Specialty Heaters

FLUENT® In-line Heaters

Watlow's FLUENT® in-line fluid heater is a small, lightweight, high-performance heater that can replace both a traditional immersion type heater or a heater wrapped around a tube as part of a thermal system. Watlow's FLUENT heater is designed as an integrated solution that replaces multiple components in a system. This heater design reduces overall system cost and complexity. Because of its high watt density, it offers ultra-fast response leading to higher system performance. Featuring Watlow's patented layered heater technology, the heater makes use of its entire surface to produce heat, which optimizes heat transfer and temperature uniformity.

Features and Benefits

Small, lightweight, robust heater construction

- Replaces multiple components in a system
- Reduces overall system size
- Lowers total cost of ownership

Patented circuit patterning process

- Facilitates customizable heating profiles
- Enables distributed wattage and/or multiple zones
- Assures precise and repeatable power distribution

High watt density, low mass heater

- Contributes to fast response time
- Allows for efficient heat transfer
- Enables on-demand process start-up

Typical Applications

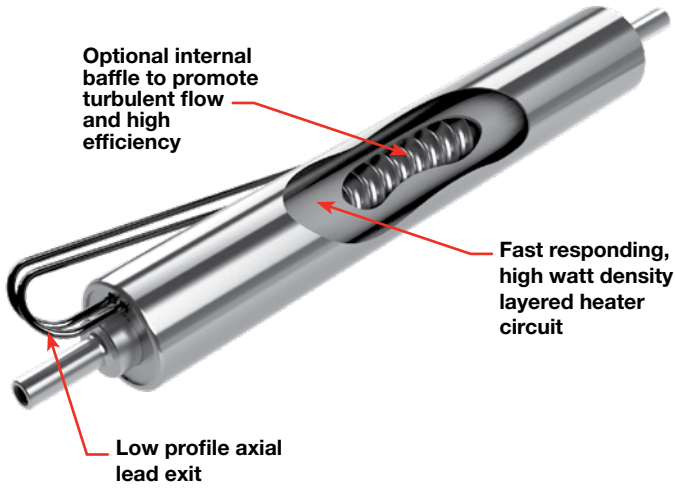
- Hemodialysis fluid heating
- Food cooking equipment
- Semiconductor purge and carrier gas heating
- Ink preheating systems
- On-demand fluid heating

FLUENT In-line Heaters

Technical Information

Specifications

- Substrate tube material: 444 SS
- Fitting and baffle material: 316L SS
- Voltage up to 240V
- Amperage up to 15A per zone
- Resistance tolerance +10%, -5%
- Typical maximum watt densities
  - Air 150 W/in^2 (23 W/cm^2)
  - Water 450 W/in^2 (70 W/cm^2)
- Maximum pressure: 150psi (10.2 bar)
- Maximum temperature: 662°F (350°C) as measured by internal T/C
- UL®/cUL® and CE

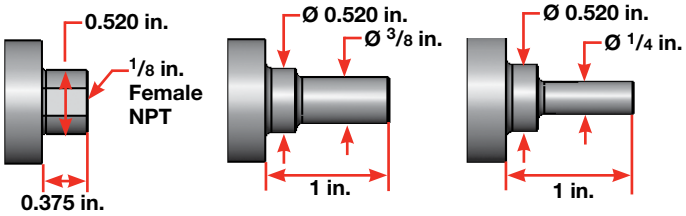


Application Orientation

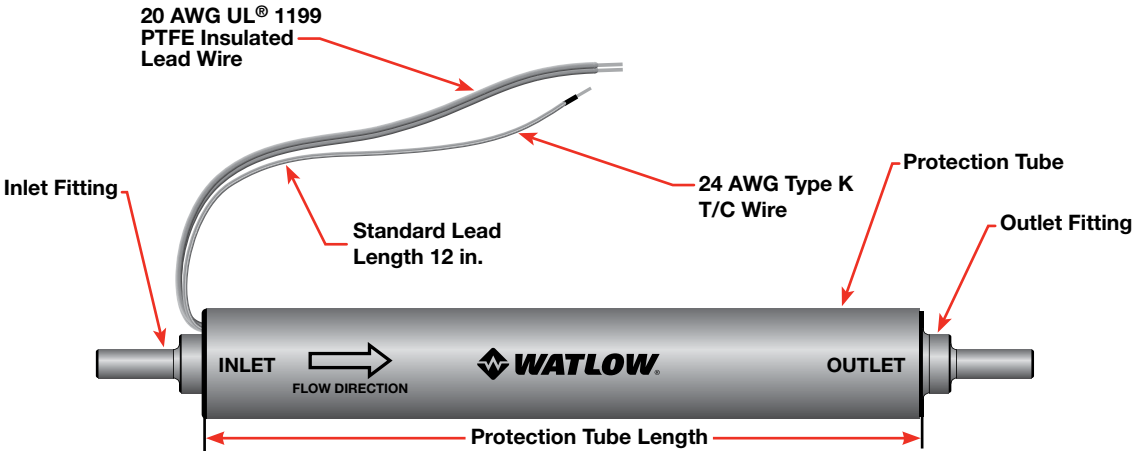
Gas Heating—
(Any orientation)

Liquid Heating—
(Heater must be vertical with inlet at the bottom)

Inlet/Outlet Fitting Options



Standard Construction



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Standard Product Offering: Base Heaters

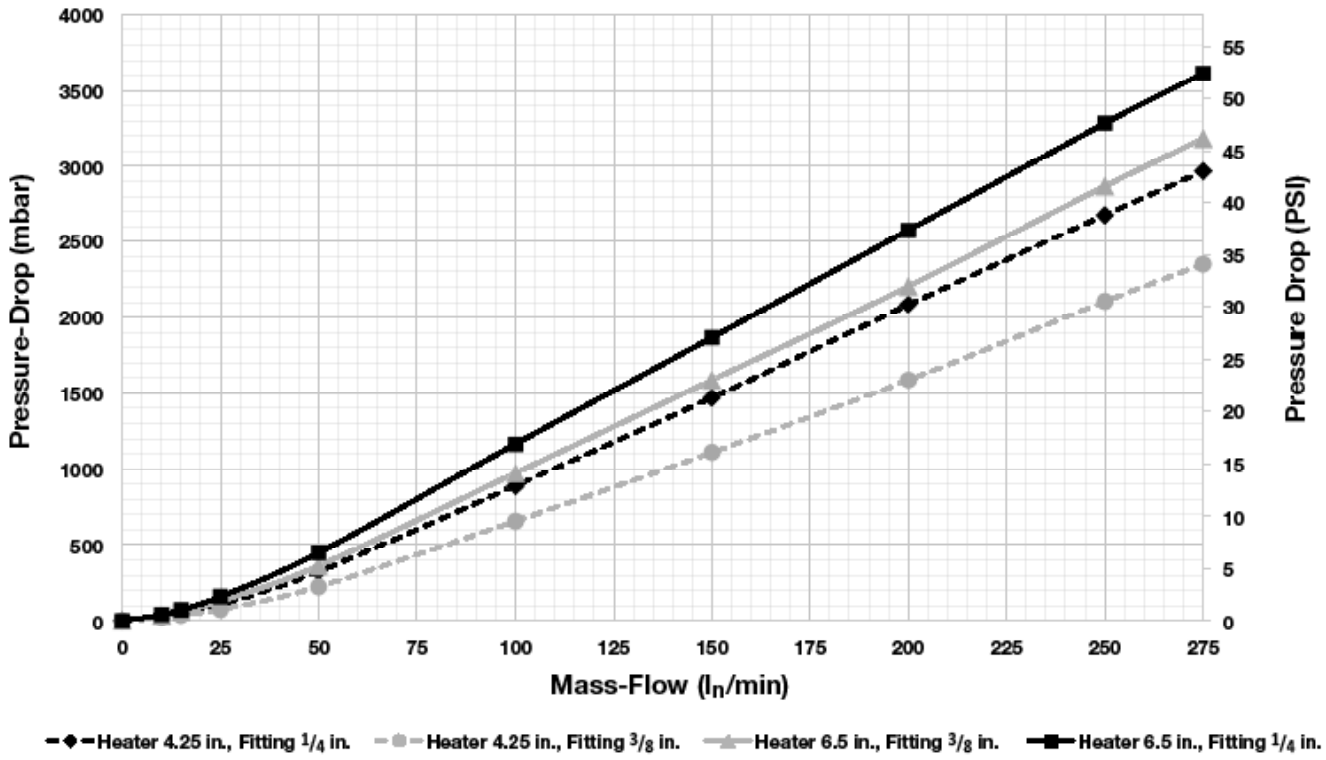
Volts	Watts	Protection Tube Length in.	(mm)	Number of Heating Circuits	Watt Density (W/in^2)
240	500	3.00	(76)	1	210
120	250	4.25	(108)	1	57
240	1,000	4.25	(108)	1	228
120	375	5.25	(133)	1	62
240	1,500	5.25	(133)	1	247
120	500	6.50	(165)	1	63
240	2,000	6.50	(165)	1	250
120	750	6.50	(165)	2	94
240	3,000	6.50	(165)	2	375
120	1,000	7.75	(197)	2	100
240	4,000	7.75	(197)	2	400
240	500	6.50	(165)	1	63

How to Specify a Standard Product:

- Select a base heater from the chart to the left.
- Choose the desired inlet and outlet fittings from page 446.

Note: Visit www.watlow.com/fluent for the latest list of standard designs and product information.

Pressure Drop - Air - With Internal Baffle @ 250°C

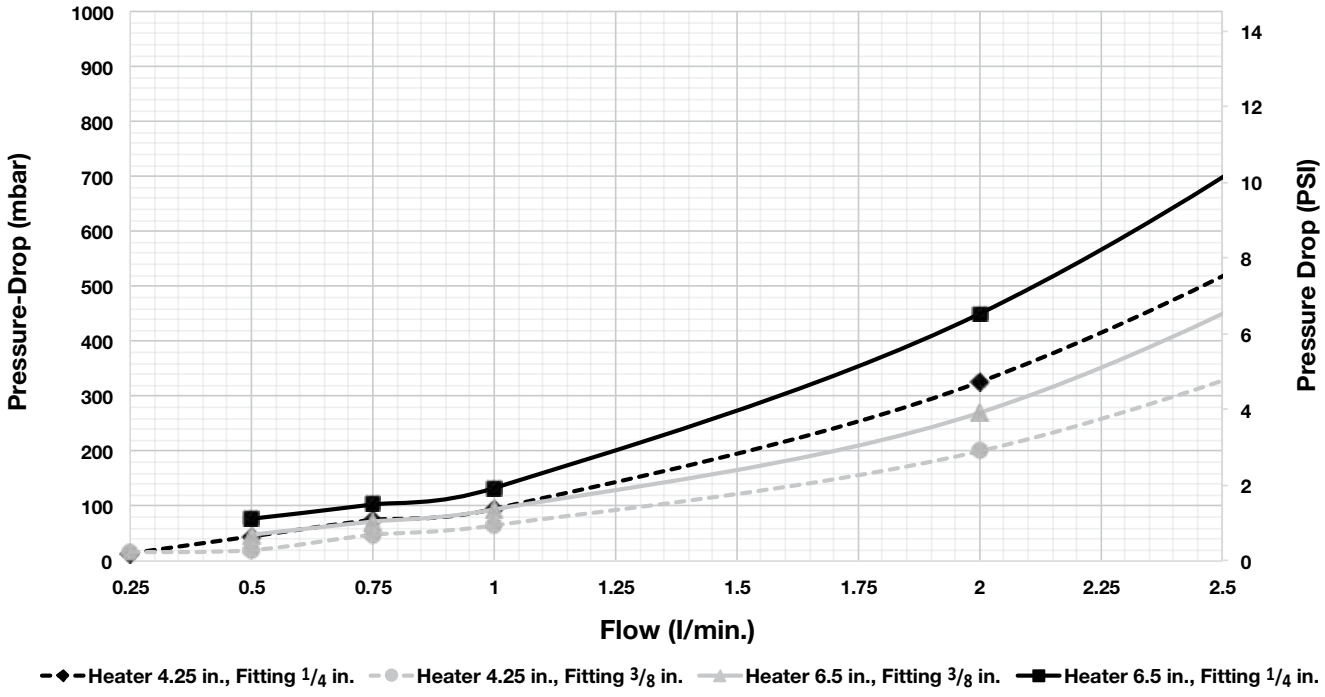


Note: Internal baffle is required for all gas heating applications.

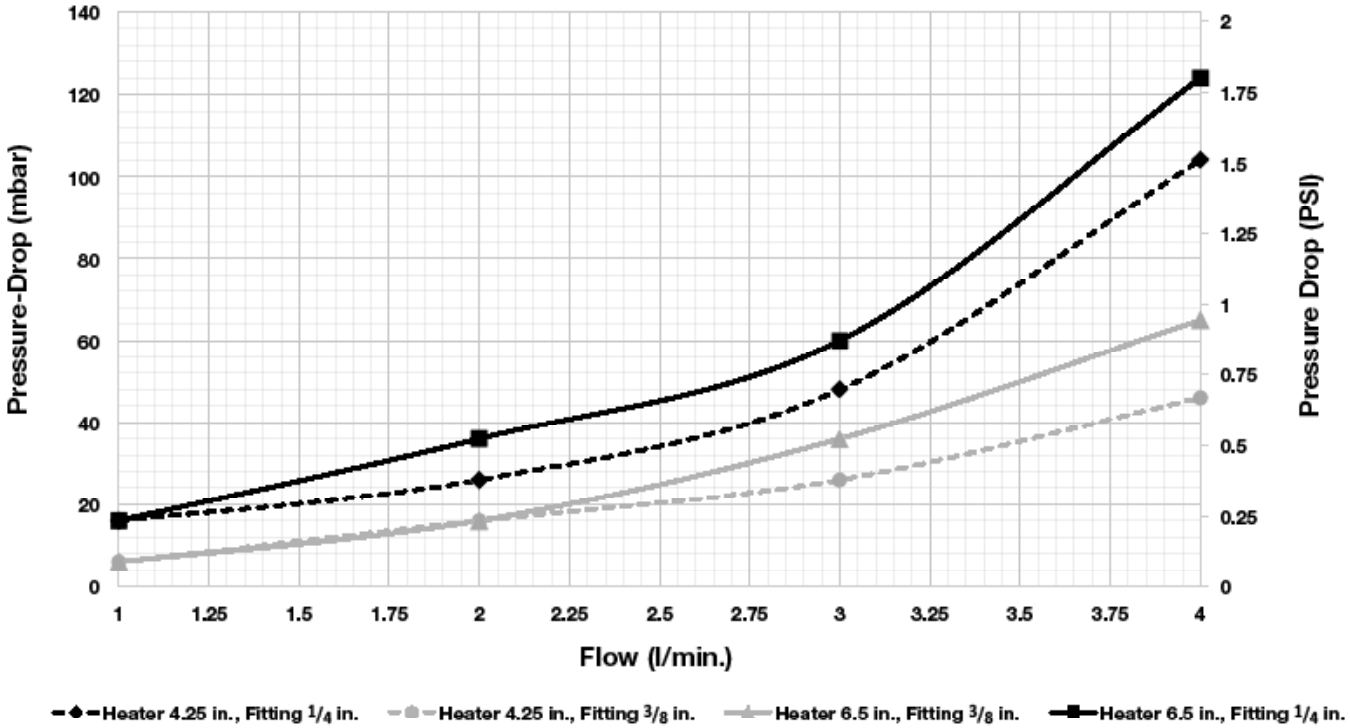
FLUENT In-line Heaters

Technical Information

Pressure Drop - Water - With Internal Baffle



Pressure Drop - Water - Without Internal Baffle



Heater internal temperature will vary based on flow rate, heater watt density and presence of the internal baffle, which increases turbulent flow. General guidelines for baffle consideration:

- For flow rates below 1 l/min, baffle should always be used to prevent an over-temperature condition.
- For flow rates over 1 l/min, removing the baffle is possible but will result in a higher internal temperature.