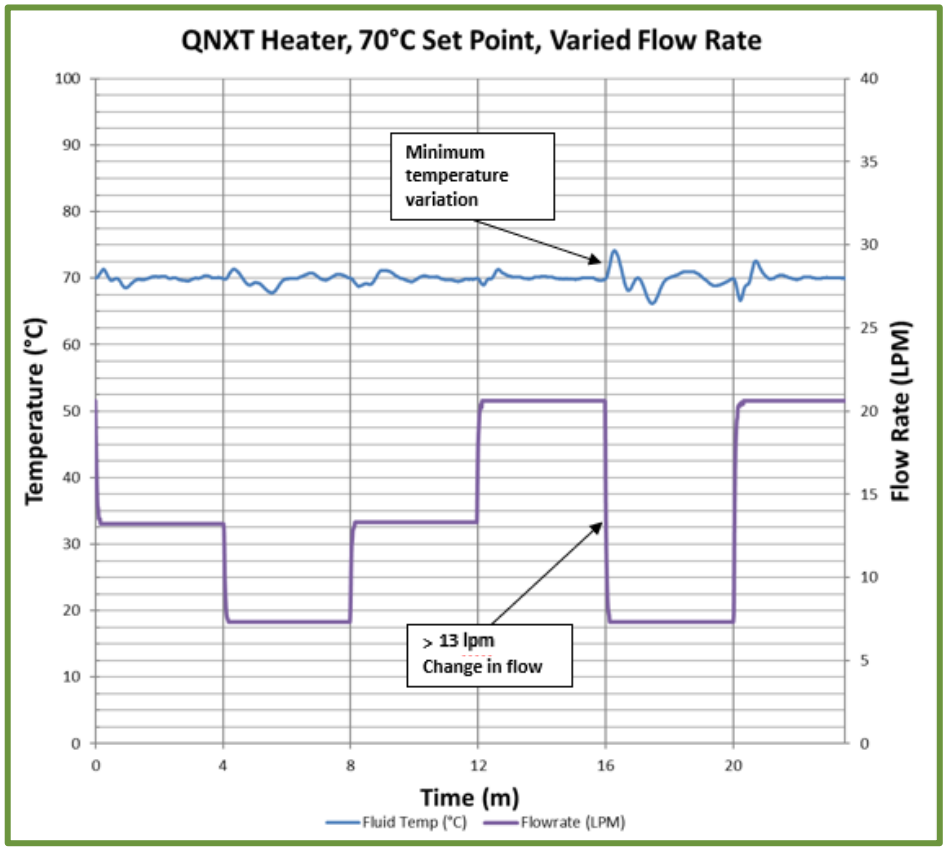
High Power UPW Heater

High Power Heater Details

- Heating technology
  - Patented Thin-film on Quartz technology
  - No O-ring seals
  - Models available in 20kW up to 288kW
- Exceptional temperature control
  - Industry leading responsiveness
  - Steady State Temperature control +/- 0.3 degrees
  - Low thermal mass element provides agile performance
- Lower Cost of Ownership
  - No consumable lamps
  - No heated DI water waste
  - Virtually maintenance free
  - Element lifespan > 44,000hrs
- Efficient water usage
  - No minimum flow requirements
- Global support network

High Power UPW Heater





Thing Film Heater Cleanliness

Metallic Ion Data

Studied in accordance with SEMI F57

Organic Speciation Data

LC-OCD Analyses performed by DOC Labor

Dissolved Silica Data

Studied in Accordance with ASTM D 859

SEMI-F104 Particle Data

Performed by CT Associates in MN

Q&A