



## BD FACSCanto™ Flow Cytometer

Efficient • Easy • Powerful

### **BD Biosciences**

Clontech  
Discovery Labware  
Immunocytometry Systems  
Pharmingen



## The BD FACSCanto System:

### Optimal Workflow and Time Management

Automated compensation algorithms with optional off-line compensation, streamlined sample loading, and automated housekeeping routines

### High Performance

Clean data, high sensitivity, and rapid processing rates

### Flexible Experimental Design

Eight-parameter detection across a range of particle sizes

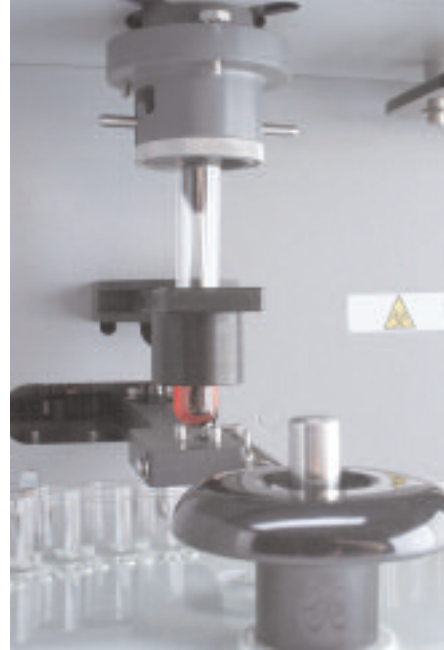
### Access to a Trusted Partner

Over 30 years of innovations in flow cytometry from BD Biosciences

The BD FACSCanto system breaks new frontiers in flow cytometry by providing an efficient, easy-to-use yet powerful six-color benchtop analyzer. It incorporates many technology advances first developed in the BD™ LSR II expandable analyzer and the BD FACSAria™ cell sorter. It supports a broad range of research applications, being particularly suited for rare event analysis with its high speed, great sensitivity, and minimal sample-to-sample carryover.

The BD FACSCanto derives its name from the musical term “bel canto,” meaning operatic singing that focuses on ease and purity of tone with an agile and precise vocal technique. This new flow cytometer embodies this through its simple, yet novel optical design, and robust electronics that keep signals precisely separated at high acquisition rates.





**Figure 1**  
The new design of the BD FACSCanto sample injection tube enables carryover of less than 0.1%.

### High Performance

The BD FACSCanto system combines a patented optical design for enhanced signal retention on six fluorescent and two scatter parameters, digital electronics for processing up to 10,000 events per second, and a novel sample injection tube supporting carryover of less than 0.1%. Your total benefit consists of the best fluorescence sensitivity to resolve dim events, cleaner data due to minimal sample contamination, and rapid processing rates, preserving valuable time for science. BD FACSCanto performance overcomes obstacles in rare event analysis and in functional studies for low detection ranges.

### Flexible Experiment Design

The BD FACSCanto system supports a full range of applications. It has a capacity for eight-parameter detection while capturing particle sizes from 0.5 to 50  $\mu\text{m}$  in diameter, enabling projects with leucocytes, cell lines, platelets, multiplexed bead technologies and beyond. Multiparameter detection helps advanced cell subset analysis, multiparameter functional studies, soluble protein detection, and quantification studies for cell-surface antigens and soluble proteins. It also decreases the total sample volume necessary for a specific project as more parameters can be read per individual test.

| Instrument                  | Laser | Excitation Laser Line (nm) | Fluorescence Channel | Fluorochromes from BD Biosciences |             |
|-----------------------------|-------|----------------------------|----------------------|-----------------------------------|-------------|
| BD FACSCanto Flow Cytometer | Blue  | 488                        | Green                | FITC                              |             |
|                             |       |                            | Yellow               | PE                                |             |
|                             |       |                            | Red                  | PerCP                             | PerCP-Cy5.5 |
|                             |       |                            | Infra Red            | PE-Cy7                            |             |
|                             | Red   | 633                        | Red                  | APC                               |             |
|                             |       |                            | Infra Red            | APC-Cy7                           |             |

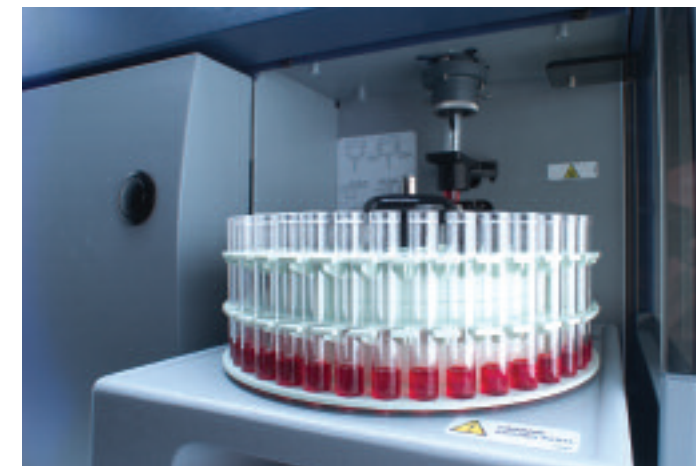
**Table 1**  
Validated fluorochrome combinations with the BD FACSCanto flow cytometer.

### Optimal Workflow and Time Management

The BD FACSCanto system is designed for optimal time management and workflow in any laboratory setting. Instrument setup and compensation nightmares are history thanks to automated compensation algorithms and preset templates. Data files are then stored raw and compensated as part of the FCS files, allowing flexibility for off-line compensation when viewing data.

Sample loading is automated with the BD FACSCanto Loader option, enabling walkaway acquisition. The Loader operation is now streamlined and fully integrated in the BD FACSDiva software user interface. Manual and automated tube loading can be switched back and forth easily and quickly. In addition, BD Biosciences digital electronics allows an unsurpassed benchtop analysis speed of up to 10,000 events per second.

The system's design makes instrument maintenance easier than ever. It includes a cart that holds large fluid tanks to run the instrument, greatly reducing the operator's need to handle fluids. Automated startup, shutdown, and cleaning routines are available with only one click. Any laser alignment is virtually eliminated because of the fixed optical bench and the fiber optics, which route focused and steady light.



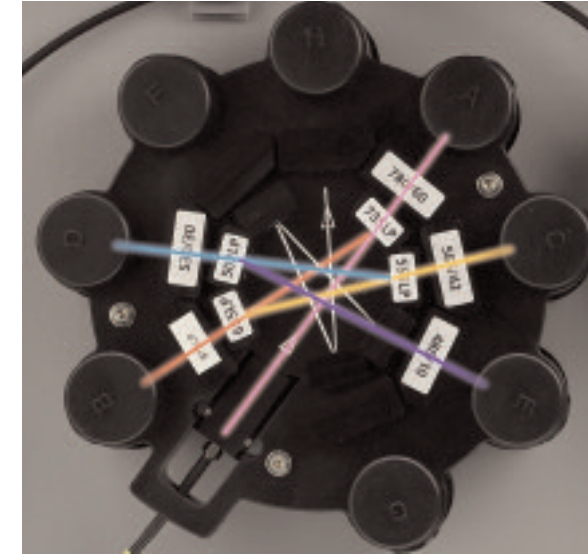
**Figure 2**  
The BD FACSCanto™ Loader option processes 76 tubes per hour while collecting 8 parameters using 6 colors as well as forward and side scatter parameters.



### Technical Overview—Optics

The BD FACSCanto system is built with blue (488 nm, air-cooled, 20 mW solid state) and red (633 nm, 17 mW HeNe) excitation sources. The laser beams are then routed via fiber optics to the beam-shaping prisms where two lasers are projected onto separate spots in the flow cell. Here, the particles intercept with the laser excitation beams and optical signals are collected at the backside of the flow cell with a gel-coupled collection lens. The optical gel, with a refractive index matched to the lens, maximizes the efficiency of light collection. Scattered light and fluorescent signals are then focused onto the emission fiber pinholes. The flow cell is incorporated into the optical plate, creating a solid excitation and collection system with fixed alignment, and no need for user intervention.

**Figure 3**  
Beam-shaping optics and flow cell.



**Figure 4**  
Serial reflective design of detector array.

The emission signals are transmitted from the flow cell to the detector arrays—an octagon for the blue and a trigon for the red laser signals. These BD-patented detector arrays use serial reflections to guide signals to their target detectors. The use of reflective coatings results in highly efficient light collection, providing maximum signal retention at the detector level. An additional advantage of the serial reflective design is the ability to collect the dimmest emission signals first, starting with the longest wavelengths (typically PE-Cy7), and finishing with the shortest (FITC), further enhancing sensitivity.



**Figure 5**  
Emission optics assembly for the blue (octagon) and the red (trigon) laser signals.



### Technical Overview—Fluidic System

The BD FACSCanto fluidics cart is designed to save you time and improve performance. It handles all fluidics necessary to operate and maintain the BD FACSCanto flow cytometer, and is fully integrated with BD FACSDiva software. Daily routine procedures, such as cleaning cycles, startup, and instrument shutdown are automated as a result. The cart holds large tanks to reduce the amount of daily fluidic handling by the operator: one BD FACSFlow™ sheath cubitainer (20L), a waste tank (10L), as well as BD FACS™ cleaning solution and BD FACS shutdown solution. The waste tank is designed at half the sheath cubitainer volume to prevent strain injuries from lifting heavy fluids for disposal at laboratory sinks. The new BD FACS shutdown solution replaces sheath fluid in all sample lines during the instrument shutdown procedure. It is supplemented with a preservative to prevent salt crystal buildup and to prevent bacterial growth.

For sample acquisition, sheath fluid is pumped from the cart to a plenum reservoir inside the instrument. The plenum reservoir holds the sheath fluid before it is pumped into the flow cell, and balances any pressure changes as it is being replenished. It allows for virtually constant flow rates using a new dynamic feedback pressure control system designed to regulate pressure to  $\pm 0.005$  psi. Thus, pressure is no longer dependent on the level of fluid in the sheath container, and the reservoir removes small air bubbles from the sheath supply.

### Technical Overview—Digital Electronics

Digital electronics improve performance and make instrument use much easier. The electronics eliminate dead time and the need for inter-beam time-delay calibration: this means the system can handle faster sample flow rates (up to 120  $\mu\text{L}/\text{min}$ ) and faster acquisition rates (up to 10,000 events per sec), and setup time is less. The digital electronics facilitate compensation, with no limits to inter- and intra-beam compensation, allowing post-acquisition compensation.



**Figure 6**  
The integrated BD FACSCanto fluidics cart handles BD FACSFlow sheath fluid, sample waste, BD FACS cleaning solution, and BD FACS shutdown solution.

### Technical Overview—System Software

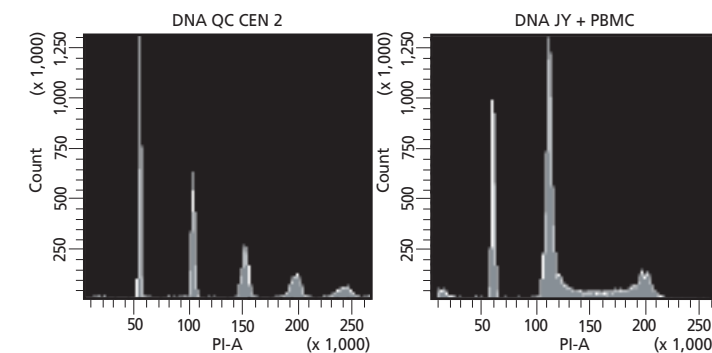
Workflow, ease-of-use, and enhanced analysis tools are the foundation of the new BD FACSDiva software. It is the selected software of the BD FACSCanto system.

#### Key Features

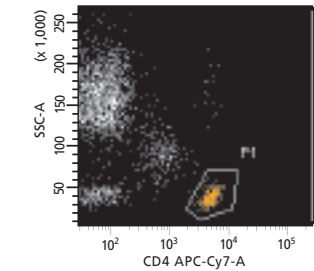
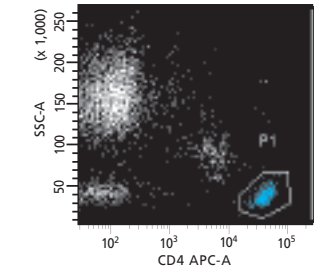
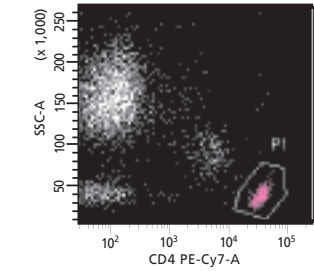
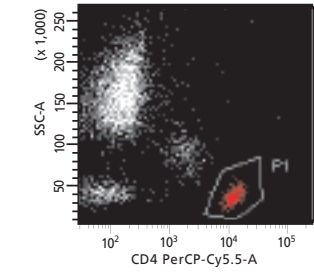
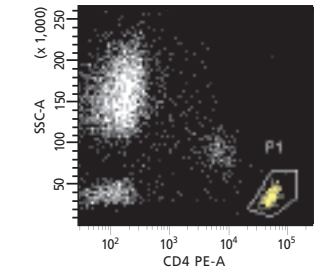
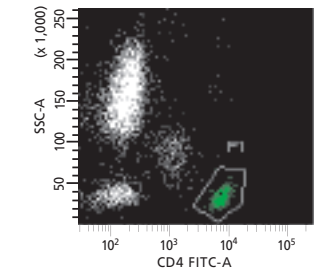
- User login to track specific user time on the instrument
- Automated sample loading option
- Automated spectral overlap correction
- Off-line compensation capability
- Templates for acquisition and analysis
- Batch analysis tools
- Tethering gates for rare event analysis
- Auto-FCS exporting
- Built-in database

The BD FACSDiva software has a database that is viewed through a browser window, providing an interface with folders, experiments, and FCS files. It streamlines data backup and contains an archiving feature for easy export and long-term storage of data.

The BD FACSCanto system operates on a PC-based Microsoft® Windows® XP platform and is equipped with a high-resolution LCD flat-panel monitor that can be upgraded to a large screen. Ethernet is built in for networking capabilities.



**Figure 7**  
CEN control sample and PBMCs + cell line stained with propidium iodide.



**Figure 8**  
Whole blood stained with CD4 single-color fluorophores.

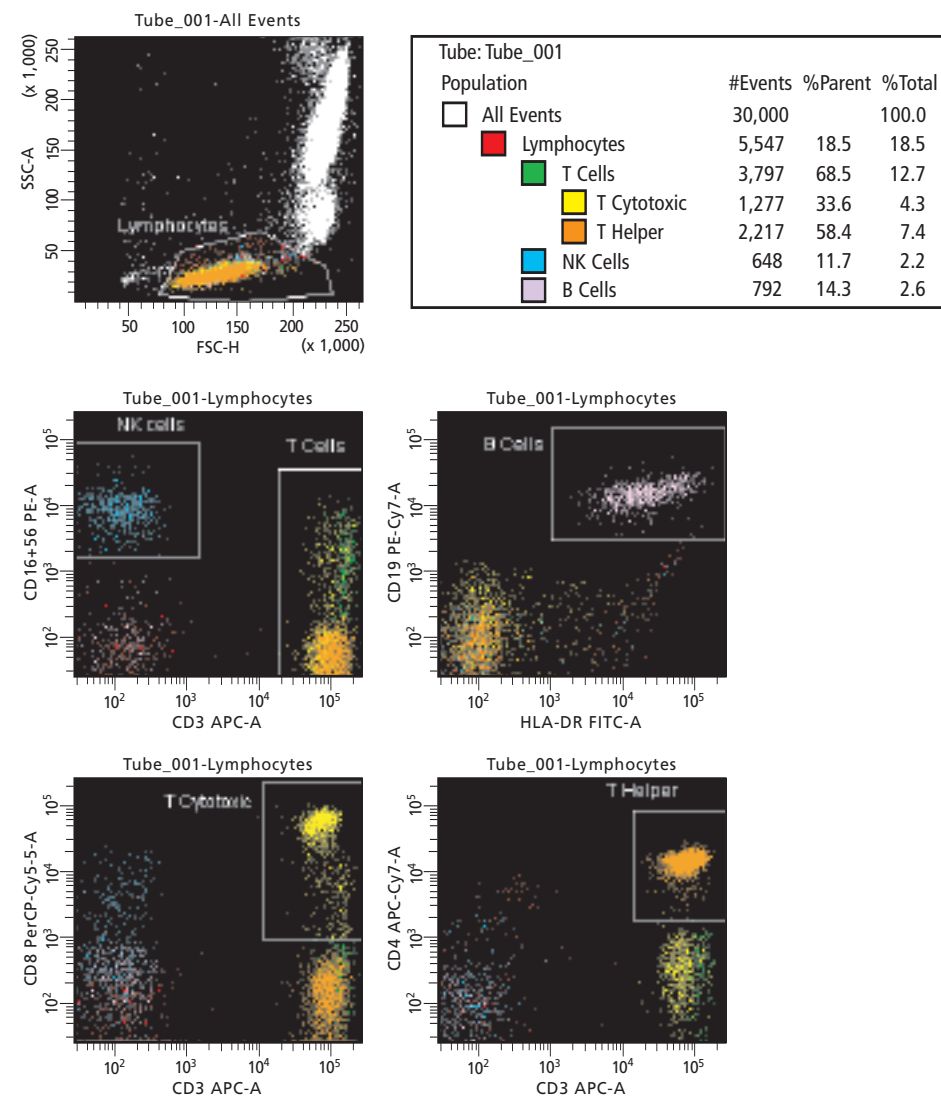
### System Characteristics

- 10,000 events/sec processing capability
- Best-of-class fluorescence sensitivity\*
- <0.1% sample carryover
- Reduced fluid handling
- No laser alignment
- Six-color detection
- Off-line compensation
- Batch analysis
- Interchangeable manual and tube loader mode

### Automation Features

- Sample loading option
- Spectral overlap correction
- Startup, shutdown, and cleaning cycles

\* <50 MESF for PE and <100 MESF for FITC measured with Spherotech Rainbow beads

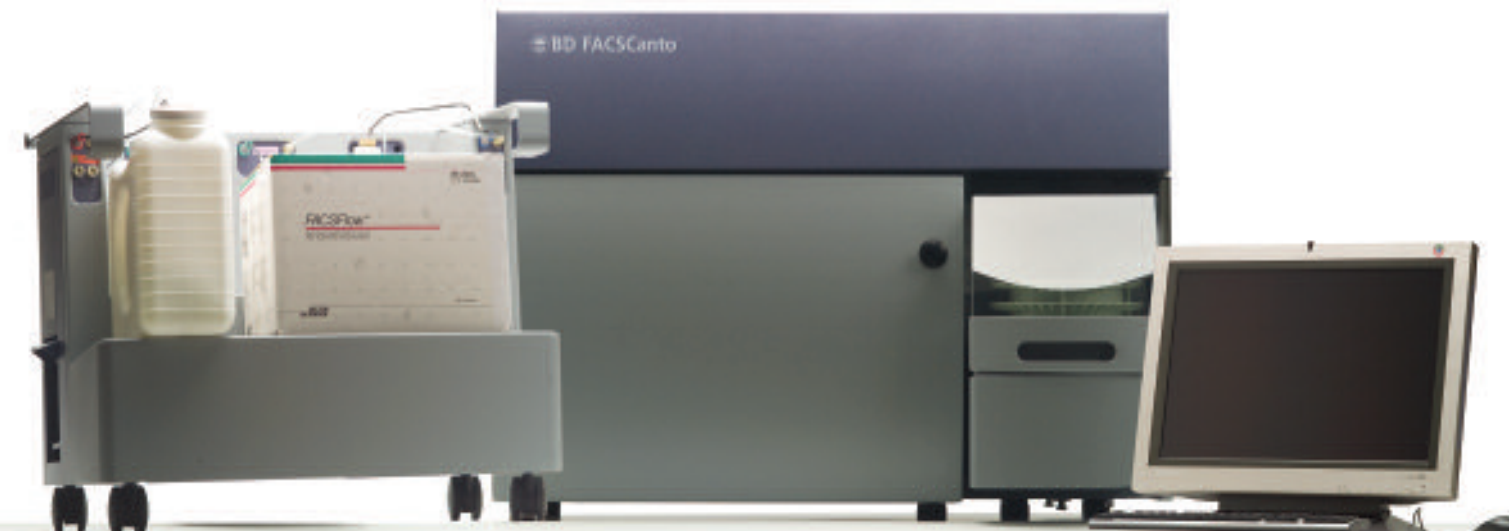


**Figure 9**  
Leucocyte subset analysis showing lysed whole blood stained with single-color reagents.

### A Trusted Partner

Since 1974, BD Biosciences has innovated flow cytometry for optimal performance, ease-of-use, and improved workflow. This is evidenced by the broad acceptance of BD Biosciences flow cytometers in laboratories around the world with >10,000 installed systems. The BD FACSCanto system was designed using 30 years of experience and our recognized expertise in flow cytometry and provides you with more than just a system, it gives you access to our in-depth experience and technical knowledge.

All BD Biosciences systems are backed by the BD worldwide phone and field service team. BD FACService™ support guarantees a fast response time and provides highly trained service and application specialists to answer any of your questions.



**Figure 10**  
BD FACSCanto system: flow cytometer, fluidics cart, computer workstation with LCD monitor.

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## IVD

### For In Vitro Diagnostic Use

Five- and six-color assays on this device  
require validation by the user for in vitro diagnostic use.

Class 1 (I) Laser Product

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