

BD FACSAria II Cell Sorter

Aerosol Management Option

Features

Evacuates aerosolized particles from the sort chamber

Equipped with a 0.12- μm ultra-low penetration air (ULPA) filter

Operates with high reliability and low noise



The BD FACSAria II cell sorter AMO manages aerosolized particles during and after sorting and analysis.

The BD FACSAria™ II cell sorter aerosol management option (AMO) uses a vacuum source to rapidly evacuate aerosolized particles through an ultra-low penetration air (ULPA) filter during routine sorting or analysis. To address lab safety, the AMO is intended for use with Good Laboratory Practices (GLP) and adherence to Occupational Safety and Health (OSHA) guidelines. In normal evacuation mode, the device creates negative pressure inside the sort chamber to draw the aerosolized particles away from the operator during routine sorting with trays. In rapid evacuation mode, the AMO also quickly evacuates aerosolized particles at the end of sorting.

Evacuation Process

First, a pre-filter in the front of the instrument's ACDCU chamber captures dust and other gross particulates to prevent them from being pulled into the chamber. Inside the AMO, a very large scale integrated (VLSI)-grade ULPA filter works in three stages:

1. A polyester filter provides preliminary filtration.
2. The ULPA medium at the core of the filter captures particulates and microorganisms down to 0.12 μm at an efficiency of 99.9995%.
3. A foam filter performs additional filtration.

The design of the sort chamber, the chamber's suction outlet ports, airflow rates, and the AMO manifold takes into account analysis from computational fluid dynamics (CFD) for proper airflow distribution and effective aerosol removal.

The evacuation rate during routine sorting (in normal mode, 20% suction setting on the evacuator) produces laminar inward flow (away from the operator) in the chamber to remove aerosols as they are being generated. This setting provides a minimum of 17 air exchanges of the chamber volume per minute. The evacuation rate protects against the sort stream being perturbed by this airflow, which allows sorting into individual wells in the tray.

The system allows the user to select a rapid evacuation mode (100% suction setting on the evacuator), which provides a minimum of 75 air exchanges of the chamber volume per minute. This mode is recommended at the completion of sorting, for a duration 30 seconds, to remove the aerosols in the sort chamber very quickly.

Filter Life Indicators

The life of the ULPA filter is factory set for 180 hours of operation. A time-based indicator on the AMO control panel provides visual information about filter life to enable routine replacement. Serving as a safety mechanism, a pressure gauge mounted on the side of the evacuator indicates that the filter needs to be replaced before the 180-hour limit. The pre-filter in the front of the ACDCU should be replaced once per month.

Visit bdbiosciences.com/facsaria_ii for more information.

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Specifications

The AMO (Cat. No. 333728) includes:

- VLSI grade ULPA filter (0.12 μm , according to manufacturer specifications)
- 1.25-inch internal-diameter (ID) tubing, 10-foot length (connects the AMO manifold and the ULPA filter)
- AMO manifold (connects five individual hoses from the sort chamber to a single 1.25-inch ID tubing)
- 5 hoses of 7/8-inch ID
- 1.5-inch snapper hose clamp
- 1-inch snapper hose clamp
- AMO pre-filter, inside the automatic cell deposition unit (ACDU) chamber front panel door
- Noise level: 39 dB at minimum power, 59 dB at maximum power

Efficacy

Glo Germ™ particles, developed by Glo Germ in Moab, Utah, have been shown to provide good visualization of aerosol deposition in normal and mock failure modes by Oberyszyn and Robertson *Cytometry*. 43:217-222, 2001).

The Glo Germ technique for assessment of aerosols allows for a quick, quantitative assessment of aerosol containment. The particles are made of a non-biohazardous material. Oberyszyn and Robertson have shown that the extent of containment using the Glo Germ technique is comparable to previous methods using phage testing techniques.

Following the procedure outlined in their paper, a test protocol was written to assess the aerosol containment in the BD FACSAria II cell sorter.

The suction on the evacuator was set to 20% (normal evacuation mode). The ULPA filter was checked to meet its lifetime requirements. Clean microscope slides were placed both inside and outside the sort chamber, at predetermined locations. A negative control slide was placed about 7 feet away from the cytometer. A positive control slide was made by smearing a small amount of Glo Germ solution onto a clean microscope slide.

Glo Germ particles (originally in oil base and converted to aqueous base) were placed on the sample station. The BD FACSAria II cell sorter was set up at a sheath pressure of 70 psi and a 90-kHz

drop drive frequency. The event rate was set to 20,000 particles per second. The charge on the sort plates was turned on, and the stream was adjusted to hit the rim of the aspirator to simulate a failure mode and produce the greatest amount of aerosol within the sort chamber. This mode was performed for 5 minutes, and then the sample and sorting were stopped. The evacuation unit was then set to 100% evacuation rate (rapid evacuation mode) for a 30-second duration, and then the evacuator was turned off.

The slides were then examined for bright green fluorescence using a fluorescence microscope equipped with a FITC filter (520–640 nm) and 10X objective. The number of Glo Germ beads in each of the slides was counted and results were tabulated. The acceptance criterion was set to less than or equal to 3 Glo Germ particles in front of the chamber. The test data revealed one (1) Glo Germ particle on a slide that was located at the far end of the chamber interior, and no Glo Germ particles were detected on the slides located outside the chamber.

The test protocol was repeated to determine Glo Germ particles at the exhaust end of the AMO unit. No Glo Germ particles were detected. Though the results of the tests show effective aerosol management by the BD FACSAria II cell sorter AMO, strict adherence to GLP and OSHA guidelines are necessary to ensure safety.

