



**SIERRA<sup>®</sup>**

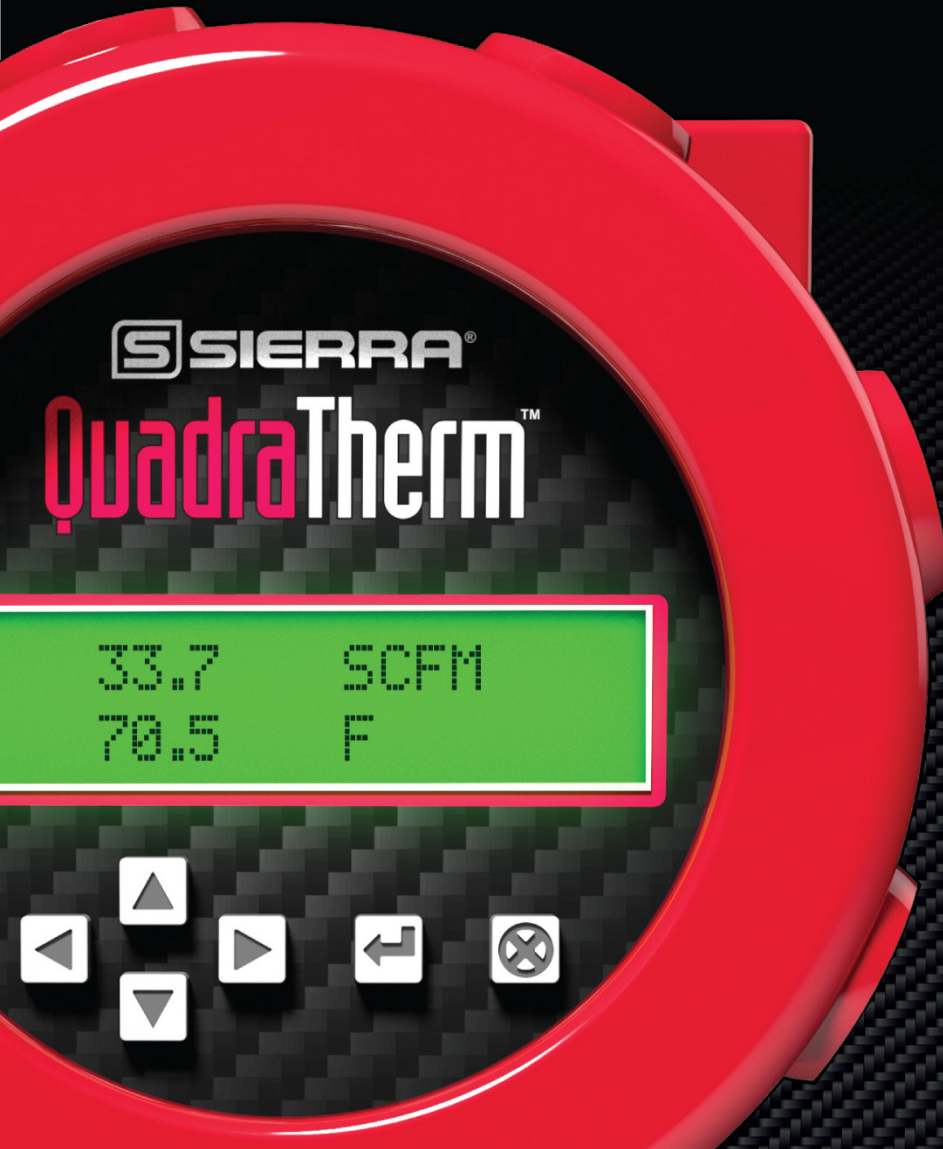
## We Will Begin Shortly...

- Important: Please put your phone on **MUTE**, if you have called in using your phone to eliminate background noise.
- Please **TURN OFF** your video.
- The **Q&A** session will be after the presentation.
- You can submit your questions using the **CHAT** function.

# QuadraTherm™ 640i / 780i

THERMAL MASS FLOW METER

**NEVER**  
before possible.



# Series of Training Webinars:

- |                                   |            |                           |
|-----------------------------------|------------|---------------------------|
| ▪Friday, October 12 <sup>th</sup> | 8:15am PST | Complete                  |
| ▪Friday, October 19 <sup>th</sup> | 8:15am PST | <b>Today!</b>             |
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# World's Most Accurate Thermal Mass Flow Meter

- Accuracy: +/- 0.5% of Reading
- Multivariable: Mass flow rate, T, and P
- QuadraTherm™ four-sensor design
- DrySense™ no-drift sensor with lifetime warranty
- iTerm™ “Brain” manages changes in gas, T, P, Outside Temp
- Dial-A-Pipe™: Change pipe size
- Dial-A-Gas™: Change gas type
- iTerm Gas Library: 18 gases & mixtures (growing & improving)
- ValidCal™ Diagnostics: Assure performance
- Smart Interface Program: Computer interface software
- Foundation Fieldbus, Profibus DP, HART (pending)





# How We Did It.

## THE FOUR PILLARS OF SUCCESS:

1. AeroMax™ sensor head
2. DrySense™ velocity sensor
3. QuadraTherm™ four-sensor design
4. iTherm™ “Brain”



# iTherm “Brain”

- QuadraTherm provides inputs:  
**T1, T2, T3, T4, W**
- iTherm solves the First Law of Thermodynamics
- iTherm delivers multivariable outputs:  
**Mass Flow Rate, T, P**
- iTherm manages changes in:
  - ✓ gas selection
  - ✓ gas temperature
  - ✓ gas pressure
  - ✓ outside temperature
  - ✓ pipe conditions (size and roughness)
  - ✓ flow profile

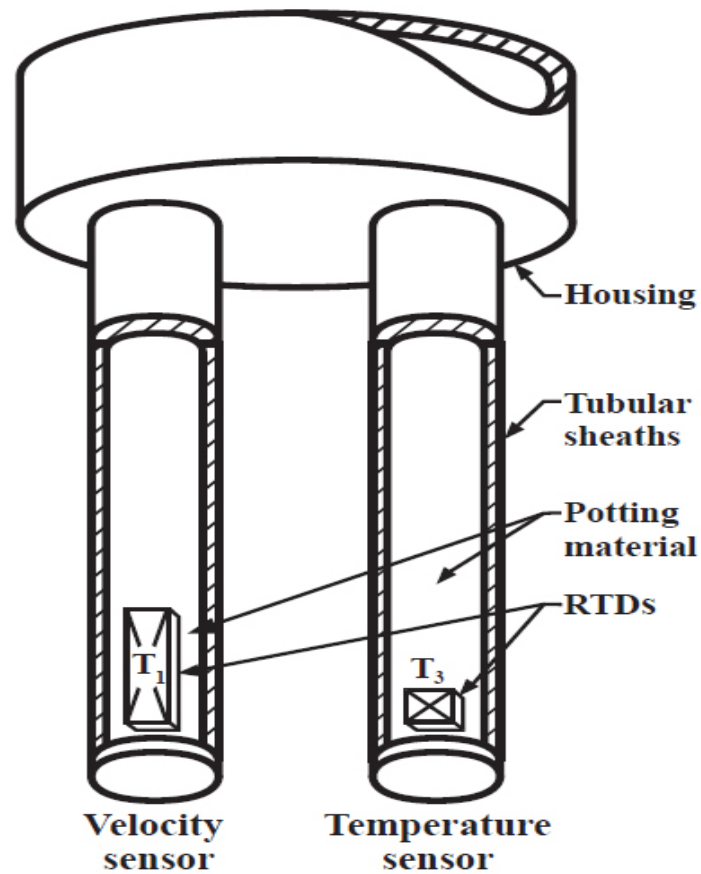


# Principle of Operation



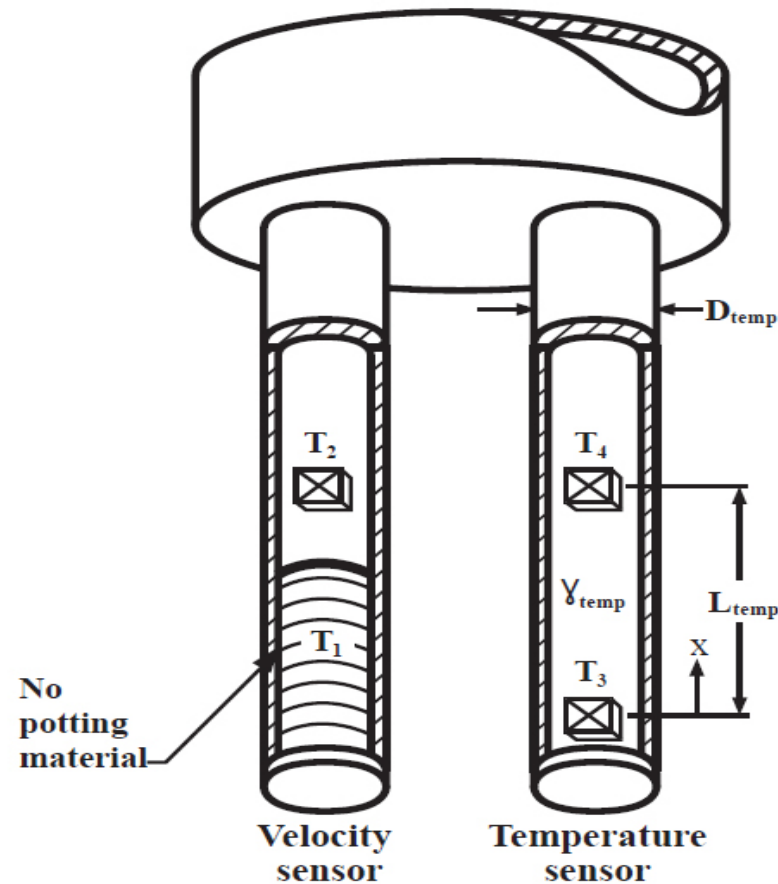


# Traditional Two-Temp Flow Sensor



(a) Two-temperature flow sensor

# QuadraTherm Four-Temp Flow Sensor



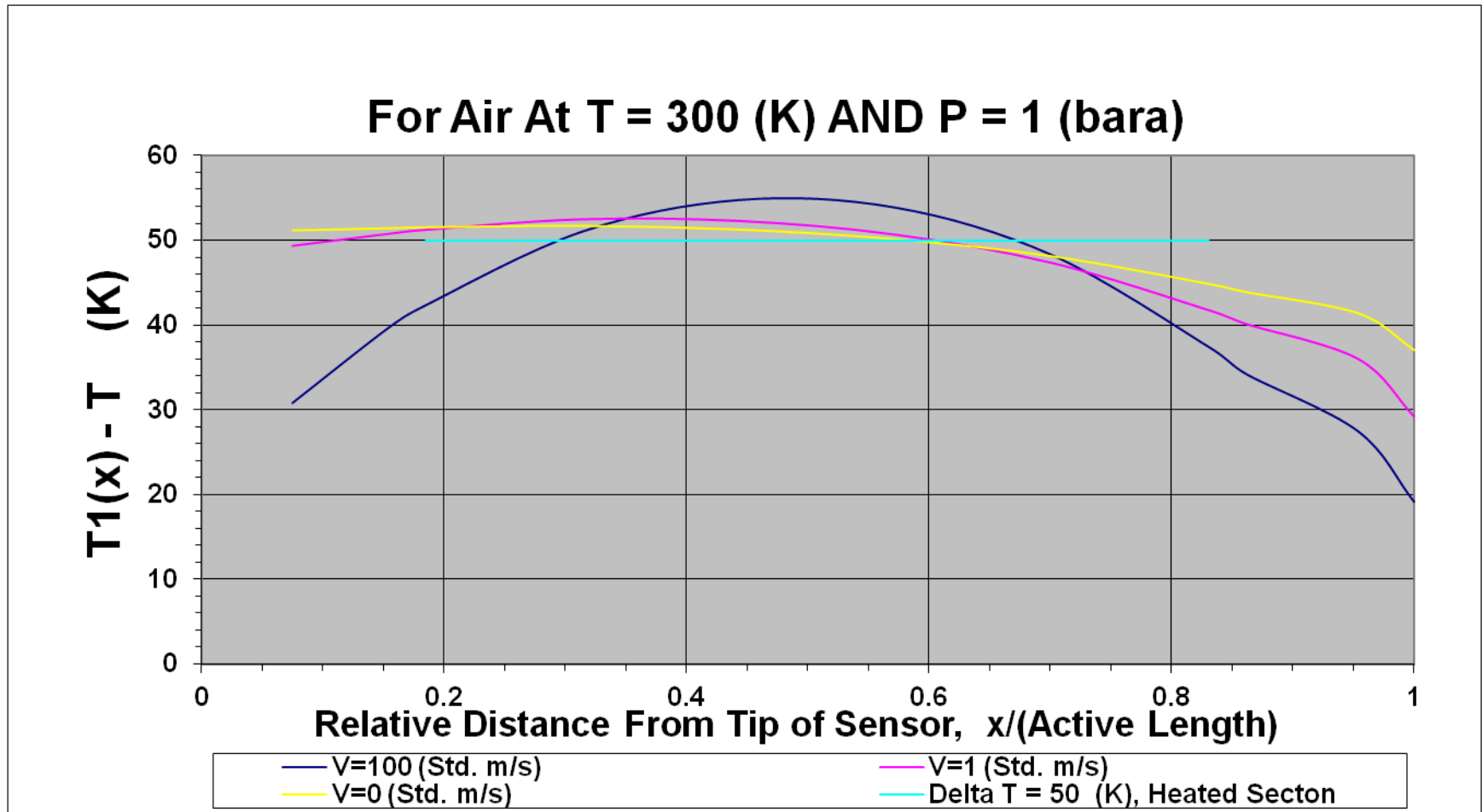
(b) Four-temperature flow sensor

# White Board Session With Dr. Olin

We'll take a short break to set up...  
Please set your video to maximum  
size



# Axial Temperature Distribution of V-Sensor Changes Greatly With Flow



# Management of:

1. Stem Conduction
2. Gas Selection
3. Changes in Temperature
4. Changes in Pressure

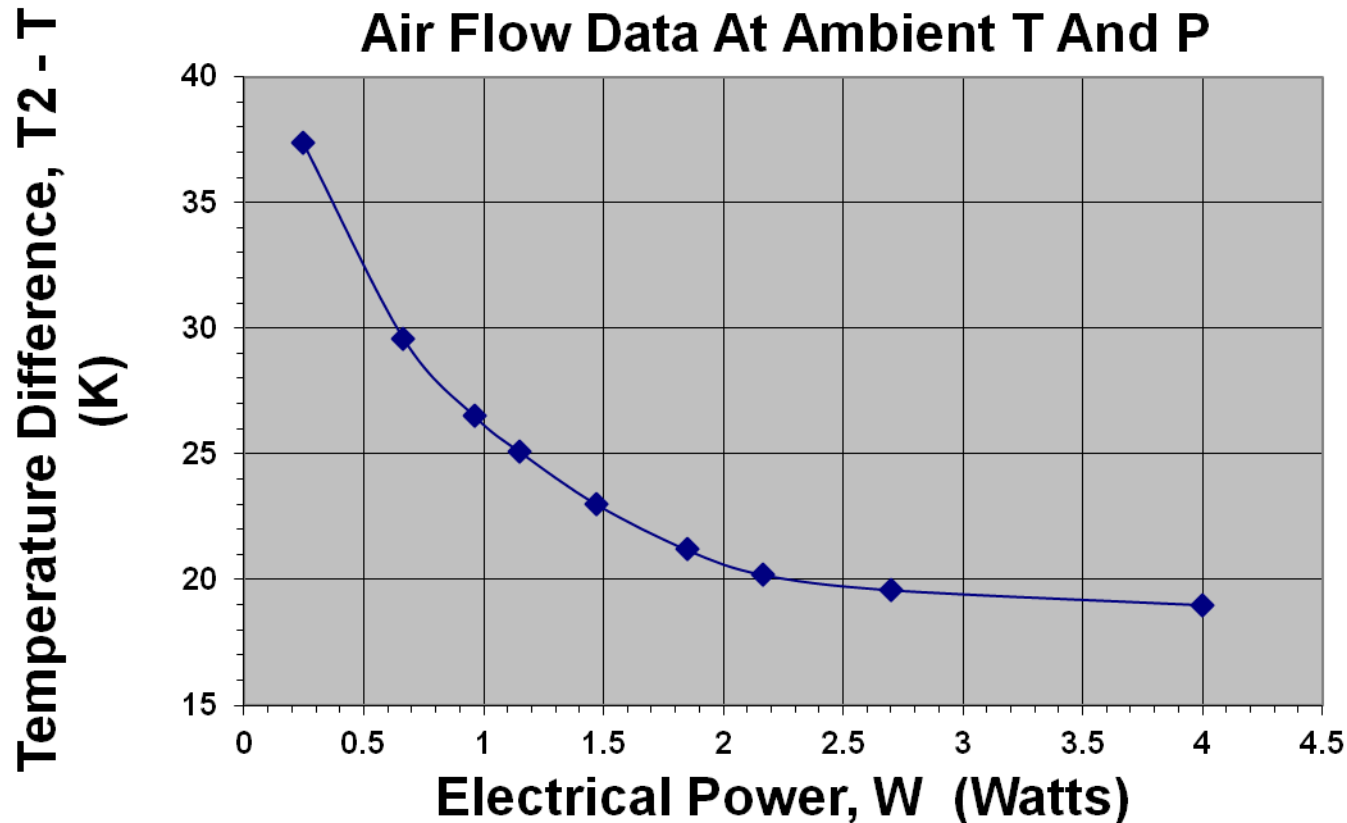


**Note: In the following figures  $\Delta T = 50\text{ }^{\circ}\text{C}$**



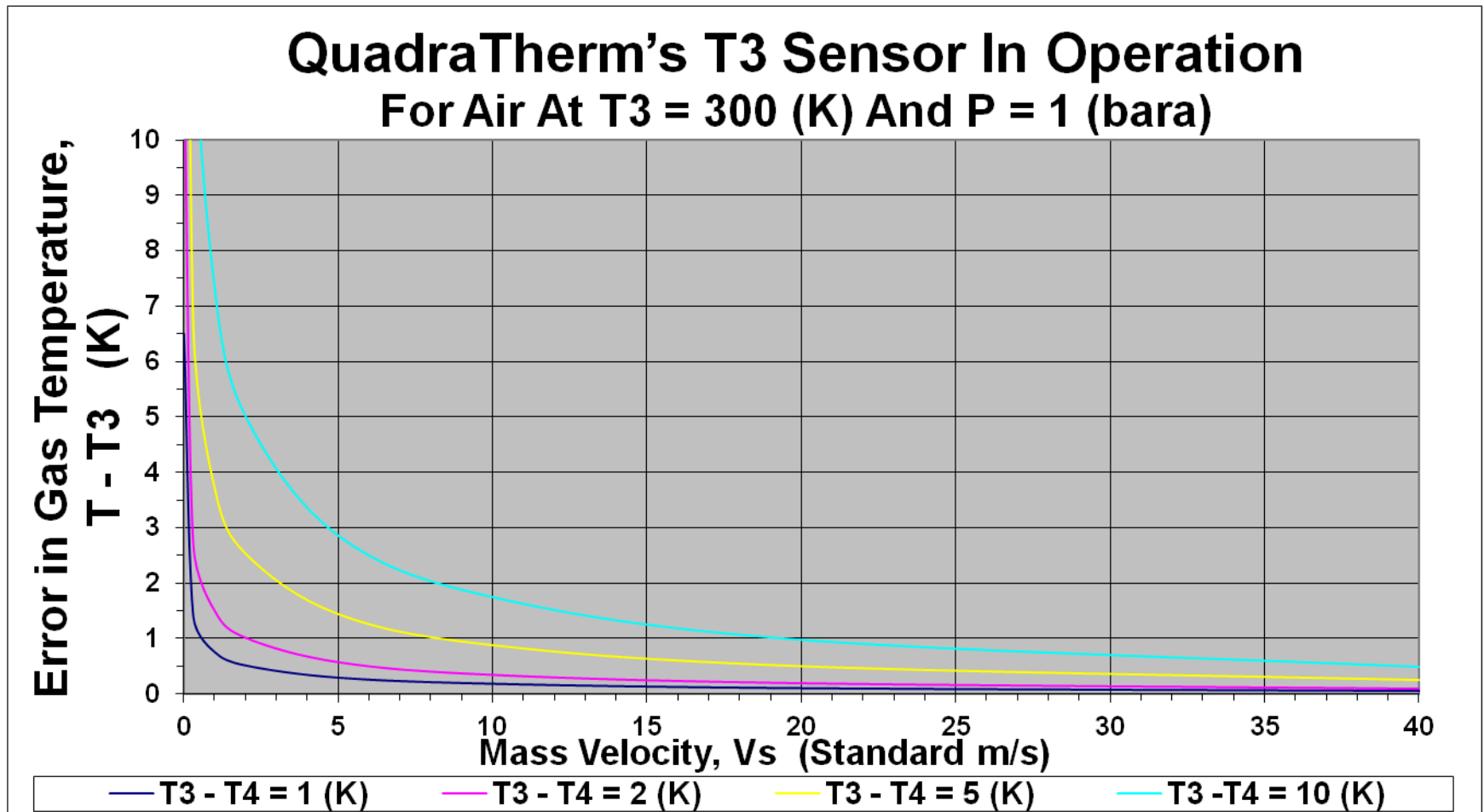
# Management of Stem-Conduction— For V-Sensor

## QuadraTherm's T2 Sensor In Operation



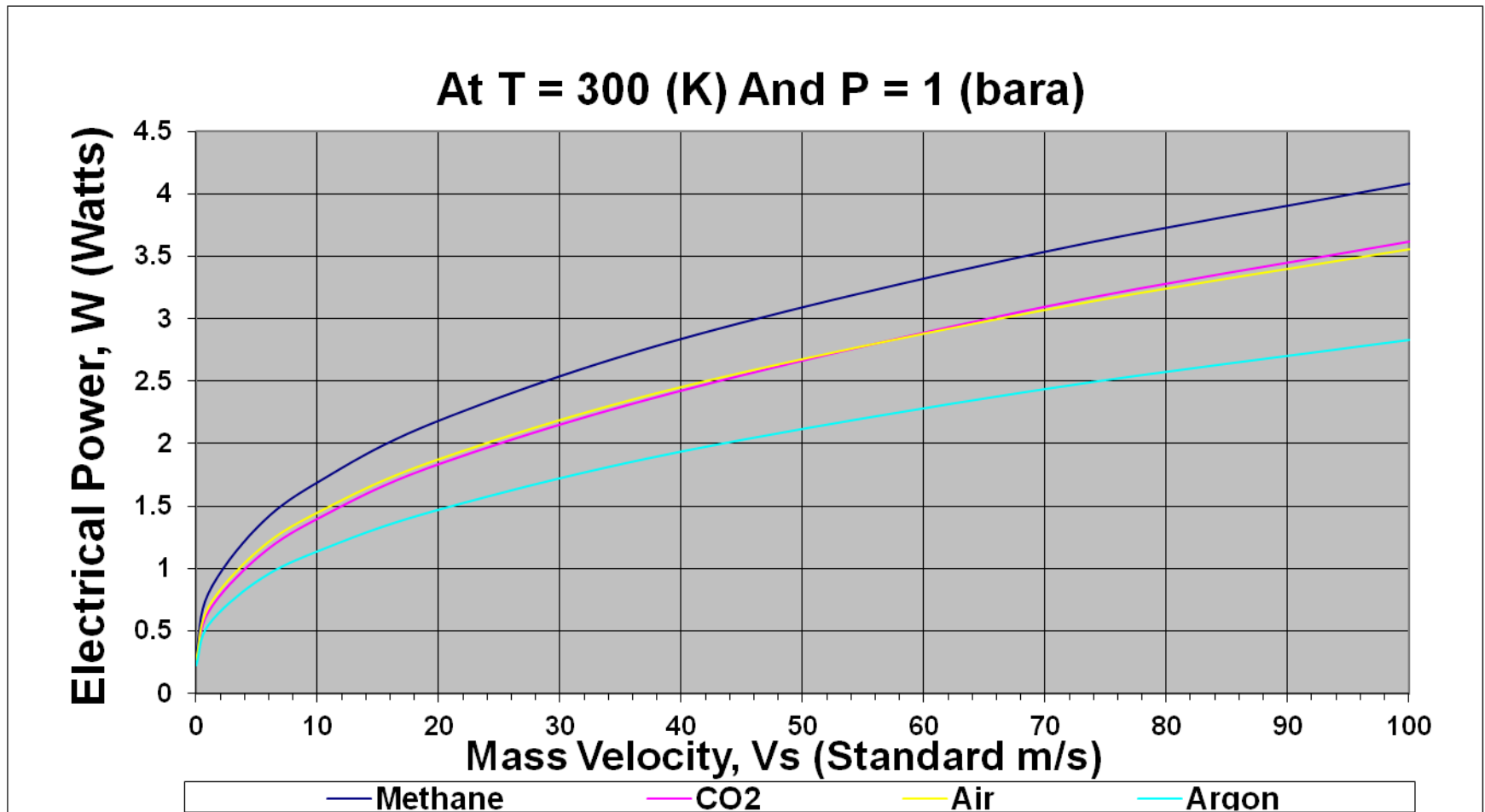
# Management of Stem Conduction—II

## For T-Sensor

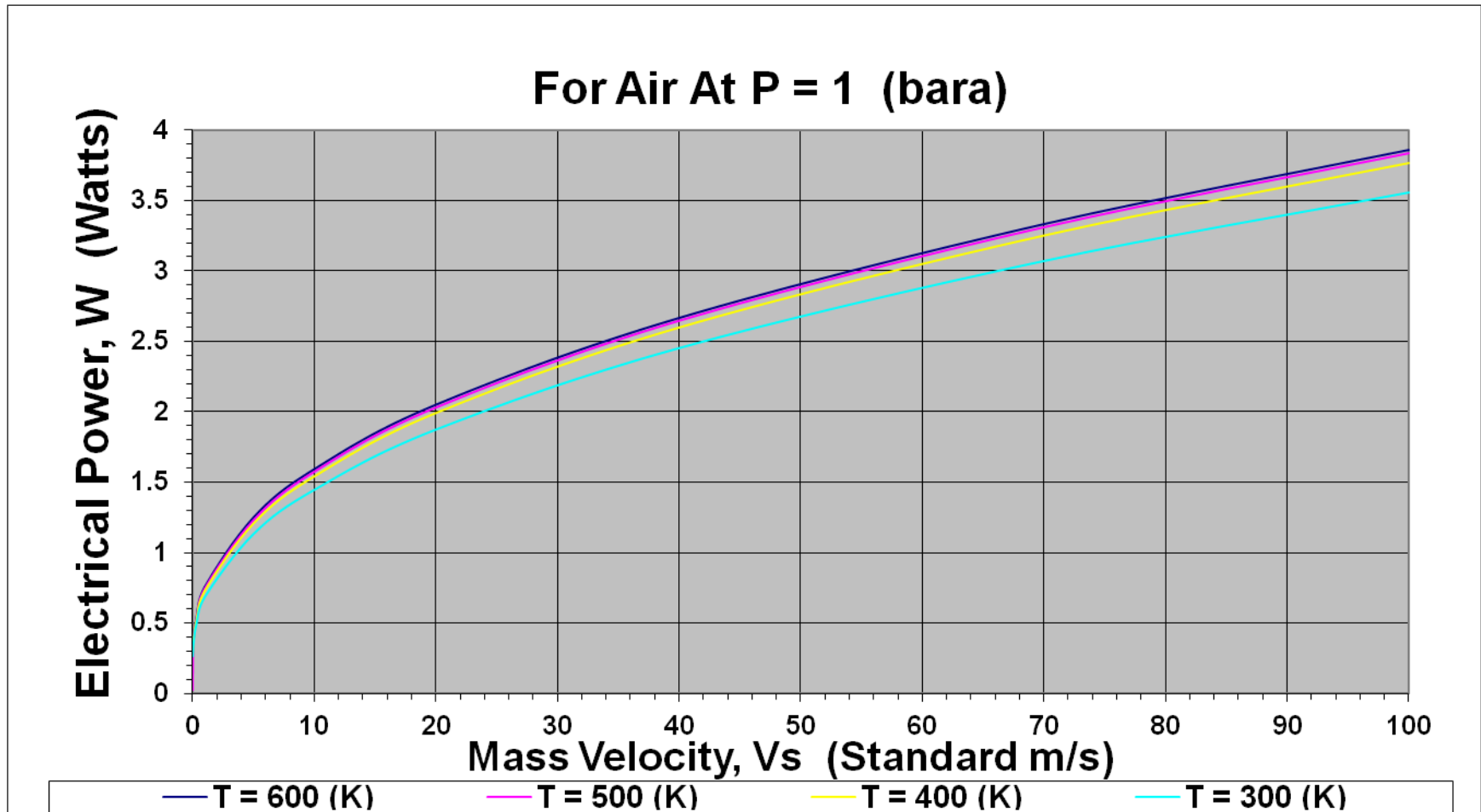


# Management of Gas Selection—I

## Classical Plot

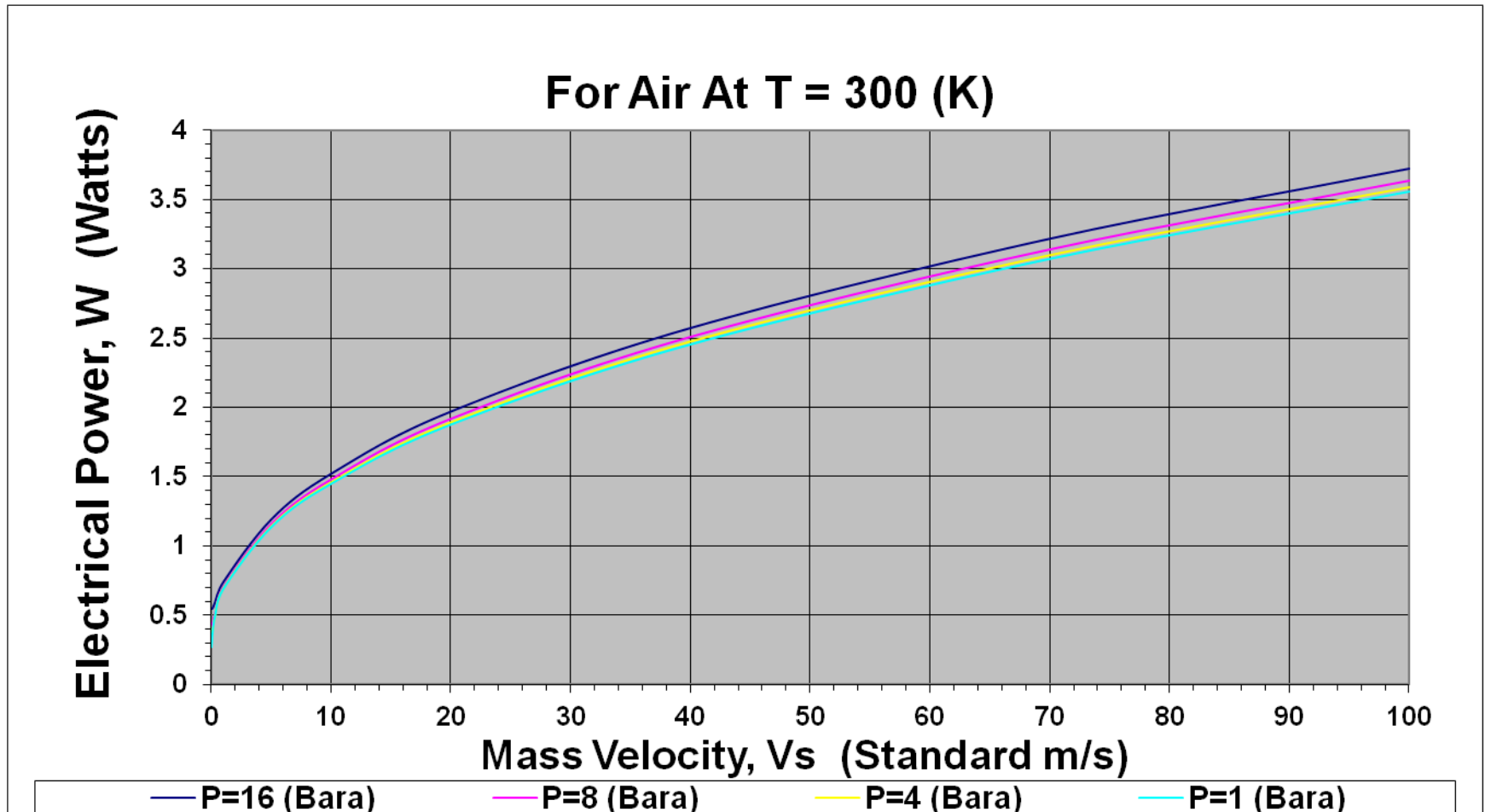


# Management of Gas Temperature



# Management of Gas Pressure—I

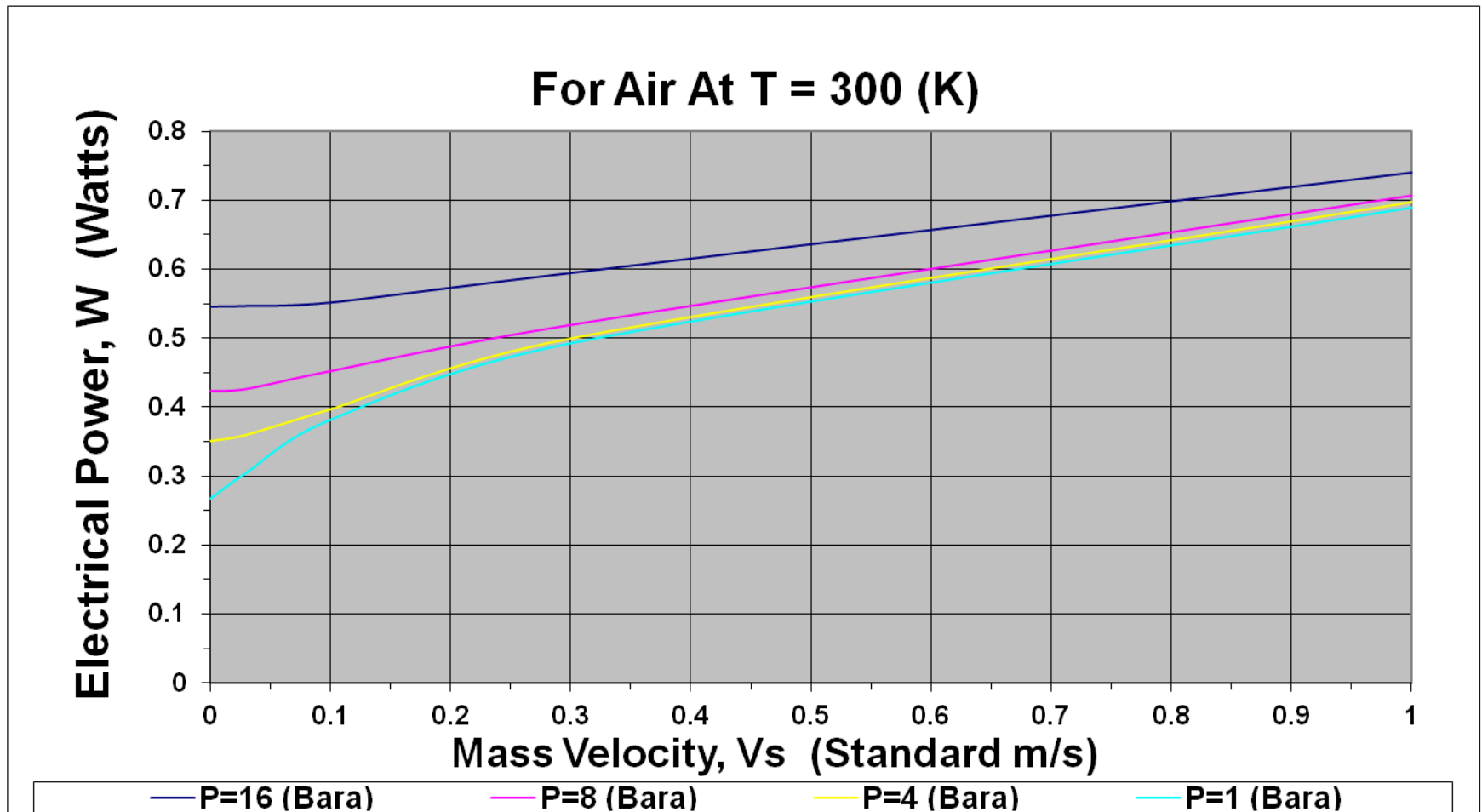
## Full Flow Range





# Management of Gas Pressure—II

## Very Low Flows

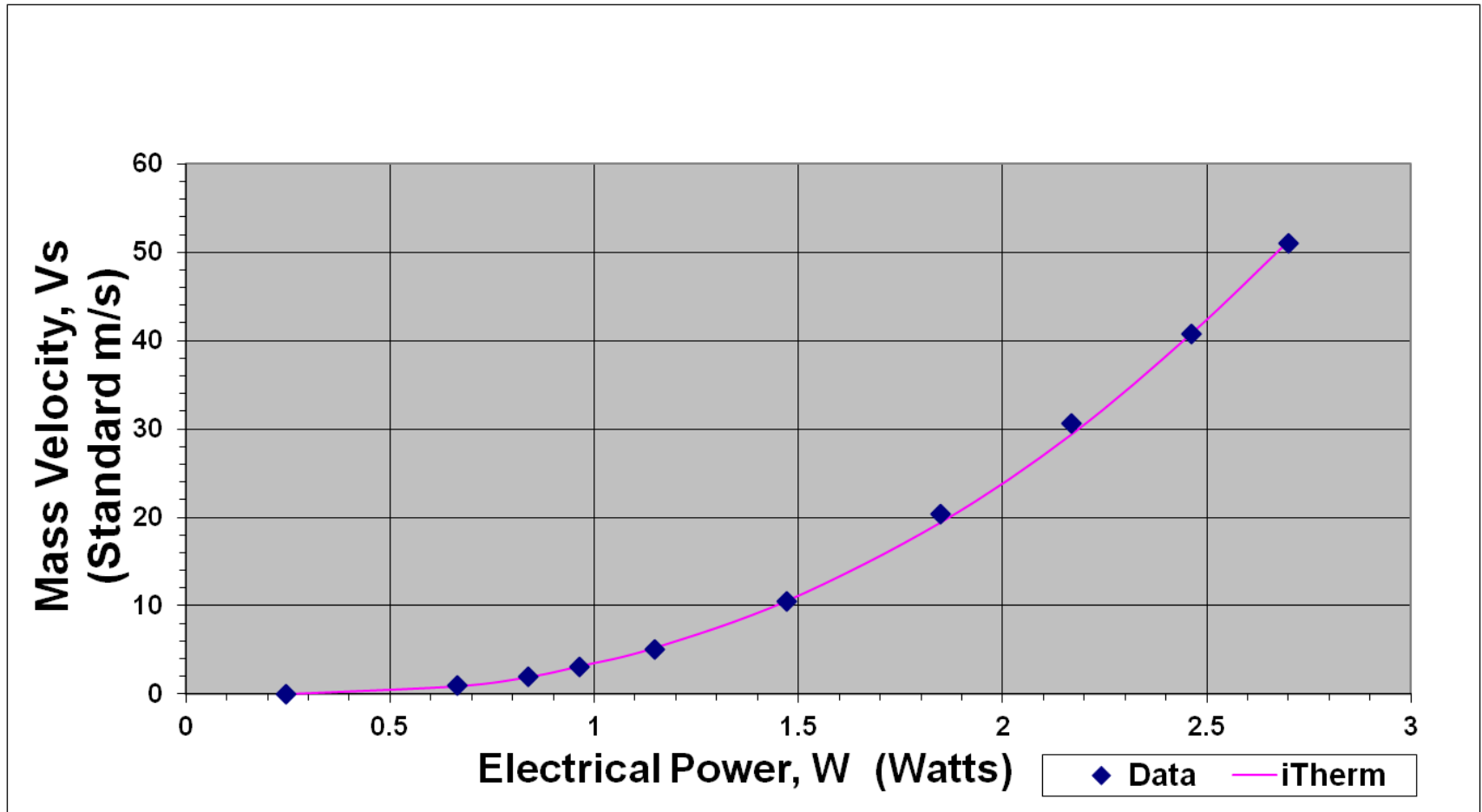


# Comparison of iTherm With Flow Calibration Data

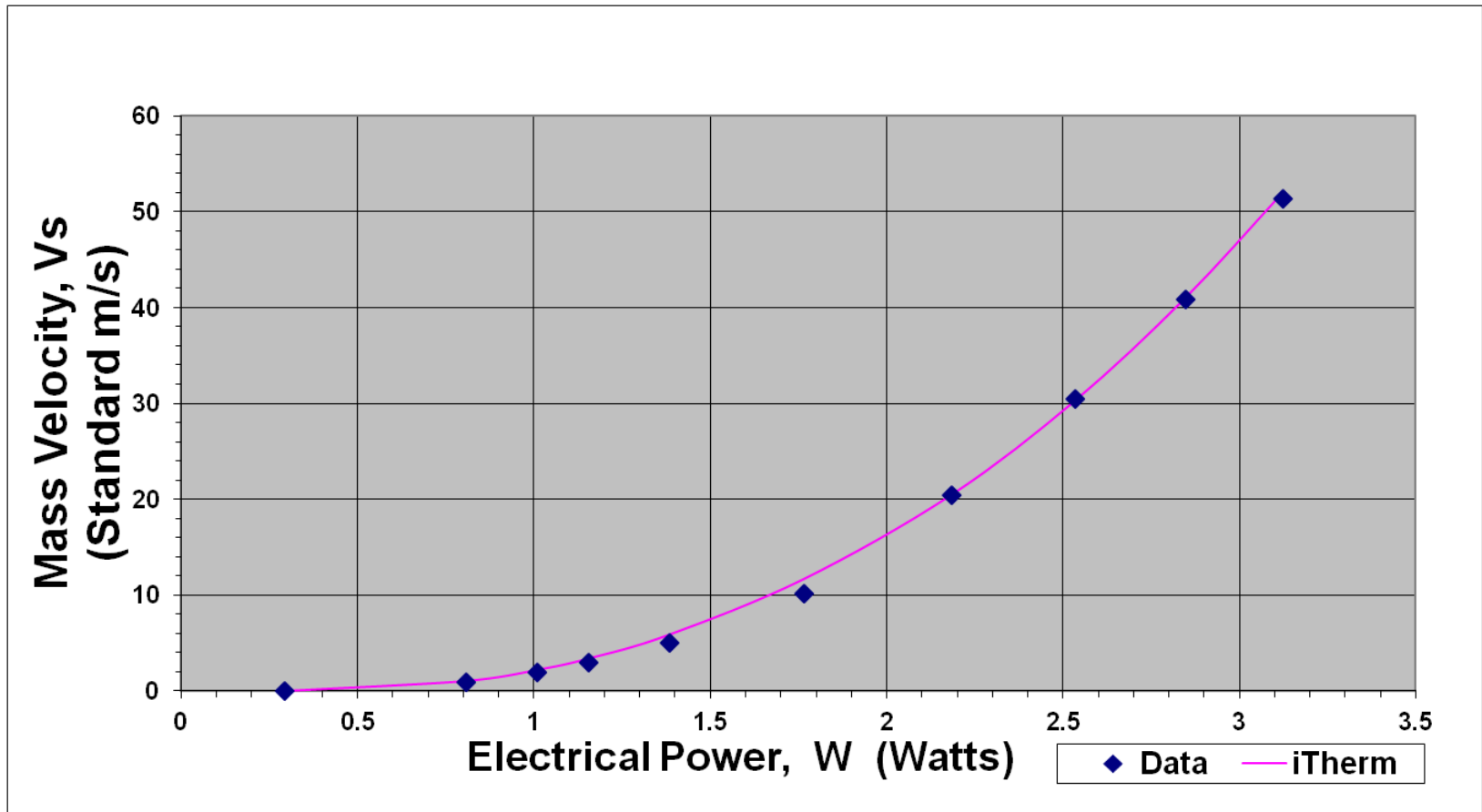


**Note:** In the following figures  $\Delta T = 50^{\circ}\text{C}$ , and data is at ambient T and P

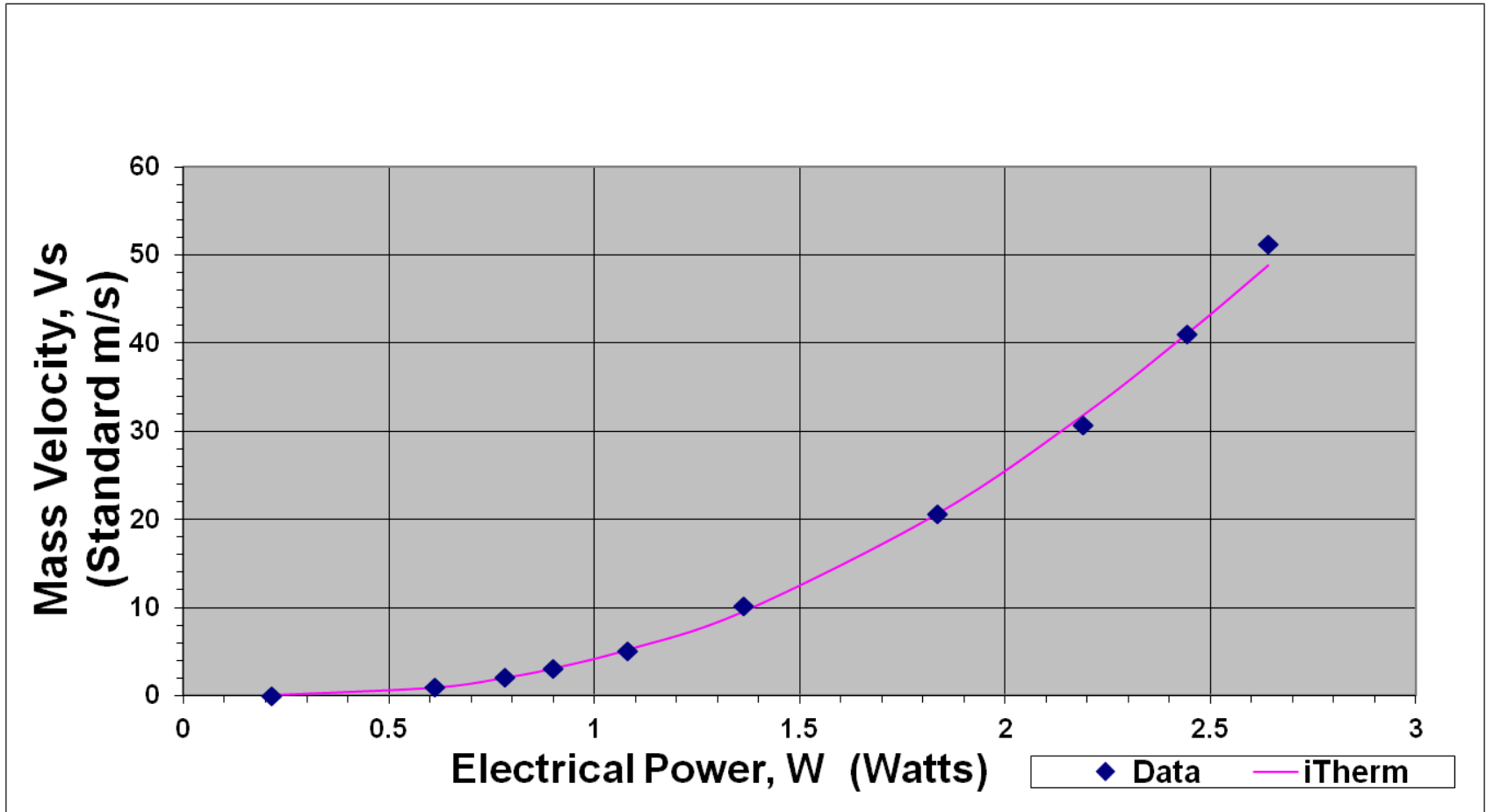
# Comparison With Air Flow Data



# Comparison With Methane Flow Data

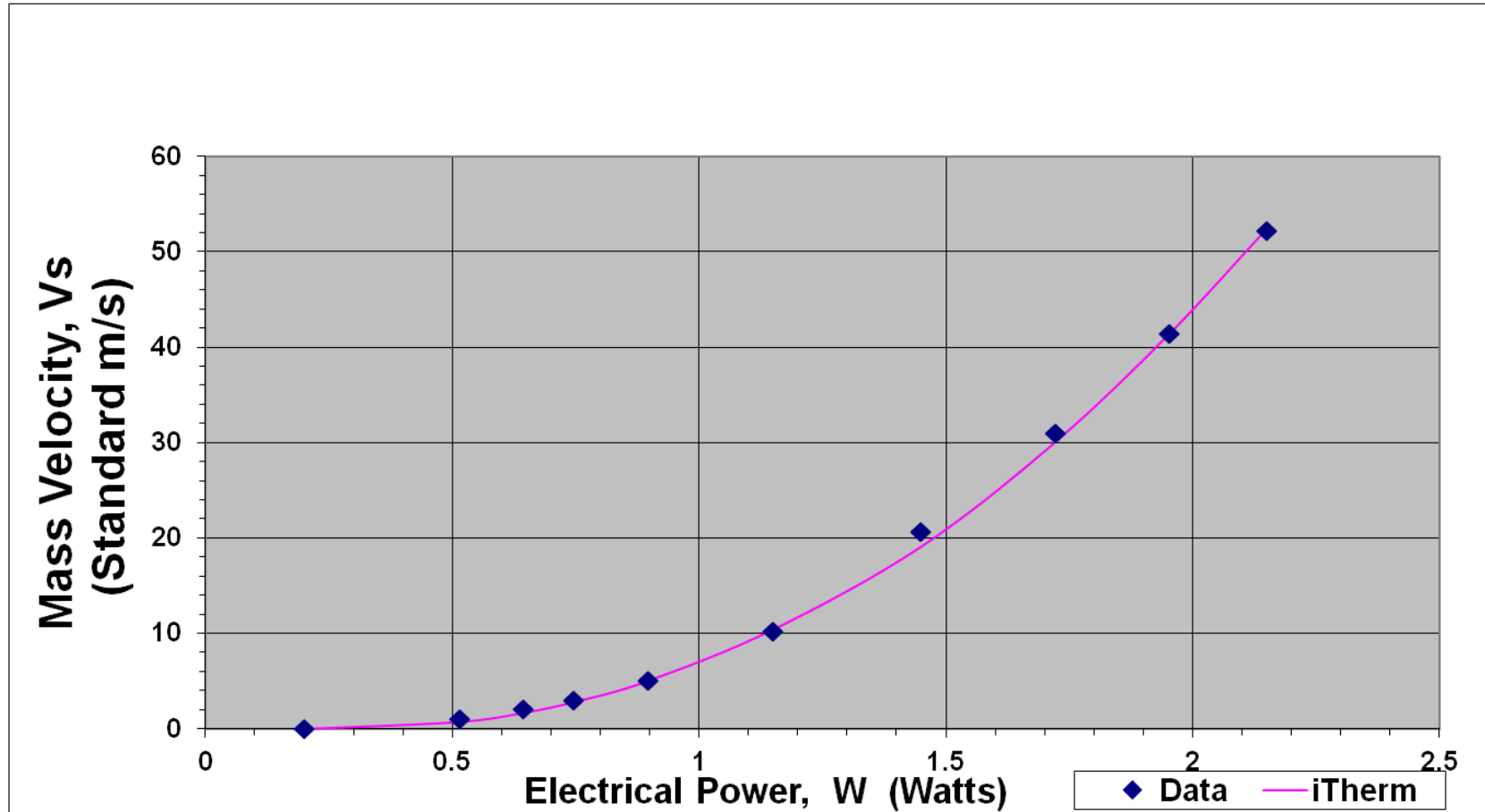


# Comparison With Carbon Dioxide Data





# Comparison With Argon Flow Data



# What this Product Does for You:

- **Highest accuracy**—0.5% of reading from 50% to 100% of full scale; 0.5% of reading plus 0.5% of full scale from 0% to 50% of full scale
- **Highest stability**—10 years
- Selection of **any gas** or gas mixture right **on the flow meter**
- Accuracy maintained when **temperature changes**
- Accuracy maintained when **pressure changes**
- Accuracy maintained when **outside temperature changes**
- **Multi-variable** outputs—mass flow rate, temperature, pressure
- **Digital protocols**—Foundation Fieldbus, Hart, Profibus, and others

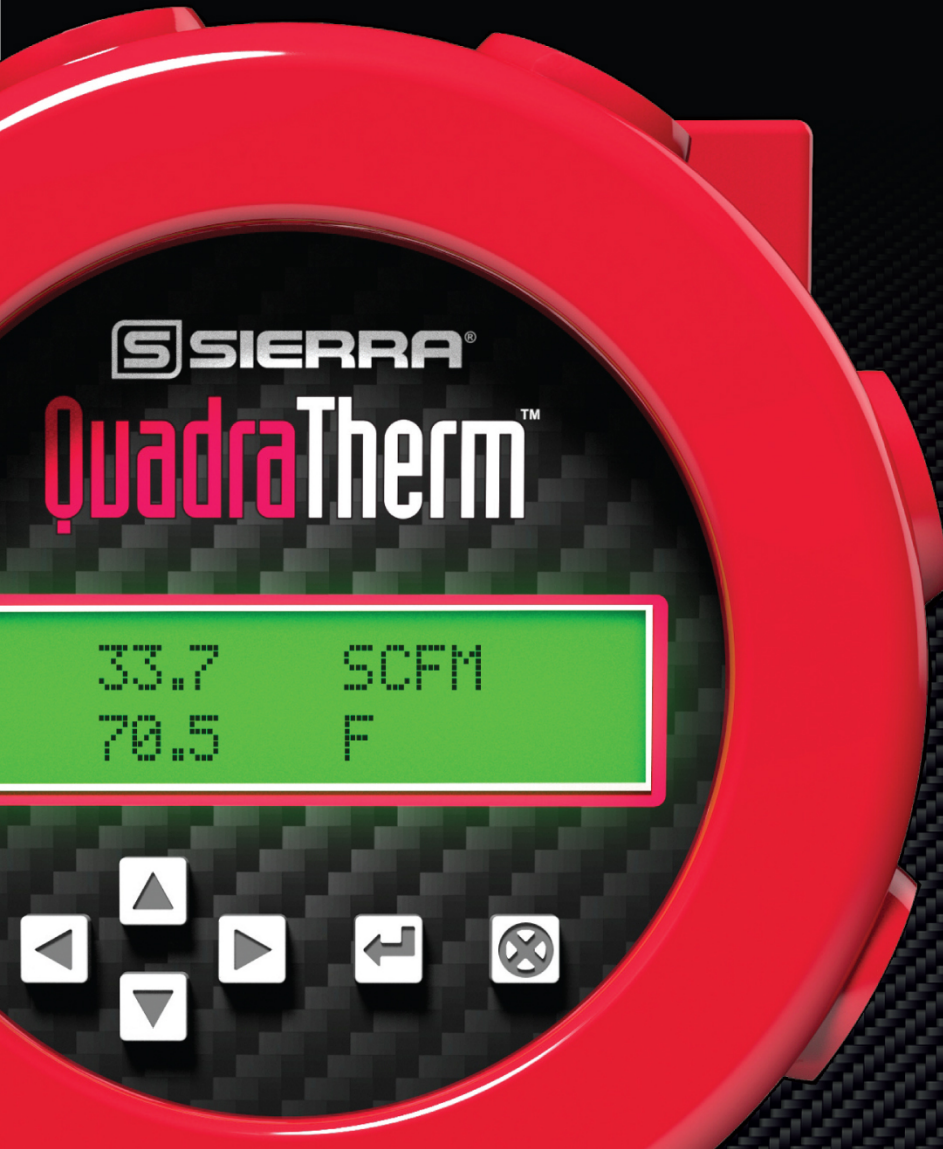


# Ask Dr. Olin Questions!

**Use the CHAT Function**

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THERMAL MASS FLOW METER



# NEVER

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# Thank you!

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