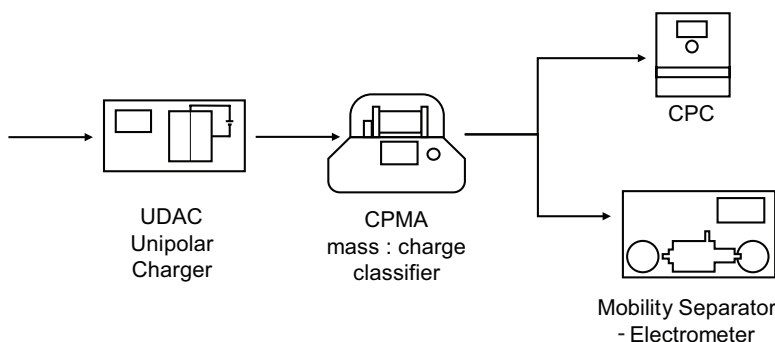
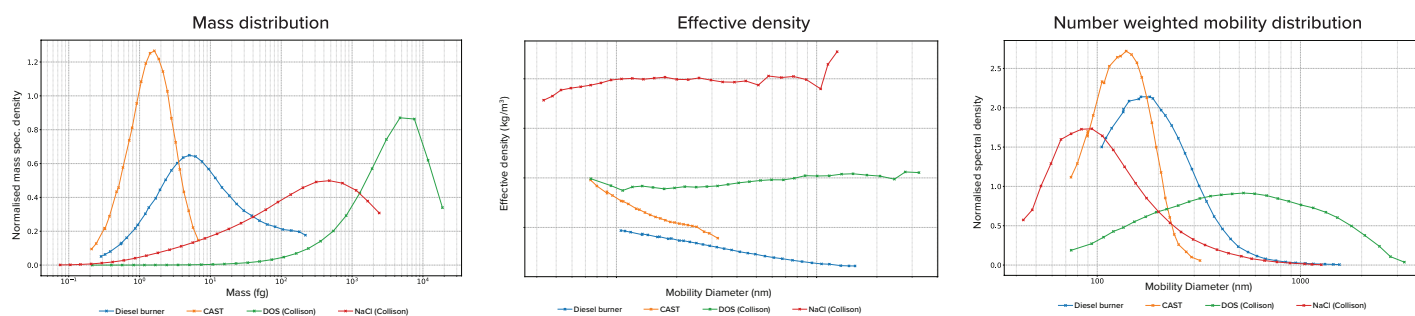


Aerosol mass, mobility and density distributions

over a wide measurement range of ~50nm - 3µm



measure:

- Mass distributions
- Density vs size
- Structure and surface
- Effect of processing on properties
- Spherical particles

compatible with:

- Combustion agglomerates
- Nanomaterials
- Engineered powders
- Coated particles
- Carbon Black & flame pyrolysis production

Mass & Mobility Aerosol Spectrometer

How the M²AS Works

Mass:charge classification

The Centrifugal Particle Mass Analyser (CPMA) selects particles within a narrow range of mass: charge ratios. Given this capability, we need to understand the particle charge in order to scan the mass distribution.

Limitations of other techniques

Previous technology often assumed the charge based on models, with consequent errors.

Direct charge measurement

The M²AS directly measures particle charge, via the ratio between simultaneous measurements of concentration (with a CPC) and total charge (with an aerosol electrometer and flow meter).

The measurement therefore remains valid even for non-spherical aerosols, where the particle morphology affects the charging behaviour.

Strong charging to avoid artefacts

Mass:charge classifiers such as the CPMA have a shortcoming that small uncharged particles may emerge from the classifier when running at low speeds, despite being much smaller than the mass:charge setpoint.

Use of a Cambustion Unipolar Diffusion Aerosol Charger (UDAC) ensures that only particles smaller than 20nm remain uncharged.

Erroneous detection of these <20nm particles in turn may be eliminated by selection of a CPC which supports a cut point such that such small particles will not grow and be detected.

Unipolar charging also ensures a pseudo-continuous charge distribution, required for the mean charge measurement to be meaningful.

Real-time mobility measurement

The final enabling technology is embodied in the new Mobility Separator Electrometer (MSE), which operates in real-time to avoid the need for another scanning component.

This allows calculation of the mobility diameter and effective density giving insights into both the particle material and morphology. It also

allows full calculation of the CPMA transfer function and thus accurate calculation of total particle concentration.

Sophisticated software

To ensure reliable data collection, accurate calibration and rapid data processing, the M²AS features specially developed proprietary software which integrates the various instruments and generates the output.

Outputs:

Mass, mobility, concentration and effective density distributions are therefore measured in a single scan.

Parameter	Specification
Sample flow	1slpm
Size range @1g/cc	50 nm – 3 µm
Mass range @1g/cc)	0.06 fg – 14 pg
Typical scan time	10 minutes
Max concentration	Typically 4 x 10 ⁶ dNdlopDp/cc
Software	Included for Windows PC
Aerosol conditions	ambient +0 – 25mbar 0 – 80% RH
Carrier gas	Air, nitrogen
Ambient conditions	+5 – +40°C, 0 – 80% RH 700mbar – 1100mbar
Electrical supply	100 – 240VAC 50/60Hz
Power consumption	Max 1,800W + CPC use
Total weight Heaviest component	76 kg excluding CPC 42 kg
Extraction requirement	1slpm of sample
Typical bench area	1m ²
Supported CPCs	Recommended: TSI 3790 Support: TSI 3752/3775 Support: Brechtel 1720
Stabilisation period (after power on)	60 minutes (limited by CPC)
OEM service interval	1000 hours of scanning
Calibration interval	12 months
Recommended reference aerosols	ammonium sulphate dioctyl sebacate "DOS"

All specifications subject to change without notice

Cambustion is an independent, privately owned company with headquarters in Cambridge, UK.

Cambustion continue to research & develop novel instrumentation, and also offer **measurement consultancy**; helping our global clients to solve a wide range of particle and gas measurement challenges.



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