Fidas® 200

EN 16450 approved fine dust measurement device for simultaneous measurement of PM2.5 and PM10

Model Variations

Fine dust measurement device Fidas® 200 E

EN 16450 approved fine dust aerosol spectrometer for simultaneous measurement of PM2.5 and PM10, featuring a separate sensor for existing ceiling glands

Fine dust measurement device Fidas® 200 S

EN 16450 approved fine dust aerosol spectrometer for simultaneous measurement of PM2.5 and PM10, in weatherproof cabinet for outdoor installation

Fidas® 200

Description

Certified fine dust measurement device Fidas 200, TÜV Rheinland certified, TÜV cer

Fig. 1: Fidas® 200 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 180 nm – 18 µm and calculates simultaneously the immission values PM10 and PM2.5 to be monitored by law. At the same time PM1, PM4, PMtot, 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 PM10 and PM2.5 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 certificate of product conformity according to EN 15267[1] issued by TÜV Rheinland and the German Federal Environmental Agency, as well as the measuring system test report[2] for the version Fidas® 200 S compiled by TÜV Rheinland are published at www.qal1.eu[3] .

[1]Link to certificate: http://www.qal1.de/15267/0000040212_03_02_palas_Fidas200S_en.pdf
[2]Link to test report: http://www.qal1.de/report/0000040212_03_21227195B_palas_Fidas200S_en.pdf
[3]Certificate webpage: http://www.qal1.eu/en/hersteller/palas.htm

Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000040212_02

Certified AMS: Fidas® 200 S respectively Fidas® 200 for particulate matter PM_{10} and $PM_{2.5}$

Manufacturer: PALAS GmbH
Greschbachstraße 3b
76229 Karlsruhe
Germany

Test Institute: TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and certified according to the standards
VDI 4202-1 (2010), VDI 4203-3 (2010), EN 12341 (1998), EN 14907 (2005), Guide to Demonstration of Equivalence of Ambient Air Monitoring Methods (2005), EN 15267-1 (2009) and EN 15267-2 (2009)

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 10 pages).
The present certificate replaces certificate 0000040212_01 of 30 September 2015

TÜVRheinland CERTIFIED
Suitability Tested Complying with 2008/50/EC EN 15267 Regular Surveillance
www.tuv.com ID 0000040212

Publication in the German Federal Gazette (BAnz.) of 26 August 2015

This certificate will expire on: 31 March 2019

German Federal Environment Agency
Dessau, 25 April 2016

TÜV Rheinland Energy GmbH
Cologne, 24 April 2016

Dr. Marcel Langner
Head of Section II 4.1

ppa. Dr. Peter Wilbring

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Tel. +49 221 806-5200

TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Cologne

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-11120-02-00

qal1.de info@qal1.de page 1 of 10

Fig. 2: 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 MCERTS/DEFRA Approval[4] certificate as well as the test report[5] are publicly available.

CSA Group

MCERTS

Environment Agency

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

1. Fidas 200 Method 11
2. Fidas 200 S 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 9.1, dated December 2015

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 µgm^{-3}
$PM_{2.5}$ 0 to 10,000 µgm^{-3}

Project No. : 70014869
Certificate No : Sira MC16029001
Initial Certification : 04 April 2016
This Certificate issued : 26 April 2016
Renewal Date : 03 April 2021

Joe Prince MSc, Minst MC
Deputy Certification 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.
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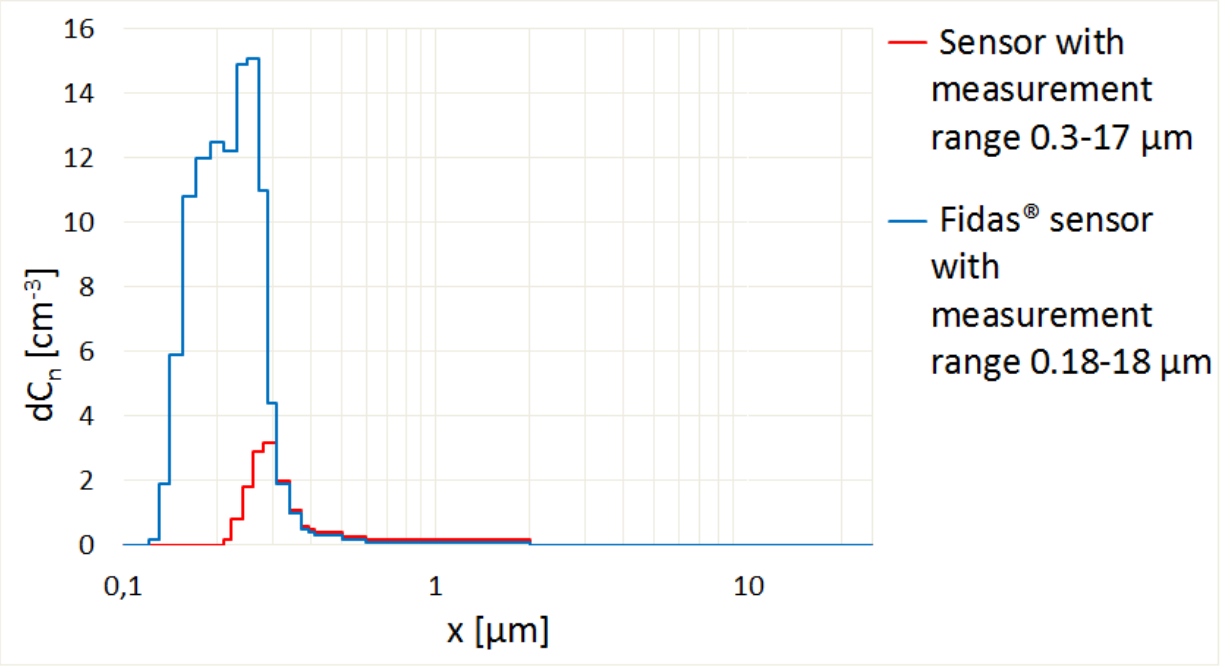
Page 1 of 10

Form 1335
Issue 2

[4]Link to certificate: http://www.csagroupuk.org/wp-content/uploads/2016/04/MC16029001.pdf
[5]Link to test report: http://www.csagroupuk.org/wp-content/uploads/2016/04/MCERTSCCPMT6PALASPM10PM2.5V10.4.pdf

Fig. 3: 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 ($d_{p,min}$ = 180 nm), 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 2119-4, 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[6] . 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 180 nm 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. 4 in comparison with a system which has a lower detection limit of 300 nm.



Certified fine dust measurement device Fidas 200, TÜV Rheinland certified, TÜV cer

Fig. 4: 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.,

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

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).

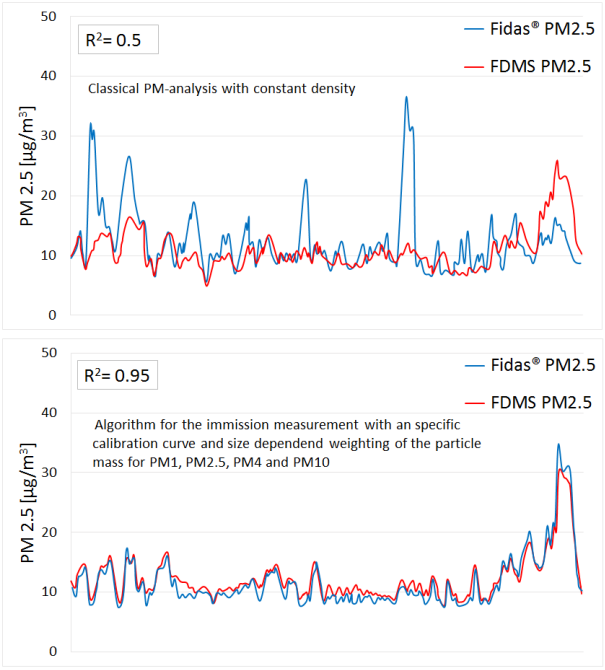


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Fig. 5: Comparison of algorithms for converting particle size distribution data to PM values For calculating mass or a mass fraction from measured data the particle size distribution is processed with a (yet particle size dependent) conversion factor (see Fig. 5). 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., PM10, 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 guaranteed 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. 6), as shown during type approval testing.

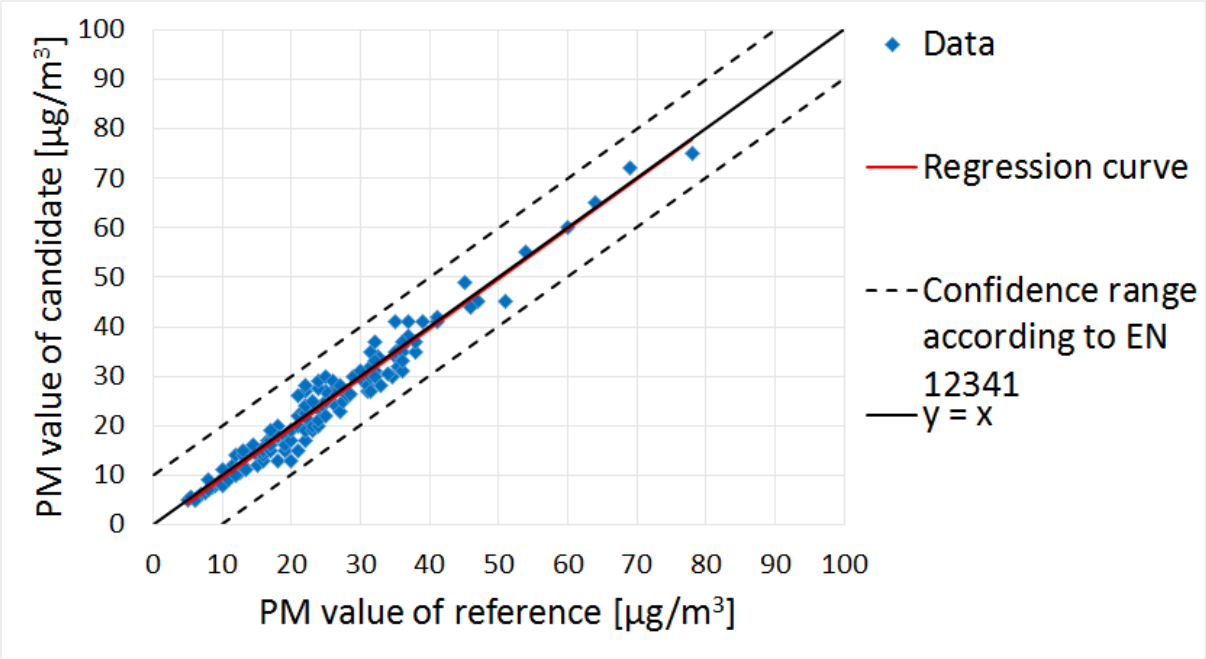

Fig. 6: PM_{10} reference equivalence function of the Fidas® 200 S in comparison with a reference small-filter device during the course of suitability testing from the "Report on supplementary testing of the Fidas® 200 S respectively Fidas® 200 measuring system manufactured by PALAS® GmbH for the components suspended particulate matter PM10 and PM2.5, 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., PM10 and PM2.5 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

Fidas® 200

Datasheet

Parameter	*Description*
Interfaces	USB, Ethernet, RS232/485, Wi-Fi
Measurement range (size)	0,18 – 100 µm (3 Messbereiche)
Size channels	64 (32/decade)
Measuring principle	Optical light-scattering
Measurement range (number C_N)	0 – 20,000 particles/cm^3
Volume flow	4.8 l/min $\triangleq$ 0.3 m^3/h
Data acquisition	Digital, 20 MHz processor, 256 raw data channels
Power consumption	approx. 200 W
User interface	Touch screen, 800 • 480 pixel, 7"
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
Data logger storage	4 GB
Software	PDAnalyze Fidas®
Aerosol conditioning	Thermal with IADS
Measurement range (mass)	0 – 10 000 µg/m^3
Reported data	PM_1, $PM_{2.5}$, PM_4, PM_{10}, TSP, C_N, Partikelgrößenverteilung, Druck, Temperatur, Feuchte
Installation conditions	+5 – +40 °C
Sampling head	Sigma-2
response time (sensor)	< 2s
Linearity	1,06 für $PM_{2.5}$ 1,03 für PM_{10} (gegen Gravimetrie nach EN16450, TÜV Report)
Accuracy	9,7 % für $PM_{2.5}$ 7,5 % für PM_{10} (erweiterte Messunsicherheit nach EN16450, TÜV Report)

Applications

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

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