

# Agilent NovoCyte Opteon Spectral Flow Cytometer Specifications

## Instrument specifications

General Specifications	
Optics	
Laser	Solid state laser with onboard thermal-electric cooling with guaranteed thermal stability
Beam Shaping Optics	Space coupled with minimal loss of laser power. Minimized stray laser-line noise and minimized loss to reflection.
Laser Beam Configuration	Spacially separated; fixed laser delay and no need for adjustment
Laser Operation	Only ON when acquiring samples. Significant extension of laser lifetime.
Photodetector	Avalanche photodiode (APD)
Optical Alignment Procedure	Fixed. No operator alignment required.
Optical Filters	High-quality bandpass filters with optimized bandwidth for each detector
Forward Scatter (FSC) Detection Laser	Off 488 nm
Side Scatter (SSC) Detection Laser	BSSC (488 nm Blue); VSSC (405 nm Violet)
Fluorescence Detection	Individual photodetector for each channel. Solid state photodetector with high-gain and photon detection efficiency.
FSC/SSC Sensitivity	FSC: 0.4 $\mu\text{m}$ ; VSSC: 0.08 $\mu\text{m}$ ; BSSC: 0.2 $\mu\text{m}$
Fluorescence Threshold Sensitivity	<ul style="list-style-type: none"> <li>- Fluorescein isothiocyanate (FITC) <math>\leq</math> 40 molecules of equivalent soluble fluorophores (MESF) (B543 channel)</li> <li>- Phycoerythrin (PE) <math>\leq</math> 10 MESF (Y582 channel)</li> <li>- Allophycocyanin (APC) <math>\leq</math> 10 MESF (R661 channel)</li> <li>- Pacific Blue <math>\leq</math> 30 MESF (V455 channel)</li> </ul>
Fluorescence Resolution	< 3% CV for CEN
SSC and Fluorescence Light Collection and Detection	Proprietary design of high numerical aperture objective lens with free-space optical filters maximizing light collection efficiency

Fluidics	
Flow Cell	170 x 490 µm rectangular quartz flow cell
Sample Acquisition Rate	100,000 events/second
Sample Delivery	Positive-displacement syringe pump enabling direct volumetric absolute count without reference counting beads
Volumetric Absolute Count Precision	≤ 5%
Sample Flow Rate	5 to 120 µL/min in 1 µL increments
Sample Acquisition Volume	1 µL to 5 mL
Sample Recovery Mode	Available
Compatibility to Autosampler	No fluidic tubing disassembly or reconnection required.
Fluid Level Sensing	Real-time active sensing with weight sensors. Automated warning when the fluid level is out of range.
Fluid Container Capacity	Sheath (6 L), waste (6 L), cleaning (500 mL), decontamination with automatic liquid volume sensing (500 mL) Optional large container for sheath (15 L) and waste (15 L)
Carryover	< 0.1%
Sample Injection Probe (SIP) Rinse	Automated flying collar wash of inner and outer SIP surface after each sampling
Fluidics System Monitoring	In-line pressure sensor monitors the pressure in real time. Automated system recovery when pressure is out of range due to clogging.
Fluidics System Maintenance	<ul style="list-style-type: none"> <li>- Automated startup and shutdown with fluidic system cleaning</li> <li>- Automated user executable cleaning, debubble, rinse, unclog, priming, and decontamination</li> <li>- Automated execution of user definable maintenance sequence</li> </ul>
Signal Processing	
Software	NovoExpress (Opteon) software
Parameters	<ul style="list-style-type: none"> <li>- Height and area for FSC, SSC, and all fluorescent channels</li> <li>- Width off FSC</li> <li>- Time</li> </ul>
Triggering Channel	Threshold using any single channel or combination of any fluorescence channel with FSC or SSC parameters.
Dynamic Range	24 bit; 7.2 decades logarithmic scale
Fluorescence Photodetector Gain Control	Individually or proportionally adjustable. Optimized default gain for each individual channel.
Data Management	
Deconvolution Algorithm	Least square regression. Live unmixing during sample acquisition.
Compensation	Allow defining virtual filters and apply compensation
Autofluorescence Subtraction	Available
Output Data Files	<ul style="list-style-type: none"> <li>- FCS 3.0</li> <li>- FCS 3.1</li> <li>- CSV</li> <li>- Batch PDF reports</li> </ul>
Data Report	Automatic, customizable, batch
Workstation	Intel Core i9, 64G RAM, 256GB SSD, 16T HDD and above
Monitor	27 inch flat panel (2,560 x 1,440 resolution) and above
Computer Operating System	Microsoft Windows 11 Professional (64 bit) and above
Usage Monitor	Comprehensive transaction log and system log
User Management	Administrative creation of individual user accounts and user groups. User operation time tracking.

Quality Control	
Instrument Daily QC	Automatic daily quality control with QC particles. Levey-Jennings plot.
Production QC	Each instrument is verified for assembly integrity and performance to specifications
Sampling	
Manual Sample Loading	12 x 75 mm, 1.5 and 2.0 mL tube
Automatic Sample Loading with NovoSampler S	40 tube rack for 12 x 75 mm tube, 40 tube rack for microtubes, 24-, 48-, 96-well (flat, V-, U-bottom), and 384-well microplates
Operating Conditions	
Instrument Dimension	<ul style="list-style-type: none"> <li>- 33.9" W x 22.0" D x 19.3" H(86 x 56 x 49 cm)</li> <li>- 43.1" W x 24.4" D x 19.3" H(110 x 62 x 49 cm) with NovoSampler S</li> </ul>
Instrument Weight (5 lasers)	<ul style="list-style-type: none"> <li>- 181 lb (82 kg)</li> <li>- 214 lb (97 kg) with NovoSampler S</li> </ul>
Power Requirements	100 to 240 VAC, 50 to 60 Hz, 220 W
Operating Environment Requirements	<ul style="list-style-type: none"> <li>- Temperature: 15 to 30 °C;</li> <li>- Relative humidity: 10 to 80%</li> </ul>
Regulatory Compliance	
Regulatory Status	<ul style="list-style-type: none"> <li>- Class 1 laser product</li> <li>- Research use only. Not for use in diagnostic or therapeutic procedures.</li> <li>- SGS, UKCA, CE, KC, RCM, EAC</li> </ul>

## Laser combinations

The combination of lasers and filters is listed below. Refer to model for detailed configurations.

Lasers and Fluorescence Channels							
System	Lasers	349 nm (20 mW)	405 nm (130 mW)	488 nm (100 mW)	561 nm (100 mW)	637 nm (120 mW)	Number of Detectors
	Channels	19	18	14	11	8	
Five Lasers	UVBYR	●	●	●	●	●	73
Four Lasers	UVBR	●	●	●		●	62
	VBYS		●	●	●	●	54
	URYB	●		●	●	●	54
	UVYS	●	●	●	●		65
Three Lasers	VBR		●	●		●	43
	VYS		●	●	●		46
	RYB			●	●	●	35

## NovoSampler S specifications

General Specifications	
Workstation	
Operating System	Microsoft Windows 11 (64 bits)
Software	Agilent NovoExpress (Opteon) software 2.0 and above
Performance and Capability	
Labware Compatibility	24 and 40 tube rack, 24-, 48-, 96-well (flat, U-, V-bottom), and 384-well microplates
Labware Calibration	Automated calibration to accommodate different well depths. Calibrated labware template can be saved for later use.
SIP Collision Detection	Automated detection of SIP collision and automated recovery. Automatically acquire the next sample after successful recovery.
Carryover	Rinse after sampling: < 0.1 %
Mix Mode	Orbital shaking: Up to 3,000 rpm Shaking diameter: 2 mm User-definable mixing frequency, speed, acceleration, and duration.
Barcode Reading	Integrated barcode reader. Automatically prompt barcode as specimen name in the software.
Fluidics System Rinse	Automated post-sampling rinse for every sample. User definable extra rinse cycle and rinse frequency.
Sampling Overhead Volume	30 $\mu$ L in absolute counting mode, 10 $\mu$ L without absolute counting mode
Dead Volume	<ul style="list-style-type: none"> <li>- 96-well plate (flat bottom): 27 <math>\mu</math>L</li> <li>- 96-well plate (V bottom and U bottom): 1 <math>\mu</math>L</li> <li>- 384-well plate: 3 <math>\mu</math>L</li> </ul>
Installation	
Installation Method	Easy attachment, user installable
Calibration	Automated self-calibration after installation. No need to reconfigure fluidics tubing or connection.
Operating Conditions	
Dimension	19.3" W x 12.0" D x 12.0" H(49 x 30 x 30 cm)
Weight	33 lb (15 kg)
Operating Temperature	15 to 30 °C
Operating Humidity	Relative humidity: 10 to 80%
Power Requirements	12 V directly from NovoCyte Opteon flow cytometer
Regulatory Compliance	
Regulation	CE; research use only

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