Half Mini (p) model
Differential Mobility Analyzer

High resolution analysis of nanoparticles and molecules
A portable DMA for high-resolution classification of 0-30 nm particles

The **Half-Mini DMA** is the most recent and lightest (3.2 kg) member of a class of Yale-developed supercritical DMAs, later improved by SEADM, able to isolate with high resolution aerosol particles smaller than 1 nm (including molecular ions). Its broad range of particle sizes (0-30 nm) is achieved with a single DMA configuration (2 cm long working section), greatly simplifying operation.

In the **Half Mini** system, the molecules or particles are ionized in an electro-spray ionization chamber and then submitted simultaneously to a gas flow and an electric field within the cylindrical Differential Mobility Analyzer (DMA). Only the particles or ions with a specific mobility are transmitted into the DMA outlet.

What makes the **Half Mini** system unique is its laminar flow even in the presence of high flow rates (high Reynolds numbers), which avoids undesirable effects (such as diffusion broadening and turbulence-related effects), delivering unrivalled resolutions.

**New Half Mini (p) model**

The new **Half mini (p) model DMA** [Fernandez de la Mora, J Aer Sci Tec, 2016] introduces substantial flow improvements over the prior **(m) model**. It operates under near ideal flow conditions over a much wider range of aerosol and sheath gas flow rates, enabling classification of 30 nm particles with a resolving power close to the ideal. This improvement relies on a new scheme for injecting the aerosol sample flow into the sheath gas flow with greatly improved axisymmetry. A comprehensive summary of the new improvements is available at our [Half Mini Cells](http://www.seadm.com/customer-reviews/) page.

**Acquisition of fast size spectra**: A key advantage of the **Half Mini** DMAs, either (p) or (m) models, over other existing DMAs is its ability to complete mobility spectra exceptionally fast without distortion of the size distribution. This advantage is due in part to the minimal particle residence time in the classification region (0.2 -2 ms), as well as to the high resolving power of the instrument (which yields almost the same residence time to all particles over the whole size range). Undistorted size spectra from 1 nm to 30 nm can therefore be obtained every 2 s [Fernandez de la Mora, Aer. Sci. Tec., accepted, Jan-2017].

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Read our customer review for the Half Mini at: [http://www.seadm.com/customer-reviews/]
Advantages and features

- Unmatched size range for a high resolution instrument, recently extended beyond 30 by the (p) model (Fernandez de la Mora, 2017)
- Highest resolutions available in the market (see results of independent studies on the right)
- Excellent transmission for enhanced sensitivity, see right (internal semiconducting tube bringing the classified particles to the grounded outlet)
- Exceptionally fast delivery of mobility spectra without distorsion of the size distribution
- Optimized flow dynamics technology to ensure laminarity even at high (Re > 20,000) flow
- Diffusion broadening minimized
- Robust architecture, mirror polishing, total thermal control
- Stand alone operation (control and monitorization units built-in) directly connected to PC-USB.

Applications and sectors

The instrument has been widely used for studies of Condensation Particle Counters (CPCs) sensitive to particles smaller than 3 nm, and other investigations involving pure nanometer size standards.

For users having a charge-reduction component (also available from SEADM), the increased size range of this DMA (relative to earlier supercritical DMAs) permits high resolution analysis of charge-reduced biomolecules and small viruses produced by electrospray.

Range of applications include:
+ Real-time exhaust analysis (as done in SUREAL-23 project)
+ Environmental/pollution research
+ Atmospheric/climate research (Kangasluoma, 2014)
+ Nucleation and reaction kinetics studies (Wang, 2015)
+ Combustion studies (Carbone, 2016)
+ Synthesis of nano-particles via gas or wet techniques (Wang, 2014 and 2015).
+ Nano-materials development (Wang, 2014)
+ Nano-particles applications (medical imaging, drug delivery, catalysis)
+ Generation of particle standards (Attoui, 2013)
Bibliography


Fernandez de la Mora J. “Expanded size range of high-resolution nanoDMAs by improving the sample flow injection at the aerosol inlet slit”, submitted to Journal of Aerosol Science (Dec-2016).


Specifications

**Ionization methods:** secondary electrospray ionization (gas samples); nano-ESI for liquid samples

**DMA type:** cylindrical

**Particle size range:** 1 -30 nm

**Resolution:** 30 at 2 nm, (peak voltage)/FWHM.

**Operational time:** 5 minutes (for start up) ≈2 seconds for 1-30 nm scan.

**Sheath flow rate:** 30-700 lpm

**Clean gas supply for sample gas:** 0.2-10 Lpm.

**Power supply:** 0-5000 V (incl. voltage control unit)

**Cylindrical DMA dimensions:** 220 (length) x 105 (diameter) x 135 (width)

**Weight:** 3.2 Kg (only the cylindrical DMA)

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SEADM, a research-intensive company, goes far beyond a simple technology provider but has the utmost interest to cooperate with you in your research. Just contact us at: