



BD FACSAria II Cell Sorter

Technical Specification

The new BD FACSAria™ II cell sorter improves ease of use, flexibility, and aseptic capability to make it the best choice for consistent results in sorting across a broad range of applications.

The heart of this cell sorting revolution is the true fixed-alignment flow cell, gel-coupled to the collection optics. Fixed alignment minimizes startup time and improves reproducibility. Gel coupling to the objective lens improves collection efficiency and increases the sensitivity and resolution needed for multicolor applications.

The BD FACSAria II cell sorter advances cell sorting with multiple improvements. A new fluidics design improves aseptic setup and cleaning. New nozzle sizes enable a wide range of particles to be sorted. Software improvements dramatically cut the time spent on cytometer setup, adjustment, and maintenance.

The BD FACSAria II cell sorter also sets a new standard for ease of use to improve both workflow and productivity. A new nozzle design allows for reproducible insertions. A new universal sort tube collection mount makes it easier to insert and remove tube holders. Software wizards and automation simplify aseptic sort setup, drop-delay determination, and clog detection. Compatibility with BD digital analyzers makes it easier to move from analysis to cell sorting.

For further information, contact your BD sales representative. A product brochure and user's guide are also available.

Performance

Fluorescence Sensitivity

Measurements performed at 70 psi and 90 kHz using SPHERO™ Rainbow Calibration Particles (RCP-30-5A)

FITC: 125 molecules of equivalent soluble fluorochrome (MESF-FITC)

PE: 125 molecules of equivalent soluble fluorochrome (MESF-PE)

Fluorescence Resolution

Coefficient of variation (CV)

PI: Area, <3.0%, full G₀/G₁ peak for propidium iodide (PI)-stained chicken erythrocyte nuclei (CEN)

Hoechst: Area, <3.5%, full G₀/G₁ peak for Hoechst-stained CEN

Fluorescence Linearity

Doublet/singlet ratio:

CEN stained with PI: 1.95–2.05 (off the 488-nm laser) or

Hoechst: 1.95–2.05 (off the 405-nm laser)

Forward and Side Scatter Sensitivity

Sensitivity enables separation of fixed platelets from noise, identification of bacteria, and detection of 0.5-micron beads.

Forward and Side Scatter Resolution

Scatter performance is optimized for resolving lymphocytes, monocytes, and granulocytes.

Sample Acquisition Rate

Maximum acquisition rate (events per second) with 12 compensation pairs and 8 parameters: 70,000.

Sort Performance

Drop Drive Frequency

Range 1–100,000 Hz

Purity and Yield

At 70 psi and 90 kHz with an average threshold rate of 25,000 events per second, a four-way sort achieved a purity of >98% and a yield >80% of Poisson's expected yield. Higher threshold rates of up to 70,000 events per second can be achieved without affecting purity; however, yield will decrease based on Poisson statistics.

Viability

Sorts were performed at a variety of sheath pressures using cell lines and human peripheral blood mononuclear cells (PBMCs). All sorts resulted in cells that proved viable and proliferated for several days post-sort.

Sort Collection Devices

Two-way sorting:
microtubes, 12 x 75 mm, and 15 mL

Four-way sorting:
microtubes and 12 x 75 mm

Automatic Cell Deposition Unit (ACDU) for slide and plate sorting:
6, 24, 48, 96, and 384-well plates

Sample Collection Cooling

Water recirculator for refrigeration/
heating (optional)

BD FACS Accudrop

- Red diode laser provided for manual or fully automated drop-delay determination
- Automated drop breakoff monitoring
- Automated clog detection system using Sweet Spot technology

Excitation Optics

Optical Platform

Fixed optical alignment of the 488, 633, 405, and 375-nm lasers upon the cuvette flow cell

Lasers and Laser Power out of the Fiber

488-nm, 13–20 mW, elliptical shape

633-nm, 10–20 mW, elliptical shape

405-nm, 30 mW, elliptical shape

375-nm, 7–10 mW, Top Hat shape

All lasers are Class IIIb.

Emission Optics

Optical Coupling

The quartz cuvette flow cell is gel-coupled by refractive index-matching optical gel to the fluorescent objective lens for optimal collection efficiency.

Numerical aperture: 1.2

Forward Scatter Detector and Filters

Photodiode detector with a 488/10 bandpass filter

Side Scatter Detector

Photomultiplier with a 488/10 bandpass filter

Fluorescence Detectors and Filters

Three fixed-fiber apertures for the 488, 633, and 405-nm lasers

The 375-nm laser is air launched and focuses on the flow cell at the same location as the 405-nm laser.

Five wavelengths detected from the 488-nm laser (standard filters):

- 515–545 nm FITC
- 564–606 nm or 563–589 nm PE
- 600–620 nm PE-Texas Red®
- 675–715 nm or 665–685 nm PE-Cy™5 or PerCP or PI
- 750–810 nm PE-Cy™7

Two wavelengths detected from the 633-nm laser (standard filters):

- 650–670 nm APC
- 750–810 nm APC-Cy7

Two wavelengths detected from the 405-nm laser (standard filters):

- 515–545 nm Alexa Fluor® 430 / AmCyan
- 430–470 nm Pacific Blue™ or DAPI or Hoechst

Two wavelengths detected from the 375-nm laser (standard filters):

- 430–470 nm Hoechst blue emission
- 675 nm Long pass Hoechst red emission

Filters and mirrors are user changeable.

Steering Optics

488, 633, and 405-nm laser: Fiber optics steer the three fixed alignment laser beams onto the beam expansion prisms, and then are focused upon the cuvette flow cell.

Near UV (375-nm) laser: Air launched and focused upon the cuvette flow cell

Signal Processing

10-MHz Analog-to-Digital converter

Workstation Resolution

262,144-channels

Data Acquisition Channels

15 parameters, 13 fluorescent and two scatter

Fluorescent Compensation

No limit to inter- and intra-beam compensation

Pulse Processing

Height, Area, and Width measurements available for any parameter. Ratio measurements are also available.

Time

Time can be correlated to any parameter for kinetic experiments or other applications.

Channel Threshold

Available for any parameter from any lasers

Fluidics

General Operation

Fluidics cart provides sheath and cleaning fluids to the instrument and receives waste.

No air or vacuum required. Room air can be used if desired.

Sheath pressure is adjustable from 5 to 75 psi.

Fluidic Reservoirs

Autoclavable 10-L sheath and waste containers and 5-L cleaning reservoirs provided.

Sample Flow Rates

Adjustable sample pressures from 1 to 11

Fluidic Cleaning Modes Included (Software)

Automated startup and shutdown

Clean flow cell

Aseptic sort setup

Sample Injection Chamber

Sample Input Sizes

Microtubes, 12 x 75 mm, and 15 mL

Polystyrene or polypropylene tubes can be used.

Sample Input Agitation

Adjustable through the software to keep sample constantly suspended

Temperature Control

Sample input, software-adjustable: 4, 20, 37, and 42°C

Sample output for sort collection: water recirculation unit (optional)

Data Management System

Workstation

PC workstation with at least Pentium® 4 processor, 3.0 GHz or faster

Memory

> 2 GB RAM

Data Storage

40-GB and 160-GB hard drives

16x DVD +/- RW, dual layer

Floppy drive

Networking

10/100/1000 Ethernet

FireWire® serial bus

Monitor

Two 19-inch LCDs, 2560 x 1024 resolution (standard)

One 20-inch LCD, 1600 x 1200 resolution (optional)

One 23-inch LCD, 1920 x 1200 resolution (optional)

Printer

Networkable color-inkjet printer

Data File Structure

Flow Cytometry Standard (FCS) 3.0 or 2.0

Software

BD FACSDiva™ software v6.1 or later

Installation Requirements

Power

Operation at 100/115/230 VAC and 50 or 60 Hz

Maximum power 1,500 watts

Water Supply

None required

Air Supply

None required

Nozzles

70, 85, 100, and 130-micron sizes

Removable and sonicatable

A registered key-fit position at the bottom of the cuvette provides fixed stream alignment.

Size and Weight

BD FACSAria II sensor (cell sorter): 28-inch (71-cm) depth, 48-inch (122-cm) width, and 28-inch (71-cm) height; approximately 400 lb (181.6 kg)

BD FACSAria II fluidics cart (wet cart): 26-inch (66-cm) depth, 32-inch (81-cm) width, and 26-inch (66-cm) height; approximately 180 lb (81.7 kg)

Table (optional)

BD FACSAria II instrument and computer table: 53-inch (134.6-cm) depth, 105-inch (266.7-cm) width, and 33.45-inch (85-cm) height; approximately 100 lb (45.4 kg)

Regulatory Requirements

CE marked for electrical safety (Europe)

UL Standard for Safety Electrical Equipment for electrical safety (USA)

CSA for electrical safety (Canada)

Class I (1) laser product per CDRH regulations and EN/IEC 60825

Aerosol Management

Standard Configuration

Sample Injection Chamber and Sample Collection Tube area provide a sealed area to minimize aerosols.

Aerosol Management Option (AMO) (optional)

Equipped with a 0.01- μ m size ultra-low penetrating air (ULPA) filter to trap aerosolized particles.

Evacuates the volume of the ACDU chamber area 16 times per minute in normal evacuation mode and 69 times per minute in rapid evacuation mode.

When operated under normal and stressed conditions (mimicking a clog), <3 Glo Germ™ beads were identified outside the ACDU sort collection chamber.

Sample Collection Cooling/Heating

Refrigerator/heater option is available to provide cooling or heating for sort collection into tube holders, multiwell plates, and slides.

BD FACSAria Upgrades

Fluidics Upgrade

This upgrade includes a fluidics wet cart and new fluidics (to improve the ability to decontaminate the entire fluidics system), flow cell, laser shutter, and BD FACSDiva™ 6.1 software.

BD FACSAria to BD FACSAria II Complete System Upgrade

This upgrade includes the fluidics upgrade, a new sort block, and additional improvements to deliver all of the new design improvements in the BD FACSAria II to an existing BD FACSAria in the field.

375-nm Laser Upgrade

A 375-nm Near-UV laser and accompanying optics to provide support for two PMTs

Technical Assistance

BD Biosciences Customer Support Center
2350 Qume Drive
San Jose, CA 95131-1807 USA
877.232.8995

Customers outside the US, contact your local BD Biosciences representative or distributor.

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BD FACS Accudrop US Patent 6,372,506

Sweet Spot US Patent 5,700,692