Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000040204_02

AMS designation:	Serinus 40 for NO, NO_2 and NO_X
Manufacturer:	Ecotech Pty Ltd. 1492 Ferntree Gully Road Knoxfield, VIC, 3180 Australia
Test Laboratory:	TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and found to comply with the standards: VDI 4202-1 (2010), VDI 4203-3 (2010), EN 14211 (2012), EN 15267-1 (2009) and EN 15267-2 (2009)

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 13 pages).
The present certificate replaces certificate 0000040204_02 of 01 April 2019.

TÜVRheinland®
CERTIFIED

Suitability Tested
Equivalent to
2008/50/EC
EN 15267
Regular Surveillance

www.tuv.com
ID 0000040204

Publication in the German Federal Gazette (BAnz) of 01 April 2014

This certificate will expire on:
30 June 2025

German Federal Environment Agency
Dessau, 01 July 2020

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 30 June 2020

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.

10/221 2.08

Test Report:	936/21221977/A dated 08 October 2013
Initial certification:	01 April 2014
Expiry date:	30 June 2025
Certificate:	Renewal (of previous certificate 0000040204_02 dated 01 April 2019 valid until 30 June 2020)
Publication:	BAnz AT 01.04.2014 B12, chapter IV number 4.1

Approved application
The certified AMS is suitable for continuous ambient air monitoring of nitrogen oxide (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three-months field test.

The AMS is approved for an ambient temperature range of 0 °C to +30 °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, in consultation with the manufacturer, that this AMS is suitable for monitoring the AMS readings 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 no. 936/21221977/A dated 08 October 2013 issued 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 01.04.2014 B12, chapter IV number 4.1, UBA announcement dated 27 February 2014 :

AMS designation:
Serinus 40 for NO, NO_2 and NO_X

Manufacturer:
Ecotech Pty Ltd., Knoxfield, Australia

Field of application:
For the continuous measurement of nitrogen oxide concentrations from stationary sources in ambient air

Measuring ranges during performance testing:

Component	Certification range	Unit
Nitrogen monoxide	0 - 1200	µg/m³
Nitrogen dioxide	0 - 500	µg/m³

Software version:
Firmware: 2.09.0005

Restrictions:
None

Notes:
1. The measuring system must be operated inside a lockable measuring cabinet or measurement container.
2. The test report on performance testing is available on the internet at www.qal1.de.

Test Laboratory:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report no.: 936/21221977/A dated 08 October 2013

Publication in the German Federal Gazette: BAnz AT 02.04.2015 B5, chapter IV notification 6, UBA announcement dated 25 February 2015:

6 Notification as regards Federal Environment Agency (UBA) notice of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter IV number 4.1).

The Serinus 40 measuring system for NO, NO_2 and NO_X manufactured by Ecotech Pty Ltd. will be equipped with a new micro processor board (C010014) in the future. This entails changes to the power supply and the software.

The following software versions apply:
2.20.0009 for instruments with the previous processor board (C010001)
3.10.001 for instruments with the new processor board (C010014)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 12 September 2014

Publication in the German Federal Gazette: BAnz AT 15.03.2017 B6, chapter V notification 7, UBA announcement dated 22 February 2017:

7 Notification as regards Federal Environment Agency (UBA) notices of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter IV number 4.1) and of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter IV 6th notification)

The latest software version of the Serinus 40 measuring system for NO, NO_2 and NO_X with microprocessor C010001 manufactured by Ecotech Pty Ltd. is:
V 2.31.0004.

Moreover, the following software version are approved for this instrument version:
V 2.21.0000, V 2.22.0000, V 2.23.0000, V 2.24.0000, V 2.25.0004, V 2.26.0000, V 2.27.0000, V 2.28.0000, V 2.29.0003 and V 2.30.0000.

The latest software version of the Serinus 40 measuring system for NO, NO_2 and NO_X with microprocessor C010014 manufactured by Ecotech Pty Ltd. is:
V 3.48.011.

Moreover, the following software version are approved for this instrument version:
V 3.13.000, V 3.14.001, V 3.15.010, V 3.16.001, V 3.18.003, V 3.20.000, V 3.22.000, V 3.23.015, V 3.24.000, V 3.26.000, V 3.27.000, V 3.28.000, V 3.29.013, V 3.30.005, V 3.31.002, V 3.32.003, V 3.33.004, V 3.34.000, V 3.35.004, V 3.36.000, V 3.37.004, V 3.38.006, V 3.39.000, V 3.40.001, V 3.41.004, V 3.42.000, V 3.43.000, V 3.44.004, V 3.45.011, V 3.46.002, V 3.47.006.

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV notification 17, UBA announcement dated 27 February 2019:

17 Notification as regards Federal Environment Agency (UBA) notices of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter IV number 4.1) and of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter IV 7th notification)

The latest software version of the Serinus 40 measuring system for NO, NO_2 and NO_X with microprocessor C010001 manufactured by Ecotech Pty Ltd. is:
V 2.35.0001.

Moreover, the following software version are approved for this instrument version:
V 2.32.0000, V 2.33.0000, V 2.34.0000

The latest software version of the Serinus 40 measuring system for NO, NO_2 and NO_X with microprocessor C010014 manufactured by Ecotech Pty Ltd. is:
V 3.74.0003.

Moreover, the following software version are approved for this instrument version:
V 3.49.0000, V 3.51.0011, V3.52.0000, V 3.53.0012, V 3.54.0000, V 3.55.0000, V 3.56.0001, V 3.57.0002, V 3.58.0000, V 3.59.0004, V 3.60.0005, V 3.61.0000, V 3.62.0000, V 3.63.0001, V 3.64.0000, V 3.65.0001, V 3.66.0000, V 3.67.0003, V 3.68.0009, V 3.69.0001, V 3.70.0000, V 3.71.0000.

The instrument's display shows the software version in the following format:
2.XX or 3.XX.

Statement issued by TÜV Rheinland Energy GmbH dated 10 October 2018

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chapter IV notification 21, UBA announcement dated 24 February 2020:

21 Notification as regards Federal Environment Agency (UBA) notices of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter IV number 4.1) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV 17th notification)

The latest software version of the Serinus 40 measuring system for NO, NO_2 and NO_X with microprocessor C010001 manufactured by Ecotech Pty Ltd. remains: V 2.35.0001.

The latest software version of the Serinus 40 measuring system for NO, NO_2 and NO_X with microprocessor C010014 manufactured by Ecotech Pty Ltd. is: V 3.87.0000.

Moreover, the following software version are approved for this instrument version: V 3.75.0003, V 3.76.0004, V 3.77.0009, V 3.78.0000, V 3.79.0001, V 3.81.0000, V 3.83.0000, V 3.84.0000, V 3.85.0001, V 3.86.0000.

The instrument's display shows the software version in the following format: 2.XX or 3.XX.

Statement issued by TÜV Rheinland Energy GmbH dated 20 September 2019

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

The Serinus 40 measuring system is a continuous nitrogen oxide monitor. The measuring principle relies on the chemiluminescence method. It was designed for the continuous measurement of NO, NO_2 and NO_x in ambient air.

Nitric oxides are measured on the basis of chemiluminescence detection of gas phases. Sample air enters the reaction cell via two separate (alternating) paths; the NO and NO_X channels.

In the first path, NO reacts with ozone as follows:

$$NO + O_3 \rightarrow NO_2^* + O_2$$

In the second path, the gas first passes through the delay coil and then through the NO_2/NO converter so that it reaches the reaction cell after the gas in the first path. At that time NO_X (total concentration of NO and NO_2) is measured.
The NO_2 concentration is then calculated by subtracting the NO value from the measured NO_X value.

This reaction releases energy in the form of chemiluminescent radiation at a wavelength of 1100 nm, which is filtered by the optical band-pass filter and detected by the photomultiplier tube (PMT).

The detected level of chemiluminescence is directly proportional to the NO concentration in the sample.

The nitrogen oxides analyser consists of five main modules:
- pneumatics for channelling sample and exhaust gas (incl. valve manifolds)
- sensors for measuring nitrogen oxides (reaction cell module) and other relevant parameters
- The control system which encompasses all circuit boards controlling sensors and pneumatic,
- power supply for all processes in the analyser
- communication module for data access

Particle filter:
The particulate filter is a Teflon 5 micron (µm) filter with a diameter of 47 mm. This filter eliminates all particles larger than 5 µm that could interfere with sample measurements.

Permeation dryer for drying the sample gas
There are two serially-connected permeation dryers in the sample gas line downstream of the particle filter. During performance testing, these dryers were integrated into the analyser and are therefore considered part of the tested measuring system. The dryers remove moisture from the sample gas and thereby reduce the amount of interference caused by moisture.

Bluetooth
This facilitates remote access to the analyser from Android devices via the “Serinus Remote” app. Via Bluetooth, it is possible to control and parameterise the analyser, download data and create real time charts.

Sample gas pump

Manufacturer: Thomas, Type: 617CD22-194 C

During performance testing, the sample gas pump mentioned above was used for the laboratory as well as in the field test. As far as the models Serinus 10 (ozone), Serinus 30 (CO) and Serinus 50 (SO_2) are concerned, one pump can be operated with up to two analysers. However, operation of the Serinus 40 (NO_X) requires one sample gas pump per analyser.

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**.

Document history

Certification of the Serinus 40 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. 0000040204: 29 April 2014
Expiry date of the certificate: 31 March 2019
Test report no.: 936/21221977/A dated 8 October 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 01.04.2014 B12, chapter IV number 4.1
UBA announcement dated 27 February 2014

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 12 September 2014
Publication: BAnz AT 02.04.2015 B5, chapter IV notification 6
UBA announcement dated 25 February 2015
(Design and software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016
Publication: BAnz AT 15.03.2017 B6, chapter V notification 7
UBA announcement dated 22 February 2017
(software updates)

Renewal of the certificate

Certificate no. 000040204_01: 01 April 2019
Expiry date of the certificate: 30 June 2020

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energy GmbH dated 10 October 2018
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 17
UBA announcement dated 27 February 2019
(New software version)

Statement issued by TÜV Rheinland Energy GmbH dated 20 September 2019
Publication: BAnz AT 24.03.2020 B7, chapter IV notification 21
UBA announcement dated 24 February 2020
(New software version)

Renewal of the certificate

Certificate no. 0000040204_02: 01 July 2020
Expiry date of the certificate: 30 June 2025

Expanded uncertainty from the results obtained in the laboratory tests for analyser 1

Measuring device: Ecotech Serinus 40 — Serial-No.: 13-0095 (Device 1)

Measured component: NO_2 — 1h-limit value: 104.6 nmol/mol

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤	1.0 nmol/mol	0.310	$u_{r,z}$	0.06	0.0035
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	0.270	$u_{r,lh}$	0.01	0.0001
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.720	u_{lfh}	0.43	0.1891
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	1.290	u_{gp}	3.56	12.6928
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.040	u_{gt}	0.09	0.0086
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.620	u_{st}	1.55	2.3938
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.045	u_V	0.13	0.0171
8a	Interferent H_2O with 21 mmol/mol	≤	10 nmol/mol (Zero)	0.090	u_{H2O}	0.01	0.0001
		≤	10 nmol/mol (Span)	-0.300			
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	-0.470	$u_{int,pos}$ or $u_{int,neg}$	0.09	0.0086
		≤	5.0 nmol/mol (Span)	1.430			
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.000			
		≤	5.0 nmol/mol (Span)	0.800			
9	Averaging effect	≤	7.0% of measured value	-1.350	u_{av}	-0.82	0.6647
18	Difference sample/calibration port	≤	1.0%	-0.260	$u_{a,s,c}$	-0.27	0.0740
21	Converter efficiency	≥	98	98.90	u_{EC}	1.15	1.3239
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941

Combined standard uncertainty	u_c	4.2981	nmol/mol
Expanded uncertainty	U	8.5963	nmol/mol
Relative expanded uncertainty	W	8.22	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty from the results obtained in the laboratory tests for analyser 2

Measuring device: Ecotech Serinus 40 — Serial-No.: 13-0094 (Device 2)

Measured component: NO_2 — 1h-limit value: 104.6 nmol/mol

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero		≤ 1.0 nmol/mol	0.190	$u_{r,z}$ 0.04		0.0014
2	Repeatability standard deviation at 1h-limit value		≤ 3.0 nmol/mol	0.190	$u_{r,lh}$ 0.01		0.0001
3	"lack of fit" at 1h-limit value		≤ 4.0% of measured value	0.840	$u_{i,lh}$ 0.51		0.2573
4	Sensitivity coefficient of sample gas pressure at 1h-limit value		≤ 8.0 nmol/mol/kPa	1.970	u_{gp} 5.37		28.8054
5	Sensitivity coefficient of sample gas temperature at 1h-limit value		≤ 3.0 nmol/mol/K	0.450	u_{gt} 1.02		1.0438
6	Sensitivity coefficient of surrounding temperature at 1h-limit value		≤ 3.0 nmol/mol/K	0.240	u_{st} 0.60		0.3647
7	Sensitivity coefficient of electrical voltage at 1h-limit value		≤ 0.30 nmol/mol/V	0.006	u_V 0.02		0.0003
8a	Interferent H_2O with 21 mmol/mol		≤ 10 nmol/mol (Zero)	0.000	u_{H2O} -0.26		0.0700
			≤ 10 nmol/mol (Span)	0.000			
8b	Interferent CO_2 with 500 µmol/mol		≤ 5.0 nmol/mol (Zero)	0.600	$u_{int,pos}$		
			≤ 5.0 nmol/mol (Span)	0.430		or 0.38	0.1434
8c	Interferent NH_3 mit 200 nmol/mol		≤ 5.0 nmol/mol (Zero)	-0.240			
			≤ 5.0 nmol/mol (Span)	1.410	$u_{int,neg}$		
9	Averaging effect		≤ 7.0% of measured value	-1.310	u_{av} -0.79		0.6259
18	Difference sample/calibration port		≤ 1.0%	0.230	u_{dsc} 0.24		0.0579
21	Converter efficiency		≥ 98	98.80	u_{EC} 1.26		1.5755
23	Uncertainty of test gas		≤ 3.0%	2.000	u_{cg} 1.05		1.0941

Combined standard uncertainty	u_c	5.8345	nmol/mol
Expanded uncertainty	U	11.6690	nmol/mol
Relative expanded uncertainty	W	11.16	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty from the results obtained in the laboratory and field tests for analyser 1

Measuring device: Ecotech Serinus 40 — Serial-No.: 13-0095 (Device 1)

Measured component: NO_2 — 1h-limit value: 104.6 nmol/mol

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤	1.0 nmol/mol	0.310	$u_{r,z}$	0.06	0.0035
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	0.270	$u_{r,lh}$	not considered, as $\sqrt{2}*u_{r,lh} = 0,01 < u_{r,f}$	-
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.720	$u_{l,h}$	0.43	0.1891
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	1.290	u_{gp}	3.56	12.6928
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.040	u_{gt}	0.09	0.0086
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.620	u_{st}	1.55	2.3938
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.045	u_V	0.13	0.0171
8a	Interferent H_2O with 21 mmol/mol	≤	10 nmol/mol (Zero)	0.090	u_{H2O}	0.01	0.0001
		≤	10 nmol/mol (Span)	-0.300			
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	-0.470	$u_{int,pos}$ or $u_{int,neg}$	0.09	0.0086
		≤	5.0 nmol/mol (Span)	1.430			
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.000			
		≤	5.0 nmol/mol (Span)	0.800			
9	Averaging effect	≤	7.0% of measured value	-1.350	u_{av}	-0.82	0.6647
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	3.550	$u_{r,f}$	3.71	13.7886
11	Long term drift at zero level	≤	5.0 nmol/mol	-0.510	$u_{d,z}$	-0.29	0.0867
12	Long term drift at span level	≤	5.0% of max. of certification range	2.510	$u_{d,lh}$	1.52	2.2977
18	Difference sample/calibration port	≤	1.0%	-0.260	u_{asc}	-0.27	0.0740
21	Converter efficiency	≥	98	98.900	u_{EC}	1.15	1.3239
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941
					Combined standard uncertainty	u_c	5.8861 nmol/mol
					Expanded uncertainty	U	11.7723 nmol/mol
					Relative expanded uncertainty	W	11.25 %
					Maximum allowed expanded uncertainty	W_{req}	15 %

Expanded uncertainty from the results obtained in the laboratory and field tests for analyser 2

Measuring device:	Ecotech Serinus 40					Serial-No.:	13-0094 (Device 2)		
Measured component:	NO_2					1h-limit value:	104.6		nmol/mol
No.	Performance characteristic		Performance criterion	Result		Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	≤	1.0 nmol/mol	0.190	$u_{r,z}$	0.04		0.0014	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	0.190	$u_{r,1h}$	not considered, as $\sqrt{2}*u_{r,1h} = 0,01 < u_{r,f}$		-	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.840	u_{1h}	0.51		0.2573	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	1.970	u_{gp}	5.37		28.8054	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.450	u_{gt}	1.02		1.0438	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.240	u_{st}	0.60		0.3647	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.006	u_V	0.02		0.0003	
8a	Interferent H_2O with 21 mmol/mol	≤	10 nmol/mol (Zero)	-0.300	u_{H2O}	-0.26		0.0700	
		≤	10 nmol/mol (Span)	-0.570					
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	0.600	$u_{int,pos}$ or $u_{int,neg}$	0.38		0.1434	
		≤	5.0 nmol/mol (Span)	0.430					
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	-0.240					
		≤	5.0 nmol/mol (Span)	1.410					
9	Averaging effect	≤	7.0% of measured value	-1.310	u_{av}	-0.79		0.6259	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	3.550	$u_{r,f}$	3.71		13.7886	
11	Long term drift at zero level	≤	5.0 nmol/mol	0.580	$u_{d,lz}$	0.33		0.1121	
12	Long term drift at span level	≤	5.0% of max. of certification range	2.550	$u_{d,lh}$	1.54		2.3715	
18	Difference sample/calibration port	≤	1.0%	0.230	u_{sso}	0.24		0.0579	
21	Converter efficiency	≥	98	98.800	u_{EC}	1.26		1.5755	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{tg}	1.05		1.0941	
					Combined standard uncertainty		u_c	7.0932	nmol/mol
					Expanded uncertainty		U	14.1864	nmol/mol
					Relative expanded uncertainty		W	13.56	%
					Maximum allowed expanded uncertainty		W_{req}	15	%