Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000081157_00

Certified AMS:	EDM 280 for $PM_{2,5}$ and PM_{10}
Manufacturer:	Grimm Aerosol Technik GmbH Vordere Aue 4 06774 Muldestausee / OT Friedersdorf 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), EN 12341 (2014), EN 16450 (2017), Guide for 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 9 pages).

TÜVRheinland® CERTIFIED

Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance

www.tuv.com
ID 0000081157

Publication in the German Federal Gazette (BAnz) of 02 August 2023

German Environment Agency
Dessau, 05 September 2023

This certificate will expire on:
01 August 2028

TÜV Rheinland Energy GmbH
Cologne, 04 September 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.

Test report:	936/21252222/A dated 03 February 2023
Initial certification:	02 August 2023
Expiry date:	01 August 2028
Publication:	BAnz AT 02.08.2023 B7, chapter II 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 a laboratory test and a field test at four different locations and over different time periods.

The AMS is approved for an ambient 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 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 use.

Basis of the certification
This certification is based on:

- Test report 936/21252222/A dated 03 February 2023 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 02.08.2023 B7, chapter II No. 1.1, Announcement by UBA dated 05 July 2023:

AMS designation:
EDM 280 for suspended particulate matter $PM_{2,5}$ and PM_{10}

Manufacturer:
Grimm Aerosol Technik GmbH, Muldestausee

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

Measuring ranges during the performance test:

Component	Certification range	Unit
$PM_{2,5}$	0 - 5,100	µg/m³
PM_{10}	0 - 12,000	µg/m³

Software versions:
1.01 (Firmware)
0.08 (FPGA)
1.01 (GUI)

Restrictions:
None

Notes:
1. The measuring module from the measuring system must be sent to Grimm service or an authorised Grimm service partner at least every 12 months (or when the wear indicator "Calibration" is completely red) for maintenance including a calibration check.
2. The measuring system can be operated with either the WS300, WS500 or WS600 weather stations.
3. The measuring system can also be used in the fully air-conditioned, weatherproof housing model 199 from Grimm Aerosol Technik.
4. The performance test report can be found online at www.qal1.de.

Test institute: TÜV Rheinland Energy GmbH,, Cologne
Report No.: 936/21252222/A dated 3 February 2023

Certified product

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

The EDM 280 measuring device is a measuring device for suspended dust in ambient air. The determination of the suspended dust concentration is carried out with an optical aerosol spectrometer, which determines the particle number size distribution via the scattered light analysis on the single particle and calculates the corresponding mass concentrations by means of an algorithm.

The EDM 280 measuring system is designed for installation in a measuring container with roof feed-through (or alternatively in the fully air-conditioned, weatherproof Model 199 housing). It essentially consists of sampling and measuring insert. The sampling unit is designed for permanent installation in a 19" rack and consists of a sample tube with sampling head (Sigma-2), a weather sensor from Ott Hydromet / Lufft (WS300, WS500 or WS600), a roof flange with rain deflector and, inside, the water separator and sample tube holder.

The measuring plug-in unit is mounted in the rack under the sample tube holder and connected to the sampling unit in just a few steps. It contains the aerosol spectrometer and all wear-related
components subject to wear and can therefore be easily removed for maintenance and calibration.

A condensate trap, which is automatically emptied during the self-test, and a two-stage dust filter with a prefilter and a residual dust filter are located downstream of the optical measuring cell. The sample volume flow is automatically controlled. The sample air pump also delivers the purge air, which is extracted from the pump exhaust air in the instrument via an ultra-fine filter and kept constant by a purge air regulator. The purge air prevents contamination of the illumination and detection optics and is used as particle-free reference air during the instrument self-test.

The sample air is drawn in at a constant flow rate of 1.2 l/min (based on operating conditions at the orifice plate) via the Sigma-2 sampling head (non-fractionating, equipped with a head heater to prevent ice formation) and fed vertically via the sample tube for sample air conditioning into the optical measuring cell in the measuring drawer. The adaptive heating in the sample tube is actively controlled so that no condensation can occur on the path of the aerosol to the measuring cell and, at the same time, the heating of the aerosol is kept as low as possible.

The device is controlled either via the touch display on the front of the device or via one of the interfaces (RS-232, USB-B, Ethernet) and one of the data protocols (GRIMM protocol, Modbus TCP, GESYTEC / Bayern-Hessen protocol).

In addition to the particulate matter fractions for PM_{10} and $PM_{2,5}$, further extensive measurement data (particulate matter fractions TSP, PM4, PM1 as well as PMCoarse, total particle number concentration, particle number size distribution in 72 size channels (0.178 µm to 29,4 µm optical latex equivalent diameter) as well as data from the weather station Ott Hydromet / Lufft WS300 (ambient temperature, humidity, ambient pressure), WS500 (like WS300, additionally wind direction and wind direction) or WS600 (like WS300, additionally wind direction, wind direction and precipitation) are available.

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 EDM 280 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

Initial certification according to EN 15267
Certificate No. 0000081157_00: 05 September 2023
Expiry date of the certificate: 01 August 2028
Test report: 936/21252222/A dated 3 February 2023
TÜV Rheinland Energy GmbH
Publication: BAnz AT 02.08.2023 B7, chapter II number 1.1
UBA announcement dated 5 July 2023

Expanded uncertainty $PM_{2.5}$

Comparison candidate with reference according to Standard EN 16450:2017				
Candidate	EDM 280	SN	FE111 & FE114	
		Limit value	30	µg/m³
Status of measured values	Slope and offset corrected	Allowed uncertainty	25	%
All comparisons				
Uncertainty between Reference	**0.53**	**µg/m³**		
Uncertainty between Candidates	**0.43**	**µg/m³**		
FE111 & FE114				
Number of data pairs	**308**			
Slope b	**1.000**	**not significant**		
Uncertainty of b	**0.012**			
Ordinate intercept a	**0.005**	**not significant**		
Uncertainty of a	**0.149**			
Expanded meas. uncertainty W_{CM}	**10.36**	**%**		
All comparisons, ≥18 µg/m³				
Uncertainty between Reference	**0.49**	**µg/m³**		
Uncertainty between Candidates	**1.02**	**µg/m³**		
FE111 & FE114				
Number of data pairs	**43**			
Slope b	**1.138**			
Uncertainty of b	**0.052**			
Ordinate intercept a	**-4.007**			
Uncertainty of a	**1.358**			
Expanded meas. uncertainty W_{CM}	**12.96**	**%**		
All comparisons, <18 µg/m³				
Uncertainty between Reference	**0.54**	**µg/m³**		
Uncertainty between Candidates	**0.25**	**µg/m³**		
FE111 & FE114				
Number of data pairs	**265**			
Slope b	**1.051**			
Uncertainty of b	**0.024**			
Ordinate intercept a	**-0.309**			
Uncertainty of a	**0.202**			
Expanded meas. uncertainty W_{CM}	**12.92**	**%**		

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	EDM 280		SN	FE111 & FE114	
			Limit value	30	µg/m³
Status of measured values	Slope and offset corrected		Allowed uncertainty	25	%
Cologne					
Uncertainty between Reference	**0.37**	**µg/m³**			
Uncertainty between Candidates	**0.19**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**79**		**73**		
Slope b	**1.134**		**1.091**		
Uncertainty of b	**0.037**		**0.039**		
Ordinate intercept a	**-0.542**		**-0.408**		
Uncertainty of a	**0.292**		**0.301**		
Expanded meas. uncertainty W_{CM}	**24.42**	**%**	**16.90**	**%**	
Bornheim					
Uncertainty between Reference	**0.48**	**µg/m³**			
Uncertainty between Candidates	**0.42**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**78**		**78**		
Slope b	**0.955**		**0.894**		
Uncertainty of b	**0.022**		**0.019**		
Ordinate intercept a	**0.785**		**0.895**		
Uncertainty of a	**0.232**		**0.207**		
Expanded meas. uncertainty W_{CM}	**8.75**	**%**	**16.89**	**%**	
Niederzier					
Uncertainty between Reference	**0.72**	**µg/m³**			
Uncertainty between Candidates	**0.08**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**75**		**75**		
Slope b	**1.067**		**1.049**		
Uncertainty of b	**0.087**		**0.084**		
Ordinate intercept a	**-0.820**		**-0.622**		
Uncertainty of a	**0.608**		**0.593**		
Expanded meas. uncertainty W_{CM}	**15.62**	**%**	**14.20**	**%**	
JRC Ispra					
Uncertainty between Reference	**0.50**	**µg/m³**			
Uncertainty between Candidates	**0.73**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**82**		**82**		
Slope b	**1.056**		**0.995**		
Uncertainty of b	**0.022**		**0.020**		
Ordinate intercept a	**-0.685**		**-0.496**		
Uncertainty of a	**0.420**		**0.393**		
Expanded meas. uncertainty W_{CM}	**13.78**	**%**	**12.05**	**%**	
All comparisons, ≥18 µg/m³					
Uncertainty between Reference	**0.49**	**µg/m³**			
Uncertainty between Candidates	**1.02**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**44**		**43**		
Slope b	**1.166**		**1.100**		
Uncertainty of b	**0.054**		**0.051**		
Ordinate intercept a	**-3.978**		**-3.718**		
Uncertainty of a	**1.383**		**1.31**		
Expanded meas. uncertainty W_{CM}	**15.06**	**%**	**13.36**	**%**	
All comparisons, <18 µg/m³					
Uncertainty between Reference	**0.54**	**µg/m³**			
Uncertainty between Candidates	**0.25**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**270**		**265**		
Slope b	**1.083**		**1.020**		
Uncertainty of b	**0.024**		**0.023**		
Ordinate intercept a	**-0.443**		**-0.168**		
Uncertainty of a	**0.206**		**0.194**		
Expanded meas. uncertainty W_{CM}	**17.11**	**%**	**9.98**	**%**	
All comparisons					
Uncertainty between Reference	**0.53**	**µg/m³**			
Uncertainty between Candidates	**0.43**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**314**		**308**		
Slope b	**1.033**	**significant**	**0.967**	**significant**	
Uncertainty of b	**0.012**		**0.011**		
Ordinate intercept a	**-0.142**	**not significant**	**0.155**	**not significant**	
Uncertainty of a	**0.152**		**0.143**		
Expanded meas. uncertainty W_{CM}	**12.11**	**%**	**11.46**	**%**	

Expanded uncertainty PM_{10}

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	EDM 280		SN	FE111 & FE114	
			Limit value	50	µg/m³
Status of measured values	Slope and offset corrected		Allowed uncertainty	25	%
All comparisons					
Uncertainty between Reference	**0.72**	**µg/m³**			
Uncertainty between Candidates	**0.62**	**µg/m³**			
FE111 & FE114					
Number of data pairs	**304**				
Slope b	**1.000**	**not significant**			
Uncertainty of b	**0.011**				
Ordinate intercept a	**-0.006**	**not significant**			
Uncertainty of a	**0.219**				
Expanded measured uncertainty WCM	**7.04**	**%**			
All comparisons, ≥30 µg/m³					
Uncertainty between Reference	**1.06**	**µg/m³**			
Uncertainty between Candidates	**1.21**	**µg/m³**			
FE111 & FE114					
Number of data pairs	**39**				
Slope b	**0.955**				
Uncertainty of b	**0.062**				
Ordinate intercept a	**1.366**				
Uncertainty of a	**2.233**				
Expanded measured uncertainty WCM	**8.12**	**%**			
All comparisons, <30 µg/m³					
Uncertainty between Reference	**0.65**	**µg/m³**			
Uncertainty between Candidates	**0.50**	**µg/m³**			
FE111 & FE114					
Number of data pairs	**265**				
Slope b	**1.022**				
Uncertainty of b	**0.016**				
Ordinate intercept a	**-0.303**				
Uncertainty of a	**0.275**				
Expanded measured uncertainty WCM	**7.70**	**%**			

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	EDM 280		SN	FE111 & FE114	
			Limit value	50	µg/m³
Status of measured values	Slope and offset corrected		Allowed uncertainty	25	%
Cologne					
Uncertainty between Reference	**0.52**	**µg/m³**			
Uncertainty between Candidates	**0.39**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**79**		**73**		
Slope b	**1.066**		**1.018**		
Uncertainty of b	**0.031**		**0.032**		
Ordinate intercept a	**-0.445**		**-0.292**		
Uncertainty of a	**0.407**		**0.414**		
Expanded measured uncertainty W_{CM}	**12.56**	**%**	**5.42**	**%**	
Bornheim					
Uncertainty between Reference	**0.71**	**µg/m³**			
Uncertainty between Candidates	**0.61**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**68**		**68**		
Slope b	**1.009**		**0.958**		
Uncertainty of b	**0.024**		**0.024**		
Ordinate intercept a	**-0.985**		**-0.874**		
Uncertainty of a	**0.445**		**0.444**		
Expanded measured uncertainty W_{CM}	**6.14**	**%**	**13.22**	**%**	
Niederzier					
Uncertainty between Reference	**0.89**	**µg/m³**			
Uncertainty between Candidates	**0.50**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**81**		**81**		
Slope b	**0.974**		**1.010**		
Uncertainty of b	**0.022**		**0.022**		
Ordinate intercept a	**1.312**		**1.229**		
Uncertainty of a	**0.466**		**0.453**		
Expanded measured uncertainty W_{CM}	**7.47**	**%**	**10.01**	**%**	
JRC Ispra					
Uncertainty between Reference	**0.69**	**µg/m³**			
Uncertainty between Candidates	**0.88**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**82**		**82**		
Slope b	**1.027**		**0.973**		
Uncertainty of b	**0.017**		**0.017**		
Ordinate intercept a	**-0.343**		**-0.147**		
Uncertainty of a	**0.446**		**0.453**		
Expanded measured uncertainty W_{CM}	**7.64**	**%**	**8.88**	**%**	
All comparisons, ≥30 µg/m³					
Uncertainty between Reference	**1.06**	**µg/m³**			
Uncertainty between Candidates	**1.21**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**39**		**39**		
Slope b	**0.969**		**0.968**		
Uncertainty of b	**0.057**		**0.075**		
Ordinate intercept a	**1.289**		**0.491**		
Uncertainty of a	**2.058**		**2.72**		
Expanded measured uncertainty W_{CM}	**6.79**	**%**	**10.13**	**%**	
All comparisons, <30 µg/m³					
Uncertainty between Reference	**0.65**	**µg/m³**			
Uncertainty between Candidates	**0.50**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**271**		**265**		
Slope b	**1.035**		**1.011**		
Uncertainty of b	**0.016**		**0.017**		
Ordinate intercept a	**-0.331**		**-0.316**		
Uncertainty of a	**0.262**		**0.291**		
Expanded measured uncertainty W_{CM}	**8.85**	**%**	**7.49**	**%**	
All comparisons					
Uncertainty between Reference	**0.72**	**µg/m³**			
Uncertainty between Candidates	**0.62**	**µg/m³**			
	FE111		**FE114**		
Number of data pairs	**310**		**304**		
Slope b	**1.013**	**not significant**	**0.990**	**not significant**	
Uncertainty of b	**0.010**		**0.012**		
Ordinate intercept a	**-0.019**	**not significant**	**-0.029**	**not significant**	
Uncertainty of a	**0.207**		**0.237**		
Expanded measured uncertainty W_{CM}	**7.16**	**%**	**7.89**	**%**	