

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000056505

**AMS designation:** T200P for NO, NO<sub>2</sub> and NO<sub>x</sub>

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

**Test Laboratory:** TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested and certified  
according to the standards**

**VDI 4202-1 (2010), VDI 4203-3 (2010), EN 14211 (2012),  
EN 15267-1 (2009) and DIN EN 15267-2 (2009).**

Certification is awarded in respect of the conditions stated in this certificate  
(this certificate contains 9 pages).



Suitability Tested  
Complying with  
2008/50/EC  
EN 15267  
Regular  
Surveillance  
[www.tuv.com](http://www.tuv.com)  
ID 0000056505

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

This certificate will expire on:  
25 March 2023

German Federal Environment Agency  
Dessau, 13 April 2018

TÜV Rheinland Energy GmbH  
Cologne, 12 April 2018

  
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)  
Phone: + 49 221 806-5200

TÜV Rheinland Energy GmbH  
Am Grauen Stein  
51105 Köln

Test institute accredited to EN ISO/IEC 17025:2005 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>	936/21238687/A dated 12 September 2017
<b>Initial certification:</b>	26 March 2018
<b>Expiry date:</b>	25 March 2023
<b>Publication:</b>	BAnz AT 26.03.2018 B8, chapter III number 1.1

### **Approved application**

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

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

The AMS is approved for an ambient temperature range of 0 °C 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, in consultation with the manufacturer, 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 planned operation purpose.

### **Basis of the certification**

This certification is based on:

- Test report 936/21238687/A dated 12 September 2017 issued by 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 number 1.1,  
UBA announcement dated 21 February 2018:

**AMS designation:**

T200P for NO, NO<sub>2</sub> and NO<sub>x</sub>

**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	0–1 200	µg/m <sup>3</sup>
Nitrogen dioxide	0–500	µg/m <sup>3</sup>

**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](http://www.qal1.de).

**Test Report:**

TÜV Rheinland Energy GmbH, Cologne

Report no.: 936/21238687/A dated 12 September 2017



### Certified product

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

Teledyne API's Model T200P is a photolytic NO/NO<sub>2</sub>/NO<sub>x</sub>-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<sub>2</sub>). 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<sub>2</sub> 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<sub>x</sub> cycle it is sucked in via the NO<sub>2</sub> → 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 generator.

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

The current software versions are:

Package Version 1.1.5

Driver Version 1.0.15.22

The current manual version is:

083730229A DCN7503/14 March 2017, translation of August 2017.

### 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](http://qal1.de).

Certification of the T200P measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

### Initial certification according to EN 15267

Certificate no. 0000056505: 13 April 2018  
Expiry date of the certificate: 25 March 2023

Test report: 936/21238687/A dated 12 September 2017  
TÜV Rheinland Energy GmbH, Cologne  
Publication: BAnz AT 26.03.2018 B8, chapter III number 1.1  
UBA announcement dated 21 February 2018



Expanded uncertainty laboratory, system 1

Measuring device:		Serial-No.:		SN: 59	
Measured component:		1h-limit value:		104.6	
T200P		NO		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 <sub>r,z</sub> 0.00	0.0000
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.230	U <sub>r,1h</sub> 0.06	0.0038
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.750	U <sub>l,1h</sub> 0.45	0.2051
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.990	U <sub>gp</sub> 2.49	6.2057
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.150	U <sub>gt</sub> 0.38	0.1425
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.410	U <sub>st</sub> 1.03	1.0644
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	U <sub>v</sub> 0.06	0.0034
8a	Interferent H <sub>2</sub> O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	-0.330	U <sub>H2O</sub> -0.41	0.1673
		≤ 10 nmol/mol (Span)	-1.370		
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	1.100		
		≤ 5.0 nmol/mol (Span)	-0.500	U <sub>int,pos</sub> 0.93	0.8668
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.930	or	
		≤ 5.0 nmol/mol (Span)	0.530	U <sub>int,neg</sub>	
9	Averaging effect	≤ 7.0% of measured value	-2.460	U <sub>av</sub> -1.49	2.2071
18	Difference sample/calibration port	≤ 1.0%	-0.240	U <sub>asc</sub> -0.25	0.0630
21	Converter efficiency	≥ 98	99.60	U <sub>ec</sub> 0.42	0.1751
23	Uncertainty of test gas	≤ 3.0%	2.000	U <sub>cg</sub> 1.05	1.0941
Combined standard uncertainty				u <sub>c</sub>	3.4931
Expanded uncertainty				U	6.9863
Relative expanded uncertainty				W	6.68
Maximum allowed expanded uncertainty				W <sub>req</sub>	15

Expanded uncertainty laboratory, system 2

Measuring device:		Serial No.:		SN: 60	
Measured component:		1h-limit value:		104.6	
T200P		NO		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 <sub>r,z</sub>	0.0000
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.460	U <sub>r,1h</sub>	0.0054
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.100	U <sub>l,1h</sub>	0.4413
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.910	U <sub>gp</sub>	5.2433
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.130	U <sub>gt</sub>	0.1070
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.732	U <sub>st</sub>	3.3927
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	U <sub>v</sub>	0.0034
8a	Interferent H <sub>2</sub> O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	-0.600	U <sub>H2O</sub>	0.1332
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 10 nmol/mol (Span)	-0.070	U <sub>int,pos</sub> or U <sub>int,neg</sub>	1.0063
		≤ 5.0 nmol/mol (Zero)	1.470		
		≤ 5.0 nmol/mol (Span)	-1.300		
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.830	U <sub>int,neg</sub>	1.0063
		≤ 5.0 nmol/mol (Span)	0.970		
9	Averaging effect	≤ 7.0% of measured value	-3.720	U <sub>av</sub>	5.0469
18	Difference sample/calibration port	≤ 1.0%	-0.130	U <sub>Asc</sub>	0.0185
21	Converter efficiency	≥ 98	99.40	U <sub>EC</sub>	0.3939
23	Uncertainty of test gas	≤ 3.0%	2.000	U <sub>cg</sub>	1.0941
Combined standard uncertainty			U <sub>c</sub>	4.1099	
Expanded uncertainty			U	8.2198	
Relative expanded uncertainty			W	7.86	
Maximum allowed expanded uncertainty			W <sub>req</sub>	15	

Combined uncertainty, laboratory and field, system 1

Measuring device:		Serial-No.:		SN: 59		nmol/mol	
Measured component:		1h-limit value:		104.6			
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 <sub>r,z</sub>	0.00	0.0000	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.230	u <sub>r,1h</sub>	not considered, as $\sqrt{2} \cdot u_{r,1h} = 0.08 < u_{rf}$	-	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.750	u <sub>l,1h</sub>	0.45	0.2051	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.990	u <sub>gp</sub>	2.49	6.2057	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.150	u <sub>gt</sub>	0.38	0.1425	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.410	u <sub>gt</sub>	1.03	1.0644	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	u <sub>v</sub>	0.06	0.0034	
8a	Interferent H <sub>2</sub> O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.330	u <sub>H2O</sub>	-0.41	0.1673	
		≤ 10 nmol/mol (Span)	-1.370				
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	1.100	u <sub>int,pos</sub>			
		≤ 5.0 nmol/mol (Span)	-0.500		0.93	0.8668	
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.930	or			
		≤ 5.0 nmol/mol (Span)	0.530	u <sub>int,neg</sub>			
9	Averaging effect	≤ 7.0% of measured value	-2.460	u <sub>av</sub>	-1.49	2.2071	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	3.830	u <sub>r,f</sub>	4.01	16.0495	
11	Long term drift at zero level	≤ 5.0 nmol/mol	-2.210	u <sub>d,l,z</sub>	-1.28	1.6280	
12	Long term drift at span level	≤ 5.0% of max. of certification range	-0.940	u <sub>d,l,1h</sub>	-0.57	0.3223	
18	Difference sample/calibration port	≤ 1.0%	-0.240	u <sub>asc</sub>	-0.25	0.0630	
21	Converter efficiency	≥ 98	99.600	u <sub>ec</sub>	0.42	0.1751	
23	Uncertainty of test gas	≤ 3.0%	2.000	u <sub>cg</sub>	1.05	1.0941	
Combined standard uncertainty						u <sub>c</sub>	5.4949
Expanded uncertainty						U	10.9898
Relative expanded uncertainty						W	10.51
Maximum allowed expanded uncertainty						W <sub>req</sub>	15



Combined uncertainty, laboratory and field, system 2

Measuring device:		Serial-No.:		nmol/mol	
T200P		SN: 60		104.6	
Measured component:		1h-limit value:			
NO					
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.000	$u_{r,z}$	0.0000
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	1.460	$u_{r,h}$ not considered, as $\sqrt{2} \cdot u_{r,h} = 0.1 < u_{r,f}$	-
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.100	$u_{l,h}$	0.4413
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.910	$u_{gp}$	5.2433
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.130	$u_{gt}$	0.1070
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.732	$u_{st}$	3.3927
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	$u_v$	0.0034
8a	Interferent H <sub>2</sub> O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.600	$u_{H_2O}$	0.1332
		≤ 10 nmol/mol (Span)	-0.070		
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	1.470	$u_{h, pos}$	
		≤ 5.0 nmol/mol (Span)	-1.300	or	1.0063
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.830		
		≤ 5.0 nmol/mol (Span)	0.970	$u_{h, neg}$	
9	Averaging effect	≤ 7.0% of measured value	-3.720	$u_{av}$	5.0469
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	3.830	$u_{r,f}$	16.0495
11	Long term drift at zero level	≤ 5.0 nmol/mol	1.150	$u_{d,l,z}$	0.4408
12	Long term drift at span level	≤ 5.0% of max. of certification range	-0.760	$u_{d,l,h}$	0.2107
18	Difference sample/calibration port	≤ 1.0%	-0.130	$u_{asc}$	0.0185
21	Converter efficiency	≥ 98	99.400	$u_{ec}$	0.3939
23	Uncertainty of test gas	≤ 3.0%	2.000	$u_{cg}$	1.0941
Combined standard uncertainty				$u_c$	5.7950
Expanded uncertainty				U	11.5899
Relative expanded uncertainty				W	11.08
Maximum allowed expanded uncertainty				$W_{req}$	15