

# Applications for aerosol and particle measurement & conditioning

Achieving more with Cambustion







Products summary

Measuring techniques

Our products combined

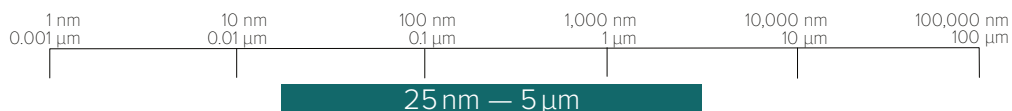
Applications

## Connect to the experts

Cambustion's unique instrumentation is used by industry, academic and government customers in over 35 countries worldwide.

Our engineers and scientists work closely with customers, offering both instrument and broader application support, enabling users to expand their measurement horizons.

Select



### AAC — Aerodynamic Aerosol Classifier

- Size select aerosol particles
- Measure size distributions & output size selected particles

0.2 ag — 6.6 pg (~7 nm — 3 μm)



### CPMA — Centrifugal Particle Mass Analyser

- Measure shape, density and morphology of particles
- Component of aerosol mass calibration standard

5 nm — 2.5 μm



### DMS500 — Fast Particle Sizer

- Real-time aerosol particle size distributions at 10Hz
- Available with sample handling options for high concentrations

5 nm — 10 μm



### 5210 CPC — Condensation Particle Counter

- Fast time response number concentration - 20Hz data
- Wide size range  $d_{50,min}$  5nm;  $d_{50,max}$  >10μm.

50 nm — 5 μm



### M<sup>2</sup>AS — Mass & Mobility Aerosol Spectrometer

- Online characterisation of aerosols and powders
- Understand size, surface, structure, effective density, coatings, ...

Measure



### AD60 — Aerosol Diluter

- Flexible general purpose diluter for aerosols
- Active control with touchscreen & data logging

0.1 — 10 lpm



### AF10 — Aerosol Flowmeter

- Maintains constant resolution of instruments with real-time flow measurement of aerosol laden gases
- Self cleaning for long term operation

1.5 — 8 lpm



### UDAC — Unipolar Diffusion Aerosol Charger

- Computer control to accurately and repeatably charge aerosols
- Applications including filtration, mass calibration standard, ...



Dilute

Monitor

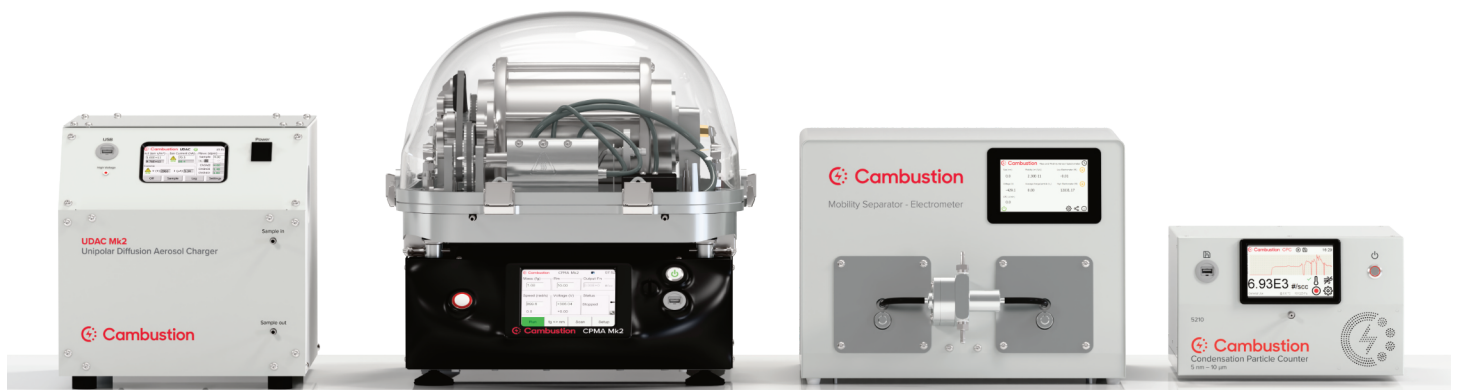
Charge



# Measure Particle Distributions

## M<sup>2</sup>AS — Mass & Mobility Aerosol Spectrometer

- Measure mass, size and number distributions in one single scan.
- Ideal for characterising non-spherical particles and revealing detailed particle morphology and structure.
- Resolve components of different density, e.g. multimodal or coatings.



## DMS500 — Fast Particle Sizer

- Measure size distributions.
- Size range of 5 nm to 2.5  $\mu\text{m}$ .
- Ideal for time varying measurements with a fast time response of  $T_{10-90\%} < 200 \text{ ms}$  and 10Hz data.
- High sensitivity for ambient measurements.
- Dilution options available for high concentration sources.





## Particle Selection

### AAC — Aerodynamic Aerosol Classifier

- Select particles by aerodynamic diameter.
- 25 nm to  $>7\ \mu\text{m}$
- Measure size distributions (with a detector).
- Pass size selected aerosol for collection, exposure studies and more.



### CPMA — Centrifugal Particle Mass Analyser

- Selects particles by mass:charge ratio.
- Combine with other instruments to study particle morphology, effective density and more.



## Particle Counting

### 5210 CPC — Condensation Particle Counter

- Fast response time and high data rate (20Hz) make the 5210 ideal for time varying applications such as aerosol flux studies.
- A uniquely wide size range, 5nm —  $10\ \mu\text{m}$ , allows the 5210 to be applied to a myriad of applications, including vehicle brakes & tyres to ambient, bioaerosols, healthcare and more.
- **Connect to the experts for tailored advice on your application!**



## Sample Handling

### AF10 — Aerosol Flowmeter

- Non-invasive measurement of aerosol gas flows for accurate, traceable measurements.
- Ideal for general lab use, and compatible with many Cambustion aerosol instruments.



### AD60 — Aerosol Diluter

- General purpose, wide range aerosol diluter.
- Flexible input and output flows allow matching of aerosol source and measurement requirements.
- Active control and monitoring for stability and accuracy.



# Combined Systems

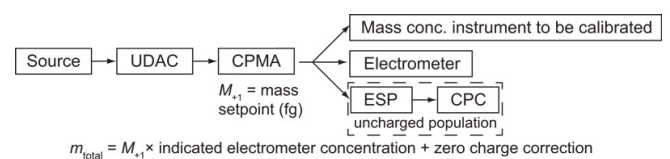
## Scanning Aerodynamic Size Spectrometer (SASS)

- Combination of **AAC + 5210 CPC**.
- Single measurement technique aerosol size distributions between 25nm and >7µm.
- Flexible software for push button operation by user or via API.



## CPMA Electrometer Reference Mass Standard (CERMS)

- Combination of **AD60 + UDAC + CPMA + 5210 CPC + Electrostatic Precipitator**.
- A calibration bench for aerosol mass concentration.
- Provides a reference for calibration of aerosol mass measurement instruments.
- Highly integrated system for metrology class accuracy, traceability and ease of use.



## AD60 + AAC + 5210 CPC

- With a suitable aerosol generator, outputs size selected aerosol of user selected concentration.
- CPC measures reference concentration.
- Calibration bench for Optical Particle Counters.



# Other Accessories

## Diffusion Dryer

- Effective drying of aerosols (including droplets) with low particle losses.
- Uses silica gel or activated carbon as absorbing agents.



## Electrostatic Precipitator

- Remove charged particles from aerosol flow.
- Variable cutpoint supports experimental measurements.





# Application Examples

## Sample handling and conditioning

- Control your sample flow with the **AD60** by easily varying the dilution factor or fixing the desired sample flow.
- Monitor flows in real time with the **AF10** and improve repeatability between experiments.
- **UDAC** places high level of selected polarity while minimizing particle losses inside the system.

## Aerosol calibration bench

- The **AAC** and **CPMA** form the cores of calibration benches for particle size/number and mass respectively.
- The **5210 CPC** offers a reference number concentration measurement
- The **AD60** allows varying of the output concentration while leaving the aerosol generator unadjusted, for maximum stability and repeatability.

## Material characterisation

- The **AAC** and **CPMA** determine particle aerodynamic diameter and mass respectively.
  - Together with a CPC, they function as a **CPMA—SASS** measuring effective density.
- The **M<sup>2</sup>AS** characterises particle's full morphology through mass, mobility and density distributions.

## Brake & tyre emissions

- **5210 CPC**'s detection range fully covers the size range of brake and tyre emission particles.
- Paired with the **DMS500**, these instruments provide a comprehensive size distribution of these particles.

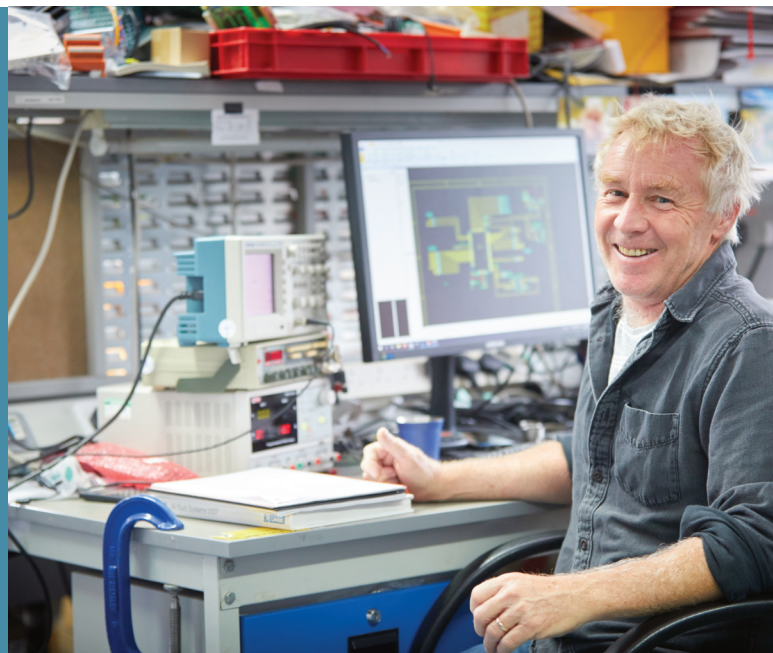
## Atmospheric aerosols

- The **SASS** combines the **AAC** and **5210 CPC** to measure ambient size distributions over the widest range.
- The **5210 CPC** combines 20Hz data with an unprecedentedly wide size range, for number concentration measurements, including rapidly changing aerosol fluxes.

## Your application

- Don't see your application here?
- Have a measurement challenge?

Contact one of our experts for a technical discussion to explore!



## Find out more

For more information on each product, system or application, please visit [www.cambustion.com](http://www.cambustion.com) or connect with an expert via [support@cambustion.com](mailto:support@cambustion.com).

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