

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

49iQ Ozone Analyzer

Manufactured by:

Thermo Fisher Scientific

27 Forge Parkway
Franklin
MA 02038
USA

has been assessed by Sira Certification Service
And for the conditions stated on this certificate complies with:

MCERTS Performance Standards for Continuous Ambient Air Quality Monitoring Systems, Version 10, June 2016

Certification Ranges :

Ozone : 0-500 $\mu\text{g}/\text{m}^3$ (0-250 ppb or nmol/mol)

Project No.: 80039232
Certificate No: Sira MC200357/00
Initial Certification: 14 July 2020
This Certificate issued: 14 July 2020
Renewal Date: 13 July 2025



Emily Alexander
Environmental Project Engineer

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

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Certificate Contents

Approved Site Application.....	2
Basis of Certification	2
Product Certified.....	2
Certified Performance	3
Description.....	5
General Notes	5

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

All tests have been conducted in accordance with EN 14625. On the basis of these tests this certificate is valid when the instrument is used for urban air quality monitoring and similar applications. For the continuous measurement of ozone concentrations from stationary sources in ambient air.

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:

TÜV Report No. : 936/21242986/A, Cologne, 2 October 2018

TÜV Report No. : 936/212446911/A, Cologne, 20 August 2019

TÜV Report No. : 936/21247113/A, Cologne, 22 August 2019

Product Certified

The 49iQ ozone measuring system consists of the following parts:

A 49iQ measurement module including the following components:

- Photometer DMC
- Common electronics
- Peripherals support system
- Flow pressure DMC

This certificate applies to all instruments of software version 1.5.1.32120 thereafter.

This certificate applies to all instruments of serial number 1180540009 thereafter.

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: 0°C to +30°C

Results are expressed as error % of certification range, unless otherwise stated.

Test	Results expressed as % of measured value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Repeatability at zero					0.20 nmol/mol	≤1 nmol/mol
Repeatability at hourly limit value					0.39 nmol/mol	≤3 nmol/mol
Residual lack of fit at zero					1.28 nmol/mol	≤5 nmol/mol
Lack of fit (largest residual from the linear regression line)			1.88			≤4%
Sensitivity coefficient to sample gas pressure					0.20 nmol/mol	≤2 nmol/mol/kPa
Sensitivity coefficient to sample gas temperature					0.09 nmol/mol/K	≤1 nmol/mol/K
Sensitivity coefficient to surrounding air temperature					Zero: 0.078 nmol/mol/K Span: 0.115 nmol/mol/K	≤1 nmol/mol/K ≤1 nmol/mol/K
Sensitivity coefficient to electrical supply voltage					0.02 nmol/mol/V	≤0.3 nmol/mol/V
Interference by H ₂ O (at concentration of 19 nmol/mol)					-0.47 nmol/mol	≤10 nmol/mol

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Test	Results expressed as % of measured value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Interference by toluene (at concentration of 0.5µmol/mol)					4.27 nmol/mol	≤5 nmol/mol
Interference by m-xylene (at concentration of 0.5µmol/mol)					4.75 nmol/mol	≤5 nmol/mol
Averaging effect	-6.4					≤7%
Short term zero drift (over 12h)					-0.11 nmol/mol	≤2 nmol/mol
Short term span drift (over 12h)					-0.25 nmol/mol	≤6 nmol/mol
Response time (rise)					60.8 s	≤180 s
Response time (fall)					61.5 s	≤180 s
Difference between rise and fall time					0.3 s	≤10 s
Reproducibility under field conditions ^{Note 1}				2.42		≤5% averaged over three month period
Long term zero drift (over 3months) ^{Note 1}					1.89 nmol/mol	≤5 nmol/mol
Long term span drift (over 3 months) ^{Note 1}			1.81			≤5% of the max of certification range
Difference between sampling and calibration port	0.17					≤1 %
Residence time in the analyser					1.0 s	≤3 s
Period of unattended operation ^{Note 1}					14 days	3 months or less if indicated by manufacturer
Availability (data capture) ^{Note 1}					100 %	>90%
Total expanded uncertainty					13.53 %	≤15%

Note 1: The field trial was performed in an urban background environment for a period of at least 3 months. The 49iQ measuring system has a maintenance interval of 14 days. The frequency at which the particle filter needs to be replaced depends on the dust concentration at the site of installation. The work detailed below has to be carried out at regular intervals, depending on local conditions;

- Regular visual inspections/telemetric inspections,
- Instrument status ok,
- No error messages,
- Replace the external Teflon filter at the sample gas inlet as required by measurement site conditions
- Perform zero and reference checks using suitable test gas every two weeks in accordance with standard EN 14625
- In addition, follow the manufacturer's instructions indicated in the user manual.

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Description

The 49iQ operates on the principle that ozone (O₃) molecules absorb UV light at a wavelength of 254nm. The relationship between intensity of the absorbance of the UV-light and the ozone concentration follows the law of Lambert-Beer.

The sample is split into two gas streams. One gas stream flows through an ozone scrubber to become the reference gas (I_o). The reference gas then flows to the reference solenoid valve. The sample gas (I) flows directly to the sample solenoid valve. The solenoid valves alternate the reference and sample gas streams between cells A and B every 10 seconds. When cell A contains reference gas, cell B contains sample gas and vice versa.

The UV light intensities of each cell are measured by detectors A and B. When the solenoid valves switch the reference and sample gas streams to opposite cells, the light intensities are ignored for several seconds to allow the cells to be flushed.

The 49iQ calculates the ozone concentration for each cell and outputs the average concentration.

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'.
2. The design of the product certified is held and maintained by TUV Rheinland for certificate No. Sira MC200357/00
3. If certified product is found not to comply, Sira Certification Service 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 Sira Certificates'.
5. This document remains the property of Sira and shall be returned when requested by the company.

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