Fidas® 200 / Fidas® 200 S

Continuous ambient air quality monitoring system for PM_1, $PM_{2.5}$ according to EN 14907* and PM_{10} according to EN 12341*

Fig. 1: Fidas 200

Fig. 2: Fidas 200 S

The **Fidas® 200** is a fine dust measurement system for regulatory ambient air quality measurements. This model is typically installed in an existing monitoring station.

The **Fidas® 200 S** consists of a Fidas® 200, which is **integrated in an IP65 weather-proof housing**. In this way, the Fidas® 200 S can be used as a stand-alone device for outdoor measurements, e.g. on the *Zugspitze* (Germany´s highest mountain) or at the North Sea Coast.

The Fidas® 200/200 S continuous ambient air quality monitoring systems provide continuous and simultaneous measurements of PM_1, $PM_{2.5}$, PM_4, PM_{10}, TSP (PM_{tot}) and the particle number concentration.

The Fidas® 200/200 S systems use the approved measurement technology of optical light scattering of single particles and are equipped with a LED light source with stable output and long lifetime. In addition, the systems provide a filter holder for the insertion of an absolute filter (ø 47 or 50 mm). This enables for example a subsequent chemical analysis of the composition of the aerosol.

The Fidas® 200/200 S systems function with a volumetric flow of 0.3 m^3/h and are equipped with a Sigma-2 sampling head according to VDI 2119-4, which allows representative measurements even at strong winds. The sampling system with drying section (Intelligent Aerosol Drying System – IADS) prevents erroneous results caused by high air humidity. An additional weather station offers reliable measurement values of ambient temperature, air pressure and relative humidity.

In addition to the measurement data with high temporal resolution, the Fidas® systems can be equipped with a standardized sampling head for $PM_{2.5}$ or PM_{10} (Leckel PMX-PNK). By weighing of the filter, the measurement data can be validated gravimetrically on site.

For all Fidas measurement systems, Palas® offers remote maintenance and data access online via www.palas.de/user.

(*) Corresponding aptitude and equivalency test in preparation

Particular advantages:

- Continuous real-time measurement of PM values (simultaneously)
- Additional information through particle number concentration
- Time resolution adjustable from 1 minute
- Light source: LED with high stability and long lifetime
- Long durability
- Low-maintenance, check of calibration possible on site
- Intuitive and easy handling
- Reliable function
- No radioactive material
- No consumables
- Reduces your operating costs!

Application examples:

- Environmental monitoring in networks
- Immission
- Long-term studies
- Source apportionment
- Propagation and distribution studies (e.g. volcano, fire)

Technical parameters:

• Measuring principle:	optical light scattering
• Reported data (simultaneous):	PM_1,$PM_{2.5}$,PM_4,PM_{10},TSP, number
• Size channels (optional):	64
• Measurement range (particle size):	0.18 – 18 µm
• Measurement range (number):	1 – 20,000 particle/cm^3
• Measurement range (mass):	0 – 1,500 µg/m^3
• Time resolution:	from 1 minute
• Aerosol flow:	5 l/min (0.3 m^3/h)
• Working temperature (200/200 S):	-30 to +35°C/0 to +35°C
• Power supply:	115/230 V; 50/60 Hz
• Power consumption (200 incl. IADS):	140 W
• Dimensions (Fidas® 200):	19“ or 18.5 x 45 x 32 cm
• Weight (Fidas® 200):	9.3 kg (20.5 lbs)
• Interface:	Touch screen 800 x 480 pixels
• Data logger (inclusive):	4 GB Compact Flash
• Interfaces:	LAN, WLAN, RS-232/485, USB optional: GPRS/UMTS modem

Accessories:

- PM heads (Leckel PMX-PNK, with aerosol flow 0.2 m^3/h)
- Sensors for the measurement of ambient conditions

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Palas® is continuously setting standards in aerosol technology with more than 50 patents filed since 1983. Our innovations result in products of superior quality and long durability, which lead to unique technical and economic advantages for our customers.

On this account, Palas® could established itself as a world-wide market leader in aerosol generation, aerosol dilution and aerosol particle measurement.

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Fidas® 200 / Fidas® 200 S
Quality in detail

Setup and principle of operation:

Figure 3 shows the setup of the Fidas® continuous ambient air quality monitoring system. It consists of a Sigma-2 sampling head, which allows representative measurements in case of strong winds. An Intelligent Aerosol Drying System (IADS) avoids that the particle size measurement is affected by moisture, by using a dynamically regulated drying system with regard to relative humidity and ambient temperature.

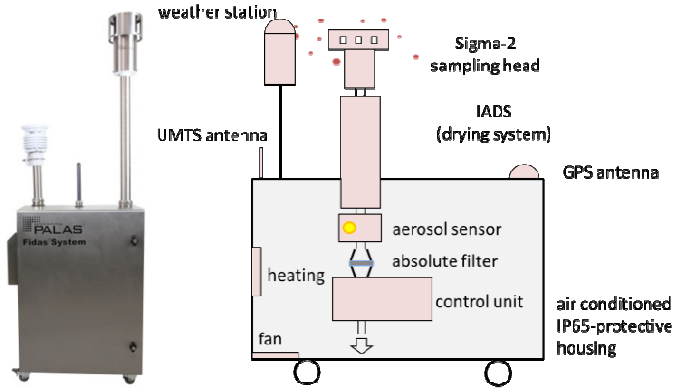

Fig. 3: Setup of the Fidas® 200 S fine dust measurement system

The aerosol sensor is an optical aerosol spectrometer, which determines the particle size and number by a scattered light analysis according to Lorenz Mie. The particles move separately through an optically differentiated measurement volume, homogeneously illuminated with white light. Each particle generates a scattered light impulse, detected at an angle of 85° to 95° degrees. The number concentration is deducted from the number of scattered light impulses. The intensity of the scattered light is a measure for the particle size diameter.

The lower detection limit was reduced to 180 nm by using optimised optics, higher light density and improved signal analysis (logarithmic analog digital converter). In this way, smaller particles, measured roadside in high concentration, can be reproduced better (figure 4).

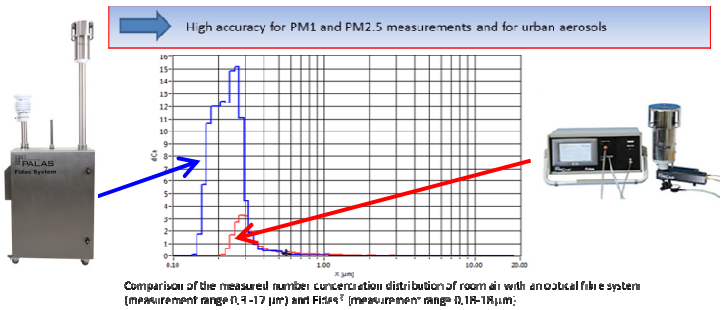

Fig. 4: Higher sensitivity with Fidas® fine dust measurement system for the particle size of 0.18 - 18 µm

The better the classification precision and the resolution capacity, the more accurate the particle size distribution can be defined.

Using a white light source, a precise calibration curve without ambiguity can be achieved, resulting in an extremely high size resolution. The patented T-aperture leads to an accurately defined optical measurement volume and permits a particle measurement without border-zone-errors and therefore a precise size measurement. The new and quick digitalised signal electronic analysis allows the identification and correction of coincidence.

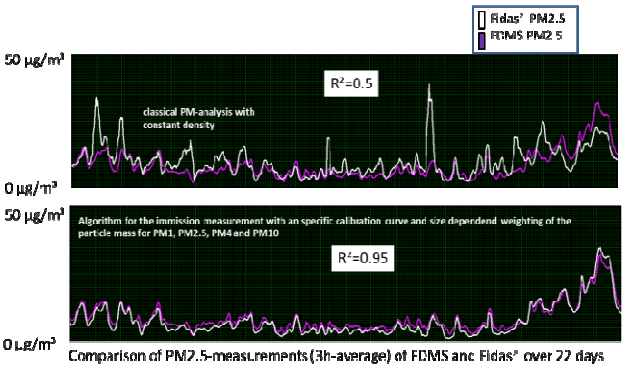

Fig. 5: Comparison of algorithms for the conversion of particle size distribution according to PM factors.

For the conversion of the measured indicators into mass or mass fractions, each value of the high resolution particle size distribution is multiplied with a correlation factor. In this way which shows that the aerosol particulate is made up of different sources (e.g. combustion aersols, tire abrasion, pollen) according to its particle size (figure 5). A mass fraction is achieved by applying an additional separation curve (e. g. DIN EN 481) to the determined particle size distribution.

At the same time, several separation curves can be used for the size distribution, which enables the simultaneous output of PM_{10}, $PM_{2,5}$, PM_1 (and others).

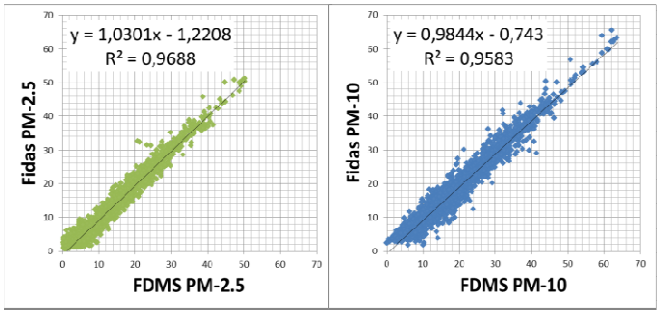

Fig. 6: Comparison of 1-h measurements for $PM_{2.5}$ and PM_{10} of Fidas® 200 S with a TEOM FDMS of a measurement campaign in a city in Northern Germany during the time from August untill November 2010

Downstream to the optical sensor there is a filter holder for an optional gravimetric validation of measured data.

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