Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000028755_04

AMS designation:	APNA 370 for NO_X
Manufacturer:	HORIBA, Ltd. 2 Miyanohigashi Kisshoin Minami-ku Kyoto 610-8510 Japan
Test Laboratory:	TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and found to comply with: VDI 4202-1 (2002), VDI 4203-3 (2004), 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 0000028755_03 of 21 January 2016.

TÜVRheinland® CERTIFIED

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

www.tuv.com
ID 0000028755

Publication in the German Federal Gazette (BAnz) of 14 October 2006

This certificate will expire on:
25 January 2026

German Federal Environment Agency
Dessau, 25 January 2021

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 24 January 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.

10/021 2.08

Test Report:	936/21204643/C dated 7 July 2006
Initial certification:	26 January 2011
Expiry date:	25 January 2026
Certificate:	Renewal (of previous certificate 0000028755_03 dated 21 January 2016 valid until 25 January 2021)
Publication:	BAnz. 14 October 2006, no. 194, p. 6715, chapter IV number 3.1

Approved application
The certified AMS is suitable for continuous ambient air monitoring of NO, NO_2 and NO_x (stationary operation).
The suitability of the AMS for this application was assessed on the basis of a laboratory test and a four-months field test.

The AMS is approved for an ambient temperature range of 0 °C to +40 °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 936/21204643/C dated 7 July 2006 issued by TÜV Rheinland Immissionsschutz und Energiesysteme
- Addenda 936/21204643/C1 dated 27 July 2011 and 936/21222689/C dated 5 October 2013
- 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. 14 October 2006, no. 194, p. 6715, chapter IV number 3.1, UBA announcement dated 12 September 2006:

AMS designation:
APNA 370

Manufacturer:
HORIBA, Ltd., Kyoto, Japan

Distribution:
HORIBA Europe GmbH, Leichlingen

Field of application:
For continuous monitoring of NO, NO_2 und NO_X in ambient air (stationary operation)

Measuring ranges during performance testing
NO_2 0 to 400 µg/m³
NO_2 0 to 500 µg/m³
NO 0 to 1200 µg/m³

Software version:
P1000878001C

Test Laboratory:
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
TÜV Rheinland Group

Test Report:
Report no. 936/21204643/C dated 7 July 2006

Publication in the German Federal Gazette: BAnz. 25 August 2009, no. 125, p. 2929, chapter III notification 2, UBA announcement dated 3 August 2009:

2 Notification as regards Federal Environment Agency notice of 12 September 2006 (BAnz. p. 6717)

The latest software version of the APNA 370 ambient air measuring system manufactured by Horiba Europe GmbH is:
P1000878001J
The type GD-6 EH sample gas pump manufactured by Horiba may be used instead of the N 86.0 KNE sample gas pump manufactured by KNF.

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH dated 31 March 2009

Publication in the German Federal Gazette: BAnz. 26 January 2011, no. 14, p. 294, chapter IV notification 6, UBA announcement dated 10 January 2011:

6 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 3.1) and of 3 August 2009 (BAnz. p. 2929, chapter III 2nd notification)

The APNA 370 measuring system for NO, NO_2 and NO_x manufactured by Horiba Ltd, Japan, and Horiba Europe GmbH meets the requirements defined in standard EN 14211. Furthermore, the manufacturing process and the quality management for the APNA 370 measuring system for NO, NO_2 and NO_X meet the requirements of EN 15267.
The test report on performance testing is available on the internet at www.qal1.de.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 6 October 2010

Publication in the German Federal Gazette: Banz. 02 March 2012, no. 36, p. 920, chapter V notification 17, UBA announcement dated 23 February 2012:

17 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 3.1) and of 10 January 2011 (BAnz. p. 294, chapter IV 6th notification)

There is an addendum to test report no. 936/21204643/C for thee APNA 370 measuring system for NO, NO_2 and NO_x manufactured by Horiba, Ltd., Japan and Horiba Europe GmbH. The addendum is assigned report no. 936/21204643/C1 and after its publication is an integral part of the test report no. 936/21204643/C and is also available online at www.qal1.de.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 3 November 2011

Publication in the German Federal Gazette: BAnz AT 05.03.2013 B10, chapter V notification 8, UBA announcement dated 12 February 2013:

8 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 3.1) and of 23 February 2012 (BAnz. p. 920, chapter V 17th notification)

The APNA 370 measuring system NO, NO_2 and NO_x manufactured by Horiba Ltd, Japan, and Horiba Europe GmbH may optionally be equipped with an additional calibration port. Calibration gas may be fed upstream or downstream of the sample gas filter using a three-way valve.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 11 October 2012

Publication in the German Federal Gazette: BAnz AT 01.04.2014 B12, chapter VI notification 27, UBA announcement dated 27 February 2014:

27	**Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 3.1) and of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter V 8th notification)** The APNA 370 measuring system for NO, NO_2 and NO_x manufactured by Horiba Ltd, Japan, and Horiba Europe GmbH meets the requirements defined in standard EN 14211 (November 2012 version). An addendum as integral part of test report no. 936/21222689/C is available online at www.qal1.de. Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 5 October 2013

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter V notification 31, UBA announcement dated 14 July 2016:

31	**Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 3.1) and of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter VI 27th notification)** The APNA-370 measuring system for NO, NO_2 and NO_X manufactured by HORIBA Ltd. is equipped with a new display which, in design and functionality, largely corresponds to its predecessor. In addition, the power supply ZWS-BAF may also be used. The current software version of the measuring system is: P1000878001K Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 February 2016.

Publication in the German Federal Gazette: BAnz AT 22.07.2019 B8, chapter V notification 10, UBA announcement dated 28 June 2019:

10	**Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 3.1) and of 14 July 2016 (BAnz AT 01.08.2016 B11, chapter V 31st notification)** The latest software version of the APNA-370 measuring system for NO, NO_2 and NO_x is: P1000878001L The rear of the housing was modified to cater for additional cable connections. Statement issued by TÜV Rheinland Energy GmbH dated 5 March 2019

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chapter IV notification 54, UBA announcement dated 24 February 2020:

54	**Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 3.1) and of 28 June 2019 (BAnz AT 22.07.2019 B8, chapter V 10th notification)** The latest software version of the APNA-370 measuring system for NO, NO_2 and NO_x manufactured by HORIBA Ltd. is: P1000878001M Statement issued by TÜV Rheinland Energy GmbH dated 20 September 2019

Publication in the German Federal Gazette: BAnz AT 31.07.2020 B10, chapter II notification 1, UBA announcement of 27 May 2020

11	**Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 3.1) and of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter IV 54th notification)** The APNA-370 measuring system for NO, NO_2 and NOX manufactured by HORIBA Ltd. can equipped with a type KPMW-MT/TC102 heating element for regeneration of the silica gel dryer for the ozone generator in the future. Furthermore, FINEFLEX BIOTM Board TOMBO No. 5625 may be used as material for thermal insulation of the NO_x converter. Statement issued by TÜV Rheinland Energy GmbH dated 10 March 2020

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

The APNA 370 NO_X measuring system is based on the measuring principle of chemiluminescence.

This method allows the continuous measurement of the nitrogen oxides (NO, NO_2 and NO_X ($NO + NO_2$)) within the atmosphere. The concentration of NO_2 is calculated from the concentrations of NO and NO_x. The measuring principle complies with the reference measuring method described in section 5.2 of Standard EN 14211 (2012).

The sample gas is split into two streams within the APNA 370 measuring system. One stream is used for measuring the concentration of NO_X ($NO + NO_2$) by reducing NO_2 to NO via a NO_X converter. The other stream is used for direct determination of the NO concentration. The NO, NO_X and span gas tubes are switched every 0.5 s by using a solenoid valve and led into the reaction chamber.

Outside air is drawn through a separate filter, dried by a self-regenerative silica gel dehumidifier and passed through the ozoniser which generates the required ozone. The ozone is passed

into the reaction chamber. The sample gas then reacts with the ozone and the emitted light is detected using a photo diode.

The instrument calculates the concentrations of NO, NO_2 and NO_X from the signal of the photo diode, which is proportional to the NO_X and NO concentrations, and displays the results as a continuous signal.

Dehumidifier:

The instrument comprises a self-regenerative silica gel dehumidifier which dehumidifies the air required for generating ozone. The dehumidifier comprises two cylinders. While one cylinder is active the other is regenerated. The silica gel is heated to approx. 160° for about 135 minutes for this purpose in order to remove humidity. This process is followed by a cooling phase of about 45 minutes. Both cylinders are switched every 180 minutes in order to ensure constant drying.

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 APNA 370 measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Basic testing

Test Report: 936/21204643/C dated 07 July 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 14 October 2006, no. 194, p. 6715, chapter IV number 3.1
UBA announcement dated 12 September 2006

Notifications

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH dated 31 March 2009
Publication: 25 August 2009, no. 125, p. 2929, chapter III notification 2
UBA announcement dated 03 August 2009
(Changes to software and hardware extension)

Initial certification according to EN 15267

Certificate no. 0000028755: 09 February 2011
Expiry date of the certificate: 25 January 2016
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 6 October 2010
Test Report: 936/21204643/C dated 07 July 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 26 January 2011, no. 14, p. 294, chapter IV notification 6
UBA announcement dated 10 January 2011:

Notifications in accordance with EN 15267

Certificate no.: 0000028755_01: 16 March 2012
Expiry date of the certificate: 25 January 2016
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 3 November 2011 and Addendum no. 936/21204643/C1 dated 27 July 2011
Publication: Banz. 02 March 2012, no. 36, p. 920, chapter V notification 17
UBA announcement dated 23 February 2012
(Supplemented by an addendum)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 3 November 2011
Publication: BAnz AT 05.03.2013 B10, chapter V notification 8
UBA announcement dated 12 February 2013
(extension of the hardware)

Certificate no. 0000028755_02: 29 April 2014
Expiry date of the certificate: 25 January 2016
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 5 October 2013 and Addendum No. 936/21222689/C dated 05 October 2013
Publication: BAnz AT 01.04.2014 B12, chapter VI notification 27
UBA announcement dated 27 February 2014
(EN 14211 (2012))

Renewal of the certificate

Certificate no. 0000028755_03: 21 January 2016
Expiry date of the certificate: 25 January 2021

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 February 2016
Publication: BAnz AT 01.08.2016 B11, chapter V notification 31
UBA announcement dated 14 July 2016
(new display)

Statement issued by TÜV Rheinland Energy GmbH dated 5 March 2019
Publication: BAnz AT 22.07.2019 B8, chapter V notification 10
UBA announcement dated 28 June 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 54
UBA announcement dated 24 February 2020
(new software version)

Statement issued by TÜV Rheinland Energy GmbH dated 10 March 2020
Publication: BAnz AT 31.07.2020 B10, chapter II notification 11
UBA announcement of 27 May 2020
(new heater and isolation material)

Renewal of the certificate

Certificate no. 0000028755_04: 25 January 2021
Expiry date of the certificate: 25 January 2026

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

Measuring device:	Horiba APNA 370				Serial-No.:		SN 10021	
Measured component:	NO2				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	0.157	$u_{r,z}$	0.05	0.0024	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	1.704	$u_{r,lh}$	0.10	0.0099	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.200	$u_{l,lh}$	0.12	0.0146	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.143	u_{gp}	0.41	0.1680	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.230	u_{gt}	0.66	0.4347	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.264	u_{st}	0.76	0.5727	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.122	u_V	0.41	0.1673	
8a	Interferent H_20 with 21 mmol/mol	≤	10 nmol/mol (Zero)	-0.024	u_{H2O}	0.18	0.0326	
		≤	10 nmol/mol (Span)	1.360				
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	-0.056	$u_{int,pos}$			
		≤	5.0 nmol/mol (Span)	-2.160	or	0.63	0.3997	
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.056				
		≤	5.0 nmol/mol (Span)	-3.620	$u_{int,neg}$			
9	Averaging effect	≤	7.0% of measured value	5.100	u_{av}	3.08	9.4860	
18	Difference sample/calibration port	≤	1.0%	0.000	$u_{\Delta sc}$	0.00	0.0000	
21	Converter efficiency	≥	98	98.60	u_{EC}	1.46	2.1445	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941	
				Combined standard uncertainty	u_c		3.8130	nmol/mol
				Expanded uncertainty	U		7.6259	nmol/mol
				Relative expanded uncertainty	W		7.29	%
				Maximum allowed expanded uncertainty	W_{req}		15	%

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

Measuring device:	Horiba APNA 370				Serial-No.:	SN 10022	
Measured component:	NO2				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	0.132	$u_{r,z}$	0.04	0.0017
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	1.250	$u_{r,lh}$	0.07	0.0052
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.300	$u_{l,lh}$	0.18	0.0328
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.130	u_{gp}	0.37	0.1389
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.150	u_{gt}	0.43	0.1849
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.140	u_{st}	0.40	0.1611
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	-0.084	u_V	-0.28	0.0787
8a	Interferent H_20 with 21 mmol/mol	≤	10 nmol/mol (Zero)	0.000	u_{H2O}	0.15	0.0216
		≤	10 nmol/mol (Span)	0.000			
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	-0.056	$u_{int,pos}$	0.52	0.2704
		≤	5.0 nmol/mol (Span)	-1.820	or		
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.184			
		≤	5.0 nmol/mol (Span)	-3.520	$u_{int,neg}$		
9	Averaging effect	≤	7.0% of measured value	4.400	u_{av}	2.66	7.0607
18	Difference sample/calibration port	≤	1.0%	0.000	$u_{\Delta sc}$	0.00	0.0000
21	Converter efficiency	≥	98	98.20	u_{EC}	1.88	3.5449
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941

Combined standard uncertainty	u_c	3.5499	nmol/mol
Expanded uncertainty	U	7.0999	nmol/mol
Relative expanded uncertainty	W	6.79	%
Maximum allowed expanded uncertainty	W_{req}	15	%

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

Measuring device:	Horiba APNA 370				Serial-No.:		SN 10021	
Measured component:	NO2				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	0.157	$u_{r,z}$	0.05	0.0024	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	1.704	$u_{r,lh}$	not considered, as √2*ur,lh = 0,14 < ur,f	-	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.200	$u_{l,lh}$	0.12	0.0146	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.143	u_{gp}	0.41	0.1680	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.230	u_{gt}	0.66	0.4347	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.264	u_{st}	0.76	0.5727	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.122	u_V	0.41	0.1673	
8a	Interferent H_20 with 21 mmol/mol	≤	10 nmol/mol (Zero)	-0.024	u_{H2O}	0.18	0.0326	
		≤	10 nmol/mol (Span)	1.360				
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	-0.056	$u_{int,pos}$	0.63	0.3997	
		≤	5.0 nmol/mol (Span)	-2.160	or			
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.056				
		≤	5.0 nmol/mol (Span)	-3.620	$u_{int,neg}$			
9	Averaging effect	≤	7.0% of measured value	5.100	u_{av}	3.08	9.4860	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	3.960	$u_{r,f}$	4.14	17.1575	
11	Long term drift at zero level	≤	5.0 nmol/mol	0.400	$u_{d,l,z}$	0.23	0.0533	
12	Long term drift at span level	≤	5.0% of max. of certification range	0.820	$u_{d,l,lh}$	0.50	0.2452	
18	Difference sample/calibration port	≤	1.0%	0.000	$u_{\Delta sc}$	0.00	0.0000	
21	Converter efficiency	≥	98	98.600	u_{EC}	1.46	2.1445	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941	
			Combined standard uncertainty		u_c		5.6546	nmol/mol
			Expanded uncertainty		U		11.3093	nmol/mol
			Relative expanded uncertainty		W		10.81	%
			Maximum allowed expanded uncertainty		W_{req}		15	%

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

Measuring device:	Horiba APNA 370				Serial-No.:		SN 10022	
Measured component:	NO2				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	0.132	$u_{r,z}$	0.04	0.0017	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	1.250	$u_{r,lh}$	not considered, as √2*ur,lh = 0,1 < ur,f	-	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.300	$u_{l,lh}$	0.18	0.0328	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.130	u_{gp}	0.37	0.1389	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.150	u_{gt}	0.43	0.1849	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.140	u_{st}	0.40	0.1611	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	-0.084	u_V	-0.28	0.0787	
8a	Interferent H_2O with 21 mmol/mol	≤	10 nmol/mol (Zero)	0.080	u_{H2O}	0.15	0.0216	
		≤	10 nmol/mol (Span)	0.696				
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	-0.056	$u_{int,pos}$ or $u_{int,neg}$	0.52	0.2704	
		≤	5.0 nmol/mol (Span)	-1.820				
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.184				
		≤	5.0 nmol/mol (Span)	-3.520				
9	Averaging effect	≤	7.0% of measured value	4.400	u_{av}	2.66	7.0607	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	3.960	$u_{r,f}$	4.14	17.1575	
11	Long term drift at zero level	≤	5.0 nmol/mol	0.560	$u_{d,l,z}$	0.32	0.1045	
12	Long term drift at span level	≤	5.0% of max. of certification range	0.970	$u_{d,l,lh}$	0.59	0.3432	
18	Difference sample/calibration port	≤	1.0%	0.000	$u_{\Delta sc}$	0.00	0.0000	
21	Converter efficiency	≥	98	98.200	u_{EC}	1.88	3.5449	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941	
			Combined standard uncertainty			u_c	5.4952	nmol/mol
			Expanded uncertainty			U	10.9903	nmol/mol
			Relative expanded uncertainty			W	10.51	%
			Maximum allowed expanded uncertainty			W_{req}	15	%