

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

Vortex Air Quality Monitoring Wireless Sensor System (VX-AQM / VTX Air)

Manufactured by:

VORTEX IOT LIMITED
*12th Floor, 1 America Square,
Fenchurch Street,
London, EC3N 2LS
UK*

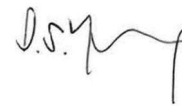
has been assessed by CSA Group
and for the conditions stated on this certificate complies with:

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

Certification range:

PM_{2.5} 0-1,000 µg/m³

Project No.: 80144491
Certificate No: CSA MC230394/00
Initial Certification: 30 June 2023
This Certificate issued: 30 June 2023
Renewal Date: 29 June 2028



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Environmental Team Manager

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The MCERTS certificate consists of this document in its entirety.

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Approved Site Application

Any potential user should make sure, 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 guidance 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 1st November 2022 to the 21st February 2023 on two candidate 'VTX Air' samplers, collocated with a Met One BAM PM_{2.5} (the reference method). The location of the field test was Port Talbot Margam, UK. The serial numbers of the two 'VTX Air' monitors were 'SN1053' and 'SN1054'.

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, test report ref. AIR18015192, dated May 2023, "Test of the Vortex VTX Air Quality Sensor for use as an Indicative Monitor for PM₁₀ and PM_{2.5}"

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Product Certified

The 'VTX Air' measuring system consists of the following parts:

- Air Quality Monitoring Sensor (VX-AQM-SEN)
- Router Power Supply Device (VX-AQM-RTR)
- Edge Gateway Device (VTX-AQM-GTW)

Sensor type and firmware version

VX-AQM-SEN sensor with firmware version 'DAT-SDS011-V1.0'.

Algorithm Version

VTXPM2.5 v1.0.0

This certificate applies to all instruments fitted with serial number SN1054 onwards.

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Certified Performance

Test (<i>Laboratory</i>)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Constancy of the sample volumetric flow					Not applicable note 1	To remain constant within $\pm 3\%$
Tightness of the sampling system					0%	Leakage not to exceed 2% of sampled volume

Test (<i>Field</i>)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Intra-instrument uncertainty for the reference method PM _{2.5}					0.67 $\mu\text{g}/\text{m}^3$	$\leq 2.5\mu\text{g}/\text{m}^3$
Intra-instrument uncertainty for the candidate method PM _{2.5} All data (n=109) $\geq 18 \mu\text{g}/\text{m}^3$ (n=6) $< 18 \mu\text{g}/\text{m}^3$ (n=103)					2.12 $\mu\text{g}/\text{m}^3$ 2.92 $\mu\text{g}/\text{m}^3$ 2.07 $\mu\text{g}/\text{m}^3$	$\leq 5\mu\text{g}/\text{m}^3$ for all data as well as for the subsets: $< \text{ or } \geq 30 \mu\text{g}/\text{m}^3$
Highest resulting uncertainty estimate comparison against data quality objective (Measurement Uncertainty) PM _{2.5} All data (n=109) $\geq 18 \mu\text{g}/\text{m}^3$ (n=6)					22.0% 43.9% (note 2)	$W_{CM} \leq 50\%$ $W_{CM} \leq W_{dpo}$ (W_{dpo} Measurement uncertainty defined as 50% for indicative instruments)
Maintenance Interval					≥ 2 weeks note 3	≥ 2 weeks

Note 1 - The 'VTX Air' utilises a fan and not a pump, therefore it was agreed that this test was not applicable.

Note 2 - The VTX Air must be set up using the configuration, as follows; i) Air Quality Monitoring (VX-AQM-SEN) sensor and V1.0 firmware version, and ii) Algorithm version: VTXPM2.5 v1.0.0.

Note 3 - Maintenance - No maintenance was required during the 16-week field test. The manufacturer states 'a minimum of 2-year maintenance service cycle'. As part of the maintenance service, the PM sensor is performance tested and replaced if necessary.

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Description

The VTX Air device measures PM_{2.5} concentrations using an optical scattering principle.

The VTX Air device uses a purge cycle to keep the internal components clean and free of dust deposits on the inlets. The PM_{2.5} concentrations are treated with a proprietary optimisation algorithm for corrections of humidity effect on the measurement.

The VTX Air device measures PM_{2.5} concentrations at 1-minute intervals. The device can be powered using different power sources (mains power, external battery power and solar power).

The VTX Air devices are networked with a proprietary Vortex Wireless Mesh Network (VTX Mesh) where the mesh network can operate standalone or connected to 4G/5G/WiFi through a VTX Gateway. The use of VTX Router devices allows extending the network range and network scalability.

The data is displayed on the VTX Air client portal and an application programming interface is provided for further integration to third-party applications and data downloads.

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 V00 for certificate no. CSA MC230394/00.
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.

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