



## THERMAL FLOW METERS PROVIDE ADVANTAGES FOR THESE APPLICATIONS:

- Bulk Tank Measurement
- N<sub>2</sub> Annealing Process
- Argon Gas Flow for Welding Machines
- CO Emissions
- CO<sub>2</sub> for Bottling Process
- Helium for Gas Chromatographs
- Hydrogen for Gen Sets
- Methane for Biogas & Coal Gas Recovery
- O<sub>2</sub> for Medical Applications
- N<sub>2</sub> & O<sub>2</sub> for ASU Plants



Figure 1: Thermal mass flow meters excel in N<sub>2</sub> flow measurement for bulk tank farms, Argon for welding gas lines, CO<sub>2</sub> for bottling process, He for GC's, H<sub>2</sub> for Gen Sets and Methane for fuel.

## THERMAL FLOW METERS HELP WITH PURE GAS APPLICATIONS

### Real time responsiveness for a variety of pure gas flow measurement applications.

Pure gas thermal mass flow meters deliver the highest level of accuracy for a wide range of applications. The gas selection In-situ calibration features - available on the Prime and Paramount products - allows the user to choose from a list of pure gases such as these:

**Argon Mass Flowmeters** offer both insertion and inline style meters for Argon flow metering in welding gas and shield gas application

**Carbon Dioxide Mass Flowmeters** for many industries - such as chemical, petrochemical, iron & steel, cement, and paper & pulp - emit CO<sub>2</sub> gas, and it is commonly used to neutralize process and waste water streams. Thermal Meters are frequently used in these applications.

**Carbon Monoxide Mass Flowmeters**-Although almost 80% of CO emissions are from transportation emissions, there are still many industries that need to measure this gas.

**Helium Mass Flowmeters**-With helium becoming scarcer and its cost rising, it is more important than ever to monitor flow rates around GC's and Analyzers and to detect leaks in order to avoid the high-costs of process inefficiencies.

**Hydrogen Mass Flowmeters**-Hydrogen is used in the pharmaceutical, chemical, petroleum, metallurgical, glass manufacturing, and electronics industries.

**Methane Mass Flowmeters**-In biogas applications such as digester operations and coal gas recovery, methane plays a large part and thermal meters work very well with these applications by accurately measuring very low-flow rates

**Nitrogen Mass Flowmeters**-Nitrogen is used in purging applications for heating, ventilation and plumbing industries. Large volumes of nitrogen are also used by oil refineries and petrochemical industries for purging and blanketing operations, and it is being used at an increasing rate by the food industry.

**Oxygen Mass Flowmeters**-Medical centers, clinics, and hospitals often have use for meters to measure the flow of oxygen. Thermal meters are approved for use in oxygen applications including medical oxygen.

Thermal flowmeters use a constant temperature differential (constant  $\Delta T$ ) technology to measure mass flow rate of air and gases. The sensor consists of two RTD's and the electrical power required to maintain a constant  $\Delta T$  is directly proportional to the gas mass flowrate. The microprocessor signal is then linearized to deliver a linear 4-20mA signal. Applications benefit from thermal flowmeters with accurate and repeatable measurement of mass flowrate, fast response, and low-flow sensitivity. For more information, contact K&I Instruments to receive a solution that best fits your application.