

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

42iQ NO-NO₂-NO_x 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 :

NO : 0-1200 µg/m³ (0-962 ppb or nmol/mol)

NO₂ : 0-500 µg/m³ (0-261 ppb or nmol/mol)

Project No.: 80039229
Certificate No: Sira MC200354/00
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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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 14211. 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 nitrogen oxide 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/C, 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 42iQ sulphur dioxide measuring system consists of the following parts:

the 42iQ measurement module including the following components:

- Reaction chamber DMC
- Ozone generator
- Permeation dryer
- NO₂-NO converter
- Common electronics
- Peripherals Support System
- Flow/Pressure DMC

This certificate applies to all instruments of software version 1.6.1.32120 thereafter.

This certificate applies to all instruments of serial number 1180540003 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					0.25 nmol/mol	<1 nmol/mol
Repeatability at hourly limit value					0.39 nmol/mol	<3 nmol/mol
Residual lack of fit at zero					0.12 nmol/mol	<5 nmol/mol
Lack of fit (largest residual from the linear regression line)			1.13			<4%
Sensitivity coefficient to sample gas pressure					0.30 nmol/mol/kPa	<8 nmol/mol/kPa
Sensitivity coefficient to sample gas temperature					0.13 nmol/mol/K	<3 nmol/mol/K
Sensitivity coefficient to surrounding air temperature					Span: 0.601 nmol/mol/K	<3 nmol/mol/K
Sensitivity coefficient to electrical supply voltage					0.04 nmol/mol/V	<0.3 nmol/mol/V
Converter efficiency					98.5 %	>98%
Interference by H ₂ O (at concentration of 19 nmol/mol)					0.20 nmol/mol	<5 nmol/mol

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Test	Results expressed as % of measured value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Interference by NH ₃ (at concentration of 200 nmol/mol)					2.40 nmol/mol	<5 nmol/mol
Interference by CO ₂ at concentration of 500 μmol/mol					0.60 nmol/mol	<5 nmol/mol
Averaging effect				3.4		<7%
Short term zero drift (over 12h)					-0.27 nmol/mol	<2 nmol/mol
Short term span drift (over 12h)					1.14 nmol/mol	<6 nmol/mol
Response time (rise)					58 s	180 s
Response time (fall)					57 s	180 s
Difference between rise and fall time					2 s	<10 s
Residence time in the analyser					2.2 s	<3 s
Reproducibility under field conditions Note 1				2.44		<5% averaged over three month period
Long term zero drift (over 3 months) Note 1					1.20 nmol/mol	<5 nmol/mol
Long term span drift (over 3 months) Note 1		0.64				<5% of the max of certification range
Period of unattended operation Note 1					14 days	3 months or less if indicated by the manufacturer
Availability (data capture) Note 1					100 %	>90%
Total expanded uncertainty					8.01%	<15%

Note 1: The field trial was performed in an urban background environment for a period of at least 3 months. The 42iQ 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 14211.
- In addition, follow the manufacturer's instructions indicated in the user manual

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Description

The 42iQ operates on the principle that nitric oxide (NO) and ozone (O₃) react to produce a characteristic luminescence with an intensity linearly proportional to the NO concentration. Nitrogen dioxide (NO₂) must first be transformed into NO before it can be measured using the chemiluminescent reaction. NO₂ is converted to NO by a molybdenum NO₂-to-NO converter heated to about 325°C.

The ambient air sample is drawn into the 42iQ through a sample permeation dryer, a capillary and then to the mode solenoid valve. The solenoid valve routes the sample either straight to the reaction chamber (NO mode) or through the NO₂-to-NO converter and then to the reaction chamber (NO_x mode).

Dry air enters the 42iQ through a permeation dryer, passes through a flow switch, and then through a silent discharge ozonator. The ozonator generates the ozone needed for the chemiluminescent reaction. At the reaction chamber, the ozone reacts with the NO in the sample to produce excited NO₂ molecules. A photomultiplier tube (PMT) housed in a thermoelectric cooler detects the luminescence generated during this reaction.

From the reaction chamber, the exhaust travels through the ozone (O₃) converter to the pump and is released through the vent. The NO and NO_x concentrations calculated in the NO and NO_x modes are stored in memory. The difference between the concentrations is used to calculate the NO₂ 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 MC200354/00
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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