

# BioSampler®

## Operating Instructions



**SKC Inc.**  
**863 Valley View Road**  
**Eighty Four, PA 15330 USA**

*Form #37084 Rev 0405*

# Description

The patented\* SKC BioSampler is a highly efficient bioaerosol and biologically inert airborne particle collection device that traps airborne microorganisms into swirling liquid for subsequent analysis. The BioSampler is made of glass and consists of three parts: inlet, nozzle section (with three tangential sonic nozzles), and collection vessel (Figure 1). The collection vessel can be filled with a liquid collection medium or coated with a sticky medium. The BioSampler can be used with water or non-evaporating liquids up to 1,000 times more viscous than water for sampling up to eight hours. The BioSampler requires a high-volume sonic flow pump such as the SKC VAC-U-GO Sampler.

## Performance Profile

Flow rate: Approximately 12.5 L/min  
Medium: Water or more viscous liquids such as ViaTrap® mineral oil  
Collection Efficiency: Nearly 100% over a wide range of particle sizes; decreases to approximately 90% at 0.5 μm.  
Pump: Sonic flow pump such as the SKC VAC-U-GO Sampler



Figure 1. BioSampler with 20 ml vessel  
(5 ml vessel available)

\*Patent Nos. 5,902,385 and 5,904,752

# Operation

## Calibration

The BioSampler's tangential nozzles act as sonic orifices. Therefore, if the pump maintains a pressure drop of 0.5 atm (15 in Hg) or more across the sampler, at normal atmospheric conditions, the flow rate will always be the same (about 12.5 L/min), unless one or more of the nozzles is clogged. Figure 2 shows the recommended calibration set up. Calibration is particularly important when sampling in areas with nonstandard temperature and pressure.

1. Connect a flowmeter (bubble or dry-gas) to the inlet of the BioSampler.
2. Connect the outlet of the BioSampler (filled with collection liquid or coated) to the inlet of a liquid trap (Cat. No. 225-22) and the outlet of the trap to a VAC-U-GO Sampler.
3. Adjust the valve lever on the VAC-U-GO Sampler until the valve is all the way open. Sonic flow is achieved when the vacuum gauge on the VAC-U-GO reads between 15 and 30.

**Note:** If using a pump that does not contain a built-in vacuum gauge, use a manometer in-line to monitor sonic flow (see Figure 2).

4. Read and record flow rate,  $Q_s$  L/min.

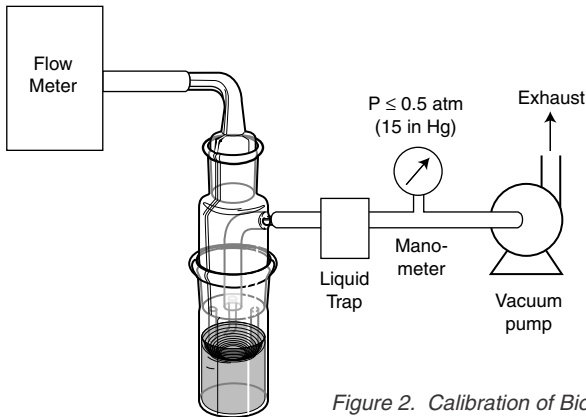


Figure 2. Calibration of BioSampler

## Sampling with Collection Liquid

The BioSampler can be used for both short-term and long-term sampling depending on the collection liquid chosen.

### Operating Cautions:

- Visually inspect BioSampler operation frequently, particularly when using a viscous collection liquid. *See Caution on p. 4.*
- Use only 15 ml of viscous liquid in 20 ml vessel and 4 ml inside a 5 ml vessel.
- Use a liquid trap in-line to ensure that collection liquid (particularly viscous liquid) in BioSampler vessel does not enter the pump.

### Short-term sampling (less than 30 minutes)

Use sterile distilled water or a liquid of similar viscosity such as physiological saline, phosphate buffered saline, nutrient broth, or peptone water.

**Caution:** Water or water-based liquids are not recommended for sampling periods over 30 minutes or when collecting hydrophobic particles such as fungal spores.

### Long-term Sampling (greater than 30 minutes)

Use a non-evaporating liquid such as ViaTrap (a special mineral oil for collecting bioaerosols) or glycerol. These liquids can be used for both long-term and short-term bioaerosol sampling. Collection efficiency has been shown to remain essentially constant during an eight-hour sampling period.

**Caution:** Glycerol is not recommended as a liquid for viable microorganism collection because the microorganisms may die from osmotic pressure.

1. Measure and record flow rate through the BioSampler,  $Q_s$  L/min, as described on p. 2.
2. Sterilize all parts of BioSampler (*see Cleaning, p. 6*).
3. Aseptically pipet the appropriate amount of sterilized collection liquid into the collection vessel. Assemble a clean, sterilized inlet, nozzle, and collection vessel in an aseptic area (*see Cleaning, p. 6*). Temporarily seal inlet and outlet of the sampler with aluminum foil or Parafilm.
4. Warm up the VAC-U-GO Sampler for at least one minute before connecting it to the sampling train (*see VAC-U-GO operating instructions*).

**Caution:** When operating correctly, the collection liquid in the BioSampler should be swirling gently up the inner wall of the sampler, wetting it where the nozzles output onto the inner wall. **It is important to visually monitor the following:**

a. That there is enough collection liquid in the vessel to wet the inner wall at the location where the nozzles output onto the inner wall. If this is not occurring, add more collection liquid.

b. That there is **not** excessive bubbling which indicates that there is too much collection liquid in the vessel. If excessive bubbling occurs, decrease the amount of collection liquid in the vessel.



Properly-Filled



Under-Filled



Over-Filled

5. When ready to sample, remove foil or Parafilm from the BioSampler and connect the outlet to the VAC-U-GO Sampler.
6. Sample for the desired sampling period.
7. After sampling is complete, record the sampling time. Volume of air passed through the BioSampler can be calculated using formula:  $V \text{ [Liter]} = Q_s \text{ [L/min]} \times t \text{ [min]}$ .
8. Disassemble the BioSampler.

9. Accurately measure the final volume of collection liquid in an aseptic area and aseptically transfer it to a sterilized container for analyses.

**Note:** If using a water-based liquid, do not sample at temperatures below 41 F (5 C) to avoid crystallization of the collection liquid.

**Note:** If sampling biologically inert particles, aseptic procedures are not necessary.

## Sampling with a Coated Collection Vessel

The BioSampler can collect samples into a collection vessel coated with a sticky non-evaporating medium. Sampling times longer than 30 minutes are not recommended for this method.

1. Measure and record flow rate,  $Q_s$  L/min, through the BioSampler as described on p. 2.
2. Sterilize all parts of BioSampler (*see Cleaning, p. 6*).
3. Prepare the collection vessel by using a petroleum jelly/hexane solution (approx. 0.1 g petroleum jelly per milliliter of hexane). Place a few drops of the solution into the collection vessel and rotate it so that its entire inner surface is wetted. Ensure that the coating covers the region where the air jets impact the inner surface of the collection vessel. The hexane will evaporate within five minutes leaving a uniform sticky layer on the inner surface of the collection vessel.

**Note:** Alternative coating methods may be used.

4. Assemble clean, sterilized inlet and nozzle sections with the prepared collection vessel in an aseptic area (*see Cleaning, p. 6*).
5. Warm up the VAC-U-GO Sampler for at least one minute before connecting it to the sampling train (*see VAC-U-GO operating instructions*).
6. Connect outlet of newly prepared BioSampler to the inlet of a liquid trap and the trap outlet to a VAC-U-GO Sampler.
7. Sample for the desired sampling period not exceeding 30 minutes.
8. After sampling is complete, record the sampling time. Volume of air passed through the BioSampler can be calculated using formula:  $V$  [Liter] =  $Q_s$  [L/min]  $\times$   $t$  [min].
9. Disassemble the BioSampler.
10. After sampling is complete, wipe the inner surface of the collection vessel with a small piece of cloth or paper.
11. Transfer the sample for microbiological or chemical analysis.

## Transporting Samples

1. All individual sample containers should be sealed to prevent contamination during transport and properly labeled with the sample identification.
2. Because many tests have very short hold times, samples should be delivered to the laboratory as soon as possible after collection, preferably within 24 hours.
3. Provide with the samples, sample identification, all pertinent sample information (e.g., sampling rate, time, and location), and analysis request. *Contact the laboratory for more specific requirements.*

## Cleaning

Sterilize all parts of the BioSampler in an autoclave or an oven heated to 320 to 356 F (160 to 180 C) for 180 to 240 minutes before each use. This will kill bacteria, fungi, and DNA.

**Note:** Disassemble the sampler before sterilization to prevent the fritted joints in each section from sticking together after high temperature exposure.

## Analysis

Samples collected with the BioSampler can be analyzed using:

- **Growth Culture Analysis**  
Growth culture analysis is used to quantify and characterize airborne cultural bacteria and fungi. A portion of the liquid sample is transferred to a culture medium on which the microorganisms are grown into colonies for counting. A broad-spectrum of media is generally used.
- **Microscopic Analysis**  
Microscopic analysis is used for the enumeration and limited identification of total airborne bacteria and fungi. Biological particles are differentiated from non-biological ones by staining techniques.
- **Biochemical Assay**  
Biochemical assay is used to measure biological compounds such as endotoxins. A chemical or biological substance is added to a portion of the sample. The ensuing reaction forms the basis for quantification.
- **Immunoassay**  
Immunoassay is used for the quantification of airborne allergens (e.g., dust mites and animal dander). It relies on the binding of antibodies to a specific target antigen. Other methods include fluorescence, enzyme, and radioimmunoassay.
- **Polymerase Chain Reaction**  
Polymerase Chain Reaction (PCR) is used to screen samples for a specific genus or species. The PCR process is based on in-vitro replication of selected nucleic acid sequences.

## References

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## BioSampler Kits and Accessories

Description	Catalog No.
<b>BioSampler</b>	20 ml 225-9595 5 ml 225-9593
<b>BioSampler 4-pack</b>	20 ml 225-9595K4
<b>BioSampler Collection Vessel and Ground Joint Cap</b>	20 ml 225-9596 5 ml 225-9596A
<b>ViaTrap Collection Media</b> (special heavy white mineral oil)	225-9598A (120 ml) 225-9598 (500 ml) 225-9599 (950 ml)
<b>BioSampler Mini Kit</b> , includes 1 BioSampler, 2 collection vessels (20 ml bottoms) with ground joint caps, 1 BioSampler case with mounting rod, and 120 ml ViaTrap collection media.	225-9597
<b>BioSampler Case with Mounting Rod</b> , case serves as a base and rod secures BioSampler during sampling.	225-9606
<b>Complete BioSampler System</b> , includes 1 BioSampler, 2 collection vessels (20 ml bottoms) with caps, 1 BioSampler case with mounting rod, 1 ViaTrap (120 ml), 1 Vac-U-GoSampler (sonic flow) mounted in protective housing, and 1 rotameter.	225-9594 (115 V) 225-9594B (230 V)
<b>Vac-U-Go Sampler (Sonic Flow)</b> for BioSampler, includes vacuum gauge and valve, in protective housing, supplied with extension rod for mounting media and a power cord (AC operation only).	225-9605 (115 V) 225-9605B (230 V)
<b>Glass Trap</b> , prevents collection liquid from entering the pump.	225-22

*Notice: This operating instruction may not address all safety concerns (if any) associated with this product and its use. The user is responsible for determining and following the appropriate safety and health practices and regulatory limitations (if any) before using the product. The information contained in this document should not be construed as legal advice, opinion, or as a final authority on legal or regulatory procedures.*