PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

AQ Guard Smart

Manufactured by:

Palas GmbH
Greschbachstrasse 3b
76229 Karlsruhe
Germany

has been assessed by CSA Group
and for the conditions stated on this certificate complies with:

MCERTS Performance Standards for Indicative Ambient Particulate Monitors
Environment Agency, August 2017, version 4

Certification ranges:

$PM_{2.5}$	0 - 20,000 µg/m^3
PM_{10}	0 - 20,000 µg/m^3

Project No.:	80120068
Certificate No:	Sira MC220412/00
Initial Certification:	24 June 2022
This Certificate issued:	24 June 2022
Renewal Date:	23 June 2027

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

CSA Group Testing UK Ltd
Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US
Tel: +44 (0)1244 670 900

Form 1335
Issue 10

Certificate Contents

Approved Site Application

Any potential user should ensure, in consultation with the manufacturer, that the monitoring system is suitable for the intended application. For general guidance on monitoring techniques refer to the Environment Agency Monitoring Technical Guidance Notes available at www.mcerts.net

The indicative dust monitoring analyser(s) can be operated in one of two ways:
For qualitative measurements: Providing qualitative measurement data for the analysis of particulate pollution trends, and source identification studies based for example on pollution roses etc. Such application can rely on instrument factory calibration only.
For quantitative measurements: Providing measurement data with the uncertainty defined for indicative instruments (+/- 50%). This can be achieved on condition that each instrument used for measurement has been calibrated on the specific site where monitoring is taking place against a standard reference method for a period of two weeks and the resulting slope and intercept have been used for instrument calibration. Using non-standard filters and procedures for this purpose is not acceptable. To maintain the validity of data this calibration has to be repeated at least every twelve months or when the instrument is moved to a different site.

They cannot be used on national automatic monitoring networks for compliance reporting against the Ambient Air Quality Directives.

The field tests were carried out from December 2021 to March 2022 at Bornheim, Germany in a 'traffic' environment on two candidate AQ Guard Smart systems in conjunction with the reference system.

Basis of Certification

This certification is based on the following test report(s) and on CSA Group's assessment and ongoing surveillance of the product and the manufacturing process:
TÜV Rheinland Energy GmbH, report ref. 936/21254495/A, Cologne, dated 31 March 2022.

Product Certified

The "AQ Guard Smart" measuring system consists of the following parts:

AQ Guard Smart optical aerosol spectrometer with integrated weather sensor for temperature, humidity and pressure is equipped with a IADS (Intelligent Aerosol Drying System) moisture compensation module.
This certificate applies to all instruments fitted with software version 1.0.8 onwards (serial number 16265).

Certified Performance

Test (***Laboratory***)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Constancy of the sample volumetric flow			-1.53			To remain constant within ± 3%
Tightness of the sampling system			<2			Leakage not to exceed 2% of sampled volume

Test (**Field**)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Intra-instrument uncertainty for the reference method						
PM_{10} (n= 94)					0.69 µg/m^3	≤2.5µg/m^3
$PM_{2.5}$ (n=94)					0.47 µg/m^3	≤2.5µg/m^3
Intra-instrument uncertainty for the candidate method						
PM_{10}						
All data (n= 94)					0.46 µg/m^3	≤5µg/m^3 for all data as well as for the subsets: < or ≥ 30 µg/m^3
≥ 30 µg/m^3 (n= 2)					0.60 µg/m^3	
< 30 µg/m^3 (n= 81)					0.48 µg/m^3	
$PM_{2.5}$						
All data (n= 94)					0.51 µg/m^3	≤5µg/m^3 for all data as well as for the subsets: < or ≥ 30 µg/m^3
≥ 18 µg/m^3 (n= 11)					0.28 µg/m^3	
< 18 µg/m^3 (n= 82)					0.29 µg/m^3	
Highest resulting uncertainty estimate comparison against data quality objective (Measurement Uncertainty)						W_{CM}≤50% $W_{CM} \leq W_{dpo}$ (W_{dpo} Measurement uncertainty defined as 50% for indicative instruments)
PM_{10}						
All data (n= 83)					18.68%	
All data (slope corrected)* (n= 83)					11.86%	
≥ 30 µg/m^3 (n= 2)					Note 1	
$PM_{2.5}$						
All data (n= 93)					13.57%	
All data (slope corrected)* (n= 93)					10.26%	
≥ 18 µg/m^3 (n= 11)					15.23%	
≥ 18 µg/m^3 (slope corrected)* (n= 11)					11.28%	
Maintenance Interval					12 months Note 2	≥2 weeks

*Note 1 – For PM_{10} only two values were greater than 30 µg/m^3 therefore, no meaningful statical evaluation was possible. For PM_{10} - The full data set was corrected in terms of the slope (dividing by 0.926). All data sets were re-evaluated using the corrected values. $PM_{2.5}$ – The full data set was corrected in terms of the slope (dividing by 0.905) and axis intercept (subtracting 1.228). All data sets were re-evaluated using the corrected values.

Note 2 – Maintenance interval – the following tasks should be carried out once every 12 months: i) calibration using MonoDust, ii) calibration of the volume flow, iii) performing a leak test, and iv) cleaning of the inlet. Please also consult the manufacturers manual for more detail.

Certificate No: Sira MC220412/00
This Certificate issued: 24 June 2022

Description

The AQ Guard Smart employs a 90° single particle light scattering spectrometer to accurately measure aerosol particle size distribution. The light is focused on a confined optical detection volume with each pulse analyzed for signal length, amplitude and shape. Usage of a polychromatic light source in conjunction with 90° scattered light detection enables the determination of a calibration curve over the whole measurement range resulting in a high-resolution size distribution. An advanced algorithm is then used to convert this information simultaneously to $PM_{2.5}$ and PM_{10} aerosol mass concentrations.

The aerosol is sampled through a fan-assisted sampling head set to maintain the volumetric flow at 1 l/min (ambient conditions). A heated, humidity and temperature controlled, aerosol conditioning line eliminates humidity effects on the PM readings.

All data are available as real-time readings, via several data protocols and is automatically logged on the device. Self-diagnostics are used to maintain long-term stability in the field.

The device can also be equipped with electrochemical gas sensors for the components SO_2, NO_2, CO and O_3 to provide additional information about the ambient air pollution state. (The gas sensor related components are *not* covered under this certification)

General Notes

1. This certificate is based upon the equipment tested. The Manufacturer is responsible for ensuring that on-going production complies with the standard(s) and performance criteria defined in this certificate. 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 system shall be subject to regular surveillance according to 'Regulations Applicable to the Holders of CSA Group Testing UK Ltd Certificates'.

2. The design of the product certified is maintain by TÜV Rheinland Energy GmbH for certificate no. Sira MC220412/00.

3. If a certified product is found not to comply, CSA Group should be notified immediately at the address shown on this certificate.

4. The certification marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of CSA Group Testing UK Ltd Certificates'.

5. This document remains the property of CSA Group and shall be returned when requested by CSA Group.