PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

iPM Ambient Particle Monitor

Manufactured by:

Turnkey Instruments Ltd

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

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 to 600 µg/m^3
PM_{10}	0 to 1000 µg/m^3

Project No.:	80150791
Certificate No:	MC230414/00
Initial Certification:	17 March 2023
This Certificate issued:	17 March 2023
Renewal Date:	16 March 2028

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

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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 the 10th June to the 31st July 2022. Two candidate iPM samplers (ref. iPM0206 and iPM0207) were collocated with a TEOM monitor (the reference method) at a site in Brahenkentta, Helsinki (ref. “Helsinki Kallio 2”).

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:

Finnish Meteorological Institute, test report ref. “iPM Helsinki Trial, August 2022”.
MCERTS Evaluation report, ref. 80150791, dated 9th February 2023.

Product Certified

The “iPM Ambient Particle Monitor” measuring system consists of the following parts:

1. Particle spectrometer
2. Interchangeable GF/B filter capsule
3. Ultrasonic pump with flow control, volumetric flowrate set at 600 cc/min
4. Temperature and humidity controlled heated inlet. Control point set at T=50 C, no RH control

This certificate applies to all instruments fitted with firmware version ‘P2.20mjl’ onwards (serial number iPM0207).

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					0.42%, all instantaneous values within ± 5%.	To remain constant within ± 3%. Instantaneous values within ± 5%.
Tightness of the sampling system					0.40%	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}					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=84)					1.31 µg/m^3	≤5µg/m^3 for all data as well as for the subsets: < or ≥ 30 µg/m^3
$PM_{2.5}$ All data (n=84)					0.35 µg/m^3	≤5µg/m^3 for all data as well as for the subsets: < or ≥ 18 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=84)					17.1 %	
$PM_{2.5}$ All data (n=84)					15.0 %	
Maintenance Interval					24 months Note 2	≥2 weeks

Note 1 - It was not possible to assess the high concentration PM_{10} greater than 30 µg/m^3 subset nor the $PM_{2.5}$ greater than 18 µg/m^3 subset, as out of 50 days, only one had a concentration greater than 30 µg/m^3 and zero values greater than 18 µg/m^3. The test site was adjacent to a construction site which regularly produced peak PM_{10} readings in excess of 1000µg/m^3, however when these values were averaged over the 24 hours the daily $PM_{2.5}$ and PM_{10} readings remained low.

Note 2 – The field testing commenced in June 2022 and remained in operation into February 2023. During these months no maintenance was required. The manufacturer states a maintenance interval of 24 months. Filter changes may be required more frequently depending on loading. The manufacturer recommends a filter change when this exceeds 4mg.

Description

The iPM instrument uses near forward angle scatter to size individual airborne particles independently of their refractive index. This allows the instrument to simultaneously measure PM_{10} and $PM_{2.5}$ size fractions.

The iPM is calibrated with monodisperse spheres and can produce a particle spectrum between 0.2 and 10micron diameter.

Inlet heating eliminates the effect of water droplets in mist and fog. The inlet is temperature and humidity controlled to take account of ambient conditions.

An ultrasonic pump (<30dBA) draws in the air sample at a controlled 600 cc/min.

To keep the optics clean, there is a clean air recirculation system where the sampled particles are collected on an interchangeable binder free glass fibre 25mm filter. This can be analysed for material composition.

The instrument has WiFi and cellular connectivity via AirQweb(cloud portal).

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 for certificate no. CSA MC230414/00.

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.