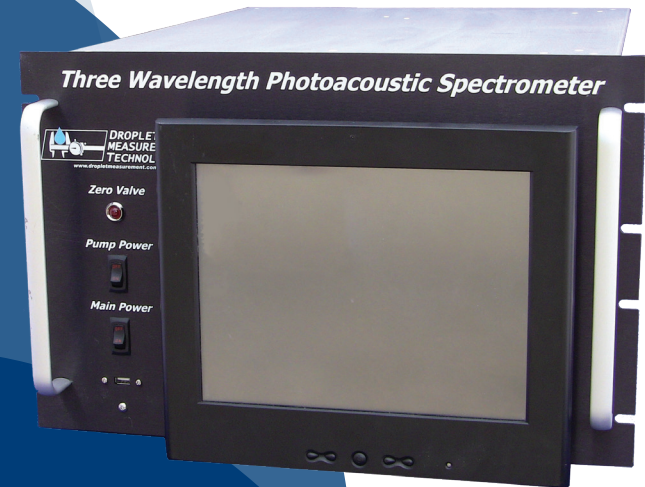


PASS-3

PHOTOACOUSTIC SOOT SPECTROMETER, 3 WAVELENGTH



OVERVIEW

The PASS-3 is a sensitive, high-resolution, fast-response instrument for measuring the absorption coefficient of aerosol particles. It uses three wavelengths (red, green, and blue) to enhance measurement capabilities.

The PASS-3 was jointly developed by Droplet Measurement Technologies and Dr. W. Patrick Arnott of the Desert Research Institute. The instrument is licensed exclusively to DMT, patent number 6,662,627.

HOW IT WORKS

Sample air is drawn through a resonator at an approximate rate of 1 lpm. The laser beam is square-wave modulated at the frequency that matches the resonance acoustic frequency of the resonator. Aerosols in the air stream absorb light, causing periodic heating of the gas in the resonator. The heated gas expands, creating a sound-source pressure wave. Since the heating is periodic, with frequency f_{res} , the resultant sound wave will have frequency

APPLICATIONS

- » Air quality and visibility studies
- » Atmosphere and climate research
- » Health effects assessment
- » Combustion source emissions testing
- » Biomass burning studies

The PASS-3 is suitable for fixed site, mobile and airborne sampling.

f_{res} . A microphone attached to one end of the resonator measures this sound wave. The other end of the resonator contains a piezo electrical element used for finding the resonance acoustic frequency f_{res} of the resonator. The laser power is measured with the integrating sphere/photodetector. This information is then used to determine the absorption and scattering coefficients.

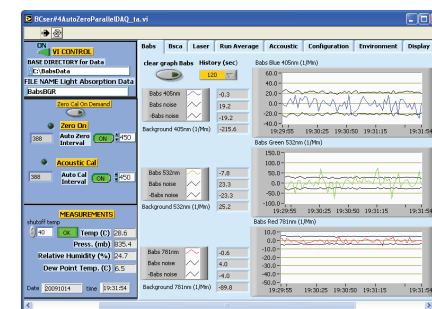
ADVANTAGES

- » *in situ* measurement
- » Real-time display of aerosol mass loading
- » Continuous and autonomous operation
- » Simultaneous measurement at three wavelengths
- » Ideal for black carbon measurement (BC) (781 nm absorption measurement is highly specific to BC)
- » No filters, and thus no measurement inaccuracies associated with filter artifacts
- » Wide dynamic range that allows both ambient and source sampling
- » Scattering measurement responds to all particle types

SOFTWARE

The PASS-3 comes with software to control the instrument. The program enables the user to perform the following tasks:

- » View absorption and scattering data in real time
- » Perform zero checks
- » Control acoustic calibration
- » Monitor housekeeping variables such as laser power
- » Configure instrument settings
- » View ambient conditions such as temperature, pressure, and relative humidity



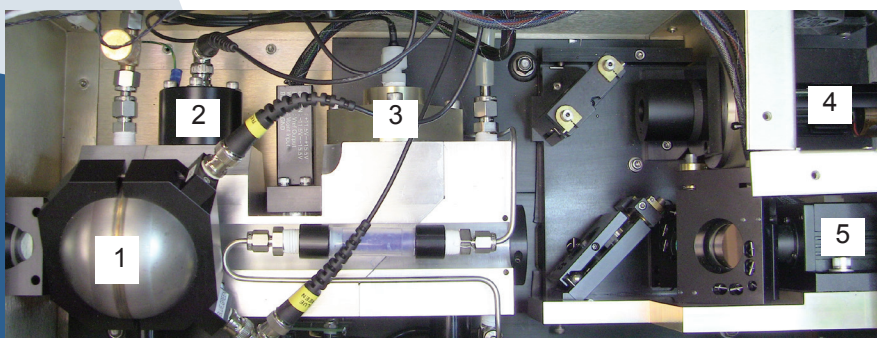
PASS-3 Software

INCLUDED ITEMS

- » Instrument
- » Software
- » Internal data system computer
- » Shipping case
- » Operator manual
- » One day of training at DMT's facility
- » One-year warranty
- » Email and phone technical support

HOW TO ORDER

Contact DMT for pricing or more information:
+1.303.440.5576,
customer-contact@dropletmeasurement.com.



Main PASS-3 Interior Components: 1. Integrating Sphere; 2. Piezo; 3. Microphone; 4. 405-nm laser; 5. 532-nm laser. (The 781-nm laser is underneath the 532 nm one and not visible in the photograph.)

PASS-3 SPECIFICATIONS

Measured Parameters	Aerosol light absorption and scattering
Auxiliary Parameters	<ul style="list-style-type: none">» Temperature» Pressure» Relative humidity» Dew point temperature
Technique	Photoacoustic method for light absorption and integrated nephelometry for light scattering
Sample Flow	1 lpm
Modulation Frequency	1500 Hz, square wave
Laser	Three wavelengths: <ul style="list-style-type: none">» 781 nm (2 W)» 532 nm (0.4 W)» 405 nm (0.6 W)
Calibration	Linear regressions applied to absorption, extinction, and scattering coefficients
Power Requirements	<ul style="list-style-type: none">» Two options: 105-125 V at 60 Hz, or 220-240 V at 50 Hz (specify option when ordering)» 100 W for instrument electronics» 250 W for AC pump
Weight	33 kg, excluding pump
Dimensions	Rack mount is 19" W x 24" L x 12" H / 48.3 cm W x 61 cm L x 30.5 cm H (7U)
Operating Limits	<ul style="list-style-type: none">» 10 – 40 °C (temperatures above 40 °C may damage the laser)» 0 - 70% Relative Humidity, non-condensing (above 70% performance will be degraded)

Specifications are subject to change without notice.

Rev A

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