PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

Osiris Airborne Particle Monitor

Manufactured by:

Turnkey Instruments Ltd

1 & 2 Dalby Court
Gadbrook Business Centre
Northwich, Cheshire
CW9 7TN

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_{10} 0 to 100µg/m^3
$PM_{2.5}$ 0 to 600µg/m^3

Project No.:	80146174
Certificate No:	CSA MC090157/07
Initial Certification:	30 September 2009
This Certificate issued:	21 March 2023
Renewal Date:	29 September 2024

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

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Form 1335
Issue 10

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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 as a substitute for continuous ambient air quality monitoring systems (CAMs) employed in national air quality monitoring networks for the EU Air Quality Directive.

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:

Bureau Veritas Report No. BV/AQ/AGGX0849/DH/2610
CSA Report ref. 80146174, dated 22 February 2023

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Product Certified

The ‘Osiris’ measuring system consists of the following parts:

- Osiris analyser
- Heated Inlet
- Flow controller
- Lampost Box

This certificate applies to all instruments fitted with software version 0400 (serial number TNO 2296 onwards).

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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					-2.7% Notes 1 & 2	To remain constant within ± 3%
Tightness of the sampling system					<2.0%	Leakage not to exceed 2% of sampled volume

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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}					0.82 µg/m^3	≤2.5µg/m^3
$PM_{2.5}$					0.82 µg/m^3	≤2.5µg/m^3
Intra-instrument uncertainty for the candidate method						
PM_{10}						
All data (n=51)					0.82 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=1)					*ND µg/m^3	
< 30 µg/m^3 (n=50)					0.82 µg/m^3	
$PM_{2.5}$						
All data (n=51)					0.32 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=0)					*ND µg/m^3	
< 18 µg/m^3 (n=51)					0.32 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=51)					29.2%	
≥ 30 µg/m^3 (n=1)					*Note 4	
$PM_{2.5}$						
All data (n=51)					32.2% *Note 3	
Maintenance Interval					12 months Note 5	≥2 weeks

Note 1 - The internal particulate filter is not used for calibration, therefore the constancy of sample volumetric flow is not treated as a pass/fail criterion of the instrument operation. The tests have been carried out for engineering assessment of the flow control system performance. The OSIRIS instrument is fitted with an internal flow controller maintaining the flow rate at 600 cc/min as the flow resistance increases with the dust loading. The recommended filter is a circular Whatman GFA of 25 mm diameter.
Note 2 - The laboratory testing was carried out on the Osiris instrument during the initial certification, ref. Certficate MC090157.
Note 3 - It was not possible to assess the high concentration $PM_{2.5}$ greater than 18 µg/m^3 subset as out of 51 days, no values had a concentration greater than 18 µg/m^3.
Note 4 - It was not possible to assess the high concentration PM_{10} greater than 30 µg/m^3 subset as out of 51 days, only one had a concentration greater than 30 µg/m^3.
Note 5 - The maintenance interval is 12 months unless the instrument is connected to "AirQWeb" whereby 24 months is applicable. The manufacturer recommends filter changes when the accumulated dust mass exceeds 4 mg. Warning messages are sent via "AirQWeb" should an error occur with the photometer or pump.

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Description

The Turnkey **Osiris** monitor gives a continuous and simultaneous indication of the $PM_{2.5}$ and PM_{10} mass fractions. They use a light scattering technique to determine the concentration of airborne dust in the particle size range from about 0.3 microns (1 micron = 10^{-6} metre) to about 20 microns. The air sample is continuously drawn into the instrument by a pump with a flow rate set by the microprocessor. The incoming air passes through a laser beam in a photometer and then through a filter to remove the particles before reaching the pump.

The Osiris monitor analyses light scattered through 10 degrees or less.

In addition, the Osiris employs a sensitive scattering volume of less than 0.1 micro-litres. Therefore, it can analyse the intensity of the light scattered by individual particles. This allows the photometer to count and size individual particles at concentrations of up to several mg/m^3. Having counted and sized the individual particles a dedicated microprocessor then continually determines the $PM_{2.5}$ and PM_{10} unit mass concentrations. These results are averaged and stored at chosen intervals and can be downloaded for analysis.

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 defined in the CSA Group Design Schedule 'version 09' for certificate No. CSA MC090157/07.

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.

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