

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000039321

**Certified AMS:** MGA12 for CO, NO, SO<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub>

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

**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: 2007  
and EN 14181: 2004**

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



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000039321

Publication in the German Federal Gazette  
(BAnz.) of 01 April 2014

This certificate will expire on:  
31 March 2019

German Federal Environment Agency  
Dessau, 29 April 2014

TÜV Rheinland Energie und Umwelt GmbH  
Cologne, 28 April 2014



i. A. Dr. Marcel Langner



ppa. Dr. Peter Wilbring

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

<b>Test report:</b>	936/21219366/A of 19 September 2013
<b>Initial certification:</b>	01 April 2014
<b>Expiry date:</b>	31 March 2019
<b>Publication:</b>	BAnz AT 01 April 2014 B12, chapter I, No. 3.4

### **Approved application**

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III 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 three-month field test at a lignite-fired power plant.

The AMS is approved for an ambient temperature range of +5 °C to +30 °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 936/21219366/A of 19 September 2013 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
- publication in the German Federal Gazette (BAnz AT 01 April 2014 B12, chapter I, No. 3.4, Announcement by UBA from 27 February 2014)

**AMS designation:**

MGA12 for CO, NO, SO<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub>

**Manufacturer:**

Dr. Födisch Umweltmesstechnik AG, Markranstädt

**Field of application:**

For measurements at plants requiring official approval (Directive 2010/75/EU, chapter III combustion plants)

**Measuring ranges during the performance test:**

Components	Certification range	Supplementary range	Units
CO	0 - 125	0 - 1000	mg/m <sup>3</sup>
NO	0 - 300	0 - 1000	mg/m <sup>3</sup>
SO <sub>2</sub>	0 - 200	0 - 1000	mg/m <sup>3</sup>
O <sub>2</sub>	0 - 25	-	Vol.-%
CO <sub>2</sub>	0 - 20	-	Vol.-%

**Software version:**

1.47

**Restrictions:**

1. The ambient temperature must not exceed +30 °C.
2. The performance criterion as related to the expanded uncertainty according to EN 15267-3 was not fulfilled for the component CO.

**Note:**

The maintenance interval is four weeks.

**Test report:**

TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Report No.: 936/21219366/A of 19 September 2013

### **Certified product**

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

The multi-component MGA12 AMS is a measuring system for continuous monitoring of CO, NO, SO<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub> in exhaust gases.

The components CO, NO, SO<sub>2</sub> and CO<sub>2</sub> are monitored using infrared absorption; O<sub>2</sub> is measured with an electrochemical cell.

The tested AMS comprises the gas analyser which is positioned in a 19" rack housing. The analyser is located in a heated and ventilated system cabinet with the dimensions 2100 x 800 x 600 mm, which also houses the sample gas pump (MGP 12), the sample gas cooler (GCU 12), the connections for measurement values and signals, and other electronic parts for electricity supply. A pump supplies the sample gas cooler with 15 % concentration phosphoric acid in order to prevent SO<sub>2</sub> absorption.

The sample gas is fed to gas preparation via a heated sample gas probe (HSP 12) and a heated sample gas pipe (25 m). The sample gas probe is fitted with a ceramic filter which, like the sample gas pipe, is heated to 180 °C.

### **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 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 its expiration is also accessible on the internet: **qal1.de**.

Certification of MGA12 for CO, NO, SO<sub>2</sub>, O<sub>2</sub> and CO<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. 0000039321: 29 April 2014

Expiry date of the certificate: 31 March 2019

Test report: 936/21219366/A of 19 September 2013  
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 01 April 2014 B12, chapter I, No. 3.4  
Announcement by UBA from 27 February 2014

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

#### Measuring system

Manufacturer	Dr. Födisch Umweltmesstechnik AG
AMS designation	MGA 12
Serial number of units under test	12002 / 12003
Measuring principle	IR

#### Test report

Test laboratory	936/21219366/A TÜV Rheinland
Date of report	2013-09-19

#### Measured component

	CO
Certification range	0 - 125 mg/m <sup>3</sup>

#### Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00 mg/m <sup>3</sup>
Sum of negative CS at zero point	0.00 mg/m <sup>3</sup>
Sum of positive CS at span point	3.70 mg/m <sup>3</sup>
Sum of negative CS at span point	-2.50 mg/m <sup>3</sup>
Maximum sum of cross-sensitivities	3.70 mg/m <sup>3</sup>
Uncertainty of cross-sensitivity	$u_i$ 2.140 mg/m <sup>3</sup>

#### Calculation of the combined standard uncertainty

##### Tested parameter

			$u^2$
Standard deviation from paired measurements under field conditions *	$u_D$ 0.690 mg/m <sup>3</sup>	0.476	(mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	$u_{lof}$ -0.577 mg/m <sup>3</sup>	0.333	(mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	$u_{d,z}$ -0.144 mg/m <sup>3</sup>	0.021	(mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	$u_{d,s}$ -1.588 mg/m <sup>3</sup>	2.522	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	$u_t$ 1.510 mg/m <sup>3</sup>	2.280	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	$u_v$ 0.537 mg/m <sup>3</sup>	0.288	(mg/m <sup>3</sup> ) <sup>2</sup>
Cross-sensitivity (interference)	$u_i$ 2.140 mg/m <sup>3</sup>	4.580	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	$u_p$ 0.346 mg/m <sup>3</sup>	0.120	(mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	$u_{rm}$ 1.010 mg/m <sup>3</sup>	1.021	(mg/m <sup>3</sup> ) <sup>2</sup>

\* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )	$u_c = \sqrt{\sum (u_{max,j})^2}$	3.41 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	6.69 mg/m <sup>3</sup>

#### Relative total expanded uncertainty

Requirement of 2010/75/EU	<b>U in % of the ELV 80 mg/m<sup>3</sup></b>	<b>8.4</b>
Requirement of EN 15267-3	<b>U in % of the ELV 80 mg/m<sup>3</sup></b>	<b>10.0</b>
	<b>U in % of the ELV 80 mg/m<sup>3</sup></b>	<b>7.5</b>

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

#### Measuring system

Manufacturer	Dr. Födisch Umweltmesstechnik AG
Name of measuring system	MGA 12
Serial number of the candidates	12002 / 12003
Measuring principle	IR

#### Test report

Test laboratory	TÜV Rheinland
Date of report	2013-09-19

#### Measured component

	NO
Certification range	0 - 250 mg/m <sup>3</sup>

#### Evaluation of the cross sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00 mg/m <sup>3</sup>
Sum of negative CS at zero point	0.00 mg/m <sup>3</sup>
Sum of positive CS at reference point	6.30 mg/m <sup>3</sup>
Sum of negative CS at reference point	0.00 mg/m <sup>3</sup>
Maximum sum of cross sensitivities	6.30 mg/m <sup>3</sup>
Uncertainty of cross sensitivity	3.637 mg/m <sup>3</sup>

#### Calculation of the combined standard uncertainty

##### Tested parameter

			u <sup>2</sup>	
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>	3.095 mg/m <sup>3</sup>	9.579	(mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	u <sub>lof</sub>	1.155 mg/m <sup>3</sup>	1.334	(mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub>	3.320 mg/m <sup>3</sup>	11.022	(mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub>	3.753 mg/m <sup>3</sup>	14.085	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub>	2.468 mg/m <sup>3</sup>	6.091	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub>	1.208 mg/m <sup>3</sup>	1.459	(mg/m <sup>3</sup> ) <sup>2</sup>
Cross sensitivity (interference)	u <sub>i</sub>	3.640 mg/m <sup>3</sup>	13.250	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	u <sub>b</sub>	1.383 mg/m <sup>3</sup>	1.913	(mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub>	2.021 mg/m <sup>3</sup>	4.083	(mg/m <sup>3</sup> ) <sup>2</sup>

\* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u<sub>c</sub>)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 7.93 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 15.53 \text{ mg/m}^3$$

#### Relative total expanded uncertainty

##### Requirement of 2010/75/EU

Requirement of EN 15267-3

**U in % of the ELV 120 mg/m<sup>3</sup> 12.9**

**U in % of the ELV 120 mg/m<sup>3</sup> 20.0**

U in % of the ELV 120 mg/m<sup>3</sup> 15.0

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

#### Measuring system

Manufacturer	Dr. Födisch Umweltmesstechnik AG
AMS designation	MGA 12
Serial number of units under test	12002 / 12003
Measuring principle	IR

#### Test report

Test laboratory	936/21219366/A TÜV Rheinland
Date of report	2013-09-19

#### Measured component

	SO <sub>2</sub>
Certification range	0 - 200 mg/m <sup>3</sup>

#### Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00 mg/m <sup>3</sup>
Sum of negative CS at zero point	-2.64 mg/m <sup>3</sup>
Sum of positive CS at span point	5.10 mg/m <sup>3</sup>
Sum of negative CS at span point	-8.00 mg/m <sup>3</sup>
Maximum sum of cross-sensitivities	-8.00 mg/m <sup>3</sup>
Uncertainty of cross-sensitivity	$u_i$ -4.619 mg/m <sup>3</sup>

#### Calculation of the combined standard uncertainty

##### Tested parameter

			$u^2$
Standard deviation from paired measurements under field conditions *	$u_D$	3.291 mg/m <sup>3</sup>	10.831 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	$u_{lof}$	1.155 mg/m <sup>3</sup>	1.334 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	$u_{d,z}$	0.346 mg/m <sup>3</sup>	0.120 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	$u_{d,s}$	-2.656 mg/m <sup>3</sup>	7.054 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	$u_t$	2.452 mg/m <sup>3</sup>	6.012 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	$u_v$	0.947 mg/m <sup>3</sup>	0.897 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross-sensitivity (interference)	$u_i$	-4.619 mg/m <sup>3</sup>	21.333 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	$u_p$	0.722 mg/m <sup>3</sup>	0.521 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	$u_{rm}$	1.617 mg/m <sup>3</sup>	2.613 (mg/m <sup>3</sup> ) <sup>2</sup>

\* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )	$u_c = \sqrt{\sum (u_{max,j})^2}$	7.12 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	13.96 mg/m <sup>3</sup>

#### Relative total expanded uncertainty

##### Requirement of 2010/75/EU

Requirement of EN 15267-3

<b>U in % of the ELV 130 mg/m<sup>3</sup></b>	<b>10.7</b>
<b>U in % of the ELV 130 mg/m<sup>3</sup></b>	<b>20.0</b>
U in % of the ELV 130 mg/m <sup>3</sup>	15.0

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

**Measuring system**

Manufacturer	Dr. Födisch Umweltmesstechnik AG
AMS designation	MGA 12
Serial number of units under test	12002 / 12003
Measuring principle	electrochemical cell

**Test report**

Test laboratory	936/21219366/A
Date of report	TÜV Rheinland 2013-09-19

**Measured component**

Certification range	O <sub>2</sub> 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 span point	0.00 Vol.-%
Sum of negative CS at span point	0.00 Vol.-%
Maximum sum of cross-sensitivities	0.00 Vol.-%
Uncertainty of cross-sensitivity	u <sub>i</sub> 0.000 Vol.-%

**Calculation of the combined standard uncertainty**

**Tested parameter**

				u <sup>2</sup>
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>	0.091 Vol.-%		0.008 (Vol.-%) <sup>2</sup>
Lack of fit	u <sub>lof</sub>	0.014 Vol.-%		0.000 (Vol.-%) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub>	-0.064 Vol.-%		0.004 (Vol.-%) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub>	-0.110 Vol.-%		0.012 (Vol.-%) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub>	0.070 Vol.-%		0.005 (Vol.-%) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub>	0.059 Vol.-%		0.003 (Vol.-%) <sup>2</sup>
Cross-sensitivity (interference)	u <sub>i</sub>	0.000 Vol.-%		0.000 (Vol.-%) <sup>2</sup>
Influence of sample gas flow	u <sub>b</sub>	-0.018 Vol.-%		0.000 (Vol.-%) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub>	0.202 Vol.-%		0.041 (Vol.-%) <sup>2</sup>

\* The larger value is used :

"Repeatability standard deviation at span" or  
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u <sub>c</sub> )	$u_c = \sqrt{\sum (u_{max,i})^2}$	0.27 Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.53 Vol.-%

**Relative total expanded uncertainty**

<b>Requirement of 2010/75/EU</b>	<b>U in % of the range 25 Vol.-%</b>	<b>2.1</b>
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	10.0 **
	U in % of the range 25 Vol.-%	7.5

\*\* For this component no requirements in the EC-directives 2010/75/EU on industrial emissions 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	Dr. Födisch Umweltmesstechnik AG
AMS designation	MGA 12
Serial number of units under test	12002 / 12003
Measuring principle	IR

**Test report**

Test laboratory	TÜV Rheinland
Date of report	2013-09-19

**Measured component**

Certification range	CO <sub>2</sub>	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 span point	0.60	Vol.-%
Sum of negative CS at span point	-0.20	Vol.-%
Maximum sum of cross-sensitivities	0.60	Vol.-%
Uncertainty of cross-sensitivity	$u_i$	0.346 Vol.-%

**Calculation of the combined standard uncertainty**

**Tested parameter**

				$u^2$
Standard deviation from paired measurements under field conditions *	$u_D$	0.142	Vol.-%	0.020 (Vol.-%) <sup>2</sup>
Lack of fit	$u_{lof}$	0.058	Vol.-%	0.003 (Vol.-%) <sup>2</sup>
Zero drift from field test	$u_{d,z}$	-0.012	Vol.-%	0.000 (Vol.-%) <sup>2</sup>
Span drift from field test	$u_{d,s}$	0.346	Vol.-%	0.120 (Vol.-%) <sup>2</sup>
Influence of ambient temperature at span	$u_t$	0.252	Vol.-%	0.064 (Vol.-%) <sup>2</sup>
Influence of supply voltage	$u_v$	0.060	Vol.-%	0.004 (Vol.-%) <sup>2</sup>
Cross-sensitivity (interference)	$u_i$	0.346	Vol.-%	0.120 (Vol.-%) <sup>2</sup>
Influence of sample gas flow	$u_n$	-0.041	Vol.-%	0.002 (Vol.-%) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	$u_{rm}$	0.162	Vol.-%	0.026 (Vol.-%) <sup>2</sup>

\* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )

$$u_c = \sqrt{\sum (u_{max, j})^2} \quad 0.60 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 1.17 \text{ Vol.-%}$$

**Relative total expanded uncertainty**

**U in % of the range 20 Vol.-%** **5.9**

**Requirement of 2010/75/EU**

**U in % of the range 20 Vol.-%** **10.0**

**Requirement of EN 15267-3**

**U in % of the range 20 Vol.-%** **7.5**