

# RAPID RESPONSE ELECTRIC HEAT EXCHANGER

## Compact, Rapid Heating of Gases, Vapors and Liquids for Precision Applications

Watlow has developed an innovative circulation heater solution for applications that demand precise temperature control for gases and other fluids. The RAPID RESPONSE Heat Exchanger provides faster thermal response and higher power in a smaller footprint when compared to most other conventional circulation heaters. Add to this the value of high pressure operating capabilities in custom formations and integrated sensing with Watlow sensors and controllers and you will quickly see the advantages of using the RAPID RESPONSE Heat Exchanger.

This patent-pending product was developed around Watlow's high quality WATROD electric heating element placed inside of a tube designed to specifically accommodate your process pressure and temperature. A wide range of special fittings on the ends of the outer tube facilitates transition of both the fluid and WATROD electrical terminations.

The intimate contact of the WATROD element with your fluid and the low thermal mass of the overall system result in high-energy efficiency and fast response. If needed, appropriate molded insulation packages can be added for efficiency improvements or touch-safe protection. The design of this product tends to enhance the circulation of your gas or fluid because of the excellent convective film coefficients created, even at lower flow rates.

If your application demands precise temperature control, let the RAPID RESPONSE Heat Exchanger provide the thermal response, wattage and space savings you need. High operating pressure will not be an issue. Add integrated sensing with Watlow sensors and controllers and you will have a complete thermal solution.

### Applications

- Solvent replacement
- Fuel cell gas heating
- Parts cleaning
- Biomass extraction
- Refrigeration systems
- Epoxy resin components
- Gas heating
- Supercritical fluids
- Humidity generation
- Bio reclamation
- Aerospace, food and deionized water heating

**Patent Number: U.S. 6,944,394 B2**



### Features and Benefits

#### Compact size and lightweight design

- Reduces the physical space required by other circulation heater technologies substantially

#### Fast thermal response

- Allows low flow conditions to be efficiently heated

#### High and low working pressure availability

- Provides a wide range of operating pressures

#### Low internal volume

- Increases heater efficiency significantly
- Minimizes overall system volumetric impact

#### Use with gases and liquids

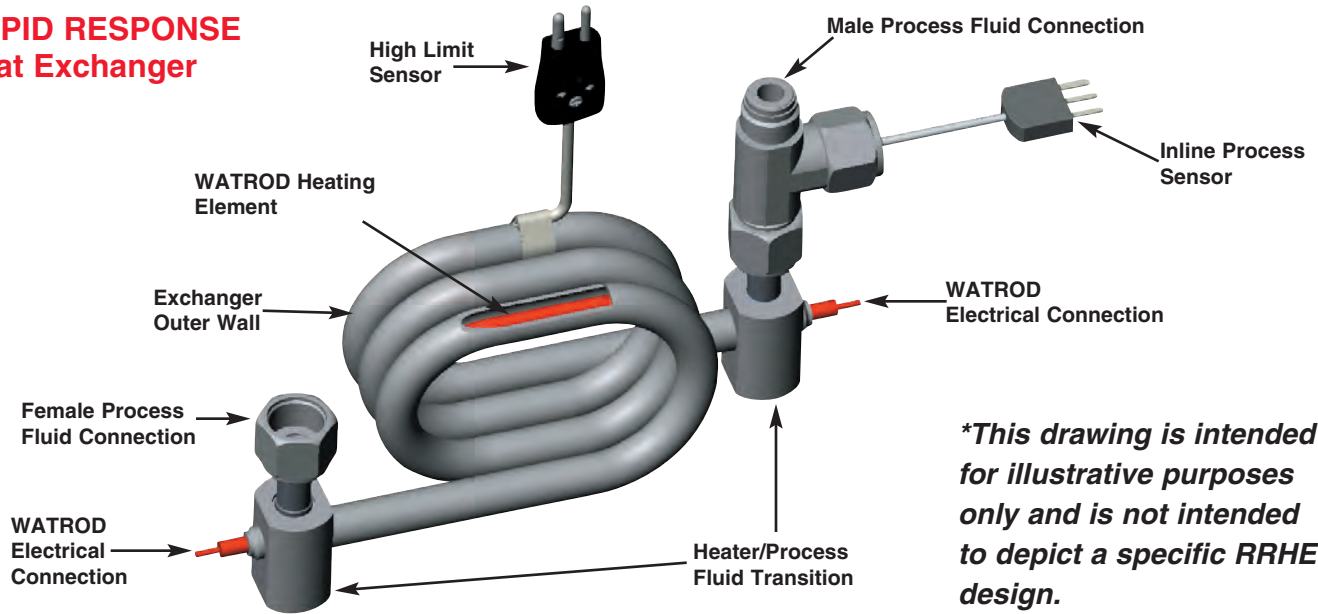
- Assures effectiveness in all media states

### Specifications

- Up to 30 amps in compact configurations
- Process temperatures up to 600°C (1200°F)
- Operating pressure up to 411 bar (6000 psi)
- Standard 208 Volt (120-480 Volt 1-phase and 3-phase capability)
- Optional finishes include: electro polished, bright annealed, passivated
- Integral inlet/outlet RTD or thermocouple sensors
- Standard 0.25 in. (6.35 mm) NPT low pressure fitting (standard and specialized process fittings are available and chosen by pressure and formation)
- Materials of construction – 304 and 316L Stainless Steel, Incoloy®, Copper
- Outside tube diameters: 0.5 and 0.625 in. (13 and 16 mm)
- Trim length and electrical terminations consistent with typical WATROD options
- Bend radii – 0.625 in. (16 mm) for flat bends, 2 in. (51 mm) inside diameter for coiled bends
- Insulation materials available – foam rubber, castable ceramic and fiberglass



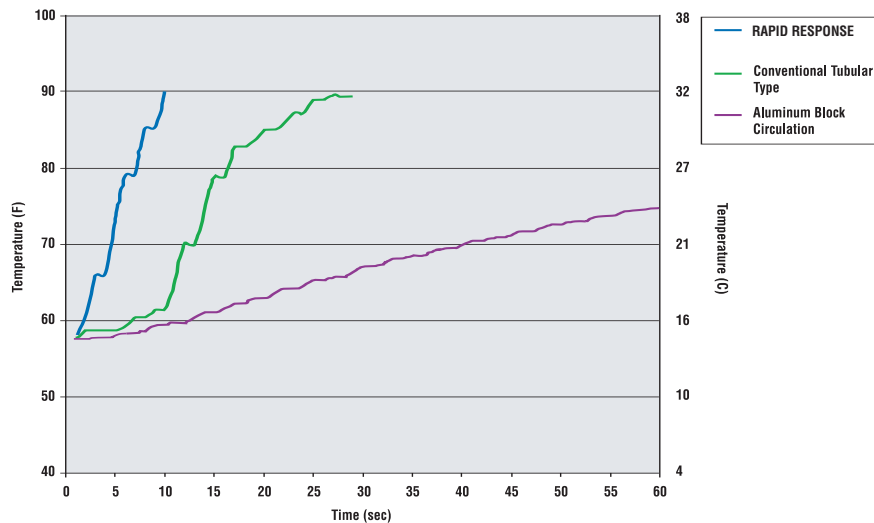
## RAPID RESPONSE Heat Exchanger



## Heat Exchanger and Circulation Heater Performance Comparison

	RAPID RESPONSE Heat Exchanger	Tubular Type Circulation Heater	Aluminum Block Circulation Heater
Heat Exchanger	5 in. tall x 6 in. dia. (127 mm tall x 152.4 mm dia.)	25 in. tall x 4 in. dia. (635 mm tall x 101.6 mm dia.)	13.5 in. tall x 4 in. dia. (342.9 mm tall x 101.6 mm dia.)
Ambient to 32°C (90°F)	10 seconds	30 seconds	371 seconds

Response time from ambient to 32°C (90°F) at 9.3 W/cm<sup>2</sup> (60 W/in<sup>2</sup>)  
3 liters per min. (0.8 gallons per min.)



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