

CERTIFICATE

on Product Conformity (QAL1)

Number of Certificate: 0000035010

Certified AMS: ENDA-5000 with analysing module CMA-5800 for NO_x, SO₂, CO, CO₂ and O₂

Manufacturer: Horiba GmbH
Kaplanstr. 5
3430 Tulln
Austria

Test Institute: TÜV Rheinland Energie und Umwelt GmbH

This is to certify that the AMS has been tested
and found to comply with:

EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2008
and EN 14181: 2004

Certification is awarded in respect of the conditions stated in this certificate
(see also the following pages).



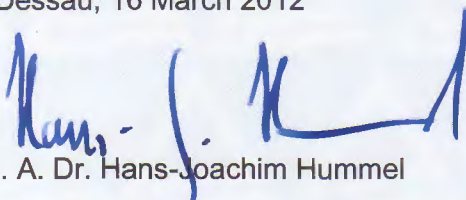
- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection


Publication in the German Federal Gazette
(BAnz.) of 02 March 2012

The certificate is valid until:
01 March 2017

Umweltbundesamt
Dessau, 16 March 2012

TÜV Rheinland Energie und Umwelt GmbH
Köln, 15 March 2012


i. A. Dr. Hans-Joachim Hummel


ppa. Dr. Peter Wilbring

www.umwelt-tuv.de / www.eco-tuv.com
teu@umwelt-tuv.de
Tel. +49 221 806-2756

TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
51105 Köln

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

Certificate:
0000035010 / 16 March 2012

Test report: 936/21212266/A of 18 October 2011
First certification: 02 March 2012
Validity ends: 01 March 2017
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 4.5

Approved application

The tested AMS is suitable for use at combustion plants according to EC directive 2001-80-EC, at waste incineration plants according to EC directive 2000-76-EC and other plants requiring official approval. The tested ranges have been chosen with respect to the wide application range of the AMS.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a five months field test at a municipal waste incinerator.

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

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 936/21212266/A dated 18 October 2011 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Environmental Agency (UBA) as the relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 4.5, announcement by UBA from 23 February 2012)

AMS name:

ENDA-5000 with analysing module CMA-5800 for NO_x, SO₂, CO, CO₂ and O₂

Manufacturer:

Horiba GmbH, Tulln, Austria

Field of application:

For measurements at plants requiring official approval (i. e. plants in 2000-76-EC, waste incineration directive and 2001-80-EC large combustion plants directive)

Measuring ranges during the suitability test:

Component	Certification range	supplementary measurement ranges	Unit
NO _x	0 – 153 ¹⁾	0 - 1530 ²⁾	mg/m ³
SO ₂	0 - 75	0 - 750	mg/m ³
CO	0 - 50	0 - 500	mg/m ³
CO ₂	0 - 20	0 - 25	Vol.-%
O ₂	0 - 25	0 - 10	Vol.-%

¹⁾ as NO₂, this corresponds to app. 0 – 100 mg/m³ NO

²⁾ as NO₂, this corresponds to app. 0 – 1000 mg/m³ NO

Software version:

P1000877001I

Restrictions:

None

Note:

A four weeks period has been specified as maintenance interval with a reservoir size of 40 l for the phosphoric acid.

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Köln
Report No.: 936/21212266/A dated 18 October 2011

Certificate:
0000035010 / 16 March 2012

Certified product

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

The measuring system is a multicomponent gas analyser for the measurement of emissions. The analyser of the type series ENDA-5000 is a measuring device to observe continuously the concentration of NO_x, SO₂, CO, CO₂ and O₂ at stationary emission sources. It measures simultaneously the five above listed gas components. The system measures the concentration of the components NO_x, SO₂, CO, CO₂ and O₂ in dry conditions because the moisture from the measuring gas is removed with help of sample gas chillers. For the measuring channels NO_x, SO₂, CO and CO₂ the non-dispersive infrared ray absorptiometry with cross modulation system (NDIR) is used.

For the determination of the oxygen concentration a magneto-pneumatic system (MPA) is applied, which is free from cylinder gas as a carrier gas.

For the minimisation of the SO₂ losses in the sample conditioning system a 10 percent phosphoric acid is added upstream of the sample gas chiller into the hot sample gas.

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 Energie und Umwelt 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 Energie und Umwelt GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the validity of the certificate and on requests of the TÜV Rheinland Energie und Umwelt GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and the validity is also accessible on the internet Address: **qal1.de**.

Certification of ENDA-5000 with analysing module CMA-5800 for NO_x, SO₂, CO, CO₂ and O₂ is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial certification according to EN 15267

Certificate No. 0000035010: 16 March 2012

Validity of the certificate: 01 March 2017

Test report: 936/21212266/A of 18 October 2011
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 4.5:
Announcement by UBA from 23 February 2012

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

Measuring system

Manufacturer	Horiba GmbH
Name of measuring system	ENDA-5000
Serial number of the candidates	0900500 / 09105800
Measuring principle	NDIR

Test report

Test laboratory	TÜV Rheinland
Date of report	2011-10-18

Measured component

Certification range	NO 0 - 100 mg/m ³
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Evaluation of the cross sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	1.30 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at reference point	3.00 mg/m ³
Sum of negative CS at reference point	0.00 mg/m ³
Maximum sum of cross sensitivities	3.00 mg/m ³
Uncertainty of cross sensitivity	1.732 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

	u	u ²
Standard deviation from paired measurements under field conditions *	u _D 0.372 mg/m ³	0.138 (mg/m ³) ²
Lack of fit	u _{lof} 0.173 mg/m ³	0.030 (mg/m ³) ²
Zero drift from field test	u _{d,z} -0.543 mg/m ³	0.295 (mg/m ³) ²
Span drift from field test	u _{d,s} -1.547 mg/m ³	2.393 (mg/m ³) ²
Influence of ambient temperature at span	u _t 0.954 mg/m ³	0.910 (mg/m ³) ²
Influence of supply voltage	u _v 0.580 mg/m ³	0.336 (mg/m ³) ²
Cross sensitivity (interference)	u _i 1.732 mg/m ³	3.000 (mg/m ³) ²
Influence of sample gas flow	u _p 0.204 mg/m ³	0.042 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.808 mg/m ³	0.653 (mg/m ³) ²
Converter efficiency for AMS measuring NOx	u _{ce} 1.900 mg/m ³	3.610 (mg/m ³) ²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 3.38 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 6.62 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC

Requirement of EN 15267-3

U in % of the ELV 131 mg/m³ 5.1

U in % of the ELV 131 mg/m³ 20.0

U in % of the ELV 131 mg/m³ 15.0

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

Measuring system

Manufacturer	Horiba GmbH
Name of measuring system	ENDA-5000
Serial number of the candidates	0900500 / 09105800
Measuring principle	NDIR

Test report

Test laboratory	936/21212266/A TÜV Rheinland
Date of report	2011-10-18

Measured component

Certification range	CO 0 - 50 mg/m³
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Evaluation of the cross sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	1.23 mg/m³
Sum of negative CS at zero point	0.00 mg/m³
Sum of positive CS at reference point	1.30 mg/m³
Sum of negative CS at reference point	0.00 mg/m³
Maximum sum of cross sensitivities	1.30 mg/m³
Uncertainty of cross sensitivity	0.751 mg/m³

Calculation of the combined standard uncertainty

Tested parameter

	u	u²
Repeatability standard deviation at set point *	u _r 0.650 mg/m³	0.423 (mg/m³)²
Lack of fit	u _{lof} -0.173 mg/m³	0.030 (mg/m³)²
Zero drift from field test	u _{d,z} -0.127 mg/m³	0.016 (mg/m³)²
Span drift from field test	u _{d,s} 0.650 mg/m³	0.423 (mg/m³)²
Influence of ambient temperature at span	u _t 0.643 mg/m³	0.413 (mg/m³)²
Influence of supply voltage	u _v 0.163 mg/m³	0.027 (mg/m³)²
Cross sensitivity (interference)	u _i 0.751 mg/m³	0.563 (mg/m³)²
Influence of sample gas flow	u _p -0.018 mg/m³	0.000 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.404 mg/m³	0.163 (mg/m³)²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 1.43 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 2.81 \text{ mg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 50 mg/m³ **5.6**

Requirement of 2000/76/EC and 2001/80/EC

U in % of the ELV 50 mg/m³ **10.0**

Requirement of EN 15267-3

U in % of the ELV 50 mg/m³ 7.5

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

Measuring system

Manufacturer	Horiba GmbH
Name of measuring system	ENDA-5000
Serial number of the candidates	0900500 / 09105800
Measuring principle	NDIR

Test report

Test laboratory	TÜV Rheinland
Date of report	2011-10-18

Measured component

Certification range	CO ₂	0 - 20 Vol.-%
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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 positive CS at reference point	0.00 Vol.-%
Sum of negative CS at reference point	-0.19 Vol.-%
Maximum sum of cross sensitivities	-0.19 Vol.-%
Uncertainty of cross sensitivity	-0.110 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

	u	u ²
Standard deviation from paired measurements under field conditions *	u _D 0.094 Vol.-%	0.009 (Vol.-%) ²
Lack of fit	u _{lof} -0.115 Vol.-%	0.013 (Vol.-%) ²
Zero drift from field test	u _{d,z} -0.072 Vol.-%	0.005 (Vol.-%) ²
Span drift from field test	u _{d,s} 0.311 Vol.-%	0.097 (Vol.-%) ²
Influence of ambient temperature at span	u _t 0.100 Vol.-%	0.010 (Vol.-%) ²
Influence of supply voltage	u _v 0.067 Vol.-%	0.004 (Vol.-%) ²
Cross sensitivity (interference)	u _i -0.110 Vol.-%	0.012 (Vol.-%) ²
Influence of sample gas flow	u _p -0.005 Vol.-%	0.000 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.162 Vol.-%	0.026 (Vol.-%) ²

* The larger value is used :
"Repeatability standard deviation at span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u _c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.42 Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.82 Vol.-%

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC	U in % of the ELV 20 Vol.-%	4.1
Requirement of EN 15267-3	U in % of the ELV 20 Vol.-%	10.0
	U in % of the ELV 20 Vol.-%	7.5

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.

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

Measuring system

Manufacturer	Horiba GmbH
Name of measuring system	ENDA-5000
Serial number of the candidates	0900500 / 09105800
Measuring principle	Paramagnetism

Test report

Test laboratory	936/21212266/A TÜV Rheinland
Date of report	2011-10-18

Measured component

Certification range	O ₂ 0 - 25 Vol.-%
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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 positive CS at reference point	0.00 Vol.-%
Sum of negative CS at reference point	-0.19 Vol.-%
Maximum sum of cross sensitivities	-0.19 Vol.-%
Uncertainty of cross sensitivity	-0.110 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

	u	u ²
Standard deviation from paired measurements under field conditions *	u _D 0.066 Vol.-%	0.004 (Vol.-%) ²
Lack of fit	u _{lof} 0.040 Vol.-%	0.002 (Vol.-%) ²
Zero drift from field test	u _{d,z} 0.098 Vol.-%	0.010 (Vol.-%) ²
Span drift from field test	u _{d,s} 0.081 Vol.-%	0.007 (Vol.-%) ²
Influence of ambient temperature at span	u _t 0.056 Vol.-%	0.003 (Vol.-%) ²
Influence of supply voltage	u _v 0.027 Vol.-%	0.001 (Vol.-%) ²
Cross sensitivity (interference)	u _i -0.110 Vol.-%	0.012 (Vol.-%) ²
Influence of sample gas flow	u _p 0.039 Vol.-%	0.002 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.202 Vol.-%	0.041 (Vol.-%) ²

* The larger value is used :
"Repeatability standard deviation at span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u _c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.28 Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.56 Vol.-%

Relative total expanded uncertainty	U in % of the range 25 Vol.-%	2.2
Requirement of 2000/76/EC and 2001/80/EC	U in % of the range 25 Vol.-%	10,0
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7,5

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.