







**Malvern** | Material relationships



-  PARTICLE COUNT
-  PARTICLE SIZE
-  PARTICLE MASS
-  PROTEIN AGGREGATION

ARCHIMEDES  
MASS MEASUREMENT ON A **DIFFERENT** SCALE

# INTRODUCING ARCHIMEDES

## Key Benefits of Archimedes

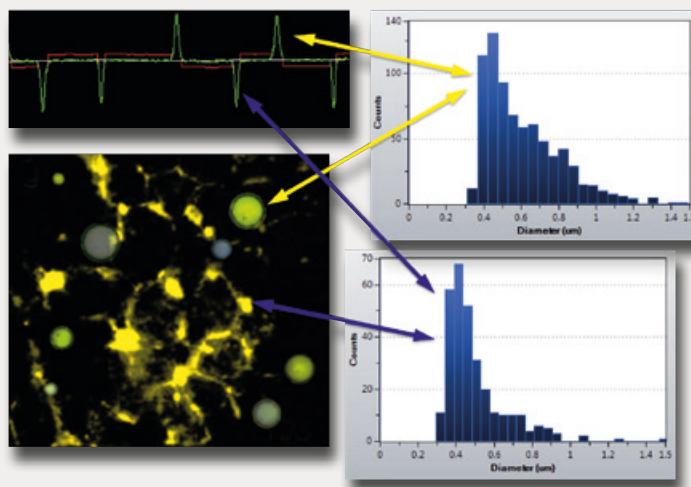
- The first truly quantitative measurement of particles in the 50 nm - 5 µm size range
- High sensitivity, resolution and reproducibility for nanoparticles and proteins
- Able to distinguish between protein aggregates and particles with different buoyancy, such as contaminating silicone oil droplets
- Simplicity of operation and maintenance, together with intuitive software, provides a powerful tool for particle characterization
- Shortens development and optimization time required for biopharmaceutical formulations
- Provides precise assessment of biotherapeutic formulation stability
- Gives an immediate, reliable assessment of protein aggregation state
- Suitable for use with high concentration samples
- Minimal sample consumption
- Fast, NIST-traceable calibration



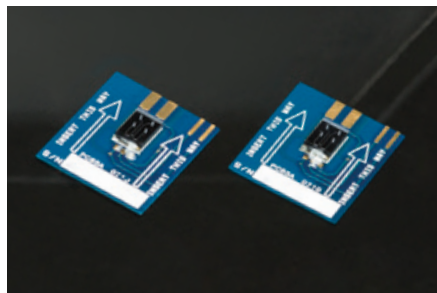
Archimedes harnesses the technique of resonant mass measurement to provide new insights into particles in the size range 50 nm - 5 µm. With simple yet powerful technology, driven by Micro Electro-Mechanical Systems (MEMS) fabricated sensors, Archimedes is able to detect and count particles, and measure their mass and size.

A key application of Archimedes is the detection, quantification and characterization of protein aggregates in the submicron to micron range, highlighted as a significant concern in terms of immunogenicity and drug efficacy and safety.

Archimedes is also uniquely able to differentiate between negatively buoyant and positively buoyant particles, enabling the discrimination of such particles as protein aggregates and droplets of silicone oil, regular contaminants of biopharmaceutical final formulations stored in prefilled syringes.



Archimedes distinguishes between protein aggregates and silicone oil droplets in a biopharmaceutical formulation



Central to Archimedes is a MEMS (Micro Electro-Mechanical Systems) technology sensor, allowing the highly sensitive, reliable and reproducible measurement of aggregates, one by one.

Archimedes is also capable of providing information on sample concentration, polydispersity, density and volume, and distinguishing between negatively buoyant proteinaceous particles and positively buoyant contaminating silicone oil droplets.



## ARCHIMEDES SPECIFICATIONS

Particle size	
Measurement range	50 nm - 5 µm*
Accuracy	Better than +/- 1% on NIST traceable latex standards
Precision / repeatability	Better than +/- 1% on NIST traceable latex standards
Resolution	Better than +/- 20 nm at 1 µm, polystyrene beads
Particle mass	
Lower limit of detection	450 ag*
Accuracy	Better than +/- 3% on NIST traceable latex standards
Precision / repeatability	Better than +/- 3% on NIST traceable latex standards
Particle counting / sample concentration	
Measurement range	10 <sup>4</sup> particles/mL – 10 <sup>9</sup> particles/mL*
Accuracy	Better than +/- 10% on NIST traceable latex standards
Precision / repeatability	Better than +/- 5% on NIST traceable latex standards
General instrument specifications	
Measurement principle	Resonant mass measurement
Drawn sample volume (minimum)	100 µL
Measured sample volume range	10 nL - 10 µL
Sample viscosity range	<1 cP -50 cP
Weight and dimensions	
Dimensions (w, d, h)	610 mm x 585 mm x 305 mm
Weight	23.6 kg

\*Sample dependent



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