



CYTEK®
TRANSCEND THE CONVENTIONAL



Cytek Borealis™ Flow Cytometer

Preliminary Technical Specifications

Technical Specifications

Optics

Excitation Optics

Optical Platform

Fixed optical assembly with advanced temperature control for thermal stability and has the capacity to be configured with up to seven spatially separated laser beams. Laser Delays are automatically adjusted during instrument QC

Lasers

7-Laser Configuration:
320 nm: 40 mW, 349 nm: 40 mW,
405 nm: 100 mW, 488 nm: 50 mW,
561 nm: 50 mW, 640 nm: 80 mW,
850 nm: 75 mW

Beam Geometry

Flat-top laser beam profile with narrow vertical beam height

Emission Optics

Emission Collection

Fused silica cuvette coupled to high numerical aperture (NA) lens for optimum collection efficiency to optical fibers

Forward And Side Scatter Detection

FSC: high-performance semiconductor detector with 488 nm bandpass filter

SSC: high-performance semiconductor detectors for each onboard laser. The violet (405 nm) and blue (488 nm) lasers each include a dedicated additional side scatter detector optimized for small particle detection

Fluorescence Detectors

Proprietary high sensitivity Spectrum Profile Detection Module per laser. No filter changes required for any fluorochrome excited by the onboard laser

Fluorescence Detector Configurations

Deep Ultraviolet (320 nm) detector module:
23 channels unevenly spaced bandwidth

Ultraviolet (349 nm) detector module:
23 channels unevenly spaced bandwidth

Violet (405 nm) detector module:
22 channels unevenly spaced bandwidth

Blue (488 nm) detector module:
17 channels unevenly spaced bandwidth

Yellow-Green (561 nm) detector module:
13 channels unevenly spaced bandwidth

Red (640 nm) detector module:
9 channels unevenly spaced bandwidth

Infrared (850 nm) detector module:
3 channels unevenly spaced bandwidth

Fluidics

Sample Flow Rates

Standard Fluidic Mode:
Low: 15 $\mu\text{L}/\text{min}$, Medium: 30 $\mu\text{L}/\text{min}$,
High: 60 $\mu\text{L}/\text{min}$, Ultra: 100 $\mu\text{L}/\text{min}$,
Max: 200 $\mu\text{L}/\text{min}$

High Resolution Fluidics Mode:
3 $\mu\text{L}/\text{min}$

Fluidic Modes

Dual fluidic modes: standard and high resolution

Manual Sample Input Format

12 x 75 mm polystyrene and polypropylene tubes

Sample Line

254 μm , user replaceable, compatible with both manual tubes and loader carriers without changing tubing

Standard Fluidic Reservoirs

4L fluid container set with real-time, active level-sensing provided. Compatible with 20L sheath and waste cubitainers

Volumetric Sensor

Volumetric measurement during sample recording with in-line flow meter, which enables calculation of counts per μL for any gated population without the need for counting beads. Automated flow meter QC is available to confirm proper operational status

Performance

Carryover

$\leq 0.1\%$ in manual tube mode

Data Acquisition Rate

Up to 30,000 events/sec*

*Requiring abort rate $\leq 10\%$ of event rate

Fluorescence Performance

Fluorescence Sensitivity*

FITC: ≤ 5 MESF

PE: ≤ 4 MESF

APC: ≤ 3 MESF

Pacific Blue: ≤ 4 MESF

*Data averaged from multiple systems. Molecules of equivalent soluble fluorochrome (MESF) calculated based on unmixed data accounting for autofluorescence of the unlabeled bead

Fluorescence Linearity

FITC $R^2 \geq 0.995$ / PE $R^2 \geq 0.995$

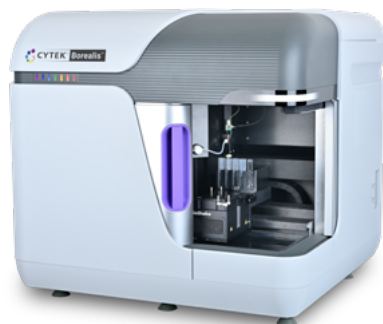
Scatter Performance

Forward Scatter Resolution

Performance is optimized for proportionally resolving lymphocytes, monocytes, and granulocytes reflecting their relative size

Side Scatter Resolution

Large dynamic range of scatter resolution using dual standard violet SSC and blue SSC detectors along with high-sensitivity violet and blue SSC detectors capable of resolving small particles down to 50 nm polystyrene beads



Functional Specifications

Plate Loader

High-Throughput Speed

24 min* for 96-well plate

*Data averaged from multiple systems. Run in high-throughput mode (no agitation, no SIT flush) with 2 sec/well stopping criteria

Plate Loader Temperature Control

4–37°C (39.2–98.6°F)

Input Compatibility

96-well plate, 96-well deep well plate,
40-tube rack (12 x 75 mm)

Plate Loader Carryover

Default Mode: $\leq 0.3\%$

Low Carryover Mode: $\leq 0.1\%$

Software

SpectroFlo® Software

Developed with multicolor assays in mind

Streamlined workflows for experiment setup,
data acquisition, and file export

Conventional compensation and spectral
unmixing capabilities

Automated QC module

Live unmixing of samples during acquisition

Autofluorescence extraction and multiple
signature autofluorescence explorer

FCS 3.1 data file standard

Automated, scheduled startup

Automated instrument shutdown with dedicated
on-board tubes for user re-loadable cleaning
solution

Automatic bubble and clog detection

Electronics

Signal Processing

Digital signal processing with automatic window
gate adjustment

22-bit 6.5 log decades

Threshold using any single parameter or
combination of parameters

Pulse Shape Parameters

Pulse area and height for every parameter.

Width for scatter parameters and one

fluorescence parameter for each laser

Workstation

Computer Specifications

Operating System: Windows® 11 Pro 64-bit

Processor

Intel® Core™ Ultra 9 Processor 285

RAM

64 GB

Hard Drive

2 TB SSD

Monitor

32" UHD 4K monitor

Installation Requirements

Dimensions (W x D x H)

Instrument Dimensions

78 x 69 x 72.5 cm (30.5 x 27 x 28.5 in)

Instrument Weight

122.5 kg (270 lb)

Room Requirements

Power

100–140 VAC, 15A or 200–250 VAC, 10A

Heat Dissipation

800 W with all solid-state lasers

Air Filtering

No excessive dust or smoke

Lighting

No special requirements

Regulatory Status

Class 1 laser product.

For research use only. Not for use in diagnostic
or therapeutic procedures



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This document reports preliminary technical specifications, final technical specifications will be confirmed upon completion of verification testing.

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