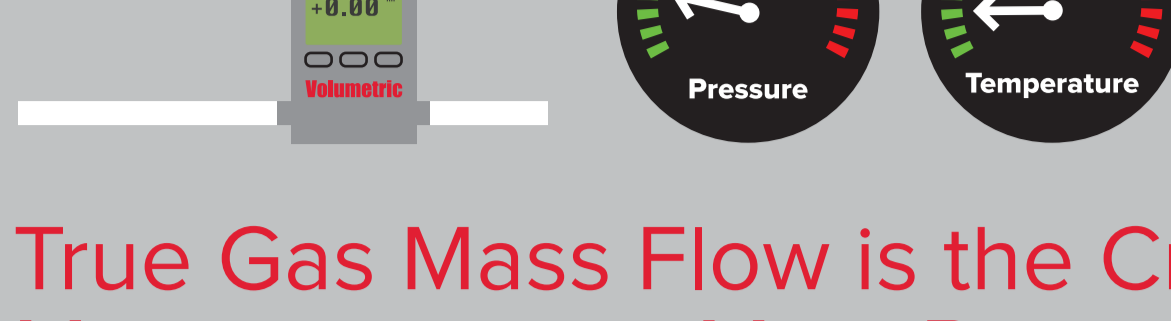


# Do YOU Have The Thermal Mass Flow Advantage?

## 1 Why Thermal Mass Flow?

Volumetric Flow Meters **Change** with Temperature and Pressure.

Volumetric Flow Meters require T & P compensation to determine true gas mass flow rate.

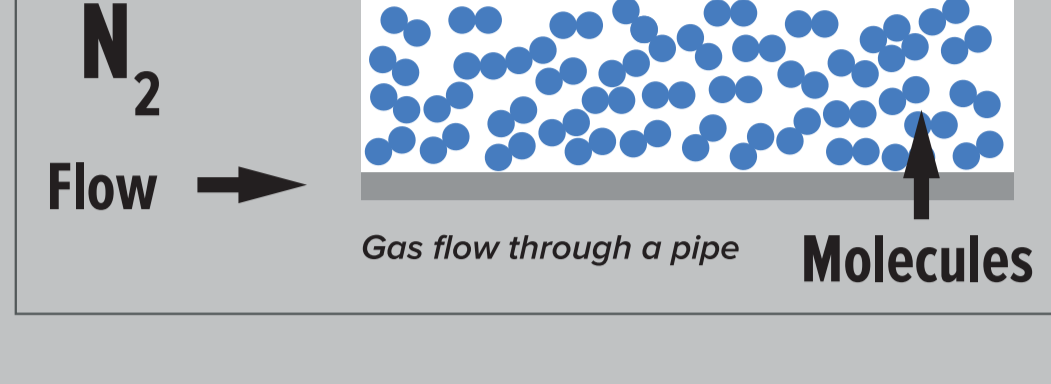


True Gas Mass Flow is the Critical Measurement in Most Processes.

When T or P change, the Gas Density Changes for a fixed volume of gas



... so Direct Mass Flow is Better.



**Direct Thermal Mass Flow is actually counting the molecules!**

Because **Direct Mass Flow** Counts Molecules and is **Independent of T & P**

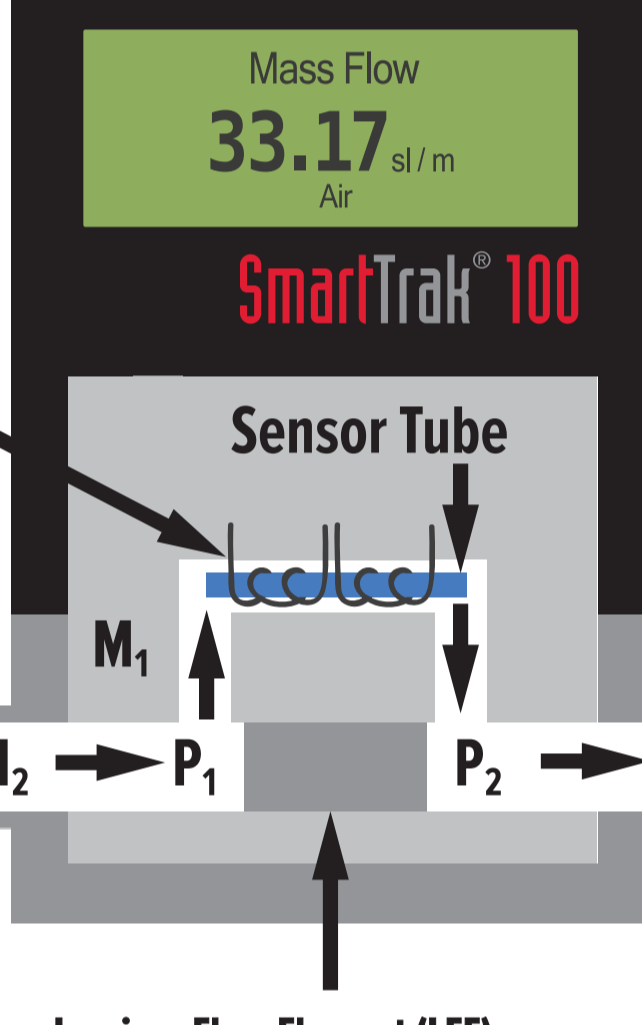
**HIGHER ACCURACY**  
**LOWER INSTALLATION COSTS**  
**MORE ECONOMICAL**

## 2 What's the Core Technology For Thermal Mass Flow?

Capillary Thermal Principal of Operation

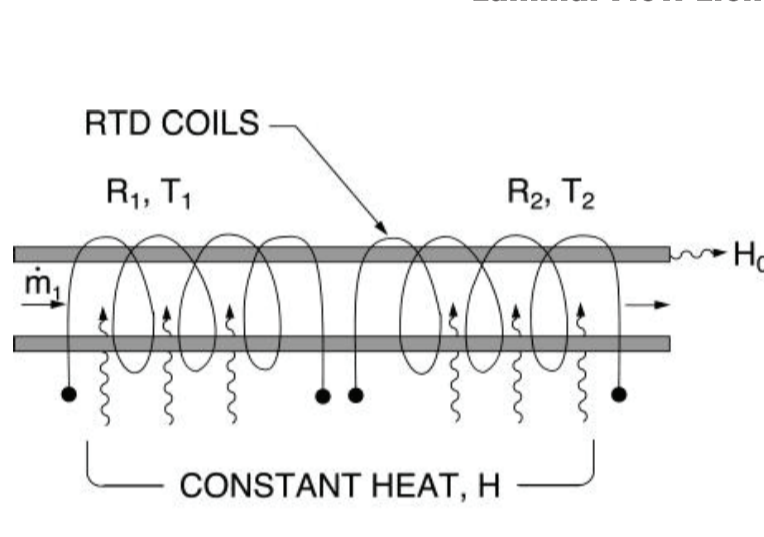
Heat Transfer and The First Law of Thermodynamics

LFE generates a pressure drop, forcing a small proportion of gas through a platinum capillary wire wound RTD sensor



Flow through sensor M1 is about 1% of M2 total flow out.

Flow in sensor M1 is linearly proportional to M2 total flow!



FIRST LAW OF THERMODYNAMICS (HEAT IN = HEAT OUT)

$$H = \dot{m}_1 C_p (T_2 - T_1) + H_0$$

$$\dot{m}_1 = \frac{H - H_0}{C_p \Delta T}$$

Close up of capillary sensor.

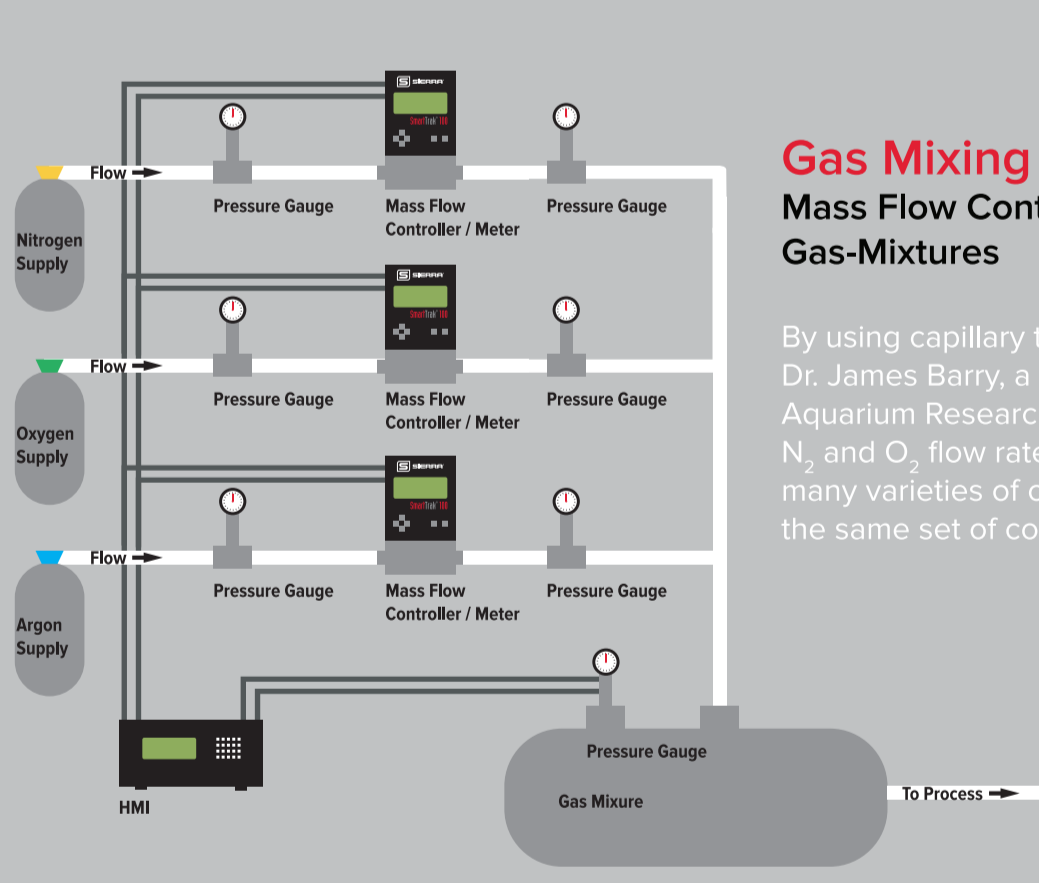
**Direct thermal mass flow does not need any T or P compensation requiring complicated calculations with flow computers**

[Watch Video >](#)

## 3 How Has Capillary Thermal Mass Flow Been used?

Over 80% of all Industrial Processes are based on Mass Flow Not Volumetric Flow

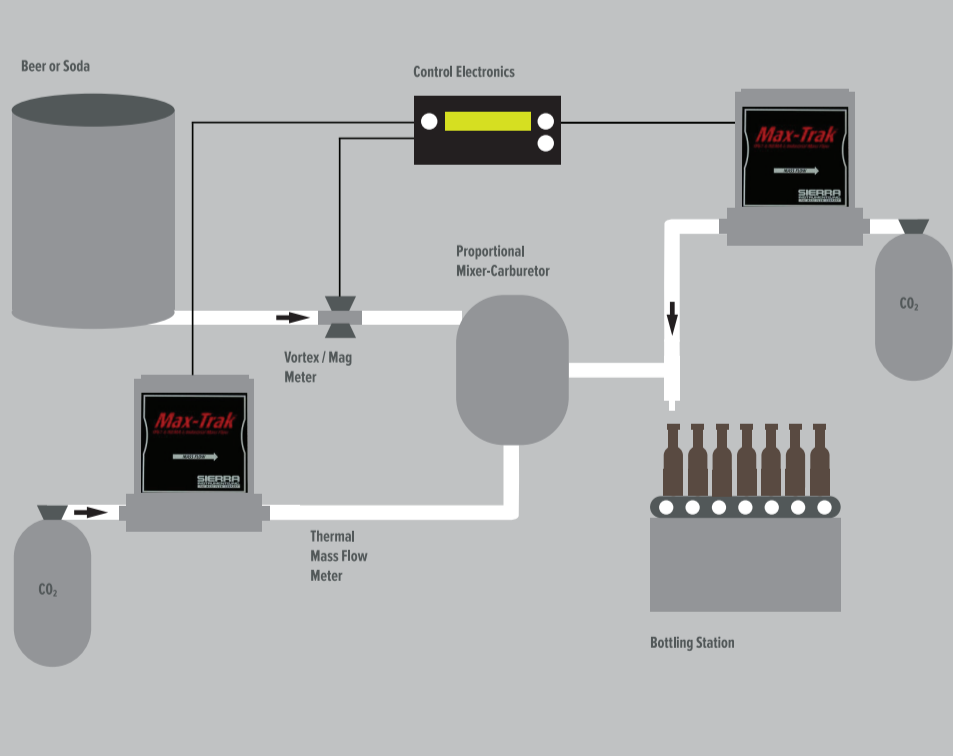
**Perfect for Systems Integrators & Scientists**



**Gas Mixing for Laboratory Research**  
Mass Flow Control for Accurate and Consistent Gas-Mixtures

By using capillary thermal mass flow controllers, Dr. James Barry, a scientist from MBARI (Monterey Bay Aquarium Research Institute) was able to change his CO<sub>2</sub>, N<sub>2</sub> and O<sub>2</sub> flow rates instantly and remotely, creating many varieties of oceanic atmospheres in his tanks with the same set of conditions...

[Learn More >](#)



**Beverage Manufacturing**  
Mass Flow Controllers Provide Precise Carbon Dioxide CO<sub>2</sub> Injection

Beverage manufacturers have the ability to control the amount of carbon dioxide (CO<sub>2</sub>) being injected into their beverages during the bottling process. Mass flow controllers (MFCs) are used to regulate and control the amount of CO<sub>2</sub> injected into the bottles during filling and capping to assure uniformity of the product...

[Learn More >](#)

## 4 Which MFC Should I Use?

(SO MANY CHOICES...)

Try Sierra's SmartTrak<sup>®</sup> 100.

Designed For Systems Integrators / OEMs & Researchers

Many customers call the SmartTrak 100 mass flow controller the "Swiss Army Knife" of MFCs. Finding a mass flow controller that can be quickly changed to handle an array of flow challenges can be a daunting task—until now.

### Key Benefits

- Multi gas
- Push Button Control
- Plug in Compod to make mini PLC
- All Digital Communications
- Multiscreen PID value tuning
- 10 point NIST Calibration
- On-site DIY Calibration
- Only MFC that ships next day—Buy Online!



### Specifications

- A single unit 0-50 slpm or any flow in between
- The smallest footprint, just 1"(25mm) wide, 3"(75mm) long
- Specify any gas, any flow ranges
- Measure even corrosive, toxic and reactive gases
- Lowest pressure drop in industry of 4.5 psid (310 mBard) @ 500 slpm
- High pressure gases up to 5000 psig

[Watch Video >](#)

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