Umwelt Bundes Amt
For our Environment

TÜVRheinland®
Precisely Right.

CERTIFICATE

on Product Conformity (QAL1)

Certificate No.: 0000038503

Certified AMS:	M300E / T300 for CO
Manufacturer:	Teledyne Advanced Pollution Instrumentation 9480 Carroll Park Drive San Diego CA 92121-5201 USA
Test Institute:	TÜV Rheinland Energie und Umwelt GmbH

This is to certify that the AMS has been tested and found to comply with:

VDI 4202-1: 2002, VDI 4203-3: 2004, EN 14626: 2005, EN 15267-1: 2009, EN 15267-2: 2009

Certification is awarded in respect of the conditions stated in this certificate (also see the following pages).

www.tuv.com TÜVRheinland® ID: 0000038503

- Complying with 2008/50/EC
- TUV approved
- Annual inspection

Publication in the German Federal Gazette (BAnz.) of 05 March 2013

German Federal Environment Agency
Dessau, 22 March 2013

i. A. Dr. Marcel Langner

The certificate will expire on:
04 March 2018

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 21 March 2013

ppa. Dr. Peter Wilbring

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TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
51105 Cologne

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

Test report:	936/21207124/B1_DE of 22 August 2007 Addendum 936/21219874/C of 31 October 2012
Initial certification:	05 March 2013
Date of expiry:	04 March 2018
Publication:	BAnz AT 05 March 2013 B10, chapter V, notification 5

Approved application
The certified AMS is suitable for continuous ambient air monitoring of CO (stationary operation).

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

The AMS is approved for the temperature range of +5 °C to +40 °C.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for ambient air applications at which it will be installed.

Basis of the certification
This certification is based on:

- test report 936/21207124/B1_DE of 22 August 2007 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH and addendum 936/21219874/C of 31 October 2012 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- the on-going surveillance of the product and the manufacturing process
- publication in the German Federal Gazette: BAnz. 29 October 2005, p. 15700, chapter IV, No. 2.1
- publication in the German Federal Gazette: BAnz. 20 April 2007, p. 4139, chapter IV, notification 7
- publication in the German Federal Gazette: BAnz. 26 January 2011, p. 294, chapter IV, notification 23 and 24
- publication in the German Federal Gazette: BAnz AT 05 March 2013 B10, chapter V, notification 5

AMS designation:
Modell 300E for CO

Manufacturer:
Teledyne Advanced Pollution Instrumentation, San Diego, USA / EAS GmbH, Brunn, Austria

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

Measuring ranges during the suitability test:
CO: 0 - 60 mg/m³
0 - 100 mg/m³

Software:
Version F.3b

Test institute:
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
TÜV Rheinland Group
Report No.: 936/21201601/B dated 10 July 2005

7 Notification as regards Federal Environmental Agency notices of 25 July 2005 (BAnz. p. 15700, chapter IV No. 2.1)

The measuring systems Modell 300E for CO and Modell 400E for ozone of the of the company Teledyne Instruments, San Diego, USA will not by distributed anymore in future – as mentioned in the publication - by the company MLU-Monitoring für Leben und Umwelt Ges.m.b.H. in A-2340 Mödling, Austria, but only by the company EAS Envimet Analytical Systems Ges.m.b.H., Brunn, Austria.

Opinion stated by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH of 14 December 2007

23 Notification as regards Federal Environmental 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 of the company Teledyne Advanced Pollution Instrumentation is:

L.8 with Library Version 6.3

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 29 September 2010

24 Notification as regards Federal Environmental 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 Modell 300E for CO of the company Teledyne Advanced Pollution Instrumentation is manufactured in the old design Modell 300E as well as in the new design Model T300. The new design differs from the old design only by a new display, a new front plate and 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 with Library Version 7.0.0 bld 57

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 29 September 2010

5 Notification as regards Federal Environmental Agency notices of 25 July 2005 (BAnz. p. 15700, chapter IV, No. 2.1) and of 10 January 2011 (BAnz. p. 294, chapter IV, 23th and 24th notification)

The measuring system M300E respectively T300 for CO of the company Teledyne Advanced Pollution Instrumentation fulfills the requirements of EN 14626 (issue July 2005). Furthermore the manufacturing and the quality management of the measuring system M300E respectively T300 for CO fulfill the requirements of EN 15267.

The test report on the type approval with the report no. 936/21207124/B1_DE as well as an addendum to the test report with the report no. 936/21219874/C are available on available on the internet at www.qal1.de.

The current software version of the measuring system M300E is:

M.0 with Library Version 6.4

The current software version of the measuring system T300 is:

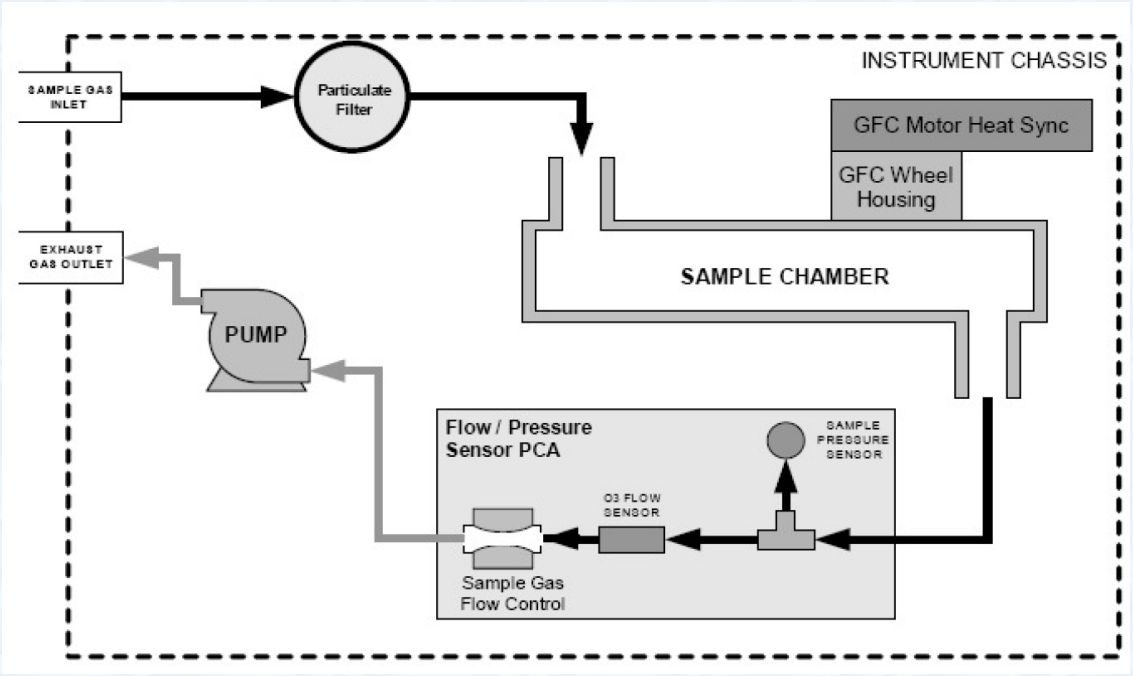
1.0.4 with Library Version 7.0.3

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 11 October 2012

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

The measuring principle of the measuring system M300E respectively T300 is based on the determination of the IR-absorption caused by the gas to be measured in the respective ranges of wave lengths characteristic for this and thus complies with the reference method described in the standard EN 14626.

The schematic set-up / flow diagram of the measuring system M300E respectively T300 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 Energie und Umwelt 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 can be applied to the product or used in publicity material for the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remains property of TÜV Rheinland Energie und Umwelt GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energie und Umwelt GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and the validity is also accessible on the internet: **qal1.de**.

Certification of M300E / T300 for CO 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, Cologne

Publication: BAnz. 29 October 2005, No. 206, p. 15700, chapter IV, No. 2.1
Announcement by UBA from 25 July 2005

Notification:

Publication: BAnz. 20 April 2007, No. 75, p. 4139, chapter IV, notification 7
Announcement by UBA from 12 April 2007

Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV, notification 23 and notification 24
Announcement by UBA from 10 January 2011

Publication: BAnz AT 05 March 2013 B10, chapter V, notification 5
Announcement by UBA from 12 February 2013

Initial certification according to EN 15267:

Certificate No. 0000038503: 22 March 2013

Expiration date of the certificate: 04 March 2018

Test report: 936/21207124/B1_DE dated 22 August 2007
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Addendum: 936/21219874/C dated 31 October 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Statement of TÜV Rheinland Energie und Umwelt GmbH from 11 October 2012

Publication: BAnz AT 05 March 2013 B10, chapter V, notification 5
Announcement by UBA from 12 February 2013

Expanded measurement uncertainty based on the results of the laboratory test for device 1

Measuring device:	Teledyne API M300E				Serial number:	SN 370	
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	≤ 1.0 µmol/mol	0.100	$u_{r,z}$	0.01	0.0001
2	Repeatability standard deviation at 8h-limit value	≤ 3.0 µmol/mol	0.100	$u_{r,lv}$	0.01	0.0001
3	"lack of fit" at 8h-limit value	≤ 4.0% of meas. value	0.300	$u_{l,lv}$	0.01	0.0002
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0.150	u_{gp}	0.16	0.0252
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.010	u_{gt}	0.02	0.0006
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.030	u_{st}	0.07	0.0056
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 21 mmol/mol	≤ 1.0 µmol/mol	-0.161	u_{H2O}	0.11	0.0118
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol	0.095	$u_{int,pos}$		
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol	0.020	or	0.07	0.0043
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol	-0.020	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of meas. value	0.800	u_{av}	0.04	0.0016
18	Difference sample/calibration port	≤ 1%	-0.020	u_{Dsc}	0.00	0.0000
23	Uncertainty of test gas	≤ 3%	2.000	ucg	0.09	0.0074

Combined standard uncertainty	u_c	0.2387	µmol/mol
Expanded uncertainty	U_c	0.4775	µmol/mol
Relative expanded uncertainty	$U_{c,rel}$	5.54	%
Maximum allowed expanded uncertainty	$U_{req,rel.}$	15	%

Expanded measurement uncertainty based on the results of the laboratory and field test for device 1

Measuring device:	Teledyne API M300E				Serial number:	SN 370	
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	≤ 1.0 µmol/mol	0.100	$u_{r,z}$	0.01	0.0001
2	Repeatability standard deviation at 8h-limit value	≤ 3.0 µmol/mol	0.100	$u_{r,lv}$	not considered, as ur,lv = 0,01 < ur,f	-
3	"lack of fit" at 8h-limit value	≤ 4.0% of meas. value	0.300	$u_{l,lv}$	0.01	0.0002
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0.150	u_{gp}	0.16	0.0252
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.010	u_{gt}	0.02	0.0006
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.030	u_{st}	0.07	0.0056
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 21 mmol/mol	≤ 1.0 µmol/mol	-0.161	u_{H2O}	0.11	0.0118
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol	0.095	$u_{int,pos}$		
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol	0.020	or	0.07	0.0043
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol	-0.020	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of meas. value	0.800	u_{av}	0.04	0.0016
10	Reproducibility standard deviation under field conditions	≤ 5.0% of 3 month average	3.470	$u_{r,f}$	0.30	0.0895
11	Long term drift at zero level	≤ 0.5 µmol/mol	0.340	$u_{d,l,z}$	0.20	0.0385
12	Long term drift at 8h-limit value	≤ 5.0% of max. of cert. range	-2.320	$u_{d,l,lv}$	-0.12	0.0133
18	Difference sample/calibration port	≤ 1%	-0.020	u_{Dsc}	0.00	0.0000
23	Uncertainty of test gas	≤ 3%	2.000	ucg	0.09	0.0074

Combined standard uncertainty	u_c	0.4452	µmol/mol
Expanded uncertainty	U_c	0.8904	µmol/mol
Relative expanded uncertainty	$U_{c,rel}$	10.33	%
Maximum allowed expanded uncertainty	$U_{req,rel.}$	15	%

Expanded measurement uncertainty based on the results of the laboratory test for device 2

Measuring device:	Teledyne API M300E				Serial number:	SN 512 / 1385	
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	≤ 1.0 µmol/mol	0.100	$u_{r,z}$	0.01	0.0002
2	Repeatability standard deviation at 8h-limit value	≤ 3.0 µmol/mol	0.000	$u_{r,lv}$	0.00	0.0000
3	"lack of fit" at 8h-limit value	≤ 4.0% of meas. value	1.200	$u_{l,lv}$	0.06	0.0036
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0.180	u_{gp}	0.19	0.0362
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.010	u_{gt}	0.02	0.0006
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.030	u_{st}	0.07	0.0056
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤ 0.3 µmol/mol/V	0.010	u_V	0.03	0.0011
8a	Interferent H_20 with 21 mmol/mol	≤ 1.0 µmol/mol	-0.112	u_{H2O}	0.08	0.0058
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol	0.067	$u_{int,pos}$ or $u_{int,neg}$	0.05	0.0020
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol	0.011			
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol	-0.018			
9	Averaging effect	≤ 7.0% of meas. value	-0.700	u_{av}	-0.03	0.0012
18	Difference sample/calibration port	≤ 1%	-0.050	u_{Dsc}	0.00	0.0000
23	Uncertainty of test gas	≤ 3%	2.000	0	0.09	0.0074

Combined standard uncertainty	u_c	0.2524	µmol/mol
Expanded uncertainty	U_c	0.5048	µmol/mol
Relative expanded uncertainty	$U_{c,rel}$	5.86	%
Maximum allowed expanded uncertainty	$U_{req,rel.}$	15	%

Expanded measurement uncertainty based on the results of the laboratory and field test for device 2

Measuring device:	Teledyne API M300E				Serial number:	SN 512 / 1385	
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	≤ 1.0 µmol/mol	0.100	$u_{r,z}$	0.01	0.0002
2	Repeatability standard deviation at 8h-limit value	≤ 3.0 µmol/mol	0.000	$u_{r,lv}$	not considered, as ur,lv = 0 < ur,f	-
3	"lack of fit" at 8h-limit value	≤ 4.0% of meas. value	1.200	$u_{l,lv}$	0.06	0.0036
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0.180	u_{gp}	0.19	0.0362
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.010	u_{gt}	0.02	0.0006
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.030	u_{st}	0.07	0.0056
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤ 0.3 µmol/mol/V	0.010	u_V	0.03	0.0011
8a	Interferent H_20 with 21 mmol/mol	≤ 1.0 µmol/mol	-0.112	u_{H2O}	0.08	0.0058
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol	0.067	$u_{int,pos}$ or $u_{int,neg}$	0.05	0.0020
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol	0.011			
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol	-0.018			
9	Averaging effect	≤ 7.0% of meas. value	-0.700	u_{av}	-0.03	0.0012
10	Reproducibility standard deviation under field conditions	≤ 5.0% of 3 month average	3.470	$u_{r,f}$	0.30	0.0895
11	Long term drift at zero level	≤ 0.5 µmol/mol	0.710	$u_{d,l,z}$	0.41	0.1680
12	Long term drift at 8h-limit value	≤ 5.0% of max. of cert. range	-4.960	$u_{d,l,lv}$	-0.25	0.0609
18	Difference sample/calibration port	≤ 1%	-0.050	u_{Dsc}	0.00	0.0000
23	Uncertainty of test gas	≤ 3%	2.000	0	0.09	0.0074

Combined standard uncertainty	u_c	0.6182	µmol/mol
Expanded uncertainty	U_c	1.2363	µmol/mol
Relative expanded uncertainty	$U_{c,rel}$	14.34	%
Maximum allowed expanded uncertainty	$U_{req,rel.}$	15	%