Particulate Monitors and Samplers

Designed for environmental and industrial monitoring

enviro technology services

World Leading Environmental Monitoring Systems

Particulate Monitoring

Airborne particulate matter (PM) is all around us and has a wide variety of sources, both natural (e.g. sea spray, entrained dust, fires, Saharan dust) and from anthropogenic activities (e.g. road transport, combustion, industry, minerals extraction, construction)

Particulate matter suspended in the air is made up of a complex mixture of solid and liquid particles that come from local and regional sources and sources in other countries (trans boundary sources).

Why do we need to measure particles in the air?

The short answer is: They have impacts on climate and precipitation that adversely affect human health.

The World Health Organisation state that particulates are the deadliest form of air pollution due to their ability to penetrate deep into the lungs and blood streams unfiltered. Primary health effects include damage to the respiratory and cardiovascular systems leading to premature death.

Real-time “Equivalent” Particulate Monitors

BAM1020 Continuous Beta-attenuation Particulate Monitor

The BAM-1020 automatically measures and records airborne particulate concentration levels (in milligrams or micrograms per cubic meter) using the industry -proven principle of beta ray attenuation.

Thousands of BAM-1020 units are currently deployed worldwide, making the unit one of the most success-ful air monitoring platforms in the world.

TSP / PM_{10} / $PM_{2.5}$ / PM_1 inlet heads are available on request.

E-BAM Beta-attenuation Particulate Monitor

The E-BAM has been built to satisfy users, regulators and those from the health community by providing truly accurate, precise, real time measurement of fine particulate matter automatically. In addition, it is rugged, portable, battery operated, and deployable in 15 minutes.

Real-time “Indicative” Particulate Monitors

E-Sampler - Laser Backscatter Particulate Monitor

The E-SAMPLER is the most feature-packed light-scatter Aerosol Monitor available. Whatever your monitoring need the E-sampler will provide accurate, dependable and relevant data.

The E-SAMPLER is a dual technology instrument that combines the unequalled real-time measurement of light scatter with the accuracy standard of filter methods. The simple filter loading process testifies to the seamless blending of both technologies.

ES-642 Remote Dust Monitor

The ES-642 is a real-time, laser-scatter based sensor designed to provide accurate measurements of particle concentration in both indoor and outdoor environments.

The ES-642’s low power and maintenance requirements make it well suited to long-term, unattended deployments.

The unit is supplied in a rugged weatherproof enclosure and includes an LCD display to provide information about particulate concentration, flow rate, instrument status and power.

NPM 2 Neighborhood Particulate Monitor

The NPM 2 is a forward light scatter laser nephelometer particulate monitor which automatically measures real-time airborne TSP, PM_{10} or $PM_{2.5}$ particulate concentration levels.

The NPM 2 features robust, patented Pump-In-A-Box with improved reliability and lower maintenance. Each NPM 2 uses a serial cable that allows the device to connect to a laptop, data logger or CCS Modem 2 where the real-time data is available for display and logged for review and reporting at a later date.

Handheld Particulate Monitors

Aerocet 531s Handheld Particle Counter

The Aerocet 531S is a full–featured, completely portable, battery operated, handheld mass monitor or particle counter. This unit provides particle counts or mass PM measurements as stored data logged values, real-time networked data, or printed results.

The 531s is capable of measuring six mass ranges ($PM_{1,}$ $PM_{2.5,}$ $PM_{4,}$ $PM_{7,}$ PM_{10} & TSP) as well as give particle size ranges when used in count mode.

Aerocet 831 Handheld Particle Counter

The Aerocet 831 is a completely portable, full–featured, battery operated, handheld mass monitor. A mass monitor that simultaneously provides five important mass ranges (PM_{1}, $PM_{2.5}$, PM_{4}, PM_{10} & TSP) in one minute from start up.

Survey the environment with this easy to use, extremely portable, size selective mass monitor. This small lightweight instrument, 28 ounces, is the perfect tool for a wide range of assessment applications.

Model 804 Handheld Particle Counter

Met One Instruments' 804 handheld particle counter is a 4 channel portable particle counter that counts particles 0.3 microns to 10.0 microns – giving you portability and reliability at very competitive pricing.

Though compact, this unit is completely self-contained with its own internal battery and sample pump. The unit is configurable, allowing you to choose your particle sizes of interest from seven sizes: 0.3, 0.5, 0.7, 1.0, 2.5, 5.0 or 10.0 microns.

GRIMM Laser Particulate Analysers

Environmental Dust Monitors for approved PM measurements

GRIMM Aerosol Technik are a German manufacturer of a wide variety of particulate monitoring instruments, ranging from handheld dust monitors to high-end condensation particle counters. All GRIMM instruments are built to last, with minimal consumables and maintenance requirements, and a flow of sheath air to protect the optics from contamination.

GRIMM particle counters and aerosol spectrometers operate on the principle of 90° light scattering detection. Specialised aerosol focusing technology is used to direct particles into the optical field, where they are irradiated with a 660nm laser. A detector at 90° to the laser path detects the light scattered by these particles, while a light trap is used to reduce noise from stray light. Incoming particles are dried in a Nafion dryer, eliminating errors due to condensation on the particles.

The EDM 180 is the leading Automated Measuring System (AMS) for measuring particulate matter concentration (PM_{10}, $PM_{2.5}$) in ambient air. This system offers outstanding features such as simultaneous PM measurements in 31 particle size channels, 0.1 µg/m3 resolution, and an isothermal inlet with an inte-grated Nafion dryer. The EDM 180 runs silent, requires low maintenance and can be validated on site using the field test kit together with our system diagnosis software.

The EDM 180 is the optimal solution for reliable environmental monitoring, e.g. automated PM measurements in environmental networks, epidemiological studies, urban and rural PM monitoring.

Digitel High Volume Samplers

High Volume Sampler Automat DHA - 80

A High Volume Sampler (HVS) for autonomous, continuous measurements. The DHA-80 is a system for sampling dust and aerosol particles for later assessment and analysis.

The sampler operation range in standard execution is from 100 - 1000 l/min (6 - 60 m^3/h).

The system is usually called ‘High Volume Sampler’. Various models of samplers are available from different applications. Generally, they differ by the number of filters processed and by the type of logging failure indication and status messages as well as by the type of remote control via various interface protocols.

DIGITEL DPA14 Low Volume Aerosol Sampler (LVS)

The DPA14 Low Volume Sampler is a fully automatic system to sample dust and aerosol particles for later assessment and analysis (gravi-metric and analytical determination) in accordance with EN12341:2014.

The DPA 14 uses 47mm filters, and is supplied with 17 filter holders for it’s automated magazine.

High Volume Sampler DH - 77

The Digitel High Volume Sampler DH-77 is a system to sample dust and aerosol particles for later assessment and analysis. The sampler operation range in standard execution is 100 to 1000 litres per minute (6 to 60 cubic metres per hour). The system’s usual designation is ‘High Volume Sampler’. Airborne dust parts in the sampled air are separated onto 150 mm diameter filters.

Digitel nucleAIR

The nucleAIR is a fully automatic system to sample dust and aerosol particles for later assessment and analysis using a gamma-spectrometer

- Constant and precise air flow, long sampling period, high-performance side channel blower
- 2 filter stacks for 36 filter holders
- convenient touch screen or remote control programming
- flexible construction

Sven Leckel Medium Volume Samplers

Sequential Gravimetric Sampler SEQ 47/50

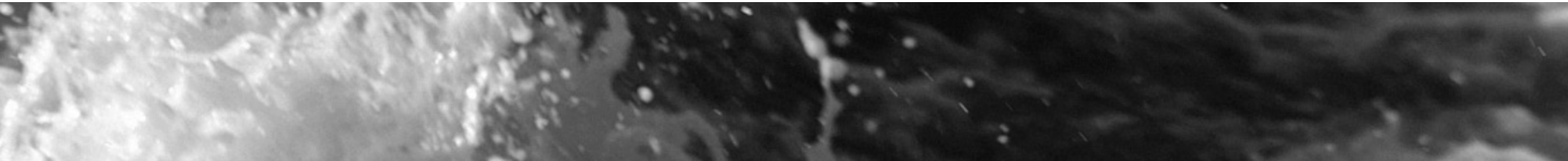
The sequential sampler SEQ47/50 is designed for outdoor use at all temperatures and environmental conditions.

- Operated and controlled by integrated LVS3 or MVS6 sampler (Kleinfiltergerat)
- Tough construction for outdoor use; (width: 19”); easy transportable by casters
- Sampling of all PM fractions and total dust
- Long maintenance intervals of the fractionating inlets
- Measurement of filter temperature, filter will be automatically heated (exceedance of dew point)
- Cooled inlet system and enclosed sampled filters within the magazine, no losses of particulate volatile material
- Suction pipe with large interior diameter no particles losses at the interior wall
- Use of different filter holders for filter diameters of 47 and 50 mm

Single Filter Gravimetric Sampler - KFG LVS-3

The Small Filter Device LVS3 is designed for outdoor use at very high as well as very low temperatures. The devices can be used also indoors.

- Tough, light-weight construction,small set-up area
- Device will be automatically heated (winter operation) and ventilated
- Controlling of operating-m3/h (ambient air conditions)
- Easy, 3-key menu-guided operation, equipped with microcontroller
- Preselectable activation, sampling duration and sampling intervals
- Protection of stored data against power failure, real-time clock
- Large illuminated digital display
- Low-noise vacuum pump with controlled rotation speed
- External set-up of inlets



MiniVol & ARA Portable Gravimetric Samplers

Portable Battery Powered Sampler - MiniVol Tas

Implementing patented lowflow technology, the TAS delivers precise and accurate results in a lightweight compact device.

The MiniVol® TAS is a versatile and reliable sampling platform that is attractive to end-users worldwide. Although specifically designed for “saturation” sampling, the MiniVol® has been routinely used in a wide variety of applications including prescribed burns, fugitive dust studies, remote location sampling, indoor air studies, fence line monitoring and ambient air sampling at remediation sites.

Improving upon the best in portable air samplers, the TAS leads the way for the next generation of innovative air sampling equipment.

ARA N-FRM Sampler

The ARA N-FRM (“Near” FRM) is a portable, rapidly deployable, battery-powered particulate sampling and monitoring device. It delivers Federal Reference Method (FRM) level of performance and integrates many additional functions for unmatched versatility.

The N-FRM uses a higher flow rate of 16.7 L/min compared to the minivol’s 5 L/min making it more comparable to reference methods.

Met One Black Carbon Analysers

BC-1050 Black Carbon Monitor

The BC-1050 measures black carbon through optical attenuation and absorption principles in both the infrared and ultraviolet spectral regions. It offers improved traceability for the measurement of black carbon (BC) compared to traditional filter-based optical techniques through its unique factory calibration process and through the incorporation of standard EPA-style sampling inlets.

BC-1054 Multi-spectrum Black Carbon Analyser

The BC-1054 continuously measures the transmittance of light across filter media onto which particulate matter is accumulating and in real-time calculates the black carbon “BC” concentrations at 10 different wavelengths ranging from the near-UV to the near-IR. By employing the same widely accepted calibration constants and principles of operation as those used in the Magee Aethalometer, the BC-1054 produces nearly identical results, but at a fraction of the cost.

BC-1054 will directly connect to a variety of products, such as the BAM-1020, discrete particle size and counting modules, or a wide array of meteorological sensor inputs.

BC-1060 portable black carbon monitor

The BC-1060 measures and reports black carbon concentrations, with user-selectable time resolution down to one minute, at both UV (370 nm) and IR (880 nm) illumination wavelengths. The combination of portability and dual-wavelength illumination permits rapid, easy deployment on a broad scale for source apportionment (fossil fuel vs biomass combustion) determination, roadside monitoring and emergency responder applications. The BC-1060 can continuously sample for up to 6 months with a single roll of glass-fiber tape.

Sunset Laboratory Inc Organic and Elemental Carbon (OCEC)

The model 4 Semi-continuous OC/EC field analyser and the model 5 OC/EC Lab Aerosol analysers from Sunset Laboratory are widely used government, academic researchers, and private sector industries including: aviation, mining, marine, astronomy, construction, and weather research.

Innovative Instrumentation for Carbon Aerosol Analysis

The model 5 OC/EC Lab Aerosol Analyser uses a proven thermal-optical method to analyse for organic and elemental carbon aerosols collected on quartz filters. The samples are thermally desorbed from the filter medium under an inert helium atmosphere followed by an oxidizing atmosphere using carefully controlled heating ramps. A flame ionization detector (FID) is used to monitor the analysis. NDIR detectors are also available. Our proven low dead volume carrier gas control system and proprietary quartz oven design provide high sensitivity with ultra low carbon background and no oxygen contamination.

Model 5 OC/EC Lab Aerosol Analyser

The model 4 Semi-Continuous OC/EC Field Analyser

The model 4 Semi-Continuous OC/EC Field Analyser incorporates the latest advances in electronic and optical technology, along with an optimized oven and detector design for sensitive and reliable field operation. It has a reduced footprint, significantly reduced need for support gases, computer controlled flow system for enhanced sensitivity and fast analysis times and improved user access for simplified maintenance and service. Extensive testing of the basic design at several EPA super-sites has demonstrated excellent sensitivity and comparability with co-located integrated filter sampling systems.

Unlike the model 5, which requires an operator to manually load discrete samples, the model 4 uses a vacuum pump to draw samples onto an internal filter. This filter is subjected to a thermo-optical protocol every hour, providing automated, semi-continous measurements.

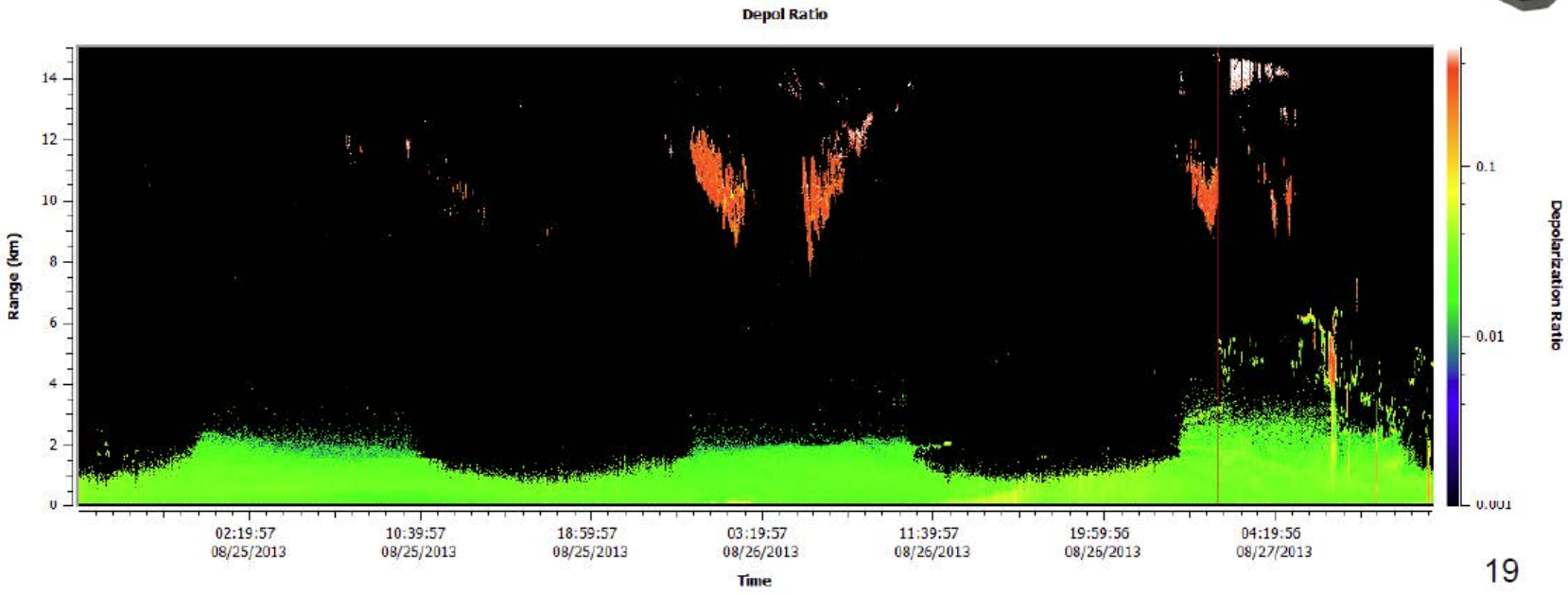
Micro Pulse LiDAR MPL Systems

The MPL and MiniMPL are versatile LiDAR instruments which are suitable for a wide variety of applications. The MPL can detect clouds and aerosols up to a range of 25km, providing accurate information on their thickness, structure, and composition. Depolarisation ratio measurements allow the MPL and MiniMPL to distinguish between ice clouds, water clouds, volcanic ash, and other types of aerosol, and because these instruments use a 532nm wavelength (1047nm versions are also available), the beam is able to penetrate and measure multiple layers of aerosol while still maintaining a high signal-to-noise ratio.

Each Micro Pulse LiDAR instrument is supplied with a dedicated computer running specialist MPL software. This software provides a user-friendly interface that allows for the control of the LiDAR, as well as real-time data visualisation and logging. Thanks to this intuitive software, the user does not need to be a LiDAR expert to make sense of the data.

Applications include:

- **Planetary boundary layer measurements**
- **Discriminating cloud structures and aerosol types**
- **Weather forecasting**
- **Volcanic ash detection/aviation safety**
- **Tracking particulate emissions and plumes**
- **Airbourne and vehicle-based measurements**



Airmodus Nano Particle Counters and Magnifiers

A10 Particle Size Magnifier

Study and monitor particles smaller than the detection threshold of any CPC.
Airmodus Particle Size Magnifier A10 grows nano sized aerosol particles into sizes that can be detected with a standard CPC.

Particles as small as 1 nm can be counted.

A20 Condensation Particle Counter

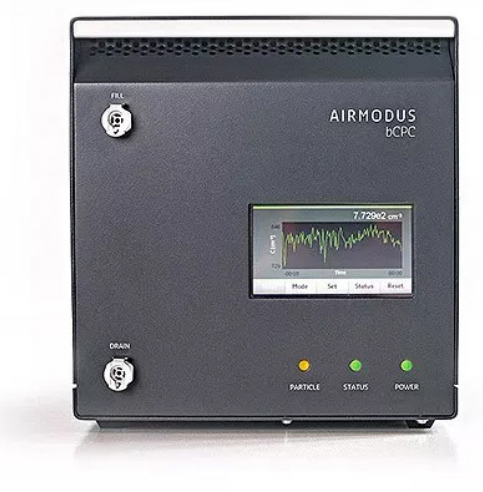
Airmodus Condensation Particle Counters are designed to count individual aerosol particles accurately from very low concentrations to high concentrations. They are ideal for ambient air monitoring as well as aerosol research.

The A20 is a robust and reliable tool for aerosol particle measurements in all applications where precision and sensitivity is of the essence. It is a user-friendly tool for counting aerosol particles larger than 5 nm.

A23 Condensation Particle Counter for Vehicle Emissions

The Airmodus A23 Condensation Particle Counter is a user-friendly tool for all applications where counting aerosol particles larger than 23 nm is a necessity. It fulfills the requirements of the Particle Measurement Protocol (PMP) for EURO 5/6.

The A23 can be used both as a stand-alone instrument for measuring the total particle number concentration, and as a counter in different kinds of aerosol measurement systems.



A11 nCNC-system

The Airmodus A11 nano Condensation Nucleus Counter (nCNC) is the only commercially available measurement system for determining the size distribution of both neutral and charged 1-4 nm aerosol particles. Consisting of the A10 PSM and the A20 CPC, the A11 nCNC-system, helps you to detect and monitor the very smallest aerosol particles, down to 1 nm in size.

With the A11 you can observe the temporal variations of the number of sub-3 nm particles that are not visible with other methods.

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