

CERTIFICATE

of Product Conformity (QAL1)

Certificate number: 0000001013_04

Certified AMS:	CEMS II e for CO, NO, NO ₂ , N ₂ O, SO ₂ , HCl, HF, NH ₃ , CO ₂ , H ₂ O, O ₂ , CH ₄ and CH ₂ O
Manufacturer:	Gasmet Technologies Oy Pulttitie 8A1 00880 Helsinki Finland

Test Institute: TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and certified according to the standards

EN 15267-1 (2009), EN 15267-2 (2009), EN 15267-3 (2007) and EN 14181 (2004)

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 19 pages).

The present certificate replaces certificate 0000001013_03 of 22 July 2016



Suitability Tested EN 15267 QAL1 Certified Regular Surveillance

www.tuv.com ID 0000001013

Publication in the German Federal Gazette (BAnz.) of 1 August 2016

German Federal Environment Agency Dessau, 19 August 2016

Mach

Dr. Marcel Langner Head of Section II 4.1

www.umwelt-tuv.eu tre@umwelt-tuv.eu Tel, + 49 221 806-5200 This certificate will expire on: 28 July 2021

TÜV Rheinland Energy GmbH Cologne, 18 August 2016

De Put Gr

ppa. Dr. Peter Wilbring

TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln

Test institute accredited to EN ISO/IEC 17025:2005 by DAkkS (German Accreditation Body). This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00.

info@gal1.de

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Test report:
Initial certification:
Expiry date:
Publication:

936/21225866/B of 23 February 2016 29 July 2011 28 July 2021 BAnz AT 01.08.2016 B11, chapter I number 3.1

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13. BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17. BImSchV) and other plants requiring official approval. The measured ranges have been selected considering the wide application range of the AMS.

The suitability of the AMS for this application was assessed on the basis of several laboratory tests and of three field tests over each three months. For the maintenance interval extension a further field test was carried out over ten months. The field tests occurred at two different waste incineration plants.

The AMS is approved for an ambient temperature range of +5 °C to +40 °C.

The notification of suitability of the AMS, performance testing, and the uncertainty calculation have been effected on the basis of the regulations valid at the time of performance testing. As changes in legal regulations are possible, any potential user should ensure that this AMS is suitable for monitoring the limit value relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the installation at which it will be installed.

Basis of the certification

This certification is based on:

- Test report 936/21225866/B of 23 February 2016 of TÜV Rheinland Energie und Umwelt GmbH
- Suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- The ongoing surveillance of the product and the manufacturing process

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mg/m³

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter I number 3.1, Announcement by UBA from 14 July 2016:

AMS designation:

CEMS II e for CO, NO, NO₂, N₂O, SO₂, HCI, HF, NH₃, CO₂, H₂O, O₂, CH₄ and CH₂O

Manufacturer: Gasmet Technologies Oy, Helsinki, Finland

Field of application: For measurements at plants requiring official approval

Measuring ranges during the suitability test: Certification Supplementary Component Unit range measurement ranges CO 0 - 750 - 3000 - 1500mg/m³ NO 0 - 150 0 - 20000 - 600mg/m³ 0 - 2000 - 500NO₂ mg/m³ -N₂O 0 - 1000 - 500_ mg/m³ SO₂ 0 - 750 - 3000 - 1500mg/m³ 0 - 15HCI 0 - 90mg/m³ _ HF 0 - 100 - 3mg/m³ - NH_3 0 - 150 - 50_ mg/m³ 0 - 25Vol.-% O_2 -- CO_2 0 - 25Vol.-% - H_2O 0 - 300 - 40Vol.-% -CH₄ 0 - 150 - 500 - 150 mg/m³

Software version:

CH₂O

Calcmet: 12.18 with evaluation module 4.42.2 and

0 - 20

OXITEC Ver. 1.50 np

Restrictions: None

Notes:

- 1. The maintenance interval is three month.
- 2. During test with HF, HCI, NH₃ and CH₂O wet test gases shall be used.
- 3. The sample probe should be cleansed after plant failure.
- 4. The measurement cabinet is available as variant A (air conditioner unit on top of the measurement cabinet) and variant B (air conditioner unit on the back of the measurement cabinet).

0 - 30

0 - 90

- 5. For measurement of the component O_2 (optional) the analyser OXITEC 500E SME 5 from the company ENOTEC GmbH, Marienheide, Germany is integrated.
- 6. Supplementary testing (extension of maintenance interval, extension of components CH₄ and CH₂O, changing of certification range for the component NO, measuring of all components (without O₂) with one FTIR analyzer (Gasmet CX-4000)) for notification of the German Federal Environment Agency (UBA) of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter I number 3.1) and of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter IV Notification 33).

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne Report No.: 936/21225866/B of 23 February 2016

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Certified product

This certificate applies to automated measurement systems conforming to the following description:

The measuring equipment CEMS II e consist of the following parts:

1)	Sampling system	
	Sampling probe:	SP2000H of the manufactured by M & C, heated to 180 °C, with PTFE-filter: 2 μ m,
	Heated line:	180 °C with 4 mm Teflon tube, 25 m length, (standard 5 to 30 m)
	Pump:	heated to 180 °C, with Teflon membrane
2)	Analysers	
	FTIR:	Gasmet CX-4000, cell temperature: 180 °C, cell with optical path length: 5 m, IR-Source: SiC
	O ₂ : (optional)	ZrO_2 measuring cell OXITEC 500E SME 5 in the 19"-module manufactured by ENOTEC with the software OXITEC Ver. 1.50 np

3) Computer

Standard industrial PC with Windows 7 Ultimate 32bit.

To analyse the Gasmet CEMS spectra, the calculated spectra are transmitted to a PC via RS232 interface for further processing. The PC also controls and monitors sampling and gaseous analyte flow of the analysers.

4) Software

Evaluation software Calcmet version 12.18 with analysis module 4.42.2

5) Measuring cabinet

Air-conditioning adjusted to approx. 30 °C, Sampling pump, control units, analysers, interface boards for analogue and digital input and output and computer.

The measurement cabinet is available as version

A (dimensions: 212x61x70 cm, air conditioner unit on top of the measurement cabinet) and B (dimensions: 210x61x113 cm, air conditioner unit on the back of the measurement cabinet). In both versions it is possible to integrate in addition to the FTIR the OXITEC 500E SME 5 O₂ analyser manufactured by Enotec. All other components are identical.



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General notes

This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the EN 15267. 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 systems shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate. This can be applied to the product or used in publicity material for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and its expiration is also accessible on the internet: gal1.de.

Certification of CEMS II *e* is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial test:

Baseline report 936/21200448/A dated 07 July 2006 TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: Federal Gazette (BAnz.) of 14 October 2006, No. 194, p. 6715 Notification of the Federal Environmental Agency on 12 September 2006

Supplementary test

Supplementary test report 936/21203240/B dated 03 September 2007 TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: Federal Gazette (BAnz.) of 07 March 2008, No. 38, p. 901 Notification of the Federal Environmental Agency of 14 February 2008 (Additional component: O_2)

Notifications:

Statement of TÜV Rheinland Immissionsschutz und Energiesysteme of 14 December 2006 Publication: Federal Gazette BAnz. 20 April 2007, No. 75, p. 4139 Notification of the Federal Environmental Agency of 12 April 2007 (enclosure variants)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 29 March 2011 Publication: Federal Gazette BAnz. 29 July 2011, No. 133, p. 2725 Notification of the Federal Environmental Agency of 15 July 2011 (changes in software version)



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Initial certification according to EN 15267

Certificate No. 0000001013:	19 August 2011
Expiry date of the certificate:	28 July 2016

Test report: 936/21210692/A of 30 March 2011 TÜV Rheinland Energie und Umwelt GmbH, Cologne Publication: BAnz. 29 July 2011, No. 113, p. 2725, chapter I, No. 4.1 Announcement by UBA from 15 July 2011

Supplementary testing according to EN 15267

Certificate No. 0000001013_01:	20 August 2012
Expiry date of the certificate:	28 July 2016

Test report: 936/21218384/A of 16 March 2012 TÜV Rheinland Energie und Umwelt GmbH, Cologne Publication: BAnz AT 20.07.2012 B11, chapter 1, No. 3.1 Announcement by UBA from 06 July 2012

Certificate No. 0000001013_02:	20 August 2013
Expiry date of the certificate:	28 July 2016

Test report: 936/21220683/A of 27 March 2013 TÜV Rheinland Energie und Umwelt GmbH, Cologne Publication: BAnz AT 23.07.2013 B4, chapter I, No. 3.1 Announcement by UBA from 03 July 2013

Notifications according to EN 15267

Statement of TÜV Rheinland Energie und Umwelt GmbH of 30 September 2013 Publication in the German Federal Gazette: BAnz AT 01.04.2014 B12, chapter VI notification 12 Announcement by UBA from 27 February 2014 (software changes)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 01 October 2014 Publication in the German Federal Gazette: BAnz AT 02.04.2015 B5, chapter IV notification 33 Announcement by UBA from 03 July 2013 (hardware changes)

Renewal of the certificate

Certificate No. 0000001013_03:	22 July 2016
Expiry date of the certificate:	28 July 2021

Supplementary testing according to EN 15267

Certificate No. 0000001013_04:	19 August 2016
Expiry date of the certificate:	28 July 2021

Test report: 936/21225866/B of 23 February 2016 TÜV Rheinland Energie und Umwelt GmbH, Cologne,

Publication: BAnz AT 01.08.2016 B11, chapter I number 3.1 Announcement by UBA from 14 July 2016



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Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle Test report Test laboratory Date of report	Gasmet Technologies Oy CEMS II e 305 / 306 / 14433 / 14434 FTIR 936/21225866/B TÜV Rheinland 2016-02-23				
Measured component	со				
Certification range	0 -	75	mg/m³		
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		0.32	mg/m ³		
Sum of negative CS at zero point			mg/m ³		
Sum of postive CS at span point		1.90	mg/m ³		
Sum of negative CS at span point		-1.00	mg/m ³		
Maximum sum of cross-sensitivities		1.90	mg/m ³		
Uncertainty of cross-sensitivity	ui	1.096	mg/m³		
Calculation of the combined standard uncertainty Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	U_D U_{lof} $U_{d,z}$ $U_{d,s}$ U_t U_v U_i U_p U_{rm}	0.554 0.000 0.693 0.208 0.298 1.096 0.117 0.606	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³	u ² 0.228 0.307 0.000 0.480 0.043 0.089 1.200 0.014 0.368	(mg/m ³) ² (mg/m ³) ²
Combined standard uncertainty (u _C) Total expanded uncertainty		$\sqrt{\sum_{c} (u_{m})}$		1.65 3.24	mg/m³ mg/m³
Relative total expanded uncertainty	U in 9	% of the	ELV 50 mg/m ³		6.5
Requirement of 2010/75/EU			ELV 50 mg/m ³		10.0
Requirement of EN 15267-3			ELV 50 mg/m ³		7.5

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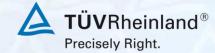
Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle Test report Test laboratory	CEM 1443 FTIR 936/2	Gasmet Technologies Oy CEMS II e 14433 / 14434 FTIR 936/21225866/B TÜV Rheinland			
Date of report	2016	2016-02-23			
Measured component Certification range	NO 0 -	150	mg/m³		
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point Sum of negative CS at zero point Sum of postive CS at span point Sum of negative CS at span point Maximum sum of cross-sensitivities Uncertainty of cross-sensitivity	ui	0.00 0.00 -2.60 -2.60	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³		
Calculation of the combined standard uncertainty					
Tested parameter Standard deviation from paired measurements under field conditions *	u _D	0.360	mg/m³	u ² 0.130	(mg/m³)²
Lack of fit	Ulof		mg/m ³	0.336	(mg/m ³) ²
Zero drift from field test	U _{d,z}	0.087	mg/m³	0.008	(mg/m ³) ²
Span drift from field test	u _{d,s}		mg/m ³	2.706	(mg/m ³) ²
Influence of ambient temperature at span	ut		mg/m ³	0.503	(mg/m ³) ²
Influence of supply voltage	uv		mg/m ³	0.144	(mg/m ³) ²
Cross-sensitivity (interference)	u _i		mg/m ³	2.244	$(mg/m^3)^2$
Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"	u _p u _{rm}		mg/m³ mg/m³	0.333 1.470	(mg/m³)² (mg/m³)²
Combined standard uncertainty (u _c)	u. =	$\sqrt{\sum (u_m)}$	ox i) ²	2.81	mg/m ³
Total expanded uncertainty		$u_c * k = u_c$		5.50	mg/m ³
Relative total expanded uncertainty	U in	% of the	ELV 98 mg/m ³		5.6
Requirement of 2010/75/EU			ELV 98 mg/m ³		20.0
Requirement of EN 15267-3			ELV 98 mg/m ³		15.0

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Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle Test report Test laboratory Date of report	Gasmet Technologies Oy CEMS II e 305 / 306 / 14433 / 14434 FTIR 936/21225866/B TÜV Rheinland 2016-02-23				
Measured component	NO ₂				
Certification range	0 -	150	mg/m³		
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		1.66	mg/m³		
Sum of negative CS at zero point		0.00	mg/m³		
Sum of postive CS at span point		7.90	0		
Sum of negative CS at span point		-1.60	0		
Maximum sum of cross-sensitivities		7.90	5		
Uncertainty of cross-sensitivity	ui	4.561	mg/m ³		
Calculation of the combined standard uncertainty Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u _D	1.200	mg/m ³	1.440	(mg/m ³) ²
Lack of fit	u _{lof}	-0.520	•	0.270	$(mg/m^3)^2$
Zero drift from field test	U _{d,z}	0.115	-	0.013	
Span drift from field test	u _{d,s}	-1.155	-	1.334	(mg/m ³) ²
Influence of ambient temperature at span	ut	0.529	-	0.280	(mg/m ³) ²
Influence of supply voltage	uv	0.571	mg/m ³	0.326	(mg/m ³) ²
Cross-sensitivity (interference)	ui	4.561	mg/m³	20.803	(mg/m ³) ²
Influence of sample gas flow	up	-0.313	mg/m³	0.098	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range * The larger value is used :	U _{rm}	1.212	mg/m³	1.470	(mg/m ³) ²
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"					
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	u. =	$\sqrt{\sum (u)}$	<u>)</u> 2	5 10	ma/m ³
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" Combined standard uncertainty (u _C)		$\sqrt{\sum_{k=1}^{k} (u_m)}$		5.10	mg/m³
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"		$\sqrt{\sum_{c} \left(u_{m} \right)^{*} k = u_{m}}$		5.10 10.00	mg/m³ mg/m³
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" Combined standard uncertainty (u _C) Total expanded uncertainty	U = u	u _c * k = u,	_c * 1.96	10.00	mg/m³
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" Combined standard uncertainty (u _C)	U = u U in 1	$k_c = u_c$ % of the		10.00 1 ³	-

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Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer	Gasmet Technologies Oy				
AMS designation	CEM	CEMS II e			
Serial number of units under test	305 /	306 / 144	133 / 14434		
Measuring principle	FTIR				
Tool report	026/2	1225066	/D		
Test report		21225866			
Test laboratory	-	Rheinland	d		
Date of report	2016	-02-23			
Measured component	N_2O				
Certification range	0 -	100	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)		0.00			
Sum of positive CS at zero point		0.00	mg/m ³		
Sum of negative CS at zero point		0.00	0		
Sum of postive CS at span point		3.20	5		
Sum of negative CS at span point			mg/m ³		
Maximum sum of cross-sensitivities		3.20	5		
Uncertainty of cross-sensitivity	ui	1.848	mg/m ³		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u _D	0.630	mg/m³	0.397	(mg/m ³) ²
Lack of fit	u _{lof}	-0.231	mg/m ³	0.053	(mg/m ³) ²
Zero drift from field test	U _{d,z}	0.000	mg/m ³	0.000	(mg/m ³) ²
Span drift from field test	u _{d,s}	0.346	mg/m³	0.120	(mg/m ³) ²
Influence of ambient temperature at span	ut	0.252	mg/m³	0.064	(mg/m ³) ²
Influence of supply voltage	uv	0.314	mg/m³	0.099	(mg/m ³) ²
Cross-sensitivity (interference)	ui	1.848	mg/m³	3.413	(mg/m ³) ²
Influence of sample gas flow	up	-0.120	mg/m ³	0.014	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm}	0.808	mg/m³	0.653	(mg/m ³) ²
* The larger value is used :					
"Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
Combined standard uncertainty (u _c)	u _c =	$\sqrt{\sum (u_m)}$	${ax i}^{2}$	2.19	mg/m ³
Total expanded uncertainty	U = u	$u_c * k = u_c$	* 1.96	4.30	U
	_				
			1.1.1.		
Relative total expanded uncertainty			range 100 mg/		4.3
Requirement of 2010/75/EU			range 100 mg/		20.0 **
Requirement of EN 15267-3	U in 9	% of the r	ange 100 mg/n	N ³	15.0

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.. A value of 20.0 % was used for this.

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Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle	CEM	net Techr S II e 306 / 144			
Test report	936/2	1225866			
Test laboratory	ΤÜV	Rheinlan	d		
Date of report	2016	-02-23			
Measured component	SO ₂				
Certification range	0 -	75	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point		0.24	mg/m ³		
Sum of negative CS at zero point			mg/m ³		
Sum of postive CS at span point			mg/m ³		
Sum of negative CS at span point			mg/m ³		
Maximum sum of cross-sensitivities		-2.90	5		
Uncertainty of cross-sensitivity	u	-1.676	mg/m ³		
Calculation of the combined standard uncertainty Tested parameter				u ²	
Repeatability standard deviation at set point *	ur	0.357	mg/m³	0.127	(mg/m ³) ²
Lack of fit	Ulof	-0.316	mg/m³	0.100	(mg/m ³) ²
Zero drift from field test	U _{d,z}	0.043	mg/m³	0.002	(mg/m ³) ²
Span drift from field test	U _{d,s}		mg/m³	0.992	(mg/m ³) ²
Influence of ambient temperature at span	u _t	0.557	mg/m³	0.310	(mg/m ³) ²
Influence of supply voltage	uv		mg/m³	0.806	(mg/m ³) ²
Cross-sensitivity (interference)	u		mg/m³	2.808	(mg/m ³) ²
Influence of sample gas flow	Up	0.226	mg/m³	0.051	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	U _{rm}	0.606	mg/m³	0.368	(mg/m³)²
Combined standard uncertainty (u _C)	u. =	$\sqrt{\sum (u_m)}$	$\left(\frac{1}{2}\right)^2$	2.36	mg/m ³
Total expanded uncertainty		$v \leq (c m)$		4.62	mg/m ³
	0 = 0	c n – u	, 1.00	4.02	ing/in
Relative total expanded uncertainty	U in 9	% of the	ELV 50 mg/n	n ³	9.2

Relative total expanded uncertainty Requirement of 2010/75/EU Requirement of EN 15267-3
 U in % of the ELV 50 mg/m³
 9.2

 U in % of the ELV 50 mg/m³
 20.0

 U in % of the ELV 50 mg/m³
 15.0

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Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle	Gasmet Technologies Oy CEMS II e 305 / 306 / 14433 / 14434 FTIR 936/21225866/B
Test report Test laboratory Date of report	TÜV Rheinland 2016-02-23
Measured component Certification range	HCI 0 - 15 mg/m³
Evaluation of the cross-sensitivity (CS) (system with largest CS)	
Sum of positive CS at zero point Sum of negative CS at zero point Sum of postive CS at span point Sum of negative CS at span point Maximum sum of cross-sensitivities Uncertainty of cross-sensitivity	0.00 mg/m ³ -0.06 mg/m ³ 0.60 mg/m ³ -0.10 mg/m ³ 0.60 mg/m ³ u _i 0.346 mg/m ³
Calculation of the combined standard uncertainty	
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit	u ² u _D 0.209 mg/m ³ 0.044 (mg/m ³) ² u _{lof} 0.173 mg/m ³ 0.030 (mg/m ³) ²
Zero drift from field test Span drift from field test	$\begin{array}{cccc} u_{d,z} & 0.000 & mg/m^3 & 0.000 & (mg/m^3)^2 \\ u_{d,s} & 0.208 & mg/m^3 & 0.043 & (mg/m^3)^2 \end{array}$
Influence of ambient temperature at span Influence of supply voltage	$\begin{array}{cccc} u_t & 0.265 & mg/m^3 & 0.070 & (mg/m^3)^2 \\ u_v & 0.091 & mg/m^3 & 0.008 & (mg/m^3)^2 \end{array}$
Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range	$\begin{array}{ccccc} u_i & 0.346 & mg/m^3 & 0.120 & (mg/m^3)^2 \\ u_p & -0.045 & mg/m^3 & 0.002 & (mg/m^3)^2 \\ u_{rm} & 0.121 & mg/m^3 & 0.015 & (mg/m^3)^2 \end{array}$
* The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	
Combined standard uncertainty (u _c) Total expanded uncertainty	$u_{c} = \sqrt{\sum (u_{max, j})^{2}} \qquad 0.58 \text{ mg/m}^{3}$ $U = u_{c} * k = u_{c} * 1.96 \qquad 1.13 \text{ mg/m}^{3}$
Relative total expanded uncertainty Requirement of 2010/75/EU Requirement of EN 15267-3	U in % of the ELV 10 mg/m³ 11.3 U in % of the ELV 10 mg/m³ 40.0 U in % of the ELV 10 mg/m³ 30.0

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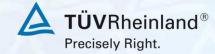
Measured component Certification rangeHF 0 - 3 mg/m³Evaluation of the cross-sensitivity (CS) (system with largest CS) 0.00 mg/m^3 Sum of positive CS at zero point 0.00 mg/m^3 Sum of negative CS at zero point 0.04 mg/m^3 Sum of negative CS at zero point 0.04 mg/m^3 Sum of negative CS at span point 0.12 mg/m^3 Uncertainty of cross-sensitivities $0.000 \text{ (mg/m}^3)^2$ Eacluation of the combined standard uncertainty Tested parameter u^2 Standard deviation from paired measurements under field conditions* u_{ur} $0.000 \text{ (mg/m}^3)^2$ Span drift from field test u_{das} $0.000 \text{ (mg/m}^3)^2$ Span drift from field test u_{das} $0.000 \text{ (mg/m}^3)^2$ Influence of ambient temperature at span Influence of supply voltage u_v 0.068 mg/m^3 Cross-sensitivity (interference) u_v 0.068 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_m 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ Combined standard uncertainty $u_v \in 1.96$ 0.19 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ Combined standard uncertainty $u_v = \sqrt{\sum} (u_{max, 1})^2$ 0.10 mg/m^3 Uncertainty of reference material at 70% of certification range u_w 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$	Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle Test report Test laboratory Date of report	Gasmet Technologies Oy CEMS II e 14433 / 14434 FTIR 936/21225866/B TÜV Rheinland 2016-02-23
Certification range0 -3 mg/m3Evaluation of the cross-sensitivity (CS) (system with largest CS) 0.00 mg/m3 0.00 mg/m3 Sum of positive CS at zero point 0.00 mg/m3 0.04 mg/m3 Sum of negative CS at zero point 0.04 mg/m3 0.02 mg/m3 0.00 mg/m3 Sum of negative CS at span point 0.12 mg/m3 0.00 mg/m3 0.12 mg/m3 Calculation of the combined standard uncertainty Tested parameter u^2 U_{off} u^2 $0.000 (mg/m9)^2$ U_{off} Calculation of file u_{off} 0.002 mg/m3 $0.000 (mg/m9)^2$ U_{off} u_{off} 0.002 mg/m3 $0.000 (mg/m9)^2$ U_{off} Lack of fit u_{gx} 0.002 mg/m3 $0.000 (mg/m9)^2$ U_{off} 0.002 mg/m3 $0.000 (mg/m9)^2$ U_{off} 0.002 mg/m3 $0.000 (mg/m9)^2$ U_{off} 0.000 mg/m3 $0.000 (mg/m9)^2$ Influence of supply voltage U_{off} u_{o} 0.040 mg/m3 $0.000 (mg/m9)^2$ $0.000 \text{ (mg/m3})^2$ U_{m} $0.000 \text{ (mg/m3})^2$ Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions* $u_{o} = \sqrt{\sum (u_{max,1})^2}$ 	Measured component	HF
(system with largest CS)Sum of positive CS at zero point0.00mg/m3Sum of negative CS at zero point0.04mg/m3Sum of positive CS at span point0.12mg/m3Sum of negative CS at span point-0.09mg/m3Maximum sum of cross-sensitivities0.12mg/m3Uncertainty of cross-sensitivities0.12mg/m3Uncertainty of cross-sensitivityu0.068mg/m3Calculation of the combined standard uncertaintyu0.010mg/m30.000Tested parameteru²u0.032mg/m30.001Standard deviation from paired measurements under field conditions *uu0.002mg/m30.001Zero drift from field testud.z0.002mg/m30.002(mg/m3)²Zero drift from field testud.s-0.040mg/m30.002(mg/m3)²Influence of ambient temperature at spanu, t0.046mg/m30.002(mg/m3)²Influence of sample gas flowu, u0.016mg/m30.000(mg/m3)²Uncertainty of reference material at 70% of certification rangeum0.024mg/m30.001(mg/m3)²* The larger value is used :"Repeatability standard deviation at span" or"Standard deviation at span" or"Standard deviation from paired measurements under field conditions"Combined standard uncertaintyU e c $\sqrt{\sum (u_{max,j})^2}$ 0.10mg/m30.001* The larger value is used :"Repeatability standard deviation at span" or <td></td> <td>0 - 3 mg/m³</td>		0 - 3 mg/m ³
Sum of positive CS at zero point0.00mg/m³ sum of negative CS at zero point0.04mg/m³ sum of positive CS at span point0.12mg/m³ sum of negative CS at span point0.012mg/m³ sum of negative CS at span point0.009mg/m³ sum of negative CS at span point0.010mg/m³ sum of negative CS at span point0.024mg/m³ sum of negative CS at span point0.012mg/m³ sum of negative CS at span point0.024mg/m³ sum of negative CS at span point0.010mg/m³ sum of negative CS at span point0.0268mg/m³0.001mg/m³ sum of cross-sensitivityu²Calculation of the combined standard uncertainty Tested parameteru²Standard deviation from paired measurements under field conditions * ud to 0.032 mg/m³0.000 (mg/m³)²Lack of fitud0.002 mg/m³0.000 (mg/m³)²Lack of fitud0.032 mg/m³0.000 (mg/m³)²Standard deviation from paired measurements under field conditions * ud, 0.040 mg/m³0.002 (mg/m³)²Influence of ambient temperature at span ut, 0.040 mg/m³0.0002 (mg/m³)²Influence of sample gas flowud0.006 mg/m³0.000 (mg/m³)²Uncertainty of reference material at 70% of certification range * * * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions*U m $_{o} = \sqrt{\sum (u_{max_1})^2}$ 0		
Sum of postive CS at span point 0.12 mg/m^3 Sum of negative CS at span point -0.09 mg/m^3 Maximum sum of cross-sensitivities 0.12 mg/m^3 Uncertainty of cross-sensitivity u_i 0.068 mg/m^3 Calculation of the combined standard uncertainty Tested parameter u^2 Standard deviation from paired measurements under field conditions * u_{lot} u_{b} 0.010 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Zaro drift from field test $u_{d,z}$ 0.022 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ Span drift from field test $u_{d,z}$ $u_{d,z}$ 0.002 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ $0.002 \text{ (mg/m}^3)^2$ Influence of ambient temperature at span u_t 0.040 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ Influence of sample gas flow u_p u_p 0.006 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_m v_m 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max,i})^2}$ Combined standard uncertainty $U = \sqrt{2 \sum (u_{max,i})^2}$ 0.10 mg/m^3 Total expanded uncertainty $U = \sqrt{2 \sum (u_{max,i})^2}$ 0.10 mg/m^3 Total expanded uncertainty $U = \sqrt{2 \sum (u_{max,i})^2}$ 0.10 mg/m^3 Requirement of 2010/75/EU $U \text{ in % of the ELV 1 mg/m}^3$ 19.4		0.00 mg/m ³
Sum of negative CS at span point -0.09 mg/m^3 Maximum sum of cross-sensitivities 0.12 mg/m^3 Uncertainty of cross-sensitivity u_i 0.068 mg/m^3 Calculation of the combined standard uncertainty Tested parameter u^2 Standard deviation from paired measurements under field conditions * u_{lof} u_b 0.010 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Lack of fit u_{lof} 0.032 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ $0.000 \text{ (mg/m}^3)^2$ Zero drift from field test $u_{d,z}$ 0.002 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Span drift from field test $u_{d,z}$ 0.040 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ Influence of ambient temperature at span u_t 0.040 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ Influence of supply voltage u_v 0.016 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Uncertainty of reference) u_i 0.068 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Influence of sample gas flow u_p -0.006 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_m 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max_i})^2}$ 0.10 mg/m^3 Combined standard uncertainty $U = u_c * k = u_c * 1.96$ 0.19 mg/m^3 0.40 Relative total expanded uncertainty $U = u_c * k = u_c * 1.96$ 0.19 mg/m^3 19.4 U in % of the ELV	-	-
Maximum sum of cross-sensitivities 0.12 mg/m^3 Uncertainty of cross-sensitivity $u_i 0.068 \text{ mg/m}^3$ Calculation of the combined standard uncertainty Tested parameter u^2 Standard deviation from paired measurements under field conditions * Lack of fit $u_b 0.010 \text{ mg/m}^3 0.000 \text{ (mg/m}^3)^2$ Zero drift from field test $u_{d,z} 0.002 \text{ mg/m}^3 0.000 \text{ (mg/m}^3)^2$ Span drift from field test $u_{d,z} 0.002 \text{ mg/m}^3 0.002 \text{ (mg/m}^3)^2$ Influence of ambient temperature at span $u_i 0.040 \text{ mg/m}^3 0.002 \text{ (mg/m}^3)^2$ Influence of supply voltage $u_v 0.016 \text{ mg/m}^3 0.000 \text{ (mg/m}^3)^2$ Influence of sample gas flow $u_p -0.006 \text{ mg/m}^3 0.000 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range $u_m 0.024 \text{ mg/m}^3 0.001 \text{ (mg/m}^3)^2$ * The larger value is used : "Repeatability standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max,i})^2} 0.10 \text{ mg/m}^3$ Combined standard uncertainty (u_C) Total expanded uncertainty (u_C) $U_i n \% \text{ of the ELV 1 mg/m}^3 19.4$ Relative total expanded uncertainty Hengurement of 2010/75/EU $U_i n \% \text{ of the ELV 1 mg/m}^3 19.4$		-
Uncertainty of cross-sensitivity u_i 0.068 mg/m^3 Calculation of the combined standard uncertainty Tested parameter u^2 Standard deviation from paired measurements under field conditions * Lack of fit u_D 0.010 mg/m^3 $0.000 (\text{mg/m}^3)^2$ Zero drift from field test $u_{d,z}$ 0.002 mg/m^3 $0.000 (\text{mg/m}^3)^2$ Span drift from field test $u_{d,s}$ -0.040 mg/m^3 $0.002 (\text{mg/m}^3)^2$ Influence of ambient temperature at span u_t 0.040 mg/m^3 $0.002 (\text{mg/m}^3)^2$ Influence of supply voltage u_v 0.016 mg/m^3 $0.000 (\text{mg/m}^3)^2$ Cross-sensitivity (interference) u_i 0.068 mg/m^3 $0.000 (\text{mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_p -0.006 mg/m^3 $0.001 (\text{mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_m 0.024 mg/m^3 $0.001 (\text{mg/m}^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max, 1})^2}$ 0.10 mg/m^3 Combined standard uncertainty (u_c) $u_c = \sqrt{\sum (u_{max, 1})^2}$ 0.10 mg/m^3 19.4 Relative total expanded uncertainty U_i in % of the ELV 1 mg/m³ 19.4 Requirement of 2010/75/EU U_i in % of the ELV 1 mg/m³ 40.0		
Calculation of the combined standard uncertainty Tested parameteru²Standard deviation from paired measurements under field conditions * Lack of fitup0.010mg/m³ mg/m³0.000(mg/m³)²Zero drift from field testuor0.032mg/m³0.000(mg/m³)²Span drift from field testud.z0.002mg/m³0.002(mg/m³)²Influence of ambient temperature at spanut0.040mg/m³0.002(mg/m³)²Influence of supply voltageuv0.016mg/m³0.000(mg/m³)²Cross-sensitivity (interference)ui0.068mg/m³0.000(mg/m³)²Uncertainty of reference material at 70% of certification rangeum0.024mg/m³0.001(mg/m³)²* The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"um0.024mg/m³0.001(mg/m³)²Combined standard uncertainty (uc)Uc = $\sqrt{\sum (u_{max, i})^2}$ 0.10mg/m³0.10mg/m³Total expanded uncertaintyUi n% of the ELV 1 mg/m³19.4Requirement of 2010/75/EUU in % of the ELV 1 mg/m³19.4		3
Tested parameter u^2 Standard deviation from paired measurements under field conditions * u_D 0.010 mg/m^3 0.000 $(mg/m^3)^2$ Lack of fit u_{lof} 0.032 mg/m^3 0.001 $(mg/m^3)^2$ Zero drift from field test $u_{d,z}$ 0.002 mg/m^3 0.002 $(mg/m^3)^2$ Span drift from field test $u_{d,z}$ 0.040 mg/m^3 0.002 $(mg/m^3)^2$ Influence of ambient temperature at span u_t 0.040 mg/m^3 0.002 $(mg/m^3)^2$ Influence of supply voltage u_v 0.016 mg/m^3 0.000 $(mg/m^3)^2$ Cross-sensitivity (interference) u_i 0.068 mg/m^3 0.000 $(mg/m^3)^2$ Uncertainty of reference material at 70% of certification range u_m 0.024 mg/m^3 0.001 $(mg/m^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or u_m 0.024 mg/m^3 0.001 $(mg/m^3)^2$ Combined standard uncertainty (u_c) $U_c = \sqrt{\sum (u_{max,i})^2}$ 0.10 mg/m^3 0.19 mg/m^3 <	Uncertainty of cross-sensitivity	u _i 0.068 mg/m ³
Standard deviation from paired measurements under field conditions * u_D 0.010 mg/m^3 0.000 $(mg/m^3)^2$ Lack of fit u_{lof} 0.032 mg/m^3 0.001 $(mg/m^3)^2$ Zero drift from field test $u_{d,z}$ 0.002 mg/m^3 0.002 $(mg/m^3)^2$ Span drift from field test $u_{d,z}$ 0.004 mg/m^3 0.002 $(mg/m^3)^2$ Influence of ambient temperature at span u_t 0.040 mg/m^3 0.002 $(mg/m^3)^2$ Influence of supply voltage u_v 0.016 mg/m^3 0.000 $(mg/m^3)^2$ Cross-sensitivity (interference) u_i 0.068 mg/m^3 0.000 $(mg/m^3)^2$ Influence of sample gas flow u_p -0.006 mg/m^3 0.001 $(mg/m^3)^2$ Uncertainty of reference material at 70% of certification range u_{rm} 0.024 mg/m^3 0.001 $(mg/m^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Umm" 0.024 mg/m^3 0.001 $(mg/m^3)^2$ Total expanded uncertainty u_c $u_c * k = u_c * 1.96$ <td></td> <td>112</td>		112
Lack of fit u_{lof} 0.032 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ Zero drift from field test $u_{d,z}$ 0.002 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Span drift from field test $u_{d,s}$ 0.004 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ Influence of ambient temperature at span u_t 0.040 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ Influence of supply voltage u_v 0.016 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Cross-sensitivity (interference) u_i 0.068 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Influence of sample gas flow u_p -0.006 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_m 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max,j})^2}$ 0.10 mg/m^3 Combined standard uncertainty (u_c) $u_c = \sqrt{\sum (u_{max,j})^2}$ 0.10 mg/m^3 0.19 mg/m^3 Total expanded uncertaintyU in % of the ELV 1 mg/m³ 19.4 Relative total expanded uncertainty $U_{in \% of the ELV 1 mg/m³$ 19.4 $u_{in \% of the ELV 1 mg/m³$ 40.0		
Zero drift from field test $u_{d,z}$ 0.002 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Span drift from field test $u_{d,s}$ -0.040 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ Influence of ambient temperature at span u_t 0.040 mg/m^3 $0.002 \text{ (mg/m}^3)^2$ Influence of supply voltage u_v 0.016 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Cross-sensitivity (interference) u_i 0.068 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Influence of sample gas flow u_p -0.006 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_m 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max, j})^2}$ 0.10 mg/m^3 Combined standard uncertainty (u_c) $u_c = \sqrt{\sum (u_{max, j})^2}$ 0.10 mg/m^3 0.19 mg/m^3 Total expanded uncertainty U in % of the ELV 1 mg/m³ 19.4 Relative total expanded uncertainty U_i in % of the ELV 1 mg/m³ 40.0		
Influence of ambient temperature at span u_t 0.040 mg/m^3 0.002 $(mg/m^3)^2$ Influence of supply voltage u_v 0.016 mg/m^3 0.000 $(mg/m^3)^2$ Cross-sensitivity (interference) u_i 0.068 mg/m^3 0.005 $(mg/m^3)^2$ Influence of sample gas flow u_p -0.006 mg/m^3 0.000 $(mg/m^3)^2$ Uncertainty of reference material at 70% of certification range u_p -0.006 mg/m^3 0.001 $(mg/m^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max, j})^2}$ 0.10 mg/m^3 Combined standard uncertainty (u_c) Total expanded uncertainty $U_c = \sqrt{\sum (u_{max, j})^2}$ 0.10 mg/m^3 Relative total expanded uncertainty Requirement of 2010/75/EUU in % of the ELV 1 mg/m^319.4 40.0	Zero drift from field test	
Influence of supply voltage u_v 0.016 mg/m^3 0.000 $(mg/m^3)^2$ Cross-sensitivity (interference) u_i 0.068 mg/m^3 0.005 $(mg/m^3)^2$ Influence of sample gas flow u_p -0.006 mg/m^3 0.000 $(mg/m^3)^2$ Uncertainty of reference material at 70% of certification range u_p -0.006 mg/m^3 0.001 $(mg/m^3)^2$ *The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max,j})^2}$ 0.10 mg/m^3 Combined standard uncertainty (u_c) $u_c = \sqrt{\sum (u_{max,j})^2}$ 0.10 mg/m^3 Total expanded uncertainty $U = u_c * k = u_c * 1.96$ 0.19 mg/m^3 Relative total expanded uncertaintyU in % of the ELV 1 mg/m³19.4U in % of the ELV 1 mg/m³40.0	Span drift from field test	u _{d,s} -0.040 mg/m ³ 0.002 (mg/m ³) ²
Cross-sensitivity (interference) u_i 0.068 mg/m^3 0.005 $(mg/m^3)^2$ Influence of sample gas flow u_p -0.006 mg/m^3 0.000 $(mg/m^3)^2$ Uncertainty of reference material at 70% of certification range u_p -0.006 mg/m^3 0.001 $(mg/m^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_c = \sqrt{\sum (u_{max, j})^2}$ 0.10 mg/m^3 Combined standard uncertainty (u_c) Total expanded uncertainty $u_c = \sqrt{\sum (u_{max, j})^2}$ 0.10 mg/m^3 Relative total expanded uncertainty Requirement of 2010/75/EUU in % of the ELV 1 mg/m^319.4U in % of the ELV 1 mg/m^340.0	Influence of ambient temperature at span	u _t 0.040 mg/m ³ 0.002 (mg/m ³) ²
Influence of sample gas flow u_p -0.006 mg/m^3 $0.000 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range u_m 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" u_m 0.024 mg/m^3 $0.001 \text{ (mg/m}^3)^2$ Combined standard uncertainty (u_c) Total expanded uncertainty $u_c = \sqrt{\sum (u_{max,j})^2}$ 0.10 mg/m^3 Relative total expanded uncertainty Requirement of 2010/75/EUU in % of the ELV 1 mg/m^319.4 40.0	Influence of supply voltage	u _v 0.016 mg/m ³ 0.000 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range u_{rm} 0.024 mg/m³0.001 (mg/m³)²* The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $u_{c} = \sqrt{\sum (u_{max,j})^2}$ 0.001 (mg/m³)²Combined standard uncertainty (u _c) Total expanded uncertainty $u_c = \sqrt{\sum (u_{max,j})^2}$ 0.10 mg/m³Relative total expanded uncertainty Requirement of 2010/75/EUU in % of the ELV 1 mg/m³19.4 40.0		
* The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" Combined standard uncertainty (u _c) Total expanded uncertainty Relative total expanded uncertainty Requirement of 2010/75/EU U in % of the ELV 1 mg/m ³ U in % of the ELV 1 mg/m ³ U in % of the ELV 1 mg/m ³ 40,0		
Total expanded uncertaintyU = u_c * k = u_c * 1.960.19 mg/m³Relative total expanded uncertaintyU in % of the ELV 1 mg/m³19.4Requirement of 2010/75/EUU in % of the ELV 1 mg/m³40.0	* The larger value is used : "Repeatability standard deviation at span" or	
Total expanded uncertaintyU = u_c * k = u_c * 1.960.19 mg/m³Relative total expanded uncertaintyU in % of the ELV 1 mg/m³19.4Requirement of 2010/75/EUU in % of the ELV 1 mg/m³40.0	Combined standard uncertainty (up)	$u_{c} = \sqrt{\sum \left(u_{max} \right)^{2}} \qquad 0.10 ma/m^{3}$
Relative total expanded uncertaintyU in % of the ELV 1 mg/m³19.4Requirement of 2010/75/EUU in % of the ELV 1 mg/m³40.0		
Requirement of 2010/75/EUU in % of the ELV 1 mg/m³40.0		
Requirement of 2010/75/EUU in % of the ELV 1 mg/m³40.0	Relative total expanded uncertainty	U in % of the ELV 1 mg/m ³ 19.4
		-
		U in % of the ELV 1 mg/m ³ 30.0

Certificate: 0000001013_04 / 19 August 2016



Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle Test report Test laboratory Date of report	CEM 305 / FTIR 936/2 TÜV	Gasmet Technologies Oy CEMS II e 305 / 306 / 14433 / 14434 FTIR 936/21225866/B TÜV Rheinland 2016-02-23			
Measured component	NH ₃				
Certification range	0 -	15	mg/m³		
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		0.06	mg/m³		
Sum of negative CS at zero point			mg/m ³		
Sum of postive CS at span point		0.30	mg/m ³		
Sum of negative CS at span point			mg/m³		
Maximum sum of cross-sensitivities		-0.60	mg/m³		
Uncertainty of cross-sensitivity	ui	-0.346	mg/m³		
Calculation of the combined standard uncertainty				112	
Tested parameter	Un	0.074	ma/m ³	u² 0.005	(ma/m ³) ²
	U _D U _{lof}	0.074 -0.139	mg/m³ mg/m³	u ² 0.005 0.019	(mg/m³)² (mg/m³)²
Tested parameter Standard deviation from paired measurements under field conditions *	Ulof	-0.139	-	0.005	(mg/m ³) ² (mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit	_	-0.139 0.000	mg/m ³	0.005 0.019	(mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test	u _{lof} U _{d,z}	-0.139 0.000 -0.199	mg/m³ mg/m³	0.005 0.019 0.000	(mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test	U _{lof} U _{d,z} U _{d,s}	-0.139 0.000 -0.199 0.115	mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040	(mg/m ³) ² (mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span	U _{lof} U _{d,z} U _{d,s} U _t	-0.139 0.000 -0.199 0.115 0.091	mg/m ³ mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040 0.013	(mg/m ³) ² (mg/m ³) ² (mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow	U _{lof} U _{d,z} U _{d,s} U _t U _v	-0.139 0.000 -0.199 0.115 0.091 -0.346 0.061	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040 0.013 0.008 0.120 0.004	(mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference)	U _{lof} U _{d,z} U _{d,s} U _t U _v U _i	-0.139 0.000 -0.199 0.115 0.091 -0.346	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040 0.013 0.008 0.120	(mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	u _{lof} U _{d,z} U _{d,s} U _t U _v U _i U _p U _{rm}	-0.139 0.000 -0.199 0.115 0.091 -0.346 0.061 0.121	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040 0.013 0.008 0.120 0.004 0.015	(mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" Combined standard uncertainty (u _c)	u_{lof} $u_{d,z}$ $u_{d,s}$ u_{t} u_{v} u_{i} u_{p} u_{rm} $u_{c} =$	$\begin{array}{c} -0.139\\ 0.000\\ -0.199\\ 0.115\\ 0.091\\ -0.346\\ 0.061\\ 0.121\\ \end{array}$	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040 0.013 0.008 0.120 0.004 0.015	(mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	u_{lof} $u_{d,z}$ $u_{d,s}$ u_{t} u_{v} u_{i} u_{p} u_{rm} $u_{c} =$	-0.139 0.000 -0.199 0.115 0.091 -0.346 0.061 0.121	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040 0.013 0.008 0.120 0.004 0.015	(mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" Combined standard uncertainty (uc) Total expanded uncertainty	u_{of} $u_{d,z}$ $u_{d,s}$ u_{t} u_{v} u_{i} u_{p} u_{rm} $U_{c} = U$ $U = U$	$-0.139 \\ 0.000 \\ -0.199 \\ 0.115 \\ 0.091 \\ -0.346 \\ 0.061 \\ 0.121 \\ \sqrt{\sum_{c} k = u_{c}}$	mg/m^{3} mg/m^{3} mg/m^{3} mg/m^{3} mg/m^{3} mg/m^{3} mg/m^{3} mg/m^{3} mg/m^{3}	0.005 0.019 0.000 0.040 0.013 0.008 0.120 0.004 0.015	(mg/m ³) ² (mg/m ³) ²
Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" Combined standard uncertainty (u _c)	u_{of} $u_{d,z}$ $u_{d,s}$ u_{t} u_{v} u_{i} u_{p} u_{rm} $U_{c} = U$ $U in t$	-0.139 0.000 -0.199 0.115 0.091 -0.346 0.061 0.121 $\sqrt{\sum (u_m)} (u_m)$ % of the	mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³ mg/m ³	0.005 0.019 0.000 0.040 0.013 0.008 0.120 0.004 0.015	(mg/m ³) ² (mg/m ³) ²

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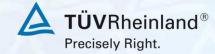


Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system Manufacturer	Gase	net Techr			
AMS designation	Gasmet Technologies Oy CEMS II e				
Serial number of units under test	-	305 / 306 / 14433 / 14434			
Measuring principle	Zirconium dioxide				
Test report	936/2	21225866	5/B		
Test laboratory	ΤÜV	Rheinlan	d		
Date of report	2016-02-23				
Measured component	O ₂				
Certification range	0 -	25	Vol%		
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		0.00	Vol%		
Sum of negative CS at zero point		0.00	Vol%		
Sum of postive CS at span point		0.00	Vol%		
Sum of negative CS at span point		0.00	Vol%		
Maximum sum of cross-sensitivities			Vol%		
Uncertainty of cross-sensitivity	ui	0.000	Vol%		
Calculation of the combined standard uncertainty Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u _D	0.047	Vol%	0.002	(Vol%)²
Lack of fit	u _{lof}		Vol%	0.011	(
Zero drift from field test	U _{d,z}		Vol%		(Vol%)²
Span drift from field test	u _{d,s}		Vol%		(Vol%)²
Influence of ambient temperature at span	ut		Vol%		(Vol%) ²
Influence of supply voltage	uv		Vol%		(Vol%) ²
Cross-sensitivity (interference)	ui		Vol%	0.000	(
Influence of sample gas flow	up		Vol%	0.000	()
Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	u _{rm}	0.202	Vol%	0.041	(Vol%)²
Combined standard uncertainty (u _c)	u. =	$\sqrt{\sum (u_m)}$.)2	0.31	Vol%
Total expanded uncertainty	U = I	$v \ge (c_m)$ $u_c * k = u_c$. * 1 96		Vol%
	0 = 0		_c 1.00	0.00	V 01 78
Relative total expanded uncertainty	ll in	% of the	range 25 Vol%		2.4
Requirement of 2010/75/EU			range 25 Vol%		10.0 **
Requirement of EN 15267-3			ange 25 Vol%		7.5
	0 11				1.0

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.. A value of 10.0 % was used for this.

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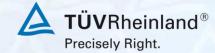


Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle Test report Test laboratory Date of report	Gasmet Tec CEMS II e 305 / 306 / * FTIR 936/212258 TÜV Rheinl 2016-02-23			
Measured component Certification range	CO ₂ 0 - 2	25 Vol%		
Evaluation of the cross-sensitivity (CS) (system with largest CS) Sum of positive CS at zero point Sum of negative CS at zero point Sum of postive CS at span point	0.0	00 Vol% 00 Vol% 0 Vol%		
Sum of negative CS at span point Maximum sum of cross-sensitivities Uncertainty of cross-sensitivity	-0.9 -0.9	90 Vol% 90 Vol% 20 Vol%		
Calculation of the combined standard uncertainty Tested parameter Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test	u _D 0.10 u _{lof} 0.11 u _{d,z} 0.00	00 Vol% 15 Vol% 00 Vol% 30 Vol%	0.013 0.000	(Vol%)² (Vol%)² (Vol%)² (Vol%)²
Influence of ambient temperature at span Influence of supply voltage Cross-sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range	$u_t = 0.23$ $u_v = 0.09$ $u_i = -0.52$ $u_p = 0.06$	31 Vol% 39 Vol% 20 Vol% 50 Vol% 52 Vol% 52 Vol%	0.053	(Vol%) ² (Vol%) ² (Vol%) ²
 The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" 				
Combined standard uncertainty (u _C) Total expanded uncertainty	$u_{c} = \sqrt{\sum_{c} (u_{c} + k_{c})}$ $U = u_{c} + k_{c}$			Vol% Vol%
Relative total expanded uncertainty Requirement of 2010/75/EU Requirement of EN 15267-3	U in % of th	ne range 25 Vol% ne range 25 Vol% e range 25 Vol%		5.1 10.0 ** 7.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.. A value of 10.0 % was used for this.

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Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle Test report Test laboratory Date of report	Gasmet Technologies Oy CEMS II e 305 / 306 / 14433 / 14434 FTIR 936/21225866/B TÜV Rheinland 2016-02-23				
Measured component	H ₂ O				
Certification range	0 -	30	Vol%		
Evaluation of the cross-sensitivity (CS) (system with largest CS) Sum of positive CS at zero point		0.00	Vol%		
Sum of negative CS at zero point			Vol%		
Sum of postive CS at span point			Vol%		
Sum of negative CS at span point			Vol%		
Maximum sum of cross-sensitivities			Vol%		
Uncertainty of cross-sensitivity	ui	0.632	Vol%		
Calculation of the combined standard uncertainty Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u _D		Vol%	0.085	· · ·
Lack of fit	Ulof		Vol%		(Vol%) ²
Zero drift from field test	u _{d,z}		Vol%		(Vol%) ²
Span drift from field test	u _{d,s}		Vol%		(Vol%) ²
Influence of ambient temperature at span	u _t		Vol%		(Vol%) ²
Influence of supply voltage	u _v		Vol%	0.069	· · ·
Cross-sensitivity (interference) Influence of sample gas flow	ui		Vol% Vol%	0.400 0.013	` '
Uncertainty of reference material at 70% of certification range	u _p u _{rm}		Vol%	0.013	(Vol%) ²
 The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" 	urm	0.242	VOI 70	0.000	(0078)
Combined standard uncertainty (u _c)	u. =	$\sqrt{\sum (u_m)}$		0.92	Vol%
Total expanded uncertainty	U = u	$v \ge (um)$	* 1.96		Vol%
	C = U		,	1.00	01. 70
Relative total expanded uncertainty	U in 9	% of the	range 30 Vol%		6.0
Requirement of 2010/75/EU			range 30 Vol%		10.0 **
Requirement of EN 15267-3			ange 30 Vol%		7.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.. A value of 10.0 % was used for this.

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Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer	Gasmet Technologies Oy				
AMS designation	CEMS II e				
Serial number of units under test		3 / 14434			
Measuring principle	FTIR 936/21225866/B				
Test report					
Test laboratory	ΤÜV	Rheinland	b		
Date of report	2016-02-23				
Measured component	CH_4				
Certification range	0 -	15	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point		0.00	mg/m ³		
Sum of negative CS at zero point		0.00	•		
Sum of postive CS at span point		0.08	mg/m ³		
Sum of negative CS at span point		-0.38	mg/m ³		
Maximum sum of cross-sensitivities		-0.38	mg/m ³		
Uncertainty of cross-sensitivity	ui	-0.217	mg/m ³		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u _D	0.034	mg/m ³	0.001	(mg/m ³) ²
Lack of fit	ulof	0.035	mg/m ³	0.001	(mg/m ³) ²
Zero drift from field test	U _{d,z}	0.000	mg/m ³	0.000	(mg/m ³) ²
Span drift from field test	u _{d,s}	0.156	mg/m ³	0.024	(mg/m ³) ²
Influence of ambient temperature at span	ut	0.057	mg/m³	0.003	(mg/m ³) ²
Influence of supply voltage	uv	0.026	mg/m³	0.001	(mg/m ³) ²
Cross-sensitivity (interference)	ui	-0.217	mg/m³	0.047	(mg/m ³) ²
Influence of sample gas flow	up	-0.069	mg/m³	0.005	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm}	0.121	mg/m³	0.015	(mg/m³)²
 The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" 					
		$\sqrt{\sum (u_m)}$)2		L.,
Combined standard uncertainty (u _c)	u _c =	√ <u>∑</u> (u _m	ax, j)	0.31	mg/m ³
Total expanded uncertainty	U = u	_c * k = u _c	,* 1.96	0.61	mg/m³
Relative total expanded uncertainty			range 15 mg/m ³		4.1
Requirement of 2010/75/EU			range 15 mg/m ³		30.0 **
Requirement of EN 15267-3	U in 9	% of the r	ange 15 mg/m ³		22.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.. A value of 30.0 % was used for this.

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Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system Manufacturer	Gasmet Technologies Oy				
AMS designation		CEMS II e			
Serial number of units under test	-	14433 / 14434			
Measuring principle	FTIR				
Test report	936/2	1225866	5/B		
Test laboratory	ΤÜV	Rheinlan	d		
Date of report	2016				
and the second se	011.0				
Measured component	CH ₂ C				
Certification range	0 -	20	mg/m³		
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		0.16	mg/m ³		
Sum of negative CS at zero point		0.00	mg/m ³		
Sum of postive CS at span point		0.36	U U		
Sum of negative CS at span point		-0.19	mg/m ³		
Maximum sum of cross-sensitivities		0.36	0		
Uncertainty of cross-sensitivity	ui	0.208	mg/m ³		
Calculation of the combined standard uncertainty Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u _D	0.038	mg/m³	0.001	(mg/m ³) ²
Lack of fit	Ulof	-0.104	0	0.011	(mg/m ³) ²
Zero drift from field test	U _{d,z}		mg/m ³	0.000	(mg/m ³) ²
Span drift from field test	u _{d,s}		mg/m ³	0.059	
Influence of ambient temperature at span	ut	0.153	5	0.023	
Influence of supply voltage	u _v	0.047	0	0.002	
Cross-sensitivity (interference)	ui	0.208	0	0.043	
Influence of sample gas flow	up	-0.051	mg/m ³	0.003	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"	u _{rm}	0.162	mg/m³	0.026	(mg/m³)²
Combined standard uncertainty (u _c)	u., =	$\sqrt{\sum (u_m)}$	$\left(\frac{1}{2}\right)^2$	0.41	mg/m ³
Total expanded uncertainty	U = u	$v_c * k = u_c$	* 1.96	0.80	0
				0.00	
Relative total expanded uncertainty	U in 9	% of the	range 20 mg/m ³		4.0
Requirement of 2010/75/EU			range 20 mg/m ³		30.0 **
Requirement of EN 15267-3			ange 20 mg/m ³		22.5
			5 5		

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component. A value of 30.0 % was used for this.