

CERTIFICATE

on Product Conformity (QAL1)

Certificate No.: 0000032299

Certified AMS: NGA 2000 MLT 2 for N₂O

Manufacturer: Emerson Process Management GmbH & Co. OHG
Industriestrasse 1
63594 Hasselroth
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**

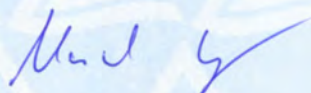
Certification is awarded in respect of the conditions stated in this certificate
(see also the following pages).



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

Publication in the German Federal Gazette
(BAnz.) of 05 March 2013

German Federal Environment Agency
Dessau, 22 March 2013



i. A. Dr. Marcel Langner

This certificate will expire on:
04 March 2018

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 21 March 2013



ppa. Dr. Peter Wilbring

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51105 Cologne

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

Test report:	936/21219398/A of 11 October 2012
Initial certification:	05 March 2013
Expiry date:	04 March 2018
Publication:	BAnz AT 05 March 2013 B10, chapter I, No. 4.1

Approved application

The tested AMS is suitable for use at 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 threemonth field test at a nitric acid plant.

The AMS is approved for an ambient temperature range of +5 °C to +40 °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 936/21219398/A of 11 October 2012 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 05 March 2013 B10, chapter I, No. 4.1

AMS designation:

Emerson NGA 2000 MLT 2 for N₂O

Manufacturer:

Emerson Process Management Manufacturing GmbH & Co. OHG, Hasselroth

Field of application:

Measurement at plants requiring official approval

Measuring ranges during performance test:

Component	Certification range	Supplementary range	Unit
N ₂ O	0 - 196	0 - 5880	mg/m ³

Software version:

3.9.4

Restrictions:

1. The measuring system shall only be employed at plants in which exhaust gas moisture does not exceed 3 Vol.-%.
2. The measuring system shall only be employed at plants in which the concentration of CO₂ does not exceed 10 Vol.-%.

Note:

The maintenance interval is four weeks.

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21219398/A of 11 October 2012

Certified product

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

The tested measuring system is an extractive IR-spectrometer for the determination of N₂O. The waste gas is sampled through a stainless steel probe and carried through a heated waste gas line (stainless steel) to a heated pressure regulator (process with pressure). From here, the sample gas is again led through another heated stainless steel gas line to a mounting plate, from which it is led by means of a pump (process without pressure) and a vortex cooler into the analyser.

The process by which the AMS is operated can either use overpressure or no pressure at all. If the overpressure process is used, the upstream pressure for the analyser is adjusted on the heated pressure regulator. If no pressure is used the gas is drawn by the pump.

In addition, the mounting plate has connections for feeding zero and span gas. It is possible to carry out automatic zero and span point calibrations by means of the analyser and magnetic valve. The gas lines, pump and valves on the mounting plate are not heated.

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 NGA 2000 MLT 2 for N₂O 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. 0000032299: 22 March 2013

Expiry date of the certificate: 04 March 2018

Test report: 936/21219398/A of 11 October 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 05 March 2013 B10, chapter I, No. 4.1
Announcement by UBA from 12 February 2013

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

Measuring system

Manufacturer	Emerson
Name of measuring system	NGA2000 MLT 2
Serial number of the candidates	3601203135496 / 3601203136462
Measuring principle	IR

Test report

Test laboratory	TÜV Rheinland
Date of report	2012-10-11

Measured component

Certification range	N ₂ O 0 - 196 mg/m ³
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Evaluation of the cross sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	6.68 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at reference point	5.59 mg/m ³
Sum of negative CS at reference point	0.00 mg/m ³
Maximum sum of cross sensitivities	6.68 mg/m ³
Uncertainty of cross sensitivity	3.859 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

	u	u ²
Standard deviation from paired measurements under field conditions [*] U _D	0.722 mg/m ³	0.521 (mg/m ³) ²
Lack of fit U _{lof}	0.294 mg/m ³	0.086 (mg/m ³) ²
Zero drift from field test U _{d,z}	-0.453 mg/m ³	0.205 (mg/m ³) ²
Span drift from field test U _{d,s}	-2.150 mg/m ³	4.623 (mg/m ³) ²
Influence of ambient temperature at span U _t	2.234 mg/m ³	4.991 (mg/m ³) ²
Influence of supply voltage U _v	0.522 mg/m ³	0.272 (mg/m ³) ²
Cross sensitivity (interference) U _i	3.859 mg/m ³	14.890 (mg/m ³) ²
Influence of sample gas flow U _p	0.377 mg/m ³	0.142 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range U _{rm}	1.584 mg/m ³	2.510 (mg/m ³) 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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 5.31 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 10.42 \text{ mg/m}^3$$

Relative total expanded uncertainty

U in % of the range 196 mg/m³ 5.3

Requirement of 2000/76/EC and 2001/80/EC

U in % of the range 196 mg/m³ 20.0**

Requirement of EN 15267-3

U in % of the range 196 mg/m³ 15.0

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