

SASS® 4100 Plus

High-Volume Dry Air Sampling + Particle Extraction System



INTRODUCTION

The SASS 4100 Plus provides total sampling capability by combining Research International's highly efficient, two-stage, dry filter-based aerosol collection device with our SASS 3010 Particle Extractor). The system can be used for many applications requiring the collection and later analysis of airborne particulates, including:

- Counter-terrorism
- Epidemiology
- Agriculture
- Food processing air quality
- Medical facility air quality

Aerosol sample analysis is frequently plagued by three problems:

- The targeted pathogen is present at a very low concentration;
- The collection process involves too small an air sample to be statistically valid; and/or
- Available bioassay methods are not sensitive enough.

In response to these issues, Research International is now offering the SASS 4100, the **highest-capacity portable** aerosol dry collector in production.

HOW THE TWO-STAGE COLLECTOR WORKS

The SASS 4100 continuously samples over 3500 liters/minute of ambient air as a primary air stream. Air flows radially inward into the concentrator through a coarse square-mesh screen. This inward radial flow provides 360 degree sampling of the surrounding aerosol environment. The primary fan and a curved air shroud are mounted above the sampler inlet section, channeling

exhaust air into a vertical stream away from the inlet area. Particulates in this air stream are transferred to a much smaller secondary air stream using patent-pending centrifugal and virtual impaction principles. Particles are routed into the secondary flow by forcing primary circuit air to circulate through specially shaped channels where centrifugal force and particle momentum isolate and concentrate the particles.

The secondary flow can reach aerosol concentrations that are 4X to 15X higher than present in the incoming air, yet the velocity of this secondary aerosol concentrate flow is much lower than peak velocities in the primary circuit. The two-stage sampler therefore amplifies and slows down the captured ambient aerosol particles prior to their collection. Due to advantageous pressure differentials within the device, one fan drives both the primary and secondary flows.

COLLECTION FILTER

Particulates are collected from this concentrate by directing the secondary air through a disposable capture element (Figure 1). The filter is a 43 mm O.D. x 3 mm thick micro-fibrous electret ultrasonically bonded to a circular frame of 59 mm diameter and 5 mm thickness.



Figure 1: Snap on filter.

The fibrous media is up to 50X more efficient than a conventional glass or cellulosic material because each fiber incorporates a built-in electric field that captures particles using electrostatic dust precipitator principles, but at a microscopic level. The electret media is stable to 70°C, is virtually inert, and has high holding capacity due to a large internal surface-to-volume ratio.

The electret filter is mounted in a compact, easily disengaged holder located under the device's baseplate.

The SASS 4100 has several favorable attributes:

- 3500 LPM flow rate
- The primary fan rotor is the only moving part.
- Maintenance is minimal.
- The operating temperature range is very wide.
- The structure is comparatively clog resistant.
- Sampled air volume is maximized, improving collection statistics.
- Organism viability is maximized by using low air flow velocities and a bulk electret filter media

A quick-release tripod, standard with the product, allows the circumferential sampling section to be located from about 0.6m to 1.43m above the tripod mounting surface.

SASS 3010 PARTICLE EXTRACTOR FEATURES



The SASS® 3010 (Figure 2) manual extractor is used to extract and transfer into a small fluid volume, particulates captured by Research International's electret filters. Captured particulates can be difficult to remove as the induced dipole fields that are responsible for their capture efficiency create a strong holding force that must be neutralized.

Once particulates have been released, they must then be removed from within the fibrous filter matrix and collected in a

small amount of sample fluid. These processes are efficiently performed in a matter of 1 to 2 minutes using the SASS 3010 manual extractor.

Extraction efficiencies are typically in the range of 70 to 80%. To test extraction efficiency, a SASS 3100 and several electret filters were used to collect airborne fluorescent polystyrene beads of 1.8 microns diameter. Each filter was operated for a period of 10 minutes. After the collection phase was completed, the filters were mounted in a SASS 3010 and captured beads transferred to 5 ml of extraction buffer using the protocol outlined below. Extraction efficiencies were then determined using fluorometric assay methods.

It was found that an average recovery of 77% was achieved. A second extraction with an additional 5 ml of extraction fluid resulted in recovery of another 17% of the embedded beads, while two more 5 ml extractions resulted in small 4.5% and 1.5% additions to the total number of beads recovered, respectively.



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Figure 2: SASS 3010 Particle Extractor.

SASS 4100 Two-Stage Aerosol Collector Specifications

Primary airflow:	3,600 liters/min is sampled uniformly from around the concentrator's circumference.
Aerosol collection media:	Fibrous electret bulk filter, RI part number 7100-134-230
Secondary airflow:	265 LPM with the electret filter in place
Air velocity at filter face	3 m/sec. (43.4 mm diameter filter active area)
Filter mount	Hat-shaped fixture that locks onto the device's baseplate
Overall size:	38 cm high x 25.4 cm diameter max.
Weight:	6.32 kg (13.9 lbs.)
Operating temperature range:	-40°C to 60°C
Ingress protection rating	45
Operating life	ECM fan rotor is only moving part. A bearing life of 30,000 hours is expected.
Power consumption:	90 watts for ECM drive motor. 100 to 230 VAC lump-in cord AD/DC converter supplied. If operated from DC, please specify DC source voltage of 12, 24 or 28 VDC.
Sound level:	72 db-A @ 1 meter radius on inlet equatorial plane.
Mounting:	Quick-detach tripod legs; 0.53m to 1.46m adjustable height.
Accessories:	<ul style="list-style-type: none"> • Hard shell carrying case. • Electret sample filter assembly

SASS 3010 Particle Extractor Specifications

Filter compatibility	For use with SASS 3100 and SASS 4100 electret filters
Extraction method	Acoustic vibration of the fluid-saturated filter is followed by pneumatic and mechanical counter flow-driven discharge of the suspended aerosol particles.
Extraction efficiency	60-80% typical
Residue, run-to-run	1.1% with dry wiping, and 0.01% to 0.1% with a 5 ml flush
Extraction time	1 to 2 minutes, typical, with a flush cycle.
Extraction fluid	Pre-filled dropper bottle with buffered extraction fluid for a 4-10 ml sample (user specified).
Sample fluid storage	Extraction fluid bottle also used for fluid sample storage after extraction.
Physical size/Weight	15 cm W x 17 cm L x 20 cm H / 1.25 Kg
Electrical power	Two size "D" primary batteries.
Operating temp. range	0° C to 70° C