Application Notes

Auditing the URG 3000N Speciation Sampler Using the Bios Definer 220™ Primary Flow Meter

Introduction

The URG 3000N sequential particulate speciation sampler can be quickly and precisely verified in the field by the hand-portable Bios Definer™ 220 primary flow meter. The Definer 220 is a primary gas flow meter that performs direct volumetric measurement of gas flow at ±0.75% of reading. Using Bios patented Proven DryCal Technology, the Definer 220 measures the time required to displace the 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.

Background

The URG 3000N is a speciation sampler that collects PM2.5 particles on filters for the analysis of organic and elemental carbon. A constant volumetric flow rate of 22 liter per minute is maintained using a pump and mass flow controller during the sampling period. A field flow audit requires the use of the Definer 220 primary flow meter, model 220H (High flow); a Bios flow adapter; and an 18" long section of 3/8" flexible tubing. The Definer 220 is powered by an internal, rechargeable lead-acid battery, rated for 6 to 8 hours of operation. It does not exhibit memory effect and may be charged continuously. The unit may be charged overnight prior to the field audit, if necessary. Additionally, the Definer 220 has a power-saving Backlight option to enable the LCD illumination to be turned off while the unit is taking flow measurements over an extended period of time (navigate to Setup–>Power).

Procedure

- 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. Using the arrows as necessary, verify that it is set to read in volumetric (Vol), and set the number of flow measurement in the average to 10. Navigate to the "Preferences" option and verify that Magnification is set to detail, this allows for viewing of the temperature and pressure.
- Navigate to CONFIRM and press ENTER. The display will flash "Confirmed-New Setting will be retained"
- Loosen the inlet stack compression sleeve on the sampler
- Open the door to the URG 3000N sampler filter module and raise the down tube connecting to the inlet tube inside the filter module housing

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- Insert the flow adapter into the inlet tube housing and connect the tubing from the adapter to the fitting labeled "Suction" on the Definer 220
- At the Definer 220's display, navigate to MEASURE and press ENTER. At "Take Measurements" choose "BURST" and press ENTER for a stream of 10 hands-free measurements (based upon the number of flow measurements in the average). The Definer 220 will take 10 consecutive flow readings, and then will stop. Record the average flow readings and then enter the reading to the URG 3000N display to obtain the accuracy (see Figure 4). Record the gas temperature and pressure displayed on the Definer 220's display

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