Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000081155_00

Certified AMS:	Fidas Smart 100 / 100 E for 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 found to comply with the standards

VDI 4202-3 (2019), VDI 4203-1 (2017), EN 12341 (2014), EN 16450 (2017), guide for Demonstration of Equivalence of Ambient Air Monitoring Methods (2015), EN 15267-1 (2009) and EN 15267-2 (2009).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 7 pages).

TÜVRheinland® CERTIFIED

Suitability Tested
Complying with 2008/50/EC
EN 15267
Regular Surveillance
www.tuv.com
ID 0000081155

Publication in the German Federal Gazette (BAnz) of 20 March 2023

This certificate will expire on: 19 March 2028

German Environment Agency
Dessau, 25 April 2023

TÜV Rheinland Energy GmbH
Cologne, 24 April 2023

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Test institute accredited to EN ISO/IEC 17025 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.

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Test report:	936/21250983/B dated 15 September 2022
Initial certification:	20 March 2023
Expiry date:	19 March 2028
Publication:	BAnz AT 20.03.2023 B6, chapter III No. 1.1

Approved application
The tested AMS is suitable for continuous ambient air monitoring of PM_{10} and $PM_{2,5}$ (stationary operation).

The suitability of the AMS for these applications was assessed based on laboratory testing and field testing at five ($PM_{2.5}$) and six (PM_{10}) different sites and with different time periods.

The AMS is approved for an ambient temperature range of -20° to 50°C.

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

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

Basis of the certification
This certification is based on:

- Test report 936/21250983/B dated 15 September 2022 of TÜV Rheinland Energy GmbH
- Suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- The ongoing surveillance of the product and the manufacturing process

Publication in the German Federal Gazette: BAnz AT 20.03.2023 B6, chapter III No. 1.1, Announcement by UBA dated 21 February 2023:

AMS designation:
Fidas Smart 100 bzw. Fidas Smart 100 E for suspended particulate matter $PM_{2,5}$ and PM_{10}

Manufacturer:
Palas GmbH, Karlsruhe

Field of application:
For continuous measurement of the $PM_{2,5}$ and PM_{10} fraction in suspended particulate matter in stationary use.

Measuring ranges during the performance test:

Component	Certification range	Unit
$PM_{2,5}$	0 - 20,000	µg/m³
PM_{10}	0 - 20,000	µg/m³

Software version: 1.0.11

Restrictions:
None

Notes:
1. The measuring system is available in a version for outdoor installation (Fidas Smart 100) as well as in a version for installation in a measuring station (Fidas Smart 100 E).
2. Algorithm PM_ENVIRO_0005-25 is used to determine the component $PM_{2,5}$ and algorithm PM_ENVIRO_0005-10 is used to determine the component PM_{10}.
3. The performance test report is available at www.qal1.de.

Test report:
TÜV Rheinland Energy GmbH,, Cologne
Report No.: 936/21250983/B dated 15 September 2022

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

The measuring device Fidas Smart 100 or Fidas Smart 100 E is a measuring device for suspended dust in the ambient air. The determination of the suspended dust concentration is carried out with an optical aerosol spectrometer, which determines the particle size via the scattered light analysis on the single particle according to Lorenz-Mie.

The particulate sample enters the sampling line at a flow rate of 1.0 l/min (operating conditions) through the sample inlet, which connects the sampling head to the aerosol sensor. The compact humidity compensation module IADS compact (Intelligent Aerosol Drying System) is used to avoid the possible effects of condensation, especially when the ambient humidity is high. The temperature of the IADS compact is controlled depending on the ambient temperature and humidity (measured by the system). The maximum heating power of the IADS compact module is 40 W. After the IADS module, the particle sample passes to the aerosol sensor where the actual measurement is performed.

The measuring device is suitable for outdoor use in the device variants Fidas Smart 100 without further weather protection. The Fidas Smart 100 E variant has an extended sampling tube (1.2 m) for installation in measuring stations with roof penetration. The Frahling sensor for determining air temperature and humidity is mounted on the sampling tube to determine the operating conditions outside the measuring container.
The Fidas Smart 100 version is equipped with an integrated sensor for temperature, humidity and pressure. The sensor is supplied with outside air via the housing fan.
The measuring device is operated either via the integrated touch-sensitive screen or remotely via data interfaces.

To test and, if necessary, adjust the sensitivity of the particle sensor, the device is exposed to particles of a defined size (MonoDust 1500). The particle size distribution of this dust is monodisperse and the peak in the distribution of the raw data generated in the instrument must be at the target channel specified on the Monodust calibration certificate (typically 140.1). If the peak deviates from this value, the value can be adjusted. This adjustment at one particle size automatically adjusts the sensitivity of the measurement system for all particle sizes, since the instrument uses only one A/D converter.

The particle mass concentration must be done for $PM_{2,5}$ with the algorithm PM_ENVIRO_0005-25 and for PM_{10} with the algorithm PM_ENVIRO_0005-10.

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 certification mark may be applied to the product or used in advertising materials for the certified product.

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 its expiration is also accessible on the internet: **qal1.de**.

History of documents

Certification of Fidas Smart 100 / 100 E 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. 0000081155_00: 25 April 2023
Expiry date of the certificate: 19 March 2028
Test report 936/21250983/B dated 15 September 2022
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 20.03.2023 B6, chapter III No. 1.1
Announcement by UBA dated 21 February 2023

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	Fidas Smart 100		SN	12248 & 12250	
			Limit value	30	µg/m³
Status of measured values	Raw data		Allowed uncertainty	25	%
All comparisons					
Uncertainty between Reference	**0.51**	**µg/m³**			
Uncertainty between Candidates	**0.43**	**µg/m³**			
	12248 & 12250				
Number of data pairs	**363**				
Slope b	**1.001**	**not significant**			
Uncertainty of b	**0.013**				
Ordinate intercept a	**-0.010**	**not significant**			
Uncertainty of a	**0.132**				
Expanded meas. uncertainty W_{CM}	**9.01**	**%**			

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	Fidas Smart 100		SN	12248 & 12250	
			Limit value	30	µg/m³
Status of measured values	Raw data		Allowed uncertainty	25	%
Köln I					
Uncertainty between Reference	**0.33**	**µg/m³**			
Uncertainty between Candidates	**0.45**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**44**			**44**	
Slope b	**1.061**			**1.012**	
Uncertainty of b	**0.020**			**0.019**	
Ordinate intercept a	**-0.367**			**-0.332**	
Uncertainty of a	**0.288**			**0.275**	
Expanded meas. uncertainty W_{CM}	**12.06**	**%**		**6.89**	**%**
Niederzier I					
Uncertainty between Reference	**0.38**	**µg/m³**			
Uncertainty between Candidates	**0.51**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**57**			**57**	
Slope b	**1.102**			**1.030**	
Uncertainty of b	**0.035**			**0.034**	
Ordinate intercept a	**-0.722**			**-0.584**	
Uncertainty of a	**0.401**			**0.385**	
Expanded meas. uncertainty W_{CM}	**18.79**	**%**		**10.36**	**%**
Köln II					
Uncertainty between Reference	**0.45**	**µg/m³**			
Uncertainty between Candidates	**0.32**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**115**			**115**	
Slope b	**1.099**			**1.030**	
Uncertainty of b	**0.032**			**0.030**	
Ordinate intercept a	**-0.517**			**-0.431**	
Uncertainty of a	**0.244**			**0.230**	
Expanded meas. uncertainty W_{CM}	**17.82**	**%**		**7.55**	**%**
Bornheim					
Uncertainty between Reference	**0.47**	**µg/m³**			
Uncertainty between Candidates	**0.54**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**93**			**93**	
Slope b	**0.937**			**0.863**	
Uncertainty of b	**0.024**			**0.025**	
Ordinate intercept a	**1.061**			**1.155**	
Uncertainty of a	**0.256**			**0.261**	
Expanded meas. uncertainty W_{CM}	**10.99**	**%**		**21.98**	**%**
Bonn					
Uncertainty between Reference	**0.80**	**µg/m³**			
Uncertainty between Candidates	**0.32**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**54**			**54**	
Slope b	**1.034**			**0.987**	
Uncertainty of b	**0.047**			**0.045**	
Ordinate intercept a	**-0.536**			**-0.516**	
Uncertainty of a	**0.458**			**0.437**	
Expanded meas. uncertainty W_{CM}	**9.95**	**%**		**10.84**	**%**
All comparisons					
Uncertainty between Reference	**0.51**	**µg/m³**			
Uncertainty between Candidates	**0.43**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**363**			**363**	
Slope b	**1.032**	**significant**		**0.971**	**significant**
Uncertainty of b	**0.013**			**0.013**	
Ordinate intercept a	**-0.039**	**not significant**		**0.017**	**not significant**
Uncertainty of a	**0.134**			**0.131**	
Expanded meas. uncertainty W_{CM}	**10.99**	**%**		**10.64**	**%**

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	Fidas Smart 100		SN	12248 & 12250	
			Limit value	50	µg/m³
Status of measured values	Raw data		Allowed uncertainty	25	%
All comparisons					
Uncertainty between Reference	**0.63**	**µg/m³**			
Uncertainty between Candidates	**0.71**	**µg/m³**			
	12248 & 12250				
Number of data pairs	**433**				
Slope b	**1.004**	**not significant**			
Uncertainty of b	**0.013**				
Ordinate intercept a	**-0.069**	**not significant**			
Uncertainty of a	**0.242**				
Expanded measured uncertainty WCM	**9.71**	**%**			

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	Fidas Smart 100		SN	12248 & 12250	
			Limit value	50	µg/m³
Status of measured values	Raw data		Allowed uncertainty	25	%
Köln I					
Uncertainty between Reference	**0.26**	**µg/m³**			
Uncertainty between Candidates	**0.52**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**53**			**53**	
Slope b	**1.109**			**1.066**	
Uncertainty of b	**0.030**			**0.026**	
Ordinate intercept a	**-2.102**			**-1.639**	
Uncertainty of a	**0.640**			**0.554**	
Expanded measured uncertainty W_{CM}	**17.41**	**%**		**11.61**	**%**
Niederzier I					
Uncertainty between Reference	**0.65**	**µg/m³**			
Uncertainty between Candidates	**0.69**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**59**			**59**	
Slope b	**1.028**			**0.974**	
Uncertainty of b	**0.028**			**0.027**	
Ordinate intercept a	**0.251**			**0.574**	
Uncertainty of a	**0.575**			**0.555**	
Expanded measured uncertainty W_{CM}	**10.55**	**%**		**8.52**	**%**
Köln II					
Uncertainty between Reference	**0.50**	**µg/m³**			
Uncertainty between Candidates	**0.42**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**117**			**117**	
Slope b	**1.037**			**0.973**	
Uncertainty of b	**0.031**			**0.027**	
Ordinate intercept a	**-0.011**			**0.327**	
Uncertainty of a	**0.397**			**0.350**	
Expanded measured uncertainty W_{CM}	**9.43**	**%**		**6.77**	**%**
Bornheim					
Uncertainty between Reference	**0.69**	**µg/m³**			
Uncertainty between Candidates	**0.52**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**83**			**83**	
Slope b	**1.028**			**0.982**	
Uncertainty of b	**0.053**			**0.053**	
Ordinate intercept a	**-0.218**			**0.086**	
Uncertainty of a	**0.948**			**0.954**	
Expanded measured uncertainty W_{CM}	**15.07**	**%**		**14.80**	**%**
Bonn					
Uncertainty between Reference	**0.50**	**µg/m³**			
Uncertainty between Candidates	**0.50**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**54**			**54**	
Slope b	**0.892**			**0.848**	
Uncertainty of b	**0.043**			**0.037**	
Ordinate intercept a	**1.265**			**1.810**	
Uncertainty of a	**0.723**			**0.625**	
Expanded measured uncertainty W_{CM}	**18.62**	**%**		**24.36**	**%**
Niederzier II					
Uncertainty between Reference	**0.94**	**µg/m³**			
Uncertainty between Candidates	**1.37**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**67**			**67**	
Slope b	**0.987**			**0.905**	
Uncertainty of b	**0.029**			**0.028**	
Ordinate intercept a	**0.972**			**0.784**	
Uncertainty of a	**0.608**			**0.592**	
Expanded measured uncertainty W_{CM}	**9.06**	**%**		**18.14**	**%**
All comparisons					
Uncertainty between Reference	**0.63**	**µg/m³**			
Uncertainty between Candidates	**0.71**	**µg/m³**			
	12248			**12250**	
Number of data pairs	**433**			**433**	
Slope b	**1.035**	**significant**		**0.976**	**not significant**
Uncertainty of b	**0.014**			**0.013**	
Ordinate intercept a	**-0.246**	**not significant**		**0.081**	**not significant**
Uncertainty of a	**0.250**			**0.239**	
Expanded measured uncertainty W_{CM}	**11.64**	**%**		**10.60**	**%**