



Application Guide

Calibrating a Pump Using an Electronic Calibrator



Personal sampling pumps are essential equipment for sampling airborne contaminants. However, determining airborne concentrations requires accurate knowledge of the volume of air sampled. Constancy of flow rate and equipment reliability are two important factors that affect air volume.

Some sample pumps feature a built-in rotameter, which is not a precision instrument and can provide only an approximation of pump flow rate. Flow rate should be measured with a primary instrument such as an electronic calibrator that bases measurement on the unchanging physical dimensions of an enclosed volume. A precision rotameter can also be used if its calibration is traceable to a primary standard and periodic calibration of the rotameter is performed. Some electronic calibrators have special features that provide advanced calibration options. The

Defender Electronic Calibrator CalChek® feature provides direct communication with a primary standard and automatic calibration at a single flow point or multiple flow points when used with an SKC AirChek 2000 or Leland Legacy Sample Pump. This Application Guide describes **Calibrating a Pump Using an Electronic Calibrator**. For calibration with a film flowmeter (non-electric), refer to Publication #1163.

Required Equipment

1. An **air sampling pump** capable of sampling at the recommended flow rate with the sampling medium in line, such as:
 - SKC Pocket Pump®
 - SKC Universal Series Sampler (low flow applications require the 224-26 Series Adjustable Low Flow Holder)
 - SKC AirChek® 2000 Sampler (low flow applications require Constant Pressure Controller 224-26-CPC and the 224-26 Series Adjustable Low Flow Holder)
 - SKC AirChek XR5000 Series Sampler (low flow applications require Constant Pressure Controller 224-26-CPC and the 224-26 Series Adjustable Low Flow Holder)
 - SKC AirChek 52 Sampler (low flow applications require Constant Pressure Controller 224-26-CPC and the 224-26 Series Adjustable Low Flow Holder)
 - SKC AirLite® Sampler (low flow applications require Constant Pressure Controller 224-26CPC-10 and 224-26 Series Adjustable Low Flow Holder)
 - SKC Leland Legacy® Sampler
 - SKC QuickTake 30 Sampler
2. An **electronic calibrator**, such as:
 - Defender Primary Standard Calibrator 717 Series
3. **Sampling medium** as specified in the method*
4. Any **additional equipment** specified in the method*
5. **CalChek Communication Cable** Cat. No. 210-502, required for CalChek feature (*Defender used with AirChek 2000 and Leland Legacy Sample Pumps only*)

* Refer to the method and to the related Application Guide for preparing a sampling train: Pre-filter and Tube #1164, Impingers #1165, Filters #1166, Air Sample Bags #1167, Sorbent Tubes #1168, or Two Tubes in Series #1171.

Introduction

This Application Guide provides general information about calibrating an air sampling pump using the Defender Electronic Calibrator. For details about the operation of a particular calibrator or sample pump, refer to the individual operating instructions.

Calibrating a Pump Using an Electronic Calibrator

1. Setting Up the Electronic Calibrator (Figure 1)

Press and hold the Defender Calibrator power button to turn on the calibrator. Use the Defender arrow keys to select Measure from the opening screen.

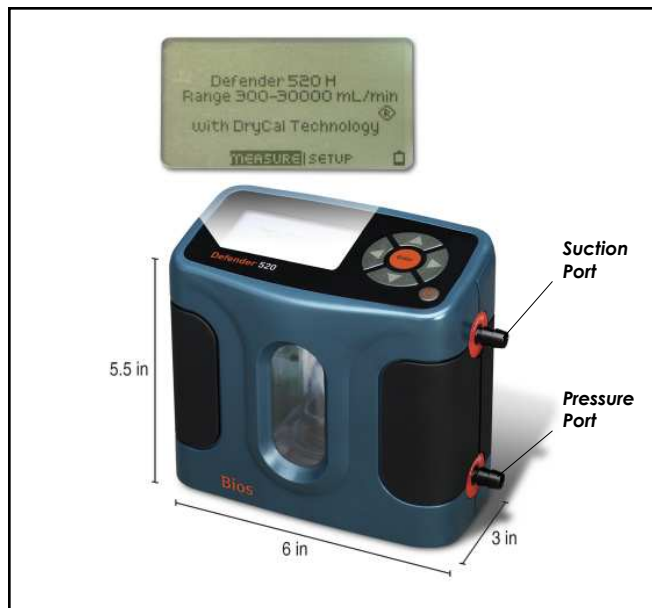


Figure 1. Defender Primary Standard Calibrator

If Using CalChek...

If using an AirChek 2000 or Leland Legacy Sample Pump with the CalChek feature, turn on the Defender Calibrator. Use the Defender arrow keys to select Setup from the opening screen and then Preferences from the next screen. Select and confirm the SKC data port.

2. Setting Up the Calibration Train (Figure 2)

Ensure pump has run for 5 minutes before calibrating. Prepare an appropriate train as specified in the method. Ensure the pump is in the appropriate mode (high or low flow) for the desired flow rate and that any necessary flow accessories (such as a CPC and low flow tube holder) are in place. With flexible tubing, connect the Defender Calibrator suction port to the inlet of a representative sample medium. Use a second length of tubing to connect the sample medium outlet to the pump inlet. Use the shortest lengths of tubing possible to avoid kinks and bends. Allow the pump to run ≥ 2 minutes for stabilization.

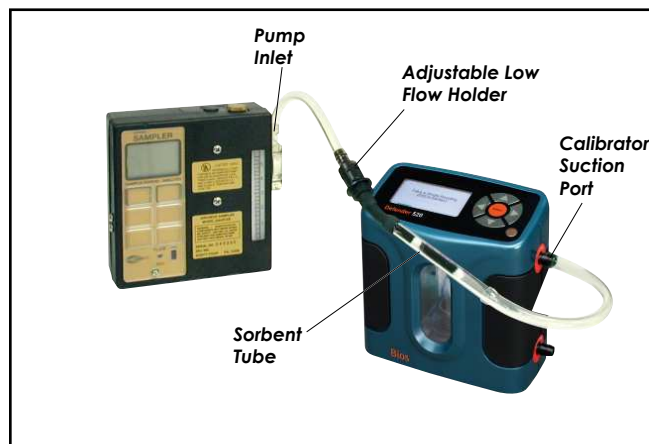


Figure 2. Defender Primary Standard Calibrator and Universal Series pump connected in a sorbent tube calibration train

Note: The Defender Calibrator has two ports (Figure 1), a pressure port for pressure applications and a suction port for pump or suction applications. Refer to the calibrator operating instructions for proper selection.

If Using CalChek...

If using an AirChek 2000 or Leland Legacy Sample Pump with the CalChek feature, prepare the calibration train as instructed in Step 2 and allow pump to stabilize. Attach the female end of the CalChek Communication Cable to the serial port (RS-232) on the back of the Defender Calibrator and the male end of the cable to the data port on the sample pump (see Figure 3). Using the Defender arrow keys, enter the Measure menu and select Cont. (continuous).

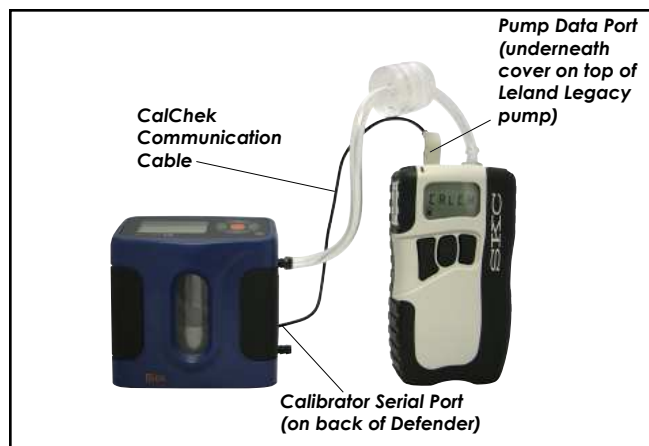


Figure 3. Leland Legacy Sample Pump with Defender Calibrator in a CalChek calibration train

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3. Calibrating the Flow Rate

In the Measure menu, use the Defender arrow keys to select Single to obtain a single flow measurement. Continue to select Single to take a minimum of three readings one-at-a-time. For an uninterrupted stream of hands-free measurements, select Cont. (continuous). If the average reading displayed on the Defender is not the desired flow rate, reset the calibrator display by selecting Reset. Adjust the flow rate on the pump until the appropriate flow rate is displayed. Repeat a minimum of three readings to verify flow. **Do not adjust pump flow rate.** Record flow rate as the pre-sample flow rate.

If Using CalChek...

If using an AirChek 2000 or Leland Legacy Sample Pump with the CalChek feature, set sample pump to CalChek mode (single-point or multiple-point calibration - *see pump operating instructions*). The Defender Calibrator will automatically calibrate the pump at a single flow point (if single-point calibration was selected) or at multiple points across a range of operational flow rates (if multiple-point calibration was selected).

4. Setting Up the Sampling Train

When ready to begin sampling, remove the calibrator and representative sampling medium from the calibration train. Remove the CalChek Communication Cable if CalChek was used. Set these aside to verify flow after sampling. Place a new unexposed sampling medium of the same type into the train.

5. Sampling

Attach the sampling medium to a worker's clothing in the breathing zone and the pump to the worker's belt. Run the pump and note sampling start time.

6. After Sampling

At the end of the sampling period, turn off the pump and note sampling end time. Remove the sampling medium and seal it. Refer to the sampling medium operating instructions for details. Record pertinent sampling information.

7. Verifying Flow

Reattach the representative sampling medium and the Defender Calibrator to the sampling train. If using an AirChek 2000 or Leland Legacy pump with CalChek, reinstall the CalChek Communication Cable. Take three flow readings as outlined in Step 3. **Do not adjust pump flow rate.** Record this value as the post-sample flow rate. Compare the pre-sample and post-sample flow rates to ensure that the two rates do not differ by more than 5%. Report the average of the pre-sample and post-sample flow rates to the laboratory as well as sample time and other relevant data.

8. Sample Transport

Send the sealed sampling medium, blanks, and pertinent sampling information to a laboratory for analysis. *Consult sampling medium operating instructions for details.*

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