

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

**GASMET MULTI-GAS ANALYSER
CX4000 with Oxitec 500 E SME 5 Oxygen Analyser,
DX4000 & EN4000 Multi-gas Analyser**

manufactured by:

Gasmet Technologies OY

*Pultitie 8 A 1
FIN-00880 Helsinki
Finland*

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 3.5 dated June 2016,
EN15267-3:2007,
& QAL 1 as defined in EN 14181: 2014**

Certification Ranges :

CO	0 to 75 mg/m ³	0 to 300mg/m ³	0 to 1500mg/m ³	
NO	0 to 150 mg/m ³	0 to 200 mg/m ³	0 to 600mg/m ³	0 to 2000mg/m ³
SO ₂	0 to 75 mg/m ³	0 to 300mg/m ³	0 to 1500mg/m ³	
NO ₂	0 to 200 mg/m ³	0 to 500 mg/m ³		
N ₂ O	0 to 100 mg/m ³	0 to 500mg/m ³		
HCl	0 to 15 mg/m ³	0 to 90mg/m ³		
NH ₃	0 to 15 mg/m ³	0 to 50mg/m ³		
H ₂ O	0 to 30 % vol.	0 to 40 % vol.		
HF	0 to 3 mg/m ³	0 to 10 mg/m ³		
CO ₂	0 to 25 % vol.			
O ₂	0 to 25 % vol.*			
CH ₄	0 to 15 mg/m ³	0 to 50 mg/m ³	0 to 150 mg/m ³	
CHOH	0 to 20 mg/m ³	0 to 30mg/m ³	0 to 90mg/m ³	

*Certification range only applies to CX4000 analyser with Oxitec 500 E SME 5 oxygen analyser option.

Project No: 674/0062 & 674/0334
Certificate No: Sira MC 030014/10
Initial Certification: 04 July 2003
This Certificate Issued: 03 July 2018
Renewal Date: 03 July 2023

Emily Alexander
Deputy Certification Manger

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

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 IED Chapter III and IED Chapter IV applications for the ranges specified. The lowest certified range for each determinand shall not be more than 1.5X the daily average emission limit value (ELV) for IED Chapter IV applications, and not more than 2.5X the ELV for IED Chapter III and other types of application.

The field tests were conducted on a municipal-waste heating-plant (initial performance-test - March to July 2006 & first supplementary test – March to June 2007) and a domestic waste incineration plant (second supplementary test – December 2010 to March 2011). Further field testing was performed between March 2015 and February 2016, to test the following additional determinands: HF, CHOH, CH₄ and NO:

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 Köln	Report Number: 936/21200448/A, dated 7 th July 2006
TÜV Köln	Report Number: 936/21203240/B, dated 3 rd September 2007
TÜV Köln	Report Number: 936/21210692/A, dated 30 th March 2011
TÜV Köln	Report Number: 936/21218384/A, dated 16 March 2012
TÜV Köln	Report Number: 936/21220683/A, dated 27 March 2013
TÜV Köln	Report Number: 936/21225866/B, dated 23 February 2016
TÜV Köln	Report Number: 936/21225866/C, dated 13 October 2016

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Product Certified

The measuring system consists of the following parts:

- Gaset FTIR Gas Analyser CX4000
- Gaset Sampling Unit
- Enotec Oxygen analyser Oxitec 500 E SME 5 (optional for O₂ measurement)
- M&C Probe SP2000
- See 'description' section for pump information

This certificate applies to all instruments with serial numbers 122416, 122417, 132576, 132577, 132578, 132708, 132724, 132727, 132728, 132729, 132737, 132738 and 142743 onwards

A new pre-amplifier board enables the measurement of all components with a single analyser (CX4000) with current software version Calcmet: 12.18 with evaluation unit 4.42.2 and OXITEC Ver. 1.50np. The evaluation algorithm of the Calcmet software has not changed since the performance test in 2013.

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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: The system corresponds to a degree of protection IP54 (The analyser itself is IP41)

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 75 mg/m³, SO₂ 0 to 75 mg/m³, HCl 0 to 15 mg/m³, NO 0 to 150 mg/m³, NO₂ 0 to 200 mg/m³, N₂O 0 to 100 mg/m³, NH₃ 0 to 15 mg/m³, CO₂ 0 to 25 % vol, O₂ 0 to 25 % vol, H₂O 0 to 30 % vol, HF 0 to 3 mg/m³, CH₄ 0 to 15 mg/m³, CHOH 0 to 20 mg/m³

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response Time					Note 1	
O ₂					20s	<200s
CO, NO, NO ₂ , N ₂ O, CO ₂ , H ₂ O, CH ₄ , CHOH					120s	<200s
SO ₂ , HCl, NH ₃					120s	<400s
HF					120s	<400s
Repeatability standard deviation at zero point						
O ₂	0.02					<0.2%
CO	0.1					<2.0%
NO	0.0					<2.0%
NO ₂	0.1					<2.0%
N ₂ O	0.0					<2.0%
SO ₂	0.0					<2.0%
HCl	0.0					<2.0%
NH ₃	0.2					<2.0%
CO ₂	0.0					<2.0%
H ₂ O	0.0					<2.0%
HF	0.0					<2.0%
CH ₄	0.1					<2.0%
CHOH	0.0					<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 reference point						
O ₂	0.04					<0.2%
CO	0.4					<2.0%
NO	0.1					<2.0%
NO ₂	0.1					<2.0%
N ₂ O	0.1					<2.0%
SO ₂	0.1					<2.0%
HCl	0.3					<2.0%
NH ₃	0.3					<2.0%
CO ₂	0.1					<2.0%
H ₂ O	0.0					<2.0%
HF	0.2					<2.0%
CH ₄	0.1					<2.0%
CHOH	0.2					<2.0%
Lack-of-fit						
O ₂	-0.2					<0.2%
CO (0 to 75 mg/m ³)			1.3			<2.0%
CO (0 to 300 mg/m ³)		-1.0				<2.0%
CO (0 to 1500 mg/m ³)		-0.7				<2.0%
NO (0 to 150mg/m ³)		0.7				<2.0%
NO (0 to 200mg/m ³)		-0.6				<2.0%
NO (0 to 600mg/m ³)	0.5					<2.0%
NO (0 to 2000mg/m ³)	0.4					<2.0%
NO ₂ (0 to 200mg/m ³)	0.5					<2.0%
NO ₂ (0 to 500mg/m ³)	0.2					<2.0%
N ₂ O (0 to 100mg/m ³)	-0.4					<2.0%
N ₂ O (0 to 500mg/m ³)	0.2					<2.0%
SO ₂ (0 to 75mg/m ³)	0.4					<2.0%
SO ₂ (0 to 300mg/m ³)		0.6				<2.0%

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	<0.5	<1	<2	<5		
SO ₂ (0 to 1500mg/m ³)	-0.3					<2.0%
HCl (0 to 15mg/m ³)		0.7				<2.0%
HCl (0 to 90mg/m ³)		0.9				<2.0%
NH ₃ (0 to 15mg/m ³)			-1.6			<2.0%
NH ₃ (0 to 50mg/m ³)			-1.8			<2.0%
CO ₂ (0 to 30 % vol.)		0.8				<2.0%
H ₂ O (0 to 30 % vol.)			-1.7			<2.0%
H ₂ O (0 to 40 % vol.)		-0.8				<2.0%
HF (0 to 3 mg/m ³)			1.8			<2.0%
HF (0 to 10 mg/m ³)		0.9				<2.0%
CH ₄ (0 to 15 mg/m ³)	0.4					<2.0%
CH ₄ (0 to 50 mg/m ³)		-0.6				<2.0%
CH ₄ (0 to 150 mg/m ³)		0.7				<2.0%
CHOH (0 to 20 mg/m ³)		-0.9				<2.0%
CHOH (0 to 30 mg/m ³)		0.7				<2.0%
CHOH (0 to 90 mg/m ³)		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		
Influence of ambient temperature zero point						
O ₂	-0.0					<0.5%
CO	-0.1					<5.0%
NO	0.0					<5.0%
NO ₂	0.2					<5.0%
N ₂ O	0.0					<5.0%
SO ₂	0.0					<5.0%
HCl	0.0					<5.0%
NH ₃		0.6				<5.0%
CO ₂	0.0					<5.0%
H ₂ O	0.0					<5.0%
HF	0.0					<5.0%
CH ₄	0.0					<5.0%
CHOH	0.0					<5.0%
Influence of ambient temperature reference point						
O ₂	-0.02					<0.5%
CO	0.5					<5.0%
NO		-0.9				<5.0%
NO ₂	0.5					<5.0%
N ₂ O	0.5					<5.0%
SO ₂	0.3					<5.0%
HCl			-1.3			<5.0%
NH ₃			1.3			<5.0%
CO ₂			-1.6			<5.0%
H ₂ O			1.3			<5.0%
HF				-2.4		<5.0%
CH ₄		0.7				<5.0%
CHOH			1.5			<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						
O ₂	0.1					<0.2%
CO	0.3					<2.0%
NO		-0.7				<2.0%
NO ₂	0.3					<2.0%
N ₂ O	-0.2					<2.0%
SO ₂	0.5					<2.0%
HCl	-0.5					<2.0%
NH ₃		0.7				<2.0%
CO ₂	-0.4					<2.0%
H ₂ O		0.7				<2.0%
HF	-0.3					<2.0%
CH ₄		-0.7				<2.0%
CHOH	-0.4					<2.0%
Influence of voltage variations 190 to 250V						
O ₂	0.03					<0.2%
CO		-0.6				<2.0%
NO	-0.3					<2.0%
NO ₂		-0.6				<2.0%
N ₂ O		-0.6				<2.0%
SO ₂			1.8			<2.0%
HCl			-1.2			<2.0%
NH ₃			-1.2			<2.0%
CO ₂		0.7				<2.0%
H ₂ O			-1.7			<2.0%
HF		0.8				<2.0%
CH ₄	0.3					<2.0%
CHOH	-0.3					<2.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Cross-sensitivity at zero: O ₂ , H ₂ O, CO ₂ , CO, CH ₄ , N ₂ O, NO, NO ₂ , NH ₃ , SO ₂ , HCl, HF, CH ₄ & CHOH						
O ₂	0.0					<0.2%
CO		0.8				<2.0%
NO	<0.5					<2.0%
NO ₂		1.0				<2.0%
N ₂ O			1.2			<2.0%
SO ₂		-0.6				<2.0%
HCl			1.6			<2.0%
NH ₃		-0.8				<2.0%
CO ₂	0.0					<2.0%
H ₂ O	<0.5					<2.0%
HF			1.54			<2.0%
CH ₄	<0.5					<2.0%
CHOH		0.8				<2.0%
Cross-sensitivity at reference: O ₂ , H ₂ O, CO ₂ , CO, CH ₄ , N ₂ O, NO, NO ₂ , NH ₃ , SO ₂ , HCl, HF, CH ₄ & CHOH						
O ₂	0.0					<0.4%
CO				2.5		<4.0%
NO			-1.7			<4.0%
NO ₂				4.0		<4.0%
N ₂ O				3.2		<4.0%
SO ₂				2.6		<4.0%
HCl				-3.4		<4.0%
NH ₃				-4.0		<4.0%
CO ₂				-3.6		<4.0%
H ₂ O		1.0				<4.0%
HF				3.9		<4.0%
CH ₄				-2.5		<4.0%
CHOH			1.8			<4.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Measurement uncertainty					Guidance - at least 25% below max permissible uncertainty	
O ₂					2.4%	<10% (7.5%)
CO (For an ELV of 50 mg/m ³)					6.5%	<10% (7.5%)
NO (For an ELV of 98 mg/m ³)					5.6%	<20% (15%)
NO ₂					6.7%	<20% (15%)
N ₂ O					4.3%	<20% (15%)
SO ₂ (For an ELV of 50 mg/m ³)					9.2%	<20% (15%)
HCl (For an ELV of 10 mg/m ³)					11.3%	<40% (30%)
NH ₃ (For an ELV of 10 mg/m ³)					9.3%	<40% (30%)
CO ₂					5.2%	<10% (7.5%)
H ₂ O					6.0%	<10% (7.5%)
HF (For an ELV of 1 mg/m ³)					19.4%	<40% (30%)
CH ₄					4.1%	<30% (22.5%)
CHOH					4.0%	<30% (22.5%)
Calibration function (field)						
O ₂					>0.99	>0.90
CO					>1.00	>0.90
NO					>0.91	>0.90
NO ₂					>1.00	>0.90
N ₂ O					>0.98	>0.90
SO ₂					>0.99	>0.90
HCl					>1.00	>0.90
NH ₃					>1.00	>0.90
CO ₂					>0.98	>0.90
H ₂ O					>0.93	>0.90
HF					>0.99	>0.90
CH ₄					>0.99	>0.90
CHOH					>0.99	>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)						
O ₂					20s	<200s
CO, NO, NO ₂ , N ₂ O, CO ₂ , H ₂ O, CH ₄ , CHOH					120s	<200s
SO ₂ , HCl, NH ₃					120s	<400s
HF					120s	<400s
Lack of fit (field)						
O ₂	-0.05					<0.2%
CO			1.6			<2.0%
NO		-1.0				<2.0%
NO ₂		0.6				<2.0%
N ₂ O		-0.7				<2.0%
SO ₂			1.5			<2.0%
HCl		0.8				<2.0%
NH ₃		-0.6				<2.0%
CO ₂			1.2			<2.0%
H ₂ O			-1.3			<2.0%
HF			1.4			<2.0%
CH ₄			-1.8			<2.0%
CHOH			-1.7			<2.0%
Maintenance interval (field)						
CX4000 & EN4000					6 months (Note 2)	>8 days
DX4000					>8 days (Note 3)	>8 days
Availability (field)					98.4%	>95%
Zero and Span drift requirement	The AMS provides for the recording zero and span drift and thus fulfils the requirements of QAL3 according to EN14181. See Note 4.					Clause 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Change in zero point over maintenance interval (field)						
O ₂	0.1					<0.2%
CO	-0.1					<3.0%
NO	0.1					<3.0%
NO ₂	-0.1					<3.0%
N ₂ O	0.0					<3.0%
SO ₂	0.1					<3.0%
HCl	0.0					<3.0%
NH ₃	0.0					<3.0%
CO ₂	0.1					<3.0%
H ₂ O	0.0					<3.0%
HF	0.1					<3.0%
CH ₄	0.0					<3.0%
CHOH	0.0					<3.0%
Change in reference point over maintenance interval (field)						
O ₂	-0.2					<0.2%
CO			1.6			<3.0%
NO			1.9			<3.0%
NO ₂		-1.0				<3.0%
N ₂ O		0.6				<3.0%
SO ₂				2.3		<3.0%
HCl				2.4		<3.0%
NH ₃				-2.3		<3.0%
CO ₂		-1.3				<3.0%
H ₂ O			-1.9			<3.0%
HF				-2.3		<3.0%
CH ₄			1.8			<3.0%
CHOH				-2.1		<3.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Reproducibility (field)						
O ₂	0.09					<0.2%
CO			1.2			<3.3%
NO	0.5					<3.3%
NO ₂			1.2			<3.3%
N ₂ O			1.2			<3.3%
SO ₂		0.6				<3.3%
HCl				2.7		<3.3%
NH ₃		0.9				<3.3%
CO ₂		0.8				<3.3%
H ₂ O			1.9			<3.3%
HF		0.7				<3.3%
CH ₄	0.4					<3.3%
CHOH	0.4					<3.3%

Note 1: Results obtained from the field trial

Note 2: The results for the maintenance interval apply to the EN 4000 when is constructed within the same type of system as the CX 4000.

Note 3: The maintenance interval would not ordinarily apply to the DX4000, as it is a transportable system and zero/span checks would ordinarily be performed at least every 24 hours, or at the beginning and end of a monitoring campaign, if shorter than 24 hours.

Note 4: For the span point check (QAL3) of components CO, SO₂, NO, NO₂, HCl, CH₄, N₂O, H₂O, CO₂, HF, CHOH and NH₃, surrogate test gases may be used as detailed in Technical Guidance Note M22 version 3, section 7.4.2.

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Description:

GASMET CX4000 FTIR multicomponent gas analyser uses the Fourier Transform Infrared technique to measure several gaseous components including water vapor using sample extraction without dilution or drying of the sample gas. The FTIR instrument operates in the wave number range of 4200 to 900 cm^{-1} . The heated measuring cell has a path length of up to 5 meters and the temperature is set to 180°C. The sample extraction system is heated throughout and the sample is transferred through electrically heated sample lines. Sample line length in the field test was 25 meters.

The Gasmet CEM system tested for MCERTS consists of:

- × Gasmet CX4000 FTIR gas analyser
- × Gasmet Industrial Computer running Calcmet software
- × Enotec Oxygen analyser Oxitec 500 E SME 5 (optional)
- × Gasmet sampling system with the following functional parts
Sampling probe SP2000H heated to 180°C with PTFE-filter 2 μm , heated line with 25m Teflon hose (usually 5 to 30 m long), heated pump with Teflon membrane, heated lines, heated probe: M&C Products model SP 2000

GASMET DX4000 is a portable version of the CX4000 and is used in the following configuration:

- × Gasmet DX4000 portable FTIR gas analyser
- × Portable Computer running Calcmet software
- × Gasmet portable sampling system with the following functional parts
Sampling probe PSP4000 heated to 180°C, heated line with Teflon hose, heated pump with Teflon membrane, heated lines, heated probe: M&C Products model PSP 4000

GASMET EN4000 model is produced for incorporation in other manufacturer's equipment and is based on CX4000

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 V3 for certificate No. Sira MC 030014/09.
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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