

# CERTIFICATE

## about Product Conformity (QAL1)

Number of Certificate: 0000025929\_01

**Certified AMS:** MCA 04 for N<sub>2</sub>O, NO<sub>2</sub>, H<sub>2</sub>O, HCl, CO, NO, SO<sub>2</sub>, NH<sub>3</sub>, CO<sub>2</sub> and O<sub>2</sub>

**Manufacturer:** Dr. Födisch Umweltmesstechnik AG  
Zwenkauer Straße 159  
04420 Markranstädt  
Germany

**Test Institute:** TÜV Rheinland Energie und Umwelt 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).

The present certificate replaces Certificate No. 0000025929 of 2010-02-12



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

Publication in the German Federal Gazette  
BAnz. 2010-07-28

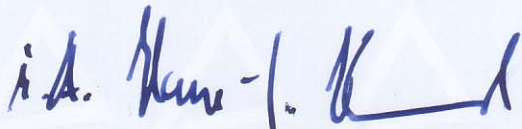
The certificate is valid until: 2015-02-11

Umweltbundesamt

TÜV Rheinland Energie und Umwelt GmbH

Dessau, 2010-08-02

Köln, 2010-07-29



i. A. Dr. Hans-Joachim Hummel



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Am Grauen Stein  
51105 Köln

Accreditation according to EN ISO/IEC 17025:2005 and certification according to EN ISO 9001:2008

**Test report:** 936/21211571/B of 2010-03-25  
**First certification:** 2010-02-12  
**Run of validity until:** 2015-02-11  
**Publication** BAnz. 2010-07-28, No. 111, p. 2597

**Approved application:**

The certified AMS is suitable for use at combustion plants according to EC directive 2001-80-EC, at waste incinerations according to EC directive 2000-76-EC and other plants requiring official permission. The certification 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 more than six month 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<sub>2</sub>O, HCl, CO, NO, SO<sub>2</sub>, NH<sub>3</sub>, CO<sub>2</sub> and O<sub>2</sub>.

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 reports 936/21211571/A of 2009-10-28 and 936/21211571/B of 2010-03-25 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, 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. 2010-07-28, No. 111, p. 2597: UBA publication from 2010-07-12):

**AMS name:**

MCA 04 for N<sub>2</sub>O, NO<sub>2</sub>, H<sub>2</sub>O, HCl, CO, NO, SO<sub>2</sub>, NH<sub>3</sub>, CO<sub>2</sub> and O<sub>2</sub>

**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 <sub>2</sub> O	0 - 40	-	Vol.-%
HCl	0 - 15	0 - 90	mg/m <sup>3</sup>
CO	0 - 75	0 - 300	mg/m <sup>3</sup>
NO	0 - 200	0 - 395	mg/m <sup>3</sup>
SO <sub>2</sub>	0 - 75	0 - 300	mg/m <sup>3</sup>
NH <sub>3</sub>	0 - 30	0 - 75	mg/m <sup>3</sup>
CO <sub>2</sub>	0 - 20	-	Vol.-%
O <sub>2</sub>	0 - 25	-	Vol.-%
N <sub>2</sub> O	0 - 50	0 - 1000	mg/m <sup>3</sup>
NO <sub>2</sub>	0 - 50	0 - 1000	mg/m <sup>3</sup>

**Software version:**

MC3 Firmware V 1.83

**Restrictions:**

1. For SO<sub>2</sub> in the measuring range 0- 75 mg/m<sup>3</sup> the minimum requirements for the cross interference at HCl concentrations > 50 mg/m<sup>3</sup> and at N<sub>2</sub>O concentrations > 20 mg/m<sup>3</sup> are not fulfilled.
2. For HCl in the measuring range 0- 15 mg/m<sup>3</sup> the minimum requirements for the cross interference at SO<sub>2</sub> concentrations > 200 mg/m<sup>3</sup> and at N<sub>2</sub>O concentrations > 20 mg/m<sup>3</sup> are not fulfilled.
3. Only eight of the components N<sub>2</sub>O, NO<sub>2</sub>, H<sub>2</sub>O, HCl, CO, NO, SO<sub>2</sub>, NH<sub>3</sub> and CO<sub>2</sub> can be measured simultaneously. Possible interference compensation shall be taken into account when selecting the components to be measured.

**Remarks:**

1. The measuring device is working with wet sample gas.
2. The maintenance interval for the measuring system amounts to three months.
3. Supplementary test (extension of the maintenance interval for the components NO<sub>2</sub> und N<sub>2</sub>O) to the publications of the German Federal Environmental Agency dated 2005-07-25 (BAnz. p. 15701), 2006-02-21 (BAnz. p. 2654) and 2010-01-25 (BAnz. p. 554).

**Test report:**

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln  
Report No.: 936/21211571/B of 2010-03-25

### **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<sub>2</sub>, H<sub>2</sub>O, CO<sub>2</sub>, NO<sub>2</sub>) and
- gas filter correlation (CO, NO, HCl, NH<sub>3</sub>, N<sub>2</sub>O).

For the measurement of the oxygen content in the sample gas an extractive 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 Energie und Umwelt 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 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 seen at the Internet Address: **qal1.de**.

Certification of the MCA 04 measuring system for measuring the components N<sub>2</sub>O, NO<sub>2</sub>, H<sub>2</sub>O, HCl, CO, NO, SO<sub>2</sub>, NH<sub>3</sub>, CO<sub>2</sub> and O<sub>2</sub> 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. 0000025929: 2010-02-12

Validity of the certificate: 2015-02-11

Test report: 936/21211571/A of 2009-10-28,  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln,

Publication: BAnz. 2010-02-12, No. 24, p. 554: Announcement by UBA from 2010-01-25.

**Supplementary testing according to EN 15267:**

Certificate No. 0000025929\_01:2010-07-28

Validity of the certificate: 2015-02-11

Test report: 936/21211571/B of 2010-03-25,  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln,

Publication: BAnz. 2010-07-28, No. 111, p. 2597: Announcement by UBA from 2010-07-12.



**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	Bi-frequency method

**TÜV Data**

Approval Report	936/21211571/B / 2010-03-25
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Editor	Röllig
Date	2010-03-21

**Measurement Component**

Certificated range	N <sub>2</sub> O	50 mg/m <sup>3</sup>
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**Evaluation of the cross sensitivity (CS)**

Sum of positive CS at zero point	0.00 mg/m <sup>3</sup>
Sum of negative CS at zero point	-1.74 mg/m <sup>3</sup>
Sum of positive CS at reference point	1.40 mg/m <sup>3</sup>
Sum of negative CS at reference point	-0.70 mg/m <sup>3</sup>
Maximum sum of cross sensitivities	-1.74 mg/m <sup>3</sup>
Uncertainty of cross sensitivity	-1.00 mg/m <sup>3</sup>

**Calculation of the combined standard uncertainty**

**Test Value**

	u	u <sup>2</sup>
Standard deviation from paired measurements under field conditions ***	u <sub>D</sub> 3.248 mg/m <sup>3</sup>	10.549 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	u <sub>lof</sub> -0.115 mg/m <sup>3</sup>	0.013 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub> 0.400 mg/m <sup>3</sup>	0.160 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub> 0.580 mg/m <sup>3</sup>	0.336 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub> 0.361 mg/m <sup>3</sup>	0.130 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub> 0.276 mg/m <sup>3</sup>	0.076 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross sensitivity (interference)	u <sub>i</sub> -1.005 mg/m <sup>3</sup>	1.009 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample pressure	u <sub>p</sub> 0.000 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	u <sub>p</sub> -0.066 mg/m <sup>3</sup>	0.004 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub> 0.404 mg/m <sup>3</sup>	0.163 (mg/m <sup>3</sup> ) <sup>2</sup>

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

\*\* Determined in the measuring range 0 to 1000 mg/m<sup>3</sup>

Combined standard uncertainty (u <sub>c</sub> )	$u_c = \sqrt{\sum (u_{max,j})^2}$	3.53 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1,96$	6.91 mg/m <sup>3</sup>

**Relative total expanded uncertainty**

Requirement of 2000/76/EC and 2001/80/EC***	U in % of the ELV 50 mg/m <sup>3</sup>	13.8
Requirement of EN 15267-3	U in % of the ELV 50 mg/m <sup>3</sup>	20.0
	U in % of the ELV 50 mg/m <sup>3</sup>	15.0

**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	Bi-frequency method

**TÜV Data**

Approval Report	936/21211571/B / 2010-03-25
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Editor  
Date

Röllig  
2010-03-21

**Measurement Component**

Certificated range	NO <sub>2</sub> 50 mg/m <sup>3</sup>
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**Evaluation of the cross sensitivity (CS)**

Sum of positive CS at zero point	1.66 mg/m <sup>3</sup>
Sum of negative CS at zero point	-0.21 mg/m <sup>3</sup>
Sum of positive CS at reference point	1.75 mg/m <sup>3</sup>
Sum of negative CS at reference point	-0.65 mg/m <sup>3</sup>
Maximum sum of cross sensitivities	1.75 mg/m <sup>3</sup>
Uncertainty of cross sensitivity	1.01 mg/m <sup>3</sup>

**Calculation of the combined standard uncertainty**

**Test Value**

	u	u <sup>2</sup>
Standard deviation from paired measurements under field conditions *	u <sub>D</sub> 0.078 mg/m <sup>3</sup>	0.006 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	u <sub>lof</sub> 0.520 mg/m <sup>3</sup>	0.270 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub> -0.120 mg/m <sup>3</sup>	0.014 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub> 0.870 mg/m <sup>3</sup>	0.757 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub> 0.208 mg/m <sup>3</sup>	0.043 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub> 0.261 mg/m <sup>3</sup>	0.068 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross sensitivity (interference)	u <sub>i</sub> 1.010 mg/m <sup>3</sup>	1.021 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample pressure	u <sub>p</sub> 0.000 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	u <sub>p</sub> -0.102 mg/m <sup>3</sup>	0.010 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub> 0.404 mg/m <sup>3</sup>	0.163 (mg/m <sup>3</sup> ) <sup>2</sup>

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

Combined standard uncertainty (u <sub>c</sub> )	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.53 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1,96$	3.01 mg/m <sup>3</sup>

**Relative total expanded uncertainty**

Requirement of 2000/76/EC and 2001/80/EC	<b>U in % of the ELV 20 mg/m<sup>3</sup></b>	<b>15.0</b>
Requirement of EN 15267-3	<b>U in % of the ELV 20 mg/m<sup>3</sup></b>	<b>20.0</b>
	<b>U in % of the ELV 20 mg/m<sup>3</sup></b>	<b>15.0</b>