

# CERTIFICATE

on Product Conformity (QAL1)

Number of Certificate: 0000001014\_02

**Certified AMS:** 4500 MKIII for dust

**Manufacturer:** Land Instruments International Ltd.  
Stubley Lane, Dronfield  
Derbyshire  
S18 1DJ  
United Kingdom

**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. 0000001014\_01 of 16 March 2012



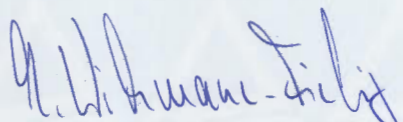
- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

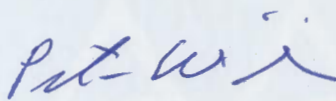
Publication in the German Federal Gazette  
(BAnz.) of 20 July 2012

The certificate is valid until:  
28 July 2016

Umweltbundesamt  
Dessau, 20 August 2012

TÜV Rheinland Energie und Umwelt GmbH  
Köln, 17 August 2012

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

<b>Test report:</b>	936/21217693/A of 21 March 2012
<b>First certification:</b>	29 July 2011
<b>Validity ends:</b>	28 July 2016
<b>Publication:</b>	BAnz AT 20 July 2012 B11, chapter I, No. 1.3

### **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 fifteen months field test on 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 936/21213182/A dated 31 March 2011 of TÜV Rheinland Energie und Umwelt GmbH,
- test report 936/21216966/A dated 15 September 2011 of TÜV Rheinland Energie und Umwelt GmbH and test report 936/21217693/A of 21 March 2012 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 AT 20 July 2012 B11, chapter I, No. 1.3



**AMS name:**  
4500 MKIII for dust

**Manufacturer:**  
Land Instruments International Ltd, Dronfield, United Kingdom

**Approval:**  
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 ranges during the suitability test:**

Component	Certification range	supplementary measurement ranges			Unit
		0 – 0.1	0 – 0.4	0 – 1.2	
dust	0 – 0.2	0 – 0.1	0 – 0.4	0 – 1.2	Ext.

0 – 0.2 Ext.  $\pm$  15 mg/m<sup>3</sup> dust at a measuring path of 5 m length.

**Software version:**  
Control Software Version: 01.03.01,  
HI Software Version: 01.02.01

**Restrictions:**  
The AMS is only fit for purpose as long as it is assured that the temperature will not drop below the dew point.

- Remarks:**
1. Dust concentration is measured in wet flue gas under operating conditions.
  2. The maintenance interval is six months.
  3. Multiplying the length of the measuring path (5m) with a measuring range of 15 mg/m<sup>3</sup> as determined through calibration, leads to a product of 75 mg m/m<sup>3</sup> at the field test plant.
  4. The requirement of the DIN EN 15267-3 for the correlation coefficient R<sup>2</sup> of the calibration function was not met during the suitability test.
  5. Complementary testing (extension of the maintenance interval) to Federal Environmental Agency notice of 23 February 2012 (Federal Journal (BAnz.) p. 920, Chapter I, No. 1.1).

**Test report:**  
TÜV Rheinland Energie und Umwelt GmbH, Köln  
Report No.: 936/21217693/A of 21 March 2012

### **Certified product**

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

The measurement device Land 4500 MKIII was developed for the determination of the dust concentration at emitting plants. The underlying principle is the measurement of the optical transmission.

The Land Model 4500 MKIII is a further development from the Land Model 4500 MKII+. The main light source uses three green LEDs in a special configuration (patent pending) to ensure homogeneity over the entire transmitted light beam. The light source is modulated at a frequency of 1 kHz, to reduce electrical noise and eliminate errors due to ambient light. A second light source, the (patented) "Flood LED" is used to reduce the effect of temperature drift in the detectors to an almost immeasurable low level.

Electronic modulation eliminates the need for a mechanical chopper and so the only moving parts are the motors used in the calibration system. These motors have a very low duty cycle and are very reliable.

The Land Instruments International Model 4500 MKIII Continuous Opacity Monitoring System (COMS) measures opacity by shining a light beam through flue gases. An internal microprocessor calculates dust density and other parameters. The instrument comprises the following parts: The Transceiver which contains all of the optical and electro-optic components; the Retro-Reflector containing a glass reflector and the air purge system.

The air purge system is available in several forms depending upon individual site requirements. Single and dual electric blowers are available, as are compressed-air driven devices. Continuous purge air supply is essential to prevent dust and corrosive gases from affecting the optical system. Automatic fail-safe shutters can also be fitted for temporary protection in the event of a purge air failure.

The analyser is basically composed of the following components:

**Transceiver:** Containing all of the major electronic and electro-optic components.

**Retro-Reflector:** Containing a corner cube reflector.

**Air Purge System:** A continuous supply of purge air is essential to prevent dust and corrosive gases from affecting the optical system. Single and dual electric blowers or compressed-air driven devices are available to suit individual site requirements. Automatic fail-safe shutters can also be fitted for temporary protection in the event of a purge air failure

Measurement path length and concentration:

0 – 0,2 Ext.  $\cong$  15 mg/m<sup>3</sup> dust at 5 m measurement path length

**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 4500 MKIII for dust 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. 0000001014: 19 August 2011

Validity of the certificate until: 28 July 2016

Test report: 936/21213182/A of 31 March 2011,  
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 29 July 2011, No. 113, p. 2725, Chapter I No. 1.1:  
Announcement by UBA from 15 July 2011

**Supplementary testing according to EN 15267**

Certificate No. 0000001014\_01: 16 March 2012

Validity of certificate until: 28 July 2016

Test report: 936/21216966/A of 15 September 2011  
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 1.1:  
Announcement by UBA from 23 February 2012

**Supplementary testing according to EN 15267**

Certificate No. 0000001014\_02: 20 August 2012

Validity of certificate until: 28 July 2016

Test report: 936/21217693/A of 21 March 2012  
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz AT 20 July 2012 B11, chapter I, No. 1.3  
Announcement by UBA from 06 July 2012

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

**Measuring system**

Manufacturer	Land Instruments International Ltd.
Name of measuring system	4500 MKIII
Serial number of the candidates	150854 83 / 154891 91
Measuring principle	Transmission

**Test report**

Test laboratory	936/21213182/A / 936/21213182/B / 936/21217693/A
Date of report	TÜV Rheinland Energie und Umwelt GmbH 31.03.2011 / 15.09.2011 / 21.03.2012

**Measured component**

Certification range	Dust	0 - 15	mg/m <sup>3</sup>
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**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> 0,110	mg/m <sup>3</sup>	0,012	(mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	u <sub>inf</sub> -0,081	mg/m <sup>3</sup>	0,007	(mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub> 0,095	mg/m <sup>3</sup>	0,009	(mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub> -0,219	mg/m <sup>3</sup>	0,048	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub> 0,030	mg/m <sup>3</sup>	0,001	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub> 0,023	mg/m <sup>3</sup>	0,001	(mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub> 0,121	mg/m <sup>3</sup>	0,015	(mg/m <sup>3</sup> ) <sup>2</sup>
Excursion of measurement beam	u <sub>reb</sub> 0,173	mg/m <sup>3</sup>	0,030	(mg/m <sup>3</sup> ) <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> )	$u_c = \sqrt{\sum (u_{max,j})^2}$	0,35	mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0,68	mg/m <sup>3</sup>

<b>Relative total expanded uncertainty</b>	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>6,8</b>
<b>Requirement of 2000/76/EC and 2001/80/EC</b>	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>30,0</b>
Requirement of EN 15267-3	U in % of the ELV 10 mg/m <sup>3</sup>	22.5