



PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

AR500 Open Path Monitor

manufactured by:

Opsis AB

PO Box 244
5-244 02 Furulund
Sweden

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

MCERTS Performance Standards for Open Path Ambient Air Quality Monitoring Systems using Differential Optical Absorption Spectrometry (DOAS) Version 1, January 2004

Certification Ranges :

SO ₂	0 to 400 µg/m ³ at 300m equivalent to 0 to 45 ppm.metres
NO ₂	0 to 400 µg/m ³ at 300m equivalent to 0 to 72 ppm.metres
O ₃ (Ozone)	0 to 400 µg/m ³ at 300m equivalent to 0 to 60 ppm.metres
C ₆ H ₆ (Benzene)	0 to 10 µg/m ³ at 300m equivalent to 0 to 1 ppm.metres

Project No: 674/0148 & 674/0422
Certificate No: Sira MC 040048/01
Initial Certification: 5 November 2004
This Certificate Issued: 17 March 2010
Renewal Date: 4 November 2014



Technical Director

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

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Field Test Site

The AR500 analyser was assessed on the basis of three month field trial on an urban field test site.

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 Environmental 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 on urban air quality 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 Rheinland	Report ref: 936/807014/A dated 11 th February 2000
TÜV Rheinland	Report ref: 936/807014/B dated 12 th February 1999
TÜV Rheinland	Report ref: 936/807014/C dated 26 th January 2001
UMEG Karlsruhe	Report ref: 33-01/93 dated 1993

Product Certified

The system tested comprised:

- AR500 analyser
- Emitter and receiver ER110 (EM110 emitter and RE110 receiver)
- Emitter and receiver ER150 (EM150 emitter and RE150 receiver)

This certificate applies to all instruments fitted with software version 7.21 onwards (serial number E091 onwards).

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: +5°C to +40°C

Performance values are expressed as a percentage of the certification range, except for availability and analysis function.

Test	Results expressed as % of limit value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Drift (24 hours)						
Zero:						
SO ₂	0.0					≤2%
NO ₂	0.01					≤2%
Ozone	-0.01					≤2%
Benzene	-0.01					≤2%
Span:						
SO ₂	0.0					≤2%
NO ₂	-0.03					≤2%
Ozone	-0.01					≤2%
Benzene	-0.03					≤2%
Repeatability (detection limit)						
Zero:						
SO ₂			1.22			≤2%
NO ₂		0.55				≤1%
O ₃		1.0				≤1%
C ₆ H ₆				3.80		≤5%
Span:						
SO ₂		0.95				≤2%
NO ₂		1.90				≤2%
O ₃		0.83				≤2%
C ₆ H ₆			1.12			≤2%

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Test	Results expressed as % of limit value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Linearity						
SO ₂			<2.0			≤2%
NO ₂			1.80			≤2%
O ₃		0.90				≤5%
C ₆ H ₆			1.60			≤2%
Cross sensitivity to individual interferents						
SO ₂			<2.0			≤2%
NO ₂	0.46					≤2%
O ₃			1.32			≤2%
C ₆ H ₆			<2.0			≤2%
Cross sensitivity to all interferents						
SO ₂ , NO ₂ , O ₃ , C ₆ H ₆				<5.0		≤5% of limit value
Effect of ambient temperature (5°C to 40°C)						
Zero shift: SO ₂	0.10					≤2%
NO ₂		0.90				≤2%
O ₃		0.80				≤2%
C ₆ H ₆			1.10			≤2%
Span shift: SO ₂		0.90				≤2%
NO ₂			1.70			≤2%
O ₃		0.80				≤2%
C ₆ H ₆			2.00			≤2%
Dependence on line voltage (220-245V)						
All components					No voltage dependence observed	≤2%

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Test	Results expressed as % of limit value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Combined performance characteristic						
SO ₂					13%	≤15%
NO ₂ , O ₃					11%	≤15%
C ₆ H ₆					14%	≤20%
Response times in single components mode						
SO ₂					40 s	≤60 s
NO ₂ , O ₃ , C ₆ H ₆					30 s	≤60 s
Long term drift (over the 30 days maintenance interval test)						≤5% of limit value
Zero: SO ₂	0.00					
NO ₂	0.02					
O ₃	-0.14					
C ₆ H ₆				<5.0		
Span: SO ₂	0.0					
NO ₂	-0.10					
O ₃	0.003					
C ₆ H ₆	0.00					
Field repeatability						≤8% of the average of three months period
SO ₂			1.90			
NO ₂		0.93				
O ₃					< 8%	
C ₆ H ₆			1.32			
Maintenance interval						
SO ₂					30 days	30 days
NO ₂ , O ₃ , C ₆ H ₆					> 30 days	30 days

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Test	Results expressed as % of limit value				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Availability (data capture)						
SO ₂					98%	> 90%
NO ₂ , O ₃					98.6%	> 90%
C ₆ H ₆					95%	> 90%
Maximum path length for consistence with point analyser					300 m Se note 1	≤300 m

Note 1: The maximum path length for consistence with a point analyser is indicative only and will depend on the mode of application. Longer lengths can be expected at well-mixed background locations, whereas in street canyons greater non-homogeneity of concentrations will occur. For this reason site specific investigations are recommended for each application if the results are to be interpreted in terms of Air Quality Guidelines.

Note 2: The combined performance was calculated using the methodology specified in ISO Guide to Uncertainty in Measurements (GUM).

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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 SO₂, NO₂, O₃ and C₆H₆.

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 fiber 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 Sira Certificates'. The design of the product certified is defined in the Sira Design Schedule for certificate No. Sira MC 040048/00.
2. If certified product is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.
3. 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'.
3. This document remains the property of Sira and shall be returned when requested by the company.

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