

# PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

**Advance CEMAS FTIR – NT (ACF-NT)  
Multigas Continuous Emission Monitoring System**

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 :

CO	-	0 to 75 mg/m <sup>3</sup>	0 to 300 mg/m <sup>3</sup>	
NO	-	0 to 200 mg/m <sup>3</sup>	0 to 400 mg/m <sup>3</sup>	
SO <sub>2</sub>	-	0 to 75 mg/m <sup>3</sup>	0 to 300 mg/m <sup>3</sup>	
HCl	-	0 to 15 mg/m <sup>3</sup>		
NH <sub>3</sub>	-	0 to 15 mg/m <sup>3</sup>		
H <sub>2</sub> O	-	0 to 40 %Vol		
HF	-	0 to 5 mg/m <sup>3</sup>	0 to 10 mg/m <sup>3</sup>	
O <sub>2</sub>	-	0 to 25 %Vol	0 to 12 %Vol	0 to 6 %Vol
TOC	-	0 to 15 mg/m <sup>3</sup>		

Project No.: 673/0348  
Certificate No: Sira MC030016/09  
Initial Certification: 01 October 2003  
This Certificate issued: 20 May 2013  
Renewal Date: 19 May 2018

R Cooper | 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 trial was performed over time intervals between 3 months and more than one year with the ACF-NT installed on a municipal waste incinerator. Both H<sub>2</sub> only and H<sub>2</sub>/He mix (40% / 60%) fuel types were used during the field test.

## 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:

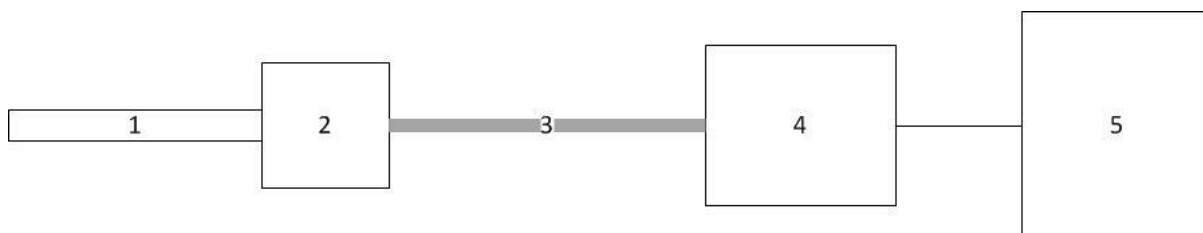
TÜV Rhineland	Report No. 936/801003/A dated 01.10.2001
TÜV Rhineland	Report No. 936/801003/B supplementary report for HF dated 16.10.2001
TÜV Rhineland	Report No. 936/801003/C supplementary report for O <sub>2</sub> dated 18.01.2002
TÜV Rhineland	Report No. 936/21204160/A dated 21.12.05
TUV Rhineland	Report No. 936/21210471/A dated 13.02.2009

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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: PFE2	Model: ceramic filter, pore size <0.3µm	Model: TBL01-S  Length: 18m	Model: SC-Block integrated	Model: ACF-NT

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.
- FID analyser (optional)
- ZrO<sub>2</sub> analyser (optional)

This certificate applies to all instruments fitted with software version 2.10 onwards (Syscon I system software) and software version 3.0.2 & 3.06 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: 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 CO 0 to 75mg/m<sup>3</sup>, NO 0 to 200 mg/m<sup>3</sup>, SO<sub>2</sub> 0 to 75mg/m<sup>3</sup>, HCl 0 to 15 mg/m<sup>3</sup>, NH<sub>3</sub> 0 to 15 mg/m<sup>3</sup>, H<sub>2</sub>O 0 to 40%vol, O<sub>2</sub> 0 to 25%vol

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
CO					136s	<200s
NO					147s	<200s
SO <sub>2</sub>					144s	<200s
HCl					151s	<400s
NH <sub>3</sub>					143s	<400s
H <sub>2</sub> O					140s	<200s
HF					256s	<400s
O <sub>2</sub>					13s	<200s
TOC					33s	<200s
Repeatability standard deviation at zero point						
CO	0.17					<2.0%
NO		0.56				<2.0%
SO <sub>2</sub>	0.45					<2.0%
HCl		0.53				<2.0%
NH <sub>3</sub>			1.13			<2.0%
H <sub>2</sub> O	0.13					<2.0%
HF		1.00				<2.0%
O <sub>2</sub>	0.04					<0.2%
TOC	0.07					<2.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Repeatability standard deviation at span point						
CO	0.24					<2.0%
NO	0.46					<2.0%
SO <sub>2</sub>	0.37					<2.0%
HCl		0.93				<2.0%
NH <sub>3</sub>		0.87				<2.0%
H <sub>2</sub> O	0.23					<2.0%
HF			1.80			<2.0%
O <sub>2</sub>	0.20					<0.2%
TOC		1.00				<2.0%
Lack-of-fit						
CO		0.8				<2.0%
CO 0 to 300 mg/m <sup>3</sup>	0.3					<2.0%
NO	-0.4					<2.0%
NO 0 to 400 mg/m <sup>3</sup>	0.4					<2.0%
SO <sub>2</sub>		-0.6				<2.0%
SO <sub>2</sub> 0 to 300 mg/m <sup>3</sup>	0.6					<2.0%
HCl		-0.8				<2.0%
HCl 0 to 90 mg/m <sup>3</sup>			1.3			<2.0%
NH <sub>3</sub>			1.2			<2.0%
H <sub>2</sub> O		-0.9				<2.0%
HF			-1.9			<2.0%
HF 0 to 10 mg/m <sup>3</sup>			-1.7			<2.0%
O <sub>2</sub>	-0.1					<0.2%
O <sub>2</sub> 0 to 12%vol	0.14					<0.2%
O <sub>2</sub> 0 to 6%vol	0.02					<0.2%
TOC	0.1					<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 ambient temperature zero point						
CO		0.8				<5.0%
NO		0.8				<5.0%
SO <sub>2</sub>			-2.0			<5.0%
HCl			-1.4			<5.0%
NH <sub>3</sub>				2.1		<5.0%
H <sub>2</sub> O	0.4					<5.0%
HF				-2.4		<5.0%
O <sub>2</sub>	-0.08					<0.5%
TOC		1.0				<5.0%
Influence of ambient temperature span point						
CO			1.7			<5.0%
NO				2.3		<5.0%
SO <sub>2</sub>			-1.1			<5.0%
HCl				-3.0		<5.0%
NH <sub>3</sub>				3.7		<5.0%
H <sub>2</sub> O				-2.6		<5.0%
HF				4.0		<5.0%
O <sub>2</sub>	-0.26					<0.5%
TOC			1.3			<5.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of sample gas flow for extractive CEMS CO, SO <sub>2</sub> , HCl, NH <sub>3</sub> , H <sub>2</sub> O NO, O <sub>2</sub> HF TOC	0.00		-1.4		Note 1	<2.0% <2.0% <2.0% <2.0%
Influence of voltage variations 190 to 250V CO NO SO <sub>2</sub> HCl NH <sub>3</sub> H <sub>2</sub> O HF O <sub>2</sub> TOC	0.3 0.3 0.1 -0.5 -0.5 0.5 0.8				Note 2 Note 2	<2.0% <2.0% <2.0% <2.0% <2.0% <2.0% <0.2% <2.0%
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s <sup>2</sup> )					Not tested Note 3	To be reported
Cross-sensitivity at zero CO NO SO <sub>2</sub> HCl NH <sub>3</sub> H <sub>2</sub> O HF O <sub>2</sub> TOC	<0.5 <0.02		-1.7 -1.6 1.8	2.8 -3.5 -3.6 -4.0	Note 4	<4.0% <4.0% <4.0% <4.0% <4.0% <4.0% <0.4% <4.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Cross-sensitivity at span					Note 4	
CO				-3.7		<4.0%
NO				2.2		<4.0%
SO <sub>2</sub>				3.6		<4.0%
HCl				2.6		<4.0%
NH <sub>3</sub>				2.4		<4.0%
H <sub>2</sub> O	<0.5					<4.0%
HF				-4.0		<4.0%
O <sub>2</sub>	<0.02					<0.40%
TOC				3.4		<4.0%
Effect of oxygen for TOC CEMS	-0.5					<2.0%
Response factors for TOC CEMS						
Methane					1.09	0.9 to 1.2
Aliphatic Hydrocarbons (cyclohexane)					1.02	0.9 to 1.1
Aromatic Hydrocarbons (tolulene)					0.96	0.8 to 1.1
Dichloromethane (tetrachlorethene)					0.97	0.75 to 1.15
Aliphatic alcohols (Isopropanol)					0.74	0.7 to 1.0
Ester and keytones (acetone)					0.71	0.7 to 1.0
Organic acids					Not tested	0.5 to 1.0

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Measurement uncertainty						
CO (ELV 50 mg/m <sup>3</sup> )					9.8% (Note 5)	7.5%
NO (ELV 130 mg/m <sup>3</sup> )					8.2%	15%
SO <sub>2</sub> (ELV 50 mg/m <sup>3</sup> )					10.0%	15%
HCl (ELV 10 mg/m <sup>3</sup> )					11.8%	30%
NH <sub>3</sub> (ELV 10 mg/m <sup>3</sup> )					12.5%	15%
H <sub>2</sub> O (range 40 Vol%)					4.2%	7.5%
HF (ELV 2 mg/m <sup>3</sup> )					31.5% (Note 5)	30%
O <sub>2</sub> (range 25Vol%)					2.4%	7.5%
TOC (ELV 10 mg/m <sup>3</sup> )					18.2%	22.5%
Calibration function (field)						
CO					0.99	>0.90
NO					0.99	>0.90
SO <sub>2</sub>					0.99	>0.90
HCl					0.99	>0.90
NH <sub>3</sub>					0.99	>0.90
H <sub>2</sub> O					0.99	>0.90
HF					0.96	>0.90
O <sub>2</sub>					0.99	>0.90
TOC					0.98	>0.90

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time (field)						
CO					178s	<200s
NO					182s	<200s
SO <sub>2</sub>					198s	<200s
HCl					196s	<400s
NH <sub>3</sub>					192s	<400s
H <sub>2</sub> O					190s	<200s
HF					187s	<400s
O <sub>2</sub>					<120s	<200s
TOC					<120s	<200s
Lack of fit (field)						
CO	0.3					<2.0%
NO	0.5					<2.0%
SO <sub>2</sub>		-0.7				<2.0%
HCl			1.2			<2.0%
NH <sub>3</sub>		0.9				<2.0%
H <sub>2</sub> O		-0.6				<2.0%
HF			-2.0			<2.0%
O <sub>2</sub>		-0.7				<0.2%
TOC		0.6				<2.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Maintenance interval						
CO, NO, SO <sub>2</sub> , HCl, NH <sub>3</sub> , H <sub>2</sub> O					6 months	>8 days
HF					3 months	>8 days
O <sub>2</sub>					1 month	>8 days
TOC					2 weeks	>8 days
Zero and Span drift requirement	<p><b>Statement from Manufacturer:</b></p> <p><b>ACF-NT</b> A twice daily zero calibration is carried out automatically using purified air. A verification of the span point is required only every six months.</p> <p><b>RGM11 (Optional)</b> The analyser is checked for zero and span drift on the 1<sup>st</sup> day of every month using air. Zero-point calibration takes place using air. Span-point calibration takes place using a mixture of oxygen in nitrogen. Automatic calibration is possible via built-in zero gas and test gas valves.</p> <p><b>MultiFID14 (Optional)</b> The analyser is checked for zero and span drift every 14 days using test gases. Zero-point calibration takes place using air or nitrogen. Span-point calibration takes place using propane or another hydrocarbon in air or nitrogen. Automatic calibration is possible via built-in zero gas and test gas valves.</p>					
Change in zero point over maintenance interval						
CO		-0.9				<3.0%
NO		0.9				<3.0%
SO <sub>2</sub>			1.1			<3.0%
HCl			1.7			<3.0%
NH <sub>3</sub>			1.2			<3.0%
H <sub>2</sub> O	0.1					<3.0%
HF				3.0		<3.0%
O <sub>2</sub>	0.15					<0.2%
TOC				2.3		<3.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Change in span point over maintenance interval						
CO				-2.7		<3.0%
NO			1.6			<3.0%
SO <sub>2</sub>			-1.9			<3.0%
HCl				-2.7		<3.0%
NH <sub>3</sub>				3.0		<3.0%
H <sub>2</sub> O			-1.5			<3.0%
HF				2.6		<3.0%
O <sub>2</sub>	0.20					<0.2%
TOC				2.8		<3.0%
Availability						
CO, NO, SO <sub>2</sub> , HCl, NH <sub>3</sub> , H <sub>2</sub> O					98.2%	>95%
HF					97.1%	>95%
O <sub>2</sub> , TOC					99.4%	>98% for O <sub>2</sub>
Reproducibility						
CO				2.4		<3.3%
NO			1.4			<3.3%
SO <sub>2</sub>				3.2		<3.3%
HCl			1.4			<3.3%
NH <sub>3</sub>			1.5			<3.3%
H <sub>2</sub> O				2.9		<3.3%
HF				3.2		<3.3%
O <sub>2</sub>	0.06					<0.20%
TOC			1.9			<3.3%

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- Note 1 The sample gas flow test has been performed for O<sub>2</sub>, HF, NO and TOC. O<sub>2</sub> and TOC have been tested as different sensors are used. NO has been tested as it is a standard measurement, and HF tested as it is deemed the most difficult component of the FT-IR measurement.
- Note 2 For TOC and O<sub>2</sub> no relevant influence on reading due to voltage variations was detected by the test house, but the readings were not recorded.
- Note 3 The measuring system was not tested against vibration as it is an extractive analyser.
- Note 4 Interferents used for cross sensitivity: 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>2</sub>, NH<sub>3</sub>, SO<sub>2</sub>, HCl
- Note 5 The measurement uncertainty result for CO and HF does not meet the requirements of EN-15267-3: 'at least 25% below max permissible uncertainty', but does meet the requirements of the EC directives 2000/76/EC (WID) and 2001/80/EC (LCPD).

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## Description:

The ABB Advance Cemas FTIR-NT (ACF-NT) system is a hot/wet extractive multigas analyser using Fourier Transform Infrared (FTIR) analysis to measure several gaseous components (including water).

The RGM 11 which is a zirconia-sensor based monitoring system for oxygen, and the AO2000-MultiFID14 which is a flame ionisation detector measuring total content of organic carbon, can be optionally integrated.

The loss-free measurement of the lowest concentrations of water-soluble components is achieved by seamless heating of the system to 180°C – from the probe filter element to the analyzer.

A low-maintenance electronically controlled air injector system conveys the sample gas from the chimney stack to the analyzers at constant pressure. In order to avoid pressure dependencies, which could arise if an uncontrolled feed pump were used, no moving parts are employed.

Measurements at very high moisture content are possible using a chemometric model optimized for waste incineration processes.

## 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 MC030016/05
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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