



Product data sheet

Palas® Fidas® 200



Applications

- Regulatory environmental monitoring in measuring networks
- Ambient air measurement campaigns
- Long-term studies
- Emission source classification
- Distribution studies (e.g. fires, volcanoes)

Benefits

- Type-approved and certified according to latest EN requirements (EN 15267)
- Continuous and simultaneous real-time measurement of multiple PM values
- Additional information 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 (> 99 %)
- 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

Description

The Fidas® 200 is a fine dust monitoring and ambient air measurement system for ambient air monitoring of fine dust for regulatory purposes. This version is designed for indoor installation at temperature-controlled sites and is typically incorporated in measurement cabinets or stations.

The Fidas® 200 enables the continuous and simultaneous measurement of PM₁, PM_{2.5}, PM₄, PM₁₀, TSP (PM_{tot}), as well as the particle number concentration and the particle size distribution in a size range of 180 nm to 18 µm (further non-certified size ranges possible upon request).

The Fidas® 200 incl. the variations Fidas® 200 S and Fidas® 200 E is currently the only optical ambient air measuring system for online and simultaneous PM_{2.5}- and PM₁₀-measurements at single particles (counting measuring method), which is type-approved according to the Standards VDI 4202-1, VDI 4203-3, EN 12341 (PM₁₀), EN 14907 (PM_{2.5}) and the EN Equivalence Guide GDE and certified according to the Standards EN 15267-1 and -2. The publication of the declaration of suitability of the Fidas® 200 was carried out first in the German Federal Gazette BAnz AT 02nd April 2015 B5 in chapter IV notification 14, the publication of the EN 15267 certificate (issued by TÜV Rheinland and German Federal Environment Agency) and the test report is carried out on www.qal1.de.



Fig. 1: EN 15267 certificate for Fidas® 200

Moreover the measuring system is also approved and certified according to the latest requirements in the UK (CAMS & MCERTS for UK particulate matter (Defra Approval)). The respective certificate can be found under <http://www.csagroupuk.org/wp-content/uploads/2016/04/MC16029001.pdf>.



Fig. 3: MCERTS/DEFRA Approval for Fidas® 200

The Fidas® 200 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® 200 operates with a volume flow of approx. 0.3 m³/h and is equipped with a Sigma-2 sampling head as per Standard VDI 2119-4, which enables representative measurements even under strong wind conditions. The sampling system includes a drying system (intelligent aerosol drying system - IADS) that prevents measurement inaccuracies caused by condensation effects resulting from high humidity. In addition, a weather station provides reliable results for ambient air temperature, atmospheric pressure, and relative humidity, by request additionally also for wind velocity, wind direction and precipitation. 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.

The Fidas® 200 offers various possibilities for communication and allows both complete remote control and remote maintenance of the systems and also online data access via www.palas.de/user. The evaluation software PDAnalyze Fidas® allows additionally for versatile data evaluations (e.g. extensive statistics and averaging calculations) and offers data export possibilities.

Additionally to the indoor version Fidas® 200, also an outdoor version Fidas® 200 S is available. This version is integrated in an IP65-weather proof cabinet and can thus be operated totally independent of a measurement cabinet in outdoor conditions.

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. 4).

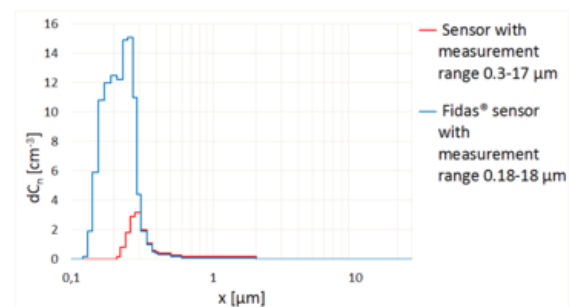


Fig. 4: Higher sensitivity with the Fidas® fine dust measurement system for the 0.18 - 18 μm particle size range

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.

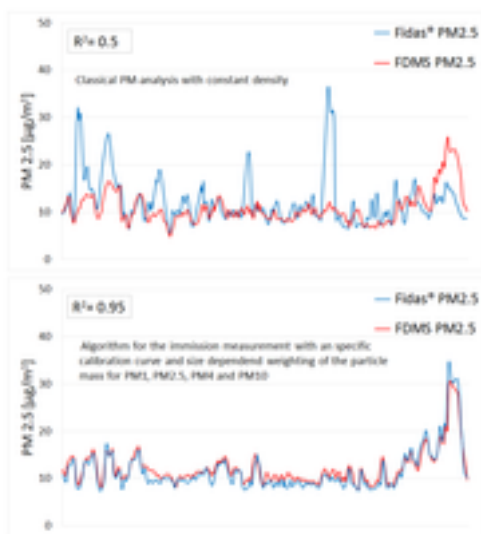


Fig. 5: Comparison of the algorithms for conversion of the particle size distribution by PM values

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. 5). A mass fraction is obtained by additionally applying the separation curve (see DIN EN 481) to the determined particle size distribution. Exact matches with gravimetric results cannot be guaranteed in every case due to the different principle

of measurement (equivalent method), but as a matter of principle a very good correlation with the standard reference method (see Fig. 6) could be demonstrated among others during the type approval testing and can be reviewed in the type approval test report under www.qal1.de.

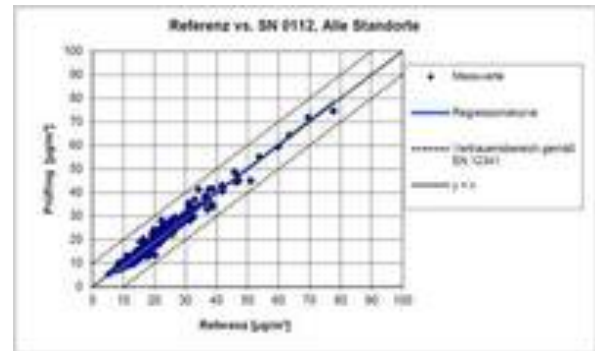


Fig. 6: PM10 reference equivalence function of the Fidas® 200 S in comparison with a reference small-filter device during the course of suitability testing from the "Report on supplementary testing of the Fidas® 200 S respectively Fidas® 200 measuring system manufactured by PALAS GmbH for the components suspended particulate matter PM10 and PM2.5, TÜV report no.: 936/21227195/B".

Multiple separation curves can be used simultaneously for the same size distribution, which enables the simultaneous output of PM10, PM2.5, PM1 (and others).

Specifications

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, 15 min in type approved operation
Volume flow	4.8 l/min \approx 0.3 m ³ /h
Data acquisition	Digital, 20 MHz processor, 256 raw data channels
Power consumption	Approx. 200 W
User interface	Touchscreen, 800 • 480 Pixel, 7"
Power supply	115 - 230 V, 50 - 60 Hz
Housing	Table housing, optionally with mounting brackets for rack-mounting
Dimensions	450 • 320 • 180.5 mm (H • W • D), 19"
Weight	9.3 kg (control unit only)
Operating system	Windows embedded
Data logger storage	4 GB
Software	PDAnalyze Fidas®
Aerosol conditioning	Thermal with IADS
Measurement range (mass)	0 - 10000 $\mu\text{g}/\text{m}^3$
Reported data	PM ₁ , PM _{2.5} , PM ₄ , PM ₁₀ , TSP, C_N , particle size distribution, pressure, temperature, humidity
Installation conditions	+5 – +40 °C
Sampling head	Sigma-2