

CERTIFICATE

on Product Conformity (QAL1)

Certificate No.: 0000038502

Certified AMS: M200E / T200 for NO, NO₂ and NO_x

Manufacturer: Teledyne Advanced Pollution Instrumentation
9480 Carroll Park Drive
San Diego
CA 92121-5201
USA

Test Institute: TÜV Rheinland Energie und Umwelt 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: 2005,
EN 15267-1: 2009, EN 15267-2: 2009

Certification is awarded in respect of the conditions stated in this certificate
(also see the following pages).



- Complying with 2008/50/EC
- TUV approved
- Annual inspection

Publication in the German Federal Gazette
(BAnz.) of 05 March 2013

The certificate will expire on:
04 March 2018

German Federal Environment Agency
Dessau, 22 March 2013

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 21 March 2013



i. A. Dr. Marcel Langner



ppa. Dr. Peter Wilbring

www.umwelt-tuv.de / www.eco-tuv.com
teu@umwelt-tuv.de
Tel. +49 221 806-2756

TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
51105 Cologne

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

Test report:	936/21205926/A of 22 June 2007 Addendum 936/21219874/B of 11 October 2012
Initial certification:	05 March 2013
Date of expiry:	04 March 2018
Publication:	BAnz AT 05 March 2013 B10, chapter V, notification 4

Approved application

The certified AMS is suitable for continuous ambient air monitoring (stationary operation).

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

The AMS is approved for the temperature range of +5 °C to +40 °C.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for ambient air applications at which it will be installed.

Basis of the certification

This certification is based on:

- test report 936/21205926/A of 22 June 2007 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH and addendum 936/21219874/B of 11 October 2012 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- the on-going surveillance of the product and the manufacturing process
- publication in the German Federal Gazette: BAnz. 06 November 2007, p. 7925, chapter II, No. 2.1
- publication in the German Federal Gazette: BAnz. 26 January 2011, p. 294, chapter IV, notification 21 and 22
- publication in the German Federal Gazette: BAnz AT 05 March 2013 B10, chapter V, notification 4

AMS designation:

M200E for NO, NO₂ and NO_x

Manufacturer:

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

Field of application:

For continuous ambient air monitoring of NO, NO₂ and NO_x (stationary operation)

Measuring ranges during the suitability test:

NO₂ 0 - 400 µg/m³

0 - 500 µg/m³

NO 0 - 1200 µg/m³

Software version:

Revision G.2

Test report:

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

TÜV Rheinland Group

Report No.: 936/21205926/A dated 22 June 2007

**21 Notification as regards Federal Environmental Agency notices
of 23 September 2007 (BAZ. p. 7925, chapter II No. 2.1)**

The current software version of the ambient air measuring system M200E for NO, NO₂ and NO_x of the company Teledyne Advanced Pollution Instrumentation is:

K.4 with Library Version 6.3

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 29 September 2010

**22 Notification as regards Federal Environmental Agency notices
of 23 September 2007 (BAZ. p. 7925, chapter II No. 2.1)**

The measuring system M200E for NO, NO₂ and NO_x of the company Teledyne Advanced Pollution Instrumentation is manufactured in the old design M200E as well as in the new design Model T200. The new design differs from the old design only by a new display, a new front plate and 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 with Library Version 7.0.0 bld 57

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 29 September 2010

**4 Notification as regards Federal Environmental Agency notices
of 23 September 2007 (BAZ. p. 7925, chapter II No. 2.1) and
of 10 January 2011 (BAZ. p. 294, chapter IV, 21th and 22th notification)**

The measuring system M200E respectively T200 for NO, NO₂ and NO_x of the company Teledyne Advanced Pollution Instrumentation fulfills the requirements of EN 14211 (issue June 2005). Furthermore the manufacturing and the quality management of the measuring system M200E respectively T200 for NO, NO₂ and NO_x fulfill the requirements of EN 15267.

The test report on the type approval with the report no. 936/21205926/A as well as an addendum to the test report with the report no. 936/21219874/B are available on the internet at www.qal1.de.

The current software version of the measuring system M200E is:

K.7 with Library Version 6.4

The current software version of the measuring system T200 is:

1.0.4 with Library Version 7.0.3

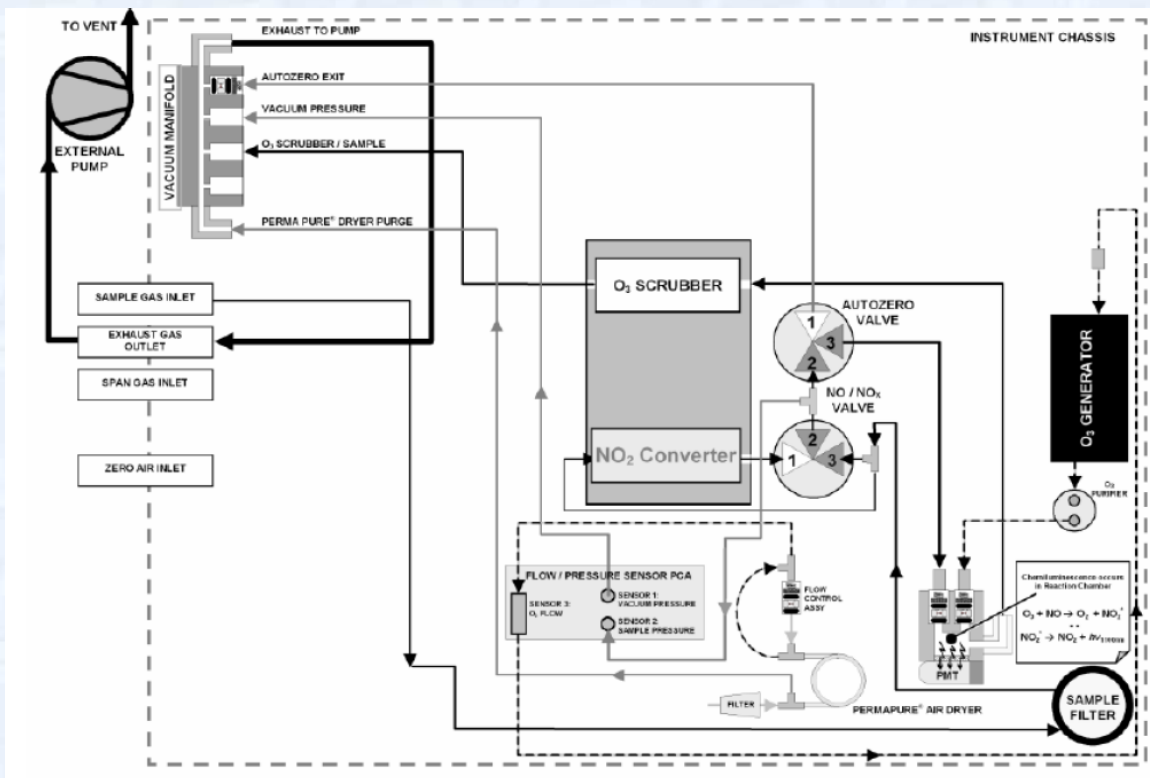
Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 11 October 2012

Certified product

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

The measuring principle of the measuring system M200E respectively T200 is based on the determination of the chemiluminescence caused by reaction of nitrogen monoxide (NO) with ozone (O₃) thus complies with the reference method described in the standard EN 14211.

The schematic set-up / flow diagram of the measuring system M200E respectively T200 (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 Energie und Umwelt 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 can be applied to the product or used in publicity material for the certified product is presented on page 1 of this certificate.

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

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

Certification of M200E / T200 for NO, NO₂ and NO_x 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 Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: BAnz. 6 November 2007, No. 206, p. 7925, chapter II, No. 2.1
Announcement by UBA from 23 September 2007

Notification:

Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV, notification 21 and notification 22
Announcement by UBA from 10 January 2011

Publication: BAnz AT 05 March 2013 B10, chapter V, notification 4
Announcement by UBA from 12 February 2013

Initial certification according to EN 15267:

Certificate No. 0000038502: 22 March 2013

Expiration date of the certificate: 04 March 2018

Test report: 936/21205926/A dated 22 June 2007
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Addendum: 936/21219874/B dated 11 October 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Statement of TÜV Rheinland Energie und Umwelt GmbH from 11 October 2012

Publication: BAnz AT 05 March 2013 B10, chapter V, notification 4
Announcement by UBA from 12 February 2013

Expanded measurement uncertainty based on the results of the laboratory test for device 1

Measuring device:		Teledyne API M200E		Serial number:		SN 1 (1253)	
Measured component:		NO		1h-Limit value:		505 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	$u_{r,z}$	0.11	0.0117	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.050	$u_{r,lv}$	0.12	0.0135	
3	"lack of fit" at 1h-limit value	≤ 4.0% of meas. value	-0.600	$u_{l,lv}$	-1.75	3.0603	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.140	u_{gp}	1.29	1.6656	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.040	u_{gt}	0.50	0.2470	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.520	u_{st}	6.50	42.2196	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.010	u_v	0.17	0.0294	
8a	Interferent H ₂ O with 21 mmol/mol	≤ 5.0 nmol/mol	-3.787	u_{H_2O}	2.56	6.5357	
8b	Interferent CO ₂ with 500 µmol/mol	≤ 5.0 nmol/mol	0.704	$u_{int,pos}$	0.99	0.9793	
8c	Interferent O ₃ with 200 nmol/mol	≤ 2.0 nmol/mol	-1.714				
8d	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol	0.700	$u_{int,neg}$			
9	Averaging effect	≤ 7.0% of meas. value	0.800	u_{av}	2.33	5.4405	
18	Difference sample/calibration port	≤ 1%	0.000	u_{Dsc}	0.00	0.0000	
21	Converter efficiency	≥ 98	98.000	u_{EC}	5.83	34.0033	
22	Increase of NO ₂ -conc. due to residence time in the analyser	≤ 4.0 nmol/mol	0.350	u_{ctr}	1.02	1.0414	
23	Uncertainty of test gas	≤ 3%	2.000	u_{cg}	5.05	25.5025	
Combined standard uncertainty				u_c		10.9898	nmol/mol
Expanded uncertainty				U_c		21.9795	nmol/mol
Relative expanded uncertainty				$U_{c,rel}$		4.35	%
Maximum allowed expanded uncertainty				$U_{req,rel}$		15	%

Expanded measurement uncertainty based on the results of the laboratory and field test for device 1

Measuring device:		Teledyne API M200E		Serial number:		SN 1 (1253)	
Measured component:		NO		1h-Limit value:		505 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	$u_{r,z}$	0.11	0.0117	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.050	$u_{r,lv}$	not considered, as $u_{r,lv} = 0,11 < u_{r,f}$	-	
3	"lack of fit" at 1h-limit value	≤ 4.0% of meas. value	-0.600	$u_{l,lv}$	-1.75	3.0603	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.140	u_{gp}	1.29	1.6656	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.040	u_{gt}	0.50	0.2470	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.520	u_{st}	6.50	42.2196	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.010	u_v	0.17	0.0294	
8a	Interferent H ₂ O with 21 mmol/mol	≤ 5.0 nmol/mol	-3.787	u_{H_2O}	2.56	6.5357	
8b	Interferent CO ₂ with 500 µmol/mol	≤ 5.0 nmol/mol	0.704	$u_{int,pos}$	0.99	0.9793	
8c	Interferent O ₃ with 200 nmol/mol	≤ 2.0 nmol/mol	-1.714				
8d	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol	0.700	$u_{int,neg}$			
9	Averaging effect	≤ 7.0% of meas. value	0.800	u_{av}	2.33	5.4405	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of 3 month average	1.770	$u_{r,f}$	1.85	3.4278	
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 1h-limit value	≤ 5.0% of max. of cert. range	1.030	$u_{d,l,lv}$	3.00	9.0185	
18	Difference sample/calibration port	≤ 1%	0.000	u_{Dsc}	0.00	0.0000	
21	Converter efficiency	≥ 98	98.000	u_{EC}	5.83	34.0033	
22	Increase of NO ₂ -conc. due to residence time in the analyser	≤ 4.0 nmol/mol	0.350	u_{ctr}	1.02	1.0414	
23	Uncertainty of test gas	≤ 3%	2.000	u_{cg}	5.05	25.5025	
Combined standard uncertainty				u_c		11.6908	nmol/mol
Expanded uncertainty				U_c		23.3816	nmol/mol
Relative expanded uncertainty				$U_{c,rel}$		4.63	%
Maximum allowed expanded uncertainty				$U_{req,rel}$		15	%

Expanded measurement uncertainty based on the results of the laboratory test for device 2

Measuring device:		Teledyne API M200E			Serial number:		SN 2 (1257)	
Measured component:		NO			1h-Limit value:		505 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	$u_{r,z}$	0.10	0.0095		
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.230	$u_{r,lv}$	0.14	0.0189		
3	"lack of fit" at 1h-limit value	≤ 4.0% of meas. value	-0.200	$u_{l,lv}$	-0.58	0.3400		
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.060	u_{gp}	0.55	0.3003		
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.030	u_{gt}	0.37	0.1393		
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.180	u_{st}	2.25	5.0589		
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	u_v	0.51	0.2647		
8a	Interferent H ₂ O with 21 mmol/mol	≤ 5.0 nmol/mol	-4.219	u_{H2O}	2.85	8.1119		
8b	Interferent CO ₂ with 500 µmol/mol	≤ 5.0 nmol/mol	1.306	$u_{int, pos}$ or $u_{int, neg}$	1.75	3.0462		
8c	Interferent O ₂ with 200 nmol/mol	≤ 2.0 nmol/mol	-1.719					
8d	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol	1.717					
9	Averaging effect	≤ 7.0% of meas. value	1.000	u_{av}	2.92	8.5008		
18	Difference sample/calibration port	≤ 1%	0.000	u_{psc}	0.00	0.0000		
21	Converter efficiency	≥ 98	98.200	u_{EC}	5.25	27.5427		
22	Increase of NO ₂ -conc. due to residence time in the analyser	≤ 4.0 nmol/mol	0.350	u_{ctr}	1.02	1.0414		
23	Uncertainty of test gas	≤ 3%	2.000	u_g	5.05	25.5025		
Combined standard uncertainty				u_c	8.9390	nmol/mol		
Expanded uncertainty				U_c	17.8780	nmol/mol		
Relative expanded uncertainty				$U_{c,rel}$	3.54	%		
Maximum allowed expanded uncertainty				$U_{req,rel}$	15	%		

Expanded measurement uncertainty based on the results of the laboratory and field test for device 2

Measuring device:		Teledyne API M200E			Serial number:		SN 2 (1257)	
Measured component:		NO			1h-Limit value:		505 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	$u_{r,z}$	0.10	0.0095		
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.230	$u_{r,lv}$	not considered, as $u_{r,lv} = 0,13 < u_{r,f}$	-		
3	"lack of fit" at 1h-limit value	≤ 4.0% of meas. value	-0.200	$u_{l,lv}$	-0.58	0.3400		
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.060	u_{gp}	0.55	0.3003		
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.030	u_{gt}	0.37	0.1393		
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.180	u_{st}	2.25	5.0589		
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	u_v	0.51	0.2647		
8a	Interferent H ₂ O with 21 mmol/mol	≤ 5.0 nmol/mol	-4.219	u_{H2O}	2.85	8.1119		
8b	Interferent CO ₂ with 500 µmol/mol	≤ 5.0 nmol/mol	1.306	$u_{int, pos}$ or $u_{int, neg}$	1.75	3.0462		
8c	Interferent O ₂ with 200 nmol/mol	≤ 2.0 nmol/mol	-1.719					
8d	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol	1.717					
9	Averaging effect	≤ 7.0% of meas. value	1.000	u_{av}	2.92	8.5008		
10	Reproducibility standard deviation under field conditions	≤ 5.0% of 3 month average	1.770	$u_{r,f}$	1.85	3.4278		
11	Long term drift at zero level	≤ 5.0 nmol/mol	-0.840	$u_{d,l,z}$	-0.48	0.2352		
12	Long term drift at 1h-limit value	≤ 5.0% of max. of cert. range	-0.950	$u_{d,l,lv}$	-2.77	7.6720		
18	Difference sample/calibration port	≤ 1%	0.000	u_{psc}	0.00	0.0000		
21	Converter efficiency	≥ 98	98.200	u_{EC}	5.25	27.5427		
22	Increase of NO ₂ -conc. due to residence time in the analyser	≤ 4.0 nmol/mol	0.350	u_{ctr}	1.02	1.0414		
23	Uncertainty of test gas	≤ 3%	2.000	u_g	5.05	25.5025		
Combined standard uncertainty				u_c	9.7278	nmol/mol		
Expanded uncertainty				U_c	19.4556	nmol/mol		
Relative expanded uncertainty				$U_{c,rel}$	3.85	%		
Maximum allowed expanded uncertainty				$U_{req,rel}$	15	%		