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

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 24 April 2016

ppa. Dr. Peter Wilbring

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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

Test report:	936/21227195/B of 5 October 2015
Initial certification:	01 April 2014
Date of expiry:	31 March 2019
Publication:	BAnz AT 26.08.2015 B7, chapter III no. 2.1

Approved application
The certified AMS is suitable for permanent monitoring of suspended particulate matter PM_{10} and $PM_{2.5}$ in ambient air (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a sixteen-month field test.

The Version Fidas® 200 S is approved for a temperature range of -20 °C to +50 °C. The Version Fidas® 200 is approved for a temperature range of +5 °C to +40 °C.

The notification of suitability of the AMS, performance testing, and the uncertainty calculation have been effected on the basis of the regulations valid at the time of performance testing. As changes in legal regulations are possible, any potential user should ensure that this AMS is suitable for monitoring the limit value relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for ambient air applications at which it will be installed.

Basis of the certification
This certification is based on:

- test report 936/21227195/B of 5 October 2015 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- the on-going surveillance of the product and the manufacturing process

Certificate:
0000040212_02 / 25 April 2016

Publication in the German Federal Gazette: BAnz AT 26.08.2016 B4, chapter III number 2.1, Announcement by UBA from 22 July 2015:

Measuring system:
Fidas® 200 S and Fidas® 200 for suspended particulate matter PM_{10} and $PM_{2.5}$

Manufacturer:
PALAS GmbH, Karlsruhe

Field of application:
For the continuous parallel measurement of the PM_{10} and $PM_{2.5}$ fractions in suspended particulate matter in ambient air in stationary application

Measuring ranges during performance testing:

Component	Certification range	Unit
PM_{10}	0 – 10,000	µg/m³
$PM_{2.5}$	0 – 10,000	µg/m³

Software version:
100380.0014.0001.0001.0011

Restrictions:
None

Notes:
1. The Fidas® 200 S measuring system is also available for indoor installation in temperature controlled environments under the product designation Fidas® 200.
2. The requirements of the guideline “Demonstration of Equivalence of Ambient Air Monitoring Methods” were fulfilled during the first four comparison campaigns of the preliminary test as well as during the six comparison campaigns of the supplementary test for both measured components PM_{10} und $PM_{2.5}$.
3. The requirements as related to the variance coefficient R^2 in accordance with EN 12341 (issue of 1998) were not met by one of the candidates at the location Cologne, summer.
4. The sensitivity of the particle sensor shall be checked once a month with CalDust 1100 or MonoDust1500.
5. The measuring system shall be calibrated regularly on site by means of the gravimetric reference method for $PM_{2.5}$ and PM_{10} as stipulated in EN 12341 (issue of 2014).
6. The performance test report is available online at www.qal1.de.
7. Supplementary testing (extension of equivalence test, presentation of design changes, new test standard MonoDust1500) to Federal Environment Agency announcement of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter IV number 5.1) and 25 February 2015 (BAnz AT 02.04.2015 B5, chapter IV notification 14).

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report no.: 936/21227195/A of 9 March 2015

Publication in the German Federal Gazette: BAnz AT 14.03.2016 B7, chapter V notification 6, Announcement by UBA from 18 February 2016:

6 Notification as regards Federal Environment Agency (UBA) notices of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter III number 2.1)

A mistake regarding the description of the of the IADS-control functions was detected in the manual for the Fidas® 200 S or the Fidas® 200 measuring system for PM_{10} and $PM_{2.5}$ manufactured by PALAS GmbH. The description should correctly read as follows:

"*The temperature of the IADS is controlled as a function of the ambient temperature and humidity (as measured by the weather station). The minimum temperature is 23°C. Moisture compensation is ensured via a dynamic adjustment of the IADS temperature up to a maximum heat capacity of 90 Watt.*"

The manufacturer corrected this mistake as of manual version V0140815. Test report 936/21227195/A dated 9 March 2015 issued by TÜV Rheinland Energie und Umwelt GmbH was corrected accrodingly and replaced by test report 936/21227195/B dated 5 October 2015.

The measuring system can alternatively be operated with a WS300-UMB weather station. An extended IADS adaptable for lengths between 1.20m and 2.10m is available for the measuring system.

Furthermore, the Fidas® 200 E version of the measuring system may be used with an external sensor.

The current software version is: 100396.0014.0001.0001.0011.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 6 November 2015

Certified product
This certificate applies to automated measurement systems conforming to the following description:

The Fidas® 200 S respectively Fidas® 200 is an optical aerosol spectrometer which determines particle size by means of scattered light analysis according to Lorenz-Mie.

The version Fidas® 200 is the indoor version, the Fidas® 200 S is the outdoor version.

The measuring system tested consists of the Sigma-2 sampling head, a sampling tube with the IADS (Intelligent Aerosol Drying System) moisture compensation module, the Fidas® control unit with integrated aerosol sensor, the compact WS600-UMB weather station, a UMTS-antenna, weatherproof housing (IP 65), corresponding connection lines and cables, a bottle of CalDust 1000 or MonoDust1500 as well as manuals in German.

The particle sample passes through the Sigma-2 sampling head at a flow rate of 4.8 l/min (based on 25 °C and 1013 hPa) and is led into the sampling line which connects the sampling head to the Fidas control unit. The IADS (Intelligent Aerosol Drying System) moisture compensation module is used in order to avoid the possible effects of condensation, especially when ambient air humidity is high. The IADS is regulated with regard to relative humidity and ambient temperature (measured with weather station WS600-UMB). The minimum temperature is 23 °C, the humidity compensation is done via a dynamic adjustment of the IADS Temperature up to a maximum heat output of max. 90 watts. The IADS module is controlled via the Fidas Firmware. After passing through the IADS module, the particle sample is led to the aerosol sensor where the actual measuring is performed. From the aerosol sensor the sample is then led through an absolute filter which can be used, for instance, to further analyse the collected aerosol. The measuring system Fidas® 200 S is complete with an integrated weather station (WS600-UMB) to capture the measured quantities wind velocity, wind direction, amount of precipitation, type of precipitation, temperature, humidity, and pressure. The Fidas® 200 S control unit contains the necessary electronics for operating the measuring system as well as the 2 parallel-connected sample pumps. Should one pump fail, proper operation is secured by the remaining pump.

The Fidas® 200 S measuring system saves data in the RAW format. In order to determine the mass concentration values, the stored raw data have to be converted by means of an evaluation algorithm. A size-dependent and weighted algorithm is used to convert particle size and number to mass concentrations. During performance testing, conversion was performed using the evaluation algorithm PM_ENVIRO_0011.

The measuring system can be operated using either the touch screen at the front side of the instrument or remotely via radio modem using the corresponding software (e.g. TeamViewer). The user can access measurement data and device information, change parameters, and perform tests to monitor the functionality of the measuring system.

General notes
This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the EN 15267. The manufacturer is required to maintain an approved quality management system controlling the manufacture of the certified product. Both the product and the quality management systems shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate. This can be applied to the product or used in publicity material for the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and the validity is also accessible on the internet: **qal1.de**.

Certification of Fidas® 200 S respectively Fidas® 200 for particulate matter PM_{10} and $PM_{2.5}$ is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial certification according to EN 15267

Certificate No. 0000040212: 29 April 2014
Validity of the certificate: 31 March 2019

Test report: 936/21218896/A of 20 September 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 01.04.2014 B12, chapter IV, No. 5.1
Announcement by UBA from 27 February 2014

Notification:
Statement of TÜV Rheinland Energie und Umwelt GmbH of 27 September 2014
Publication: BAnz AT 2 April 2015 B5, chapter IV notification 14
UBA announcement of 25 February 2015
(New LED, Indoor variant, new display of software)

Supplementary testing according to EN 15267

Certificate No. 0000040212_01: 30 September 2015
Expiry date of the certificate: 31 March 2019

Test report: 936/21227195/A of 9 March 2015
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 26.08.2015 B4, chapter III number 2.1
Announcement by UBA from 22 July 2015

Notification:
Certificate No. 0000040212_02: 25 April 2016
Expiry date of the certificate: 31 March 2019
Statement of TÜV Rheinland Energie und Umwelt GmbH of 6 November 2015
and test report 936/21227195/B of 5 October 2015
Publication: BAnz AT 14.03.2016 B7, chapter V notification 6
UBA announcement of 18 February 2016
(Correction of manual, alternative weather station and new software version)

Umwelt Bundesamt

Certificate:
0000040212_02 / 25 April 2016

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Results of the equivalence test for systems SN 0111 & SN 0112, for the measured component $PM_{2.5}$ after correction of slope /intercept, comparison campaign GER+UK, evaluation algorithm PM_ENVIRO_0011

Comparison candidate with reference according to Guide "Demonstration of Equivalence Of Ambient Air Monitoring Methods", January 2010					
Candidate	FIDAS 200 S		SN	SN 0111 & SN 0112	
			Limit value	30	µg/m³
Status of measured values	Slope corrected		Allowed uncertainty	25	%
All comparisons					
Uncertainty between Reference	**0.53**	**µg/m³**			
Uncertainty between Candidates	**0.45**	**µg/m³**			
	SN 0111 & SN 0112				
Number of data pairs	**313**				
Slope b	**0.999**	**not significant**			
Uncertainty of b	**0.008**				
Ordinate intercept a	**-0.190**	**not significant**			
Uncertainty of a	**0.136**				
Expanded meas. uncertainty W_{CM}	**9.35**	**%**			
All comparisons, ≥18 µg/m³					
Uncertainty between Reference	**0.60**	**µg/m³**			
Uncertainty between Candidates	**0.80**	**µg/m³**			
	SN 0111 & SN 0112				
Number of data pairs	**67**				
Slope b	**0.981**				
Uncertainty of b	**0.020**				
Ordinate intercept a	**0.306**				
Uncertainty of a	**0.630**				
Expanded meas. uncertainty W_{CM}	**12.51**	**%**			
All comparisons, <18 µg/m³					
Uncertainty between Reference	**0.51**	**µg/m³**			
Uncertainty between Candidates	**0.31**	**µg/m³**			
	SN 0111 & SN 0112				
Number of data pairs	**246**				
Slope b	**1.065**				
Uncertainty of b	**0.023**				
Ordinate intercept a	**-0.782**				
Uncertainty of a	**0.224**				
Expanded meas. uncertainty W_{CM}	**11.34**	**%**			

Umwelt Bundesamt

Certificate:
0000040212_02 / 25 April 2016

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Comparison candidate with reference according to Guide "Demonstration of Equivalence Of Ambient Air Monitoring Methods", January 2010					
Candidate	FIDAS 200 S		SN	SN 0111 & SN 0112	
			Limit value	30	µg/m³
Status of measured values	Slope corrected		Allowed uncertainty	25	%
Cologne, Summer					
Uncertainty between Reference	0.66	µg/m³			
Uncertainty between Candidates	0.11	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	81			82	
Slope b	1.053			1.050	
Uncertainty of b	0.032			0.033	
Ordinate intercept a	-0.850			-0.810	
Uncertainty of a	0.342			0.357	
Expanded meas. uncertainty W_{CM}	10.46	%		10.77	%
Cologne, Winter					
Uncertainty between Reference	0.54	µg/m³			
Uncertainty between Candidates	0.52	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	51			50	
Slope b	0.991			0.956	
Uncertainty of b	0.013			0.013	
Ordinate intercept a	0.656			0.645	
Uncertainty of a	0.296			0.307	
Expanded meas. uncertainty W_{CM}	8.50	%		9.43	%
Bonn					
Uncertainty between Reference	0.62	µg/m³			
Uncertainty between Candidates	0.66	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	50			50	
Slope b	1.050			1.008	
Uncertainty of b	0.024			0.026	
Ordinate intercept a	-0.723			-0.471	
Uncertainty of a	0.539			0.584	
Expanded meas. uncertainty W_{CM}	12.32	%		12.33	%
Bornheim					
Uncertainty between Reference	0.42	µg/m³			
Uncertainty between Candidates	0.47	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	45			45	
Slope b	1.142			1.115	
Uncertainty of b	0.051			0.050	
Ordinate intercept a	-1.370			-1.482	
Uncertainty of a	0.607			0.607	
Expanded meas. uncertainty W_{CM}	22.40	%		17.49	%
Teddington, Winter					
Uncertainty between Reference	0.42	µg/m³			
Uncertainty between Candidates	0.52	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	44			44	
Slope b	0.964			0.963	
Uncertainty of b	0.012			0.011	
Ordinate intercept a	-0.004			-0.143	
Uncertainty of a	0.223			0.208	
Expanded meas. uncertainty W_{CM}	9.46	%		10.01	%
Teddington, Summer					
Uncertainty between Reference	0.25	µg/m³			
Uncertainty between Candidates	0.35	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	44			44	
Slope b	0.934			0.926	
Uncertainty of b	0.020			0.020	
Ordinate intercept a	0.461			0.399	
Uncertainty of a	0.232			0.229	
Expanded meas. uncertainty W_{CM}	11.50	%		13.40	%
All comparisons, ≥18 µg/m³					
Uncertainty between Reference	0.60	µg/m³			
Uncertainty between Candidates	0.80	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	67			67	
Slope b	0.999			0.965	
Uncertainty of b	0.020			0.021	
Ordinate intercept a	0.134			0.443	
Uncertainty of a	0.642			0.65	
Expanded meas. uncertainty W_{CM}	12.67	%		13.39	%
All comparisons, <18 µg/m³					
Uncertainty between Reference	0.51	µg/m³			
Uncertainty between Candidates	0.31	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	248			248	
Slope b	1.083			1.052	
Uncertainty of b	0.023			0.023	
Ordinate intercept a	-0.841			-0.744	
Uncertainty of a	0.227			0.226	
Expanded meas. uncertainty W_{CM}	13.84	%		9.97	%
All comparisons					
Uncertainty between Reference	0.53	µg/m³			
Uncertainty between Candidates	0.45	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	315			315	
Slope b	1.014	not significant		0.985	not significant
Uncertainty of b	0.008			0.008	
Ordinate intercept a	-0.225	not significant		-0.137	not significant
Uncertainty of a	0.137			0.137	
Expanded meas. uncertainty W_{CM}	9.50	%		10.17	%

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Certificate:
0000040212_02 / 25 April 2016

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Results of the equivalence test for systems SN 0111 & SN 0112, for the measured component PM_{10} after correction of slope /intercept, comparison campaign GER+UK, evaluation algorithm PM_ENVIRO_0011

Comparison candidate with reference according to Guide "Demonstration of Equivalence Of Ambient Air Monitoring Methods", January 2010					
Candidate	FIDAS 200 S		SN	SN 0111 & SN 0112	
			Limit value	50	µg/m³
Status of measured values	Slope & offset corrected		Allowed uncertainty	25	%
All comparisons					
Uncertainty between Reference	**0.58**	**µg/m³**			
Uncertainty between Candidates	**0.65**	**µg/m³**			
	SN 0111 & SN 0112				
Number of data pairs	**316**				
Slope b	**1.000**	**not significant**			
Uncertainty of b	**0.009**				
Ordinate intercept a	**0.010**	**not significant**			
Uncertainty of a	**0.208**				
Expanded measured uncertainty WCM	**7.33**	**%**			
All comparisons, ≥30 µg/m³					
Uncertainty between Reference	**0.68**	**µg/m³**			
Uncertainty between Candidates	**1.15**	**µg/m³**			
	SN 0111 & SN 0112				
Number of data pairs	**44**				
Slope b	**0.955**				
Uncertainty of b	**0.034**				
Ordinate intercept a	**2.060**				
Uncertainty of a	**1.490**				
Expanded measured uncertainty WCM	**10.68**	**%**			
All comparisons, <30 µg/m³					
Uncertainty between Reference	**0.56**	**µg/m³**			
Uncertainty between Candidates	**0.55**	**µg/m³**			
	SN 0111 & SN 0112				
Number of data pairs	**272**				
Slope b	**1.006**				
Uncertainty of b	**0.018**				
Ordinate intercept a	**-0.122**				
Uncertainty of a	**0.300**				
Expanded measured uncertainty WCM	**6.63**	**%**			

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Certificate:
0000040212_02 / 25 April 2016

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Comparison candidate with reference according to Guide "Demonstration of Equivalence Of Ambient Air Monitoring Methods", January 2010					
Candidate	FIDAS 200 S		SN	SN 0111 & SN 0112	
			Limit value	50	µg/m³
Status of measured values	Slope & offset corrected		Allowed uncertainty	25	%
Cologne, Summer					
Uncertainty between Reference	0.80	µg/m³			
Uncertainty between Candidates	0.26	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	81			82	
Slope b	1.007			0.990	
Uncertainty of b	0.027			0.027	
Ordinate intercept a	-0.221			-0.112	
Uncertainty of a	0.473			0.471	
Expanded measured uncertainty W_{CM}	6.59	%		7.00	%
Cologne, Winter					
Uncertainty between Reference	0.53	µg/m³			
Uncertainty between Candidates	0.64	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	51			50	
Slope b	1.026			0.990	
Uncertainty of b	0.014			0.014	
Ordinate intercept a	0.130			0.107	
Uncertainty of a	0.385			0.384	
Expanded measured uncertainty W_{CM}	8.19	%		5.89	%
Bonn					
Uncertainty between Reference	0.38	µg/m³			
Uncertainty between Candidates	0.87	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	50			50	
Slope b	1.005			0.968	
Uncertainty of b	0.026			0.028	
Ordinate intercept a	1.279			1.419	
Uncertainty of a	0.792			0.834	
Expanded measured uncertainty W_{CM}	10.60	%		9.15	%
Bornheim					
Uncertainty between Reference	0.54	µg/m³			
Uncertainty between Candidates	0.84	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	47			47	
Slope b	1.086			1.043	
Uncertainty of b	0.038			0.038	
Ordinate intercept a	-0.555			-0.731	
Uncertainty of a	0.707			0.694	
Expanded measured uncertainty W_{CM}	16.74	%		9.15	%
Teddington, Winter					
Uncertainty between Reference	0.48	µg/m³			
Uncertainty between Candidates	0.73	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	44			44	
Slope b	0.963			0.934	
Uncertainty of b	0.017			0.016	
Ordinate intercept a	-0.195			-0.179	
Uncertainty of a	0.426			0.405	
Expanded measured uncertainty W_{CM}	10.41	%		15.18	%
Teddington, Summer					
Uncertainty between Reference	0.46	µg/m³			
Uncertainty between Candidates	0.54	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	45			45	
Slope b	0.912			0.910	
Uncertainty of b	0.028			0.029	
Ordinate intercept a	1.264			0.868	
Uncertainty of a	0.457			0.489	
Expanded measured uncertainty W_{CM}	13.68	%		15.62	%
All comparisons, ≥30 µg/m³					
Uncertainty between Reference	0.68	µg/m³			
Uncertainty between Candidates	1.15	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	44			44	
Slope b	0.983			0.928	
Uncertainty of b	0.035			0.034	
Ordinate intercept a	1.474			2.590	
Uncertainty of a	1.518			1.50	
Expanded measured uncertainty W_{CM}	11.17	%		11.47	%
All comparisons, <30 µg/m³					
Uncertainty between Reference	0.56	µg/m³			
Uncertainty between Candidates	0.55	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	274			274	
Slope b	1.025			0.990	
Uncertainty of b	0.018			0.017	
Ordinate intercept a	-0.172			-0.102	
Uncertainty of a	0.308			0.297	
Expanded measured uncertainty W_{CM}	8.05	%		6.99	%
All comparisons					
Uncertainty between Reference	0.58	µg/m³			
Uncertainty between Candidates	0.65	µg/m³			
	SN 0111			SN 0112	
Number of data pairs	318			318	
Slope b	1.016	not significant		0.983	not significant
Uncertainty of b	0.009			0.009	
Ordinate intercept a	-0.019	not significant		0.043	not significant
Uncertainty of a	0.212			0.209	
Expanded measured uncertainty W_{CM}	8.16	%		8.01	%