

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000038501_03

Certified AMS: 100E / T100 for SO₂

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 14212 (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 13 pages).

The present certificate replaces certificate 0000038501_02 dated 05 March 2018.



Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance
www.tuv.com
ID 0000038501

Publication in the German Federal Gazette
(BAnz) of 06 November 2007

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

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:	936/21205926/B dated 22 June 2007
Initial certification:	05 March 2013
Expiry date:	04 March 2028
Certificate:	Renewal (of previous certificate 0000038501_02 of 05 March 2018 valid until 04 March 2023)
Publication:	BAnz. 06 November 2007, No. 206, p. 7925, chapter II No. 1.1

Approved application

The tested AMS is suitable for continuous ambient air monitoring of SO₂ (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 936/21205926/B dated 22 June 2007 of TÜV Immissionsschutz und Energiesysteme GmbH
- Addendum 936/21219874/A dated 11 October 2012 der TÜV Rheinland Energie und Umwelt GmbH
- Addendum 936/21221556/A dated 16 March 2013 der 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. 06 November 2007, No. 206, p. 7925, chapter II No. 1.1, Announcement by UBA dated 23 September 2007:

AMS designation:

M100E for SO₂

Manufacturer:

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

Field of application:

For the continuous measurement of SO₂ in ambient air (stationary operation).

Measuring ranges during the suitability test:

SO₂: 0 – 700 µg/m³
 0 – 1000 µg/m³

Software version:

Revision C.3

Test institute:

TÜV Immissionsschutz und Energiesysteme GmbH, Cologne,
TÜV Rheinland Group,
Test report No.: 936/21205926/B dated 22. Juni 2007

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chap. IV notification 19, Announcement by UBA dated 10 January 2011:

19 Notification as regards Federal Environment Agency notice of 23 September 2007 (BAnz p. 7925, chapter II, no. 1.1)

The current software version of the M100E ambient air measuring system for SO₂ manufactured by Teledyne Advanced Pollution Instrumentation is:

G.4 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 20, Announcement by UBA dated 10 January 2011:

20 Notification as regards Federal Environment Agency notice of 23 September 2007 (BAnz p. 7925, chapter II no. 1.1)

The measuring system M100E for SO₂ manufactured by Teledyne Advanced Pollution Instrumentation is manufactured both in its old design M100E and in its new design Model T100. 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 T100

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 3, Announcement by UBA dated 12 February 2013

**3 Notification as regards Federal Environment Agency (UBA) notices
of 23 September 2007 (BAnz p. 7925, chapter II no. 1.1) and
of 10 January 2011 (BAnz p. 294, chapter IV, notification 19 and 20)**

The M100E/T100 versions of the measuring system for SO₂ manufactured by Teledyne Advanced Pollution Instrumentation meets the requirements of EN 14212 (Issue June 2005). Furthermore the manufacturing process and the quality management for the M100E/T100 versions of the measuring system for SO₂ meet the requirements of EN 15267.

The test report on performance testing, report no. 936/21205926/B, and addendum to the test report, no. 936/21219874/A, which is an integral part of the test report, are available on the internet at www.qal1.de.

The current software version of the M100E measuring system is:
G.6 incl. Library Version 6.4

The current software version of the T100 measuring system is:
1.0.3 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 15, Announcement by UBA dated 03 July 2013

**15 Notification as regards Federal Environment Agency (UBA) notices
of 23 September 2007 (BAnz p. 7925, chapter II No. 1.1) and
of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter V notification 3)**

The M100E/T100 versions of the measuring system for SO₂ manufactured by Teledyne Advanced Pollution Instrumentation meets the requirements of EN 14212 (Issue November 2012). An addendum as integral part of test report no. 936/21221556/A is available online at www.qal1.de.

The new designation of the M100E measuring system for SO₂ is 100E.

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 17, Announcement by UBA dated 17 July 2014:

17 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz P. 7925, chapter II number 1.1) and of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter V notification 15)

The 100E/T100 measuring systems for monitoring SO₂ 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 7, Announcement by UBA dated 18 February 2016:

7 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz P. 7925, chapter II number 1.1) and of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter V notification 17)

The current software versions of the 100E/T100 measuring system for SO₂ manufactured by Teledyne Advanced Pollution Instrumentation are:

Package Version: 1.0.4
Driver Version: 1.0.12

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 11, Announcement by UBA dated 21 February 2018:

11 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (BAnz. p. 7925, chapter II no. 1.1) and of 18 February 2016 (BAnz AT 14.03.2016 B7, chapter V notification 7)

The production site of the 100E/T100 air quality monitor for SO₂ 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 64, Announcement by UBA dated 27 February 2019:

64 Notification as regards Federal Environment Agency notices of 23 September 2007 (BAnz. p. 7925, chapter II number 1.1) and of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V notification 11)

The current software version of the T100E/T100 measuring system for SO₂ manufactured by Teledyne Advanced Pollution Instrumentation is:

Package version: 1.2.2
Driver version: 1.0.19

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 64, Announcement by UBA dated 24 February 2020:

64 Notification as regards Federal Environment Agency (UBA) notices of 23 September 2007 (p. 7925, chapter II number 1.1) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV notification 64)

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

The latest software version of the 100E/T100 measuring system for SO₂ manufactured by Teledyne API is:

Package version: 1.3.19
Driver version: 1.0.24

This includes the following versions:

Package Version	Driver Version
1.3.17	1.0.24
1.3.12, build 244	1.0.23
1.3.11	1.0.22
1.3.8	1.0.21
1.3.4	1.0.21
1.3.1	1.0.20
1.3.0, build 216	1.0.20
1.3.0, build 214	1.0.20
1.3.0, build 213	1.0.19
1.2.9	1.0.19
1.2.7	1.0.19
1.2.6	1.0.19
1.2.5	1.0.19
1.2.4	1.0.19
1.2.3	1.0.19
1.2.2	1.0.19

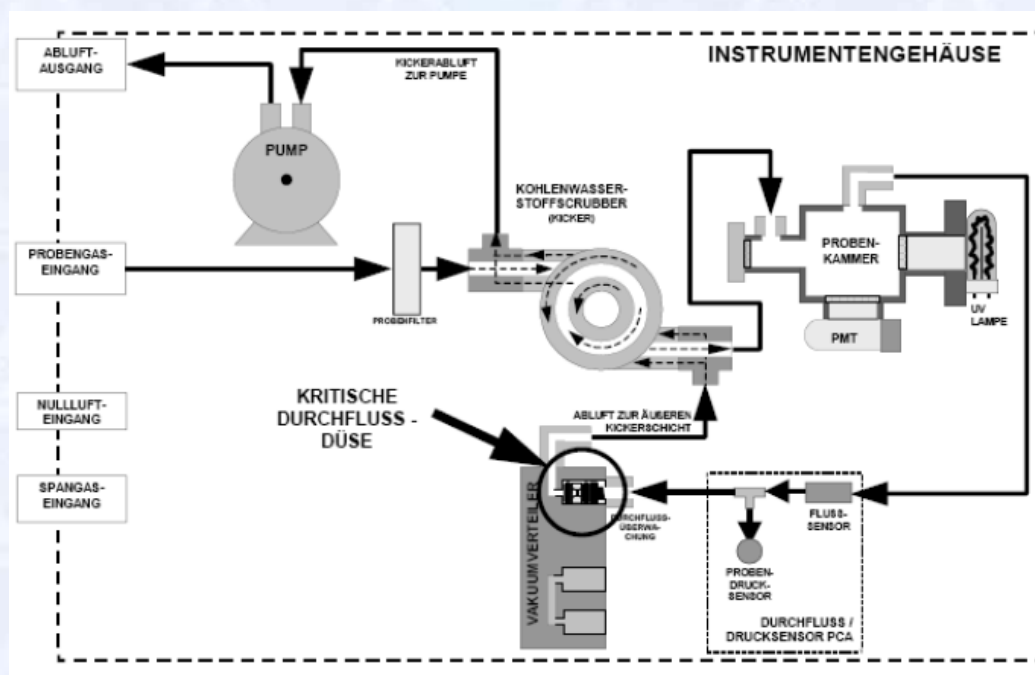
Statement issued by TÜV Rheinland Energy GmbH dated 2 September 2019

Certified product

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

The physical principle on which the measuring method of the 100E and T100 versions of the measuring system relies is based on the fluorescence, which appears when sulphur dioxide (SO₂) is activated by UV-light at a wavelength in the range between 190 nm and 230 nm and thus complies with the reference method described in the standard EN 14212.

The schematic set-up / flow diagram of the 100E and T100 versions of the measuring system (with optional zero/span gas port) 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 100E / T100 is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Basic test

Test report 936/21205926/B dated 22 June 2007
TÜV Immissionsschutz und Energiesysteme GmbH
Publication BAnz. 06 November 2007, No. 206, p. 7925, chapter II number 1.1
UBA announcement dated 23 September 2007

Notifications

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 19
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 20
UBA announcement dated 10 January 2011
(Software and design changes)

Initial certification according to EN 15267

Certificate No. 0000038501_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 936/21205926/B dated 22 June 2007 issued by
TÜV Immissionsschutz und Energiesysteme GmbH,
Addendum 936/21219874/A dated 11 October 2012 issued by
TÜV Rheinland Energie und Umwelt GmbH,
Publication BAnz AT 05.03.2013 B10, chapter V notification 3
UBA announcement dated 12 February 2013

Certificate based on a notification

Certificate No. 0000038501_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 936/21205926/B dated 22 June 2007 issued by
TÜV Immissionsschutz und Energiesysteme GmbH,
Addendum 936/21219874/A dated 11 October 2012 issued by
TÜV Rheinland Energie und Umwelt GmbH,
Addendum 936/21221556/A dated 16 March 2013 issued by
TÜV Rheinland Energie und Umwelt GmbH,
Publication BAnz AT 23.07.2013 B4, chapter V notification 15
UBA announcement dated 3 July 2013
(Meets the requirements of the EN 14212:2012
The addendum amends the testreport.)

Notifications

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 27 March 2014
Publication BAnz AT 05.08.2014 B11, chapter V notification 17
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 7
UBA announcement dated 18 February 2016
(Software changes)

Renewal of certificate

Certificate No. 0000038501_02: 05 March 2013
Expiry date of the certificate: 04 March 2018

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 17 August 2017
Publication BAnz AT 26.03.2018 B8, chapter V notification 11
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 64
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 64
UBA announcement dated 24 February 2020
(Software changes and new manufacturer name)

Renewal of certificate

Certificate No. 0000038501_03: 02 March 2023
Expiry date of the certificate: 04 March 2028

Expanded uncertainty laboratory, system 1

Measuring device:		Teledyne API M100E / T100		Serial number:		SN 1 (1177)	
Measured component:		SO2		1h-Limit value:		132 nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.300	$u_{r,z}$	0.09	0.0079	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.500	$u_{r,1h}$	0.15	0.0230	
3	"lack of fit" at 1h-limit value	≤ 4.0% of the meas. value	-0.400	$u_{l,1h}$	-0.30	0.0929	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 3.0 nmol/mol/kPa	0.020	u_{sp}	0.53	0.2846	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 1.0 nmol/mol/K	-0.013	u_{gt}	-0.10	0.0105	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 1.0 nmol/mol/K	0.050	u_{st}	0.39	0.1554	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	-0.010	u_v	-0.11	0.0117	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.400	u_{H_2O}	-1.28	1.6472	
		≤ 10 nmol/mol (Span)	-1.700				
8b	Interferent H ₂ S with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.300	$u_{int,pos}$	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	0.900				
8c	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.300	or	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	0.100				
8d	Interferent NO with 500 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.500	or	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	3.200				
8e	Interferent NO ₂ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.010	or	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	0.500				
8f	Interferent m-Xylene with 1 µmol/mol	≤ 10 nmol/mol (Zero)	0.000	$u_{int,neg}$	3.45	11.8950	
		≤ 10 nmol/mol (Span)	1.200				
9	Averaging effect	≤ 7.0% of the meas. value	2.400	u_{av}	1.83	3.3454	
18	Difference sample/calibration port	≤ 1%	0.000	u_{asc}	0.00	0.0000	
21	Uncertainty of test gas	≤ 3%	1.000	u_{cg}	0.66	0.4356	
Combined standard uncertainty				u_c		4.2319	nmol/mol
Expanded uncertainty				U		8.4639	nmol/mol
Relative expanded uncertainty				W		6.41	%
Maximum allowed expanded uncertainty				W_{req}		15	%

Expanded uncertainty laboratory, system 2

Measuring device:		Teledyne API M100E / T100		Serial number:		SN 2 (1183)	
Measured component:		SO2		1h-Limit value:		132 nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.500	$u_{r,z}$	0.15	0.0222	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.900	$u_{r,1h}$	0.27	0.0741	
3	"lack of fit" at 1h-limit value	≤ 4.0% of the meas. value	0.200	$u_{l,1h}$	0.15	0.0232	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 3.0 nmol/mol/kPa	0.060	u_{sp}	1.60	2.5613	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 1.0 nmol/mol/K	0.013	u_{gt}	0.10	0.0105	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 1.0 nmol/mol/K	0.030	u_{st}	0.24	0.0559	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	u_v	0.22	0.0467	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.100	u_{H_2O}	-1.21	1.4668	
		≤ 10 nmol/mol (Span)	-1.600				
8b	Interferent H ₂ S with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.400	$u_{int,pos}$	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	0.400				
8c	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.300	or	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	1.100				
8d	Interferent NO with 500 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.400	or	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	2.900				
8e	Interferent NO ₂ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.100	or	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	0.800				
8f	Interferent m-Xylene with 1 µmol/mol	≤ 10 nmol/mol (Zero)	0.300	$u_{int,neg}$	3.56	12.6928	
		≤ 10 nmol/mol (Span)	0.900				
9	Averaging effect	≤ 7.0% of the meas. value	1.100	u_{av}	0.84	0.7028	
18	Difference sample/calibration port	≤ 1%	0.000	u_{asc}	0.00	0.0000	
21	Uncertainty of test gas	≤ 3%	1.000	u_{cg}	0.66	0.4356	
Combined standard uncertainty				u_c		4.2535	nmol/mol
Expanded uncertainty				U		8.5069	nmol/mol
Relative expanded uncertainty				W		6.44	%
Maximum allowed expanded uncertainty				W_{req}		15	%

Combined uncertainty, laboratory and field, system 1

Measuring device:		Teledyne API M100E / T100		Serial number:		SN 1 (1177)	
Measured component:		SO2		1h-Limit value:		132 nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.300	$u_{r,z}$	0.09	0.0079	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.500	$u_{r,1h}$	not considered, as $u_{r,1h} = 0.15 < u_{r,f}$	-	
3	"lack of fit" at 1h-limit value	≤ 4.0% of the meas. value	-0.400	$u_{l,1h}$	-0.30	0.0929	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 3.0 nmol/mol/kPa	0.020	u_{sp}	0.53	0.2846	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 1.0 nmol/mol/K	-0.013	u_{st}	-0.10	0.0105	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 1.0 nmol/mol/K	0.050	u_{st}	0.39	0.1554	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	-0.010	u_v	-0.11	0.0117	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.400	u_{H2O}	-1.28	1.6472	
		≤ 10 nmol/mol (Span)	-1.700				
8b	Interferent H ₂ S with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.300	$u_{int,pos}$	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	0.100				
8c	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.500	or	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	3.200				
8d	Interferent NO with 500 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.010	or	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	3.200				
8e	Interferent NO ₂ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.500	or	3.45	11.8950	
		≤ 5.0 nmol/mol (Span)	0.000				
8f	Intererent m-Xylene with 1 µmol/mol	≤ 10 nmol/mol (Zero)	1.200	$u_{int,neg}$	1.83	3.3454	
		≤ 10 nmol/mol (Span)	2.400				
9	Averaging effect	≤ 7.0% of the meas. value	2.400	u_{av}	1.83	3.3454	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of 3 month average	4.800	$u_{r,f}$	6.34	40.1449	
11	Long term drift at zero level	≤ 5.0 nmol/mol	1.060	$u_{d,l,z}$	0.61	0.3745	
12	Long term drift at 1h-limit value	≤ 5.0% of max. of cert. range	1.490	$u_{d,l,1h}$	1.14	1.2894	
18	Difference sample/calibration port	≤ 1%	0.000	u_{sc}	0.00	0.0000	
21	Uncertainty of test gas	≤ 3%	1.000	u_{cg}	0.66	0.4356	
				Combined standard uncertainty		u_c	7.7263 nmol/mol
				Expanded uncertainty		U	15.4525 nmol/mol
				Relative expanded uncertainty		W	11.71 %
				Maximum allowed expanded uncertainty		W_{req}	15 %

Combined uncertainty, laboratory and field, system 2

Measuring device:		Teledyne API M100E / T100		Serial number:		SN 2 (1183)	
Measured component:		SO2		1h-Limit value:		132 nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.500	$u_{r,z}$	0.15	0.0222	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.900	$u_{r,1h}$	not considered, as $u_{r,1h} = 0.27 < u_{r,f}$	-	
3	"lack of fit" at 1h-limit value	≤ 4.0% of the meas. value	0.200	$u_{l,1h}$	0.15	0.0232	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 3.0 nmol/mol/kPa	0.060	u_{sp}	1.60	2.5613	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 1.0 nmol/mol/K	0.013	u_{st}	0.10	0.0105	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 1.0 nmol/mol/K	0.030	u_{st}	0.24	0.0559	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	u_v	0.22	0.0467	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.100	u_{H2O}	-1.21	1.4668	
		≤ 10 nmol/mol (Span)	-1.600				
8b	Interferent H ₂ S with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.400	$u_{int,pos}$	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	0.400				
8c	Interferent NH ₃ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	1.100	or	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	1.100				
8d	Interferent NO with 500 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.400	or	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	2.900				
8e	Interferent NO ₂ with 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.100	or	3.56	12.6928	
		≤ 5.0 nmol/mol (Span)	0.800				
8f	Intererent m-Xylene with 1 µmol/mol	≤ 10 nmol/mol (Zero)	0.300	$u_{int,neg}$	0.84	0.7028	
		≤ 10 nmol/mol (Span)	0.900				
9	Averaging effect	≤ 7.0% of the meas. value	1.100	u_{av}	0.84	0.7028	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of 3 month average	4.800	$u_{r,f}$	6.34	40.1449	
11	Long term drift at zero level	≤ 5.0 nmol/mol	1.350	$u_{d,l,z}$	0.78	0.6075	
12	Long term drift at 1h-limit value	≤ 5.0% of max. of cert. range	1.560	$u_{d,l,1h}$	1.19	1.4134	
18	Difference sample/calibration port	≤ 1%	0.000	u_{sc}	0.00	0.0000	
21	Uncertainty of test gas	≤ 3%	1.000	u_{cg}	0.66	0.4356	
				Combined standard uncertainty		u_c	7.7578 nmol/mol
				Expanded uncertainty		U	15.5156 nmol/mol
				Relative expanded uncertainty		W	11.75 %
				Maximum allowed expanded uncertainty		W_{req}	15 %