

CAMBUSTION

Advantages of the DMS500 *MkII* Fast Particulate Spectrometer

DMS500 *MkII* Features:

- Designed for engine test cell use
- Integrated sampling and dilution options
- Fastest available $T_{10-90\%}$ time response
- Programmable / scheduled operation
- MS Office data processing tools
- Calibrations for different engine types

DMS500 *MkII* Outputs

- Real-time particle number output
- Real-time particle mass output
- Real-time particle size spectra
- Measurement range 5 – 1000nm (5 –2500nm option)
- CSV file format - easy to import into your software
- Data recorded to supplied PC

DMS500 *MkII* Inputs

- Digital remote control and analogue I/O for test cell integration
- DMS500 can use external analogue exhaust flow data to calculate *total* mass & number emission in real-time.

DMS500 *MkII* NEW FEATURES

- Sensitivity now improved by 3x (compared with DMS500 MkI)
- Wider dilution ratio range
- Ethernet communications for reliability and easy switching between test cells
- AK protocol support for even better test cell integration



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.

Wide Range of Sampling Locations

Existing legislation around the world for tailpipe particle emissions relies on gravimetric filter paper measurements. The proposed 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

With a $T_{10-90\%}$ response of **200ms** and a data rate of 10Hz, 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 studies 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 states 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. External control by the test cell is also possible.

The DMS500 can automatically correct output for dilution if required.

Wide Size Range

The DMS500 measures over the unprecedented size ranges of **5 – 1000nm** or **5 – 2500nm** 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.

Enhanced Sensitivity

The sensitivity improvement in the DMS500 *MkII* further enhances its suitability 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 analogue inputs

Four user configurable analogue outputs

The DMS500 features digital remote control, allowing automated control of the instrument by the test cell.

Analogue control of 2nd dilution ratio and an analogue output indicating Signal to Noise ratio is also provided.

The DMS500 can also be operated in a scheduled operation mode, based on a file containing timings and instructions.

Data Logging

The Cambustion DMS500 records data to the PC at between 10Hz and 1/minute. The data file is in the CSV format, and can be viewed in MS Excel (for which macros are provided) or in program 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 is in use around the world for aerosol measurement in automotive, ambient, aerospace, biological and other applications.

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