

# Advantages of the **CAMBUSTION**

## DMS500 *MkII* Fast Particulate Analyzer for Engine Emissions Measurements



### DMS500 *MkII* Features

Designed for engine test cell use

Fully integrated sampling system

Fastest available  $T_{10-90\%}$  time response

Calibrations for different engine types

Best in class sensitivity

### DMS500 *MkII* Inputs & Outputs

Real-time: particle mass  
particle number  
particle size spectra

Measurement range 5 – 1,000 nm  
(5 – 2,500 nm option)

Data recorded to PC at up to 10 Hz

Open text file format - easy to import

Full 10 Hz analogue inputs and outputs

Use external analogue exhaust flow data  
to calculate real-time total mass & number  
emission

AK protocol enables control via test cell

### Unique Data Output Capabilities

The DMS Series instruments output real-time particle mass and number from a single instrument, together with full particle size information. This combination of data makes the DMS Series *the* cost-effective tool for developing engine and after-treatment systems to meet global particulate emissions standards, while remaining relevant for fundamental R&D projects.

### Wide Range of Sampling Locations

Existing legislation around the world for tailpipe particle emissions relies on gravimetric filter paper measurements. The European PMP standard measures particle number via the CVS system.

For development of engines and after-treatment, the DMS500's ability to measure both these parameters upstream or downstream of after-treatment, or in the CVS tunnel is invaluable. Real-time particle mass and number data measured upstream of the after-treatment is used to optimise engine calibration and strategy, while the DMS is also used to evaluate devices such as Diesel Particulate Filters when sampling downstream.

### Calibrations for Diesel / GDI Engines

Gasoline engines (whether port or direct injected) tend to produce near spherical soot particles. Diesel engines produce fractal agglomerates. To correctly measure the particle mass and number emitted from these two engine types, different calibrations are required. The DMS500 is supplied with software switchable calibrations appropriate for each engine type.

## Fastest Time Response & Data Rate

With a  $T_{10-90\%}$  response time of 200 ms and a data rate of 10 Hz, the Cambustion DMS500 is the fastest available instrument offering particle number, mass and size measurements.

As engines become more complicated, accurate control of fuel/airflows during transients becomes more difficult. These engine conditions, which make up only a small proportion of the legislated cycle, can contribute a significant proportion of the total cycle emissions.

A high data rate alone is insufficient to study these effects - the rapid  $T_{10-90\%}$  time response of the DMS500 allows it to identify such conditions, and aid engine calibrators in reducing particulate emissions.

The DMS500 provides all its outputs in real-time, speeding development work and lending itself to automated emissions development work. With a fast response time, measurement even at steady state takes less time, saving money.

## Flexible Sample Handling System

The wide range of aerosol concentrations encountered in automotive applications leads to the need for variable dilution. Further the presence of water in the exhaust requires a heated sampling system to prevent condensation prior to dilution.

In the DMS500 the two stage dilution system and heated sample line are fully integrated and controlled via the main User Interface.

There is no need to separately add and meter makeup air. The DMS500 and internal dilution system are calibrated as one for particle losses, ensuring the indicated concentrations accurately reflect the real world. The DMS500 automatically corrects the output for dilution if required.

## Wide Size Range

The DMS500 measures over the unprecedented size ranges of 5 – 1,000 nm or 5 – 2,500 nm simultaneously. The DMS500's wide size range allows study of both combustion and other particle sources which contribute to emissions, such as blow-by gases and crankcase fumes.

## High Sensitivity

The high sensitivity and dilution flexibility of the DMS500 *MkII* makes it suitable for sampling low concentration aerosols, as found with GDI engines or post-Diesel Particulate Filters.

Instrument sensitivity is measured during the automatic zeroing process and displayed on the screen/recorded to the data file.

## Test Cell Integration

The DMS500 is fully controlled from a supplied PC via an Ethernet interface.

Four user configurable 10 Hz analog inputs

Four user configurable 10 Hz analog outputs

The DMS500 offers AK protocol support, for easy test cell integration.

## Data Logging

The Cambustion DMS500 records data to the PC at between 10 Hz and 1/minute. The data file is in plain text, and can be viewed in MS Excel (for which macros are provided) or in programs such as Matlab/Scilab.

## Data Presentation Tools

The DMS500 is supplied with a suite of Excel macros. These assist the user in manipulating the data, automatically generating summary statistics, a variety of animations and contour plots.

## Technical Support

Cambustion have been leaders in fast response analysers for over 20 years and have unrivalled expertise in the transient measurement of gases and aerosols. This allows us to provide outstanding support for a wide range of standard and special applications.

## In Service Worldwide

The DMS500 has been adopted around the world for aerosol measurement in automotive, ambient, aerospace, biological and other applications since 2002.

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