Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000081161_01

Certified AMS:	N300 for CO
Manufacturer:	Teledyne API 9970 Carroll Canyon Road San Diego, CA, 92131 USA
Test Institute:	TÜV Rheinland Energy & Environment GmbH

This is to certify that the AMS has been tested and found to comply with the standards VDI 4202-1 (2018), EN 14626 (2012), EN 14626 (2024) as well as EN 15267-1 (2009) and EN 15267-2 (2023).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 11 pages).
This certificate replaces certificate 0000081161_00 dated 5 September 2023.

TÜVRheinland® CERTIFIED
Suitability Tested
Complying with 2008/50/EC
EN 15267
Regular Surveillance
www.tuv.com
ID 0000081161

Publication in the German Federal Gazette (BAnz) of 10 July 2026

This certificate will expire on:
9 July 2031

German Environment Agency
Dessau, 17 September 2026

TÜV Rheinland Energy & Environment GmbH
Cologne, 15 September 2026

Dr. Marcel Langner
Head of Section II 4

Dipl.-Ing. G. Baum

www.umwelt-tuv.eu
tre@umwelt-tuv.eu
Tel. + 49 221 806-5200

TÜV Rheinland Energy and Environment 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/B dated 25 January 2023 as well as addendum EuL/21272240/B dated 15 July 2025
Initial certification:	2 August 2023
Expiry date:	9 July 2031
Publication:	BAnz AT 02.08.2023 B7, chapter II Number 3.1 and BAnz AT 10.07.2026 B5, chapter VI notification 75

Approved application

The tested AMS is suitable for continuous ambient air monitoring of CO (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/B dated 25 January 2023 of TÜV Rheinland Energy & Environment GmbH as well as addendum EuL/21272240/B dated 15 July 2025 by TÜV Rheinland Energy & Environment 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 Number 3.1, Announcement by UBA dated 05 July 2023:

AMS designation:
N300 for carbon monoxide

Manufacturer:
Teledyne API, San Diego, USA

Field of application:
For the continuous determination of the ambient air concentrations of carbon monoxide in stationary use.

Measuring ranges during the performance test:

Component	Certification range	Unit
Carbon monoxide	0 - 100	mg/m³

Software version:
Rev. 1.9.0

Restrictions:
None

Notes:
1. The performance test report can be found online at www.qal1.de.
2. The measuring system is approved for an ambient temperature range of 0 - 45 °C.
3. The N300 measuring system can be equipped with a controlled pump (PID controlled) as well as with a non-controlled pump (HD Non-PID).
4. The N300 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 report: TÜV Rheinland Energy GmbH, Cologne
Report No.: 936/21255654/B dated 25 January 2023

Publication in the German Federal Gazette: BAnz AT 19 May 2025 B3, Chapter VI notification 68, Announcement by UBA dated 2 April 2025:

68 Notification as regards Federal Environment Agency (UBA) notice dated 5 July 2023 (BAnz AT 02.08.2023 B7, chapter II number 3.1)

The current software version of the measuring system N300 for CO manufactured by Teledyne API is:
Rev. 1.11.2
The version 1.11.1 is also covered.

Statement issued by TÜV Rheinland Energy & Environment GmbH dated 26 September 2024

Publication in the German Federal Gazette: BAnz AT 10 July 2026 B5, Chapter VI notification 75, Announcement by UBA dated 18 May 2026:

75 Notification as regards Federal Environment Agency (UBA) notice dated 5 July 2023 (BAnz AT 02.08.2023 B7, chapter II number 3.1) and dated 2 April 2025 (BAnz AT 19.05.2025 B3, chapter IV notification 68)

The N300 measuring system for CO from Teledyne API complies with the requirements of EN 14626 (2024 edition). An addendum to the test report, with report number EuL/21272240/B, is available online at www.qal1.de.

Statement issued by TÜV Rheinland Energy & Environment GmbH dated 15 July 2025

Certified product

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

The immission measuring device N300 is a continuous carbon monoxide analyzer. The measurement principle is based on non-dispersive infrared photometry.

The N300 analyzer uses a heated infrared source to generate a beam of broadband IR light with a known intensity (measured during instrument calibration). This beam is sent several times through the measurement chamber, which is filled with sample gas. The measurement chamber uses mirrors at each end to send the IR beam back and forth through the measurement chamber several times (see Figure 3) to create a long absorption path. The absolute length that the reflected light travels is directly related to the intended accuracy of the instrument. The lower the concentrations the instrument is intended to detect, the longer the light path must be to produce detectable attenuations.

Upon exiting the measurement chamber, the light beam passes through a bandpass filter that only allows light with a wavelength of 4.7 µm to pass through. Finally, the beam hits a photodetector, which converts the light signal to a modulated voltage signal representing the attenuated intensity of the beam.

Since water vapor also absorbs light at 4.7 µm, a gas filter correlation (GFC) wheel is added to the IR light path to prevent the interference effect of water vapor. The GFC wheel is a metallic wheel with two chambers. The chambers are hermetically sealed on both sides with a material transparent to 4.7 µm IR radiation Each cavity is mainly filled with gas mixtures. One chamber is filled with pure N_2 (the measurement chamber). The other is filled with a mixture of N_2 and a high concentration of CO (the reference chamber). As the GFC wheel rotates, the IR light passes alternately through these two cavities. When the beam hits the reference chamber, the CO in the gas filter wheel clears the beam of most of the 4.7 µm IR. When the beam hits the measurement chamber, the N_2 in the filter wheel does not absorb the IR light. Thus, a fluctuation in the intensity of the IR light is produced on the photodetector, allowing a measurement signal to be determined.

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 & Environment 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 & Environment 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 & Environment 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 N300 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. 0000081161_00: 5 September 2023
Expiry date of the certificate: 1 August 2028
Test report: 936/21255654/B dated 25 January 2023
TÜV Rheinland Energy GmbH
Publication: BAnz AT 02.08.2023 B7, chapter II number 3.1
UBA announcement dated 5 July 2023

Certificate based on a notification
Certificate No. 0000081160_01: 17 September 2026
Expiry date of the certificate: 9 July 2031
Statement issued by TÜV Rheinland Energy & Environment GmbH dated 15 July 2025
Addendum EuL/21272240/B dated 15 July 2025
Publication: BAnz AT 10.07.2026 B5, chapter IV notification 75
(Also complies with EN 14626; an addendum is attached to the test report)
UBA publication dated 18 May 2026

Notifications
Statement issued by TÜV Rheinland Energy & Environment GmbH dated 26 September 2024
Publication: BAnz AT 19.05.2025 B3, chapter IV notification 68,
UBA publication dated 2 April 2025
(Software changes)

Expanded uncertainty laboratory, system 1 (2012)

N300			Serial-No.:	54	
CO			8h-limit value:	8,62	µmol/mol

Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
Repeatability standard deviation at zero	≤ 0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
Repeatability standard deviation at 8h-limit value	≤ 0.4 µmol/mol	0,050	u_r	0,01	0,0001
"lack of fit" at 8h-limit value	≤ 4.0% of measured value	2,250	u_l	0,11	0,0125
Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0,110	u_{gp}	0,25	0,0638
Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,000	u_{gt}	0,00	0,0000
Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,076	u_{st}	0,17	0,0305
Sensitivity coefficient of electrical voltage at 8h-limit value	≤ 0.3 µmol/mol/V	0,000	u_v	0,00	0,0000
Interferent H_20 with 19 mmol/mol	≤ 1.0 µmol/mol (Zero)	-0,270	u_{H2O}	-0,20	0,0408
	≤ 1.0 µmol/mol (Span)	-0,020			
Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,000	$u_{int,pos}$	0,12	0,0148
	≤ 0.5 µmol/mol (Span)	-0,060			
Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,000	or		
	≤ 0.5 µmol/mol (Span)	-0,020			
Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero)	0,020			
	≤ 0.5 µmol/mol (Span)	-0,130	$u_{int,neg}$		
Averaging effect	≤ 7.0% of measured value	4,300	u_{av}	0,21	0,0458
Difference sample/calibration port	≤ 1.0%	0,140	$u_{\Delta sc}$	0,01	0,0001
Uncertainty of test gas	≤ 3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,4647	µmol/mol
Expanded uncertainty	U	0,9293	µmol/mol
Relative expanded uncertainty	W	10,78	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty laboratory, system 2 (2012)

Measuring device:	N300		Serial-No.:	55	
Measured component:	CO		8h-limit value:	8,62	µmol/mol

No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
2	Repeatability standard deviation at 8h-limit value	≤ 0.4 µmol/mol	0,050	u_r	0,01	0,0001
3	"lack of fit" at 8h-limit value	≤ 4.0% of measured value	2,210	u_l	0,11	0,0121
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0,020	u_{gp}	0,05	0,0021
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,000	u_{gt}	0,00	0,0000
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,064	u_{st}	0,15	0,0216
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤ 0.3 µmol/mol/V	0,000	u_v	0,00	0,0000
8a	Interferent H_20 with 19 mmol/mol	≤ 1.0 µmol/mol (Zero)	-0,140	u_{H2O}	-0,10	0,0109
		≤ 1.0 µmol/mol (Span)	-0,110			
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,170	$u_{int,pos}$	0,06	0,0040
		≤ 0.5 µmol/mol (Span)	0,050			
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,000			
		≤ 0.5 µmol/mol (Span)	0,060	or		
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero)	0,050			
		≤ 0.5 µmol/mol (Span)	-0,090	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	5,800	u_{av}	0,29	0,0833
18	Difference sample/calibration port	≤ 1.0%	-0,060	$u_{\Delta sc}$	-0,01	0,0000
21	Uncertainty of test gas	≤ 3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,3764	µmol/mol
Expanded uncertainty	U	0,7528	µmol/mol
Relative expanded uncertainty	W	8,73	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty, laboratory and field, system 1 (2012)

Measuring device:	N300			Serial-No.:	54	
Measured component:	CO			8h-limit value:	8,62	µmol/mol

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤	0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
2	Repeatability standard deviation at 8h-limit value	≤	0.4 µmol/mol	0,050	u_r	not considered, as ur = 0,01 < ur,f	-
3	"lack of fit" at 8h-limit value	≤	4.0% of measured value	2,250	u_l	0,11	0,0125
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤	0.7 µmol/mol/kPa	0,110	u_{gp}	0,25	0,0638
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,000	u_{gt}	0,00	0,0000
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,076	u_{st}	0,17	0,0305
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤	0.3 µmol/mol/V	0,000	u_V	0,00	0,0000
8a	Interferent H_20 with 19 mmol/mol	≤	1.0 µmol/mol (Zero)	-0,020	u_{H2O}	-0,20	0,0408
		≤	1.0 µmol/mol (Span)	-0,270			
8b	Interferent CO_2 with 500 µmol/mol	≤	0.5 µmol/mol (Zero)	0,000	$u_{int,pos}$	0,12	0,0148
		≤	0.5 µmol/mol (Span)	-0,060			
8c	Interferent NO with 1 µmol/mol	≤	0.5 µmol/mol (Zero)	0,000	or		
		≤	0.5 µmol/mol (Span)	-0,020			
8d	Interferent N_2O with 50 nmol/mol	≤	0.5 µmol/mol (Zero)	0,020			
		≤	0.5 µmol/mol (Span)	-0,130	$u_{int,neg}$		
9	Averaging effect	≤	7.0% of measured value	4,300	u_{av}	0,21	0,0458
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	1,080	$u_{r,f}$	0,09	0,0087
11	Long term drift at zero level	≤	0.5 µmol/mol	0,020	$u_{d,l,z}$	0,01	0,0001
12	Long term drift at span level	≤	5.0% of max. of certification range	-1,560	$u_{d,l,8h}$	-0,08	0,0060
18	Difference sample/calibration port	≤	1.0%	0,140	u_{dsc}	0,01	0,0001
21	Uncertainty of test gas	≤	3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,4802	µmol/mol
Expanded uncertainty	U	0,9605	µmol/mol
Relative expanded uncertainty	W	11,14	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty, laboratory and field, system 2 (2012)

Measuring device:	N300			Serial-No.:	55	
Measured component:	CO			8h-limit value:	8,62	µmol/mol

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤	0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
2	Repeatability standard deviation at 8h-limit value	≤	0.4 µmol/mol	0,050	u_r	not considered, as ur = 0,01 < ur,f	-
3	"lack of fit" at 8h-limit value	≤	4.0% of measured value	2,210	u_l	0,11	0,0121
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤	0.7 µmol/mol/kPa	0,020	u_{gp}	0,05	0,0021
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,000	u_{gt}	0,00	0,0000
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,064	u_{st}	0,15	0,0216
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤	0.3 µmol/mol/V	0,000	u_V	0,00	0,0000
8a	Interferent H_20 with 19 mmol/mol	≤	1.0 µmol/mol (Zero)	-0,110	u_{H2O}	-0,10	0,0109
		≤	1.0 µmol/mol (Span)	-0,140			
8b	Interferent CO_2 with 500 µmol/mol	≤	0.5 µmol/mol (Zero)	0,170	$u_{int,pos}$	0,06	0,0040
		≤	0.5 µmol/mol (Span)	0,050			
8c	Interferent NO with 1 µmol/mol	≤	0.5 µmol/mol (Zero)	0,000	or		
		≤	0.5 µmol/mol (Span)	0,060			
8d	Interferent N_2O with 50 nmol/mol	≤	0.5 µmol/mol (Zero)	0,050			
		≤	0.5 µmol/mol (Span)	-0,090	$u_{int,neg}$		
9	Averaging effect	≤	7.0% of measured value	5,800	u_{av}	0,29	0,0833
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	1,080	$u_{r,f}$	0,09	0,0087
11	Long term drift at zero level	≤	0.5 µmol/mol	0,040	$u_{d,l,z}$	0,02	0,0005
12	Long term drift at span level	≤	5.0% of max. of certification range	1,560	$u_{d,l,8h}$	0,08	0,0060
18	Difference sample/calibration port	≤	1.0%	-0,060	u_{dsc}	-0,01	0,0000
21	Uncertainty of test gas	≤	3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,3960	µmol/mol
Expanded uncertainty	U	0,7920	µmol/mol
Relative expanded uncertainty	W	9,19	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty laboratory, system 1 (2024)

Measuring device:	N300		Serial-No.:	54	
Measured component:	CO		8h-limit value:	8,62	µmol/mol

No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
2	Repeatability standard deviation at 8h-limit value	≤ 0.4 µmol/mol	0,050	u_r	0,01	0,0001
3	"lack of fit" at 8h-limit value	≤ 4.0% of measured value	1,690	u_l	0,08	0,0071
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0,100	u_{gp}	0,15	0,0234
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,010	u_{gt}	0,03	0,0007
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,076	u_{st}	0,17	0,0305
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤ 0.3 µmol/mol/V	0,000	u_V	0,00	0,0000
8a	Interferent H_20 with 19 mmol/mol	≤ 1.0 µmol/mol (Zero)	-0,270	u_{H2O}	-0,20	0,0408
		≤ 1.0 µmol/mol (Span)	-0,020			
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,000	$u_{int,pos}$		
		≤ 0.5 µmol/mol (Span)	-0,060			
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,000			
		≤ 0.5 µmol/mol (Span)	-0,020	or	0,05	0,0021
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero)	0,020			
		≤ 0.5 µmol/mol (Span)	0,000	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	4,300	u_{av}	0,21	0,0458
18	Difference sample/calibration port	≤ 1.0%	0,140	$u_{\Delta sc}$	0,01	0,0001
21	Uncertainty of test gas	≤ 3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,3977	µmol/mol
Expanded uncertainty	U	0,7954	µmol/mol
Relative expanded uncertainty	W	9,23	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty laboratory, system 2 (2024)

Measuring device:	N300		Serial-No.:	55	
Measured component:	CO		8h-limit value:	8,62	µmol/mol

No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
2	Repeatability standard deviation at 8h-limit value	≤ 0.4 µmol/mol	0,050	u_r	0,01	0,0001
3	"lack of fit" at 8h-limit value	≤ 4.0% of measured value	0,710	u_l	0,04	0,0012
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0,150	u_{gp}	0,23	0,0528
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,010	u_{gt}	0,03	0,0007
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0,064	u_{st}	0,15	0,0216
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤ 0.3 µmol/mol/V	0,000	u_V	0,00	0,0000
8a	Interferent H_20 with 19 mmol/mol	≤ 1.0 µmol/mol (Zero)	-0,140	u_{H2O}	-0,10	0,0109
		≤ 1.0 µmol/mol (Span)	-0,110			
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,170	$u_{int,pos}$		
		≤ 0.5 µmol/mol (Span)	0,050			
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero)	0,000			
		≤ 0.5 µmol/mol (Span)	0,060	or	0,06	0,0040
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero)	0,010			
		≤ 0.5 µmol/mol (Span)	-0,030	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	5,800	u_{av}	0,29	0,0833
18	Difference sample/calibration port	≤ 1.0%	-0,060	$u_{\Delta sc}$	-0,01	0,0000
21	Uncertainty of test gas	≤ 3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,4269	µmol/mol
Expanded uncertainty	U	0,8537	µmol/mol
Relative expanded uncertainty	W	9,90	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Umwelt Bundesamt

Certificate:
0000081161_01 / 17 September 2026

TÜVRheinland®
Precisely Right.

Expanded uncertainty, laboratory and field, system 1 (2024)

Measuring device:	N300				Serial-No.:	54	
Measured component:	CO				8h-limit value:	8,62	µmol/mol

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤	0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
2	Repeatability standard deviation at 8h-limit value	≤	0.4 µmol/mol	0,050	u_r	not considered, as ur = 0,01 < ur,f	-
3	"lack of fit" at 8h-limit value	≤	4.0% of measured value	1,690	u_l	0,08	0,0071
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤	0.7 µmol/mol/kPa	0,100	u_{gp}	0,15	0,0234
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,010	u_{gt}	0,03	0,0007
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,076	u_{st}	0,17	0,0305
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤	0.3 µmol/mol/V	0,000	u_V	0,00	0,0000
8a	Interferent H_20 with 19 mmol/mol	≤	1.0 µmol/mol (Zero)	-0,020	u_{H2O}	-0,20	0,0408
		≤	1.0 µmol/mol (Span)	-0,270			
8b	Interferent CO_2 with 500 µmol/mol	≤	0.5 µmol/mol (Zero)	0,000	$u_{int,pos}$	0,05	0,0021
		≤	0.5 µmol/mol (Span)	-0,060			
8c	Interferent NO with 1 µmol/mol	≤	0.5 µmol/mol (Zero)	0,000	or		
		≤	0.5 µmol/mol (Span)	-0,020			
8d	Interferent N_2O with 50 nmol/mol	≤	0.5 µmol/mol (Zero)	0,020			
		≤	0.5 µmol/mol (Span)	0,000	$u_{int,neg}$		
9	Averaging effect	≤	7.0% of measured value	4,300	u_{av}	0,21	0,0458
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	0,200	$u_{r,f}$	0,02	0,0003
11	Long term drift at zero level	≤	0.5 µmol/mol	0,020	$u_{d,l,z}$	0,01	0,0001
12	Long term drift at span level	≤	5.0% of max. of certification range	-1,560	$u_{d,l,8h}$	-0,08	0,0060
18	Difference sample/calibration port	≤	1.0%	0,140	$u_{\Delta sc}$	0,01	0,0001
21	Uncertainty of test gas	≤	3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,4056 µmol/mol
Expanded uncertainty	U	0,8112 µmol/mol
Relative expanded uncertainty	W	9,41 %
Maximum allowed expanded uncertainty	W_{req}	15 %

Expanded uncertainty, laboratory and field, system 2 (2024)

Measuring device:	N300				Serial-No.:	55	
Measured component:	CO				8h-limit value:	8,62	µmol/mol

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤	0.3 µmol/mol	0,030	$u_{r,z}$	0,01	0,0000
2	Repeatability standard deviation at 8h-limit value	≤	0.4 µmol/mol	0,050	u_r	not considered, as ur = 0,01 < ur,f	-
3	"lack of fit" at 8h-limit value	≤	4.0% of measured value	0,710	u_l	0,04	0,0012
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤	0.7 µmol/mol/kPa	0,150	u_{gp}	0,23	0,0528
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,010	u_{gt}	0,03	0,0007
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤	0.3 µmol/mol/K	0,064	u_{st}	0,15	0,0216
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤	0.3 µmol/mol/V	0,000	u_V	0,00	0,0000
8a	Interferent H_20 with 19 mmol/mol	≤	1.0 µmol/mol (Zero)	-0,110	u_{H2O}	-0,10	0,0109
		≤	1.0 µmol/mol (Span)	-0,140			
8b	Interferent CO_2 with 500 µmol/mol	≤	0.5 µmol/mol (Zero)	0,170	$u_{int,pos}$	0,06	0,0040
		≤	0.5 µmol/mol (Span)	0,050			
8c	Interferent NO with 1 µmol/mol	≤	0.5 µmol/mol (Zero)	0,000			
		≤	0.5 µmol/mol (Span)	0,060	or		
8d	Interferent N_2O with 50 nmol/mol	≤	0.5 µmol/mol (Zero)	0,010			
		≤	0.5 µmol/mol (Span)	-0,030	$u_{int,neg}$		
9	Averaging effect	≤	7.0% of measured value	5,800	u_{av}	0,29	0,0833
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	0,200	$u_{r,f}$	0,02	0,0003
11	Long term drift at zero level	≤	0.5 µmol/mol	0,040	$u_{d,l,z}$	0,02	0,0005
12	Long term drift at span level	≤	5.0% of max. of certification range	1,560	$u_{d,l,8h}$	0,08	0,0060
18	Difference sample/calibration port	≤	1.0%	-0,060	$u_{\Delta sc}$	-0,01	0,0000
21	Uncertainty of test gas	≤	3.0%	2,000	u_{cg}	0,09	0,0074

Combined standard uncertainty	u_c	0,4347 µmol/mol
Expanded uncertainty	U	0,8694 µmol/mol
Relative expanded uncertainty	W	10,09 %
Maximum allowed expanded uncertainty	W_{req}	15 %