

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 Sira Certification Service
and for the conditions stated on this certificate complies with:

**MCERTS Performance Standards for Indicative Ambient Particulate Monitors,
Version 2, dated July 2012**

Certification Range:

PM₁₀ 0 to 100µg/m³

Project No: 674/0356A
Certificate No: Sira MC090157/04
Initial Certification: 30 September 2009
This Certificate Issued: 01 October 2014
Renewal Date: 29 September 2019

Deputy Certification Manager

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

12 Acorn Industrial Park, Crayford Road, Crayford
Dartford, Kent, UK DA1 4AL
Tel: +44 (0)1322 520500 Fax: +44 (0)1322 520501



*This certificate may only be reproduced in its entirety and without change
To authenticate the validity of this certificate please visit www.siracertification.com/mcerts
Registered Office: Rake Lane, Eccleston, Chester, UK CH4 9JN*

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 field test was conducted on a site representative of urban background particulate loading.

Basis of Certification

This certification is based on the following Test Report(s) and on Sira's assessment and ongoing surveillance of the product and the manufacturing process:

Bureau Veritas Report No. BV/AQ/AGGX0849/DH/2610

Product Certified

The 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).

Certificate No: Sira MC090157/04
This Certificate Issued: 01 October 2014

*This certificate may only be reproduced in its entirety and without change
To authenticate the validity of this certificate please visit www.siracertification.com/mcerts*

Certified Performance

Test	Results	MCERTS specification
Constancy of the sample volumetric flow	-2.7% See Note 1	Remain constant within $\pm 3\%$ of rated value
Tightness of the sampling system	<2%	Leakage not to exceed 2% of sampled volume
Maintenance Interval	Four weeks	Two weeks
Between sampler/instrument uncertainty for the complete data set	$\leq 5\mu\text{g}/\text{m}^3$	$\leq 5\mu\text{g}/\text{m}^3$
Between sampler/instrument uncertainty for two data sets obtained by splitting the full data set into values below and above 50% of the limit value	$\leq 5\mu\text{g}/\text{m}^3$	$\leq 5\mu\text{g}/\text{m}^3$
Highest resulting uncertainty estimate comparison against data quality objective (Measurement Uncertainty)	$W_{CM} \leq W_{dqo}$ 2007: $W_{CM} = 46.20\%$ 2003: $W_{CM} = 50.10\%$	$W_{CM} \leq W_{dqo}$ Measurement uncertainty defined as 50% for indicative instruments

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 and TOPAS instruments are 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.

Certificate No: Sira MC090157/04
This Certificate Issued: 01 October 2014

*This certificate may only be reproduced in its entirety and without change
To authenticate the validity of this certificate please visit www.siracertification.com/mcerts*

Description:

The Turnkey **Osiris**, **Topas** and **Dustmate** instruments give a continuous and simultaneous indication of the PM₁, PM_{2.5}, PM₁₀ and TSP 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 dusty air passes through a laser beam in a photometer and then through a filter to remove the particles before reaching the pump.

The light scattered by airborne particles can be thought of as consisting of three components. Light reflected from the surface of the particle, light refracted through the particle and light which is diffracted from its original path by the presence of the particle. The intensity of the light scattered by reflection or refraction strongly depends on the type of particle. Thus a white limestone particle will reflect much more light than a black diesel fume particle of the same size. On the other hand the diffracted component depends only on the size of the particle and is independent of its material composition.

For irregularly shaped particles, light which is reflected and refracted tends to be scattered over all possible directions. The diffracted component, however, tends to be scattered only through very small angles. For example, for a 5 micron diameter particle, 90% of the diffracted light is scattered by less than 10 degrees from the original direction of the light beam.

Turnkey's instruments analyse only the light scattered through 10 degrees or less. That is they respond only to the diffracted component and have a virtually constant response whether the particles are black or white. Other commercially available photometers detect light scattered through much wider angles or even at 90 degrees to the light beam.

In addition, all of Turnkey's instruments employ a sensitive scattering volume of less than 0.1 micro-litres. Therefore they can analyse the intensity of the light scattered by individual particles, even when there are many millions of them per litre. This allows the photometers to accurately count and size individual particles at concentrations of up to several mg/m³. Having counted and sized the individual particles a dedicated microprocessor then continually determines the PM₁, PM_{2.5}, PM₁₀ and TSP unit mass concentrations. These results are averaged and stored at chosen intervals and can be downloaded for analysis.

Certificate No: Sira MC090157/04
This Certificate Issued: 01 October 2014

*This certificate may only be reproduced in its entirety and without change
To authenticate the validity of this certificate please visit www.siracertification.com/mcerts*

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 Sira Certificates'. The design of the product certified is defined in the Sira Design Schedule for certificate No. Sira MC090157/03.
2. If certified product is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.
3. The Certification Marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of Sira Certificates'.
4. This document remains the property of Sira and shall be returned when requested by the company.

Certificate No: Sira MC090157/04
This Certificate Issued: 01 October 2014

*This certificate may only be reproduced in its entirety and without change
To authenticate the validity of this certificate please visit www.siracertification.com/mcerts*