Fidas® 100

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Real-time dust monitor for indoor air quality measurements and workplace exposure assessments

Description

Fig. 1: Fidas® 100

The Fidas® 100 is specifically designed for long-term workplace exposure assessments and indoor air quality measurements.

It enables the continuous and simultaneous measurement of PM_1, $PM_{2.5}$, PM_4, PM_{10}, TSP or respirable, thoracic, and inhalable mass fractions as per DIN EN 481. In addition the particle number concentration as well as the particle size distribution in 32 size classes per decade within the particle size range of 180 nm – 18 µm are determined.*

The Fidas® 100 uses the recognized measurement technology of optical light scattering of single particles and is equipped with an LED light source with high intensity (dp_{min} = 180 nm), highly stable output and long lifetime. The calibration of the system can be checked and adjusted, if necessary, easily and quickly also under field conditions on site at any time with the help of a monodisperse test powder.

The Fidas® 100 operates with a volume flow of approx. 0.3 m3/h and is equipped with sensors for measuring environmental conditions, such as temperature, atmospheric pressure, and relative humidity. It is also equipped with a filter holder for the insertion of a plane filter (47 or 50 mm in diameter). This enables a subsequent chemical analysis of the composition of the aerosol, for example.

For emission measurement in exhaust air ducts, the Fidas® 100 can be connected to an isokinetic sampling probe.

The Fidas® 100 offers various possibilities for communication and allows both complete remote control and remote maintenance of the systems and also online data access über www.palas.de/en/user. The evaluation software PDAnalyze Fidas® allows additionally for versatile data evaluations (e.g. extensive statistics and averaging calculations) and offers data export possibilities.

(*) Other fractions can be implemented upon request. The size range can also be changed to 0.5 – 40 µm or 2 – 100 µm.

Design and function

The actual aerosol sensor is an optical aerosol spectrometer that determines the particle size using Lorenz-Mie scattered light analysis of single particles. The single particles move through an optically differentiated measurement volume that is homogeneously illuminated with white light. Each particle generates a scattered light impulse that is detected at an angle of 85° to 95° degrees. The particle number is measured based on the number of scattered light impulses. The level of the scattered light impulse is a measure of the particle size diameter.

The lower detection limit for immission measurement was able to be reduced to 180 nm through improved optics, higher light density using a new white LED as the light source, and improved signal analysis (logarithmic analog digital converter). This enables greatly improved detection, especially of smaller particles, which are mainly found at high concentrations near roadsides (see Fig. 1).

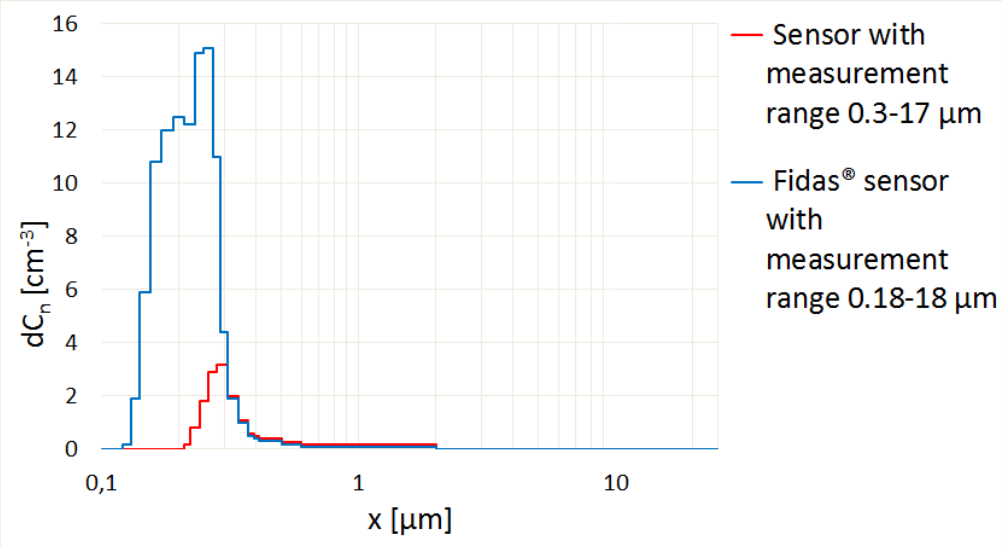

Fig. 1: Higher sensitivity with the Fidas® fine dust measurement system for the 0.18 – 18 µm particle size range

The better the classification accuracy and the resolution capacity, the more accurate the definition of the particle size distribution.

Using a white light source enables a precise and unambiguous calibration curve to be obtained, resulting in an extremely high size resolution. The patented T-stop provides a precisely defined optical measurement volume and enables particle measurement without border-zone errors, resulting in a precise size measurement. The new digitized electronic signal analysis system enables the rapid identification and correction of coincidence, as necessary.

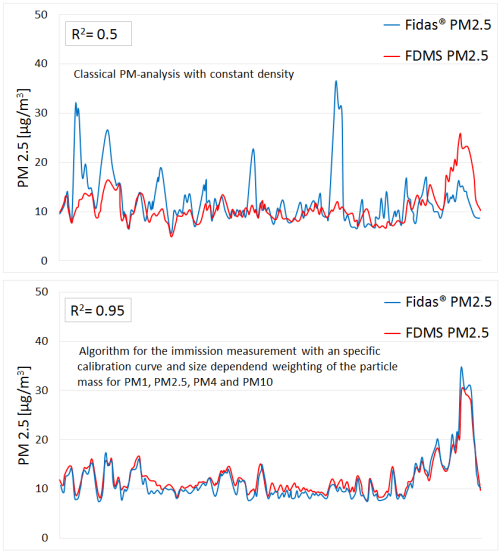

Fig. 2: Comparison of the algorithms for conversion of the particle size distribution by PM values

In order to convert the measured values into a mass or mass fraction, the high-resolution particle size distribution in each value is multiplied by a correlation factor that reflects the different sources (e.g. combustion aerosols, tire wear, pollen) of the environmental aerosol (see Fig. 2). A mass fraction is obtained by additionally applying the separation curve (see DIN EN 481) to the determined particle size distribution. Multiple separation curves can be used simultaneously for the same size distribution, which enables the simultaneous output of PM_{10}, $PM_{2.5}$, PM_1 (and others). For example the Fidas® 100 can be operated with the same conversion algorithm, which has also been implemented in the type-approved and certified ambient air monitoring system Fidas® 200 for regulatory monitoring of ambient $PM_{2.5}$ and PM_{10} concentrations.

Benefits

- Continuous and simultaneous real-time measurement of multiple PM values
- Additional information based on particle number concentration and particle size distribution
- Adjustable time resolution from > 1 s to 24 h
- Light source: LED with high stability and long lifetime
- Long service life
- Low maintenance
- External check of calibration on site possible
- Intuitive and easy to operate
- Reliable function, very high data availability
- 2 pumps in parallel operation for additional operational safety due to redundancy
- Permanent monitoring of status, among others online monitoring of calibration
- Remote monitoring, maintenance and control easily possible
- Cloud zone via Palas server for worldwide data retrieval
- No radioactive material
- No consumables
- Low energy consumption
- Reduces your operating expenses

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Datasheet

Parameter	*Description*
Interfaces	USB, Ethernet, RS232/485, Wi-Fi
Measurement range (size)	0.18 - 100 µm (3 measuring ranges)
Size channels	64 (32/decade)
Measuring principle	Optical light-scattering
Measurement range (number C_N)	0 - 20000 particles/cm^3
Time resolution	1 s - 24 h
Volume flow	4.8 l/min

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Applications

- Indoor air quality studies
- Workplace exposure measurements
- Exhaust air monitoring
- Emission source classification

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