

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000053811\_02

**AMS designation:** LasIR HCl/H<sub>2</sub>O for HCl und H<sub>2</sub>O

**Manufacturer:** Unisearch Associates  
96 Bradwick Drive  
Concord, Ontario / L4K 1K8  
Canada

**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 (2014).**

Certification is awarded in respect of the conditions stated in this certificate  
(this certificate contains 8 pages).  
The present certificate replaces certificate 0000053811\_01 of 13 April 2018.



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000053811

Publication in the German Federal Gazette  
(BAnz) of 26 March 2018

German Federal Environment Agency  
Dessau, 02 March 2022

This certificate will expire on:  
14 March 2027

TÜV Rheinland Energy GmbH  
Cologne, 01 March 2022

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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.

<b>Test report:</b>	936/21226120/B of 28 July 2017
<b>Initial certification:</b>	25 April 2017
<b>Expiry date:</b>	14 March 2027
<b>Certificate</b>	Renewal (of previous certificate 0000053811_01 of 13 April 2018 valid until 14 March 2022)
<b>Publication:</b>	BAnz AT 26.03.2018 B8, chapter I number 3.4

### **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, plants according to the 27<sup>th</sup> BImSchV and other plants requiring official approval. 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 twelve-month field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of 5 °C to +40 °C, the measuring heads are 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 936/21226120/B of 28 July 2017 by TÜV Rheinland Energy 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 26.03.2018 B8, chapter I number 3.4, UBA announcement dated 21 February 2018:

**AMS designation:**

LasIR HCl/H<sub>2</sub>O for HCl und H<sub>2</sub>O

**Manufacturer:**

Unisearch Associates, Concord, Canada

**Field of application:**

For plants requiring official approval

**Measuring ranges during performance testing:**

Component	Certification range	Supplementary measuring ranges		Unit
HCl	0 – 15*	0 – 90*	–	mg/m <sup>3</sup> *m
H <sub>2</sub> O	0 – 30*	0 – 40*	0 – 50*	vol.-%

\* referred to a measuring path of 1.0 m

**Software version:**

4.90

**Restrictions:**

None

**Notes:**

1. HCl can be determined with the help of dry test gases from a pressured gas bottle and an unheated measurement cell.
2. The maintenance interval is six months.
3. The measuring system was performance tested with the dual-pass optics option.
4. Should the length of the measurement path exceed 1m (as used in performance testing), the requirements for cross-sensitivities as defined in EN 15267-3 need to be tested again when the AMS is installed.
5. Supplementary testing (extension of the maintenance interval) as regards Federal Environment Agency (UBA) notices of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter I number 3.2) and of 13 July 2017 (BAnz AT 31.07.2017 B12, chapter II 29<sup>th</sup> notification).

**Test Report:**

TÜV Rheinland Energy GmbH, Cologne  
Report no.: 936/21226120/B of 28 July 2017

Publication in the German Federal Gazette: BAnz AT 31.07.2020 B10, chapter II  
23<sup>rd</sup> notification, UBA announcement of 27 May 2020

**23 Notification as regards Federal Environment Agency (UBA) notice  
of 26 February 2018 (BAnz AT 26.03.2018 B8, chapter I number 3.4)**

The current software version of the LasIR measuring system for HCl and H<sub>2</sub>O  
manufactured by Unisearch Associates Inc. is: 4.95.

Statement issued by TÜV Rheinland Energy GmbH dated 27 February 2020

Publication in the German Federal Gazette: BAnz AT 05.08.2021 B5, chapter IV  
50<sup>th</sup> notification, UBA announcement dated 29 June 2021:

**50 Notification as regards Federal Environment Agency (UBA) notices  
of 26 February 2018 (BAnz AT 26.03.2018 B8, chapter I number 3.4) and  
of 27 May 2020 (BAnz AT 31.07.2020 B10, chapter II 23<sup>rd</sup> notification)**

The current software version of the LasIR measuring system for HCl and H<sub>2</sub>O  
manufactured by Unisearch Associates Inc. is: 4.96

The AMS can also be operated with the FFTR option.

The Laser Controller Board can also be used in the updated version with the  
hardware identifier "LMH".

Statement issued by TÜV Rheinland Energy GmbH dated 24 February 2021



### **Certified product**

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

The LasIR measuring system uses the principle of light absorption in the near infrared region of the spectrum by a tunable diode laser. It was designed for in-situ gas measurement of HCl/H<sub>2</sub>O. The laser diode is the heart of the LasIR measuring system. It serves as light source in the near infrared spectrum. These diodes emit a light beam in a narrow but tunable wavelength spectrum. Its high spectral sensitivity and the tuneable laser diode allow the measuring system to determine the optical absorption of a single rotation/vibration line in the spectrum of the molecule to be measured. This clearly identifies the gas to be measured and makes the measurement robust against interfering gases.

The measuring system comprises the following components:

- LasIR control/analysis unit
- Emitter/receiver unit with purge unit
- Reflector unit with purge unit
- Optical cable (between analysis unit and emitter/receiver unit)
- Unheated sample gas cell (length: 12.5 cm)
- Heated sample gas cell (length: 1 m)

### **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 LasIR HCl/H<sub>2</sub>O 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. 0000053811\_00: 25 April 2017  
Expiry date of the certificate: 14 March 2022  
Test report: 936/21226120/A of 13 October 2016  
TÜV Rheinland Energy GmbH  
Publication: BAnz AT 15.03.2017 B6, chapter I number 3.2  
UBA announcement dated 22 February 2017

#### **Notifications according to EN 15267**

Statement issued by TÜV Rheinland Energy GmbH dated 23 January 2017  
Publication: BAnz AT 31.07.2017 B12, chapter II notification 29  
UBA announcement dated 13 July 2017  
(Software updates)

#### **Supplementary testing according to EN 15267**

Certificate no. 0000053811\_01: 13 April 2018  
Expiry date of the certificate: 14 March 2022  
Test report: 936/21226120/B of 28 July 2017  
TÜV Rheinland Energy GmbH  
Publication: BAnz AT 26.03.2018 B8, chapter I number 3.4  
UBA announcement dated 21 February 2018

#### **Notifications according to EN 15267**

Statement issued by TÜV Rheinland Energy GmbH dated 27 February 2020  
Publication: BAnz AT 31.07.2020 B10, chapter II notification 23  
UBA announcement of 27 May 2020  
(Software updates)

Statement issued by TÜV Rheinland Energy GmbH dated 24 February 2021  
Publication: BAnz AT 05.08.2021 B5, chapter IV notification 50  
UBA announcement dated 29 June 2021  
(Software updates)

#### **Renewal of the certificate**

Certificate no. 0000053811\_02: 02 March 2022  
Expiry date of the certificate: 14 March 2027



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

**Measuring system**

Manufacturer	Unisearch Associates
AMS designation	LasIR
Serial number of units under test	16 / 17
Measuring principle	Laser spectroscopy

**Test report**

Test laboratory	936/21226120/B
Date of report	TÜV Rheinland 2017-07-28

**Measured component**

Certification range	H <sub>2</sub> O	0 - 30 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	0.00	Vol.-%
Sum of positive CS at span point	0.20	Vol.-%
Sum of negative CS at span point	0.00	Vol.-%
Maximum sum of cross-sensitivities	0.20	Vol.-%
Uncertainty of cross-sensitivity	$u_i$	0.116 Vol.-%

**Calculation of the combined standard uncertainty**

**Tested parameter**

				$u^2$
Standard deviation from paired measurements under field conditions *	$u_D$	0.122	Vol.-%	0.015 (Vol.-%) <sup>2</sup>
Lack of fit	$u_{lof}$	0.116	Vol.-%	0.013 (Vol.-%) <sup>2</sup>
Zero drift from field test	$u_{d,z}$	0.121	Vol.-%	0.015 (Vol.-%) <sup>2</sup>
Span drift from field test	$u_{d,s}$	-0.225	Vol.-%	0.051 (Vol.-%) <sup>2</sup>
Influence of ambient temperature at span	$u_t$	0.115	Vol.-%	0.013 (Vol.-%) <sup>2</sup>
Influence of supply voltage	$u_v$	0.139	Vol.-%	0.019 (Vol.-%) <sup>2</sup>
Cross-sensitivity (interference)	$u_i$	0.116	Vol.-%	0.013 (Vol.-%) <sup>2</sup>
Influence of sample gas pressure	$u_p$	0.021	Vol.-%	0.000 (Vol.-%) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	$u_{rm}$	0.242	Vol.-%	0.059 (Vol.-%) <sup>2</sup>
Excursion of measurement beam	$u_{mb}$	0.690	Vol.-%	0.476 (Vol.-%) <sup>2</sup>

\* The larger value is used :  
"Repeatability standard deviation at set point" or  
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )	$u_c = \sqrt{\sum (u_{max, j})^2}$	0.82	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.61	Vol.-%

**Relative total expanded uncertainty**

<b>Requirement of 2010/75/EU</b>	<b>U in % of the range 30 Vol.-%</b>	<b>5.4</b>
Requirement of EN 15267-3	<b>U in % of the range 30 Vol.-%</b>	<b>10.0 **</b>
	<b>U in % of the range 30 Vol.-%</b>	<b>7.5</b>

\*\* The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.  
A value of 10.0 % was used for this.

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

**Measuring system**

Manufacturer	Unisearch Associates
AMS designation	LasIR
Serial number of units under test	16 / 17
Measuring principle	Laser spectroscopy

**Test report**

Test laboratory	936/21226120/B
Date of report	TÜV Rheinland
	2017-07-28

**Measured component**

Certification range	HCl	0 - 15 mg/m <sup>3</sup>
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**Evaluation of the cross-sensitivity (CS)**

(system with largest CS)

Sum of positive CS at zero point	0.06 mg/m <sup>3</sup>
Sum of negative CS at zero point	0.00 mg/m <sup>3</sup>
Sum of positive CS at span point	0.00 mg/m <sup>3</sup>
Sum of negative CS at span point	-0.08 mg/m <sup>3</sup>
Maximum sum of cross-sensitivities	-0.08 mg/m <sup>3</sup>
Uncertainty of cross-sensitivity	$u_i$ -0.046 mg/m <sup>3</sup>

**Calculation of the combined standard uncertainty**

**Tested parameter**

			$u^2$
Standard deviation from paired measurements under field conditions *	$u_D$	0.224 mg/m <sup>3</sup>	0.050 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	$u_{lof}$	-0.087 mg/m <sup>3</sup>	0.008 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	$u_{d,z}$	0.095 mg/m <sup>3</sup>	0.009 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	$u_{d,s}$	0.121 mg/m <sup>3</sup>	0.015 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	$u_t$	0.100 mg/m <sup>3</sup>	0.010 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	$u_v$	0.031 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross-sensitivity (interference)	$u_i$	-0.046 mg/m <sup>3</sup>	0.002 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas pressure	$u_p$	0.020 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	$u_{rm}$	0.121 mg/m <sup>3</sup>	0.015 (mg/m <sup>3</sup> ) <sup>2</sup>
Excursion of measurement beam	$u_{mb}$	0.540 mg/m <sup>3</sup>	0.292 (mg/m <sup>3</sup> ) <sup>2</sup>

\* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )	$u_c = \sqrt{\sum (u_{max, j})^2}$	0.63 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.24 mg/m <sup>3</sup>

**Relative total expanded uncertainty**

Requirement of 2010/75/EU	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>12.4</b>
Requirement of EN 15267-3	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>40.0</b>
	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>30.0</b>