

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000036413_01

Certified AMS: SERVOTOUGH Laser Model 2930 for H₂O and NH₃

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

Test Institute: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested and certified
according to the standards**

**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
(this certificate contains 9 pages).



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000036413

Publication in the German Federal Gazette
(BAnz.) of 02 March 2012

German Federal Environment Agency
Dessau, 28 February 2017



Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
01 March 2022

TÜV Rheinland Energy GmbH
Cologne, 27 February 2017



ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu
tre@umwelt-tuv.eu
Tel. + 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
qal1.de info@qal1.de page 1 of 9

Certificate:
0000036413_01 / 28 February 2017

Test report: 936/21216873/A of 19 October 2011
Initial certification: 02 March 2012
Expiry date: 01 March 2022
Certificate renewal (previous certificate 0000036413 dated from 16 March 2012 with validity up to the 01 March 2017)
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 4.7

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13. BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17. BImSchV) and other plants requiring official approval. The measured ranges have been selected considering 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 twelve months field test at a municipal waste incinerator.

The AMS is approved for an ambient temperature range of -20 °C to +50 °C.

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

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 936/21216873/A of 19 October 2011 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. 02 March 2012, No. 36, p. 920, chapter I, No. 4.7,
Announcement by UBA from 23 February 2012:

AMS name:

SERVOTOUGH Laser Model 2930 for H₂O and NH₃

Manufacturer:

Servomex Group Ltd., Crowborough, England

Field of application:

For measurements at plants requiring official approval and plants according to 27th BImSchV

Measuring ranges during the suitability test:

Component	Certification range	Supplementary measurement ranges		Unit
NH ₃	0 – 10	0 – 15		mg/m ³ *
H ₂ O	0 – 40	0 – 30	0 – 50	Vol.-%*

* at 1 m measurement path length

Software version:

STL 6.1e2

Restrictions:

None

Notes:

1. The actual measuring path length was 0.513 m during the laboratory test and 1.0 m during the field test
2. Dry test gases can be used with an unheated measuring cell for measuring NH₃.
3. The maintenance interval is six months.
4. The AMS contains an internal cell for automated span checks of NH₃.
5. Additional testing (transposition into DIN EN 15267, modified housing, distribution by a different manufacturer) for publications made by the Federal Environment Agency dated 19 February 2009 (BAnz. p. 899, chapter I No. 2.3) and 25 January 2010 (BAnz. p. 552 chapter IV 14th notification).

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21216873/A of 19 October 2011

Publication in the German Federal Gazette: BAnz AT 20.07.2012 B11, chapter IV notification 13,

Announcement by UBA from 06 July 2012:

13 Notification as regards Federal Environmental Agency notice of 23 February 2012 (Federal Gazette (BAnz.) p. 920, chapter I, No. 4.7)

The current software version for the SERVOTOUGH Laser Model 2930 measuring system for NH₃ and H₂O manufactured by Servomex Group Ltd., Crowborough, England is:

6.1f1

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 23 March 2012

Publication in the German Federal Gazette: BAnz AT 05.08.2014 B11, chapter V notification 12,

Announcement by UBA from 17 July 2014:

12 Notification as regards Federal Environmental Agency notices of 23 February 2012 (Federal Gazette (BAnz.) p. 920, chapter I, no. 4.7) and of 6 July 2012 (Federal Gazette (BAnz.) AT 20 July 2012 B11, chapter IV notification 13)

The software for the SERVOTOUGH Laser Model 2930 measuring system for monitoring NH₃ and H₂O manufactured by Servomex Group Ltd., Crowborough, England is now designated as:

STL 6.1f1-6.

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 2 April 2014

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 14,

Announcement by UBA from 22 July 2015:

14 Notification as regards Federal Environment Agency (UBA) notices of 23 February 2012 (Federal Gazette (BAnz.) p. 920, chapter I number 4.7) and of 17 July 2014 (Federal Gazette (BAnz.) AT 5 August 2014 B11, chapter IV notification 12)

The SERVOTOUGH Laser Model 2930 measuring system for NH₃ and H₂O, manufactured by Servomex Group Ltd., can also be used with a detector of the type IG17X3000G1i, manufactured by Laser Components.

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 20 March 2015

Certified product

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

The SERVOTOUGH Laser Model 2930 is an optical instrument that transmits infrared laser light from the transmitter unit straight through a duct, chimney etc. to the receiver unit on the opposite side. The measured results are derived from the absorption of infrared radiation by the gas molecules in the measuring path.

The measuring principle of "single-line spectroscopy" is based on the fact that most gases absorb light at specific wavelengths. Thus, absorption is a direct indicator for gas concentrations in the measuring path. The wavelength of the laser diode is modified by means of the selected absorption line. Absorption is assessed as a function of the wavelength.

The tested AMS comprises the following parts:

- Transmitter with purge gas device and evaluation system
- Receiver unit with purge gas device and internal reference cuvette
- Data cable of 5 m length for connecting the transmitter and receiver unit
- Energy supply
- Heated measuring path (active measuring path length: 0.513 m)
- Unheated measuring path (active measuring path length: 0.712 m)
- System software, version STL 6.1f1-6 for SERVOTOUGH Laser Model 2930

The transmitter unit is mounted to a DN50 flange. It contains a temperature-stabilised laser diode, an optical means to focus the laser beam and a main board. The laser is adjusted to a specific wavelength and frequency used for gas detection. Servotough Laser Systems are available for measuring various gases. The transmitter unit also comprises the display for measured values. An external computer can be connected via the RS232 interface or an Ethernet interface for maintenance works.

The receiver unit is also mounted to a DN50 flange. It contains a lens, which focusses the laser beam onto the detector. The received signal is amplified and returned to the transmitter unit via a cable.

Both the transmitter and the receiver unit have a degree of protection of IP66. The optical window withstands pressures of up to six bars. The mounting flanges include purge gas connections and a tilting mechanism for easy alignment.

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 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 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 Energy GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy 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 SERVOTOUGH Laser Model 2930 for H₂O and NH₃ 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. 0000036413: 16 March 2012
Expiry date of the certificate: 01 March 2017

Test report: 936/21216873/A of 19 October 2011
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 4.7
Announcement by UBA from 23 February 2012

Notifications according to EN 15267

Statement of TÜV Rheinland Energie und Umwelt GmbH of 23 March 2012
Publication: BAnz AT 20.07.2012 B11, chapter IV notification 13
Announcement by UBA from 06 July 2012
(new software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 02 April 2014
Publication: BAnz AT 05.08.2014 B11, chapter V notification 12
Announcement by UBA from 17 July 2014
(new software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 20 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 14
Announcement by UBA from 22 July 2015
(detector option)

Renewal of the certificate

Certificate No. 0000036413_01: 28 February 2017
Expiry date of the certificate: 01 March 2022

Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	NEO monitors / Servomex Group Ltd.
Name of measuring system	LaserGas II / SERVOTOUGH Laser
Serial Number	3187 / 3188 / 3473 / 3474
Measuring Principle	Spectroscopy

TÜV Data

Approval Report	936/21216873/A
Date	2011-10-19
Editor	Carsten Röllig

Measurement Component

certificated range	Ammonia 10 mg/m ³
--------------------	---------------------------------

Evaluation of the cross sensitivity (CS)

to 21 Vol.-% Oxygen	QE $X_{max,i}$ 0.00 mg/m ³
to 30 Vol.-% Humidity	0.00 mg/m ³
to 300 mg/m ³ Carbon monoxide	-0.05 mg/m ³
to 15 Vol.-% Carbon dioxide	-0.04 mg/m ³
to 50 mg/m ³ Methane	0.08 mg/m ³
to 100 mg/m ³ Dinitrogen monoxide	-0.04 mg/m ³
to 300 mg/m ³ Nitrogen monoxide	0.00 mg/m ³
to 30 mg/m ³ Nitrogen dioxide	0.00 mg/m ³
to 1000 mg/m ³ Sulphur dioxide	-0.12 mg/m ³
to 200 mg/m ³ Hydrogen chloride	0.00 mg/m ³
Sum of positive cross sensitivities	0.08 mg/m ³
Sum of negative cross sensitivities	-0.25 mg/m ³

Calculation of the combined standard uncertainty

Test Value		$\Delta X_{max,j}$	u^2
Standard deviation from paired measurements under field conditions	u_{inf}	0.14 mg/m ³	0.020
Lack of fit	$u_{d.z}$	0.10 mg/m ³	0.003
Zero drift from field test	$u_{d.s}$	0.05 mg/m ³	0.001
Span drift from field test	u_t	-0.13 mg/m ³	0.006
Influence of ambient temperature at span	u_n	-0.20 mg/m ³	0.013
Influence of supply voltage	u_f	-0.02 mg/m ³	0.000
Cross sensitivity (interference) **	u_v	-0.25 mg/m ³	0.021
Uncertainty of reference material at 70% of certification range	u_{rm}	0.14 mg/m ³	0.007
Excursion of measurement beam	u_{mb}	0.12 mg/m ³	0.005

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

** The absolut value of the sum of negativ cross sensitivity is greater than sum of positiv cross sensitivity

Combined standard uncertainty (u_c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.3
Total expanded uncertainty	$U = u_c * k = u_c * 1,96$	0.54

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC	U in % of the ELV 10 mg/m³	5.4
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	40.0
	U in % of the ELV 10 mg/m³	30.0

Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	NEO monitors / Servomex Group Ltd.
Name of measuring system	LaserGas II / SERVOTHOUGH Laser
Serial Number	3187 / 3188 / 3473 / 3474
Measuring Principle	Spectroscopy

TÜV Data

Approval Report	936/21216873/A
Date	2011-10-19
Editor	Carsten Röllig

Measurement Component

certificated range (CR)	water	40 Vol.-%
-------------------------	-------	-----------

Evaluation of the cross sensitivity (CS)

	QE $X_{max,j}$
to 21 Vol.-% Oxygen	0.20 Vol.-%
to 300 mg/m ³ Carbon monoxide	0.00 Vol.-%
to 15 Vol.-% Carbon dioxide	0.28 Vol.-%
to 50 mg/m ³ Methane	-0.17 Vol.-%
to 100 mg/m ³ Dinitrogen monoxide	-0.22 Vol.-%
to 300 mg/m ³ Nitrogen monoxide	0.18 Vol.-%
to 30 mg/m ³ Nitrogen dioxide	-0.20 Vol.-%
to 1000 mg/m ³ Sulphur dioxide	-0.22 Vol.-%
to 200 mg/m ³ Hydrogen chloride	0.00 Vol.-%
Sum of positive cross sensitivities	0.66 Vol.-%
Sum of negative cross sensitivities	-0.81 Vol.-%

Calculation of the combined standard uncertainty

Test Value

	$\Delta X_{max,j}$	u^2
Standard deviation from paired measurements under field conditions u_{inf}	0.39 Vol.-%	0.152
Lack of fit $u_{d,z}$	-0.56 Vol.-%	0.105
Zero drift from field test $u_{d,s}$	0.04 Vol.-%	0.001
Span drift from field test u_t	-0.16 Vol.-%	0.009
Influence of ambient temperature at span u_n	0.20 Vol.-%	0.013
Influence of supply voltage u_f	-0.08 Vol.-%	0.002
Cross sensitivity (interference) ** u_v	-0.81 Vol.-%	0.220
Uncertainty of reference material at 70% of certification range u_{rm}	0.56 Vol.-%	0.105
Excursion of measurement beam u_{mb}	0.26 Vol.-%	0.023

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

** The absolut value of the sum of negativ cross sensitivity is greater than sum of positiv cross sensitivity

Combined standard uncertainty (u_c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.8
Total expanded uncertainty	$U = u_c * k = u_c * 1,96$	1.55

Relative total expanded uncertainty

Requirement based on 2000/76/EC and 2001/80/EC	U in % of the CR 40 Vol.-%	3.9
Requirement of EN 15267-3	U in % of the CR 40 Vol.-%	10.0 **
	U in % of the CR 40 Vol.-%	7.5

** For this component no requirements in the EC-directives 2001/80/EG and 2000/76/EG are given.
A value of 10.0 % was used for this.