Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000056505_01

Certified AMS:	T200P for NO, NO_2 and NO_x
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 10 pages).
The present certificate replaces certificate 0000056505_00 dated 13 April 2018.

TÜVRheinland® CERTIFIED

Suitability Tested
Complying with 2008/50/EC
EN 15267
Regular Surveillance
www.tuv.com
ID 0000056505

Publication in the German Federal Gazette (BAnz) of 26 March 2018

German Environment Agency
Dessau, 22 March 2023

Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
25 March 2028

TÜV Rheinland Energy GmbH
Cologne, 21 March 2023

ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu
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.

10/221 2.08

Test report:	936/21238687/A dated 12 September 2017
Initial certification:	26 March 2018
Expiry date:	25 March 2028
Certificate:	Renewal (of previous certificate 0000056505_00 of 13 April 2018 valid until 25 March 2023)
Publication:	BAnz AT 26.03.2018 B8, chapter III No. 1.1

Approved application
The tested AMS is suitable for continuous ambient air monitoring of NO, NO_2 and NO_x (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 0° 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 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 936/21238687/A dated 12 September 2017 of TÜV Rheinland Energy 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 26.03.2018 B8, chapter III No. 1.1, Announcement by UBA dated 21 February 2018:

AMS designation
T200P for NO, NO_2 and NO_x

Manufacturer:
Teledyne API, San Diego, USA

Field of application:
For continuous ambient air monitoring of nitrogen oxide (stationary operation)

Measuring ranges during performance testing:

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

Software versions:
Package Version 1.1.5
Driver Version 1.0.15.22

Restrictions:
none

Note:
The test report on performance testing is available on the internet at www.qal1.de.

Test institute:
TÜV Rheinland Energy GmbH, Cologne
Report no. 936/21238687/A dated 12 September 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chap. IV notification 68, Announcement by UBA dated 27 February 2019:

68 Notification as regards Federal Environment Agency (UBA) notice of 21 February 2018 (BAnz AT 26.08.2018 B8, chapter III number 1.1)

The current software version of the T200P measuring system for NO, NO_2 and NO_x manufactured by Teledyne Advanced Pollution Instrumentation is:
Package version: 1.3.0
Driver version: 1.0.15

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 68, Announcement by UBA dated 24 February 2020:

68 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2018 (BAnz AT 26.08.2018 B8, chapter III number 1.1) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV notification 68)

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

The latest software version of the T200P measuring system for NO, NO_2 and NO_x manufactured by Teledyne API is:

Package version: 1.3.19
Driver version: 1.0.21

This includes the following versions:

Package Version	Driver Version
1.3.18	1.0.21
1.3.17	1.0.20
1.3.12, build 162	1.0.18
1.3.11	1.0.17
1.3.4	1.0.16
1.3.1	1.0.15
1.3.0	1.0.15

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 22, Announcement by UBA dated 27 May 2020:

22 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2018 (BAnz AT 26.08.2018 B8, chapter III number 1.1) and of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter IV, notification 68)

The latest software version of the T200P measuring system for NO, NO_2 and NO_x manufactured by Teledyne API is:

Package Version: 1.3.27
Driver Version: 1.0.22

This includes the following versions:
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 02 March 2020

Certified product

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

Teledyne API's Model T200P is a photolytic NO/NO_2/NO_x-Analyser that uses a patented high efficiency Blue Light Converter (BLC) coupled with state-of-the-art microprocessor technology to provide true measurement of ambient nitrogen dioxide (NO_2). The BLC includes the latest technology in high powered LEDs and a Teflon cell with reflective properties that increase the overall conversion efficiency, which allows for better speciation of lower NO_2 levels.

In the analyser, sample gas flows to a solenoid valve unit via an inlet filter. At this point, the relevant inlet can be selected (sample, zero gas, test gas). The dryer between the dust filter and the solenoid valves allows the removal of all interference caused by moisture.

For the NO-cycle, the sample is sucked into the reaction cell directly; for the NO_x cycle it is sucked in via the $NO_2 \rightarrow$ NO-BLC converter.

The ozoniser generates the necessary ozone for measurements from ambient air. Dust is removed from the air sucked in before the latter is transported through a drier. At the outlet of the ozone generator, the ozone passes through cleaning before it reaches the reaction chamber inside the measuring module. The ozoniser chip ensures the energy supply of the ozone gen-erator.

Furthermore, the dryer provides purge air for the conversion of the photomultiplier tube after flow through of the purge dryer filter. The vacuum distributor connected to the external pump connects all internal elements which require negative pressure.

The following main components are situated inside the analyser:

- Blue light converter (BLC)
- Photomultiplier tube (PMT)
- Optical filter
- Ozone dryer/sample dryer
- Ozone generator
- Vacuum pump

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**.

History of documents
Certification of T200P 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. 0000056505_00: 13 April 2018
Expiry date of the certificate: 25 March 2023
Test report 936/21238687/A dated 12 September 2017
TÜV Rheinland Energy GmbH
Publication BAnz AT 26.03.2018 B8, chapter III number 1.1
UBA announcement dated 21 February 2018

Notifications
Statement issued by TÜV Rheinland Energy GmbH dated 5 September 2018
Publication BAnz AT 26.03.2019 B7, chapter IV notification 68
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 68
UBA announcement dated 24 February 2020
(Software changes and new manufacturer name)

Statement issued by TÜV Rheinland Energy GmbH dated 2 March 2020
Publication BAnz AT 31.07.2020 B10, chapter II notification 22
UBA announcement dated 27 May 2020
(Software changes)

Renewal of certificate
Certificate No. 0000056505_01: 22 March 2023
Expiry date of the certificate: 25 March 2028

Expanded uncertainty laboratory, system 1

Measuring device:	T200P		Serial-No.:	SN: 59	
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	1.230	$u_{r,lh}$	0.06	0.0038
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.750	$u_{l,lh}$	0.45	0.2051
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.990	u_{gp}	2.49	6.2057
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.150	u_{gt}	0.38	0.1425
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.410	u_{st}	1.03	1.0644
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	u_V	0.06	0.0034
8a	Interferent H_20 with 21 mmol/mol	≤ 10 nmol/mol (Zero)	-0.330	u_{H2O}	-0.41	0.1673
		≤ 10 nmol/mol (Span)	-1.370			
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	1.100	$u_{int,pos}$		
		≤ 5.0 nmol/mol (Span)	-0.500	or	0.93	0.8668
8c	Interferent NH_3 mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.930			
		≤ 5.0 nmol/mol (Span)	0.530	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	-2.460	u_{av}	-1.49	2.2071
18	Difference sample/calibration port	≤ 1.0%	-0.240	$u_{\Delta sc}$	-0.25	0.0630
21	Converter efficiency	≥ 98	99.60	u_{EC}	0.42	0.1751
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941

Combined standard uncertainty	u_c	3.4931	nmol/mol
Expanded uncertainty	U	6.9863	nmol/mol
Relative expanded uncertainty	W	6.68	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty laboratory, system 2

Measuring device:	T200P		Serial-No.:	SN: 60	
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	1.460	$u_{r,lh}$	0.07	0.0054
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.100	$u_{l,lh}$	0.66	0.4413
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.910	u_{gp}	2.29	5.2433
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.130	u_{gt}	0.33	0.1070
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.732	u_{st}	1.84	3.3927
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	u_V	0.06	0.0034
8a	Interferent H_20 with 21 mmol/mol	≤ 10 nmol/mol (Zero)	-0.600	u_{H2O}	-0.36	0.1332
		≤ 10 nmol/mol (Span)	-0.070			
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	1.470	$u_{int,pos}$		
		≤ 5.0 nmol/mol (Span)	-1.300	or	1.00	1.0063
8c	Interferent NH_3 mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.830			
		≤ 5.0 nmol/mol (Span)	0.970	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	-3.720	u_{av}	-2.25	5.0469
18	Difference sample/calibration port	≤ 1.0%	-0.130	$u_{\Delta sc}$	-0.14	0.0185
21	Converter efficiency	≥ 98	99.40	u_{EC}	0.63	0.3939
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941

Combined standard uncertainty	u_c	4.1099	nmol/mol
Expanded uncertainty	U	8.2198	nmol/mol
Relative expanded uncertainty	W	7.86	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Umwelt Bundesamt

Certificate:
0000056505_01 / 22 March 2023

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Combined uncertainty, laboratory and field, system 1

Measuring device:	T200P		Serial-No.:	SN: 59	
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	1.230	$u_{r,lh}$	not considered, as √2*ur,lh = 0.08 < ur,f	-
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.750	$u_{l,lh}$	0.45	0.2051
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.990	u_{gp}	2.49	6.2057
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.150	u_{gt}	0.38	0.1425
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.410	u_{st}	1.03	1.0644
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	u_V	0.06	0.0034
8a	Interferent H_20 with 21 mmol/mol	≤ 10 nmol/mol (Zero)	-0.330	u_{H2O}	-0.41	0.1673
		≤ 10 nmol/mol (Span)	-1.370			
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	1.100	$u_{int,pos}$	0.93	0.8668
		≤ 5.0 nmol/mol (Span)	-0.500	or		
8c	Interferent NH_3 mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.930			
		≤ 5.0 nmol/mol (Span)	0.530	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	-2.460	u_{av}	-1.49	2.2071
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	3.830	$u_{r,f}$	4.01	16.0495
11	Long term drift at zero level	≤ 5.0 nmol/mol	-2.210	$u_{d,l,z}$	-1.28	1.6280
12	Long term drift at span level	≤ 5.0% of max. of certification range	-0.940	$u_{d,l,lh}$	-0.57	0.3223
18	Difference sample/calibration port	≤ 1.0%	-0.240	$u_{\Delta sc}$	-0.25	0.0630
21	Converter efficiency	≥ 98	99.600	u_{EC}	0.42	0.1751
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941

Combined standard uncertainty	u_c	5.4949	nmol/mol
Expanded uncertainty	U	10.9898	nmol/mol
Relative expanded uncertainty	W	10.51	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Combined uncertainty, laboratory and field, system 2

Measuring device:	T200P		Serial-No.:	SN: 60	
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	1.460	$u_{r,lh}$	not considered, as √2*ur,lh = 0.1 < ur,f	-
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.100	$u_{l,lh}$	0.66	0.4413
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.910	u_{gp}	2.29	5.2433
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.130	u_{gt}	0.33	0.1070
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.732	u_{st}	1.84	3.3927
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	u_V	0.06	0.0034
8a	Interferent H_20 with 21 mmol/mol	≤ 10 nmol/mol (Zero)	-0.600	u_{H2O}	-0.36	0.1332
		≤ 10 nmol/mol (Span)	-0.070			
8b	Interferent CO_2 with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	1.470	$u_{int,pos}$	1.00	1.0063
		≤ 5.0 nmol/mol (Span)	-1.300	or		
8c	Interferent NH_3 mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.830			
		≤ 5.0 nmol/mol (Span)	0.970	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	-3.720	u_{av}	-2.25	5.0469
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	3.830	$u_{r,f}$	4.01	16.0495
11	Long term drift at zero level	≤ 5.0 nmol/mol	1.150	$u_{d,l,z}$	0.66	0.4408
12	Long term drift at span level	≤ 5.0% of max. of certification range	-0.760	$u_{d,l,lh}$	-0.46	0.2107
18	Difference sample/calibration port	≤ 1.0%	-0.130	$u_{\Delta sc}$	-0.14	0.0185
21	Converter efficiency	≥ 98	99.400	u_{EC}	0.63	0.3939
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941

Combined standard uncertainty	u_c	5.7950	nmol/mol
Expanded uncertainty	U	11.5899	nmol/mol
Relative expanded uncertainty	W	11.08	%
Maximum allowed expanded uncertainty	W_{req}	15	%