



Palas Fidas® 200 Series

Continuous ambient air quality monitoring system for $PM_{1,}$ $PM_{2.5}$
according to EN 14907* and PM_{10} according to EN 12341*



TOGETHER WE CREATE SOLUTIONS THAT SHAPE THE FUTURE

ABOUT PALAS®

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

ECOTECH is the exclusive distributor of PALAS in Australia and New Zealand.



*Corresponding aptitude and equivalency test in progress

Fidas® 200 series

FIDAS® 200 / FIDAS® 200 S / FIDAS® 200 E

Fidas® 200 is a fine dust measurement system for regulatory ambient air quality measurements.

This model is typically installed in an existing shelter. For flexible installation we also offer Fidas® 200 E, which features a detached sensor unit that fits to the bottom end of the aerosol inlet tube. The distance between controller and sensor can be up to 6 m.

Fidas® 200 S consists of a Fidas® 200, integrated in a weather proof housing. The Fidas® 200 S is designed as a standalone device for outdoor measurements, e.g. on the Zugspitze (Germany's highest mountain) or at the North Sea Coast.

The Fidas® 200 / S / E ambient air monitors are certified by German Umweltbundesamt & DEFRA/mCERTs for continuous, simultaneous measurement of $PM_{2.5}$ and PM_{10} .

All Fidas® 200 / S / E monitors 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 (\varnothing 47 or 50 mm). This enables for example a subsequent chemical analysis of the composition of the aerosol.



All Fidas® 200 / S / E monitors operate with a volumetric flow of $0.3 \text{ m}^3 / \text{h}$ 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® 200 / S / E monitors can be equipped with a standardised 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.

Specifications

PARTICULAR ADVANTAGES

- Continuous real-time measurement of PM values (simultaneously)
- Additional information through particle number concentration
- Time resolution adjustable
- 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
- Emission
- Long term studies
- Source apportionment
- Propagation and distribution studies (e.g. volcano, fire).

ACCESSORIES

- PM heads (Leckel PMX-PNK, with aerosol flow 0.2 m³ / h)
- Sensors for the measurement of ambient conditions.

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 (number):	0.18 – 18 µm
Measurement range (mass):	Max. 20,000 particle / cm ³ max. 10,000 µg / m ³ shortest interval 1s
Time resolution:	µg / m ³ shortest interval 1s
Aerosol flow:	5 l / min (0.3 m ³ / h)
Working temperature (200/200 S):	0 – 50° C / - 20 – 50° C
Power supply:	115 / 230 V; 50 / 60 Hz
Power consumption (200 incl. IADS):	140 W
Fidas® 200 Dimensions:	19“ or 18.5 x 45 x 32 cm
Fidas® 200 Weight :	9.3 kg (20.5 lbs)
Interface:	Touch screen 800 x 480 pixels 8 GB
Data logger (inclusive):	Compact Flash
Interfaces:	LAN, WLAN, RS - 232 / 485, USB optional: GPRS / UMTS modem

Quality in detail

SETUP & PRINCIPLE OF OPERATION

Figure 1 shows the setup of the Fidas® continuous ambient air quality monitoring system.

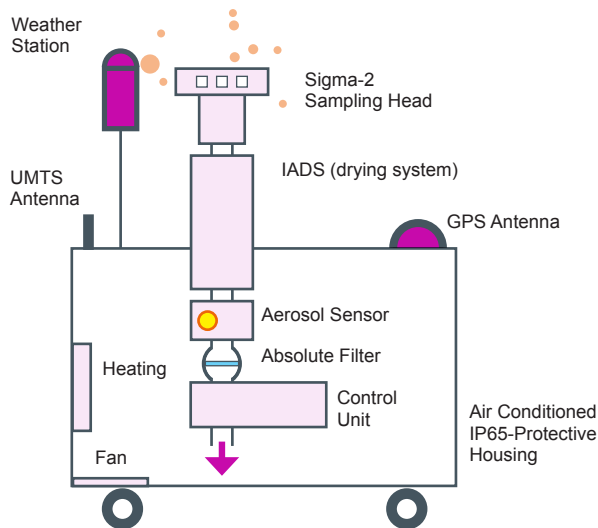


Fig. 1

Setup of the Fidas® 200 S fine dust measurement system

The lower detection limit was reduced to 180 nm by using optimised optics, higher light density and improved signal analysis (logarithmic analog digital converter).

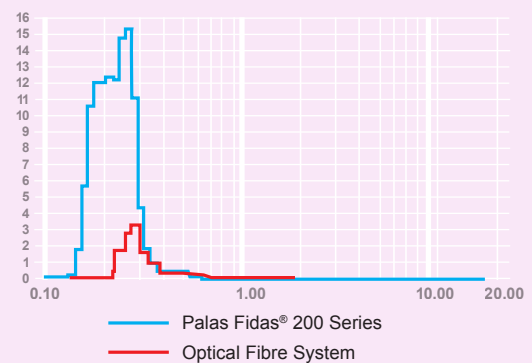
In this way, smaller particles, measured roadside in high concentration, can be reproduced better (figure 1).

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

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.

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 deduced from the number of scattered light impulses. The intensity of the scattered light is a measure for the particle size diameter.

High accuracy for PM₁ & PM_{2.5} measurements & for urban aerosols



Comparison of the measured number concentration distribution of room air with an optical fibre system (measurement range 0.3-17 µm) and Fidas® (measurement range 0.18-18 µm)

Fig. 2

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

SETUP & PRINCIPLE OF OPERATION

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.

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 aerosols, tire abrasion, pollen) according to its particle size (figure 3).

A mass fraction is achieved by applying an additional separation curve (e.g. DIN EN 481) to the determined particle size distribution. Due to the different measurement principle (equivalence measurement method) an exact matching to gravimetry cannot be guaranteed in every case.

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).

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

Fig. 3

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

— Fidas® $PM_{2.5}$
— FDMS $PM_{2.5}$

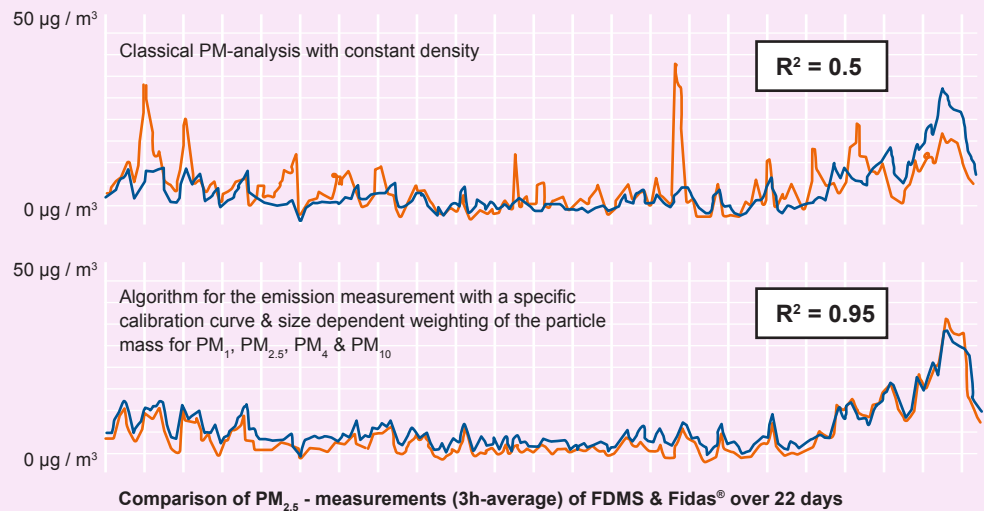
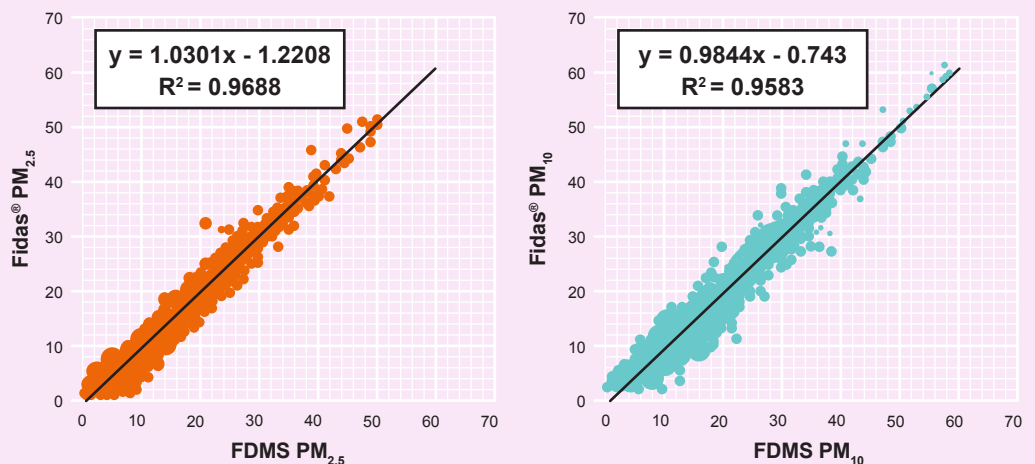


Fig. 4

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 until November 2010





ABOUT ECOTECH: Together we create solutions that shape the future

For over 40 years ECOTECH has pioneered innovative solutions in environmental monitoring for air, water, gas, noise, vibration, blast, fine particulate and dust. Headquartered in Australia, and certified to internationally recognised quality standards, ECOTECH operates in more than 80 countries, managing and maintaining over 500 real-time environmental monitoring sites consisting of thousands of individual pieces of precision equipment. ECOTECH is part of the ACOEM Group.

ABOUT ACOEM: Reduce your environmental impact

The ACOEM Group is a global leader in providing sustainable solutions for the development of smart cities of the future. It is committed to helping companies and public authorities meet challenges by offering products and services that:

- Prevent and control air, noise and vibration pollution
- Increase the productivity and reliability of industrial machinery
- Contribute to the development of effective, robust & noiseless solutions
- Protect soldiers, sites and vehicles in military theatres of operation.

Across the world, ACOEM's 700+ employees innovate in the measurement, analysis and control of environmental parameters through its 01dB, ECOTECH, AIR MONITORS, ONEPROD, FIXTURLASER, MEAX, VIBRALIGN and METRAVIB brands.

ECOTECH ACOEM Group

NZ, VIC, SA, TAS

1492 Ferntree Gully Road
Knoxfield VIC 3180
Melbourne Australia

+61 3 9730 7800
email@ecotech.com

NSW, ACT

40/65 Marigold Street
Revesby NSW 2212
Sydney Australia

+61 2 8707 7400
email@ecotech.com

QLD, NT

84 Lomandra Drive
Brisbane Airport
Brisbane QLD 4008

+61 7 3393 7400
email@ecotech.com

WA

45 Horus Bend
Bibra Lake WA 6163
Perth Australia

+61 8 9434 7800
email@ecotech.com

ecotech.com



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