FIDAS® 200

MODEL VARIATIONS

Fidas® 200 E

EN 16450 approved fine dust aerosol spectrometer for simultaneous measurement of $PM_{2,5}$ and PM_{10}, featuring a separate sensor for existing roof glands

Fidas® 200 S

EN 16450 approved fine dust aerosol spectrometer for simultaneous measurement of $PM_{2.5}$ and PM_{10} in weatherproof cabinet for outdoor installation

DESCRIPTION

The fine dust measurement device Fidas® 200 is an aerosol spectrometer developed specifically for regulatory air pollution control. It analyzes continuously the fine dust particles present in the ambient air in the size range 0.18 – 18 μm and calculates simultaneously the immission values PM_{10} and $PM_{2.5}$ to be monitored by law. At the same time PM_1, PM_4, TSP, the particle number concentration C_N, and the particle size distribution are calculated and recorded. It thus delivers comprehensive information about the fine dust particles, as only provided by a counting, single particle measuring principle. The Fidas® 200 version displayed here is a 19″ rack mount device designed for installation in air conditioned monitoring stations (temperature range 5 – 40 °C). Variants are the Fidas 200® E with separate sensor (for easier integration in stations with existing ceiling glands) and the Fidas® 200 S for outdoor installation (including a stainless steel cabinet).

Fidas® 200 as well as its functionally identical variations Fidas® 200 E and Fidas® 200 S are currently the only optical single particle measuring devices that are type approved for simultaneous monitoring of PM_{10} and $PM_{2.5}$ according to standards VDI 4202-1, VDI 4203-3, EN 12341, EN 14907, EN 16450, and the EU Equivalence Guide GDE and certified in compliance with standards EN 15267-1 and -2. Type approval declaration of the Fidas® 200 was published first in the German Federal Gazette BAnz AT 02nd April 2015 B5 in chapter IV, notification 14. The product[1] issued by TÜV Rheinland and the German Federal Environmental Agency, as well as the measuring[2] for the version Fidas® 200 S compiled by TÜV Rheinland are published at www.qal1.eu[3] .

Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000040212_05

AMS designation: Fidas® 200 S, Fidas® 200 and Fidas® 200 E for suspended particulate matter PM_{10} and $PM_{2.5}$

Manufacturer: PALAS GmbH, Greschbachstraße 3b, 76229 Karlsruhe, Germany

Test Laboratory: TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and found to comply with:
VDI 4202-1 (2010), VDI 4203-3 (2010), EN 12341 (1999), EN 14907 (2005), EN 16450 (2017) Guide to the demonstration of equivalence of ambient air monitoring methods (2010), EN 15267-1 (2009) and EN 15267-2 (2009)

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 14 pages).
The present certificate replaces certificate 0000040212_04 of 13 April 2018.

TÜVRheinland CERTIFIED

Performance tested
Equivalent to:
2006/50/EC
EN 15267
Regular Surveillance
www.tuv.com
ID 0000040212

Publication in the German Federal Gazette (BAnz) of 26 March 2019

This certificate will expire on: 25 March 2024

German Federal Environment Agency, Dessau, 12 June 2019

TÜV Rheinland Energy GmbH, Cologne, 11 June 2019

Dr. Marcel Langner, Head of Section II 4.1

ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu / www.enviro-tuv.eu
tre@umwelt-tuv.eu
Phone: + 49 221 806-5200

TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln

Test institute accredited to EN ISO/IEC 17025:2005 by DAkkS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11123-02-00.

qal1.de

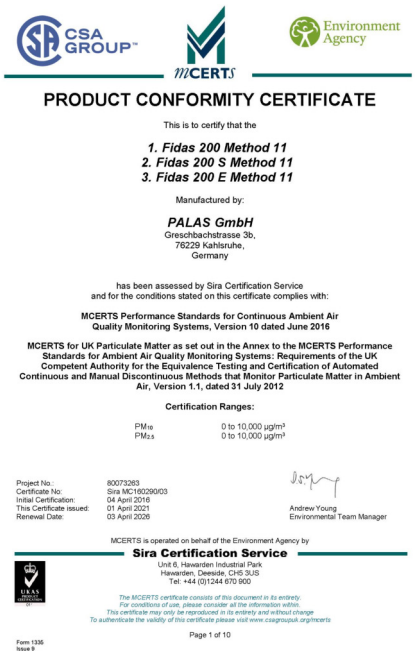
Page 1 of 14

Fig. 1: EN 15267 certificate for Fidas® 200

Beyond that the fine dust measurement devices Fidas® 200 as well as Fidas® 200 E and Fidas® 200 S are also type approved and certified in the UK (Defra Approval) in compliance with the requirements of ″MCERTS Performance Standards for CAMS″ and ″MCERTS for UK Particulate Matter″. The respective [4]

MCERTS/DEFRA Approval[5] certificate as well as the test report[6] are publicly available.

[1] Link to the certificate: https://qal1.de/report/0000040212_21227195C_palas_Fidas200S_en.pdf
[2] measuring system test report: https://qal1.de/report/0000040212_21227195C_palas_Fidas200S_en.pdf
[3] www.qal1.eu.: https://qal1.de/en/hersteller/palas.htm
[4] MCERT certificate-2021: https://www.csagroupuk.org/wp-content/uploads/2017/02/MC16029003.pdf
[5] MCERT certificate-2021: https://www.csagroupuk.org/wp-content/uploads/2017/02/MC16029003.pdf
[6] Link to test report: http://www.csagroupuk.org/wp-content/uploads/2016/04/MCERTSCCPMT6PALASPM10PM2.5V10.4.pdf



PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

1. Fidas 200 Method 11
2. Fidas 200 S Method 11
3. Fidas 200 E Method 11

Manufactured by:

PALAS GmbH
Greschbachstrasse 3b,
76229 Kahlsruhe,
Germany

has been assessed by Sira Certification Service
and for the conditions stated on this certificate complies with:

MCERTS Performance Standards for Continuous Ambient Air Quality Monitoring Systems, Version 10 dated June 2016

MCERTS for UK Particulate Matter as set out in the Annex to the MCERTS Performance Standards for Ambient Air Quality Monitoring Systems: Requirements of the UK Competent Authority for the Equivalence Testing and Certification of Automated Continuous and Manual Discontinuous Methods that Monitor Particulate Matter in Ambient Air, Version 1.1, dated 31 July 2012

Certification Ranges:

PM_{10} 0 to 10,000 µg/m³
$PM_{2.5}$ 0 to 10,000 µg/m³

Project No.: 80073263
Certificate No: Sira MC160290/03
Initial Certification: 04 April 2016
This Certificate issued: 01 April 2021
Renewal Date: 03 April 2026

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service
Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US
Tel: +44 (0)1244 670 900

The MCERTS certificate consists of this document in its entirety.
For conditions of use, please consider all the information within.
This certificate may only be reproduced in its entirety and without change.
To authenticate the validity of this certificate please visit www.csagroupuk.org/mcerts

Page 1 of 10

Form 1335
Issue 9

Fig. 2: MCERTS/DEFRA Approval for Fidas® 200

The fine dust measurement device Fidas® 200 utilizes the acknowledged principle of single particle light scattering size analysis and is equipped with an LED light source of high intensity ($d_{p,min}$ = 0.18 µm), highly stable light output and long lifetime. The calibration of the instrument can be verified and, if necessary, adjusted easily and quickly at any time even when installed on site, using a monodisperse test aerosol.

The sampling system of the Fidas® 200 operates with a volume flow of approximately 0.3 m^3/h. It is equipped with a Sigma-2 sampling head according to VDI 2119, which allows representative sampling even under strong wind conditions, and a drying line which prevents condensation from causing measurement errors. The drying line (Intelligent Aerosol Drying System – IADS) is controlled based on ambient air temperature, pressure, and relative humidity. These data are provided by a weather station; optionally wind velocity, wind direction, and precipitation data can be provided as well. A filter holder for circular plane filters (47 mm dia.) is integrated into the sampling system, which allows, e. g., subsequent chemical analysis of the aerosol composition.

The fine dust measurement device Fidas® 200 offers numerous communications options and allows full remote control and maintenance of the system as well as online data access via palas.de[7] . The software provided along with the system offers versatile options for evaluation (e. g., comprehensive statistics and averaging) and export of measurement data.

The actual aerosol sensor is an optical aerosol spectrometer which determines the particle size using Lorenz-Mie scattered light analysis of single particles. The particles travel individually through an optically confined measurement volume which is homogeneously illuminated with polychromatic light. Every particle generates a scattered light impulse that is detected at an angle between 85° and 95°. The particle number is determined based on the number of scattered light impulses. Particle size is derived from the level of a scattered light impulse.

Precise optics, high light output from the polychromatic LED used, and powerful signal processing electronics using logarithmic A/D conversion allow detection of particles down to 0,18 µm diameter. The detection of small particles, which can be found in high concentration in particular close to roads, is of importance, e. g., for the correct determination of PM2.5. The influence of the lower particle size detection limit is illustrated in Fig. 3 in comparison with a system which has a lower detection limit of 0.3 µm.

[7] User area on palas.de: http://www.palas.de/en/user

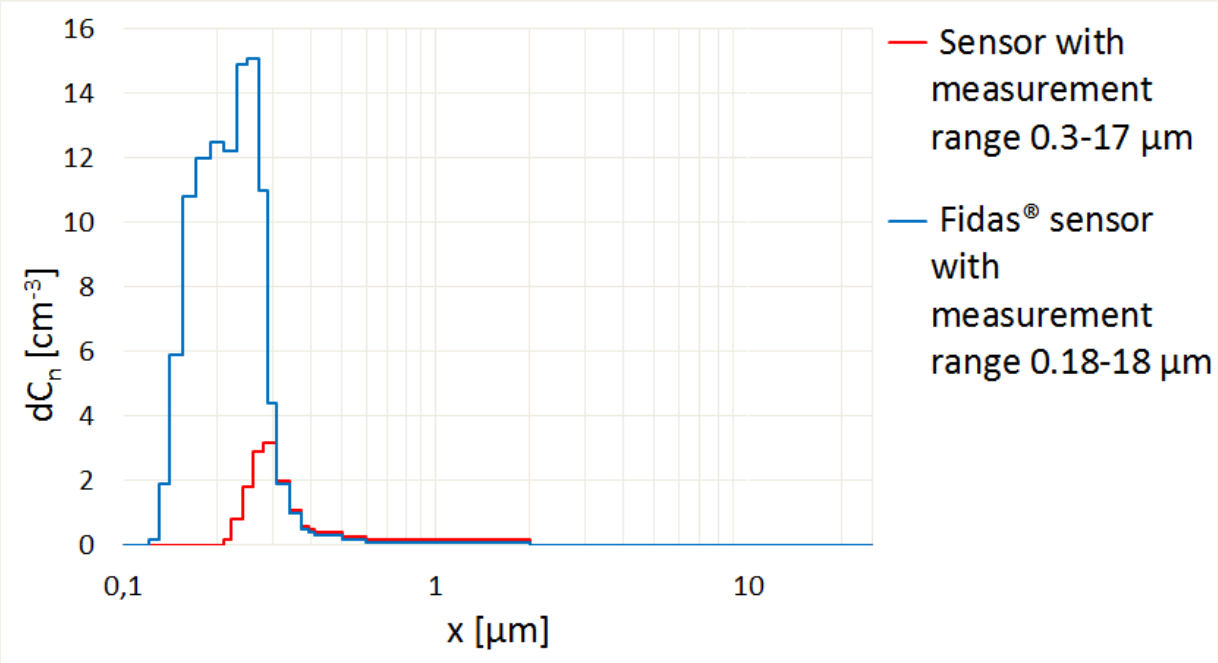


Fig. 3: Higher sensitivity with the Fidas® fine dust measurement device in the size range 0.18 – 18 μm

The better the classification precision and the resolution of a particle sizing instrument, the more accurately the particle size distribution can be determined. The Fidas® 200 light source allows for an unambiguous calibration curve, and thus very high particle size resolution, resp., accuracy of classification. The measurement volume of the Fidas® sensor is precisely optically delimited using the patented T-aperture technique, which allows particle sizing without border zone errors and so contributes to sizing accuracy. Powerful digital signal processing makes it possible to identify and, if required, compensate coincident readings (caused by concurrent presence of multiple particles).

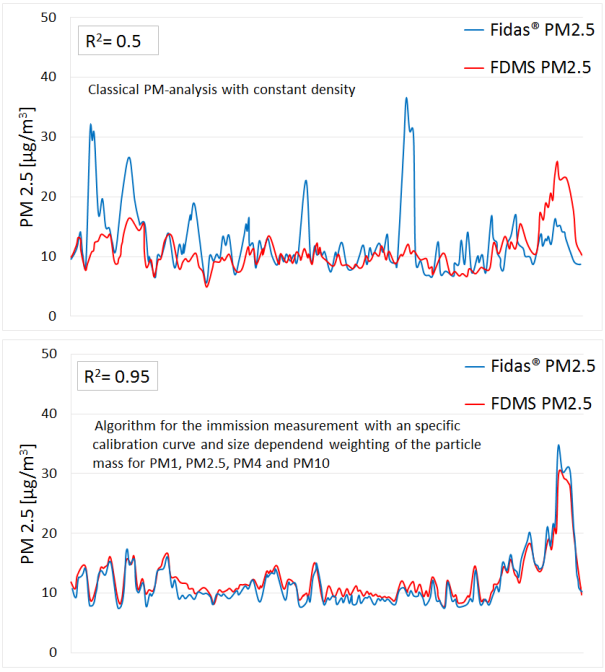


Fig. 4: Comparison of algorithms for converting particle size distribution data to PM values

For calculating mass or a mass fraction from measured data the particle size distribution is processed with a (yet particle size dependent) conversion factor (see Fig. 4). This takes into account that, depending on particle size, ambient aerosol is composed of particles from different sources (such as combustion aerosols, tire attrition, pollen). A mass fraction like, e. g., PM_{10}, is finally determined by applying the associated separation curve (see EN 481) to the particle size distribution data. Even though the optical measuring technique determines particle mass indirectly (equivalence method), which means that exact identity with gravimetric results is not guranteed in each and any case, the empirical knowledge used in processing the measured data ensures a very good correlation with the standard reference method (see Fig. 5), as shown during type approval testing.

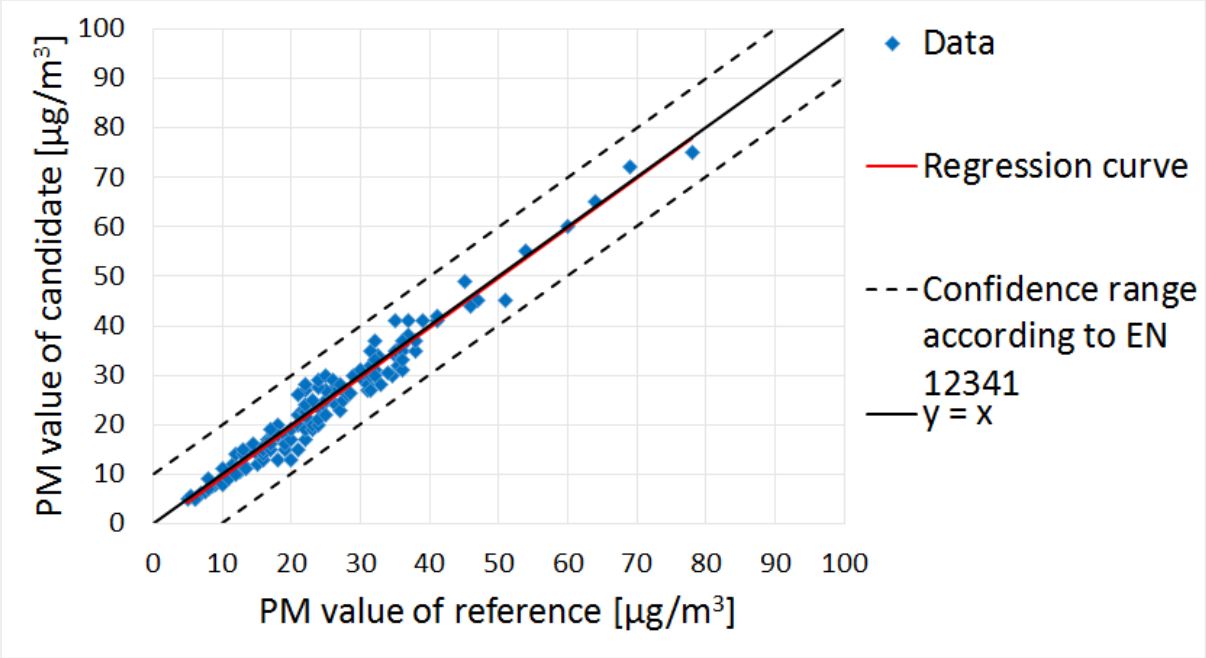


Fig. 5: PM_{10} reference equivalence function of the Fidas® 200 S in comparison with a reference small-filter device during the course of suitability testing from the "Report on supplementary testing of the Fidas® 200 S respectively Fidas® 200 measuring system manufactured by PALAS® GmbH for the components suspended particulate matter PM_{10} and $PM_{2.5}$, TÜV report no.: 936/21227195/B".

Multiple separation curves can be applied simultaneously to the same size distribution data which allows simultaneous calculation and output of, e. g., PM_{10} and $PM_{2.5}$ and other mass fractions.

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
- Reduces your operating expenses

DATASHEET

Measuring principle	Optical light scattering of single particles
Reported data	PM_1, $PM_{2.5}$, PM_4, PM_{10}, TSP, C_N, particle size distribution, ambient pressure, ambient temperature, rel. ambient humidity
Measurement range (number C_N)	0 – 20,000 particles/cm^3
Size channels	64 (32/decade)
Measurement range (size)	0.18 – 18 μm (certified range, other measuring ranges on request)
Measurement range (mass)	0 – 10,000 $\mu g/m^3$
Measurement uncertainty	9.7 % for $PM_{2.5}$, 7.5 % for PM_{10} (expanded measurement uncertainty according to EN 16450, TÜV Report)
Volume flow	4.8 l/min $\triangleq$ 0.3 m^3/h ± 3% (24h), complient with EN 16450
Time resolution	1 s – 24 h
Data acquisition	Digital, 20 MHz processor, 256 raw data channels
Light source	LED
User interface	Touchscreen, 800 • 480 pixel, 7″ (17.78 cm)
Housing	Table housing, optional: with mounting brackets for rack-mounting
Weight	Control unit: 9.3 kg, sample head: 2.25 kg, sample tube: 4.5 kg
Operating system	Windows
Data logger storage	Capacity for 2 years continuous operation at 60 s storage interval
Software	PDAnalyze Fidas®
Response time	< 2 s
Installation conditions	+5 – +40 °C
Interfaces	USB, Ethernet (LAN), RS-232, Wi-Fi
Power supply	115 – 230 V, 50/60 Hz
Sampling head	Passive collector Sigma-2
Dimensions	450 • 320 • 180.5 mm (H • W • D), 19″
Linearity	1.06 for $PM_{2.5}$, 1.03 for PM_{10} (against gravimetry according to EN 16450, TÜV report)
Sampling System	Drying of the aerosol by IADS (Intelegent Aerosol Drying System)
Noise emission	< 70 dB(A)
Fuse	T2A
Resolution	0.1 $\mu g/m^3$
Power consumption	Normal operation: 60 W, max. 200 W

APPLICATIONS

- Regulatory pollution control in monitoring networks
- Ambient air monitoring campaigns
- Long-term studies
- Emission source attribution
- Emission dispersion studies (e.g. fires, volcanoes)

Mehr Informationen:
https://www.palas.de/product/fidas200

Palas GmbH
Greschbachstrasse 3 b | 76229 Karlsruhe | Germany
Phone: +49 721 96213-0 | Fax: +49 721 96213-33
www.palas.de