

## NANORANGER™ ES-DMA VERSION 0.5 Specifications

NanoRanger™ is a high resolution, transportable and programmable Electro-spray Differential Mobility Analyzer system (ES-DMA) designed for research in instrumentation, particle detection, virology and macromolecular biology. NanoRanger is optimized for high resolution characterization of particles with mobility size of 1-120 nm, with demonstrated capability to distinguish between particles differing in drag coefficient by 2% or less<sup>1</sup>. The system is highly configurable with a choice of DMA geometries and high voltage ranges. NanoRanger™ v0.5 features three separate inputs (Eppendorf vial, capillary\*, and external air/ES bypass) and is compatible with multiple particle detectors (CPC, Electrometer). NanoRanger™ is 100% computer controlled with industry leading testing algorithms and digital camera assisted ES tuning.



NanoRanger Front View with Laptop Control SW



NanoRanger in Pelican Transport Case

### Commercial

Availability	Fall 2022
Order lead time	90-120 days
List price	Quote available upon request
Software included	Electro-spray Ionization Process Closed Loop Control High Resolution DMA Spectrum collection and recording

### General

External dimensions	L= 66 cm; W= 46 cm; H= 25.4 cm.
Weight	23 kg
Power	AC Input Range 80~264Vac, usage ~ 120 watts
Control interface	USB-3 connection to PC running Windows 10.0 or later
Bio-Safety	Total airtight sample containment
Electrical Safety	Safety door high voltage interlocks
Regulatory	Research Use Only. Not FDA approved

<sup>1</sup> Based on similar configurations tested by J. Fernandez de la Mora at Yale University. Papers available upon request.

\*Denotes new for v0.5

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### Sample Inputs

Vials	Standard 0.5 mL screw-top microcentrifuge vials
External capillary*	Accommodates 0.360 mm OD capillaries
External air	6.35 mm OD tube compression fitting with ¼ turn manual valve

### ES-DMA Measurement Process Controls - programmable closed loop

+/- ES vial air-over-liquid pressure	0-350 mB
+/- ES vials Pt electrode voltage	0-2 kV DC
ES sample air flow	0-5 SLM
DMA air flow (recirculated)	0-220 SLM
DMA voltage	+5 to -5 kVDC or 0 to -10kVDC
Detector air flow	0-5 SLM (controllable to support CPC operation)
Real time Imaging of Taylor cones	10 M-Pixel monochrome digital camera w/ telescope lens Images appear in Software's Graphical User Interface

### Configurations

DMA <sup>2</sup>	JFM "Perez" (NanoRanger v0.5.0) JFM "Perez MT" (NanoRanger v0.5.1)
DMA power supply	+/- or All-negative
Neutralizer	Bipolar electro-spray

### Compatible External Detectors <sup>3</sup>

Condensation Particle Counter	Aerosol Dynamics Model 9001* Kanomax FCPC 3650* Other CPCs with BNC pulse out port
Electrometer	NEC Proprietary TSI Model 3068B*

<sup>2</sup> Specifications available upon request. DMAs are generally installed on a one-time basis.

<sup>3</sup> Others can be implemented upon request.

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Software features	
Real-time controls	Sample and neutralizer vial pressure Sample and neutralizer voltage ES air flow DMA air flow Detector air flow Digital camera viewing screen and frames/sec (for Taylor cones)
Programmable testing*	All real-time controls, plus: Unlimited separate spectra per sample Programmable across full range of all voltages and airflows* 1 V minimum DMA voltage step 1 V minimum Sample voltage step 1 SPL minimum ES (sample) airflow step 1 SPL minimum DMA (sheath) airflow step 1 millisecond minimum sequence time.
Parameters captured	Date/Time Sequence # DMA voltage DMA air flow Detector particle count Electro-spray settings* Room temperature* Relative humidity* Ambient pressure* Operator name*

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