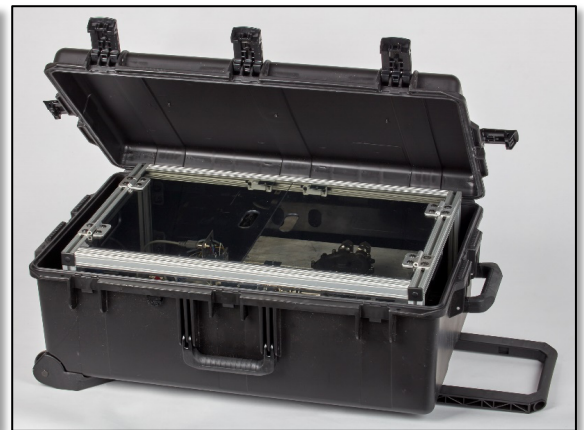


NANORANGER™ ES-DMA VERSION 0.6 Specifications

NanoRanger™ is a high resolution, transportable and programmable Electro-spray Differential Mobility Analyzer (ES-DMA) system designed for research in instrumentation, particle detection, virology and macromolecular biology. NanoRanger is optimized for high resolution characterization of particles with mobility size of 20-250nm, with demonstrated capability to distinguish between particles in this range differing by 2% or less. The system comes with a choice of electro-spray emitter to address a variety of applications. NanoRanger™ v0.6 features three separate inputs (Eppendorf vial, capillary*, and external air), is compatible with multiple particle detectors (CPC, Electrometer) and pairs with mass spectrometers (“ES-DMA-MS”). NanoRanger™ is 100% computer controlled with industry leading test algorithms and digital camera-assisted electro-spray tuning.



NanoRanger Front View with Laptop Control S/W



NanoRanger in Pelican Transport Case

NanoRanger v0.6 features the new Perez MT DMA. This patented technology maintains the same functional geometry as the Perez LT developed by Prof. Juan Fernandez de la Mora of Yale University, the highest resolution DMA ever tested with published results well in excess of 70x (FWHM). The Perez MT exhibits similar performance but with less weight and lower cost. NanoRanger also features the industry’s highest DMA voltage range (-10KV to +10KV).

NanoRanger v0.6 is offered in three electro-spray configurations depending on researchers’ needs for liquid sample handling:

NanoRanger v0.6D	NanoRanger v0.6M	NanoRanger v0.6N
Duo-pole Electro-spray	Mono-pole Electro-spray	No Electro-spray nor liquid sample input
Ionizes and neutralizes liquid samples ¹	Ionizes liquid samples	Externally ionized air samples and/or external electro-spray
Ideal for >20 nm particles	Best for <20nm particles that do not benefit materially from neutralization	Best for testing air samples when no calibration of liquid samples is required

¹ Our patented Duo-pole electro-spray neutralization method features a second electro-spray emitting negative ions. Neutralization increases the proportion of +1 charged particles for better resolution. Our Duo-pole electro-spray is high yield, easy to handle, and gentle for biological samples. It replaces other neutralizers such as radioisotopes and soft x-ray.

*Denotes new for v0.6

NANORANGER™ ES-DMA VERSION 0.6 Specifications

Commercial

Availability	Summer 2023
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

Sample Inputs and handling

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 ²
Sample cooling	0-5 degrees Celsius via external water circulator

ES-DMA Measurement Process Controls - programmable closed loop

+/- ES vial air-over-liquid pressure	0-1,000 mB
+/- ES vials Pt electrode voltage	+2 kV to -2kV DC*
ES sample air flow	0-5 SLM
DMA air flow (recirculated)	0-220 SLM
DMA voltage	+10 kV to -10kV*
Detector air flow	0-5 SLM (controllable to support CPC operation)
Real time Imaging of Taylor cones	10 MP monochrome telescopic digital camera for each electrospray emitter, plus a third camera to position emitter tips

² Air samples can be ionized with secondary electrospray or a third-party ionizer such as corona discharge, radioisotope, or soft x-ray.

*Denotes new for v0.6

NANORANGER™ ES-DMA VERSION 0.6 Specifications

Compatible External Detectors and Collectors ³

Condensation Particle Counter	Aerosol Dynamics Model 9001* Kanomax FCPC 3650* Any other CPC with BNC pulse out port
Electrometer	Amperical Instruments 1 TOhm TSI Model 3068B
Post-DMA CGT Collector	Aerosol Devices Spot Sampler, BioSpot-GEM and BioSpot-VIVAS

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: <ul style="list-style-type: none"> • 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 • 0.1 SLM minimum ES (sample) airflow step • 0.1 SLM minimum DMA (sheath) airflow step • 1 millisecond minimum dwell time.
Digital data captured	Date/Time Sequence # DMA voltage DMA air flow Detector particle count Electro-spray current* Electro-spray liquid sample flow rate* DMA Sheath air temperature* Ambient air temperature, pressure and humidity*

³ Inquire about other detector options.

*Denotes new for v0.6