

# *Threaded Inline Air Heaters*

FOR SAFETY & LONG HEATER LIFE, CAREFULLY READ THIS MANUAL BEFORE USE.



## **Safety**



### **SHOCK HAZARD!**

Only qualified individuals should install this heater and related controls. Follow all applicable electrical codes and use proper wiring.



### **BURN/FIRE/EXPLOSION HAZARD!**

Do not use in hazardous environments, and/or near explosive or reactive gases, or combustible materials. Avoid contact with the heater or exit accessories during or soon after operation. DO NOT USE NEAR VOLATILE OR COMBUSTIBLE MATERIALS.

## Description

Stainless Steel threaded heaters for heating high-pressure air or inert gases to 1400°F (760°C). Sizes include 3/8", 1/2", 1-1/4" and 2-1/2" diameter, with wattages from 1.6 to 24 Kilowatts. There are two (2) body styles. Body Style A has power feed thru posts and unit is considered leak-proof to 150PSI. Body Style B has 12" flexible fiberglass sleeved power wires and rated to 150 PSI (10 BAR), but will have slight air leakage through the power wire strands. If operated correctly, the heater will operate continuously for 5000 hours or longer.

## Limited Warranty

TUTCO SureHeat warrants that all products to be delivered hereunder will be free from defects in material and workmanship at the time of delivery. TUTCO SureHeat's obligation under this warranty shall be limited to (at its option) repairing, replacing, or granting a credit at the prices invoiced at the time of shipment for any of said products. This warranty shall not apply to any such products which shall have been repaired or altered, except by TUTCO SureHeat, or which shall have been subjected. TUTCO SureHeat shall be liable under this warranty only if (A) TUTCO SureHeat receives notice of the alleged defect within sixty (60) days after the date of shipment; (B) the adjustment procedure hereinafter provided is followed, and (C) such products are, to TUTCO SureHeat's satisfaction, determined to be defective.

THE WARRANTY SET FORTH IN THE PRECEDING PARAGRAPH IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR OF MERCHANTABILITY.

The information contained in this manual is based on data considered to be true and accurate. Reasonable precautions for accuracy has been taken in the preparation of this manual, however TUTCO SureHeat assumes no responsibility for any omissions or errors, nor assumes any liability for damages that may result from the use of the product in accordance with the information contained in this manual.

Please direct all warranty/repair requests or inquiries to the place of purchase, and provide the following information, in writing:

- (A) Order number under which products were shipped
- (B) Model/Serial Number of product
- (C) Reason for rejection

**PRODUCTS CAN NOT BE RETURNED TO TUTCO SUREHEAT WITHOUT AUTHORIZATION.**

Replacement, repair, or credit for products found to be defective will be made by the place of purchase. All products found to be not defective will be returned to the Buyer; transportation charges collect or stored at Buyers expense.

## Heater Models and Parts List

Part Number	Body Style	Diameter	Maximum Wattage	Maximum Voltage	Maximum Amperage	Maximum Temperature
F038821	A	3/8"	1600	170	9.4	1400°F / 760°C
F038822	B*					
F038823	A	1/2"	4000	220	18.2	
F038824	B*					
F038825	A	1-1/4"	6000	220	27.3	
F038826	B*					
F063007	B*	2-1/2"	18000	240	75 (1PH) / 44 (3PH)	
F076418	B*			480	21.7 (3PH only)	
F074439	B*		24000	240	58 (3PH only)	

\* For Body Style B Heaters there will be a slight air leakage through power wire strands

## Specifications

Maximum Inlet Pressure	150 PSI (10 BAR)*
Maximum Inlet Air Temperature	900°F (482°C) for Body Style A 200°F (93°C) for Body Style B
Maximum Exit Air Temperature	1400°F (760°C) (see page 8 for Performance Curves)

\* For Body Style B Heaters there will be a slight air leakage through power wire strands

## General Information

### Environmental Conditions:

Ambient Temperature	32°F to 104°F (0°C to 40°C)
Humidity	0% to 95% R.H.

### Ventilation:

Use in a well-ventilated area away from excess dust, dirt, and moisture.

### Cleaning:

With unit OFF and unplugged, exterior surfaces may be wiped clean using a dry, lint-free cloth.

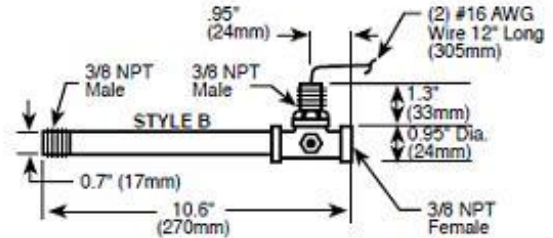
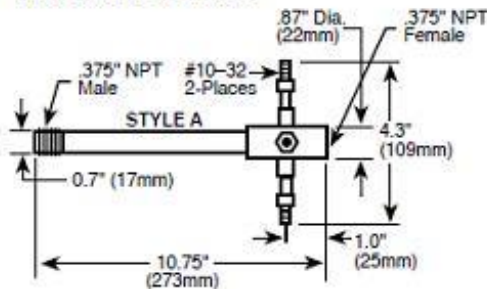
### Protective Earthing:

Each heater comes with a convenient grounding stud and hardware located at the inlet of the heater for protective means of earthing.

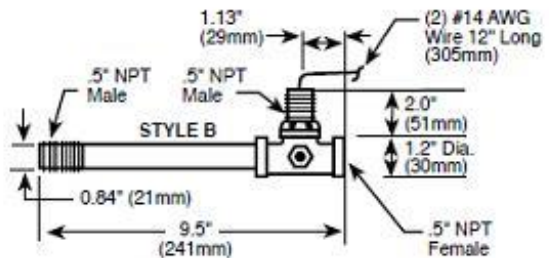
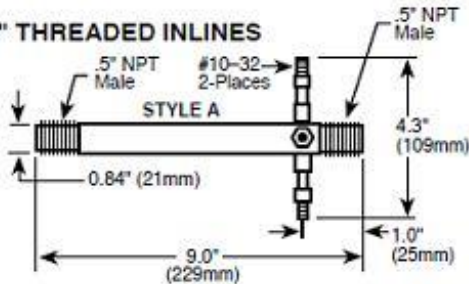
## Dimensions/Mounting

**NOTE:** The inlet side of the heater is located where the leads/power feedthrus come out of the housing. Failure to install the heater in its proper orientation can result in heater damage and is not covered under the manufacturer's warranty.

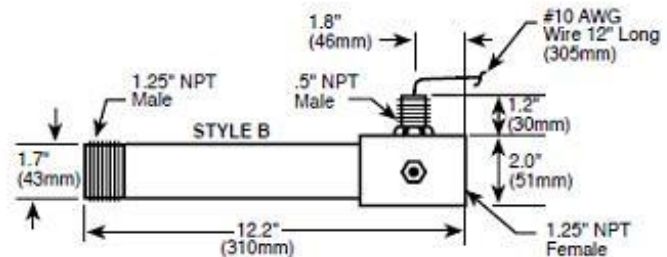
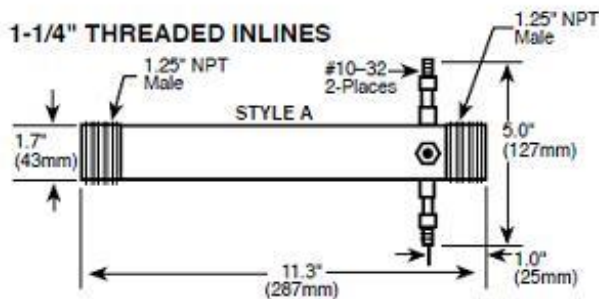
### 3/8" THREADED INLINES



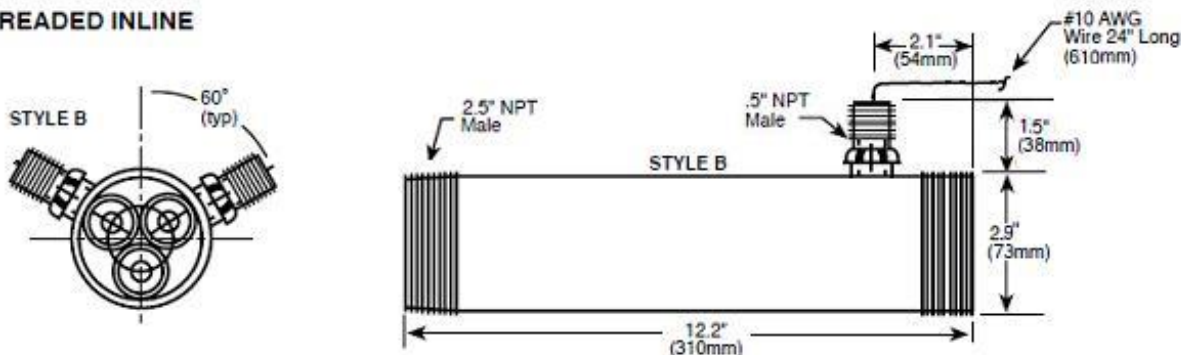
### 1/2" THREADED INLINES



### 1-1/4" THREADED INLINES



### 2-1/2" THREADED INLINE



## Precautions

1. Use filtered air. Avoid grease, oil, or oil vapors, corrosive or reactive gases which will damage heater.  
**Note:** When using compressed air a pressure reduction valve and an oil & water separation unit should be installed to avoid contaminating the heater and reduce heater life.
2. Operate at safe voltages as shown on the Performance Curves (*see page 8*). Excess voltage will cause premature failure.
3. Always have sufficient airflow through the heater before applying power. Otherwise element will overheat very quickly, and burn out. **Note:** A thermocouple cannot detect temperatures if there is no flow – turn on flow before applying power, even when a controller with a thermocouple is being used.
4. Use Style 'A' threaded inline heaters for absolute leak-proof applications (150 PSI). Style 'B' threaded inline heaters will have some air leakage through the lead wires.
5. Use phase angle fired power controllers. On-Off controllers may shorten heater life (or burnout element).
6. For closed-loop control, use exposed junction type "K" thermocouple located within one inch of the heater exit.
7. For closed-loop control, use a temperature controller with a fast sampling period (<500ms) and minimal overshoot.

## Installation

**CAUTION: DO NOT Operate Heater Without Air**

Securely mount the heater before wiring.

- **WARNING:** THE INLET AIR/GAS SIDE OF THE HEATER IS LOCATED CLOSEST TO WHERE THE POWER FEED-THRU CONNECTIONS ARE MADE. INSTALLING THE HEATER IN THE WRONG ORIENTATION WILL DAMAGE THE HEATER AND CAN CREATE ADDITIONAL HAZARDS AS A RESULT.

**For 3/8", 1/2", & 1-1/4" HEATER ONLY (#F038821, F038822, F038823, F038824, F038825 & F038826):**

1. There are two (2) feed-thrus on the heater. Connect one power lead to one heater electrical feed-thru (or one lead wire) and connect the other power lead to the other electrical feed-thru (or the other lead wire).
2. Connect the ground wire to the green grounding nut on the heater body.
3. Connect the air source to the heater.
4. If a thermocouple is used, ensure that it is located within one inch from the heater exit.

**For 2-1/2" HEATER ONLY (#F063007): 18 kW - 240 Volt - 1Ø Operation:**

**Note:** Running this heater at 240 Volts 1Ø will draw up to 75 Amps

1. The heater has two (2) set of power feed-thrus with three (3) wires (marked 1, 2, or 3) coming out of it.
2. Connect one side from the power to all three (3) leads that exit one (1) feed-thru (1, 2, and 3 together).
3. Connect the other side of the power to all three (3) leads that exit the second feed-thru (1, 2, and 3 together).
4. Make sure the heater is properly grounded.
5. Connect the filtered air source to the heater.
6. If a thermocouple is used, ensure that it is located within one inch from the heater exit.

**FOR 2½" HEATER ONLY (#F063007 & F074439): 18 & 24 kW - 240 Volt – 3Ø Operation:**

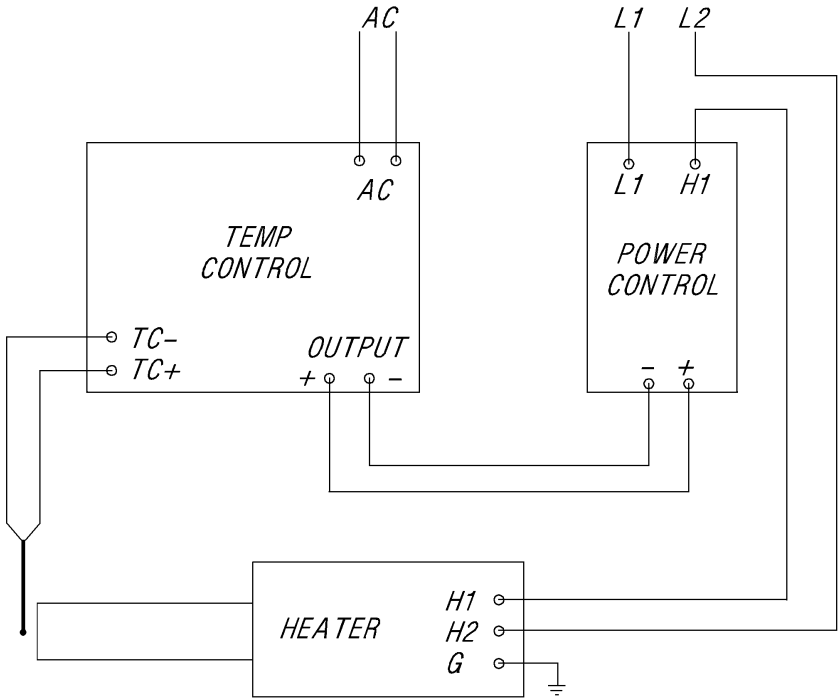
1. The heater has two (2) set of power feed-thrus with three (3) wires (marked 1, 2, or 3) coming out of it.
2. Connect the elements in a standard delta configuration. (Connect one (1) power lead to each of the following pairs: 1-2, 2-3, 3-1).
3. Check resistance leg to leg. They should be approximately within 0.1 ohms of each other if wired properly.
4. Make sure the heater is properly grounded.
5. Connect the filtered air source to the heater.
6. If a thermocouple is used, ensure that it is located within one inch from the heater exit.

**FOR 2½" HEATER ONLY (#F076418): 18 kW - 480 Volt – 3Ø Operation:**

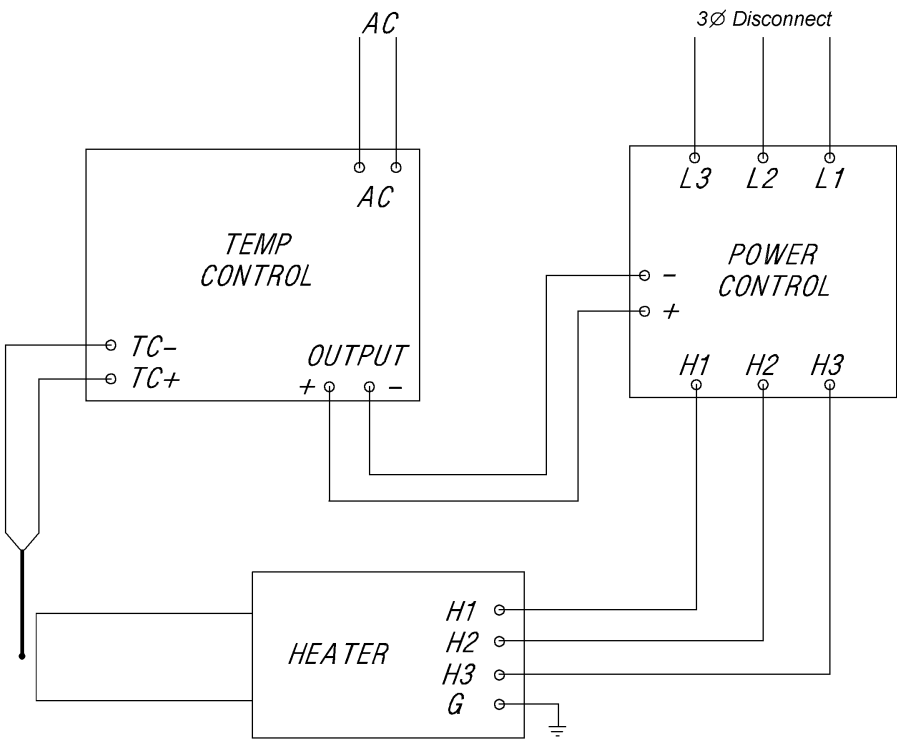
1. The heater has one (1) set of three (3) wire leads (marked 1, 2, or 3) coming out of it.
2. Connect the leads directly to the output of the power controller for standard 480V 3Ø operation.
3. Check resistance leg to leg. They should be approximately within 0.1 ohms of each other if wired properly.
4. Make sure the heater is properly grounded.
5. Connect the filtered air source to the heater.
6. If a thermocouple is used, ensure that it is located within one inch from the heater exit.



Typical Wiring for 1Ø Heater with Closed Loop Control



Typical Wiring for 3Ø Heater with Closed Loop Control



## Operation (with Heater)

### START-UP

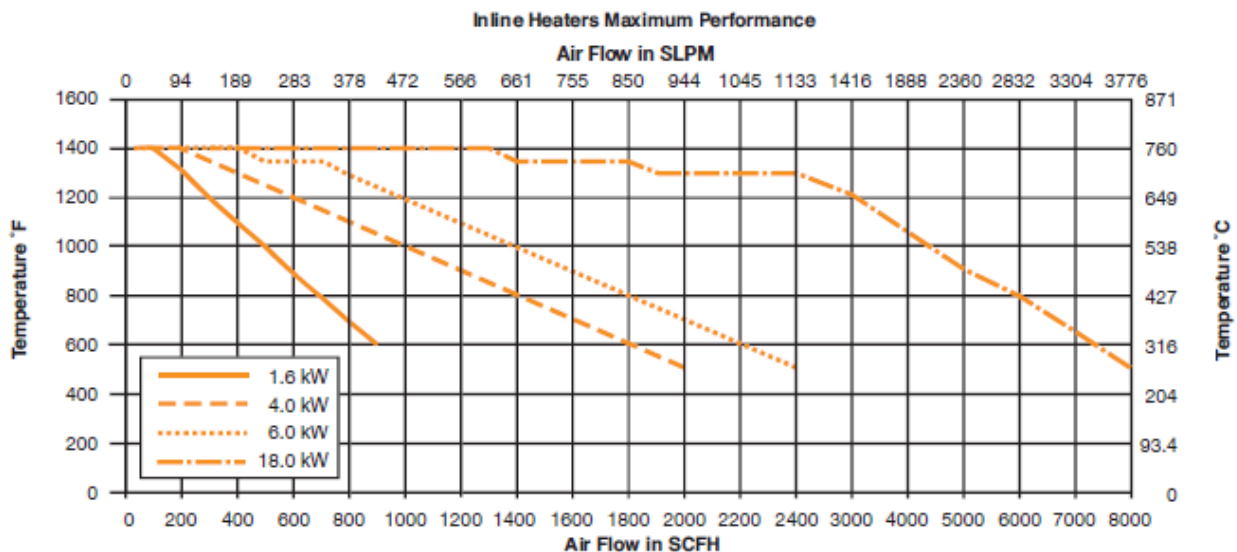
1. Reference the Performance Curves section (see page 8) for operational parameters before attempting to operate heater(s).
2. Turn on air and set pressure or flow to desired operating level.
3. If using a closed loop system, turn on power to the temperature and power controller, then set the desired temperature on the temperature controller. If using an open loop system, increase power to the heater through the power controller until the desired temperature is attained.

### SHUT-DOWN

1. Turn off Main Power circuit breaker or disconnect MAIN POWER line.
2. Allow air to continue to flow for a minimum of 1 minute or until exit air temperature is 300°F (150°C) or less for safety. Continue airflow longer as necessary to prevent burn hazard to personnel.
3. Turn off air to the system.

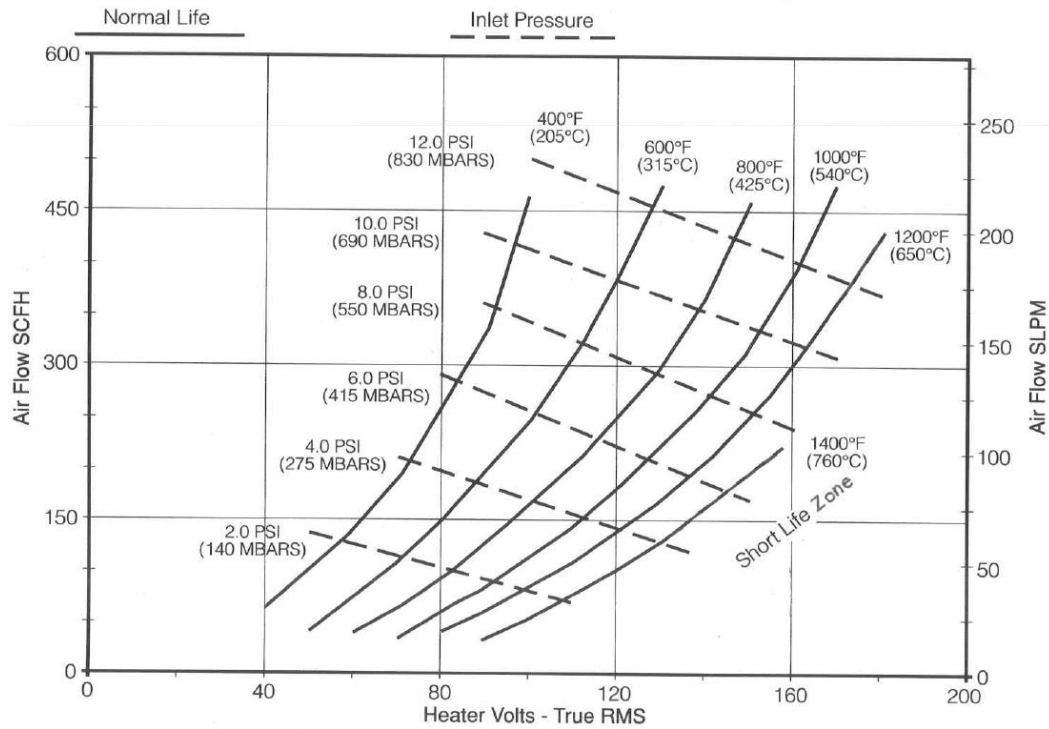
## Performance Curves

The attached performance curves show exit air temperatures at different airflows and voltages. Pressure readings (longer dashed lines) are measured at the inlet to the heater with no entrance or exit restrictions. Solid lines indicate safe, normal-life operating conditions. The shorter dash lines indicate marginal, shorter-life operating conditions leading to premature burnout. With a known flow (or pressure) at the heater entrance, follow the flow (or pressure) line across until it meets the desired temperature curve. Drop a line straight down to intersect the x-axis. This point, along the “Heater volts – true RMS” axis, represents the voltage required to generate the desired exit air temperature at the chosen flow rate (inlet pressure).

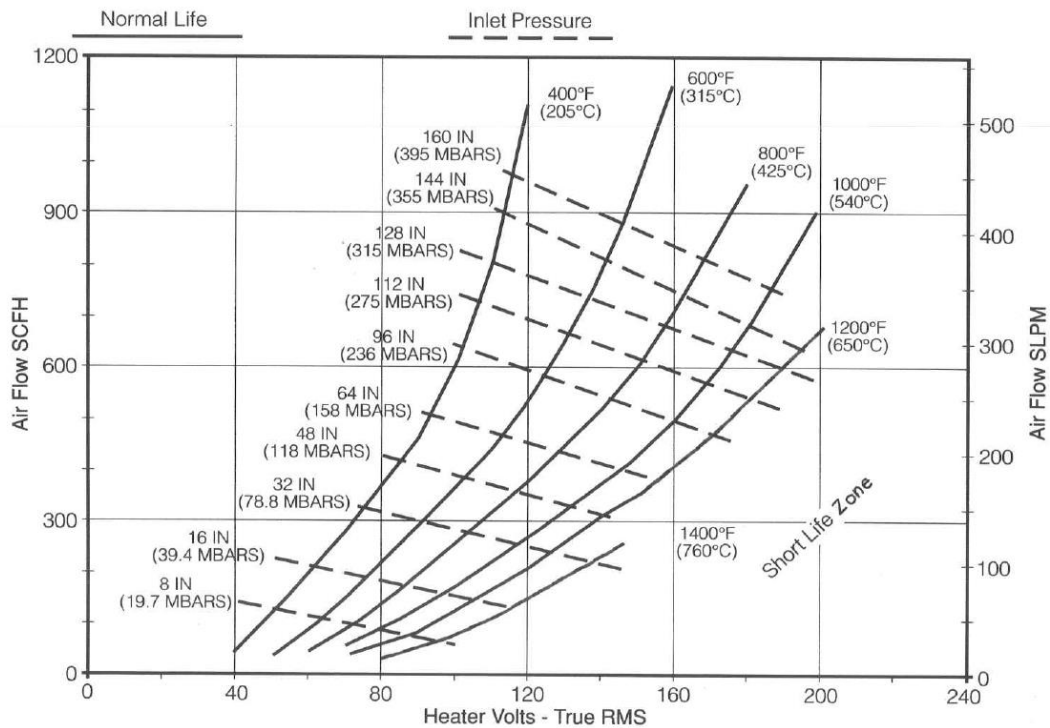




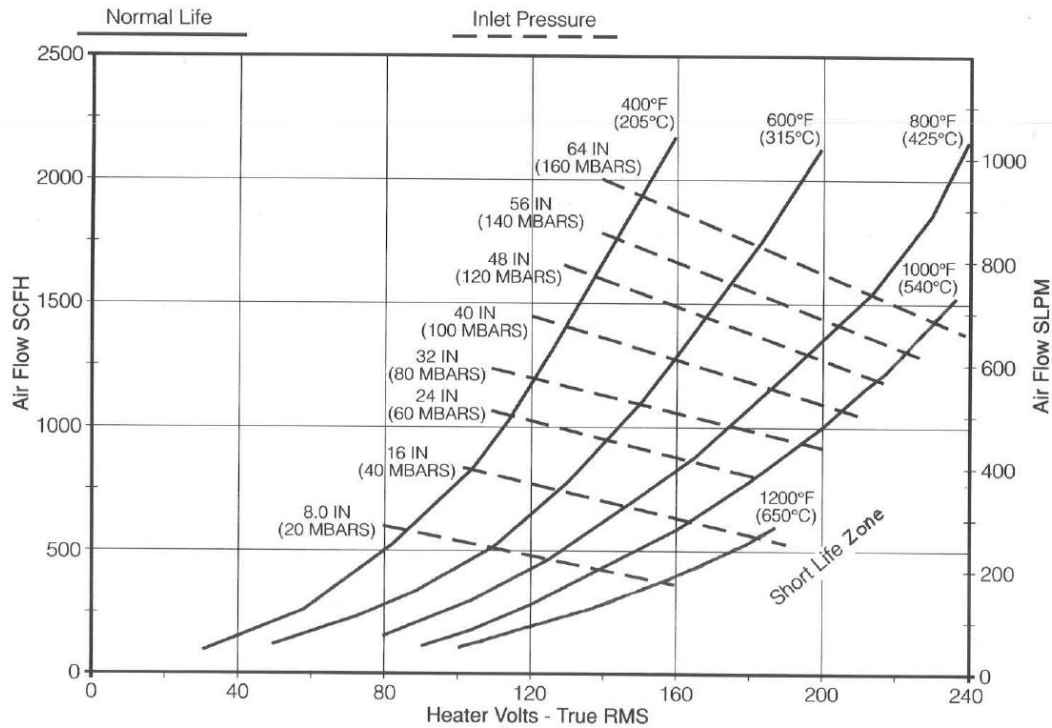
**3/8" Inline Heater - 038821/038822**



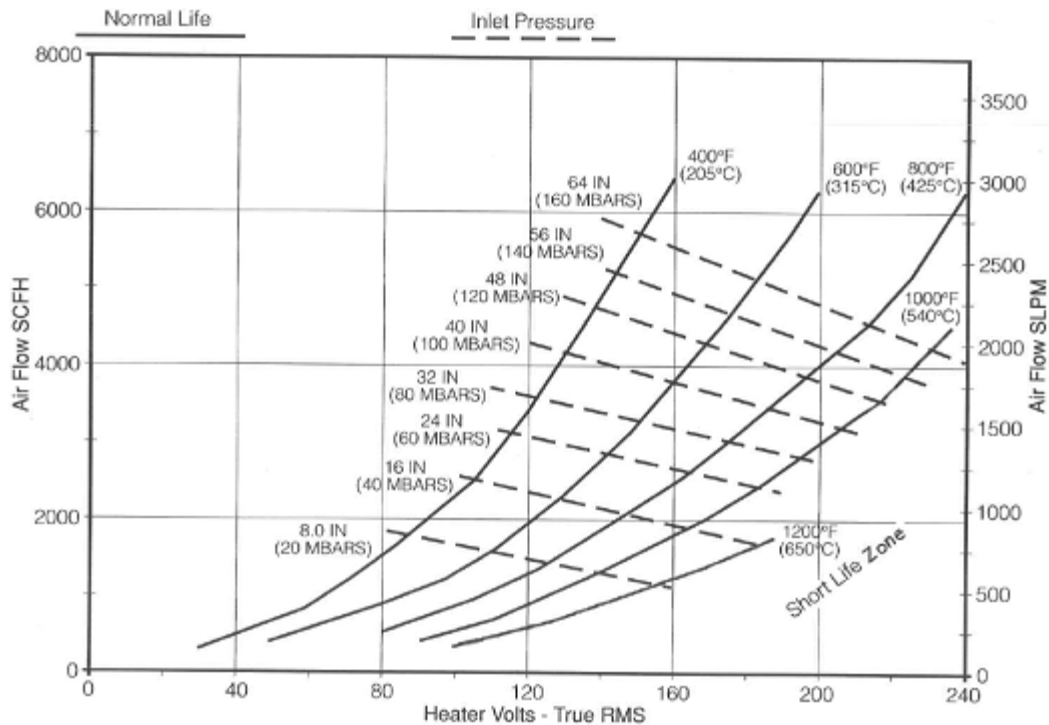
**1/2" Inline Heater - 038823/038824**



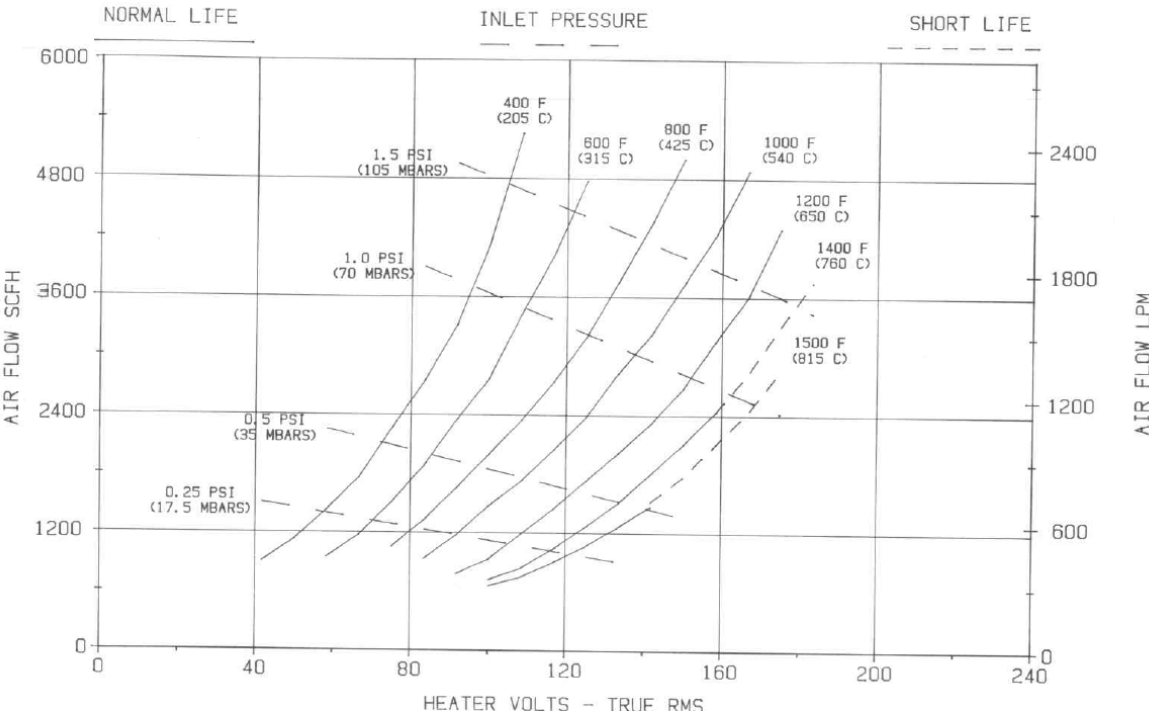
**1-1/4" Inline Heater - 038825/038826**



**2-1/2" Inline Heater - 063007/076418**



2-1/2" Inline Heater - 074439



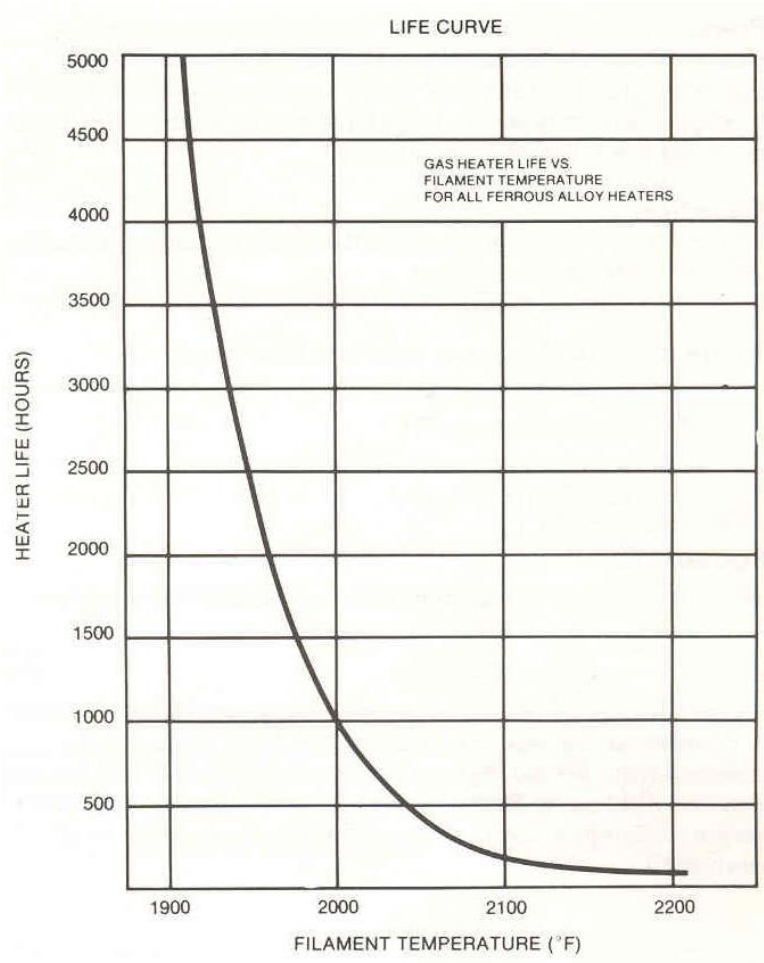
## Troubleshooting and Replacing Heaters

1. Note that "TYPICAL" Element Life is APPROXIMATELY 5000 hours. This is based on heater element operating at or below temperatures shown on PERFORMANCE CURVE. In addition to normal end of life, elements can fail due to mechanical damage, or problems with the control system.
2. If an element has failed prematurely, it should be inspected to determine the cause of the element failure.
3. When replacing or troubleshooting heaters, turn off power to the system and be sure to follow lock-out/tag-out procedures.
  - a. For Troubleshooting Heater
    - i.) Use multi-meter to check continuity between:
      1. Power terminals H1-H2 (for 1Ø) or H1 to H2, H2 to H3 and H1 to H3 (for 3Ø)
      2. Thermocouples positive (+ yellow) to negative (- red)
    - ii.) If there is continuity on all above tests, check system wiring:
      1. Crossed thermocouple wires.
      2. Reversed thermocouple wire polarity – note RED is NEGATIVE.
      3. Verify inlet air temp is below set point on INLET TEMP controller.
    - iii.) If there is no continuity on any test, then contact your local TUTCO SureHeat representative for assistance.
4. Remove entire heater assembly from system. Internal components are typically not replaceable.
5. Reconnect thermocouples, power and ground wires for new/replacement heater.
6. Attach any covers and operate heater as normal.

Element Life Curve

(This is published by the element wire manufacturer. It is considered typically and not a guaranteed life)

The life of a TUTCO SureHeat heater is directly based on the temperature of the filament wire. The curve below shows that 5000 hours of life can be obtained by maintaining a filament temperature below 1900°F. Also note that the element does not fail until it reaches more than 2200°F!



***The technical data and specifications supplied in this operating manual are subject to change without prior notice. Contact TUTCO SureHeat for additional assistance.***