# Access a world of possibilities

with the versatile CytoFLEX platform

ACCELERATING
*answers*

BECKMAN COULTER
Life Sciences

# Discover your ideal flow cytometry solution

From nanoscale to high-dimensional cytometry and sorting, you can choose the CytoFLEX instruments that best suit your research needs for today and tomorrow. Designed for durability with a compact build, the CytoFLEX platform is renowned for its exceptional sensitivity, which enables effortless detection of dim fluorescent signals and particles as small as 40 nm.*

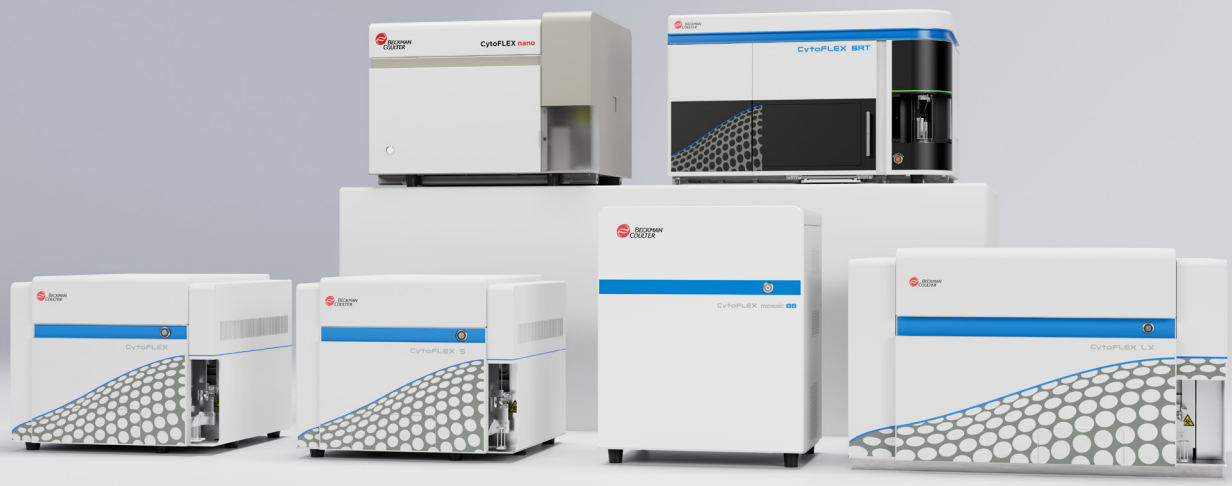
Since its inception, the CytoFLEX platform has consistently provided flexible, user-friendly operation for generating high-quality data. The platform's intuitive CytExpert software simplifies learning and ensures reproducible results. Using any instrument within the CytoFLEX platform, you can achieve reliable, high-quality outcomes for your experiments.

Features 6 fluorescent & 5 side scatter channels for characterizing nanoparticles at least as small as 40 nm.*

**CytoFLEX nano Flow Cytometer**

Capable of complex sort logic and can be configured with up to 4 lasers & 15-color detection.

**CytoFLEX SRT Cell Sorter**




**Original CytoFLEX Flow Cytometer**

Offers configurations with 3 lasers & up to 13 colors.

**CytoFLEX S Flow Cytometer**

Offers configurations with up to 4 lasers & 13 colors.

**CytoFLEX mosaic Spectral Detection Module**

Offers 2 configurations: CytoFLEX mosaic 63 for CytoFLEX S ** and CytoFLEX mosaic 88 for the CytoFLEX LX .

**CytoFLEX LX Flow Cytometers**

Offers configurations up to 6 lasers & 21 colors.

*"Everyone likes to use the CytoFLEX because it's so easy. With complex panels there is flexibility to change channels and gains, which makes it easy to transfer setup from one cell type to another. This saves money on antibodies and time because challenging experiments are easily set up in minutes instead of hours."*

***Anssi Kailaanmäki**, Head of research, Kuopio Center for Gene and Cell Therapy, Finland*

*Characterized using 40 nm polystyrene beads and triggering on violet side scatter
** Only valid for CytoFLEX S (V-B-Y-R) Series Flow Cytometer

# The CytoFLEX Platform provides a seamless user experience

## Currently used by nearly 10,000 labs around the world, the CytoFLEX Platform offers you:

### Data you can trust

CytoFLEX technology was designed to deliver the most accurate, reproducible results, whether for routine assays or high-complexity flow cytometry applications.

### Sensitivity

This includes detection of dimly fluorescent samples and nanoparticles. Most CytoFLEX analyzers can detect nanoparticles as small as 80 nm*—and the CytoFLEX nano analyzer can detect particles at least as small as 40 nm.*

Dim Fluorochromes | Rare Cell Detection | Immunophenotyping | Particle Analysis

### Flexibility

From modular to automation options and the ability to activate as many or as few lasers you need, most CytoFLEX instruments provide the flexibility to upgrade.

Plate Loader Options | Optional Bandpass Filters** | Flexible Instrument Upgrades

### A user-friendly experience

The average user can be trained on a CytoFLEX flow cytometer in < 1 hour.

### Robustness

The CytoFLEX platform is built for exceptional robustness and reliability, all within a compact footprint—so you can maximize lab efficiency.

*"I enjoy the ability to swap out filters—that's a huge advantage of the instrument. I don't have to purchase additional lasers, it already comes with all the filters that I would ever need. It also allows me to upgrade the instrument. Currently, I only have 2 lasers, and I can upgrade to the violet laser, I can upgrade to a plate loader, I can upgrade to whatever I might need in the future, which is a huge advantage as a core manager."*

***Sarah Schuett**, Core Lab Manager, North Carolina State Veterinary College*

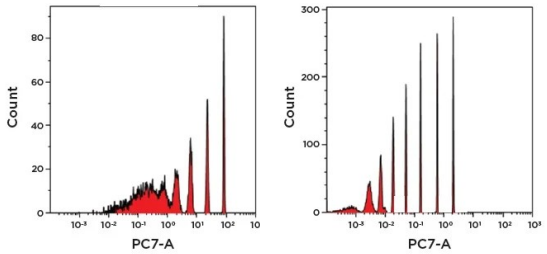
*Characterized using 40 nm polystyrene beads and triggering on violet side scatter
**Not available on all CytoFLEX instruments

# Best-in-class sensitivity: multicolor flow cytometry from cells to nanoparticles

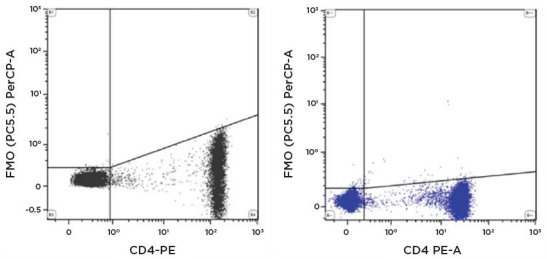
CytoFLEX is a novel semiconductor-based platform that uses Avalanche Photodiode detectors (APDs), a Wavelength Division Multiplexer (WDM), enhanced optics, and diode lasers to maximize light capture and minimize optical and electronic noise.

- APDs minimize spillover due to spreading, thanks to their higher photo-sensitivity and high quantum efficiency (QE), particularly for wavelengths > 800 nm.
- WDM technology enhances light efficiency and minimizes light loss by using fiber optics and bandpass filters to separate light wavelengths.
- Integrated optics reduce light loss more effectively than conventional flow cytometers by focusing light onto the flow cell.

**The CytoFLEX was the first instrument to bring APD (Avalanche Photodiode) technology to the market, setting a new standard in sensitivity and precision for flow cytometry.**




Comparison of Spherotech 8-peak beads on PMT (left) and APD (right) shows better resolution of the dimmest beads due to increased quantum efficiency (QE), especially for emission wavelengths > 650 nm.




Higher QE also contributes to less data spreading in adjacent detectors in APD-based systems (right) compared to PMT-based systems (left).

## 4 reasons the CytoFLEX platform yields data you can trust:

1. APD technology to find dim populations
2. Intuitive software to facilitate multicolor analysis
3. Advanced data analysis tools
4. Improved resolution and linearity

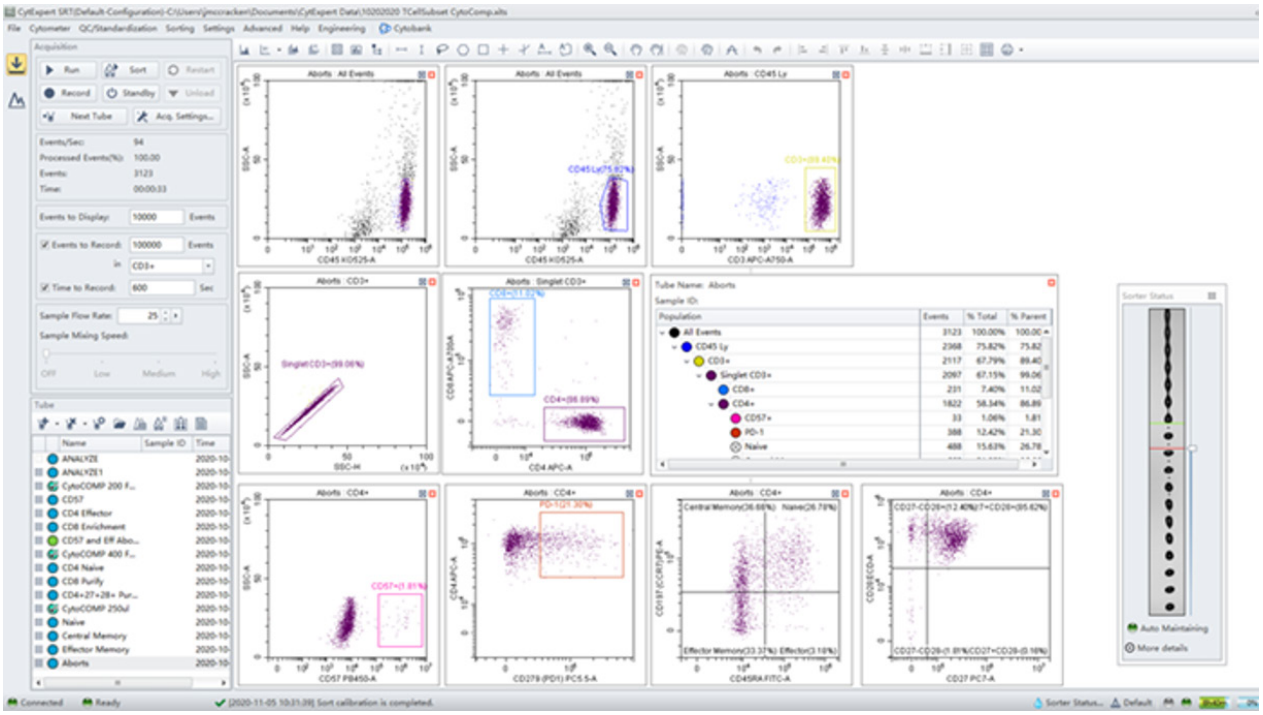
# Simplify complexity with CytExpert software

## CytExpert Software Benefits

- **21 CFR Part 11 compliance**
  using CytExpert v2.3 and higher versions ensures electronic records meet regulatory standards
- **Easy experiment configuration**
  for new and experienced users
- **Precision management**
  of instrument operations and data
- **Streamlined interface**
  for the entire CytoFLEX Platform ensures a familiar user experience
- **Streamlined compensation workflow**
  across all CytoFLEX instruments
- **Easily export**
  high-quality data for publications

Best-in-class CytoFLEX hardware technology is paired with CytExpert software. This powerful combination ensures superior data quality by using gain-independent compensation for precise results.

Learn more about gain-independent compensation



Template created for the CytoFLEX S Flow Cytometer using CytExpert software and imported into CytExpert for CytoFLEX SRT. Having a similar interface across the CytoFLEX platform reduces training time and improves efficiency across the experimental workflow.

*"Our end-users have found the software very easy to learn and reliable. In our opinion, a researcher who has not done flow cytometry in the past typically needs about half the time to become proficient on CytoFLEX."*

***Florin Tuluc, MD, Ph.D.,*** *Director Flow Cytometry Core Laboratory, Children's Hospital of Philadelphia Research Institute*

# Sensitive, flexible and consistent nanoparticle detection

## It's breaking boundaries in nanoparticle detection.

The CytoFLEX nano Flow Cytometer is a pivotal development in field of flow cytometry because it enables analysis of nanoparticles at least as small as 40 nm.* It offers 6 fluorescent, 5 side scatter and 1 forward scatter channel, to deliver full nanoparticle characterization.

With the CytoFLEX nano Flow Cytometer, you can expect:

- Increased size sensitivity from 1 µm to at least 40 nm*
- Flexibility for your experimental design with 6 fluorescent channels and 5 side scatter channels
- Consistency of results with >90% volumetric counting accuracy and <1% carryover between samples

*Characterized using 40 nm polystyrene beads and triggering on violet side scatter

*"The (CytoFLEX nano) instrument has in-built mechanisms to check what your background is like, washing and cleaning cycles that ensure that your instrument is clean, and different aspects to help you troubleshoot when there is noise in the system. All of these things provide a confidence level that you are now analyzing single EVs."*

***Vera Tang**, Core Facility Manager, University of Ottawa*

Learn more about the CytoFLEX nano analyzer

## Choose the right CytoFLEX instrument for your cell and EV research

**CytoFLEX nano flow cytometer**

Characterizes nanoparticles down to 40 nm*

**CytoFLEX, CytoFLEX S, CytoFLEX LS flow cytometers**

Characterize cells & nanoparticles down to 80 nm*

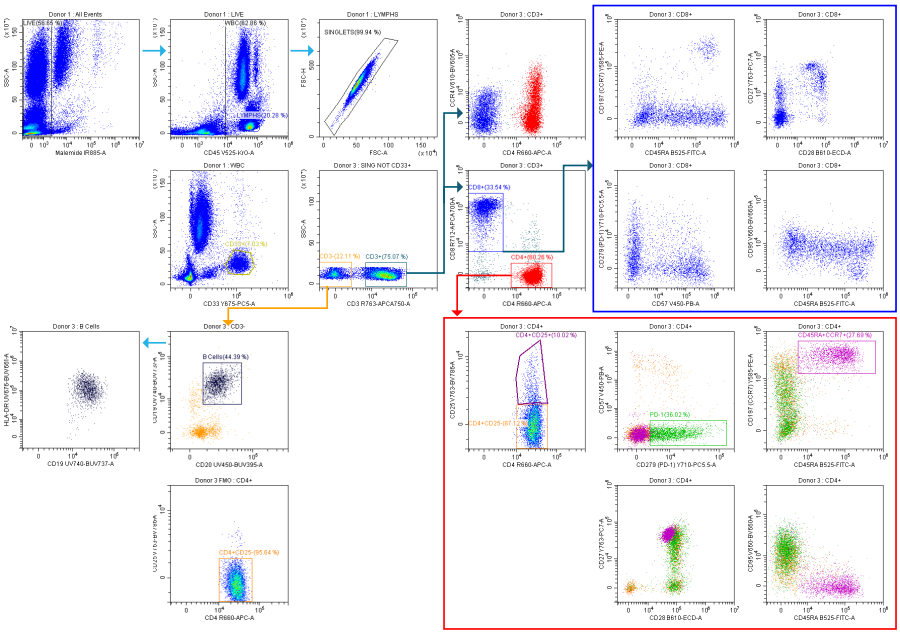
**CytoFLEX SRT cell sorter**

Sorts cells and nanoparticles down to 200 nm

# CytoFLEX analyzers provide efficient multicolor flow cytometry

## A robust system—detectors, light management, fluidics and compensation algorithms—means that establishing multicolor assays requires less planning and optimization.

Read more on advanced analysis of human T cell subsets on a CytoFLEX flow cytometer.

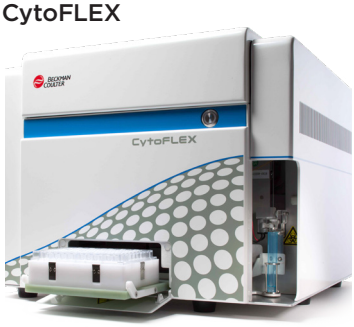


| 375 NM | | | 405 NM | | | | | 488 NM | | | 561 NM | | | | | 638 NM | | | 808 NM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 405/305 | 675/30 | 740/35 | 450/45 | 525/40 | 601/20 | 660/10 | 763/43 | 525/40 | 610/20 | 690/50 | 585/42 | 610/20 | 675/20 | 710/50 | 763/43 | 660/10 | 712/25 | 763/43 | 840/20 | 885/40 |
| BUV395 | BUV661 | BUV737 | PAC BLUE | KROME ORANGE | BV605 | BV650 | BV786 | FITC | ECD | B690 | PE | Y610 | PC5 | PC5.5 | PC7 | APC | APC-A700 | APC-A750 | IR840 | IR885/40 |
| CD20 | HLA-DR | CD19 | CD57 | CD45 | CCR4 | CD95 | CD25 | CD45RA | CD28 | | CCR7 | | CD33 | CD279 (PD-1) | CD27 | CD4 | CD8 | CD3 | | Viabillity |

**Optimizing multicolor immunophenotyping:** Deep immune cell immunophenotyping was performed on human blood (A). Using a DURAClone IM T Cell panel (red outline) more markers were added to increase the breadth of cell types (B). Analysis was completed on a 6-laser CytoFLEX LX analyzer. Fluorochromes were spread across different lasers to reduce spectral overlap. Using CytExpert software, sequential hierarchical gating was used to identify B & T cell populations, including deep analysis of the T cell compartment.

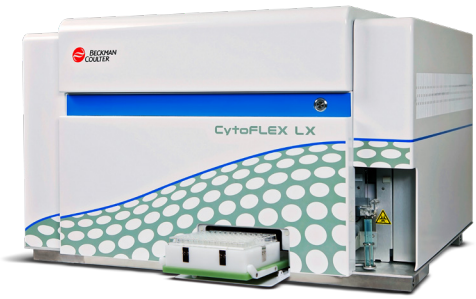
## Choose the best CytoFLEX analyzer for your lab

### CytoFLEX




### CytoFLEX S

### CytoFLEX LX



# The CytoFLEX flow cytometer platform meets spectral detection

The CytoFLEX mosaic Spectral Detection Module provides you with the flexibility to switch between true conventional and spectral modes, to handle the simplest to the most advanced experimental workflow in a "grow as you need" approach.

**You can now add spectral capabilities to your existing CytoFLEX S* and LX flow cytometers.**

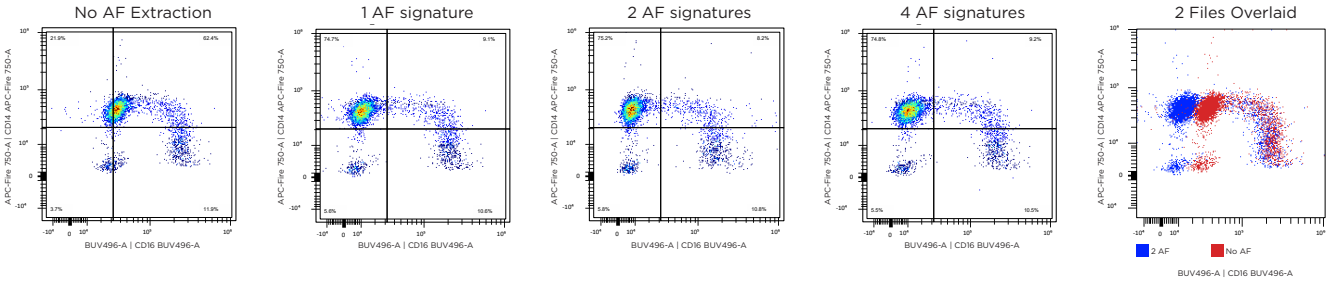
The CytoFLEX mosaic module attaches manually to a CytoFLEX S* or CytoFLEX LX analyzer

Separate CytExpert for Spectral software with minimal differences in the user experience

Two algorithms available for unmixing, depending on user requirements and to confirm results quality

Ability to extract autofluorescence spectral signatures from up to 10 populations

SSC on each laser to expand the possibilities of your research with label-free parameters




Autofluorescence extraction of RBC lysed whole blood. The gating strategy for monocytes involved first selecting CD45+ single cells. Granulocytes, monocytes, and lymphocytes were distinguished based on FSC-A versus SSC-A. Monocyte subsets were then defined using CD14 and CD16 expression. Without AF extraction CD14++ and CD16- (classical monocytes) appear CD16+. Not only is this incorrect, but users also lose resolution leading to underestimation of monocytes.

*"The thing that I find very appealing is how easy it is to perform autofluorescence extraction. I have users with highly autofluorescent and complex tissue samples. For them, adding multiple autofluorescent signatures is critical to get an optimal unmixing."*

***Tamar Tak,*** *Leiden University Medical Center*

Learn more about the CytoFLEX mosaic module

*Only valid for CytoFLEX S (V-B-Y-R) Series Flow Cytometer.

# For spectral analysis, it's the best CytoFLEX you can get for your lab

## Makes the complex easy

CytExpert for Spectral software enhances the familiar CytoFLEX software experience, minimizing the need for extensive training, and accelerating your lab's transition to spectral technology.

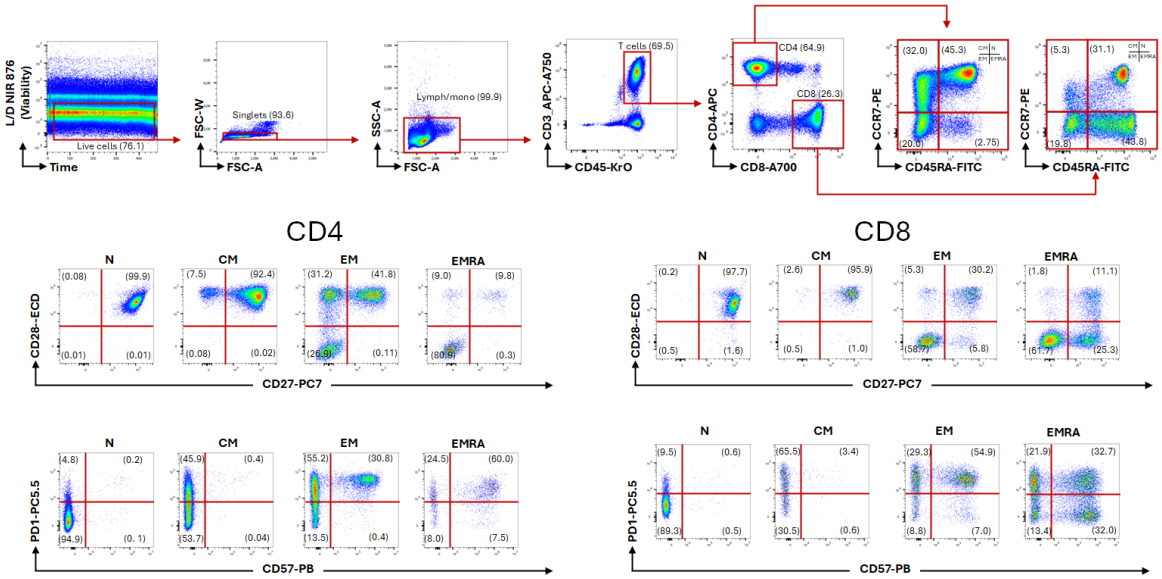
## A flexible approach to spectral flow

The CytoFLEX mosaic module provides you with the flexibility to switch between true conventional and spectral modes, allowing you to cover from the simplest to the most advanced experimental workflow. You can now implement spectral capabilities while ensuring the continuity of your experiments.

## Delivers more comprehensive data you can trust

The CytoFLEX mosaic module is powered by a unique algorithm capable of improving resolution compared to other available methods.

With unmixing accuracy checks and all the necessary features for accurate controls, you can be sure you're getting reliable results from your spectral experiments.




Dot plots showing a sequential gating strategy for T cell analysis using **the CytoFLEX mosaic 88 Spectral Detection Module paired with the CytoFLEX LX Flow Cytometer**, with % of positive populations for each step, including singlet, viability, lymphocyte, CD3+CD45+, CD4+, CD8+, and T cell subsets defined by CD45RA vs. CCR7. Further analysis of CD27/CD28 and PD-1/CD57 expression is also shown. (Naïve T-cells (N): CCR7+ CD45RA+, ii. Central memory (CM): CCR7+ CD45RA−, iii. Effector memory (EM): CCR7− CD45RA−, iv. Effector memory RA (EMRA): CCR7− CD45RA+)

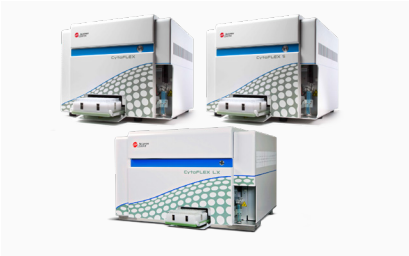
Cytobank

### More data from spectral analysis can be simplified even more

The cloud-based Cytobank software platform optimizes cytometry data analysis and increases reliability of results by reducing manual steps and keeping all data in an organized, traceable environment. You can access the Cytobank platform from CytExpert for Spectral Software with 1 click, for user-friendly, machine learning-powered analysis of complex spectral data.

# The CytoFLEX Platform provides unmatched flexibility

Upgrade flexibility enables you to start with the lasers you need now, knowing you can upgrade later to up to 6 lasers, or add a plate loader or spectral capabilities, making your instrument future-proof.



**CytoFLEX Platform Upgrades**
For additional instrument functionality when experimental needs change

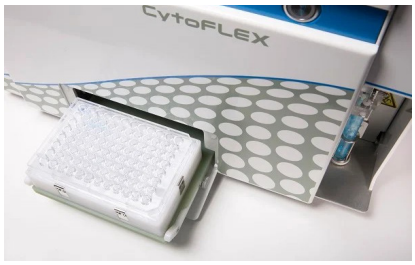


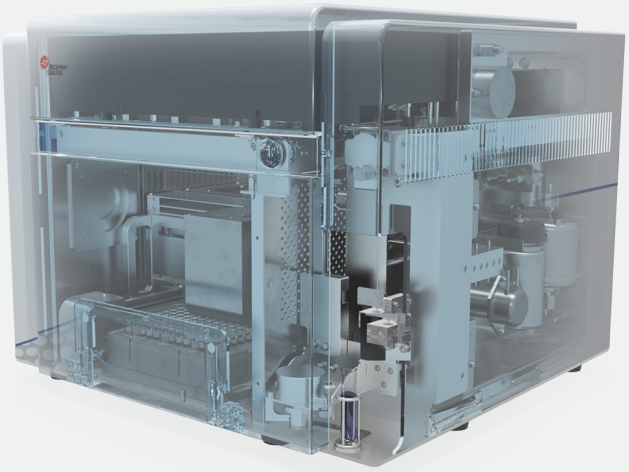

**Plate Loader Options**
Accessories such as plate loaders are compatible with all CytoFLEX instruments and can be installed at any time without increasing the analyzer's footprint

**Optional Bandpass Filters**
Movable bandpass filters offer a significant advantage, because you can easily swap them out without purchasing additional ones, as all required filters are included

## CytoFLEX footprint: small but mighty

The CytoFLEX platform has been designed for exceptional robustness and reliability while maintaining a compact design, so you don't have to invest a lot of precious lab space—or extra effort in maintaining instrument uptime.

- Small footprint saves space and is ideal for small labs.
- Internal plate loader automates sample handling to reduce errors.
- Reliable performance ensures consistent operation with minimal maintenance



## Inside the CytoFLEX

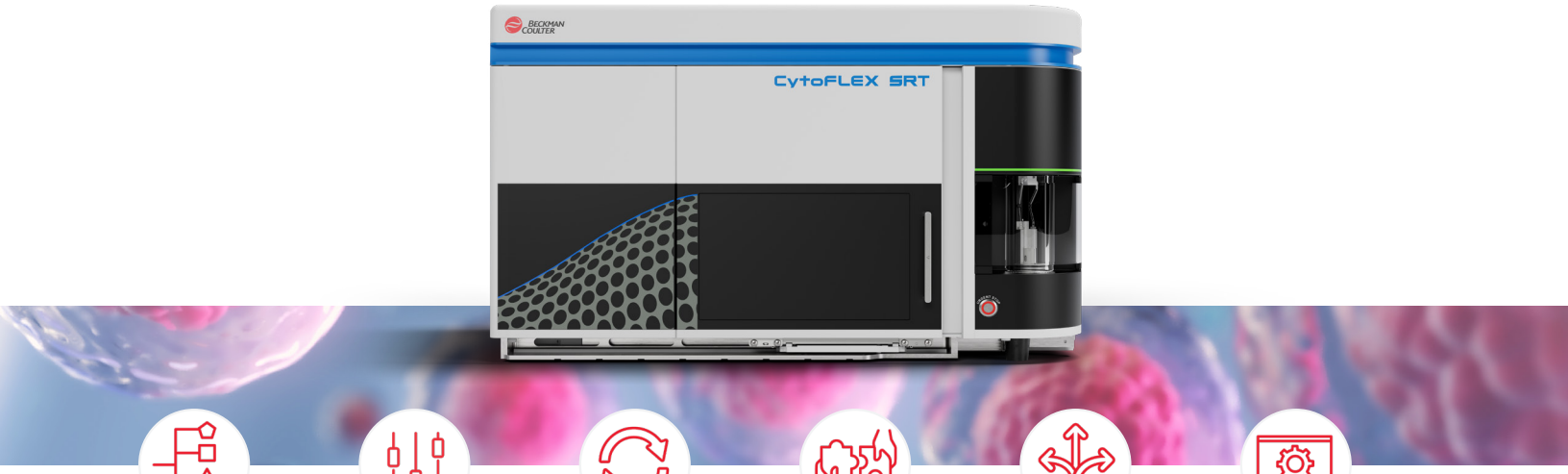
Transparent view of the CytoFLEX showing internal components of the fluidics and sample loading systems. The optional plate loader module is installed inside the cytometer to preserve the instrument's compact footprint.

# CytoFLEX SRT Benchtop Cell Sorter - a CytoFLEX that sorts

As part of the CytoFLEX platform, the **CytoFLEX SRT benchtop cell sorter** includes innovative technologies that simplify setup and operation, empowering investigators to focus on their research questions—not their sorter.

It can be configured to use up to 4 lasers and up to 15-color detection to identify subtle differences between cells.

It's capable of complex sort logic, with different combinations of sort settings on each of 4 streams, including the ability to catch aborts of other streams.




Up to 4-way sorting

Exquisite sensitivity for multicolor applications

Extensive set of repositionable bandpass filters

Compatible with different types of collection tubes and plates

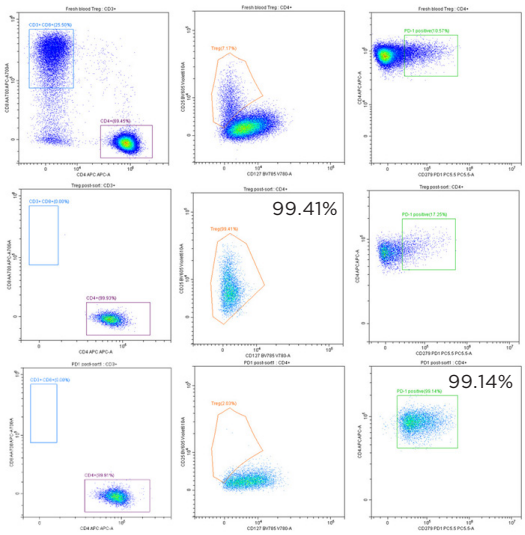
Flexibility to upgrade by activating additional detection channels

Intuitive software to facilitate multicolor analysis

**Pre-sort**

**Post-sort**
CD4+/CD25+ /CS127-

**Post-sort**
CD4+/PD-1+




**T Cells sorted from whole blood** (8,000 events/second in Purity mode). Human blood was lysed with VersaLyse (PN A09777) stained with DURAClone IM T Cell Subsets Antibody Panel (PN B53328) with drop-in liquid markers, CD25-BV605 and CD127-BV785. A 2-way sort was set up to isolate Treg and PD1+ CD4 T cells and the resulting sorted populations were re-analyzed. Gates on the CD127-BV785 by CD25-BV605 plot were readjusted to accommodate for the loss of signal due to photobleaching of BV605. All plots were gated on singlet CD3+ lymphocytes.

Scan here to learn more about the CytoFLEX SRT sorter

# Enjoy service & support—by flow cytometrists FOR flow cytometrists

With your investment in a CytoFLEX analyzer, you're getting more than just an instrument. You're getting a collaborative partner who wants to be with you every step of the way.

Our service/support team members include:

- Experts holding MS, MD & Ph.D. degrees
- Immunologists
- Cell biologists
- Virologists...and more

And they're a great source of information we use to improve our current portfolio and innovate new instruments.

What's more, a service plan is an efficient, cost-effective way to minimize instrument downtime and workflow disruptions in your research, year after year. You can choose from multiple **service contract options** based on your lab's needs and budget.

Beckman Connect

Secure, real-time online service & support

- Remote desktop sharing (view/control)
- File transfer (to and from instrument controller PC)
- Downloadable and customer installable
- Customer must approve all remote activity

Learn more about CytoFLEX Service Plans

**For more information about the CytoFLEX platform, consult your Beckman Coulter Life Sciences representative or visit beckman.com.**

BECKMAN COULTER Life Sciences

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