BD FACSJazz™

Technical Specifications

The BD FACSJazz™ cell sorter incorporates design features that simplify operation of stream-in-air cell sorters, increasing the operational efficiency of labs with high workloads, and making the most commonly used sorting applications accessible to researchers with limited flow cytometry experience. The key features include factory-optimized settings, intuitive alignment, real-time video monitoring, and BD FACS™ Accudrop technology.

The BD FACSJazz is an easy fit in a core facility or an individual lab. The power supply, electronics, and fluid tanks are placed below the lab bench to allow the instrument to occupy a reduced footprint or be installed easily in a biological safety cabinet (BSC).

The BD FACSJazz can be configured with up to three lasers and eight parameters to support application requirements for individuals and core labs. In a core lab, the BD FACSJazz can offload sorting demand and free high-end sorters by handling routine applications such as cloning. The system has also been designed to meet the needs of individuals for applications, such as single-cell analysis, which are driving the accelerated pace of genomics and next-generation sequencing.

To simplify setup and training, the BD FACSJazz runs with factory-optimized settings. It comes with BD FACS™ Sortware, an innovative software application specifically designed for comprehensive instrument control during acquisition, sorting, and analysis.

BD

Optics

Excitation Optics

Optical Platform

Each laser beam is aligned independently and has its own final focus lens for optimal tuning.

The 488-nm laser comes standard. The 405-nm laser, 561-nm laser, and 640-nm laser are optional.

Power Out of the Laser Head

405 nm: ≥50 mW

488 nm: ≥80 mW

561 nm: ≥75 mW

640 nm: ≥50 mW

Emission Optics

Steering Optics

Emission light is collected through a 20X, 0.6 NA microscope objective. Light is focused on spatially separated mirror pinholes. Simultaneous video observation of the stream, pinholes, and laser intercepts allows for fast and intuitive alignment.

Forward Scatter Detector and Filters

Collected using 75- and 50-mm lenses and a photomultiplier tube (PMT) with a 488/10 bandpass filter and an OD3 neutral density filter.

Side Scatter Detector and Filter

Collected through the 90° collection lens and measured using a PMT with a 488/10 bandpass filter.

Fluorescence Detectors and Filters

Collected through the 90° collection lens and measured using PMTs.

See the *BD FACSJazz Filter Guide* for specifications of the longpass mirrors and bandpass filters.

Fluidics

General Operation

- The fluidics system uses external air pressure and vacuum.
- An optional air pressure supply and/or vacuum pump is available.
- Sheath pressure is fixed at 27 psi (1.8 bar). Consumption of sheath fluid is approximately 0.5 L per hour.

Fluidics Reservoirs

Autoclavable 7-L sheath and waste containers, equipped with pressure and vacuum readout, are provided.

Fluidics Control

- A sample flow fine adjustment is provided for precise regulation of the sample flow.
- Purge, pulse, rinse, and run functions are provided for quick stream startup and bubble removal.

Nozzles

100 µm (2 included with the instrument)

Replaceable Fluidics Path

- The fluidics path, including the nozzle assembly and sample line, can be exchanged. There are no inline valves. Only pinch valves are used.

Bubble Detector

A bubble detector in the sample line detects air bubbles from the sample tube and stops sample flow when the sample tube is empty, preventing air bubbles from reaching the nozzle assembly.

Sample Input

- Recommended minimum sample volume is 0.2 mL. The dead volume is approximately 25 µL.
- 12 x 75-mm polypropylene tubes

Performance

Fluorescence Sensitivity

Fluorescence sensitivity was measured using SPHERO™ Rainbow Calibration Particles according to the manufacturer's specifications:

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

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

Fluorescence Resolution

Measured with propidium iodide (PI) -stained chicken erythrocyte nuclei (CEN) and Pulse Processing/Integrator option. Coefficient of variation (CV) of PI fluorescence area: <3.0% full G_0/G_1 peak. Use of the integrator option enables differentiation of G_2/M singlets from G_0/G_1 doublets for PI stained calf thymus nuclei (CTN).

Fluorescence Linearity

Doublet/singlet ratio: 1.95–2.05 for CEN stained with PI

Forward and Side Scatter Sensitivity

Sensitivity enables separation of fixed platelets from noise, and detection of 1.0-µm beads.

Forward and Side Scatter Resolution

Scatter resolution enables differentiation of lymphocytes, monocytes, and granulocytes.

Sort Performance

Drop Drive Frequency

37–41 kHz

Purity and Yield

At 27 psi and 39 kHz with an average threshold of 10,000 events per second, a two-way sort achieved a purity of 98% and a yield of >80% of Poisson's expected yield for both populations. Higher thresholds up to 20,000 events per second can be achieved without affecting purity; however, yield will decrease based on Poisson's statistics.

Viability

Sorts of Jurkat cells resulted in >90% viability and similar proliferation rates

* MESF threshold sensitivity for specific fluorochromes (such as FITC and PE) is dependent on particle excitation and emission properties and bandpass filter specifications, and is provided as a reference, not as a measure of true sensititvity.

several days post-sort to those of non-sorted cells.

Performance

Sort Collection Devices
These collection devices are designed to fit on the Computerized Cell Deposition Unit (CCDU). The CCDU is standard on all instruments.

Two-way sorting: 5-mL and 15-mL tubes

Plates and slides: 6, 24, 96, and 384-well plates; and user-defined collection devices

Temperature Control
Sample and sort collection tubes can be cooled or heated by an optional circulating water bath.

BD FACS Accudrop
Drop-delay confirmation with BD FACS Accudrop technology. The drop-delay value can be adjusted while viewing BD FACS Accudrop beads in the center and side sort streams which are illuminated by a red diode laser.

Sort monitoring with live video feed of the breakoff point, waste collection, and side streams.

Signal Processing

Data acquisition channels: 8 (FSC, SSC, and up to 6 colors)

Signal Processing
- 16-bit analog-to-digital conversion
- Parallel data streams with channel ID and integrity check
- Less than 1 correlation error per 10^8 events

Acquisition Rate
Dead time is 0 µs. The maximum throughput rate is 200,000 events per second, independent of the number of parameters.

Fluorescence Compensation
8 x 8 digital compensation matrix. Compensated parameters are added to the bus as separate parameters.

Pulse Processing
All signals are measured in height (peak) by default. Width measurement on the trigger parameter is standard. The Pulse Processing/Integrator option adds area and width measurements for up to four parameters.

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

Data Management

Software
BD FACS Sortware sorter software

Workstation
PC workstation with at minimum: Intel® 3.3GHz Quad Core CPU, Microsoft® Windows® 7 Professional 64-bit operating system

Memory
8 GB of RAM

Data Storage
2 x 300 GB hard drives, RAID 1 (mirrored) configuration

8X DVD+/-RW

7 USB 2.0

Networking
(10/100/1000) GB Ethernet

Monitor
27-inch LCD, 2560x1440 resolution

Installation Requirements

Dimensions (H x W x D)
Cytometer: 53.3 x 50.8 x 50.8 cm (21 x 20 x 20 in.)

Table (optional): 94.0 x 121.9 x 81.3 cm (37 x 48 x 32 in.)

Computer cart (optional): 94.0 x 71.1 x 66.0 cm (37 x 28 x 26 in.)

Biological safety cabinet (optional): 233.4 to 249.9 x 136.5 x 87.6 cm (91.9 to 98.4 x 53.8 x 34.5 in.)

Weight
Sort head does not exceed 56.6 kg (125 lb)

Cytometer system, excluding options, does not exceed 151.5 kg (334 lb)

Temperature Operating Range
15°C–25°C (59°F–77°F)

Temperature changes within this range can affect the surface tension of fluids, and may require the operator to make minor adjustments to the system.

Power
One dedicated power line: 100/120/220/240 VAC, 50–60 Hz

Optional biological safety cabinet, aerosol management option, sample temperature control, air compressor, and vacuum supply may require an additional line.

Power consumption: <600 VA

Humidity
55% ±10% relative humidity (non-condensing)

Heat Dissipation
The BTU ratings at 120 VAC for the components are as follows:

Cytometer: 1,638 BTU or 480 Whr

Air compressor (optional): 3,275 BTU or 960 Whr

Vacuum pump (optional): 1,720 BTU or 504 Whr

Sample temperature control (optional): 4,709 BTU or 1,380 Whr

Air Supply
A laboratory air source of compressed air must deliver clean (less than 5 PPM), dry-filtered (oil-free) air with stable pressure of 40–90 psi (2.5–6.2 bar) regulated. An air source option is available.

Vacuum Supply
A laboratory vacuum source must supply between 5–15 in. Hg at 1 CFM. A vacuum source option is available.

System Options

Lasers

- 50 mW, 640-nm laser
- 50 mW, 405-nm laser
- 75 mW, 561-nm laser

Pulse Processing/Integrator Option

Specially modified Baker SterilGARD® e3 Class II, Type A2 biological safety cabinet

Air compressor

Vacuum pump

Sample temperature control

Aerosol Management Option (AMO)

Table

Computer cart

Compliance with Safety Standards

UL 61010 (US)

IEC 61010 and IEC 60825 (Europe)

CSA Electrical Safety Standard (Canada)

23-13601-02

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