CytoFLEX SRT Cell Sorter

EVERY
event matters.

BECKMAN COULTER
Life Sciences

The CytoFLEX that Sorts

If you need an approachable instrument for sorting multiple populations to generate high quality material for downstream assays, the CytoFLEX SRT benchtop cell sorter is quick to learn and easy to operate. This extension of the CytoFLEX platform is built on the same optical features as the flow cytometer, but equally important, it continues to adhere to the principles that made multicolor applications accessible to many biomedical research and pharma R&D labs:

- Exquisite sensitivity for multicolor applications
- Extensive set of repositionable bandpass filters
- Flexibility to upgrade by activating additional detection channels
- Intuitive software to facilitate multicolor analysis

And now leveraging technology to simplify sorting, including automation that:

- Facilitates stream setup
- Monitors and maintains side streams
- Detects and resolves bubble interference

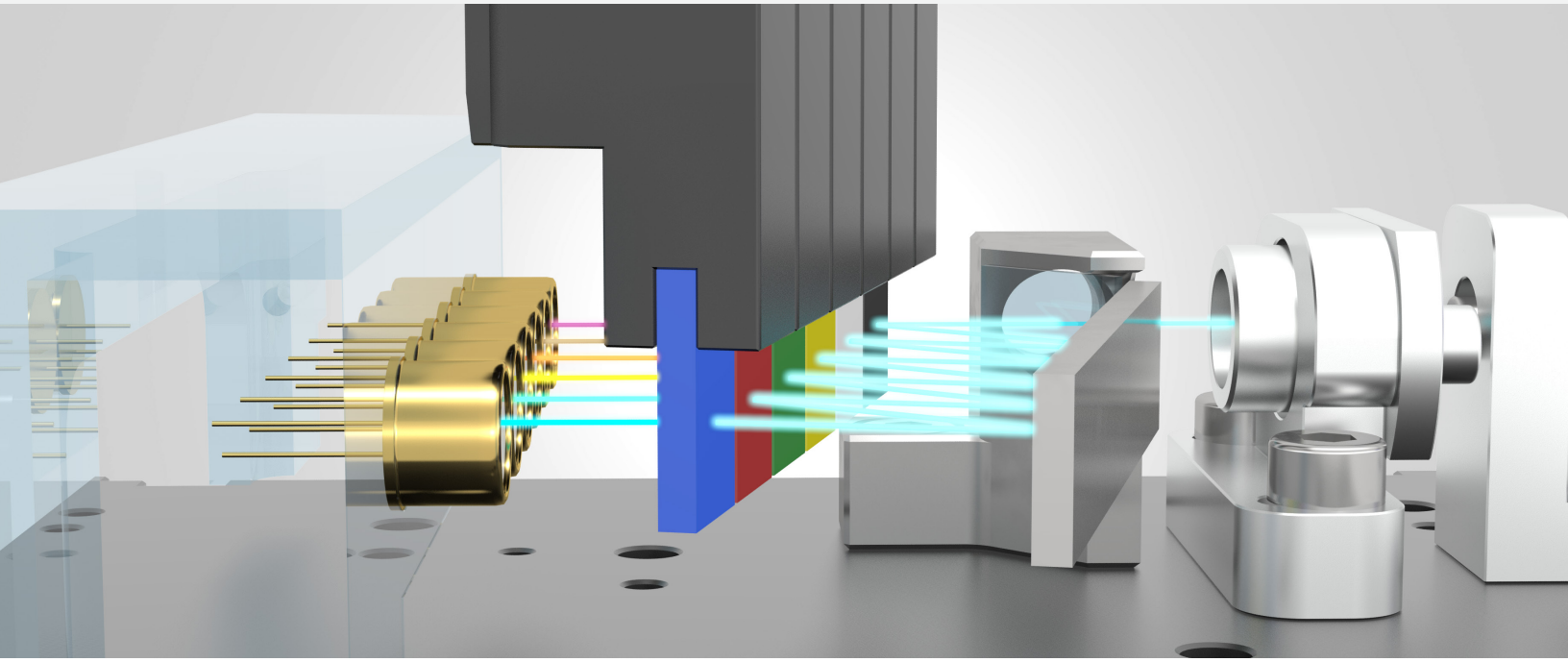
CytoFLEX SRT Cell Sorter

CytoFLEX SRT Cell Sorter is offered in seven fluorescence detector configurations. You can activate the lasers and detectors you need now and, by purchasing an activation key, add more channels later as your research needs grow. The fully activated instrument includes five fluorescent channels from the 405 nm (Violet) laser, two from the 488 nm (Blue) laser, five from the 561 nm (Yellow Green) laser, and three from the 638 nm (Red) laser. Every configuration includes 15 bandpass filters which can be repositioned as needed.

450/45, 525/40 (2), 585/42, 610/20 (2), 660/10 (2), 675/30, 690/50, 710/50, 712/25, 780/60 (3)

Part Number	Configuration	Lasers	Fluorescence Detectors
C71883	V5-B2-Y5-R3	4	15
C85214	V4-B2-Y4-R3	4	13
C71884	V5-B2-Y5-R0	3	12
C85213	V3-B2-Y3-R2	4	10
C71885	V5-B2-Y0-R3	3	10
C71886	V0-B2-Y5-R3	3	10
C71887	V5-B2-Y0-R0	2	7
C71888	V0-B2-Y5-R0	2	7
C71889	V0-B2-Y0-R3	2	5

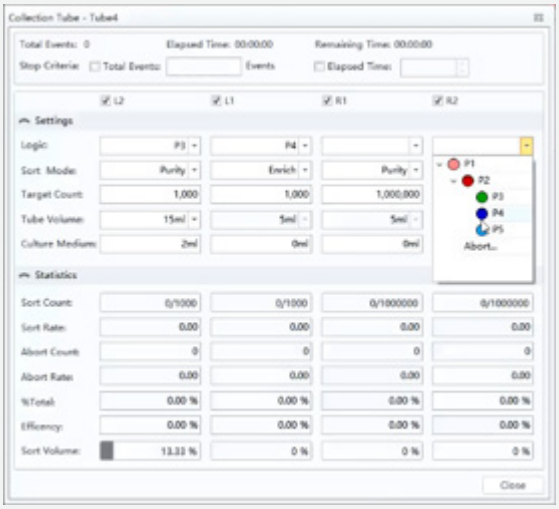
The CytoFLEX platform is a bandpass only instrument. Simply move the filter of interest in front of the detector to set the wavelengths detected. All instruments use the same WDM design meaning that filters are interchangeable across the platform. In addition to the full complement included with each instrument, non-standard filters are also available. A custom filter holder increases the flexibility of the platform allowing users to define their own wavelengths.

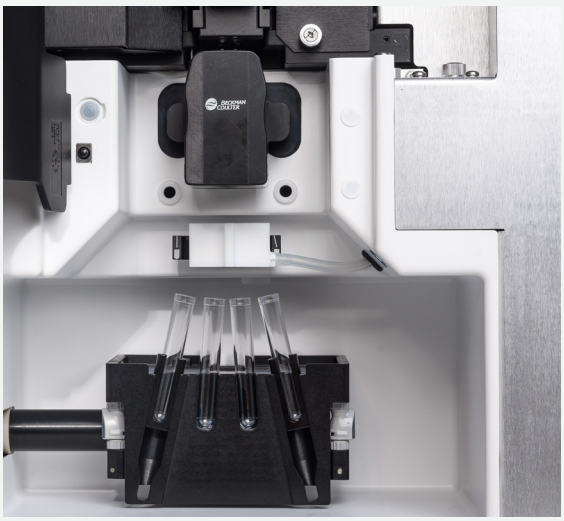


High Performance Sorting, Simplified Workflow

CytoFLEX SRT Cell Sorter is a benchtop sorter. It is capable of meeting requirements for a wide range of sorting needs. And like the CytoFLEX Platform, it includes innovative technologies that simplify the setup and operation, empowering investigators to focus on the research questions. The instrument can be configured to use up to four lasers and up to 15-color detection to identify subtle differences between cells. It is capable of complex sort logic with different combinations of sort settings on each of four streams, including the ability to catch aborts of the other streams.

- 4-way sorting
- Mixed mode sorting
- Complex sort logic
- Ability to catch aborts and preserve precious cells
- 100 µm Nozzle
- 35 kHz droplet frequency
- Low sheath pressure



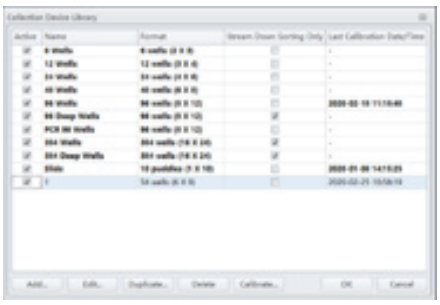


CytoFLEX SRT acquires data and consults sort decisions that are defined by the operator. The electrode applies a positive or negative charge to the sheath stream based on the information that was collected after the particle was interrogated by the laser, together with the specified sort decisions. The charged deflection plates positioned on either side of the droplet stream attract or deflect the charged droplets into the appropriate receptacles.

Variety of Collection Vessel Options Helps You Control Downstream Workflows

The system includes a 3-in-1 holder to hold tubes, slides or microplates. Preconfigured sort output definitions determine plate voltage and defanning to automatically direct sort streams to the appropriate receptacles. The system supports these sort collection devices:

- 5 mL tube
- 15 mL tube
- 96-well plate (deep and shallow)
- 384-well plate
- Slides



The CytExpert for SRT features automated workflow with innovative setup, monitoring, and stream maintenance systems. Novice users can learn how to operate the system quickly, allowing researchers to spend more time on biological questions and experimental design. Built-in algorithms provide real-time calibration and make sure the right drop delay is assigned factoring in ambient temperature and particle sizes. Stream adjusts and is monitored automatically to help ensure that droplets reach the target tube or well.

Startup

Click the button and follow the prompts on the screen. Install the nozzle and click next. The system completes diagnostic tests, pressurizes, and starts the stream in less than 10 minutes.

Instrument QC

Instrument QC is the same process as on the CytoFLEX platform and uses the same QC bead. This routine takes less than 5 minutes.

Sort Calibration

The software defines the droplet parameters and completes the side stream parameter settings. The drop delay is determined and drop delay values are given. Total time ~6 minutes.

Sort

User interface allows operators to set up complex sort logic for four independent streams quickly. Set population, sort mode, collection tube volume, and target count.

Shutdown

System Shutdown procedure rinses the sample line and perfuses the flow cell to prevent saline accumulation. Long term shutdown routine prepares the instrument fluidics for inactivity exceeding 7 days. System liquid is replaced with 70% ethanol solution to prevent microbial growth.

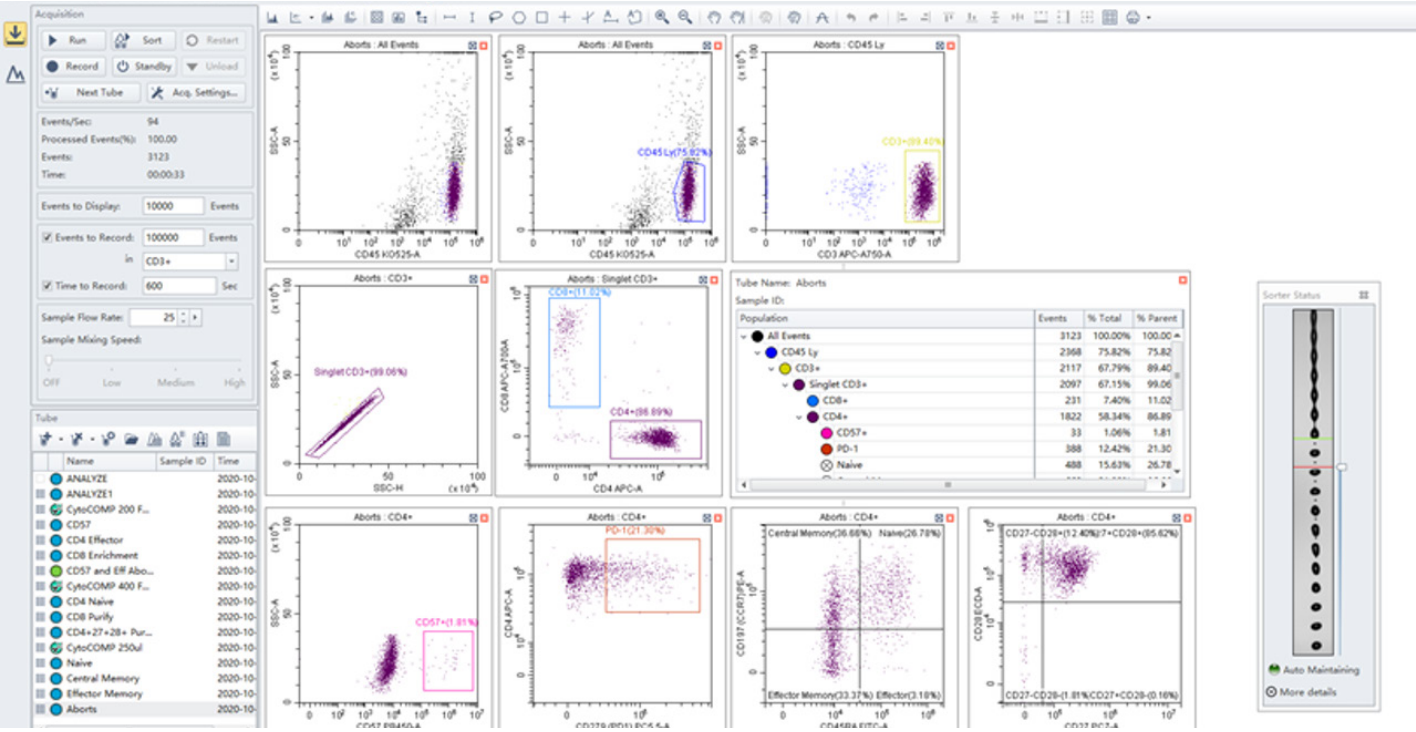
<30 min

From startup to sample sorting

Multicolor Applications

Building on the reputation of the CytoFLEX platform for ease of use for multicolor applications, CytoFLEX SRT uses a CytExpert-based software. The user interface continues to use the same features that facilitate multicolor flow cytometry applications.

Check out our whitepaper Gain Independent Compensation Enables New Multicolor Flow Cytometry Workflows.

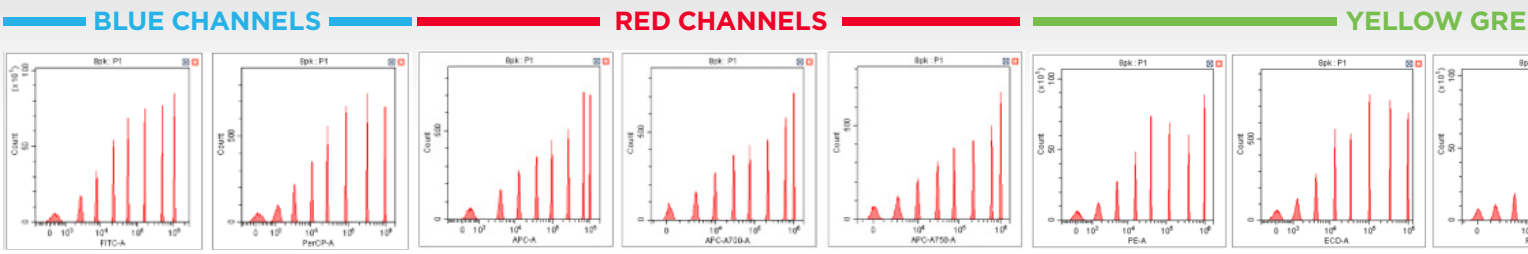


CytExpert for CytoFLEX SRT Interface. Template was created for CytoFLEX S using CytExpert software and imported into CytExpert for CytoFLEX SRT. Data was acquired, and sort logic established based on gates.

Parameter Matched Detector Configuration

The detector configuration for CytoFLEX SRT is an extension of the CytoFLEX S V-B-Y-R Series. It contains two additional channels, one off of the Yellow Green laser and another off of the Violet laser. Having both instruments enables high volume laboratories to design a sort gating strategy using the analyzer before executing on the sorter. CytExpert templates can be ported to CytoFLEX SRT to save time on instrument setup.

	Blue (488 nm)		Red (638 nm)			Yellow Green (561 nm)					Violet (405 nm)				
CYTOFLEX SRT	525/40	690/50	660/10	712/25	780/60	585/42	610/20	675/30	710/50	780/60	450/45	525/40	610/20	660/10	780/60
CYTOFLEX S V-B-Y-R SERIES	525/40	690/50	660/10	712/25	780/60	585/42	610/20		690/50	780/60	450/45	525/40	610/20	660/10	

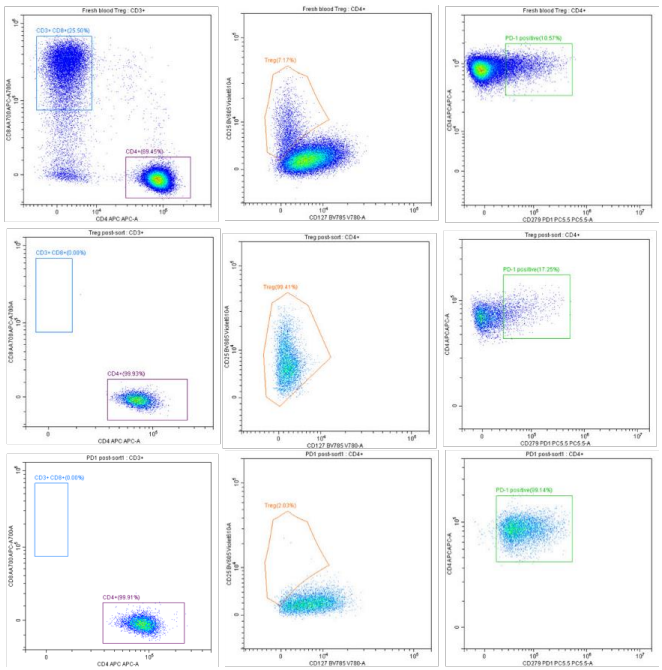


Excellent resolution of 8-peak SPHERO™ Rainbow Calibration Particles.

Pre-sort

Post-sort
CD4+/CD25+/CD127-

Post-sort
CD4+/PD-1+



T Cells Sorted from Whole Blood. Human Blood was lysed with VersaLyse (Part Number A09777) stained with DURAClone IM T Cell Subsets Antibody Panel (Part Number B53328) with drop-in liquid markers, CD25-BV605 and CD127-BV785. A two-way sort was set up to isolate Treg and PD1+ CD4 T Cells. The resulting sorted populations were re-analyzed. Gates on the CD127-BV785 by CD25-BV605 plot were adjusted to accommodate for the loss of signal due to photobleaching of BV605. All plots were gated on singlet CD3+ lymphocytes. Sample was sorted at 8,000 events per second in Purity mode.

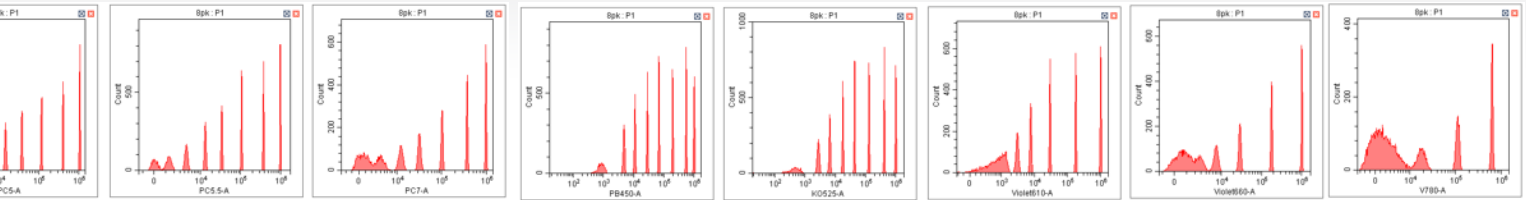
A

B

Mixed Mode Sorting. CytoTROL Control Cells (Part Number 6604248) were stained with DURAClone IM T Cell Subsets Antibody Panel (Part Number B53328). A four-way sort was set up to isolate Naïve, Central Memory, Effector Memory, and aborts from all three sort streams, panel A. The resulting sorted populations were re-analyzed, panel B. CD197 (CCR7)-PE staining shows loss of signal post sorting, as expected due to photobleaching of this fluorochrome. All plots were gated for CD3+CD4+ singlet lymphocytes.

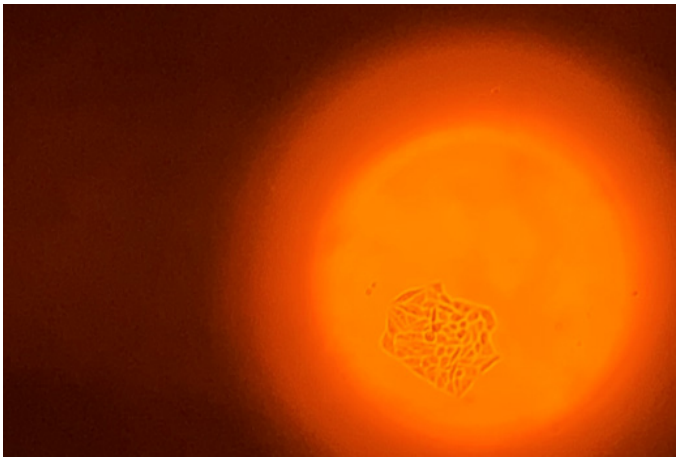
EN CHANNELS

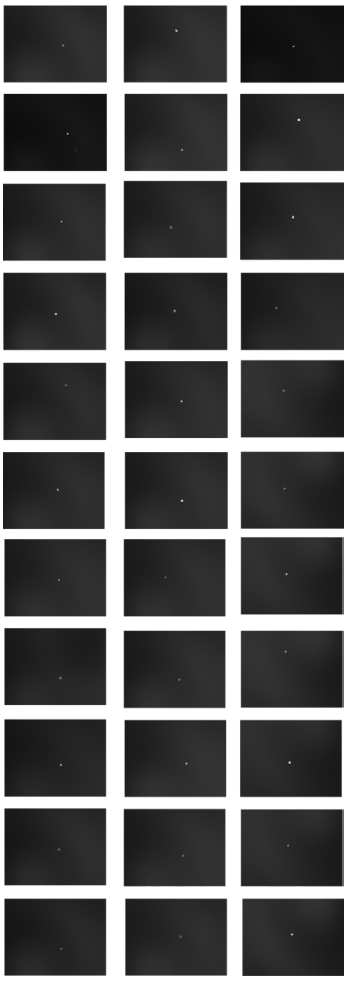
VIOLET CHANNELS



Cell Line Development

Cell lines are critical for biomedical research, where they are used as models for complex biological systems, and for biotherapeutic manufacturing as cellular factories synthesizing and modifying complex molecules with therapeutic applications. Obtaining clonal populations of modified cells is time consuming and labor intensive. A number of properties contribute to the suitability of the cell line, from cell specific production rate, effectiveness of post-translation modifications (PTMs), genetic stability, and adaptability to growth in the bioreactor. Adding cell sorting to the development method gives investigators the ability to develop cell lines with a wider range of properties for downstream characterization and method development.



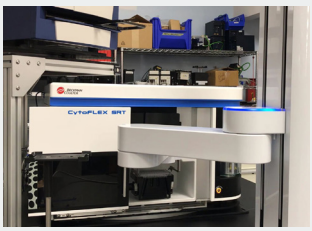


Deposition Accuracy of the Cyclone Movement System. HeLa cells transfected with a GFP expression construct were sorted onto a shallow glass slide and imaged on a microscope. The trial was repeated 3 times with a sample of 11 cells per trial. 100% of the droplets contained a single GFP+ cell.

Aseptic Clean Program

Carry out an aseptic clean if the instrument has not been used for more than 30 days or prior to performing an aseptic sorting. The procedure will perfuse 10% bleach through the instrument fluidics and soak per the user specified time. After rinsing with deionized water, an additional perfusion of 70% ethanol will be conducted. The instrument will be prepared for idle by perfusing with sterile sheath fluid.

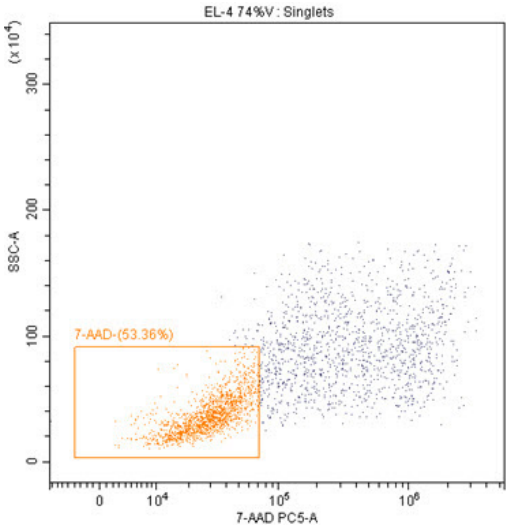
Automation



Applications in cell line development and other high-throughput applications can be very time consuming with many multiwell plates to fill. CytoFLEX SRT ships automation-ready, with Application Programming Interface (API) functions built in to CytExpert SRT. The CytExpert SRT API is a C# language program built on .NET framework 4.8 and allows for third party control of sorter functions like recording data, creating new data files, and starting or stopping sorts when plates are filled. API functionality also allows the CytoFLEX SRT to be integrated into larger automated workflows with the addition of plate hotels, incubators, Biomek liquid handlers, and more.

Genomics

Understanding how cellular diversity is coded, somatic changes in DNA or expression of RNA, is essential for understanding biological systems. Single-cell genomics and transcriptomics allow scientists to generate detailed maps of tissues, cellular interactions, and regulatory networks that drive functional outcomes. Underpinning the quality of this data is the quality of the sample and preparation of the single cells. Quality scRNA-seq data depends on quickly and carefully capturing single, live cells to prevent RNA degradation prior to library preparation.

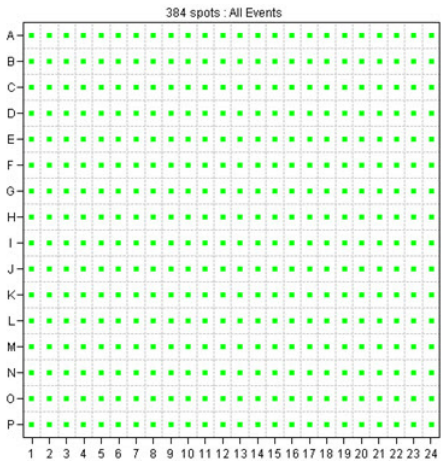


Sort Stream	% Viable	Estimated Recovery
L2	94%	92.8%
R2	96.6%	80.7%
R1	98.5%	92.3%
L1	100%	101.6%

Recovery and Post Sort Viability. EL4 mouse T cell lymphoma cell line was assessed for culture viability using the Vi-CELL XR Cell Counter. A four-way sort was set up and the resulting recovery was assessed using estimated sorted liquid volumes and cell count from the sort report and cell counts measured with the Vi-CELL. % viability as measured with the Vi-CELL are also reported. The average recovery across four samples was 91.9% and the post sort viability was >94%.

Index Sorting for Single-cell Applications

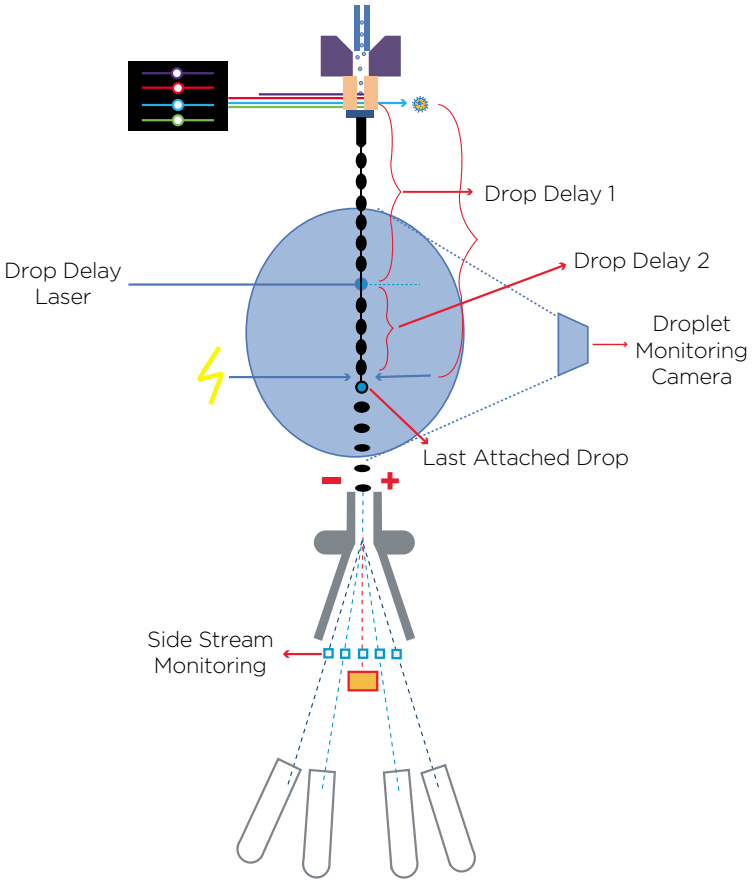
Index sorting allows you to sort single cells onto a plate or slide and indexes the well or slide location to the collected parameters for that cell. You can use this feature to ensure that a sorted cell with a specific phenotype has been sorted. Index sorting is useful in characterizing subpopulations of phenotypically similar events using post-sort genetic, chemical, and/or metabolic applications. The use of Straight Down Mode switches the center stream for sorting into plates. Use this mode for better post sort viability when performing Index Sorting.



Auto Sort Calibration

Sort Calibration allows the system to achieve an optimal droplet break-off point, optimal side stream settings, and generate the drop delay value automatically (auto drop delay). If the software detects stream instability that cannot be restored by the Auto Maintain function within 1 minute, the Auto Recovery function is initiated.

- **Droplet Calibration**
  System automatically scans the frequency and amplitude to form an optimal droplet.
- **Side Stream Calibration**
  After completing the droplet calibration, the system sequentially calibrates charge phase, charge voltage, and defanning automatically for each sort stream. Detectors also keep the waste stream vertical.
- **Auto Maintain**
  Measures the pixel number, will change the voltage to the piezo to adjust the droplet formation, maintaining the drop delay.



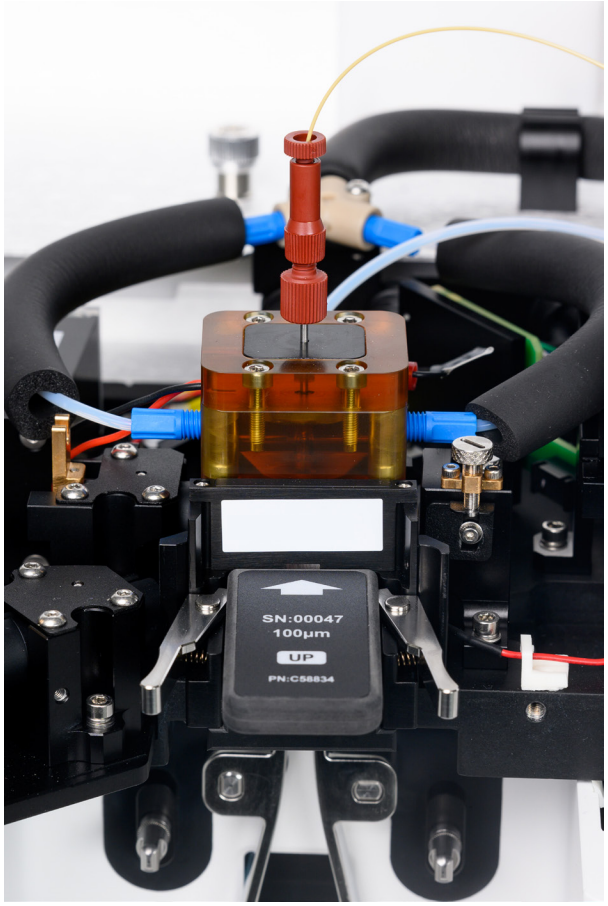
One Bead, Two Processes

The CytoFLEX Daily QC Bead, used for setting laser delays, is also used to establish Drop Delay 1 automatically during Auto-stream setup.

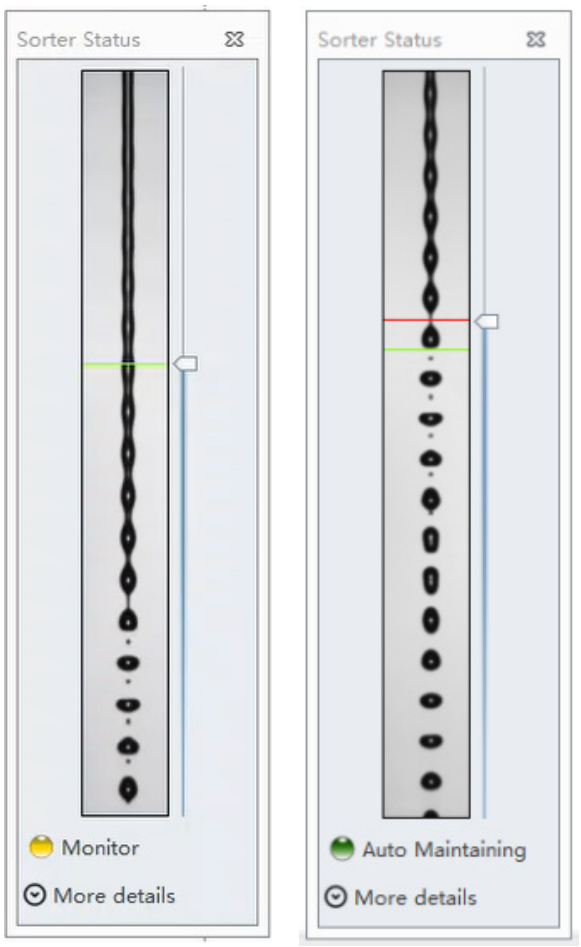
Auto Recovery

If the software detects stream instability which cannot be restored by the Auto Maintain function within 1 minute, Auto Maintain will be turned off and the system starts the Auto Recovery function.

In Auto Recovery, the system sequentially stops the sample flow, extends out the waste catcher, and starts Flow Cell De-bubble. If Auto Recovery succeeds, the system re-enters the Auto Maintain state and restarts sorting automatically. If Auto Recovery fails, the sorting stops, and user intervention is required, for example, cleaning the nozzle holder, performing sort calibration.



CytoFLEX SRT Flow Cell Assembly with integrated auto-recovery features



Auto Maintain and Recovery. After sort calibration the droplet breakoff point is established, indicated with the green line. When stream instability is detected the system enters Monitor mode and attempts to reestablish the stream. During sorting, if the stream cannot be reestablished, the system will initiate recovery mode.

CytoFLEX SRT 100 µm Nozzle

Nozzle design makes resolving clogs easy, and with minimal complications

Total Cost of Ownership

The total cost of ownership (TCO) is used to calculate the cost of purchasing and operating a technology product or service over its useful life. It is important for evaluating technology costs that aren't always reflected in upfront pricing.

Avoid Hidden Costs

No need for dedicated operator	• Builds on the CytoFLEX Platform reputation for being easy to use and master • Automates sort setup so that users can get to the science
Reduced productivity due to lost samples	• Approachable instrument dedicated to your research strategy and schedule • Automated stream monitoring and recovery • Aseptic Cleaning Mode to reduce the chance of contamination • Multimode sorting allows you to collect aborts increasing the odds for recovery of precious rare populations
Expensive maintenance	• Perform many routine maintenance procedures independently • Service packages available for more peace of mind
Instrument downtime	• Purposely built for reliability and serviceability • Available with BeckmanConnect to troubleshoot and diagnose problems before the Service Representative even gets on site

Training: From Sorting Theory to CytoFLEX SRT Operation

We are committed to supporting investigators as they incorporate single-cell techniques into their approach. The CytoFLEX SRT is an approachable instrument that is quick to learn and easy to operate. The software will be familiar to experienced users of CytExpert for CytoFLEX. A variety of options are available to support operators.

Computer Based Training

- Learn about sorting concepts
- Introduction to operating the CytoFLEX SRT

Instructor-led Training

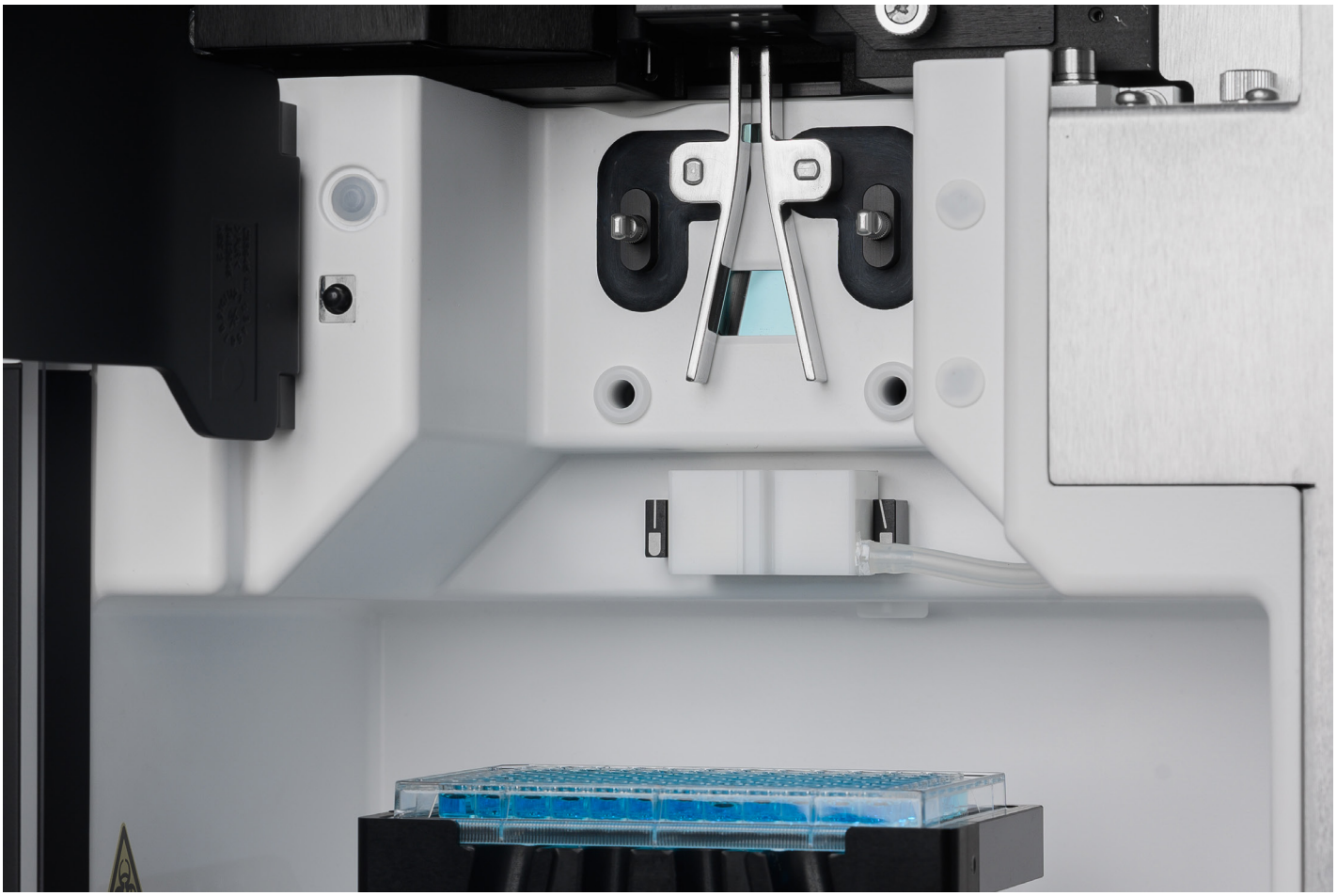
- In-depth sorting theory (2 days)
- CytoFLEX SRT Operation (1 day)

Field Application Scientist

- CytoFLEX SRT Basic Operation and Assay Setup

Service and Support Packages

We understand that acquiring the CytoFLEX SRT Cell Sorter may be the beginning of your relationship with Beckman Coulter. This is why we continually invest in enhancing the critical resources needed to sustain a valuable and collaborative partnership that minimize instrument downtime, maximize data integrity and protect your investment to optimize your success throughout the lifetime of your instrument.



Fostering optimal performance, maximum uptime, and peace of mind

Prevent transactional and logistical delays in ordering and scheduling support. With a service package your operators can get the help they need when they need it.

A service package keeps you connected for proactive communication of product improvements, ensuring that you have access to cutting edge technology.

We've designed flexible options to suit the needs of any lab or operation. No matter which package you select, you're making a choice to strengthen your investment.

Lock in your service pricing with a package purchased with the instrument. Ask your Sales Representative for details.

Accessories and Consumables

Sample Temperature Control

Refrigerated recirculating water bath provides temperature control of cell sorter Cyclone output for tubes or plates and/or the sample input chamber

Part Number	Description
998905C	Haake Refrigerated Waterbath, 230V/50Hz
998904C	Haake Refrigerated Waterbath, 115V/60Hz

Field Upgrades

Part Number	Description
C85942	CytoFLEX SRT 2 GAL Sheath Tank Assembly Kit
C98336	CytoFLEX SRT 15 mL Plate and Tube Holder Kit
C98337	CytoFLEX SRT API Plate and Tube Holder Kit

Replacement Parts

Part Number	Description
C64209	CytoFLEX SRT Capsule Filter
C64203	CytoFLEX SRT Sample Line Assembly
C64204	CytoFLEX SRT Sample Probe
C58834	CytoFLEX SRT Nozzle Module, 100 µm
C68147	CytoFLEX SRT Nozzle, 100 µm
C64205	CytoFLEX SRT Orifice O-Ring (x10)
C64206	CytoFLEX SRT Sheath Tank Assembly
C64207	CytoFLEX SRT Waste Container
C64208	CytoFLEX SRT Shutdown Fluid Container
C64210	CytoFLEX SRT Waste Air Filter (x6)
C64211	CytoFLEX SRT De-bubble Filter
C72894	CytoFLEX SRT Fluidic Filter Bundle

C58834, CytoFLEX SRT Nozzle, Module 100 µm

Startup Packs

Part Number	Description
C81624	CytoFLEX SRT Startup Reagent Bundle Kit

Reagents

Part Number	Description
81911	Contrad 70 Cleaning Solution
C65719	CytoFLEX Ready to Use Daily QC Fluorospheres
B51503	CytoFLEX Sheath Fluid
A64669	FlowClean Cleaning Agent
6605359	FP, FLOW CHECK KIT COULTER FLUOROSPHERES 3 X 10 ML KIT
8546859	IsoFlow Sheath Fluid
C52574	CytoFLEX SRT Shutdown Fluid

C65719 - CytoFLEX Ready to Use Daily QC Fluorospheres

Plastic

Part Number	Description
2523749	Polypropylene Sample Tubes, Blue
609801	Microtiter Plates, 96-well V Bottom
609844	Microtiter Plates, 96-well Flat Bottom

Biosafety Cabinet

We've partnered with Baker Corporation to develop the SterilGARD for CytoFLEX SRT Cell Sorter. This is a class II, Type Biosafety Containment Cabinet designed specifically for the CytoFLEX SRT and verified to meet personnel and product protection standards. It includes an aerosol evacuation system.

Standards and Codes Description	
NSF/ANSI 49	The cabinet is microbiologically tested with the instrument inside the work area to validate personnel and product protection for each listed standard. This testing does not constitute actual product listing.
EN12469	
BS EN12469	
SANS 12469	
NF-095	
YY-0569	
JIS K 3800	
AS 1807.1	
UL/IEC 61010-1, 3rd Edition	Mechanical, Electrical and Personal safety testing, US and International
CE mark	Cabinet adheres to the safety and health requirements of the relevant EC directives
Work Area Cleanliness	Meet or exceed ISO Class 5 (Class 100)

Models Available

Part Number	Description
C71892	Biosafety Cabinet, CytoFLEX SRT, 115V
C71890	Biosafety Cabinet, CytoFLEX SRT, 230V
C71891	Biosafety Cabinet, CytoFLEX SRT, 100V

Aerosol Evacuation System

An aerosol management system to evacuate aerosols is available for use with or without a biosafety cabinet.

Part Number	Description
C63649	AEROSOL EVAC SYSTEM, 100/120V-50/60Hz
C63648	AEROSOL EVAC SYSTEM, 220/240V-50/60Hz

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For over 85 years Beckman Coulter has driven innovation. We remain committed to shaping flow cytometry technology to fit seamlessly into your lab's workflow and to provide an optimal user experience. When you choose a Beckman Coulter instrument you receive the highest level of expertise, innovation, and quality assurance.

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BECKMAN COULTER
Life Sciences

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