Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000038506_01

Certified AMS:	Model 6888A for O_2
Manufacturer:	Emerson Process Management Rosemount Analytical Inc. 6565P Davis Industrial Parkway Solon, OH 44139 USA
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).
The present certificate replaces Certificate No. 000038506 of 20 August 2013

TÜVRheinland® CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000038506

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

This certificate will expire on:
22 July 2018

German Federal Environment Agency
Dessau, 29 April 2014

i. A. Dr. Marcel Langner

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 28 April 2014

ppa. Dr. Peter Wilbring

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

Test report:	936/21219899/C of 30 August 2013
Initial certification:	23 July 2013
Expiry date:	22 July 2018
Publication:	BAnz AT 01 April 2014 B12, chapter II, No. 1.1

Approved application
The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III, at waste incineration plants according to Directive 2010/75/EU, chapter IV 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 an eleven-month field test at a municipal waste incinerator.

The AMS is approved for an ambient temperature range of -20 °C to +50 °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 936/21219899/C of 30 August 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 II, No. 1.1, Announcement by UBA from 27 February 2014)

AMS designation:
Model 6888A for O_2

Manufacturer:
Emerson Process Management Rosemount Analytical Inc, Solon, USA

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

Measuring range during the performance test:

Component	Certification range	Unit
O_2	0 - 25	Vol.-%

Software version:
V 1.048

Restrictions:
None

Notes:
1. The maintenance interval is four months.
2. The AMS is available in two configurations:
   Model 6888A-1OXY-4-1-5DR (the raw signal is processed by the external control unit 6888Xi) and Model 6888A-1OXY-4-1-1HT (the raw signal is processed directly at the probe head).
3. Supplementary testing (extension of the maintenance interval) as regards Federal Environmental Agency notice of 03 July 2013 (BAnz AT 23 July 2013 B4, chapter II No. 1.1).

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21219899/C of 30 August 2013

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

The measuring system model 6888A is a zirconium dioxide probe for the measurement of oxygen with a measurement range of 0 – 25 Vol.-%.

The continuously heated sensor is fitted to the tip of the probe so that it is exposed to the flue gas in its in-situ position. It generates a millivolt signal between the measuring and the reference electrodes. This current is caused by a potential difference which is a result of different oxygen particle pressures. The measuring electrode is exposed to the flue or exhaust gas, while the reference electrode is surrounded by span gas (usually ambient or instrument air with 20.95 Vol.-% O_2).

Due to its direct position in the exhaust gas, the ZrO_2 measuring cell measures the oxygen concentration as a percentage of the overall volume, including the steam concentration.

The measuring system model 6888A comprises a measuring probe with probe head as well as Xii electronics.

The measuring system is available in two configurations: model 6888A-1OXY-4-1-5DR; and model 6888A-1OXY-4-1-1HT.

There are no processing electronics in the probe head in variant 6888A-1OXY-4-1-5DR. The raw signals from the measuring cell are transmitted via a 7-core special cable from the probe housing to the Xi electronics, where they are then processed.

Furthermore, the Xi electronics provide the heating element of the probe with electricity and regulates the temperature of the ZrO_2 measuring cell.

In variant 6888A-1OXY-4-1-1HT the signal-processing electronics and the electricity supply are located directly in the probe head on the probe. The raw signal is transformed into a linear 4-20 mA analogue signal in the probe housing and the temperature of the probe heating is regulated.

Both system variants are controlled by Xi electronics. In the case of variant 6888A-1OXY-4-1-5DR the electronics are fitted with a circuit board for signal processing and temperature control. This circuit board is not present in variant 6888A-1OXY-4-1-1HT which has probe-internal processing electronics.

Regardless of the variant, the probes are available in various configurations. Probes are available in lengths between 0.457 m and 5.49 m. Probes of 0.91 m length were used in the perfomance test.

A filter is fitted on the probe head before the ZrO_2 measuring cell. Depending on the temperature of the exhaust gas to be measured, filters made from sintered metal (up to 500 °C), ceramic (up to 825 °C) or Hastelloy (up to 700 °C) are available. The probes tested contained sintered metal filters.

The measuring system has a 4 – 20 mA analogue output for measurement values in both variants.

Variant 6888A-1OXY-4-1-5DR contains one relay output for error or warning messages, variant 6888A-1OXY-4-1-1HT with probe-internal electronics contains two.

Error and warning messages are also shown on the Xi electronics display and can be identified by activating the diagnosis switch.

Communication with the measuring signal converter electronics in the probe head and the Xi electronics is performed using the Xi electronics control unit. Wireless access is however also possible via HART (highway addressable remote transducer) using a THUM adapter.

Adjustment is carried out via a calibration gas input which is located between the probe tube and the probe housing. The calibration gas is directed to the sensor on the probe tip via a tube within the probe with a volume flow of 2.5 l/min. In the event of repeated calibration gas injection it is important to reproduce the volume flow of 2.5 l/min as exactly as possible, otherwise measured value deviations can occur.

The reference gas input is located directly next to the calibration gas input. The reference gas flows from there via an extra gas line to the reference gas side of the sensor. The reference gas consists predominantly of instrument air (20.95 Vol.-% O_2). The sensor must be permanently supplied with reference air with approx. 1 l/m when used at the exhaust gas duct.

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 Model 6888A for 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. 0000038506: 20 August 2013

Expiry date of the certificate: 22 July 2018

Test report: 936/21219899/B of 28 March 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 23 July 2013 B4, chapter II, No. 1.1
Announcement by UBA from 03 July 2013

Supplementary testing according to EN 15267

Certificate No. 0000038506_01: 29 April 2014

Expiry date of the certificate: 22 July 2018

Test report: 936/21219899/C of 30 August 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 01 April 2014 B12, chapter II, No. 1.1
Announcement by UBA from 27 February 2014

Umwelt Bundesamt

Certificate:
0000038506_01 / 29 April 2014

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

Measuring system					
Manufacturer			Emerson Process Management Rosemount Analytical Inc.		
Name of measuring system			Modell 6888A		
Serial number of the candidates			M-110150 / M-110152		
Measuring principle			Zirconia		
Test report			936/21219899/C		
Test laboratory			TÜV Rheinland		
Date of report			2013-08-30		
Measured component			O2		
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 reference point			0.17	Vol.-%	
Sum of negative CS at reference point			0.00	Vol.-%	
Maximum sum of cross sensitivities			0.17	Vol.-%	
Uncertainty of cross sensitivity			0.100	Vol.-%	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.020	Vol.-%	0.000	(Vol.-%)²
Lack of fit	u_{lof}	-0.069	Vol.-%	0.005	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.100	Vol.-%	0.010	(Vol.-%)²
Span drift from field test	$u_{d,s}$	0.080	Vol.-%	0.006	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.115	Vol.-%	0.013	(Vol.-%)²
Influence of supply voltage	u_v	0.025	Vol.-%	0.001	(Vol.-%)²
Cross sensitivity (interference)	u_i	0.100	Vol.-%	0.010	(Vol.-%)²
Influence of sample pressure	u_p	0.085	Vol.-%	0.007	(Vol.-%)²
Influence of sample gas flow	u_p	0.000	Vol.-%	0.000	(Vol.-%)²
Excursion of measurement beam	u_{mb}	0.000	Vol.-%	0.000	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.31	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.60	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.4**
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

** For this component no requirements in the directive 2010/75/EU on industrieal emissions are given.
The chosen value is recommended by the certification body.