

Application Notes:

Verifying a Dry Gas Meter Using the Bios Primary Flow Meter

Introduction:

A Dry Gas Meter can be verified by the hand-portable Bios Definer™ 220 primary flow meter and a timing device

The Definer 220 is a primary gas flow meter that performs direct volumetric measurement of gas flow at $\pm 0.75\%$ of reading. Using Bios- patented Proven DryCal Technology, the Definer 220 measures the time required to displace a piston through a glass cylinder of known volume (accuracy is dimensional, based upon length and time, two of the primary units of measure, or the SI Base Units). As a direct volumetric device, the Definer 220 is not affected by air temperature, barometric pressure, air composition or humidity

Flow Corrections:

A dry gas meter has two or more chambers formed by movable diaphragms. With the gas flow directed by internal valves, the chambers alternately fill with and expel gas, producing a near continuous flow through the meter. As the diaphragms expand and contract, levers connected to them convert the linear motion of diaphragms into rotary motion of a crank shaft which drives a counter mechanism to determine the volume of gas. The Bios Definer measures flow rate (volume/time). Multiply the Definer's average flow rate with time to obtain the gas volume.

Connection Diagram for Dry Gas Meter

Follow the connection diagram below for a simple verification of the dry gas meter to the DryCal. Adjust the needle valve to obtain the desired flow



Follow the connection diagram below for a third party console such as Environmental Supply's Mercury Emissions Sampler. Connect the DryCal, DGM, and Flow source as shown in the connection diagram. Use the needle valve to create the pressure drop necessary to provide isolation and to simulate the mercury absorbent tube



Procedure

Connect all the devices as per the set up diagram. Connect tubing from the back pressure regulator to the inlet of the DryCal and leave the outlet open to atmosphere

- Turn the Definer 220 on by pressing and holding the On/Off button for approximately one second. A “splash screen” will appear, indicating the product name, model number and flow range. Using the arrows on the control panel, navigate to “SETUP” and press ENTER.
- Once within the Setup menu, navigate to the “Readings” option. Set the flow reading type in the DryCal to volumetric (Vol) and the number of flow measurement in the average to 100.
- On the Definer 220’s display, navigate to MEASURE and press ENTER. At “Take Measurements” choose “BURST” and press ENTER. Turn on the flow source and start the timing device. After sufficient time has passed for the dry gas meter to indicate the desired volume and prior to the DryCal taking 100 readings, stop the flow of gas and the timing device.
- Calculate the volume of gas by multiplying the average flow rate from the Definer with the time interval from the timing device to obtain the volume.
- Compare this volume to the volume indicated by the dry gas meter between the start and stop of the timing device.

Note: The accuracy of the volume comparison will be the combined accuracy of the timing device, the Bios Definer, and the accuracy of the timing of the start and stop

About Bios

Bios is a recognized leader in primary flow measurement. We provide products, services, and solutions for professionals in diverse disciplines including environmental protection, occupational health and safety, industrial process control, research and development and calibration laboratories.

Our Butler, NJ facility is one of the world’s most accurate gas flow measurement laboratories. Since 2004, we’ve been accredited to calibration laboratory quality and proficiency standards set forth by ISO 17025, ANSI Z-540 and NIST handbook 150, through National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology (NIST), the national lab of the United States.

We are pleased to state that our Scope of Accreditation uncertainty is $\pm 0.071\%$ of reading for gas flow measurements from 5 to 50,000 scc per minute.

