

# BioSIS™



## Bioaerosol Slit Impaction Air Sampler

Operating/Instruction Manual

### Introduction

The BioSIS™ is the latest development in slit impaction sampling technology, employing industry standard sampling techniques. Created to answer the need for a low cost, re-useable, high quality, bioaerosol sampler for aeroallergen studies. Although the BioSIS™ is simple to use, this user's manual provides tips on getting started, pump calibration, cleaning, set up and operation, slide preparations, and suggestions for quantitative analysis.

### Advantages

The easy to use BioSIS™ offers advantages over other bioaerosol samplers. Listed are a few:

1. Re-useable 1 piece aluminum design offers greater durability and reduces sampling costs.
2. No expiration, fresh sampling media every time, no need to throw away cassettes, ready to use when you are.
3. The laminar flow venturi produces a more defined impact zone.
4. Sample integrity can be verified in the field.
5. No need to worry about broken or damaged slides. Obtain a good sample first time, every time.
6. The durable compact design fits into the most mounting hardware or tripods required.
7. Easy to use, sets up in minutes and allows for quick and easy clean up between samples to prevent cross contamination in the field.
8. Detection limits of 100 to 1000 times over filter methods.
9. Higher precision obtained by conducting inline flow rate calibration. Greater accuracy in determining sample to air volume which inherently improves the quality of the analytical results.
10. Uses conventional high volume vacuum pumps and standard microscope slides.

### Applications

The BioSIS™ was developed for the sampling and collection of air-borne contaminants for quantifiable analysis of pollen, mold spores, skin fragments, insects, combustion particles, toners, environmental dust and other air-borne particulates. Applications include:

1. Industrial hygiene and occupational health testing and awareness.
2. Indoor air quality characterization for schools, hospitals and office areas, etc...
3. Clean room inspections
4. HVAC studies, plant equipment, stack emissions and sick building investigations.
5. Insurance claims for post flood damage and pre-mortgage home inspections.

### Vacuum Pump Calibration

A significant improvement over disposable cassettes is that precise flow measurements can be established by calibrating using a blank slide. Because calibration is done inline, it includes the back pressure inherent in the BioSIS™ thus improving collection accuracy.

Connect a rotameter which has been previously calibrated to a primary standard to the vacuum supply (high volume pump). Disassemble the two halves of the BioSIS™ and install a blank slide. Reassemble and connect a vacuum line from the rotameter to the male barbed fitting on the unit. (see figure 1). Turn the vacuum pump on and accurately adjust the vacuum level (flow) to suit your air characterization needs. Although a flow rate of per minute (lpm) is traditionally accepted, the BioSIS is capable of sampling rates of 5 to 50 lpm without damaging the slide. Consult with your local indoor air quality professional for appropriate sampling rates and times. Disassemble the BioSIS™, remove the blank slide and pre-clean the top cap as directed within this guide.

### **Slide Preparation**

Once the BioSIS™ has been decontaminated, visually inspect a clean 25mm x 75mm glass microscope slide (crystal clear adhesive tape will clean the slide in the field) and label the slide for identification purposes. Next, place the clean slide in the bottom plate of the sampler and place 3 to 5 drops of slide adhesive to the center of the slide and evenly spread the solution about the impaction area, which is the middle third of the slide (figure 2).

Please note that excessive build-up of slide adhesive will make contact with the top cap thus requiring additional clean up and may effect sampling integrity. The small clearance between the slide and the venturi was developed to achieve optimal impaction quality. Once the solution is applied to the slide the sampler is ready for re-assembly. Slowly place the top cap onto the bottom plate with the venturi lengthwise towards the vacuum outlet (figure 3). The BioSIS (TM) is now ready to be placed in the collection area of interest.

### **Sampling Procedures**

Bioaerosol sampling is an extremely sensitive sampling strategy. The impaction zone is so efficient that overloading can occur in areas of high air-borne particulate contamination. The impaction zone should look slightly gray at the heaviest loading. (figure 4).

Visual inspection can be done in the field before samples are sent to the lab. If the sample looks overloaded with visible debris, re-sample with shorter sampling times. The recommended sample time is 10 minutes at 15 lpm. Reduce to five minutes in extremely heavy or dirty areas.

The standard sampling time of ten minutes at 15 lpm seems to provide the best collection efficiency for all contaminants that are generally sought after. Lower flow rates reduce the impaction efficiency and higher rates may not allow smaller particles to impact onto the slide.

Once the sample has been collected, carefully remove the top cap and visually inspect the slide to determine loading. If the loading appears to be sufficient carefully remove the slide and place it into a plastic slide carrier (or similar transport device) for delivery to an experienced lab for analysis.

### **Analysis Procedure**

Analysis can be preformed on most light microscopes with the capability of oil immersion at 1000X. The microscope should be properly aligned and cleaned. Calibrate the field of view of your 40X and 100X objectives for the diameter of the field of view. Remove the slide from the carrier and place on a clean stable surface. Place 1-2 drops of staining agent on the impaction zone (figure 5). Next, take a clean cover slip and place perpendicular to the slide with the drop of stain. Careful placement of the cover slip will help prevent the formation of air bubbles under the cover slip and also helps reduce smearing. Place the slide in the microscope, perform gross analysis and most pollen analysis using the objective. Starting at one end of the impaction zone, transverse across the zone perpendicular to the impaction zone counting all relevant structures (see figure 6).

Fifteen total transverse is a sufficient amount to characterize the impaction zone. Next move to the immersion objective and perform a similar analysis. This level is generally used for the identification of mold spores. Keep an individual tally of each different spore, pollen, particle, etc... for a total when determining final counts.

Environmental Monitoring Systems (EMS) recommends the use of experienced and trained Laboratory Technologists, Microbiologists or Environmental Microscopists.

### **Care and Maintenance**

Like with all precision instruments, a certain level of care is required to maintain proper operation of the BioSIS™. For lasting operation, EMS recommends never storing the BioSIS™ in the assembled position. Prolonged compression of the O'ring may cause permanent deformation allowing the unit to leak under high levels of vacuum. The BioSIS™ may also require a small drop of slide adhesive be applied to the inside diameter of the top cap. This acts as a lubricant and will ensure easy disassembly. Replacement parts can be ordered directly from EMS. The BioSIS™ is available as a single unit or in a convenient kit which includes everything necessary to complete your own sampling on site including:

The Biosis™ is available as a single unit or in a convenient kit which includes everything necessary to complete your own sampling on site including:

- (1) Gross of microscope slides.
- (1) Bottle of staining agent.
- (6) Slide storage holders.
- (50) 22mmX30mm slide covers.
- (1) Rotameter.
- (1) Box of alcohol cleaning tissues
- (1) IAQ Stand
- (1) High volume vacuum pump
- (1) Durable molded plastic carrying case.

## BioSIS™ Information



The BioSIS™ was developed as a re-useable bioaerosol sampling device, employing industry standard slit impaction sampling techniques. The BioSIS™ is suitable for the collection of particulates such as mold spores, pollen, skin fragments and other aeroallergens for reliable bioaerosol contamination studies. The improved venturi design creates laminar flow for more defined impact zone allowing precise analysis. The BioSIS™ can be calibrated for more accurate results. Other features include:

1. Reduced sampling costs
2. No re-sampling due to damaged cassettes, over loading or broken slides
3. Easy to use, quick and easy clean up
4. New standard in sampling technology
5. Environmental friendly

### Construction

The BioSIS™ is constructed two pieces of high quality aluminum. The durable and dependable design utilizes standard 25mm X 75mm microscope slides and standard high volume pumps. The BioSIS™ does not require special mounting hardware and can be placed in the tightest environment or space. The BioSIS™ is designed to operate at flow rates from 1 lpm to 50 lpm (15 lpm is recommended for best results.)

### Single Unit or Kit

The BioSIS™ available as a single unit or in a convenient kit which includes everything necessary to complete your own sampling on site.

1. (50) 25mm X 75mm slides
2. One 30ml bottle Calbera's Stain
3. Slide Holders
4. One heavy duty molded plastic case
5. Stand
6. MegaLite Pump with Rotameter



