PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

AR500 Open Path Monitor with ER120

Manufactured by:

Opsis AB
PO Box 244
5-244 02 Furulund
Sweden

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

MCERTS Performance Standards for Continuous Ambient Air Quality Monitoring Systems, Version 10 dated June 2016
and
Open Path Ambient Air Quality Monitoring Systems using Differential Optical Absorption Spectrometry (DOAS) and FTIR Spectroscopy Version 3, August 2017

Certification ranges:

NO_2	400µg/m^3
SO_2	700µg/m^3
O_3	360µg/m^3

Project No.:	80074511
Certificate No:	Sira MC 160295/01
Initial Certification:	14 June 2016
This Certificate issued:	21 June 2021
Renewal Date:	13 June 2026

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

On the basis of these tests this certificate is valid when the instrument is used for urban air quality monitoring and similar applications.

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 Rhineland Cologne report: 936/21211350/B dated 7th October 2011

The testing for the Opsis AB AR500 Open Path Monitor with ER120 was conducted in line with EN 14211, EN 14212 and EN 14625. The analyser is not based on an EN standard method and therefore the procedure described in Figure 2 of the MCERTS Performance Standards for Continuous Ambient Air Quality Monitoring Systems (which refers to the EC guide Demonstration of Equivalence of Ambient Air Monitoring Methods) has been applied.

Product Certified

The AR500 measuring system consists of the following parts:

- AR500 analyser
- Combined Emitter – Receiver Unit ER120

This certificate applies to all instruments fitted with software version 7.21 (serial number 1329 onwards).

Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range:	+5°C to +40°C	
Instrument IP rating:	Analyser	IP20
	Sender/receiver unit	IP65

Note: If the instrument is supplied with an enclosure, then the ambient temperature shall be monitored inside the enclosure to ensure that it stays within the above ambient temperature range.

Results are expressed as error % of the measured value, unless otherwise stated.

Test	Results expressed as % of the measured value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
NO_2					120s	<180s
SO_2					120s	<180s
O_3					120s	<180s
Repeatability standard deviation at zero point						
NO_2					<0.1 nmol/mol	<1.0 nmol/mol
SO_2					<0.1 nmol/mol	<1.0 nmol/mol
O_3					<0.2 nmol/mol	<1.0 nmol/mol
Repeatability standard deviation at reference point						
NO_2					<2.0 nmol/mol	<3.0 nmol/mol
SO_2					<0.1 nmol/mol	<3.0 nmol/mol
O_3					<0.6nmol/mol	<3.0 nmol/mol
Residual lack-of-fit at zero						
NO_2					<-3.79 nmol/mol	<5.0 nmol/mol
SO_2					<-0.64 nmol/mol	<5.0 nmol/mol
O_3					<-0.41 nmol/mol	<5.0 nmol/mol
Lack-of-fit						
NO_2		0.8				<4% of measured value
SO_2			1.6			<4% of measured value
O_3	0.4					<4% of measured value

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Test	Results expressed as % of the measured value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Short term drift at zero level (12hrs)						
NO_2					<0.3 nmol/mol over 12 h	<2.0 nmol/mol over 12 h
SO_2					<0.9 nmol/mol over 12 h	<2.0 nmol/mol over 12 h
O_3					<-0.2 nmol/mol over 12 h	<2.0 nmol/mol over 12 h
Short term drift at span level (12hrs)						
NO_2					<0.9 nmol/mol over 12 h	<6.0 nmol/mol over 12 h
SO_2					<-0.5 nmol/mol over 12 h	<6.0 nmol/mol over 12 h
O_3					<1.9 nmol/mol over 12 h	<6.0 nmol/mol over 12 h
Sensitivity coefficient to surrounding air temperature at zero.						
NO_2					0.02 nmol/mol/K	<3.0 nmol/mol/K
SO_2					-0.02 nmol/mol/K	<1.0 nmol/mol/K
O_3					0.02 nmol/mol/K	<1.0 nmol/mol/K
Sensitivity coefficient to surrounding air temperature at span.						
NO_2					0.05 nmol/mol/K	<3.0 nmol/mol/K
SO_2					-0.06 nmol/mol/K	<1.0 nmol/mol/K
O_3					0.15 nmol/mol/K	<1.0 nmol/mol/K
Sensitivity coefficient to sample gas temperature.						
NO_2					-0.03 nmol/mol/K	<3.0 nmol/mol/K
SO_2					0.02 nmol/mol/K	<1.0 nmol/mol/K
O_3					0.01 nmol/mol/K	<1.0 nmol/mol/K

Test	Results expressed as % of the measured value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Dependence on supply voltage						
NO_2					<0.07 nmol/mol/V	<0.3 nmol/mol/V
SO_2					<0.01 nmol/mol/V	<0.3 nmol/mol/V
O_3					<0.01 nmol/mol/V	<0.3 nmol/mol/V
Single gas interference						
NO_2						
CO_2					2.6 nmol/mol	<5.0 nmol/mol
NH_3					2.3 nmol/mol	<5.0 nmol/mol
O_3					2.2 nmol/mol	<2.0 nmol/mol
						Note 1
SO_2						
H_2S					0.5 nmol/mol	<5.0 nmol/mol
NH_3					0.4 nmol/mol	<5.0 nmol/mol
NO					-0.6 nmol/mol	<5.0 nmol/mol
NO_2					0.4 nmol/mol	<5.0 nmol/mol
m-Xylene					1.4 nmol/mol	<10.0 nmol/mol
O_3						
m-Xylene					2.6 nmol/mol	<5.0 nmol/mol
toluene					2.2 nmol/mol	<5.0 nmol/mol
Averaging effect						
NO_2		-0.6				<7%
SO_2	-0.1					<7%
O_3		-0.9				<7%
Total expanded uncertainty						
NO_2					6.52	<15%
SO_2					6.23	<15%
O_3					8.01	<15%

Test	Results expressed as % of the measured value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Period of unattended operation (Maintenance interval)						
All gases					4 weeks	>2 weeks
Zero drift (over maintenance interval)						
NO_2					1.62 nmol/mol	<5 nmol/mol
SO_2					-0.92 nmol/mol	<5 nmol/mol
O_3					-1.84 nmol/mol	<5 nmol/mol
Span drift (over maintenance interval)						
NO_2					0.50	<5% of maximum certification range
SO_2					-2.07	
O_3					2.90	
Field reproducibility						
NO_2					4.72	<5% of the average over three months period
SO_2					4.83	
O_3					2.41	
Availability (data capture)						
All gases					96.7%	>90%

Description

The system is an open path ambient air gas measurement system that uses an AR500 (UV) analyser and transmitter and receiver. The AR500 analyser is based upon UV absorption techniques for measuring SO_2, NO_2 and O_3.

The transmitter and receiver units are mounted opposite each other typically 200-800 metres apart. The receiver is connected to the control unit by a fibre optic cable.

The AR500 analyser system can measure other gases but these are not included under the certification, please contact the manufacturer for details.

The ER110 (EM110 emitter and RE110 receiver) can be used on path up to approximately 500 metres and the ER150 (EM150 emitter and RE150 receiver) up to approximately 1000 metres. The difference is the diameter of the two mirror options, the ER110 mirror is 100mm and the ER150 mirror is 150mm. The emitter contains a xenon lamp and a mirror.

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. Sira MC160295/00.

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.