Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

# CERTIFICATE

## of Product Conformity (QAL1)

**Certificate No.: 0000043103_01**

| | |
|---|---|
| **AMS designation:** | MGA12 HR for CO, NO, $SO_2$ and $O_2$ |
| **Manufacturer:** | Dr. Födisch Umweltmesstechnik AG<br>Zwenkauer Str. 159<br>04420 Markranstädt<br>Germany |
| **Test Laboratory:** | TÜV Rheinland Energy GmbH |

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

**EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2007 and EN 14181: 2015**

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 10 pages).
The present certificate replaces certificate 0000043103 of 9 September 2014.

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 2024

German Federal Environment Agency
Dessau, 5 August 2019

Dr Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 4 August 2019

ppa. Dr. Peter Wilbring


www.umwelt-tuv.eu
tre@umwelt-tuv.eu
Phone: + 49 221 806-5200

TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln


Test institute accredited to EN ISO/IEC 17025:2005 by DAkkS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00.



10/221 2.08

| | |
|---|---|
| **Test Report:** | 936/21219366/B dated 1 April 2014 |
| **Initial certification:** | 5 August 2014 |
| **Expiry date:** | 4 August 2024 |
| **Publication:** | BAnz AT 05.08.2014 B11, chapter I number 4.4 |

**Approved application**
The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV) and other plants requiring official approval. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a six-months field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of +5 °C to +30 °C.

The notification of suitability of the AMS, performance testing and the uncertainty calculation have been effected on the basis of the regulations applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the limit values and oxygen concentrations relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

**Basis of the certification**
This certification is based on:

- Test report 936/21219366/B dated 1 April 2014 issued by 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 05.08.2014 B11, chapter I number 4.4, UBA announcement dated 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 plants according to the 13th BImSchV and other plants requiring official approval

**Measuring ranges during performance testing:**

| Component | Certification range | supplementary range | Unit |
|---|---|---|---|
| CO | 0–125 | 0–1 000 | mg/m³ |
| NO | 0–300 | 0–1 000 | mg/m³ |
| $SO_2$ | 0–200 | 0–1 000 | mg/m³ |
| $O_2$ | 0–25 | - | vol.-% |

**Software version:**
1.47

**Restrictions:**
1. Ambient temperature must not exceed +30 °C.
2. The measuring system did not meet the requirement for total uncertainty as defined in EN 15267-3 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 dated 1 April 2014

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V 32nd notification, UBA announcement dated 22 July 2015:

**32 Notification as regards Federal Environment Agency (UBA) notice of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 4.4)**

The current software version of the MGA12 HR measuring system for CO, NO, $SO_2$ and $O_2$ manufactured by Dr. Födisch Umweltmesstechnik AG is:

1.50.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH
dated 18 February 2015

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter V 6th notification, UBA announcement dated 14 July 2016:

**6 Notification as regards Federal Environment Agency (UBA) notices of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 4.4) and of 22 July 2015 (BAnz AT 26.08.2015 B4, B11, chapter V 32nd notification)**

The GCU12 test gas cooler, which is used for the MGA12 HR measuring system for CO, NO, $SO_2$ and $O_2$ manufactured by Dr. Födisch Umweltmesstechnik AG, has been equipped with new electronics and display units. The new version of the test gas cooler is called GCU16 (from S/N 17xxx) and may be used instead of the previous version.

Statement issued by TÜV Rheinland Energy GmbH dated 27 April 2016

**Certified product**
This certification 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 waste 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 voltage supply. A pump supplies the sample gas cooler with a 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 remarks**
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 manufacturing process for the certified product. Both the product and the quality management system shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy 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 document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at **qal1.de**.

## Document history

Certification of the MGA12 HR measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system.

### 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 dated 1 April 2014
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 05.08.2014 B11, chapter III number 4.4
UBA announcement dated 17 July 2014

### Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 18 February 2015
Publication: BAnz AT 26.08.2015 B4, Chapter V 32nd notification
UBA announcement dated 22 July 2015
(New software version)

Statement issued by TÜV Rheinland Energy GmbH dated 27 April 2016
Publication: BAnz AT 01.08.2016 B11, Chapter V 6th notification
UBA announcement dated 14 July 2016
(Design changes)

### Renewal of the certificate

Certificate no. 0000043103_01: 5 August 2019
Expiry date of the certificate: 4 August 2024

## 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.

## 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.

## 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.