

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000081160\_00

**Certified AMS:** N200 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),  
 as well as EN 15267-1 (2009) and EN 15267-2 (2009).**

Certification is awarded in respect of the conditions stated in this certificate  
 (this certificate contains 7 pages).



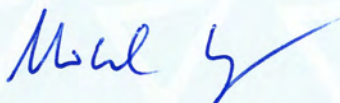
Suitability Tested  
 Complying with  
 2008/50/EC  
 EN 15267  
 Regular  
 Surveillance  
 www.tuv.com  
 ID 0000081160

Publication in the German Federal Gazette  
 (BAnz) of 02 August 2023

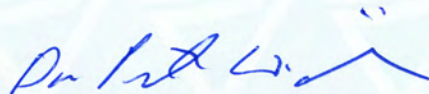
German Environment Agency  
 Dessau, 05 September 2023

This certificate will expire on:  
 01 August 2028

TÜV Rheinland Energy GmbH  
 Cologne, 04 September 2023



Dr. Marcel Langner  
 Head of Section II 4



ppa. Dr. Peter Wilbring

[www.umwelt-tuv.eu](http://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.

**Test report:** 936/21255654/A dated 25 January 2023  
**Initial certification:** 02 August 2023  
**Expiry date:** 01 August 2028  
**Publication:** BAnz AT 02.08.2023 B7, 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 three month field test.

The AMS is approved for an ambient temperature range of +0 °C to +45 °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 936/21255654/A dated 25 January 2023 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 02.08.2023 B7, chapter II No. 2.1,  
Announcement by UBA dated 05 July 2023:

**AMS designation:**

N200 for NO, NO<sub>2</sub> and NO<sub>x</sub>

**Manufacturer:**

Teledyne API, San Diego, USA

**Field of application:**

For the continuous determination of the ambient air concentrations of nitrogen oxides in stationary use.

**Measuring ranges during the performance test:**

Component	Certification range	Unit
Nitrogene monoxide	0 - 1,200	µg/m <sup>3</sup>
Nitrogene dioxide	0 - 500	µg/m <sup>3</sup>

**Software version:**

Rev. 1.9.0

**Restrictions:**

None

**Notes:**

1. The performance test report can be found online at [www.qal1.de](http://www.qal1.de).
2. The measuring system is approved for an ambient temperature range of 0 - 45 °C.
3. The N200 measuring system can be equipped with either an internal or an external pump.
4. The N200 measuring system can be equipped with a standard Teflon particle filter with a pore size of 5 µm and a diameter of 47 mm as well as with a DFU filter cartridge with a pore size of 0.01 µm.

**Test institute:** TÜV Rheinland Energy GmbH,, Cologne

Report No.: 936/21255654/A dated 25 January 2023

## Certified product

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

The Nitric Oxide Analyzer N200 determines the concentration of Nitric Oxide (NO), Total Nitric Oxide (NO<sub>x</sub>, the sum of NO and NO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) of a sample drawn into the instrument. For this purpose, sample and calibration gases must be provided at ambient air pressure to ensure a constant gas flow through the reaction chamber. In the reaction chamber, ozone (O<sub>3</sub>) is applied to the sample gas, causing a light-emitting chemical reaction (chemiluminescence). The instrument measures the amount of chemiluminescence to determine the NO content in the sample gas. A catalytic-reactive converter converts any NO<sub>2</sub> in the sample gas to NO, which is then displayed as NO<sub>x</sub>, including the NO in the sample gas. NO<sub>2</sub> is calculated as the difference between NO<sub>x</sub> and NO.

The only gas that is actually measured in the N200 is NO. Any NO<sub>2</sub> contained in the gas is not detected because NO<sub>2</sub> does not react with O<sub>3</sub> to be exposed to chemiluminescence. To measure the concentration of NO or NO<sub>x</sub>, the N200 periodically cycles the sample gas stream through a converter cartridge filled with molybdenum chips and heated to a temperature of 315°C. The heated molybdenum reacts with the NO<sub>2</sub> in the sample gas and converts it to NO. After the NO<sub>2</sub> in the sample gas is converted to NO, it is passed through the reaction chamber where it is subjected to the chemiluminescence reaction.

By converting the NO<sub>2</sub> in the sample gas to NO, the analyzer can measure the total NO<sub>x</sub> (NO + NO<sub>2</sub>) content in the sample gas. By turning the NO<sub>2</sub> converter on and off in and out of the gas stream at 6 - 10 second intervals, the analyzer can quasi continuously measure both NO and total NO<sub>x</sub> content. The NO<sub>2</sub> concentration is ultimately not measured, but calculated by subtracting the known NO content from the sample gas from the known NO<sub>x</sub> content.



## 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: [gal1.de](http://gal1.de).

## History of documents

Certification of N200 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. 0000081160\_00: 05 September 2023  
Expiry date of the certificate: 01 August 2028  
Test report: 936/21255654/A dated 25 January 2023  
TÜV Rheinland Energy GmbH  
Publication: BAnz AT 02.08.2023 B7, chapter II number 2.1  
UBA announcement dated 5 July 2023

### Expanded uncertainty laboratory, system 1

Measuring device:	N200	Serial-No.:	55
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	0,280	$u_{r,z}$	0,05	0,0026
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0,560	$u_{r,h}$	0,02	0,0005
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0,400	$u_{l,h}$	0,24	0,0584
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0,820	$u_{sp}$	2,06	4,2574
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,050	$u_{st}$	0,13	0,0158
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,581	$u_{st}$	2,19	4,8090
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0,000	$u_v$	0,00	0,0000
8a	Interferent H <sub>2</sub> O with 19 nmol/mol	≤ 10 nmol/mol (Zero)	1,200	$u_{i20}$	0,33	0,1112
		≤ 10 nmol/mol (Span)	-2,400			
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	-0,600	$u_{int,pos}$	0,19	0,0373
		≤ 5.0 nmol/mol (Span)	1,600			
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0,000	$u_{int,neg}$	0,54	0,2954
		≤ 5.0 nmol/mol (Span)	1,600			
9	Averaging effect	≤ 7.0% of measured value	0,900	$u_{av}$	0,81	0,6561
18	Difference sample/calibration port	≤ 1.0%	-0,190	$u_{sc}$	-0,20	0,0395
21	Converter efficiency	≥ 98	99,20	$u_{ec}$	0,84	0,7056
23	Uncertainty of test gas	≤ 3.0%	2,000	$u_{tg}$	1,05	1,0941
Combined standard uncertainty				$u_c$		3,3800 nmol/mol
Expanded uncertainty				U		6,7600 nmol/mol
Relative expanded uncertainty				W		6,46 %
Maximum allowed expanded uncertainty				$W_{req}$		15 %

### Expanded uncertainty laboratory, system 2

Measuring device:	N200	Serial-No.:	56
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	0,250	$u_{r,z}$	0,05	0,0021
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0,350	$u_{r,h}$	0,01	0,0002
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1,070	$u_{l,h}$	0,65	0,4176
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0,860	$u_{sp}$	2,16	4,6829
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,090	$u_{st}$	0,23	0,0513
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,269	$u_{st}$	1,02	1,0309
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 <sub>2</sub> O with 19 nmol/mol	≤ 10 nmol/mol (Zero)	0,000	$u_{i20}$	0,40	0,1622
		≤ 10 nmol/mol (Span)	0,000			
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	-0,600	$u_{int,pos}$	0,24	0,0584
		≤ 5.0 nmol/mol (Span)	0,400			
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0,000	$u_{int,neg}$	-0,18	0,0328
		≤ 5.0 nmol/mol (Span)	2,000			
9	Averaging effect	≤ 7.0% of measured value	-0,300	$u_{av}$	-0,03	0,0010
18	Difference sample/calibration port	≤ 1.0%	-0,030	$u_{sc}$	0,73	0,5361
21	Converter efficiency	≥ 98	99,30	$u_{ec}$	1,05	1,0941
23	Uncertainty of test gas	≤ 3.0%	2,000	$u_{tg}$	1,05	1,0941
Combined standard uncertainty				$u_c$		2,8413 nmol/mol
Expanded uncertainty				U		5,6827 nmol/mol
Relative expanded uncertainty				W		5,43 %
Maximum allowed expanded uncertainty				$W_{req}$		15 %

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

Measuring device:	N200	Serial-No.:	55
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	0,280	$u_{r,z}$	0,05	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0,560	$u_{r,h}$	not considered, as $\sqrt{2} \cdot u_{r,h} = 0,03 < u_{r,f}$	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0,400	$u_{l,h}$	0,24	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0,820	$u_{sp}$	2,06	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,050	$u_{st}$	0,13	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,581	$u_{st}$	2,19	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0,000	$u_v$	0,00	
8a	Interferent H <sub>2</sub> O with 19 nmol/mol	≤ 10 nmol/mol (Zero)	1,200	$u_{iCO}$	0,33	
		≤ 10 nmol/mol (Span)	-2,400			
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	-0,600	$u_{i2, pos}$	0,19	
		≤ 5.0 nmol/mol (Span)	1,600			
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0,000	or	0,0373	
		≤ 5.0 nmol/mol (Span)	1,600			
9	Averaging effect	≤ 7.0% of measured value	0,900	$u_{av}$	0,54	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	3,570	$u_{r,f}$	3,73	
11	Long term drift at zero level	≤ 5.0 nmol/mol	0,840	$u_{d,z}$	0,48	
12	Long term drift at span level	≤ 5.0% of max. of certification range	-1,190	$u_{d,h}$	-0,72	
18	Difference sample/calibration port	≤ 1.0%	-0,190	$u_{sc}$	-0,20	
21	Converter efficiency	≥ 98	99,200	$u_{EC}$	0,84	
23	Uncertainty of test gas	≤ 3.0%	2,000	$u_{tg}$	1,05	
				Combined standard uncertainty	$u_c$	5,1107
				Expanded uncertainty	U	10,2215
				Relative expanded uncertainty	W	9,77
				Maximum allowed expanded uncertainty	$W_{req}$	15

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

Measuring device:	N200	Serial-No.:	56
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	0,250	$u_{r,z}$	0,05	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0,350	$u_{r,h}$	not considered, as $\sqrt{2} \cdot u_{r,h} = 0,01 < u_{r,f}$	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1,070	$u_{l,h}$	0,65	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0,860	$u_{sp}$	2,16	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,090	$u_{st}$	0,23	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0,269	$u_{st}$	1,02	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0,010	$u_v$	0,04	
8a	Interferent H <sub>2</sub> O with 19 nmol/mol	≤ 10 nmol/mol (Zero)	1,000	$u_{iCO}$	0,40	
		≤ 10 nmol/mol (Span)	-1,200			
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	-0,600	$u_{i2, pos}$	0,24	
		≤ 5.0 nmol/mol (Span)	0,400			
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0,000	or	0,0584	
		≤ 5.0 nmol/mol (Span)	2,000			
9	Averaging effect	≤ 7.0% of measured value	-0,300	$u_{av}$	-0,18	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	3,570	$u_{r,f}$	3,73	
11	Long term drift at zero level	≤ 5.0 nmol/mol	0,960	$u_{d,z}$	0,55	
12	Long term drift at span level	≤ 5.0% of max. of certification range	-1,270	$u_{d,h}$	-0,77	
18	Difference sample/calibration port	≤ 1.0%	-0,030	$u_{sc}$	-0,03	
21	Converter efficiency	≥ 98	99,300	$u_{EC}$	0,73	
23	Uncertainty of test gas	≤ 3.0%	2,000	$u_{tg}$	1,05	
				Combined standard uncertainty	$u_c$	4,7867
				Expanded uncertainty	U	9,5734
				Relative expanded uncertainty	W	9,15
				Maximum allowed expanded uncertainty	$W_{req}$	15