

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000038502\_03

**Certified AMS:** 200E / T200 for NO, NO<sub>2</sub> and NO<sub>x</sub>

**Manufacturer:** Teledyne API  
9970 Carroll Canyon Road  
San Diego, CA, 92131  
USA

**Test Institute:** TÜV Rheinland Energy 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 15267-1 (2009) and EN 15267-2 (2009).**

Certification is awarded in respect of the conditions stated in this certificate  
(this certificate contains 14 pages).

The present certificate replaces certificate 0000038502\_02 dated 05 March 2018.



Suitability Tested  
Complying with  
2008/50/EC  
EN 15267  
Regular  
Surveillance  
[www.tuv.com](http://www.tuv.com)  
ID 0000038502

Publication in the German Federal Gazette  
(BAnz) of 06 November 2007

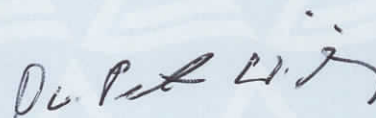
German Environment Agency  
Dessau, 02 March 2023

This certificate will expire on:  
04 March 2028

TÜV Rheinland Energy GmbH  
Cologne, 01 March 2023



Dr. Marcel Langner  
Head of Section II 4.1



ppa. Dr. Peter Wilbring

[www.umwelt-tuv.eu](http://www.umwelt-tuv.eu)  
[tre@umwelt-tuv.eu](mailto:tre@umwelt-tuv.eu)  
Tel. + 49 221 806-5200

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 the certificate D-PL-11120-02-00.

<b>Test report:</b>	936/21205926/A dated 22 June 2007
<b>Initial certification:</b>	05 March 2013
<b>Expiry date:</b>	04 March 2028
<b>Certificate:</b>	Renewal (of previous certificate 0000038502_02 of 05 March 2018 valid until 04 March 2023)
<b>Publication:</b>	BAnz. 06 November 2007, No. 206, p. 7925, chapter II No. 2.1

### **Approved application**

The tested AMS is suitable for continuous ambient air monitoring of NO, NO<sub>2</sub> and NO<sub>x</sub> (stationary operation).

The suitability of the AMS for these applications was assessed based on a laboratory test and a 3-month field test.

The AMS is approved for an ambient temperature range of +5° 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 936/21205926/A dated 22 June 2007 of TÜV Immissionsschutz und Energiesysteme GmbH
- Addendum 936/21219874/B dated 11 October 2012 of TÜV Rheinland Energie und Umwelt GmbH
- Addendum 936/21221556/B dated 16 March 2013 of 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. 06 November 2007, No. 206, p. 7925, chapter II No. 2.1, Announcement by UBA dated 23 September 2007:

**AMS designation**

M200E for NO, NO<sub>2</sub> und NO<sub>x</sub>

**Manufacturer:**

Teledyne Advanced Pollution Instrumentation, San Diego, USA/EAS GmbH, Brunn, Austria

**Field of application:**

For the continuous measurement of NO, NO<sub>2</sub> and NO<sub>x</sub> in ambient air (stationary operation).

Measuring ranges during the suitability test:

NO<sub>2</sub>: 0 – 400 µg/m<sup>3</sup>

0 – 500 µg/m<sup>3</sup>

NO: 0 – 1200 µg/m<sup>3</sup>

**Software version:**

Revision G.2

**Test institute:**

TÜV Immissionsschutz und Energiesysteme GmbH, Cologne,  
TÜV Rheinland Group,

Test report No.: 936/21205926/A vom 22. Juni 2007

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chap. IV notification 21, Announcement by UBA dated 10 January 2011:

**21 Notification as regards Federal Environment Agency notice of 23 September 2007 (BAnz p. 7925, chapter II no. 2.1)**

The current software version of the M200E ambient air measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation is:

K.4 incl. Library Version 6.3

Statement issued by TÜV Rheinland Energie und Umwelt GmbH  
dated 29 September 2010

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chap. IV notification 22, Announcement by UBA dated 10 January 2011:

**22 Notification as regards Federal Environment Agency notice of 23 September 2007 (BAnz p. 7925, chapter II no. 2.1)**

The M200E measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation is manufactured both in its old design M200E and in its new design Model T200. The new design differs from the old design only in that it has a new display, a new front plate and offers extended possibilities for communication.

The current name of the new design of the measuring system is:

Model T200

The current software version of the new design of the measuring system is:

1.0.0 bld 54 incl. Library Version 7.0.0 bld 57

Statement issued by TÜV Rheinland Energie und Umwelt GmbH  
dated 29 September 2010

Publication in the German Federal Gazette: BAnz AT 05.03.2013 B10, chap. V No. 4,  
Announcement by UBA dated 12 February 2013

**4 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz p. 7925, chapter II no. 2.1) and of 10 January 2011 (BAnz p. 294, chapter IV, notification 21 and 22)**

The M200E/T200 versions of the measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation meet the requirements of EN 14211 (Issue June 2005).

Furthermore the manufacturing process and the quality management for the M200E/T200 versions of the measuring system for NO, NO<sub>2</sub> NO<sub>x</sub> meet the requirements of EN 15267.

The test report on performance testing, report no. 936/21205926/B, and addendum to the test report, no. 936/21219874/B, which is an integral part of the test report, are available on the internet at [www.qal1.de](http://www.qal1.de).

The current software version of the M200E measuring system is:

K.7 incl. Library Version 6.4

The current software version of the T200 measuring system is:

1.0.4 incl. Library Version 7.0.3

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

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chap. V No.16,  
UBA-Bekanntmachung vom 03. Juli 2013

**16 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz p. 7925, chapter II no. 2.1) and of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter V notification 4)**

The M200E/T200 versions of the measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation meet the requirements of EN 14211 (Issue November 2012).

An addendum as integral part of test report no. 936/21221556/B is available online at [www.qal1.de](http://www.qal1.de).

In addition to the valve used so far as NO/NO<sub>x</sub> valve and auto-zero valve (VA0000007), the measuring system may alternatively use the new valve (VA0000059). The measuring system is fitted with an additional mixing nozzle in order to further extend its life cycle.

The new designation of the M200E measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> is 200E.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 16 March 2013

Publication in the German Federal Gazette: BAnz AT 02.04.2015 B5, chap. IV notification 15,  
Announcement by UBA dated 25 February 2015:

**15 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz p. 7925, chapter II number 2.1) and of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter V notification 16)**

The 200E/T200 measuring systems for monitoring NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation may alternatively be equipped with the PU1998N828-5.07 sample gas pump manufactured by KNF.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH  
dated 4 September 2014

Publication in the German Federal Gazette: BAnz AT 14.03.2016 B7, chap. V notification 8,  
Announcement by UBA dated 18 February 2016:

**8 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz p. 7925, chapter II no. 2.1) and of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter IV notification 15)**

The current software version of the 200E/T200 measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation is:

Package Version: 1.0.2

Driver Version: 1.0.6

Statement issued by TÜV Rheinland Energie und Umwelt GmbH  
dated 19 October 2015

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B8, chap. V notification 12,  
Announcement by UBA dated 21 February 2018:

**12 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz. p. 7925, chapter II no. 2.1) and of 18 February 2016 (BAnz AT 14.03.2016 B7, chapter V notification 8)**

The production site of the 200E/T200 air quality monitor for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation has changed to  
9970 Carroll Canyon Road  
San Diego, CA 92131  
USA

Statement issued by TÜV Rheinland Energy GmbH dated 17 August 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chap. IV notification 65, Announcement by UBA dated 27 February 2019:

**65 Notification as regards Federal Environment Agency notices of 23 September 2007 (BAnz. p. 7925, chapter II number 2.1) and of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V notification 12)**

The current software version of the 200E/T200 measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne Advanced Pollution Instrumentation is:

Package version: 1.2.6  
Driver version: 1.0.9

Statement issued by TÜV Rheinland Energy GmbH dated 5 September 2018

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chap. IV notification 65, Announcement by UBA dated 24 February 2020:

**65 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz. p. 7925, chapter II number 2.1) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV notification 65)**

The company name has changed from Teledyne Advanced Pollution Instruments to Teledyne API.

The latest software version of the 200E/T200 measuring system for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Teledyne API is:

Package version: 1.3.19  
Driver version: 1.0.21

Folgende Versionen sind hierin eingeschlossen:

Package Version	Driver Version
1.3.18	1.0.21
1.3.17	1.0.20
1.3.14	1.0.19
1.3.12, build 219	1.0.18
1.3.11	1.0.17
1.3.4	1.0.16
1.3.0, build 196	1.0.15
1.3.0, build 190	1.0.15
1.3.0, build 188	1.0.15
1.3.0, build 185	1.0.15
1.2.8	1.0.15
1.2.7	1.0.15
1.2.6	1.0.9

Statement issued by TÜV Rheinland Energy GmbH dated 2 September 2019

Publication in the German Federal Gazette: BAnz AT 31.07.2020 B10, chap. II  
notification 21, Announcement by UBA dated 27 May 2020:

**21 Notification as regards Federal Environment Agency (UBA) notices  
of 23 September 2007 (BAnz. p. 7925, chapter II number 2.1) and  
of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter IV, notification 65)**

The latest software version of the 200E/T200 measuring system for NO, NO<sub>2</sub> and  
NO<sub>x</sub> manufactured by Teledyne API is:

Package version: 1.3.27  
Driver version: 1.0.22

This includes the following versions: Folgende Versionen sind hierin eingeschlossen:

Package Version	Driver Version
1.3.26	1.0.22
1.3.23	1.0.22
1.3.21	1.0.21

Statement issued by TÜV Rheinland Energy GmbH dated 07 May 2020

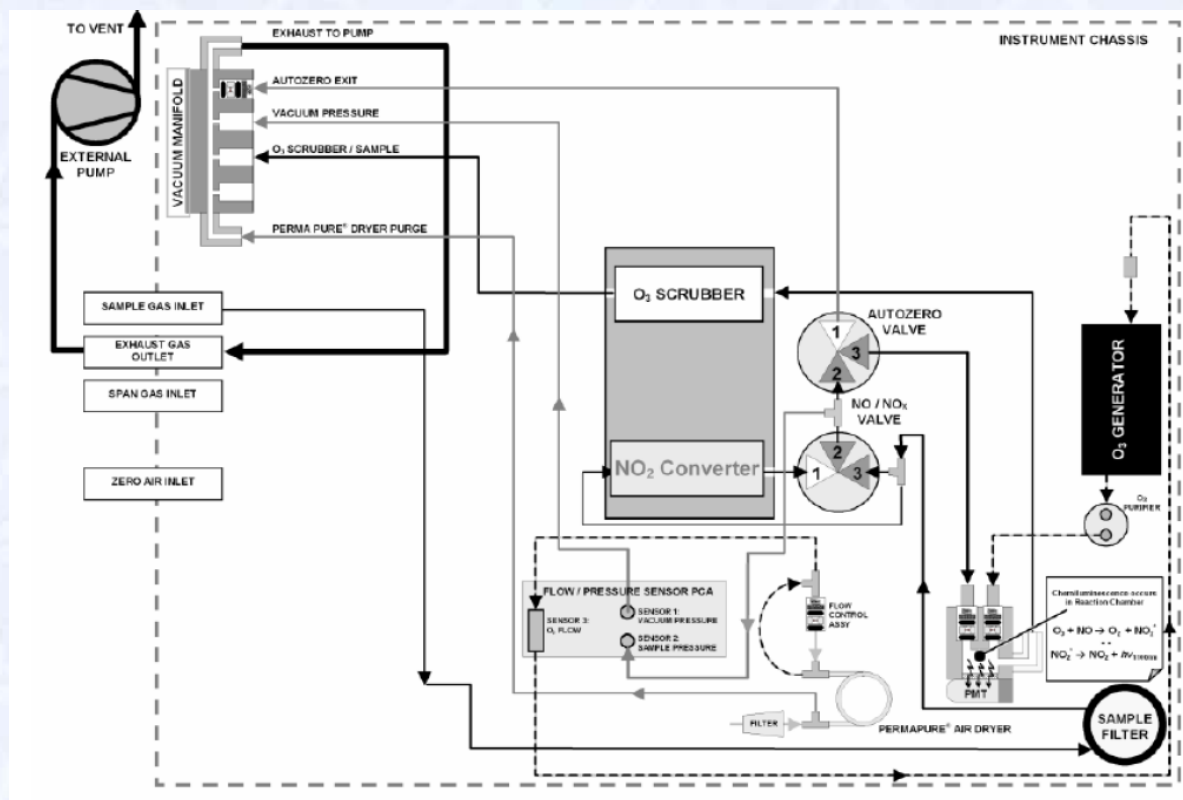


**Certified product**

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

The principle on which the measuring method of the 200E and T200 versions of the measuring system relies is based on the chemiluminescence, which results when from the reaction of nitrogen oxide (NO) and ozone (O<sub>3</sub>) and thus complies with the reference method described in standard EN 14211.

The schematic set-up / flow diagram of the 200E and T200 versions of the measuring system (with optional zero/span gas port) is as follows:



**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 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 GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy 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](http://qal1.de).

### History of documents

Certification of 200E / T200 is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

### Basic test

Test report 936/21205926/A dated 22 June 2007  
TÜV Immissionsschutz und Energiesysteme GmbH  
Publication BAnz. 06 November 2007, No. 206, p. 7925, chapter II number 2.1  
UBA announcement dated 23 September 2007

### Notifications

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2010  
Publication BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 21  
UBA announcement dated 10 January 2011  
(Software changes)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2010  
Publication BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 22  
UBA announcement dated 10 January 2011  
(Software and design changes)

### Initial certification according to EN 15267

Certificate No. 0000038502\_00: 22 March 2013  
Expiry date of the certificate: 04 March 2018  
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 11 October 2012  
Test report 936/21205926/A dated 22 June 2007 issued by  
TÜV Immissionsschutz und Energiesysteme GmbH,  
Addendum 936/21219874/B dated 11 October 2012 issued by  
TÜV Rheinland Energie und Umwelt GmbH,  
Publication BAnz AT 05.03.2013 B10, chapter V notification 4  
UBA announcement dated 12 February 2013

### Certificate based on a notification

Certificate No. 0000038502\_01: 20 August 2013  
Expiry date of the certificate: 04 March 2018  
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 16 March 2013  
Test report 936/21205926/A dated 22 June 2007 issued by  
TÜV Immissionsschutz und Energiesysteme GmbH,  
Addendum 936/21219874/B dated 11 October 2012 issued by  
TÜV Rheinland Energie und Umwelt GmbH,  
Addendum 936/21221556/B dated 16 March 2013 issued by  
TÜV Rheinland Energie und Umwelt GmbH,  
Publication BAnz AT 23.07.2013 B4, chapter V notification 16  
UBA announcement dated 3 July 2013  
(Meets the requirements of the EN 14211:2012  
The addendum amends the testreport.)

**Notifications**

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 4 September 2014  
Publication BAnz AT 02.04.2015 B5, chapter IV notification 15  
UBA announcement dated 25 February 2015  
(New vacuum pump)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 19 October 2015  
Publication BAnz AT 14.03.2016 B7, chapter V notification 8  
UBA announcement dated 18 February 2016  
(Software changes)

**Renewal of certificate**

Certificate No. 0000038502\_02: 05 March 2018  
Expiry date of the certificate: 04 March 2023

**Notifications**

Statement issued by TÜV Rheinland Energy GmbH dated 17 August 2017  
Publication BAnz AT 26.03.2018 B8, chapter V notification 12  
UBA announcement dated 21 February 2018  
(Change of production site)

Statement issued by TÜV Rheinland Energy GmbH dated 5 September 2018  
Publication BAnz AT 26.03.2019 B7, chapter IV notification 65  
UBA announcement dated 27 February 2019  
(Software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 2 September 2019  
Publication BAnz AT 24.03.2020 B7, chapter IV notification 65  
UBA announcement dated 24 February 2020  
(Software changes and new manufacturer name)

Statement issued by TÜV Rheinland Energy GmbH dated 7 May 2020  
Publication BAnz AT 31.07.2020 B10, chapter II notification 21  
UBA announcement dated 27 May 2020  
(Software changes)

**Renewal of certificate**

Certificate No. 0000038502\_03: 02 March 2023  
Expiry date of the certificate: 04 March 2028

**Expanded uncertainty laboratory, system 1**

Measuring device:		Teledyne API M200E/T200		Serial-No.:		SN 1 (1253)	
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	0.940	$u_{r,z}$	0.22	0.0466	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.050	$u_{r,th}$	0.05	0.0023	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	-0.600	$u_{l,th}$	-0.36	0.1313	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.140	$u_{sp}$	1.29	1.6656	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.040	$u_{gt}$	0.10	0.0106	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.520	$u_{st}$	1.35	1.8113	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.010	$u_v$	0.04	0.0013	
8a	Interferent H <sub>2</sub> O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	3.300	$u_{H_2O}$	1.43	2.0510	
		≤ 10 nmol/mol (Span)	-3.300				
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.300	$u_{int,pos}$	0.63	0.3915	
		≤ 5.0 nmol/mol (Span)	0.700				
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.700	$u_{int,neg}$	0.63	0.3915	
		≤ 5.0 nmol/mol (Span)	0.700				
9	Averaging effect	≤ 7.0% of measured value	0.800	$u_{av}$	0.48	0.2334	
18	Difference sample/calibration port	≤ 1%	0.000	$u_{asc}$	0.00	0.0000	
21	Converter efficiency	≥ 98	98.00	$u_{EC}$	2.09	4.3765	
23	Uncertainty of test gas	≤ 3%	2.000	$u_{cg}$	1.05	1.0941	
Combined standard uncertainty				$u_c$		3.4445	nmol/mol
Expanded uncertainty				U		6.8890	nmol/mol
Relative expanded uncertainty				W		6.59	%
Maximum allowed expanded uncertainty				$W_{req}$		15	%

**Expanded uncertainty laboratory, system 2**

Measuring device:		Teledyne API M200E/T200		Serial-No.:		SN 2 (1257)	
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	0.830	$u_{r,z}$	0.19	0.0379	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.230	$u_{r,th}$	0.06	0.0032	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	-0.200	$u_{l,th}$	-0.12	0.0146	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.060	$u_{sp}$	0.55	0.3003	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.030	$u_{gt}$	0.08	0.0060	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.180	$u_{st}$	0.47	0.2170	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	$u_v$	0.11	0.0114	
8a	Interferent H <sub>2</sub> O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	0.000	$u_{H_2O}$	0.19	0.0359	
		≤ 10 nmol/mol (Span)	0.000				
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.700	$u_{int,pos}$	0.68	0.4650	
		≤ 5.0 nmol/mol (Span)	1.300				
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.000	$u_{int,neg}$	0.68	0.4650	
		≤ 5.0 nmol/mol (Span)	1.700				
9	Averaging effect	≤ 7.0% of measured value	1.000	$u_{av}$	0.60	0.3647	
18	Difference sample/calibration port	≤ 1%	0.000	$u_{asc}$	0.00	0.0000	
21	Converter efficiency	≥ 98	98.20	$u_{EC}$	1.88	3.5449	
23	Uncertainty of test gas	≤ 3%	2.000	$u_{cg}$	1.05	1.0941	
Combined standard uncertainty				$u_c$		2.4771	nmol/mol
Expanded uncertainty				U		4.9543	nmol/mol
Relative expanded uncertainty				W		4.74	%
Maximum allowed expanded uncertainty				$W_{req}$		15	%

### Combined uncertainty, laboratory and field, system 1

Measuring device:		Teledyne API M200E/T200		Serial-No.:		SN 1 (1253)	
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	0.940	$u_{r,z}$	0.22	0.0466	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.050	$u_{r,h}$	not considered, as $\sqrt{2} \cdot u_{r,h} = 0.06 < u_{r,f}$		-
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	-0.600	$u_{l,h}$	-0.36	0.1313	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.140	$u_{sp}$	1.29	1.6656	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.040	$u_{gt}$	0.10	0.0106	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.520	$u_{st}$	1.35	1.8113	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.010	$u_v$	0.04	0.0013	
8a	Interferent H <sub>2</sub> O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	3.300	$u_{H_2O}$	1.43	2.0510	
		≤ 10 nmol/mol (Span)	-3.300				
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.300	$u_{int,pos}$	0.63	0.3915	
		≤ 5.0 nmol/mol (Span)	0.700				
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.700	$u_{int,neg}$	0.48	0.2334	
		≤ 5.0 nmol/mol (Span)	0.700				
9	Averaging effect	≤ 7.0% of measured value	0.800	$u_{av}$	0.48	0.2334	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	1.770	$u_{r,f}$	1.85	3.4278	
11	Long term drift at zero level	≤ 5.0 nmol/mol	0.400	$u_{d,z}$	0.23	0.0533	
12	Long term drift at span level	≤ 5.0% of max. of certification range	1.030	$u_{d,h}$	0.62	0.3869	
18	Difference sample/calibration port	≤ 1%	0.000	$u_{sc}$	0.00	0.0000	
21	Converter efficiency	≥ 98	98.000	$u_{EC}$	2.09	4.3765	
23	Uncertainty of test gas	≤ 3%	2.000	$u_{cg}$	1.05	1.0941	
Combined standard uncertainty				$u_c$		3.9658	nmol/mol
Expanded uncertainty				U		7.9317	nmol/mol
Relative expanded uncertainty				W		7.58	%
Maximum allowed expanded uncertainty				$W_{req}$		15	%

### Combined uncertainty, laboratory and field, system 2

Measuring device:		Teledyne API M200E/T200		Serial-No.:		SN 2 (1257)	
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	0.830	$u_{r,z}$	0.19	0.0379	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.230	$u_{r,h}$	not considered, as $\sqrt{2} \cdot u_{r,h} = 0.08 < u_{r,f}$		-
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	-0.200	$u_{l,h}$	-0.12	0.0146	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.060	$u_{sp}$	0.55	0.3003	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.030	$u_{gt}$	0.08	0.0060	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.180	$u_{st}$	0.47	0.2170	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	$u_v$	0.11	0.0114	
8a	Interferent H <sub>2</sub> O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	1.300	$u_{H_2O}$	0.19	0.0359	
		≤ 10 nmol/mol (Span)	-3.700				
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.700	$u_{int,pos}$	0.68	0.4650	
		≤ 5.0 nmol/mol (Span)	1.300				
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.000	$u_{int,neg}$	0.60	0.3647	
		≤ 5.0 nmol/mol (Span)	1.700				
9	Averaging effect	≤ 7.0% of measured value	1.000	$u_{av}$	0.60	0.3647	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	1.770	$u_{r,f}$	1.85	3.4278	
11	Long term drift at zero level	≤ 5.0 nmol/mol	-0.840	$u_{d,z}$	-0.48	0.2352	
12	Long term drift at span level	≤ 5.0% of max. of certification range	-0.950	$u_{d,h}$	-0.57	0.3291	
18	Difference sample/calibration port	≤ 1%	0.000	$u_{sc}$	0.00	0.0000	
21	Converter efficiency	≥ 98	98.200	$u_{EC}$	1.88	3.5449	
23	Uncertainty of test gas	≤ 3%	2.000	$u_{cg}$	1.05	1.0941	
Combined standard uncertainty				$u_c$		3.1815	nmol/mol
Expanded uncertainty				U		6.3630	nmol/mol
Relative expanded uncertainty				W		6.08	%
Maximum allowed expanded uncertainty				$W_{req}$		15	%