Umwelt Bundes Amt
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CERTIFICATE

about Product Conformity (QAL1)

Number of Certificate: 0000025929

Certified AMS:	MCA 04 for N_2O, NO_2, H_2O, HCl, CO, NO, SO_2, NH_3, CO_2 and O_2
Manufacturer:	Dr. Födisch Umweltmesstechnik AG Zwenkauer Straße 159 04420 Markranstädt Germany
Test Institute:	TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

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

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 (see also the following pages).

www.tuv.com TÜVRheinland® ID.: 0000025929

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

Publication in the German Federal Gazette (BAnz.) of 2010-02-12

The certificate is valid until: 2015-02-11

Umweltbundesamt

Dessau, 2010-03-15

i. A. Dr. Hans-Joachim Hummel

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

Köln, 2010-03-10

i. V. Dr. Peter Wilbring

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TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
Am Grauen Stein
51105 Köln

Accreditation according to EN ISO/IEC 17025 and ISO 9001:2000.

Test report:	936/21211571/A of 2009-10-28
First certification:	2010-02-12
Run of validity until:	2015-02-11
Publication	BAnz. 2010-02-12, no.: 24, page: 554

Approved application:
The suitability of the AMS for applications according to 2000-76-EC, waste incineration directive, 2001-80-EC large combustion plants directive and other plants requiring an official permission was assessed on the basis of a laboratory test and a field test on a plant for the production of nitric acid. The AMS was already published in 2006 after a laboratory test and a more than six month lasting field test in an industrial waste incineration plant for the components H_2O, HCl, CO, NO, SO_2, NH_3, CO_2 and O_2. The AMS is approved for the temperature range from +5 °C to +40 °C.

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

Basis of the certification
This certification is based on the test report 936/21211571/A of 2009-10-28 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH and on the relevant bodies (German Umweltbundesamt) assessment and ongoing surveillance of the product and the manufacturing process and the publication in the German Federal Gazette (BAnz.):

AMS name:
MCA 04 for N_2O, NO_2, H_2O, HCl, CO, NO, SO_2, NH_3, CO_2 and O_2

Manufacturer:
Dr. Födisch Umweltmesstechnik AG, Markranstädt

Approval:
For measurements at plants requiring official permission (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 range	Unit
H_2O	**0 - 40**	-	Vol.-%
HCl	**0 - 15**	0 - 90	mg/m³
CO	**0 - 75**	0 - 300	mg/m³
NO	**0 - 200**	0 - 395	mg/m³
SO_2	**0 - 75**	0 - 300	mg/m³
NH_3	**0 - 30**	0 - 75	mg/m³
CO_2	**0 - 20**	-	Vol.-%
O_2	**0 - 25**	-	Vol.-%
N_2O	**0 - 50**	0 - 1000	mg/m³
NO_2	**0 - 50**	0 - 1000	mg/m³

Software version:
MC3 Firmware V 1.83

Restrictions:
1. For SO_2 in the measuring range 0- 75 mg/m³ the minimum requirements for the cross interference at HCl concentrations > 50 mg/m³ and at N_2O concentrations > 20 mg/m³ are not fulfilled.
2. For HCl in the measuring range 0- 15 mg/m³ the minimum requirements for the cross interference at SO_2 concentrations > 200 mg/m³ and at N_2O concentrations > 20 mg/m³ are not fulfilled.
3. Only eight of the components N_2O, NO_2, H_2O, HCl, CO, NO, SO_2, NH_3 and CO_2 can be measured simultaneously.

Remarks:
1. The measuring device is working with wet sample gas.
2. The maintenance interval for the components N_2O and NO_2 amounts to four weeks and for the measuring components H_2O, HCl, CO, NO, SO_2, NH_3, CO_2 und O_2 to three months.
3. Supplementary test (extension by the components NO_2 und N_2O) to the publications of the German Federal Environmental Agency dated 2005-05-27 (BAnz. p. 15701) and 2006-02-21 (BAnz. p. 2654).

Test report:
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln
Report No.: 936/21211571/A dated 2009-10-28

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

The Multi Component gas analyser MCA 04 is a measuring system for the continuous measurement of gas components in waste gases. It can measure quasi-simultaneously up to eight components.
The optical bench for the measurement of the infrared-active components consists of an infrared source with chopper, a test cell, an rotating filter disk and a detector.

For the measurement of the infrared-active components two different measuring principles are used:
- bifrequency method (SO_2, H_2O, CO_2, NO_2) and
- gas filter correlation (CO, NO, HCl, NH_3, N_2O).

For the measurement of the oxygen content in the sample gas an extraktive zirconium dioxide cell is used.

The analyser system MCA 04 consists of a temperature controlled, vented steel cabinet with partial pivoting frame and clear door. On the mounting board and on further assembly rails the complete electrical equipment/electronics (electric feeding, power distribution, signal processing and SPS) as well as the gas treatment system is mounted.

The tested AMS consists of the following single components:
- sampling probe SP 2000 H with heated filter element,
- heated sample gas line (length during the approval testing procedure: 15 m),
- analyser cabinet MCA 04,
- software MC3 Firmware V 1.83.

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 DIN 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 certified product is found no longer to comply with the applicable European Standard, TÜV Rheinland Immissionsschutz und Energiesysteme GmbH should be notified at the address shown on page 1.

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

This document as well as the certification mark remains the property of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH.
With revocation of the publication the certificate looses its validity.
After the expiration of the validity of the certificate and on requests of the TÜV Rheinland Immissionsschutz und Energiesysteme 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 seen at the Internet Address: **qal1.de**.

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Certificate:
0000025929 / 2010-03-10

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Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	Dr. Födisch Umweltmeßtechnik GmbH
Name of measuring system	MCA 04
Serial Number	355 / 368
Measuring Principle	Bifrequenz

TÜV Data

Approval Report	21211571/A / 09-10-28
Editor	Röllig
Date	2009-10-27

Measurement Component	NO_2
Certificated range	50 mg/m³

Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	1.66 mg/m³
Sum of negative CS at zero point	-0.21 mg/m³
Sum of postive CS at reference point	1.75 mg/m³
Sum of negative CS at reference point	-0.65 mg/m³
Maximum sum of cross sensitivities	1.75 mg/m³
Uncertainty of cross sensitivity	1.01 mg/m³

Calculation of the combined standard uncertainty

Test Value		u	u²
Standard deviation from paired measurements under field conditions *	u_D	0.078 mg/m³	0.006 (mg/m³)²
Lack of fit	u_{lof}	0.520 mg/m³	0.270 (mg/m³)²
Zero drift from field test	$u_{d,z}$	-0.120 mg/m³	0.014 (mg/m³)²
Span drift from field test	$u_{d,s}$	0.780 mg/m³	0.608 (mg/m³)²
Influence of ambient temperature at span	u_t	0.208 mg/m³	0.043 (mg/m³)²
Influence of supply voltage	u_v	0.261 mg/m³	0.068 (mg/m³)²
Cross sensitivity (interference)	u_i	1.010 mg/m³	1.021 (mg/m³)²
Influence of sample pressure	u_p	0.000 mg/m³	0.000 (mg/m³)²
Influence of sample gas flow	u_p	-0.102 mg/m³	0.010 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.404 mg/m³	0.163 (mg/m³)²

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.49 mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	2.91 mg/m³

Relative total expanded uncertainty	**U in % of the ELV 20 mg/m³**	**14.6**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the ELV 20 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 20 mg/m³	15.0

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TÜV Data

Approval Report	21211571/A / 09-10-28
Editor	Röllig
Date	2009-10-27

Measurement Component	N_2O
Certificated range	50 mg/m³

Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	0.00 mg/m³
Sum of negative CS at zero point	-1.74 mg/m³
Sum of postive CS at reference point	1.40 mg/m³
Sum of negative CS at reference point	-0.70 mg/m³
Maximum sum of cross sensitivities	-1.74 mg/m³
Uncertainty of cross sensitivity	-1.00 mg/m³

Calculation of the combined standard uncertainty

Test Value		u	u²
Standard deviation from paired measurements under field conditions *	u_D	3.248 mg/m³	10.549 (mg/m³)²
Lack of fit	u_{lof}	-0.115 mg/m³	0.013 (mg/m³)²
Zero drift from field test	$u_{d,z}$	0.400 mg/m³	0.160 (mg/m³)²
Span drift from field test	$u_{d,s}$	0.580 mg/m³	0.336 (mg/m³)²
Influence of ambient temperature at span	u_t	0.361 mg/m³	0.130 (mg/m³)²
Influence of supply voltage	u_v	0.276 mg/m³	0.076 (mg/m³)²
Cross sensitivity (interference)	u_i	-1.005 mg/m³	1.009 (mg/m³)²
Influence of sample pressure	u_p	0.000 mg/m³	0.000 (mg/m³)²
Influence of sample gas flow	u_p	-0.066 mg/m³	0.004 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.404 mg/m³	0.163 (mg/m³)²

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	3.53 mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	6.91 mg/m³

Relative total expanded uncertainty	**U in % of the ELV 50 mg/m³**	**13.8**
Requirement of 2000/76/EC and 2001/80/EC*[1]	**U in % of the ELV 50 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	15.0

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