

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000001014\_04

**AMS designation:** 4500 MKIII for dust

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

**Test Laboratory:** TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested  
and found to comply with 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 7 pages).

The present certificate replaces certificate 0000001014\_03 of July 22, 2016.



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000001014

Publication in the German Federal Gazette  
(BAnz) of 20 July 2016

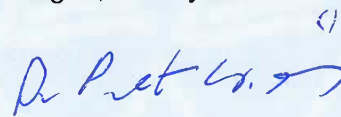
German Federal Environment Agency  
Dessau, 28 July 2021



Dr. Marcel Langner  
Head of Section II 4.1

This certificate will expire on:  
28 July 2022

TÜV Rheinland Energy GmbH  
Cologne, 27 July 2021



ppa. Dr. Peter Wilbring

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TÜV Rheinland Energy GmbH  
Am Grauen Stein  
51105 Köln

Test institute accredited to EN ISO/IEC 17025 by DAkkS (German Accreditation Body).  
This accreditation is limited to the accreditation scope defined in the enclosure to certificate D-PL-11120-02-00.

**Certificate:**  
0000001014\_04 / 28 July 2021

**Test Report:** 936/21217693/A of 21 March 2012  
**Initial certification:** 29 July 2011  
**Expiry date:** 28 July 2022  
**Certificate:** Renewal (of previous certificate 0000001014\_03 of July 22, 2016 valid until 28 July 2021)  
**Publication:** BAnz AT 20.07.2012 B11, chapter I number 1.3

### **Approved application**

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13<sup>th</sup> BImSchV), chapter IV (17<sup>th</sup> BImSchV), 30<sup>th</sup> BImSchV, plants in compliance with TA Luft and plants according to the 27<sup>th</sup> BImSchV. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a fifteen-month field test at a waste incineration plant.

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 applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the limit values relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

### **Basis of the certification**

This certification is based on:

- Test report 936/21217693/A of 21 March 2012 by 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 20.07.2012 B11, chapter I number 1.3, UBA notification of 06 July 2012:

**AMS designation:**

4500 MKIII for dust

**Manufacturer:**

Land Instruments International Ltd., Dronfield, United Kingdom

**Field of application:**

For plants requiring official approval and for plants according to the 27<sup>th</sup> BImSchV

**Measuring ranges during performance testing:**

Component	Certification range	Supplementary measuring ranges			Unit
Dust	0 – 0.2	0 – 0.1	0 – 0.4	0 – 1.2	Ext.

0 – 0.2 Ext.  $\hat{=}$  15 mg/m<sup>3</sup> dust at 5 m measurement path

**Software versions:**

Control Software version: 01.03.01,  
HI Software version: 01.02.01

**Restriction:**

The measuring system may only be employed if the temperature does not fall below dew point.

**Notes:**

1. Dust concentration is measured in wet flue gas under operating conditions.
2. The maintenance interval is six months.
3. The measuring path length of 5 m and the measuring range of 15 mg/m<sup>3</sup> determined during the calibration results in a product of 75 mg m/m<sup>3</sup> for the field test plant.
4. During performance testing in accordance with EN 15267-3, the requirement for the determination coefficient R<sup>2</sup> of the calibration function was not fulfilled.
5. Supplementary testing (extension of the maintenance interval) as per Federal Environmental Agency (UBA) notice of 23 February 2012 (BAnz. p. 920, chapter I number 1.1).

**Test Report:**

TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Report no.: 936/21217693/A of 21 March 2012



Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV 39<sup>th</sup> notification, UBA announcement dated 27 February 2019:

**39 Notification as regards Federal Environment Agency (UBA) notices of 13 July 2011 (BAnz. p. 2725, chapter I number 1.1) and of 6 July 2012 (BAnz AT 20.07.2012 B11 chapter I number 1.3)**

Within the scope of continuous product development for the 4500 MKIII measuring system for dust, manufactured by the company Land Instruments International Ltd., the following changes were made to the measuring system:

- The measuring system can now also be equipped with the Winstar WG12864C display (from HI software version 01.03.00).
- The opal diffuser is no longer glued, but attached with a clip.
- A UV-hardening adhesive is now used to fix the optical filters in the detector assembly.
- The mechanics for the automatic control cycle have been optimised to increase operational safety.
- The 47R resistance heater is now used to heat the measuring system at very low temperatures.

The latest software version of the measuring system now is:

Control Software version: 01.04.00  
HI Software version: 01.03.02

Moreover, the following software version are approved for this instrument version:

Control Software version: 01.03.02, HI Software version: 01.02.02  
Control Software version: 01.03.02, HI Software version: 01.03.00  
Control Software version: 01.03.04, HI Software version: 01.03.01  
Control Software version: 01.03.05, HI Software version: 01.03.02.

Statement issued by TÜV Rheinland Energy GmbH dated 10 January 2019

**Certified product**

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

The measurement system 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 interference 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 immeasurably 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 AMS 4500 MKIII essentially consists 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.  $\pm 15$  mg/m<sup>3</sup> dust at 5 m measuring path length.

#### General remarks

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 manufacturing process for 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 document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at [qal1.de](http://qal1.de).



### Document history

Certification of the 4500 MKIII measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

#### Initial certification according to EN 15267

Certificate no. 0000001014: 19 August 2011  
Expiry date of the certificate: 28 July 2016  
Test Report: 936/21213182/A of 31 March 2011  
TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Publication: BAnz. 29 July 2011, no. 113, p. 2725, chapter I number 1.1  
UBA announcement dated 15 July 2011

#### Supplementary testing according to EN 15267

Certificate no. 0000001014\_01: 16 March 2012  
Expiry date of the certificate: 28 July 2016  
Test Report: 936/21216966/A of 15 September 2011  
TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Publication: BAnz. 02 March 2012, no. 36, pg. 920, chapter I number 1.1  
UBA announcement dated 23 February 2012

Certificate no. 0000001014\_02: 20 August 2012  
Expiry date of the certificate: 28 July 2016  
Test Report: 936/21217693/A of 21 March 2012  
TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Publication: BAnz AT 20.07.2012 B11, chapter I number 1.3  
UBA announcement dated 06 July 2012

#### Renewal of the certificate

Certificate no. 0000001014\_03: 22 July 2016  
Expiry date of the certificate: 28 July 2021

#### Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energy GmbH dated 10 January 2019  
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 39  
UBA announcement dated 27 February 2019  
(Hardware changes, software changes)

#### Renewal of the certificate

Certificate no. 0000001014\_04: 28 July 2021  
Expiry date of the certificate: 28 July 2022

**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	TÜV Rheinland Energie
Date of report	2012-03-21

**Measured component**

Certification range	Staub
	0 - 15 mg/m <sup>3</sup>

**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>of</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>mb</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