

# PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

**AO2000 Limas11 UV**  
**Multigas Continuous Emission Monitoring Analyser**  
**with SCC-K NO/NO<sub>2</sub> converter**  
**(Previously called Advance Optima LIMAS 11)**

manufactured by:

**ABB Automation GmbH**  
Stierstaedter Strasse 5  
D-60488 Frankfurt-am-Main  
Germany

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

**MCERTS Performance Standards for Continuous Emission  
Monitoring Systems, Version 3.4 dated July 2012,**  
**EN15267-1:2009, EN15267-2:2009, EN15267-3:2007,**  
**& QAL 1 as defined in EN 14181: 2004**

Certification Ranges :

SO <sub>2</sub>	0 to 75 mg/m <sup>3</sup>	
NO	0 to 33.5 mg/m <sup>3</sup>	to 0 to 200 mg/m <sup>3</sup>
O <sub>2</sub>	0 to 10% by volume	to 0 to 25% by volume
NO <sub>2</sub>	0 to 125 mg/m <sup>3</sup>	
NOx*	0 to 50 mg/m <sup>3</sup>	to 0 to 300 mg/m <sup>3</sup> (expressed as NO <sub>2</sub> )

\*See Note 1

Project No.: 673/0348  
Certificate No: Sira MC030017/11  
Initial Certification: 01 October 2003  
This Certificate issued: 20 May 2013  
Renewal Date: 19 May 2018

R Cooper I Eng MInst MC  
Technical Director

MCERTS is operated on behalf of the Environment Agency by

## Sira Certification Service

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**Registered Office: Rake Lane, Eccleston, Chester, UK CH4 9JN**

## Approved Site Application

*Any potential user should ensure, in consultation with the manufacturer that the emission monitoring system is suitable for the process on which it will be installed.*

*For general guidance on stack emission monitoring techniques refer to Environment Agency Technical Guidance Note M2: Monitoring of stack emissions to air. Operators with installations falling under the Large Combustion Plant Directive or Waste Incineration Directive must refer to Technical Guidance Note M20: Quality Assurance of Continuous Emission Monitoring Systems, for guidance on the suitability of CEMS for their installations. M2 and M20 are available on the Agency's website at [www.mcerts.net](http://www.mcerts.net)*

On the basis of the assessment and the ranges required for compliance with EU Directives this instrument is considered suitable for use on waste incineration and large coal-fired combustion plant applications. This CEM has been proven suitable for its measuring task (parameter and composition of the flue gas) by use of the QAL 1 procedure specified in EN14181, for LCPD and WID applications for the ranges specified. The lowest certified range for each determinand shall not be more than 1.5X the emission limit value (ELV) for WID applications, and not more than 2.5X the ELV for LCPD and other types of application.

The field test was carried out over 6 months with the system mounted on a waste incinerator. An additional 3 month field trial was conducted with the ABB SCC-K NO<sub>2</sub>/NO converter with the system mounted on a power plant.

## 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 Munich	LIMAS 11	Report No. 24023188 dated August 2000
TÜV Munich	Syscon II	Report No. 170608 dated January 2003*
AEA Technology	SCC-K NO <sub>x</sub> converter	Report No. MCT/ABB/SCC-K/1 dated 29 April 2005
Sira Report	LIMAS 11	Report No. 05 Issue 01 dated 20 September 2007
TÜV Munich	LIMAS 11	Report No. 1236011b dated January 2009
Sira Report	LIMAS 11	Report No. MCERTS A dated 07/05/09
Sira Report	LIMAS 11	Report No. MCERTS B dated 15/05/09
Sira Report	LIMAS 11	Report No. MCERTS C dated 15/05/09
Sira Report	LIMAS 11	Report No. 16A21953 dated 28/09/2010

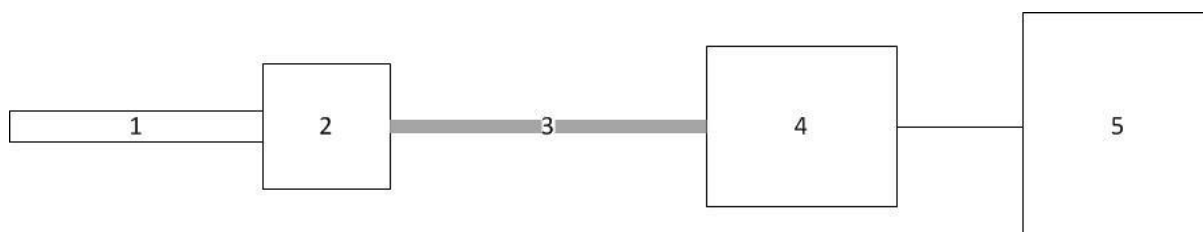
\* Report is evaluation on the Syscon II that is a new controller system now used in all analysers in the AO2000 series.

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## Product Certified

The measuring system consists of the following parts:



1. Sample Probe	2. Heated Filter	3. Heated Sample Line	4. Gas Conditioning	5. Analyser
Model: FE2	Model: ceramic filter, pore size <0.3µm	Model: CBWB 13  Length: 18m	Model: SCC-C & SCC-F	Model: Limas 11UV

Allowable variations could include:

- A different brand or model of sampling system of the same type, provided that there is evidence the alternative system works with similar types of CEM.
- Additional manifolds and heated valves used to allow more than one analyser to share a sampling system.
- SCC-K NO/NO<sub>2</sub> Converter (Optional)

This certificate applies to all instruments fitted with software version 2.0.6 onwards (Analyser software) and software version 4.0.1 onwards (Syscon II system software).

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## Certified Performance

The instrument was evaluated for use under the following conditions:

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

Instrument IP rating: AO2020 IP20 (can be supplied with protective casing to meet IP40 if required)  
AO2040 IP54

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.

Unless otherwise stated the evaluation was carried out on the certification range SO<sub>2</sub> 0 to 75mg/m<sup>3</sup>, NO 0 to 33.5mg/m<sup>3</sup>, O<sub>2</sub> 0 to 10%vol, NO<sub>x</sub> 0 to 50mg/m<sup>3</sup> and NO<sub>2</sub> 0 to 125mg/m<sup>3</sup>

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
SO <sub>2</sub>					169s	<200s
NO					26s	<200s
O <sub>2</sub>					40s	<200s
NO <sub>2</sub>					44s	<200s
NO <sub>x</sub>					Note 1	<200s
Repeatability standard deviation at zero point						
SO <sub>2</sub>			1.23			<2.0%
NO	0.40					<2.0%
O <sub>2</sub>	0.07					<0.2%
NO <sub>2</sub>	0.28					<2.0%
NO <sub>x</sub>					Note 1	<2.0%
Repeatability standard deviation at span point						
SO <sub>2</sub>			1.10			<2.0%
NO		0.80				<2.0%
O <sub>2</sub>	0.09					<0.2%
NO <sub>2</sub>	0.09					<2.0%
NO <sub>x</sub>					Note 1	<2.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Lack-of-fit						
SO <sub>2</sub>		-0.61				<2.0%
NO		0.57				<2.0%
O <sub>2</sub>	0.08					<0.2%
NO <sub>2</sub>	0.41					<2.0%
NO <sub>x</sub>					Note 1	<2.0%
Influence of ambient temperature zero point						
SO <sub>2</sub>				-2.06		<5.0%
NO	0.33					<5.0%
O <sub>2</sub>	-0.18					<0.50%
NO <sub>2</sub>				-2.39		<5.0%
NO <sub>x</sub>					Note 1	<5.0%
Influence of ambient temperature reference point						
SO <sub>2</sub>			-1.06			<5.0%
NO			1.06			<5.0%
O <sub>2</sub>	0.28					<0.50%
NO <sub>2</sub>				-2.47		<5.0%
NO <sub>x</sub>					Note 1	<5.0%
Influence of sample gas flow for extractive CEMS						
SO <sub>2</sub>		<1				<2.0%
NO		<1				<2.0%
O <sub>2</sub>		<1				<0.2%
NO <sub>2</sub>		<1				<2.0%
NO <sub>x</sub>					Note 1	<2.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of voltage variations 190 to 250V						
SO <sub>2</sub>	0.12					<2.0%
NO	0.06					<2.0%
O <sub>2</sub>	0.02					<0.2%
NO <sub>2</sub>	0.13					<2.0%
NO <sub>x</sub>					Note 1	<2.0%
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s <sup>2</sup> )					Not tested	To be reported
Cross-sensitivity at zero					Note 2	
SO <sub>2</sub>				2.20		<4.0%
NO			1.90			<4.0%
O <sub>2</sub>	-0.09					<0.40%
NO <sub>2</sub>				2.38		<4.0%
NO <sub>x</sub>					Note 1	<4.0%
Cross-sensitivity at span					Note 2	
SO <sub>2</sub>				-3.90		<4.0%
NO			1.60			<4.0%
O <sub>2</sub>	0.16					<0.40%
NO <sub>2</sub>				2.28		<4.0%
NO <sub>x</sub>					Note 1	<4.0%
Converter Efficiency					97.6%	>95%
Measurement uncertainty						
SO <sub>2</sub>					11.4%	15%
NO					4.65%	15%
O <sub>2</sub>					-	-
NO <sub>2</sub>					4.56%	20%
NO <sub>x</sub>					Note 1	

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Calibration function (field)						
SO <sub>2</sub>		0.97				>0.90
NO		0.98				>0.90
O <sub>2</sub>		0.96				>0.90
NO <sub>2</sub>		0.98				>0.90
NO <sub>x</sub>					Note 1	>0.90
Response time (field)					Note 3	
SO <sub>2</sub> (Note 3)					169s	<200s
NO (Note 3)					26s	<200s
O <sub>2</sub> (Note 3)					40s	<200s
NO <sub>2</sub>					60s	<200s
NO <sub>x</sub> (Note 3)					Note 1	<200s
Lack of fit (field)					Note 4	
SO <sub>2</sub>			<2.0			<2.0%
NO			<2.0			<2.0%
O <sub>2</sub>	<0.2					<0.2%
NO <sub>2</sub>		0.80				<2.0%
NO <sub>x</sub>					Note 1	<2.0%
Maintenance interval (field)						
SO <sub>2</sub> , NO, O <sub>2</sub>					>8 days	>8 days
NO <sub>2</sub>					3 months	>8 days

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Zero and Span drift requirement  Clause 6.13 & 10.13  Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.	<u>Statement from manufacturer:</u>  <b>Limas11 UV</b> <i>The analyser is equipped with an internal span auto-adjustment facility, operating with gas filled cells. A verification of the gas filled cells is required once a year with external reference gas. A weekly zero calibration is carried out automatically using ambient air.</i>  <b>Oxygen Sensor</b> <i>The analyser is equipped with automatic single-point adjustment during the maintenance interval, using ambient air. A verification of the analyser at the zero point is required once a year.</i>					
Change in zero point over maintenance interval (field)  SO <sub>2</sub>  NO  O <sub>2</sub>  NO <sub>2</sub>  NO <sub>x</sub>			1.9			<3.0%  <3.0%  <0.2%  <3.0%  Note 2 <3.0%
Change in span point over maintenance interval (field)  SO <sub>2</sub>  NO  O <sub>2</sub>  NO <sub>2</sub>  NO <sub>x</sub>			-1.6			<3.0%  <3.0%  <0.2%  <3.0%  Note 2 <3.0%
Availability (field)  SO <sub>2</sub> , NO, O <sub>2</sub>  NO <sub>2</sub>  NO <sub>x</sub>					98.2%  Note 5  100%	>95%  >95%  >95%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Reproducibility (field)						
SO <sub>2</sub>				2.19		<3.3%
NO			1.56			<3.3%
O <sub>2</sub>	0.19				Note 5	<0.20%
NO <sub>2</sub>						<3.3%
NO <sub>x</sub>	0.15					<3.3%

Note 1 – The Limas 11 measures NO<sub>x</sub> through use of a verified NO<sub>x</sub> convertor. Measurements of NO and NO<sub>2</sub> can be provided by subtraction.

Note 2 – The cross sensitivity test has been conducted with the following interferents: O<sub>2</sub>, H<sub>2</sub>O, CO, CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, NO, NO<sub>2</sub>, NH<sub>3</sub>, SO<sub>2</sub>, HCl, H<sub>2</sub>S.

Note 3 – Response time in the lab is stated, as response time in the field has not been recorded

Note 4 – Data derived from the analysis function/ calibration function test

Note 5 – Data not available as an EN14181 report used for field trial data.

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### Description:

The Limas11 UV is a photometer using gas filter correlation in Ultraviolet (UV) spectrum range 200...600 nm. The measuring principle is particularly reliable because of its high stability which is based on the four-beam signal processing principle. As a result, the Limas11 is unaffected by contamination in the cells. A high degree of selectivity is provided by using interference and gas filters as well as optimum selection of measured wavelength and reference wavelength.

The device can measure up to four components plus Oxygen, which is measured using an integrated Electrochemical Sensor.

The system measures NO<sub>x</sub> by integrating the ABB SCC-K NO/NO<sub>2</sub> converter, which uses a molybdenum catalyst supported by carbon. Alternatively, NO<sub>x</sub> can be measured without the converter by selective measurement of NO and NO<sub>2</sub>.

### 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 MC030017/05.
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'.
4. This document remains the property of Sira and shall be returned when requested by the company.

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