CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000087852_00

Certified AMS:	APNA-380 for NO, NO_2 and NO_x
Manufacturer:	HORIBA Europe GmbH Hans-Mess-Str. 6 61440 Oberursel Germany
Test Institute:	TÜV Rheinland Energy & Environment GmbH

This is to certify that the AMS has been tested and found to comply with the standards VDI 4202-1 (2018), EN 14211 (2012), EN 14211 (2024) as well as EN 15267-1 (2009) and EN 15267-2 (2023).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 11 pages).

TÜVRheinland® CERTIFIED

Suitability Tested
Complying with 2008/50/EC
EN 15267
Regular Surveillance

www.tuv.com
ID 0000087852

Publication in the German Federal Gazette (BAnz) of 31 October 2025

German Environment Agency

Dessau, 23 March 2026

This certificate will expire on:
22 March 2031

TÜV Rheinland
Energy & Environment GmbH
Cologne, 20 March 2026

Dr. Marcel Langner
Head of Section II 4

i. V. Guido Baum

www.umwelt-tuv.eu
qal1-info@tuv.com
Tel. + 49 221 806-5200

TÜV Rheinland Energy & Environment 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 the certificate D-PL-11120-02-00.

Test report:	EuL/21262682/B dated 7 February 2025
Initial certification:	31 October 2025
Expiry date:	22 March 2031
Publication:	BAnz AT 31.10.2025 B5, chapter III No. 2.1

Approved application
The tested AMS is suitable for continuous ambient air measurement of NO, NO_2 and NO_x in stationary use.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three month field test at a location close to traffic.

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 measured values relevant to the application.

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

Basis of the certification
This certification is based on:

- Test report EuL/21262682/B dated 7 February 2025 of TÜV Rheinland Energy & Environment 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 31.10.2025 B5, chapter III No. 2.1, Announcement by UBA dated 27 August 2025:

AMS designation:
APNA-380 for NO, NO_2 and NO_x

Manufacturer:
Horiba Europe GmbH, Oberursel, Germany

Field of application:
For the continuous determination of ambient air concentrations of nitrogen oxides in outdoor air in stationary use

Measuring ranges during the performance test:

Component	Certification range	Unit
Nitrogen monoxide	0 – 1,200	µg/m³
Nitrogen dioxide	0 – 500	µg/m³

Software versions:

A7:	P2002638C 1.01
M4:	P2002642B 1.00
Analyzer:	P2002584C 1.02
FPGA:	P2002759A 1.01

Restrictions:
None

Notes:
1. The measuring system also fulfils the requirements of EN 14211:2024.
2. The test report on the suitability test can be viewed on the internet at www.qal1.de.

Test Report:
TÜV Rheinland Energy & Environment GmbH, Cologne
Report No.: EuL/21262682/B dated 7 February 2025

Certified product

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

The APNA-380 nitrogen oxide analyser determines the concentration of nitrogen oxide (NO), total nitrogen oxide (NO_x, the sum of NO and NO_2) and nitrogen dioxide (NO_2) in a sample drawn into the instrument.

The measuring principle is based on the detection of chemiluminescence occurring during the reaction of nitrogen oxide (NO) with ozone (O_3).
NO_x chemiluminescence refers to the specific chemiluminescence reaction that occurs when nitrogen oxides (NO_x) are present in a sample gas and react with ozone (O_3). This reaction leads to the emission of light, which can be measured and used for quantitative analyses in various applications.

The chemiluminescence reaction with NO_x and ozone can be summarised as follows:

Oxidation of NO to NO_2: NO reacts with ozone (O_3) in the presence of excess oxygen to form nitrogen dioxide (NO_2) and oxygen gas.

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

Energy transfer:
The electronically excited NO_2 molecules then undergo an energy transfer with other gas molecules or collision partners such as helium, which leads to the transfer of excess energy to these partners.

Light emission:
When the excited NO_2 molecule is de-excited, it emits excess energy in the form of light. The emitted light typically falls into the visible or near-infrared part of the electromagnetic spectrum.
By detecting and measuring the intensity of this chemiluminescent light, it is possible to quantify the concentration of NO_x in the sample gas.

The APNA-380 analyser splits the sampled gas into two gas streams. One is used directly to determine NO. The other is used to measure NOx concentrations (NO + NO_2) by reducing NO_2 to NO via the NO_x converter. These sample gases are switched by the solenoid valve in the order NO_x line, NO line and reference line, and repeatedly introduced into the reaction chamber.

Ambient air is drawn in through a separate air filter, dried by a self-regenerating silica gel dehumidifier and passed through the ozonator, where the required ozone is generated. The ozone is then fed into the reaction chamber. Here, the sample gas reacts with the ozone and the emitted light is detected by a photodiode.
The instrument calculates the concentrations of NO, NO_2 and NO_x from the photodiode signal, which is proportional to the concentration of the NO_x and NO gases, and outputs the results as a continuous signal.

Technical data APNA-380:

Measuring range:	Maximum 0-20 ppm (selectable)
Units:	ppb / ppm / µg/m³ / mg/m³
Measured compounds:	Nitrogen oxides
Sample flow:	Approx. 0.7 litres/min (during the test)
Outputs:	Ethernet TCP/IP Modbus Serial interface, RS232 0 - 1/5/10 Volt analogue 4 - 20 mA analogue USB INTERFACE
Input voltage:	100 V to 240 V, 50 Hz or 60 Hz
Power:	140 W; maximum 190 W
Dimensions (L x W x H)	568 x 430 x 221 mm
Weight:	Approx. 18 kg

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 Energy & Environment 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 certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy & Environment GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy & Environment GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and its expiration is also accessible on the internet: **qal1.de**.

History of documents
Certification of APNA-380 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. 0000087852_00: 23 March 2026
Expiry date of the certificate: 22 March 2031
Test report: EuL/21262682/B dated 7 February 2025
TÜV Rheinland Energy & Environment GmbH
Publication: BAnz AT 31.10.2025 B5, chapter III number 2.1
UBA announcement dated 27 August 2025

Overall uncertainty according to EN 14211 (2012)

Expanded uncertainty laboratory, system 1

Measuring device:	APNA 380		Serial-No.:	FGF7XTX9	
Measured component:	NO		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	0.000	$u_{r,z}$	0.00	0.0000	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.310	$u_{r,lh}$	0.01	0.0001	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.730	$u_{l,lh}$	0.44	0.1944	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.100	u_{gp}	0.25	0.0633	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.030	u_{gt}	0.08	0.0057	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.220	u_{st}	0.55	0.3065	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	u_V	0.11	0.0132	
8a	Interferent H_20 with 19 mmol/mol	≤ 10 nmol/mol (Zero)	0.600	u_{H2O}	0.45	0.2004	
		≤ 10 nmol/mol (Span)	0.600				
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0571	
		≤ 5.0 nmol/mol (Span)	1.200				
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	-1.300	u_{av}	-0.79	0.6164	
18	Difference sample/calibration port	≤ 1.0%	-0.220	$u_{\Delta sc}$	-0.23	0.0530	
21	Converter efficiency	≥ 98	99.50	u_{EC}	0.52	0.2735	
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	1.6964	nmol/mol
Expanded uncertainty	U	3.3928	nmol/mol
Relative expanded uncertainty	W	3.24	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty laboratory, system 2

Measuring device:	APNA 380		Serial-No.:	WNL01SY4	
Measured component:	NO		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	0.130	$u_{r,z}$	0.02	0.0004	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.130	$u_{r,lh}$	0.00	0.0000	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.790	$u_{l,lh}$	0.48	0.2276	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.190	u_{gp}	0.48	0.2286	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.050	u_{gt}	0.13	0.0158	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.200	u_{st}	0.50	0.2533	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.010	u_V	0.04	0.0015	
8a	Interferent H_20 with 19 mmol/mol	≤ 10 nmol/mol (Zero)	0.000	u_{H2O}	-0.12	0.0140	
		≤ 10 nmol/mol (Span)	0.000				
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0566	
		≤ 5.0 nmol/mol (Span)	0.600				
8c	Interferent NH_3 mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.000				
		≤ 5.0 nmol/mol (Span)	1.400				
9	Averaging effect	≤ 7.0% of measured value	-0.700	u_{av}	-0.42	0.1787	
18	Difference sample/calibration port	≤ 1.0%	-0.110	$u_{\Delta sc}$	-0.12	0.0132	
21	Converter efficiency	≥ 98	99.20	u_{EC}	0.84	0.7002	
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	1.6687	nmol/mol
Expanded uncertainty	U	3.3373	nmol/mol
Relative expanded uncertainty	W	3.19	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Combined uncertainty, laboratory and field, system 1

Measuring device:	APNA 380					Serial-No.:	FGF7XTX9	
Measured component:	NO					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	0.000	$u_{r,z}$	0.00	0.0000	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	0.310	$u_{r,lh}$	not considered, as √2*ur,lh = 0.01 < ur,f	-	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.730	$u_{l,lh}$	0.44	0.1944	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.100	u_{gp}	0.25	0.0633	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.030	u_{gt}	0.08	0.0057	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.220	u_{st}	0.55	0.3065	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.030	u_V	0.11	0.0132	
8a	Interferent H_20 with 19 mmol/mol	≤	10 nmol/mol (Zero)	0.600	u_{lH2O}	0.45	0.2004	
		≤	10 nmol/mol (Span)	0.600				
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0571	
		≤	5.0 nmol/mol (Span)	1.200				
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	-1.300	u_{av}	-0.79	0.6164	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	1.210	$u_{r,f}$	1.27	1.6019	
11	Long term drift at zero level	≤	5.0 nmol/mol	0.480	$u_{d,l,z}$	0.28	0.0768	
12	Long term drift at span level	≤	5.0% of max. of certification range	1.020	$u_{d,l,lh}$	0.62	0.3794	
18	Difference sample/calibration port	≤	1.0%	-0.220	$u_{\Delta sc}$	-0.23	0.0530	
21	Converter efficiency	≥	98	99.500	u_{EC}	0.52	0.2735	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	2.2216	nmol/mol
Expanded uncertainty	U	4.4433	nmol/mol
Relative expanded uncertainty	W	4.25	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Combined uncertainty, laboratory and field, system 2

Measuring device:	APNA 380					Serial-No.:	WNL01SY4	
Measured component:	NO					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	0.130	$u_{r,z}$	0.02	0.0004	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	0.130	$u_{r,lh}$	not considered, as √2*ur,lh = 0 < ur,f	-	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	0.790	$u_{l,lh}$	0.48	0.2276	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.190	u_{gp}	0.48	0.2286	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.050	u_{gt}	0.13	0.0158	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.200	u_{st}	0.50	0.2533	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.010	u_V	0.04	0.0015	
8a	Interferent H_20 with 19 mmol/mol	≤	10 nmol/mol (Zero)	-0.200	u_{lH2O}	-0.12	0.0140	
		≤	10 nmol/mol (Span)	0.000				
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0566	
		≤	5.0 nmol/mol (Span)	0.600				
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.000				
		≤	5.0 nmol/mol (Span)	1.400				
9	Averaging effect	≤	7.0% of measured value	-0.700	u_{av}	-0.42	0.1787	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	1.210	$u_{r,f}$	1.27	1.6019	
11	Long term drift at zero level	≤	5.0 nmol/mol	-0.240	$u_{d,l,z}$	-0.14	0.0192	
12	Long term drift at span level	≤	5.0% of max. of certification range	-0.660	$u_{d,l,lh}$	-0.40	0.1589	
18	Difference sample/calibration port	≤	1.0%	-0.110	$u_{\Delta sc}$	-0.12	0.0132	
21	Converter efficiency	≥	98	99.200	u_{EC}	0.84	0.7002	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	2.1364	nmol/mol
Expanded uncertainty	U	4.2729	nmol/mol
Relative expanded uncertainty	W	4.08	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Overall uncertainty according to EN 14211 (2024)

Expanded uncertainty laboratory, system 1

Measuring device:	APNA 380		Serial-No.:	FGF7XTX9	
Measured component:	NO		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	0.000	$u_{r,z}$	0.00	0.0000	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.310	$u_{r,lh}$	0.01	0.0001	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.680	$u_{l,lh}$	1.01	1.0293	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.260	u_{gp}	0.44	0.1902	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.050	u_{gt}	0.15	0.0215	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.240	u_{st}	0.70	0.4964	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	u_V	0.11	0.0132	
8a	Interferent H_20 with 19 mmol/mol	≤ 10 nmol/mol (Zero)	0.600	u_{H2O}	0.45	0.2004	
		≤ 10 nmol/mol (Span)	0.600				
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0571	
		≤ 5.0 nmol/mol (Span)	1.200				
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	-1.300	u_{av}	-0.79	0.6164	
18	Difference sample/calibration port	≤ 1.0%	-0.220	$u_{\Delta sc}$	-0.23	0.0530	
21	Converter efficiency	≥ 98	99.50	u_{EC}	0.52	0.2735	
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	2.0113	nmol/mol
Expanded uncertainty	U	4.0227	nmol/mol
Relative expanded uncertainty	W	3.85	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty laboratory, system 2

Measuring device:	APNA 380		Serial-No.:	WNL01SY4	
Measured component:	NO		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	0.130	$u_{r,z}$	0.02	0.0004	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.130	$u_{r,lh}$	0.00	0.0000	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.510	$u_{l,lh}$	0.91	0.8316	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.240	u_{gp}	0.40	0.1621	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.070	u_{gt}	0.21	0.0422	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.301	u_{st}	0.88	0.7808	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.010	u_V	0.04	0.0015	
8a	Interferent H_20 with 19 mmol/mol	≤ 10 nmol/mol (Zero)	0.000	u_{H2O}	-0.12	0.0140	
		≤ 10 nmol/mol (Span)	0.000				
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0566	
		≤ 5.0 nmol/mol (Span)	0.600				
8c	Interferent NH_3 mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.000				
		≤ 5.0 nmol/mol (Span)	1.400				
9	Averaging effect	≤ 7.0% of measured value	-0.700	u_{av}	-0.42	0.1787	
18	Difference sample/calibration port	≤ 1.0%	-0.110	$u_{\Delta sc}$	-0.12	0.0132	
21	Converter efficiency	≥ 98	99.20	u_{EC}	0.84	0.7002	
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	1.9687	nmol/mol
Expanded uncertainty	U	3.9374	nmol/mol
Relative expanded uncertainty	W	3.76	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Combined uncertainty, laboratory and field, system 1

Measuring device:	APNA 380					Serial-No.:	FGF7XTX9	
Measured component:	NO					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	0.000	$u_{r,z}$	0.00	0.0000	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	0.310	$u_{r,lh}$	not considered, as √2*ur,lh = 0,01 < ur,f	-	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	1.680	$u_{l,lh}$	1.01	1.0293	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.260	u_{gp}	0.44	0.1902	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.050	u_{gt}	0.15	0.0215	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.240	u_{st}	0.70	0.4964	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.030	u_V	0.11	0.0132	
8a	Interferent H_20 with 19 mmol/mol	≤	10 nmol/mol (Zero)	0.600	u_{H2O}	0.45	0.2004	
		≤	10 nmol/mol (Span)	0.600				
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0571	
		≤	5.0 nmol/mol (Span)	1.200				
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	-1.300	u_{av}	-0.79	0.6164	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	0.290	$u_{r,f}$	0.30	0.0920	
11	Long term drift at zero level	≤	5.0 nmol/mol	0.480	$u_{d,l,z}$	0.28	0.0768	
12	Long term drift at span level	≤	5.0% of max. of certification range	1.020	$u_{d,l,lh}$	0.62	0.3794	
18	Difference sample/calibration port	≤	1.0%	-0.220	$u_{\Delta sc}$	-0.23	0.0530	
21	Converter efficiency	≥	98	99.500	u_{EC}	0.52	0.2735	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	2.1432	nmol/mol
Expanded uncertainty	U	4.2865	nmol/mol
Relative expanded uncertainty	W	4.10	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Combined uncertainty, laboratory and field, system 2

Measuring device:	APNA 380					Serial-No.:	WNL01SY4	
Measured component:	NO					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	0.130	$u_{r,z}$	0.02	0.0004	
2	Repeatability standard deviation at 1h-limit value	≤	3.0 nmol/mol	0.130	$u_{r,lh}$	not considered, as √2*ur,lh = 0 < ur,f	-	
3	"lack of fit" at 1h-limit value	≤	4.0% of measured value	1.510	$u_{l,lh}$	0.91	0.8316	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤	8.0 nmol/mol/kPa	0.240	u_{gp}	0.40	0.1621	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.070	u_{gt}	0.21	0.0422	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤	3.0 nmol/mol/K	0.301	u_{st}	0.88	0.7808	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤	0.30 nmol/mol/V	0.010	u_V	0.04	0.0015	
8a	Interferent H_20 with 19 mmol/mol	≤	10 nmol/mol (Zero)	-0.200	u_{H2O}	-0.12	0.0140	
		≤	10 nmol/mol (Span)	0.000				
8b	Interferent CO_2 with 500 µmol/mol	≤	5.0 nmol/mol (Zero)	0.000	$u_{int,pos}$ or $u_{int,neg}$	0.24	0.0566	
		≤	5.0 nmol/mol (Span)	0.600				
8c	Interferent NH_3 mit 200 nmol/mol	≤	5.0 nmol/mol (Zero)	0.000				
		≤	5.0 nmol/mol (Span)	1.400				
9	Averaging effect	≤	7.0% of measured value	-0.700	u_{av}	-0.42	0.1787	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	0.290	$u_{r,f}$	0.30	0.0920	
11	Long term drift at zero level	≤	5.0 nmol/mol	-0.240	$u_{d,l,z}$	-0.14	0.0192	
12	Long term drift at span level	≤	5.0% of max. of certification range	-0.660	$u_{d,l,lh}$	-0.40	0.1589	
18	Difference sample/calibration port	≤	1.0%	-0.110	$u_{\Delta sc}$	-0.12	0.0132	
21	Converter efficiency	≥	98	99.200	u_{EC}	0.84	0.7002	
23	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	1.05	1.0941	

Combined standard uncertainty	u_c	2.0361	nmol/mol
Expanded uncertainty	U	4.0723	nmol/mol
Relative expanded uncertainty	W	3.89	%
Maximum allowed expanded uncertainty	W_{req}	15	%