

# CERTIFICATE

on Product Conformity (QAL1)

Number of Certificate: 0000036414

**Certified AMS:** SERVOFLEX MiniMP 5200 for O<sub>2</sub>

**Manufacturer:** Servomex Group Limited,  
Jarvis Brook,  
Crowborough,  
East Sussex,  
TN6 3FB,  
UK

**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: 2008  
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 02 March 2012

The certificate is valid until:  
01 March 2017

Umweltbundesamt  
Dessau, 16 March 2012

TÜV Rheinland Energie und Umwelt GmbH  
Köln, 15 March 2012

  
i. A. Dr. Hans-Joachim Hummel

  
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>	936/21216148/B of 26 September 2011
<b>First certification:</b>	02 March 2012
<b>Validity ends:</b>	01 March 2017
<b>Publication:</b>	BAnz. 02 March 2012, No. 36, p. 920, chapter II, No. 1.2

#### **Approved application**

The tested AMS is suitable for use at combustion plants according to EC directive 2001-80-EC, at waste incineration plants according to EC directive 2000-76-EC 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 months field test at a municipal waste incinerator.

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 936/21216148/B dated 26 September 2011 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Environmental Agency (UBA) as the relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz. 02 March 2012, No. 36, p. 920, chapter II, No. 1.2, announcement by UBA from 23 February 2012)

**AMS name:**

SERVOFLEX MiniMP 5200 for O<sub>2</sub>

**Manufacturer:**

Servomex Group Ltd., East Sussex, England

**Field of application:**

For measurements at plants requiring official approval (i. e. plants in 2000-76-EC, waste incineration directive and 2001-80-EC large combustion plants directive).

**Measuring range during the suitability test:**

Component	Certification range	Unit
O <sub>2</sub>	0 - 25	Vol.-%

**Software version:**

05000-cu0-18

**Restrictions:**

None

**Test report:**

TÜV Rheinland Energie und Umwelt GmbH, Köln  
Report No.: 936/21216148/B dated 26 September 2011

**Certified product**

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

The measuring system uses a paramagnetic transducer. This physical measurement method is based on the exceptionally large magnetic susceptibility of oxygen.

The measuring cell comprises two hollow spheres filled with nitrogen, which are interconnected by a bar to form a dumbbell. A small mirror is placed at the dumbbell's centre of rotation. A wire loop, which is required for the purpose of re-adjustment, is attached to the dumbbell. This system is then fixed inside a glass tube with a platinum strap to ensure axial symmetry. It is screwed on with two pole pieces. This allows disassembly of the measuring cell for cleaning.

If the measuring cell is placed in an inhomogeneous magnetic field generated by two permanent magnets and oxygenic gas flows into the measuring cell, oxygen molecules will be attracted by the magnetic field, which will have an effect on the magnetic lines of force near the wedge-shaped magnetic poles. This effect also affects the diamagnetic hollow spheres; it displaces them out of the magnetic field. This causes the dumbbell to rotate, which is then registered by an optical system. It comprises a light-emitting diode, the mirror fixed to the dumbbell and a differential photodiode.

If the dumbbell is displaced due to the existence of oxygen molecules, the electric tension of the photodiode will immediately change. The latter produces a suitable current using an amplifier. By means of the wire loop, the current produces an opposing electromagnetic current, which restores the dumbbell to its original position. This compensational current is proportional to the oxygen content in the measuring cell. It is also completely linear which means that the content can be displayed in vol.-%.

The SERVOFLEX MiniMP 5200 O<sub>2</sub>-analyser is suited for use in the field or in laboratories. The system was specifically designed for mobile use. For accreditation under the provisions of the EN 15267 Directive, a complete measuring system as well as laboratory testing and permanent field-testing for stationary sources exceeding a duration of three months at a plant is required. To this effect, a suitability test was performed for the AMS with the following configuration.

1. Sampling probe type M&C PS4000-H
2. Heated test gas line, up to 10m length, material: PTFE, inner diameter 4mm.
3. Test gas cooler M&C PSS5
4. SERVOFLEX MiniMP 5200 O<sub>2</sub>-Analyser (mains operation) with
5. Software: 05000-cu0-18

**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 validity 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 the validity is also accessible on the internet Address: **qal1.de**.

Certification of SERVOFLEX MiniMP 5200 for O<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. 0000036414: 16 March 2012

Validity of the certificate until: 01 March 2017

Test report: 936/21216148/B of 26 September 2011,  
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter II, No. 1.2:  
Announcement by UBA from 23 February 2012

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

**Measuring system**

Manufacturer	Servomex Group Ltd.
Name of measuring system	SERVOFLEX MiniMP 5200
Serial number of the candidates	11691 / 11692
Measuring principle	paramagnetic

**Test report**

Test laboratory	TÜV Rheinland
Date of report	2011-09-26

**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	-0.22 Vol.-%
Sum of positive CS at reference point	0.18 Vol.-%
Sum of negative CS at reference point	0.00 Vol.-%
Maximum sum of cross sensitivities	-0.22 Vol.-%
Uncertainty of cross sensitivity	-0.127 Vol.-%

**Calculation of the combined standard uncertainty**

**Tested parameter**

	u	u <sup>2</sup>
Standard deviation from paired measurements under field conditions *	u <sub>D</sub> 0.031 Vol.-%	0.001 (Vol.-%) <sup>2</sup>
Lack of fit	u <sub>lof</sub> -0.046 Vol.-%	0.002 (Vol.-%) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub> 0.007 Vol.-%	0.000 (Vol.-%) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub> -0.017 Vol.-%	0.000 (Vol.-%) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub> 0.095 Vol.-%	0.009 (Vol.-%) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub> 0.009 Vol.-%	0.000 (Vol.-%) <sup>2</sup>
Cross sensitivity (interference)	u <sub>i</sub> -0.127 Vol.-%	0.016 (Vol.-%) <sup>2</sup>
Influence of sample gas flow	u <sub>p</sub> -0.024 Vol.-%	0.001 (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>)

$$u_c = \sqrt{\sum (u_{\max,j})^2} \quad 0.26 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.52 \text{ Vol.-%}$$

**Relative total expanded uncertainty**

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

U in % of the range 25 Vol.-% **2.1**

Requirement of EN 15267-3

U in % of the range 25 Vol.-% **10.0**

Requirement for standard reference methods

U in % of the range 25 Vol.-% **7.5**

U in % of the range 25 Vol.-% **6.0**

\*\* 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.