

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000038503_03

Certified AMS: 300E / T300 for CO

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 14626 (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 14 pages).
The present certificate replaces certificate 0000038503_02 dated 05 March 2018.



Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance
www.tuv.com
ID 0000038503

Publication in the German Federal Gazette
(BAnz) of 29 October 2005

German Environment Agency
Dessau, 02 March 2023

This certificate will expire on:
04 March 2028

TÜV Rheinland Energy GmbH
Cologne, 01 March 2023



Dr. Marcel Langner
Head of Section II 4.1



ppa. Dr. Peter Wilbring

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Tel. + 49 221 806-5200

TUV 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:	936/21207124/B1 dated 22 August 2007
Initial certification:	05 March 2013
Expiry date:	04 March 2028
Certificate:	Renewal (of previous certificate 0000038503_02 of 05 March 2018 valid until 04 March 2023)
Publication:	BAnz. 29 October 2005, No. 206, p. 15700, chapter IV No. 2.1

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 3-month field test.

The AMS is approved for an ambient temperature range of +5° to 40°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 936/21207124/B1 dated 22 August 2007 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
- Addendum 936/21219874/C dated 31 October 2012 of TÜV Rheinland Energie und Umwelt GmbH
- Addendum 936/21221556/C dated 16 March 2013 of TÜV Rheinland Energie und Umwelt 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. 29 October 2005, No. 206, p. 15700, chapter IV No. 2.1, Announcement by UBA dated 25 July 2005:

AMS designation

Modell 300 E for CO

Manufacturer:

Teledyne Pollution, San Diego, CA 92121-2251, USA
Vertrieb: MLU Messtechnik für Luft und Umwelt GmbH, 45143 Essen

Field of application:

For the continuous measurement of CO in ambient air (stationary operation).

Measuring ranges during the suitability test:

CO: 0 – 60 µg/m³
 0 – 100 µg/m³

Software version:

Version F.3b

Test institute:

TÜV Immissionsschutz und Energiesysteme GmbH, Cologne
TÜV Rheinland Group
Test report No.: 936/21201601/B vom 10. Juli 2005

Publication in the German Federal Gazette: BAnz. 20 April 2007, No. 75, p. 4139, chap. IV notification 7, Announcement by UBA dated 12 April 2007:

7 Notification as regards Federal Environment Agency notice of 25 July 2005 (BAnz p. 15700)

The model 300E measuring system for carbon monoxide and the model 400E for ozone manufactured by Teledyne Instruments, San Diego, USA, will no longer be distributed by the company named in the announcement, MLU-Monitoring für Leben und Umwelt Ges.m.b.H. in A-2340 Mödling, Austria. In the future, they will be exclusively distributed by EAS Envimet Analytical Systems Ges.m.b.H., Brunn, Austria.

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, 51105 Cologne, Dr. Peter Wilbring, dated 14 December 2006

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chap. IV notification 23, Announcement by UBA dated 10 January 2011:

23 Notification as regards Federal Environment Agency notices of 25 July 2005 (BAnz p. 15700, chapter IV no. 2.1) and of 12 April 2007 (BAnz p. 4139, chapter IV, notification 7)

The current software version of the ambient air measuring system Modell 300E (=M300E) for CO manufactured by Teledyne Advanced Pollution Instrumentation is:
L.8 incl. Library Version 6.3

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2010

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chap. IV notification 24, Announcement by UBA dated 10 January 2011:

24 Notification as regards Federal Environment Agency notices of 25 July 2005 (BAnz p. 15700, chapter IV no. 2.1) and of 12 April 2007 (BAnz p. 4139, chapter IV, notification 7)

The measuring system 300E for CO manufactured by Teledyne Advanced Pollution Instrumentation is manufactured both in its old design M300E and in its new design Model T300. The new design differs from the old design only in that it has a new display, a new front plate and offers extended possibilities for communication. The current name of the new design of the measuring system is:

Model T300

The current software version of the new design of the measuring system is:

1.0.0 bld 54 incl. Library Version 7.0.0 bld 57

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2010

Publication in the German Federal Gazette: BAnz AT 05.03.2013 B10, chap. V notification 5, Announcement by UBA dated 12 February 2013

5 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz p. 7925, chapter II no. 2.1) and of 10 January 2011 (BAnz p. 294, chapter IV, notification 23 and 24)

The M300E/T300 versions of the measuring system for CO manufactured by Teledyne Advanced Pollution Instrumentation meet the requirements of EN 14626 (Issue July 2005). Furthermore the manufacturing process and the quality management for the M300E/T300 versions of the measuring system for CO meet the requirements of EN 15267.

The test report on performance testing, report no. 936/21207124/B1, and addendum to the test report, no. 936/21219874/C, which is an integral part of the test report, are available on the internet at www.qal1.de.

The current software version of the M300E measuring system is:

M.0 incl. Library Version 6.4

The current software version of the T300 measuring system is:

1.0.4 incl. Library Version 7.0.3

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 11 October 2012

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chap. V notification 17, Announcement by UBA dated 03 July 2013:

17 Notification as regards Federal Environment Agency (UBA) notices of 25 July 2005 (BAnz p. 15700, chapter IV no. 2.1) and of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter V notification 5)

The M300E/T300 versions of the measuring system for CO manufactured by Teledyne Advanced Pollution Instrumentation meet the requirements of EN 14626 (Is-sue December 2012). An addendum as integral part of test report no. 936/21221556/C is available online at www.qal1.de.

The new designation of the M300E measuring system for CO is 300E.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 16 March 2013

Publication in the German Federal Gazette: BAnz AT 05.08.2014 B11, chap. V notification 18, Announcement by UBA dated 17 July 2014:

18 Notification as regards Federal Environment Agency (UBA) notices of 25 July 2005 (BAnz p. 15 700, chapter IV no 2.1) and of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter V notification 17)

The 300E and T300 measuring systems for monitoring CO manufactured by Teledyne Advanced Pollution Instrumentation will be equipped with the PU3060-N811 (115/230V) vacuum pump manufactured by KNF in the future.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 27 March 2014

Publication in the German Federal Gazette: BAnz AT 14.03.2016 B7, chap. V notification 9, Announcement by UBA dated 18 February 2016:

9 Notification as regards Federal Environment Agency (UBA) notices of 25 July 2005 (BAnz p. 15700, chapter IV no 2.1) and of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter V notificationm 18)

The current software versions of the 300E/T300 measuring system for CO manufactured by Teledyne Advanced Pollution Instrumentation are:

Package Version:	1.0.1
Driver Version:	1.0.6

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 19 October 2015

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B8, chap. V notification 13,
Announcement by UBA dated 21 February 2018:

**13 Notification as regards Federal Environment Agency (UBA) notices
of 25 July 2005 (BAnz. p. 15 700, chapter IV number 2.1) and
of 18 February 2016 (BAnz AT 14.03.2016 B7, chapter V notification 9)**

The production site of the 300E/T300 air quality monitor for CO manufactured by
Teledyne Advanced Pollution Instrumentation has moved to:

9970 Carroll Canyon Road
San Diego, CA 92131
USA

Statement issued by TÜV Rheinland Energy GmbH dated 17 August 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chap. IV notification 66,
Announcement by UBA dated 27 February 2019:

**66 Notification as regards Federal Environment Notices
of 25 July 2005 (BAnz. p. 15700, chapter IV Number 2.1) and
of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V notification 13)**

The current software version of the 300E/T300 measuring system for CO
manufactured by Teledyne Advanced Pollution Instrumentation is:

Package version: 1.2.2
Driver version: 1.0.10

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 66,
Announcement by UBA dated 24 February 2020:

**66 Notification as regards Federal Environment Agency (UBA) notices
of 25 July 2005 (BAnz. p. 15700, chapter IV number 2.1) and
of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV notification 66)**

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

The latest software version of the 300E/T300 measuring system for CO
manufactured by Teledyne API is:

Package Version: 1.3.21
Driver version: 1.0.14

This includes the following versions:

Package Version	Driver Version
1.3.19	1.0.14
1.3.17	1.0.14
1.3.13	1.0.13
1.3.12, build 199	1.0.13
1.3.11	1.0.12
1.3.4	1.0.11
1.3.1	1.0.10
1.3.0	1.0.10
1.2.7	1.0.10
1.2.6	1.0.10
1.2.4	1.0.10
1.2.2	1.0.10

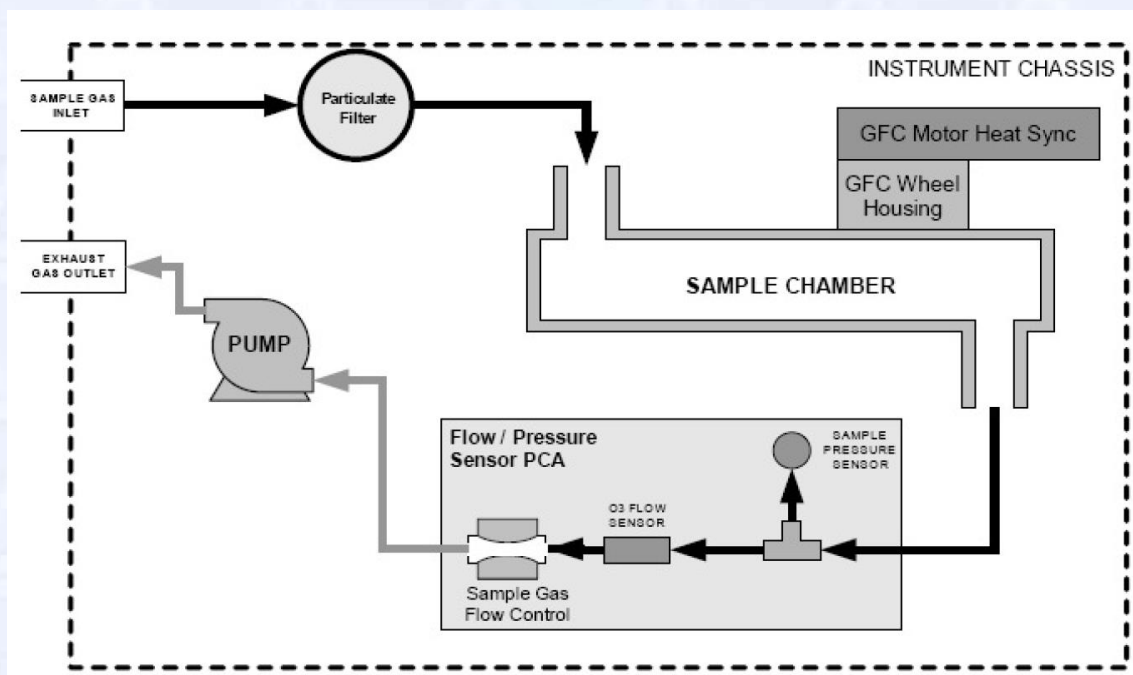
Statement issued by TÜV Rheinland Energy GmbH dated 2 September 2019

Certified product

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

To measure CO concentrations, the 300E and T300 versions of the measuring system rely on the determination of IR light absorbed by the gas to be measured in the range of wavelength which is characteristic for that gas. This corresponds to the reference method described in standard EN 14626.

The schematic set-up / flow diagram of the 300E and T300 versions of the measuring system 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 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 300E / T300 is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Basic test

Test report 936/21201601/B dated 10 July 2005
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
Publication BAnz. 29 October 2005, No. 206, p. 15700, chapter IV number 2.1
UBA announcement dated 25 July 2005

Notifications

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH dated 14 December 2006
Publication BAnz. 20 April 2007, No. 75, p. 4139, chapter IV notification 7
UBA announcement dated 12 April 2007
(new sales partner)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2010
Publication BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 23
UBA announcement dated 10 January 2011
(Software changes)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2010
Publication BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 24
UBA announcement dated 10 January 2011
(Software changes and new design)

Initial certification according to EN 15267

Certificate No. 0000038503_00: 22 March 2013
Expiry date of the certificate: 04 March 2018
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 11 October 2012
Test report 936/21207124/B1 dated 22 August 2007 issued by
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH,
Addendum 936/21219874/C dated 31 October 2012 issued by
TÜV Rheinland Energie und Umwelt GmbH,
Publication BAnz AT 05.03.2013 B10, chapter V number 5
UBA announcement dated 12 February 2013

Certificate based on a notification

Certificate No. 0000038503_01: 20 August 2013
Expiry date of the certificate: 04 March 2018
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 16 March 2013
Test report 936/21207124/B1 dated 22 August 2007 issued by
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH,
Addendum 936/21219874/C dated 31 October 2012 issued by
TÜV Rheinland Energie und Umwelt GmbH,
Test report 936/21221556/C dated 16 March 2013 issued by
TÜV Rheinland Energie und Umwelt GmbH,
Publication BAnz AT 23.07.2013 B4, chapter V number 17
UBA announcement dated 3 July 2013

Notifications

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 27 March 2014
Publication BAnz AT 05.08.2014 B11, chapter V notification 18
UBA announcement dated 17 July 2014
(New vacuum pump)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 19 October 2015
Publication BAnz AT 14.03.2016 B7, chapter V notification 9
UBA announcement dated 18 February 2016
(Software changes)

Renewal of certificate

Certificate No. 0000038503_02: 05 March 2018
Expiry date of the certificate: 04 March 2023

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 17 August 2017
Publication BAnz AT 26.03.2018 B8, chapter V notification 13
UBA announcement dated 21 February 2018
(Change of production site)

Statement issued by TÜV Rheinland Energy GmbH dated 5 September 2018
Publication BAnz AT 26.03.2019 B7, chapter IV notification 66
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 66
UBA announcement dated 24 February 2020
(Software changes and new manufacturer name)

Renewal of certificate

Certificate No. 0000038503_03: 02 March 2023
Expiry date of the certificate: 04 March 2028

Expanded uncertainty laboratory, system 1

Measuring device:		Teledyne API M300E / T300		Serial number:		SN 370	
Measured component:		CO		8h-Limit value:		8.62 $\mu\text{mol/mol}$	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	$\leq 1.0 \mu\text{mol/mol}$	0.100	$u_{r,z}$	0.02	0.0006	
2	Repeatability standard deviation at 8h-limit value	$\leq 3.0 \mu\text{mol/mol}$	0.100	u_r	0.02	0.0005	
3	"lack of fit" at 8h-limit value	$\leq 4.0\%$ of meas. value	0.300	u_l	0.01	0.0002	
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	$\leq 0.7 \mu\text{mol/mol/kPa}$	0.150	u_{gp}	0.16	0.0252	
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.010	u_{gt}	0.02	0.0006	
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.030	u_{st}	0.07	0.0056	
7	Sensitivity coefficient of electrical voltage at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/V}$	0.000	u_v	0.00	0.0000	
8a	Interferent H ₂ O with 21 mmol/mol	$\leq 1.0 \mu\text{mol/mol}$ (Zero)	-0.160	u_{H_2O}	-0.11	0.0114	
		$\leq 1.0 \mu\text{mol/mol}$ (Span)	-0.140				
8b	Interferent CO ₂ with 500 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	-0.030	$u_{int,pos}$	0.07	0.0043	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.100				
8c	Interferent NO with 1 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.010	or	0.04	0.0016	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.020				
8d	Interferent N ₂ O with 50 nmol/mol	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	-0.030	$u_{int,neg}$	0.00	0.0000	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	-0.020				
9	Averaging effect	$\leq 7.0\%$ of meas. value	0.800	u_{av}	0.04	0.0016	
18	Difference sample/calibration port	$\leq 1\%$	-0.020	u_{asc}	0.00	0.0000	
21	Uncertainty of test gas	$\leq 3\%$	2.000	u_{cg}	0.09	0.0074	
Combined standard uncertainty				u_c	0.2396	$\mu\text{mol/mol}$	
Expanded uncertainty				U	0.4793	$\mu\text{mol/mol}$	
Relative expanded uncertainty				W	5.56	%	
Maximum allowed expanded uncertainty				W_{req}	15	%	

Expanded uncertainty laboratory, system 2

Measuring device:		Teledyne API M300E / T300		Serial number:		SN 512 / 1385	
Measured component:		CO		8h-Limit value:		8.62 $\mu\text{mol/mol}$	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	$\leq 1.0 \mu\text{mol/mol}$	0.100	$u_{r,z}$	0.02	0.0006	
2	Repeatability standard deviation at 8h-limit value	$\leq 3.0 \mu\text{mol/mol}$	0.000	u_r	0.00	0.0000	
3	"lack of fit" at 8h-limit value	$\leq 4.0\%$ of meas. value	1.200	u_l	0.06	0.0036	
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	$\leq 0.7 \mu\text{mol/mol/kPa}$	0.180	u_{gp}	0.19	0.0362	
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.010	u_{gt}	0.02	0.0006	
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.030	u_{st}	0.07	0.0056	
7	Sensitivity coefficient of electrical voltage at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/V}$	0.010	u_v	0.03	0.0011	
8a	Interferent H ₂ O with 21 mmol/mol	$\leq 1.0 \mu\text{mol/mol}$ (Zero)	-0.040	u_{H_2O}	-0.07	0.0056	
		$\leq 1.0 \mu\text{mol/mol}$ (Span)	-0.110				
8b	Interferent CO ₂ with 500 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.010	$u_{int,pos}$	0.05	0.0020	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.070				
8c	Interferent NO with 1 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.030	or	0.00	0.0000	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.010				
8d	Interferent N ₂ O with 50 nmol/mol	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.020	$u_{int,neg}$	0.00	0.0000	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	-0.020				
9	Averaging effect	$\leq 7.0\%$ of meas. value	-0.700	u_{av}	-0.03	0.0012	
18	Difference sample/calibration port	$\leq 1\%$	-0.050	u_{asc}	0.00	0.0000	
21	Uncertainty of test gas	$\leq 3\%$	2.000	u_{cg}	0.09	0.0074	
Combined standard uncertainty				u_c	0.2529	$\mu\text{mol/mol}$	
Expanded uncertainty				U	0.5058	$\mu\text{mol/mol}$	
Relative expanded uncertainty				W	5.87	%	
Maximum allowed expanded uncertainty				W_{req}	15	%	

Combined uncertainty, laboratory and field, system 1

Measuring device:		Teledyne API M300E / T300		Serial number:		SN 370	
Measured component:		CO		8h-Limit value:		8.62 $\mu\text{mol/mol}$	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	$\leq 1.0 \mu\text{mol/mol}$	0.100	$u_{r,z}$	0.02	0.0006	
2	Repeatability standard deviation at 8h-limit value	$\leq 3.0 \mu\text{mol/mol}$	0.100	u_r	not considered, as $u_r = 0.02 < u_{r,f}$	-	
3	"lack of fit" at 8h-limit value	$\leq 4.0\%$ of meas. value	0.300	u_f	0.01	0.0002	
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	$\leq 0.7 \mu\text{mol/mol/kPa}$	0.150	u_{sp}	0.16	0.0252	
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.010	u_{gt}	0.02	0.0006	
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.030	u_{st}	0.07	0.0056	
7	Sensitivity coefficient of electrical voltage at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/V}$	0.000	u_v	0.00	0.0000	
8a	Interferent H ₂ O with 21 mmol/mol	$\leq 1.0 \mu\text{mol/mol}$ (Zero)	-0.140	u_{H_2O}	-0.11	0.0114	
		$\leq 1.0 \mu\text{mol/mol}$ (Span)	-0.160				
8b	Interferent CO ₂ with 500 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	-0.030	$u_{int,pos}$	0.07	0.0043	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.100				
8c	Interferent NO with 1 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.010	or	0.07	0.0043	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.020				
8d	Interferent N ₂ O with 50 nmol/mol	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	-0.030	$u_{int,neg}$	0.07	0.0043	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	-0.020				
9	Averaging effect	$\leq 7.0\%$ of meas. value	0.800	u_{av}	0.04	0.0016	
10	Reproducibility standard deviation under field conditions	$\leq 5.0\%$ of 3 month average	3.470	$u_{r,f}$	0.30	0.0895	
11	Long term drift at zero level	$\leq 0.5 \mu\text{mol/mol}$	0.340	$u_{d,l,z}$	0.20	0.0385	
12	Long term drift at 8h-limit value	$\leq 5.0\%$ of max. of cert. range	-2.320	$u_{d,l,8h}$	-0.12	0.0133	
18	Difference sample/calibration port	$\leq 1\%$	-0.020	u_{asc}	0.00	0.0000	
21	Uncertainty of test gas	$\leq 3\%$	2.000	u_{cg}	0.09	0.0074	
Combined standard uncertainty				u_c		0.4452	$\mu\text{mol/mol}$
Expanded uncertainty				U		0.8904	$\mu\text{mol/mol}$
Relative expanded uncertainty				W		10.33	%
Maximum allowed expanded uncertainty				W_{req}		15	%

Combined uncertainty, laboratory and field, system 2

Measuring device:		Teledyne API M300E / T300		Serial number:		SN 512 / 1385	
Measured component:		CO		8h-Limit value:		8.62 $\mu\text{mol/mol}$	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	$\leq 1.0 \mu\text{mol/mol}$	0.100	$u_{r,z}$	0.02	0.0006	
2	Repeatability standard deviation at 8h-limit value	$\leq 3.0 \mu\text{mol/mol}$	0.000	u_r	not considered, as $u_r = 0 < u_{r,f}$	-	
3	"lack of fit" at 8h-limit value	$\leq 4.0\%$ of meas. value	1.200	u_f	0.06	0.0036	
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	$\leq 0.7 \mu\text{mol/mol/kPa}$	0.180	u_{sp}	0.19	0.0362	
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.010	u_{gt}	0.02	0.0006	
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/K}$	0.030	u_{st}	0.07	0.0056	
7	Sensitivity coefficient of electrical voltage at 8h-limit value	$\leq 0.3 \mu\text{mol/mol/V}$	0.010	u_v	0.03	0.0011	
8a	Interferent H ₂ O with 21 mmol/mol	$\leq 1.0 \mu\text{mol/mol}$ (Zero)	-0.110	u_{H_2O}	-0.07	0.0056	
		$\leq 1.0 \mu\text{mol/mol}$ (Span)	-0.040				
8b	Interferent CO ₂ with 500 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.010	$u_{int,pos}$	0.05	0.0020	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.070				
8c	Interferent NO with 1 $\mu\text{mol/mol}$	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.030	or	0.05	0.0020	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	0.010				
8d	Interferent N ₂ O with 50 nmol/mol	$\leq 0.5 \mu\text{mol/mol}$ (Zero)	0.020	$u_{int,neg}$	0.05	0.0020	
		$\leq 0.5 \mu\text{mol/mol}$ (Span)	-0.020				
9	Averaging effect	$\leq 7.0\%$ of meas. value	-0.700	u_{av}	-0.03	0.0012	
10	Reproducibility standard deviation under field conditions	$\leq 5.0\%$ of 3 month average	3.470	$u_{r,f}$	0.30	0.0895	
11	Long term drift at zero level	$\leq 0.5 \mu\text{mol/mol}$	0.710	$u_{d,l,z}$	0.41	0.1680	
12	Long term drift at 8h-limit value	$\leq 5.0\%$ of max. of cert. range	-4.960	$u_{d,l,8h}$	-0.25	0.0609	
18	Difference sample/calibration port	$\leq 1\%$	-0.050	u_{asc}	0.00	0.0000	
21	Uncertainty of test gas	$\leq 3\%$	2.000	u_{cg}	0.09	0.0074	
Combined standard uncertainty				u_c		0.6184	$\mu\text{mol/mol}$
Expanded uncertainty				U		1.2368	$\mu\text{mol/mol}$
Relative expanded uncertainty				W		14.35	%
Maximum allowed expanded uncertainty				W_{req}		15	%