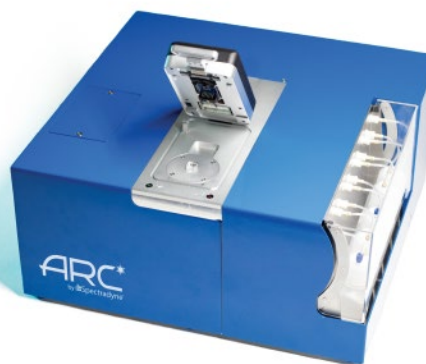




ARC

by Spectradyne®



TECHNOLOGY

OVERVIEW

Spectradyne's ARC™ particle analyzer is a fast and easy-to-use bench top instrument that delivers accurate and direct measurements of nanoparticles composed of any material. The ARC uses Spectradyne's patented core technology, Microfluidic Resistive Pulse Sensing (MRPS), which is an electrical method for directly counting and sizing particles one-by-one. MRPS delivers significantly greater measurement accuracy than conventional optical techniques, particularly in polydisperse, heterogeneous samples.

The ARC particle analyzer uniquely combines two orthogonal characterization methods in a single instrument: Simultaneously with MRPS, the ARC measures the fluorescence of each particle to enable quantification of internal and external cargo. This combination delivers fast measurements of unprecedented sensitivity and accuracy for particle size, concentration, and fluorescence—extendable far beyond the limits of conventional flow cytometry and other optical approaches.

MICROFLUIDIC PULSE SENSING (MRPS) FOR PARTICLE SIZE AND CONCENTRATION

PARTICLE SIZE RANGE

50 nanometers – 10 microns effective spherical diameter, with subranges defined by cartridge class* (footnote refers to cartridge map)

Note: Minimum detectable particle size is independent of particle material properties (e.g., refractive index, conductivity, etc.), sample polydispersity, sample heterogeneity.

CONCENTRATION RANGE

10⁴ – 10¹² particles per ml, with subranges defined by cartridge class* (footnote refers to cartridge map)

MICROFLUIDIC ANALYSIS CARTRIDGES

Spectradyne's patented microfluidic cartridges enable:

- Cleaning-free and wash-free instrument operation
- Automated optical alignment with adaptive beam positioning
- Calibration-free measurements of size, concentration and fluorescence intensity
- Direct, on-chip analysis of complex samples including tissue culture media, plasma other biofluids

SINGLE-PARTICLE FLUORESCENCE FOR PAYLOAD QUANTIFICATION AND PHENOTYPING

OVERVIEW

The ARC is configurable with up to 2 excitation wavelengths and up to 3 fluorescence emission detector channels for a total of 6 optical measurement parameters.

EXCITATION LASER SPECIFICATIONS

Laser Options (Max 2 lasers per instrument)

Laser	Wavelength	Power
Violet	405 nm	1-100 mW
Blue	488 nm	1-100 mW
Green	532 nm	1-100 mW
Yellow-Green	561 nm	1-100 mW
Red	637 nm	1-100 mW

EMISSION DETECTION

An array of 1-3 Avalanche Photo Diodes.

BANDPASS FILTERS

Optical detection bands (up to 3 channels) are easily user-configurable by exchanging filters in the instrument. Default configuration for single excitation wavelength at 488 nm:

FITC	525/39
PE	575/19
PER-CP	695/44

FLUORESCENCE DETECTION

Fluorescence delivered by fiber optics to Avalanche Photo Diode array through customizable dichroic filter bank.

QUALITY CONTROL

Option to configure Avalanche Photo Diode detector array gains to optimize fluorescence detection and reduce saturation.

PERFORMANCE

SIZE BY MRPS

Absolute accuracy: 2%*
 Resolution: 2%
 Sensitivity: Minimum detectable particle size depends on cartridge measurement range * (footnote refers to cartridge map), but is independent of particle material or optical properties.
 *Using in-measurement reference, 7% without

CONCENTRATION BY MRPS

Absolute accuracy: 5%*
 Resolution: 10%
 Sensitivity: Minimum detectable concentration depends on cartridge measurement range * (footnote refers to cartridge map), but is independent of particle material or optical properties.
 * Using in-measurement reference, 20% without

FLUORESCENCE INTENSITY

Absolute accuracy: Depends on calibration reference material
 Resolution: < 5%
 Sensitivity: 30 FITC-ERF or better, 3 PE-MESF or better, fluorochrome-dependent.

Note: Reported values are for monodisperse samples

ELECTRONICS

ACQUISITION RATE

200,000 Sa/s

Up to 1000 particle events per second (sample dependent)

User-configurable total acquisition time to ensure sufficient counting statistics on any measured size range or sub-range.

SIGNAL PROCESSING

Fully digital system with adjustable detection thresholding.

SIGNAL

MRPS Pulse height and width, Fluorescence Pulse height for all channels.

FLUIDICS

Pressure-controlled convective sample and auxiliary buffer flow.

SAMPLE FLOW RATES

Standard Operating Particle Transit Time: 15-50 μ s

Custom Flow Rate Control available through software control.

FLUID CAPACITY

Sample Volume: 3 - 10 μ L

AUTOMATED MAINTENANCE FUNCTIONS

System Startup, Instrument Prime, Cartridge Prime, Clear Constriction, Shutdown, Flush Routine

SAMPLE INPUT FORMAT

Sample is introduced by pipetting into a sample reservoir in MRPS analysis cartridge.

DATA MANAGEMENT

SOFTWARE

The SP Tools software is a full-feature software package that controls the instrument's operation, collection of experiment data, and analysis of the results.

Operating system-level login control.

Add-on software tools are available to facilitate compliance with 21 CFT Part 11.

If desired, export FCS files for offline analysis in FCSExpress, FlowJo, Kaluza, and other platforms.

STANDARDIZATION

System calibration is independent of particle material properties. Polystyrene QC beads are provided with the instrument to use as reference material and for initial setup.

In its default configuration, the ARC particle analyzer is factory-calibrated for fluorescence intensity in FITC and PE ERF/MESF.

LANGUAGE

English

OPERATING SYSTEM

Windows® 10 - 11, 64-bit

FCS FORMAT

FCS 3.0

MINIMUM COMPUTER SPECIFICATIONS

CPU: Intel Core i7, up to 3.9 GHz

RAM: 16 GB, 2 USB 3.0 and above ports

Storage: 1 TB drive

COMPENSATION

Built-in matrix compensation, including save & restore capabilities for compensation matrices to enable application between measurements.

INSTALLATION

DIMENSIONS (W X D X H)

ARC Particle Analyzer

20" x 20" x 9" (50cm x 50cm x 15.5cm)

Power and Air Supply Unit

11.8" x 15.6" x 9" (30cm x 39.6cm x 15.5cm)

WEIGHT

ARC Particle Analyzer: 62.4 lbs (28.3 kg)

Power and Air Supply Unit: 25 lbs (11.3 kg)

POWER SPECIFICATIONS

Voltage: North America: 110V, 5A, 60 Hz;

Europe: 220V-240V, 16 A, 50 Hz

OPERATING TEMPERATURE NON-CONDENSING

15-30 °C



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For additional information and resources, visit us at nanoparticleanalyzer.com