

Suitability Tested
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2008/50/EC
EN 15267
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FIDAS®

FINE DUST MONITORING SYSTEMS

Fidas® – the world's only certified optical fine dust measurement system with single particle analysis for $PM_{2.5}$ | PM_{10}



PALASCOUNTS

APPLICATIONS

- Measurements at workplaces and in interiors
- Environmental measurements and long-term studies



FINE DUST IS ALL AROUND

APPLICATIONS

– ENVIRONMENTAL MEASUREMENTS

- Environmental monitoring in monitoring networks
- Immission
- Long-term studies
- Emission source allocation
- Propagation studies (e.g. volcano, fires)

APPLICATIONS

– OCCUPATIONAL HEALTH & SAFETY / INTERIORS

- Workplace measurements
- Indoor air quality studies
- Exhaust air monitoring
- Emission measurement



Fine dust measurements in the workplace

Fine dust is on everybody's lips today – and in both senses. Not only is it a constant theme in the press and in the news, but it is literally also the mucous membranes through which fine dust particles make their way into the human body. Professor Dr. Christian Schulz from University Hospital Regensburg describes their impact on the human body in his health tips [1], ranging from irritation of the mucous membranes and local inflammation of the breathing organs right up to increased risks in terms of cardiovascular diseases in general.

As a result, it is becoming increasingly important for cities and towns to concentrate on a reduction of fine dust in the atmosphere and to ensure that the valid guide values are met, for example the limits that apply across Europe of $50 \mu\text{g}/\text{m}^3$ (PM_{10}) as a daily maximum limit that must not be exceeded more than 35 times a year. Here, focus is shifting increasingly toward very fine particles with an even lower mass concentration ($\text{PM}_{2.5}$).

In practice, before we can tackle the sources of fine dust or take any other measures, the first step we have to take is to measure the fine dust burden. This requires certified measurement devices that deliver well-founded measurement results even under varied conditions. The measurement devices from Palas® GmbH not only satisfy these requirements, but in some cases also significantly surpass them. For example, it is possible to measure and display the mass concentrations PM_{10} and $\text{PM}_{2.5}$ simultaneously with single particle measurement – a performance feat that no other device known to us has been able to deliver.

[1] <http://www.uniklinikum-regensburg.de/service/aktuelles/04664.php>



MORE THAN JUST MEASUREMENTS

Measurement values and particle number information

All Fidas® devices **simultaneously** measure PM_{10} , $PM_{2.5}$, PM_{4} , PM_{10} , TSP, the alveolar, thoracic and respirable mass fractions in accordance with DIN EN 481, and the particle size distribution **with 256 raw data channels in a single measurement device** and with a **high time resolution**.

Sigma-2 sampling head

The **virtually maintenance-free** Sigma-2 sampling head (VDI 2119) allows representative measurements to be taken even under extreme weather conditions, e.g. strong wind.

Intelligent Aerosol Drying System (IADS)

The **sampling system with drying system** prevents falsification of the measurement results due to condensation effects under high humidity. It also works reliably in fog and at low temperatures (-20 °C).

Calibration and online status monitoring

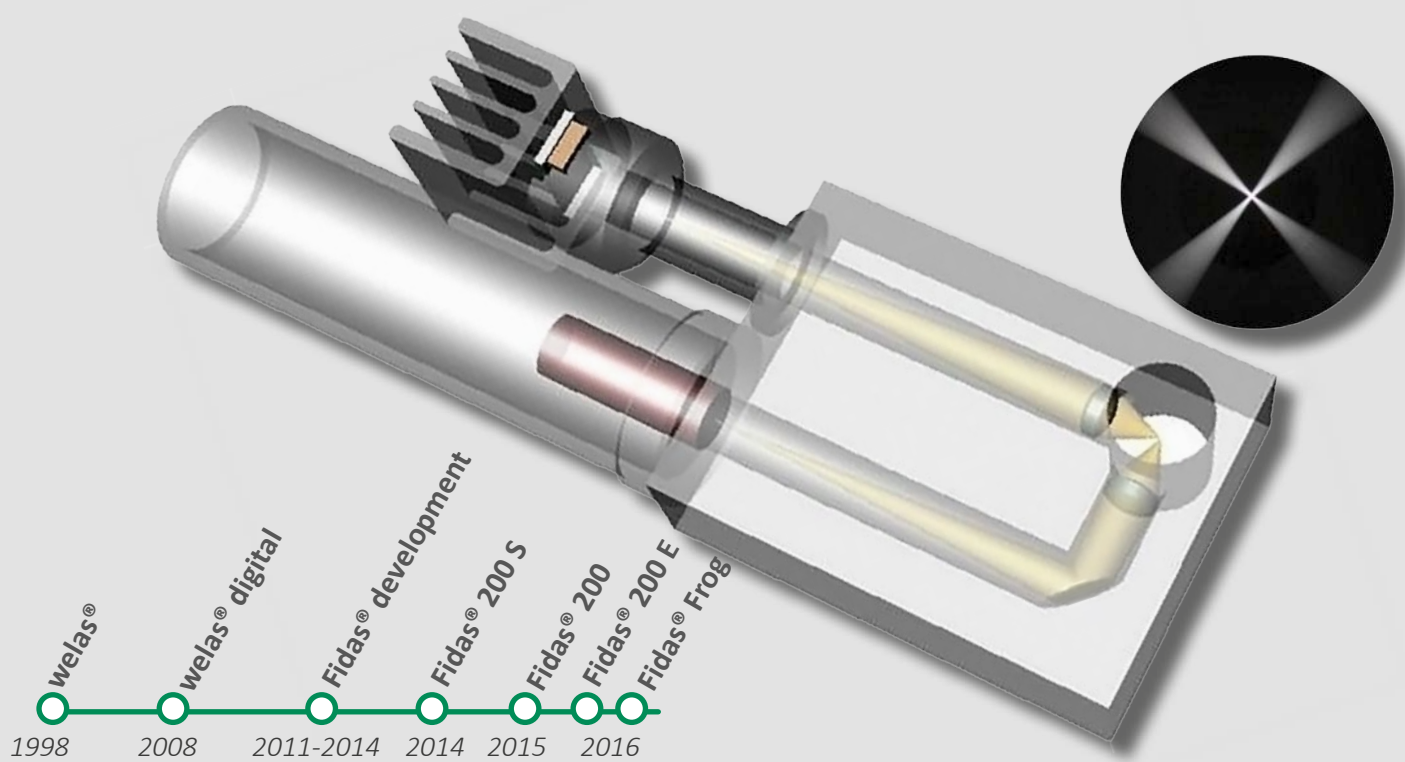
For many fine dust measurement devices, the calibration process is complex and expensive. With the Fidas® system, the user can directly perform a **clear and unambiguous calibration** at any time with the aid of the supplied calibration dust. In addition, the devices also feature our patented online status monitoring. This means that the calibration can be checked online at any time.

Optimized operation and analysis concept

The intuitive touchscreen user interface enables **simple operation** of the devices. **Remote access** is also supported and can be used to avoid unnecessary trips to the deployment sites. The supplied software offers a range of different analysis options.

FIDAS® – FINE DUST DATA IS IMMEDIATELY AVAILABLE

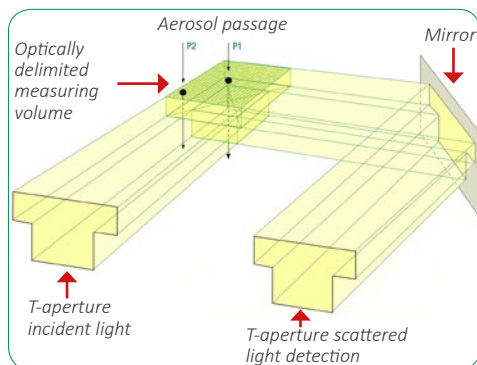
- Fidas® fine dust measurement devices detect burdens even before they arise, whereas other technologies only provide access to the results with a delay of several days in some cases. In networked systems, **early detection** and therefore **rapid warning for environmental hazards** are possible. In some cases, this allows the causes to be dealt with straight away.
- Health hazards can be caused not only by **average exposure levels**, but also by **peak short-term values**. The rapid availability of Fidas® data enables reliable **detection of peak burdens**.
- Fidas® fine dust measurement devices offer **data availability in excess of 99 %**. This extremely low failure probability increases environmental safety in areas monitored with Fidas® technology. Similarly, Fidas® devices also offer **significantly lower measurement uncertainty** than the levels that are permitted by the relevant standards.



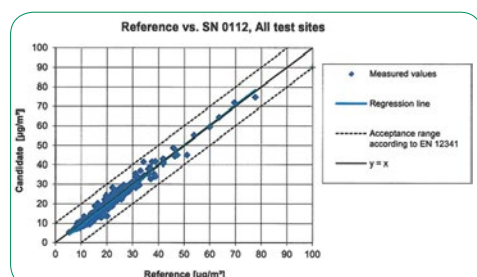
THE FIDAS® PRINCIPLE

Optical aerosol measurement

The aerosol spectrometers from Palas® (welas® digital, Promo®, Inas® and Fidas®) use the special technology of **optical light scattering of single particles** according to Lorenz-Mie, which is protected with three patents. Its basis is the patented **T-aperture technology**. By arranging two T-apertures in the optical path (refer to the illustration), a T-shaped three-dimensional measuring volume is generated. This technology enables the performance of particle size and particle quantity measurements in low concentrations with a large measuring volume and in high concentrations with a small measuring volume without border zone errors.



T-aperture technology



Reference equivalence function for PM₁₀
for Fidas® 200 and Fidas® 200 S

The devices are equipped with a **white light source** and a **unique calibration curve**. Depending on the device type, the Palas® aerosol spectrometers can be used for measurements in the particle size range from 120 nm to 100 µm and in very high concentrations up to 10⁶ particles/cm³. The measuring range for the certified Fidas® devices is between 0.18 µm and 18 µm.

In contrast to other methods, the optical scattered light measurement technology enables **continuous** and **high-resolution** measurement of **particle number and particle size** and the **simultaneous output of different PM-values from just one device**.

Cost-effective to run

The quality and technology advantages are the reason not only why the Fidas® fine dust monitoring systems are so reliable to run, but also why they are **particularly cost-effective** in operation thanks to their **minimal maintenance requirements** and **very low energy consumption**. With the Fidas® system, users can reduce their operating costs for fine dust measurements.

FIDAS® IS THE WORLD'S ONLY
CERTIFIED OPTICAL FINE DUST
MEASUREMENT SYSTEM WITH
SINGLE PARTICLE ANALYSIS FOR THE
FINE DUST FRACTIONS $PM_{2.5}$ AND PM_{10}



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... PROVEN EXCELLENCE

Approved for measurements by regulatory authorities

The fine dust measurement devices Fidas® 200, Fidas® 200 S and Fidas® 200 E from Palas® have passed TÜV Rheinland's equivalence and suitability test and, following the notification in the Federal Gazette, they are now officially approved for use in environmental measurements by official bodies and authorities. This approval applies to all measurement networks in Europe.

This means that Fidas® 200, Fidas® 200 S and Fidas® 200 E are currently the world's only optical fine dust measurement systems with single particle analysis for the fine dust fractions PM_{10} and $PM_{2.5}$ that have passed this test in accordance with DIN EN 12341 and DIN EN 14907 and have been certified in accordance with DIN EN 15267-1 & -2.

The Fidas® 200 series has also been approved for regulatory measurements in the UK (MCERTS) and France (Homologation).

Our experience delivers reliable results

The Fidas® system has been developed on the basis of over 30 years of experience and our own patented technologies. During the suitability test, it impressed with:

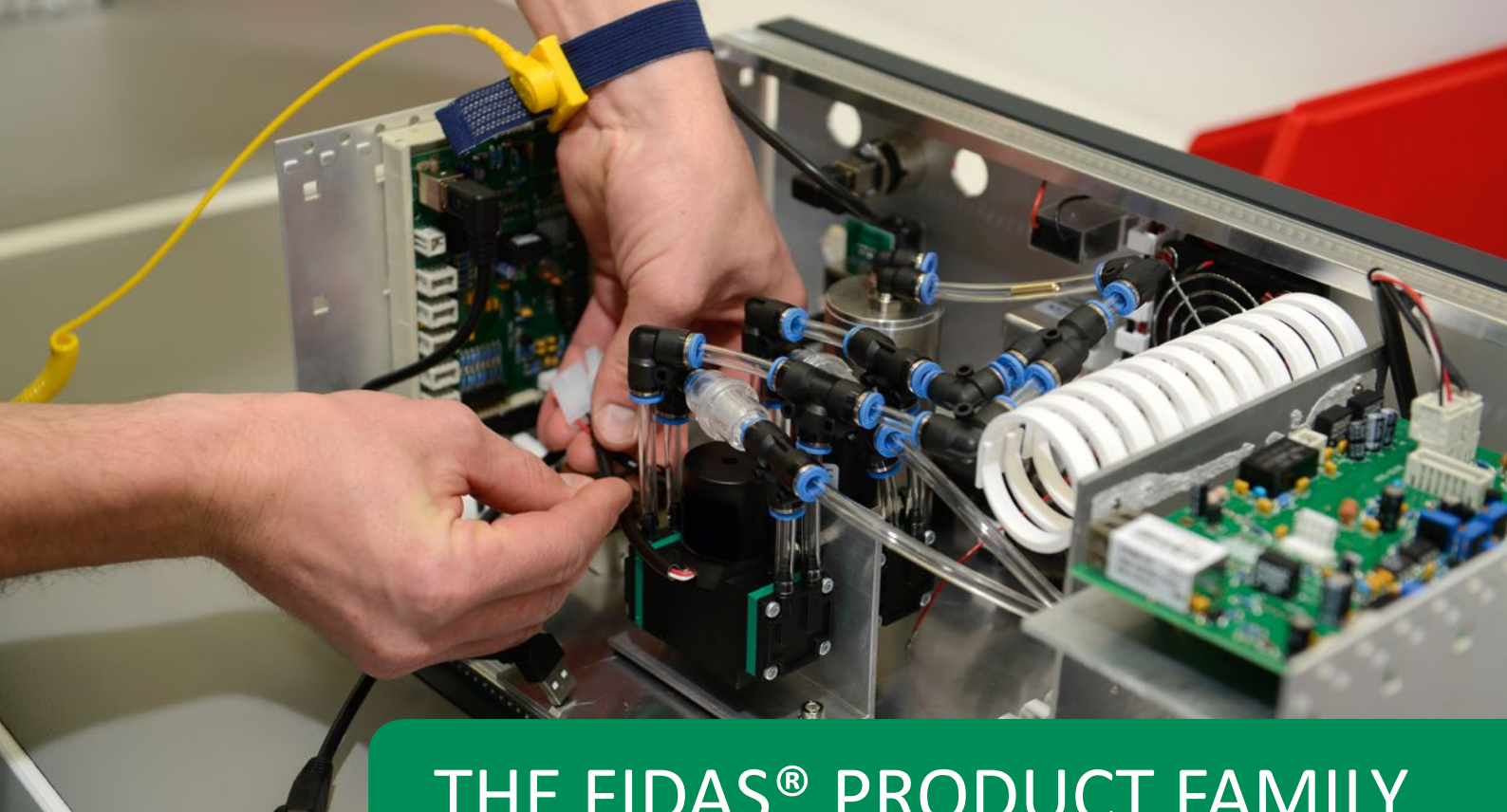
- High data availability (> 99 % in a test over 322 days of measurement)
- Low measurement uncertainty between test devices:
0.44 $\mu\text{g}/\text{m}^3$ for $PM_{2.5}$, 0.64 $\mu\text{g}/\text{m}^3$ for PM_{10} (2.5 $\mu\text{g}/\text{m}^3$ are permitted)
- Low extended measurement uncertainty (comparison of all measurement values): 10.17 % for $PM_{2.5}$, 7.22 % for PM_{10} (25 % are permitted)
- Online status monitoring (incl. calibration status)
- Lowest maintenance activities
- Simple operation

FIDAS® 200 / 200 S / 200 E TESTED IN ACCORDANCE WITH

- VDI 4202-1, VDI 4203-3, DIN EN 12341 (PM_{10}), DIN EN 14907 ($PM_{2.5}$) and the equivalence guideline

CERTIFIED TO

- **DIN EN 15267-1 and -2** by TÜV Rheinland (Europe-wide) and approved by the German Environment Agency for officially commissioned measurements. Further information can be found in the report about the suitability testing of the immission measurement devices of Palas® GmbH for the components airborne particles PM_{10} and $PM_{2.5}$ – TÜV report: 936/21227195/B at www.qal1.de
- Fidas® 200, Fidas® 200 S and Fidas® 200 E have been awarded the **MCERTS-certificate in the United Kingdom** and thus satisfy the requirements for continuous monitoring of PM_{10} and $PM_{2.5}$ in the ambient air.
- Fidas® 200, Fidas® 200 E and Fidas® 200 S have already been awarded the **homologation for suburban areas in France**. The approval for rural and urban areas is still under preparation.



THE FIDAS® PRODUCT FAMILY



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Fidas® 200 system (certified)

Along with Fidas® 200 S and Fidas® 200 E, Fidas® 200 is currently **the only certified optical fine dust measurement system** with single particle analysis for simultaneous measurement of $PM_{2.5}$ and PM_{10} values, e.g. in measuring networks. The devices are therefore officially approved for environmental measurements by regulatory authorities. The Fidas® 200 model is designed for use in a measurement container. It performs particle size measurements with 32 channels per decade.



Fidas® 200 S

Fidas® 200 S has the same properties as Fidas® 200. In addition, it is equipped with an IP65 weatherproof housing (-20 °C / +50 °C) and can be operated outdoors as a standalone device independently of a measurement container, where it is just as well suited to applications in high mountains as it is to applications on the coast.



Fidas® 200 E

On the Fidas® 200 E, the entire sensor unit is separated out from the control unit and housed in a separate enclosure. With the separate sensor unit, the degree of freedom for installation of the measurement device in a measurement station is significantly increased.



... AND ITS APPLICATIONS

Palas® has developed the certified devices in the Fidas® 200 series for environmental monitoring in networks, immission measurements, long-term studies, emission source allocation or propagation studies, for example at volcanic eruptions or large-scale fires. The system is used just as successfully in public measuring networks and conurbations as it is along coasts, in mountains, in the Arctic and in desert regions.

We spend the vast majority of our lives indoors. In many cases, the dust burden here is even higher than in the environment outside. As a result, the same high requirements apply here to the measurement technology as they do for environmental measurements. This makes it important to check the technical specifications of a fine dust measurement device very closely before making a decision to invest in it.

Fidas® Frog

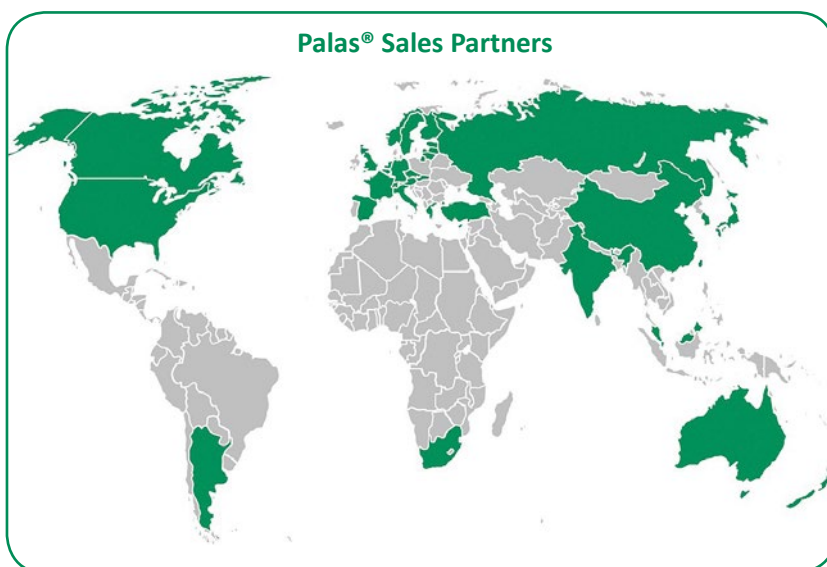
Fidas® Frog is a lightweight and compact, **portable handheld device with battery mode**. It can be operated easily and intuitively via a supplied tablet PC or via the PC of the operator. It features data storage, WiFi support and location detection (GPS) and can therefore be used quickly and flexibly. Particle size measurements are possible from $0.18\ \mu\text{m}$ – $100\ \mu\text{m}$ and are performed with 64 channels per decade. Fidas® Frog meets the requirements for measurements in workplaces and interiors.



Fidas® Fly

Fidas® Fly 100 and Fidas® Fly 200 are extremely lightweight real-time fine dust monitors for mounting on drones, which are currently being trialed. They enable measurements to be performed in previously inaccessible locations. Applications include e.g. fine dust measurements in the field of the transition of emissions into the atmosphere, over opencast mines or for data collections for forecasting models in research projects.





PALAS® – MORE THAN 30 YEARS OF EXPERTISE IN AEROSOL TECHNOLOGY

With more than 60 submitted patents, Palas® has been setting standards in aerosol and particle technology for over 30 years. Thanks to continuous innovation we are able to deliver exceptional quality and long product durability.

For our customers, this means unique technical and commercial advantages. Palas® has established itself as a global market leader in the areas of aerosol generation, aerosol dilution and aerosol measurement technology. Renowned companies, universities and research facilities all around the world trust in precision technology from Palas®.

OUR CORE COMPETENCIES

- Fine dust monitoring systems
- Nanoparticle measurement technology
- Aerosol spectrometer systems*
- Filter test systems*
- Particle generation systems*
- Dilution systems*
- Cleanroom particle technology
- Special developments
- Calibration systems*
- Services
- Training courses and seminars

** Palas® is the market leader in these product groups*

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