Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000043103

Certified AMS:	MGA12 HR for CO, NO, SO_2 and O_2
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).

TÜVRheinland® CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000043103

Publication in the German Federal Gazette (BAnz.) of 5 August 2014

This certificate will expire on:
4 August 2019

German Federal Environment Agency
Dessau, 9 September 2014

i. A. Dr. Marcel Langner

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 8 September 2014

ppa. Dr. Peter Wilbring

www.umwelt-tuv.de / **www.eco-tuv.com** teu@umwelt-tuv.de Tel. +49 221 806-5200	TÜV Rheinland Energie und Umwelt GmbH Am Grauen Stein 51105 Cologne
Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.	

10/221 2.08

Test report:	936/21219366/B of 1 April 2014
Initial certification:	5 August 2014
Expiry date:	4 August 2019
Publication:	BAnz AT 5 August 2014 B11, chapter I, no. 4.4

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 six-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/B of 1 April 2014 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 5 August 2014 B11, chapter I, no. 4.4
  UBA announcement of 17 July 2014

AMS designation:
MGA12 HR for CO, NO, SO_2 and O_2

Manufacturer:
Dr. Födisch Umweltmesstechnik AG, Markranstädt

Field of application:
For measurements at plants requiring official approval (e.g. Directive 2010/75/EU on industrial emissions, chapters III and IV)

Measuring ranges during the performance test:

Components	Certification ranges	Supplementary ranges	Units
CO	0 - 125	0 - 1000	mg/m³
NO	0 - 300	0 - 1000	mg/m³
SO_2	0 - 200	0 - 1000	mg/m³
O_2	0 - 25	-	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 three months.

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report no.: 936/21219366/B of 1 April 2014

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

The MGA12 HR multi-component AMS is a measuring system for continuous monitoring of CO, NO, SO_2 and O_2 in exhaust gases.

The components CO, NO and SO_2 are monitored using infrared absorption; O_2 is measured with an electrochemical cell.

The tested AMS comprises the gas analyser which is positioned in a 19"-rack housing. The analyser is placed 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 transmitting measured 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_2 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 HR for CO, NO, SO_2 and O_2 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. 0000043103: 9 September 2014

Expiry date of the certificate: 4 August 2019

Test report: 936/21219366/B of 1 April 2014
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 5 August 2014 B11, chapter I, no. 4.4
UBA announcement of 17 July 2014

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

Measuring system			
Manufacturer		Dr. Födisch Umweltmesstechnik AG	
AMS designation		MGA 12 HR **	
Serial number of units under test		12002 / 12003	
Measuring principle		IR	
Test report		936/21219366/B	
Test laboratory		TÜV Rheinland	
Date of report		2014-04-01	
Measured component		CO	
Certification range		0 - 125	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.00	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		3.70	mg/m³
Sum of negative CS at span point		-2.50	mg/m³
Maximum sum of cross-sensitivities		3.70	mg/m³
Uncertainty of cross-sensitivity	u_i	2.140	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.690	mg/m³	0.476	(mg/m³)²
Lack of fit	u_{lof}	-0.577	mg/m³	0.333	(mg/m³)²
Zero drift from field test	$u_{d,z}$	-0.144	mg/m³	0.021	(mg/m³)²
Span drift from field test	$u_{d,s}$	-1.588	mg/m³	2.522	(mg/m³)²
Influence of ambient temperature at span	u_t	1.510	mg/m³	2.280	(mg/m³)²
Influence of supply voltage	u_v	0.537	mg/m³	0.288	(mg/m³)²
Cross-sensitivity (interference)	u_i	2.140	mg/m³	4.580	(mg/m³)²
Influence of sample gas flow	u_p	0.346	mg/m³	0.120	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	1.010	mg/m³	1.021	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	3.41	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	6.69	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 80 mg/m³**	**8.4**
Requirement of 2010/75/EU	**U in % of the ELV 80 mg/m³**	**10.0**
Requirement of EN 15267-3	U in % of the ELV 80 mg/m³	7.5

** During performance testing, the tests were carried out with the MGA12 measuring system.

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

Measuring system			
Manufacturer			Dr. Födisch Umweltmesstechnik AG
AMS designation			MGA 12 HR **
Serial number of the candidates			12002 / 12003
Measuring principle			IR
Test report			936/21219366/B
Test laboratory			TÜV Rheinland
Date of report			2014-04-01
Measured component			NO
Certification range			0 - 250 mg/m³

Evaluation of the cross sensitivity (CS)
(system with largest CS)

Sum of positive CS at zero point		0.00	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at reference point		6.30	mg/m³
Sum of negative CS at reference point		0.00	mg/m³
Maximum sum of cross sensitivities		6.30	mg/m³
Uncertainty of cross sensitivity		3.637	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	3.095	mg/m³	9.579	(mg/m³)²
Lack of fit	u_{lof}	1.155	mg/m³	1.334	(mg/m³)²
Zero drift from field test	$u_{d,z}$	3.320	mg/m³	11.022	(mg/m³)²
Span drift from field test	$u_{d,s}$	3.753	mg/m³	14.085	(mg/m³)²
Influence of ambient temperature at span	u_t	2.468	mg/m³	6.091	(mg/m³)²
Influence of supply voltage	u_v	1.208	mg/m³	1.459	(mg/m³)²
Cross sensitivity (interference)	u_i	3.640	mg/m³	13.250	(mg/m³)²
Influence of sample gas flow	u_p	1.383	mg/m³	1.913	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	2.021	mg/m³	4.083	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	7.93	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	15.53	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 120 mg/m³**	**12.9**
Requirement of 2010/75/EU	**U in % of the ELV 120 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 120 mg/m³	15.0

** During performance testing, the tests were carried out with the MGA12 measuring system.

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

Measuring system			
Manufacturer		Dr. Födisch Umweltmesstechnik AG	
AMS designation		MGA 12 HR **	
Serial number of units under test		12002 / 12003	
Measuring principle		IR	
Test report		936/21219366/B	
Test laboratory		TÜV Rheinland	
Date of report		2014-04-01	
Measured component		SO_2	
Certification range		0 - 200	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.00	mg/m³
Sum of negative CS at zero point		-2.64	mg/m³
Sum of postive CS at span point		5.10	mg/m³
Sum of negative CS at span point		-8.00	mg/m³
Maximum sum of cross-sensitivities		-8.00	mg/m³
Uncertainty of cross-sensitivity	u_i	-4.619	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	3.291	mg/m³	10.831	(mg/m³)²
Lack of fit	u_{lof}	1.155	mg/m³	1.334	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.346	mg/m³	0.120	(mg/m³)²
Span drift from field test	$u_{d,s}$	-2.656	mg/m³	7.054	(mg/m³)²
Influence of ambient temperature at span	u_t	2.452	mg/m³	6.012	(mg/m³)²
Influence of supply voltage	u_v	0.947	mg/m³	0.897	(mg/m³)²
Cross-sensitivity (interference)	u_i	-4.619	mg/m³	21.333	(mg/m³)²
Influence of sample gas flow	u_p	0.722	mg/m³	0.521	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	1.617	mg/m³	2.613	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	7.12	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	13.96	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 130 mg/m³**	**10.7**
Requirement of 2010/75/EU	**U in % of the ELV 130 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 130 mg/m³	15.0

** During performance testing, the tests were carried out with the MGA12 measuring system.

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

Measuring system			
Manufacturer		Dr. Födisch Umweltmesstechnik AG	
AMS designation		MGA 12 HR **	
Serial number of units under test		12002 / 12003	
Measuring principle		electrochemical cell	
Test report		936/21219366/B	
Test laboratory		TÜV Rheinland	
Date of report		2014-04-01	
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		0.00	Vol.-%
Uncertainty of cross-sensitivity	u_i	0.000	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.091	Vol.-%	0.008	(Vol.-%)²
Lack of fit	u_{lof}	0.014	Vol.-%	0.000	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	-0.064	Vol.-%	0.004	(Vol.-%)²
Span drift from field test	$u_{d,s}$	-0.110	Vol.-%	0.012	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.070	Vol.-%	0.005	(Vol.-%)²
Influence of supply voltage	u_v	0.059	Vol.-%	0.003	(Vol.-%)²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000	(Vol.-%)²
Influence of sample gas flow	u_p	-0.018	Vol.-%	0.000	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.27	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.53	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.1**
Requirement of 2010/75/EU	**U in % of the range 25 Vol.-%**	**10.0 *** **
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

** During performance testing, the tests were carried out with the MGA12 measuring system.
*** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
The chosen value is recommended by the certification body.