



Certificate number: 2435071-ts



Industrie Service

CERTIFICATE

of product conformity (QAL 1)

Certificate number: 2435071-ts

AMS Set CEM CERT 7MB1957 monitoring CO, NO, NO_x, NO₂, SO₂ and O₂

Manufacturer Siemens AG
 Östliche Rheinbrückenstraße 50
 76187 Karlsruhe
 Germany

Test institute TÜV SÜD Industrie Service GmbH

This is to certify that the AMS was tested and certified subject to DIN EN 15267-1 (2009), DIN EN 15267-2 (2009), DIN EN 15267-3 (2008) and DIN EN 14181 (2004) standards.

Certification applies to the conditions listed in this certificate (the certificate consists of 27 pages).

This certificate replaces the certificate 2219424-ts dated 08th September 2015



Certificate No.: 2435071-ts

Publication in the German Federal Gazette
 dated 14th March 2016

Certificate validity
 until 4th March 2018

Umweltbundesamt
 Dessau, 26th April 2016

TÜV SÜD Industrie Service GmbH
 Testing laboratory Emission measurement/
 calibration
 Munich, 25th April 2016

Dr. Marcel Langner
 Head of Section II 4.1

Dr. Michael Waeber

Test report	2435071 from 30.09.2015
Initial certification	5 th March 2013
Certificate validity until	4 th March 2018 (5 years)
Publication	BAnz AT 14.03.2016 B7, chapter I, no. 5.1

Approved application

The AMS tested is suitable for plants according to Directive 2010/75/EU, chapter III (13th BImSchV) and plants in compliance with TA Luft. Equipped with the SIPROCESS UV600-7MB2621 module the AMS is additionally suitable for waste incineration plants according to Directive 2010/75/EU, chapter IV (17th BImSchV) for monitoring the components NO, NO₂ and SO₂. The suitability of the AMS for this application was assessed on the basis of a laboratory test and a field test of the modular measuring system Set CEM CERT 7MB1957 lasting over three months at a plant in compliance with the 17th BImSchV. The modular measuring system is authorized for the ambient temperature range from +5 °C to +40 °C.

The AMS publication, the suitability test and the performance of the uncertainty calculations were based on the requirements valid at the time of testing. Due to possible amendments to the legal basics each user should ensure before use of the AMS that it is suitable to monitor the respective relevant limit values.

The operator should consult the manufacturer to ensure that the AMS is suitable for the plant where it is being installed.

Certification basis

This certificate is based on:

- TÜV SÜD Industrie Service GmbH test report 2435071 from 30th September 2015
- Suitability publication by the Umweltbundesamt as responsible body
- Monitoring of the product and the manufacturing process
- Publication in the German Federal Gazette (BAnz AT 14th March 2016 B7, chapter I, no. 5.1 and chapter IV 1st correction, UBA publication from 18th February 2016):

AMS:	Set CEM CERT 7MB1957 monitoring CO, NO, NO _x , NO ₂ , SO ₂ and O ₂
Manufacturer:	Siemens AG, Karlsruhe
Suitability:	Modular measuring system for plants in compliance with the 13 th BImSchV and plants in compliance with TA Luft

Measurement ranges in the suitability test:

Ultramat 23-7MB2355 module				
Component	Certification range	Additional measurement range		Unit
CO	0 – 200	0 – 1250	-	mg/m ³
NO _x	0 – 150 ¹	0 – 750 ¹	0 – 2000 ¹	mg/m ³
	0 – 230 ²	0 – 1150 ²	0 – 3067 ²	
SO ₂	0 – 400	0 – 2000	0 – 7000	mg/m ³
O ₂ , paramagnetic	0 – 25	-	-	Vol.-%
O ₂ , electrochemical	0 – 25	-	-	Vol.-%
Ultramat 23-7MB2357 module				
Component	Certification range	Additional measurement range		Unit
CO	0 – 200	0 – 1250	-	mg/m ³
NO _x	0 – 150 ¹	0 – 750 ¹	0 – 2000 ¹	mg/m ³
	0 – 230 ²	0 – 1150 ²	0 – 3067 ²	
SO ₂	0 – 400	0 – 2000	0 – 7000	mg/m ³
O ₂ , paramagnetic	0 – 25	-	-	Vol.-%
O ₂ , electrochemical	0 – 25	-	-	Vol.-%
Ultramat 23-7MB2358 module				
Component	Certification range	Additional measurement range		Unit
CO	0 – 250	0 – 1250	-	mg/m ³
NO _x	0 – 400 ¹	0 – 2000 ¹	-	mg/m ³
	0 – 613 ²	0 – 3067 ²	-	
SO ₂	0 – 400	0 – 2000	0 – 7000	mg/m ³
O ₂ , paramagnetic	0 – 25	-	-	Vol.-%
O ₂ , electrochemical	0 – 25	-	-	Vol.-%
SIPROCESS UV600-7MB2621 module				
Component	Certification range	Additional measurement range		Unit
NO	0 – 50	0 – 200	0 – 2000	mg/m ³
NO ₂	0 – 50	0 – 500	-	mg/m ³
SO ₂	0 – 75	0 – 130	0 – 2000	mg/m ³

¹ stated as NO

² stated as NO₂

Measurement ranges for the modular system Set CEM CERT 7MB1957 in the suitability test:

Component	Module variation	Certification range	Additional measurement range		Unit
CO	Ultramat 23-7MB2355 – Z – T13	0 – 200	0 – 1250	-	mg/m ³
	Ultramat 23-7MB2357 – Z – T13	0 – 200	0 – 1250	-	mg/m ³
	Ultramat 23-7MB2358 – Z – T13	0 – 250	0 – 1250	-	mg/m ³
	Ultramat 23-7MB2355 – Z – T23	0 – 200	0 – 1250	-	mg/m ³
	Ultramat 23-7MB2357 – Z – T23	0 – 200	0 – 1250	-	mg/m ³
	Ultramat 23-7MB2358 – Z – T23	0 – 250	0 – 1250	-	mg/m ³
	Ultramat 23-7MB2355 – Z – T33	0 – 200	0 – 1250	-	mg/m ³
	Ultramat 23-7MB2357 – Z – T33	0 – 200	0 – 1250	-	mg/m ³
NO _x	Ultramat 23-7MB2355 – Z – T13	0 – 150 ¹ 0 – 230 ²	0 – 750 ¹ 0 – 1150 ²	0 – 2000 ¹ 0 – 3067 ²	mg/m ³
	Ultramat 23-7MB2357 – Z – T13	0 – 150 ¹ 0 – 230 ²	0 – 750 ¹ 0 – 1150 ²	0 – 2000 ¹ 0 – 3067 ²	mg/m ³
	Ultramat 23-7MB2358 – Z – T13	0 – 400 ¹ 0 – 613 ²	0 – 2000 ¹ 0 – 3067 ²	-	mg/m ³
	Ultramat 23-7MB2355 – Z – T23	0 – 150 ¹ 0 – 230 ²	0 – 750 ¹ 0 – 1150 ²	0 – 2000 ¹ 0 – 3067 ²	mg/m ³
	Ultramat 23-7MB2357 – Z – T23	0 – 150 ¹ 0 – 230 ²	0 – 750 ¹ 0 – 1150 ²	0 – 2000 ¹ 0 – 3067 ²	mg/m ³
	Ultramat 23-7MB2358 – Z – T23	0 – 400 ¹ 0 – 613 ²	0 – 2000 ¹ 0 – 3067 ²	-	mg/m ³
	Ultramat 23-7MB2355 – Z – T33	0 – 150 ¹ 0 – 230 ²	0 – 750 ¹ 0 – 1150 ²	0 – 2000 ¹ 0 – 3067 ²	mg/m ³
	Ultramat 23-7MB2357 – Z – T33	0 – 150 ¹ 0 – 230 ²	0 – 750 ¹ 0 – 1150 ²	0 – 2000 ¹ 0 – 3067 ²	mg/m ³
NO	SIPROCESS UV600-7MB2621 – Z – Y17	0 – 50	0 – 200	0 – 2000	mg/m ³
NO ₂	SIPROCESS UV600-7MB2621 – Z – Y17	0 – 50	0 – 500	-	mg/m ³
SO ₂	Ultramat 23-7MB2355 – Z – T13	0 – 400	0 – 2000	0 – 7000	mg/m ³
	Ultramat 23-7MB2357 – Z – T13	0 – 400	0 – 2000	0 – 7000	mg/m ³
	Ultramat 23-7MB2358 – Z – T13	0 – 400	0 – 2000	0 – 7000	mg/m ³
	Ultramat 23-7MB2355 – Z – T23	0 – 400	0 – 2000	0 – 7000	mg/m ³
	Ultramat 23-7MB2357 – Z – T23	0 – 400	0 – 2000	0 – 7000	mg/m ³
	Ultramat 23-7MB2358 – Z – T23	0 – 400	0 – 2000	0 – 7000	mg/m ³
	Ultramat 23-7MB2355 – Z – T33	0 – 400	0 – 2000	0 – 7000	mg/m ³
	Ultramat 23-7MB2357 – Z – T33	0 – 400	0 – 2000	0 – 7000	mg/m ³
	SIPROCESS UV600-7MB2621 – Z – Y17	0 – 75	0 – 130	0 – 2000	mg/m ³

Component	Module variation	Certification range	Additional measurement range		Unit
O ₂ , paramagnetic	Ultramat 23-7MB2355 – Z – T13	0 – 25	-	-	Vol.-%
	Ultramat 23-7MB2357 – Z – T13	0 – 25	-	-	Vol.-%
	Ultramat 23-7MB2358 – Z – T13	0 – 25	-	-	Vol.-%
O ₂ , electrochemical	Ultramat 23-7MB2355 – Z – T23	0 – 25	-	-	Vol.-%
	Ultramat 23-7MB2357 – Z – T23	0 – 25	-	-	Vol.-%
	Ultramat 23-7MB2358 – Z – T23	0 – 25	-	-	Vol.-%

¹ stated as NO

² stated as NO₂

The suitability test of the system Set CEM CERT 7MB1957 covers four modules that are equipped to measure the following components depending on the respective module variation:

Module variation	Component 1	Component 2	Component 3	Component 4
Ultramat 23-7MB2355 – Z – T13 ¹	CO	NO	SO ₂	O ₂ , paramagnetic
Ultramat 23-7MB2355 – Z – T23 ¹	CO	NO	SO ₂	O ₂ , electrochemical
Ultramat 23-7MB2355 – Z – T33 ¹	CO	NO	SO ₂	-
Ultramat 23-7MB2357 – Z – T13 ²	CO	NO	SO ₂	O ₂ , paramagnetic
Ultramat 23-7MB2357 – Z – T23 ²	CO	NO	SO ₂	O ₂ , electrochemical
Ultramat 23-7MB2357 – Z – T33 ²	CO	NO	SO ₂	-
Ultramat 23-7MB2358 – Z – T13 ³	CO	NO	SO ₂	O ₂ , paramagnetic
Ultramat 23-7MB2358 – Z – T23 ³	CO	NO	SO ₂	O ₂ , electrochemical
SIPROCESS UV600-7MB2621 – Z – Y17	NO	NO ₂	SO ₂	

¹ one component from 1 to 3 respectively

² two components from 1 to 3 respectively

³ all three components from 1 to 3 respectively

Software versions:

Ultramat 23-7MB2355:	2.15.05
Ultramat 23-7MB2357:	2.15.05
Ultramat 23-7MB2358:	2.15.05
SIPROCESS UV600-7MB2621	
BCU:	9150883_3.003
Gasmodul:	9137582_3.002
UV-Modul:	9139736_3.003
SPS:	Set CEM CERT Rev. 1.0

Restrictions:

1. The requirement for total uncertainty in the suitability test according to DIN EN 15267 was not fulfilled for the component CO and only partly fulfilled for the component SO₂.
2. The protection provided by enclosure class for the Ultramat 23-7MB2355, Ultramat 23-7MB2357 and Ultramat 23-7MB2358 module is IP 20. If the operating conditions require a higher class the analysis module shall be incorporated into an analysis cabinet with the relevant protection class.

Notes:

1. The Set CEM CERT 7MB1957 AMS, when fitted with the SIPROCESS UV600-7MB2621 module, can also be used for monitoring the components NO, NO₂ and SO₂ on plants in compliance with the 17th BImSchV.
2. The modules (with the exception of SIPROCESS UV600-7MB2621) should be operated at an interval of 24 h for automatic alignment.
3. To optimise the cross-sensitivity at the measurement channel CO with CO₂, the Ultramat 23-7MB2355, Ultramat 23-7MB2357 and Ultramat 23-7MB2358 modules from the AMS Set CEM CERT 7MB1957 will be operated with a modified CO receiver from the production month April 2014, identified with the series number from E4 onwards in the central block.
4. The modules (with the exception of SIPROCESS UV600-7MB2621) should be operated with the activated thermo-AUTOCAL-function.
5. The modular measurement system Set CEM CERT 7MB1957 can alternatively be fitted with a measurement gas sampling probe (SP2000-H) from M&C TechGroup Germany GmbH and a measurement gas cooler (EGK 2-19) from Bühler Technologies GmbH.
6. In the modular measurement system Set CEM CERT 7MB1957 the measurement gas cooler (EGK 2-19) from Bühler Technologies GmbH can be fitted with a PVDF or glass cooling element. The SIPROCESS UV600-7MB2621 module is always operated with the glass cooling element.
7. The modular measurement system Set CEM CERT 7MB1957 is fitted with a NO_x converter from M&C TechGroup Germany GmbH, type gas converter CG-2, for detecting NO_x.
8. The maintenance interval for the Ultramat 23-7MB2358 module is six months. In the case of an extension of the Set CEM CERT 7MB1957 by adding additional modules the functionality of the respective compilation of the modules should be tested within the framework of the test for proper installation and the maintenance interval should be set.

9. The maintenance interval for the Ultramat 23-7MB2355 and Ultramat 23-7MB2357 modules is eight months. In the case of an extension of the Set CEM CERT 7MB1957 by adding additional modules the functionality of the respective compilation of the modules should be tested within the framework of the test for proper installation and the maintenance interval should be set.
 10. The maintenance interval for the SIPROCESS UV600-7MB2621 modules is four weeks. In the case of an extension of the Set CEM CERT 7MB1957 by adding additional modules the functionality of the respective compilation of the modules should be tested within the framework of the test for proper installation and the maintenance interval should be set.
 11. Supplementary test (extension of maintenance interval) to the publication by the Umweltbundesamt dated 22th July 2015 (BAnz AT 26.08.2015 B4, chapter I number 3.2).
- Test report:** TÜV SÜD Industrie Service GmbH, Munich
Report-No.: 2435071 from 30th September 2015

1 Correction to the publication by the Umweltbundesamt from 22nd July 2015 (BAnz AT 26.08.2015 B4, chapter I number 3.2)

The additional measurement range of 0 – 2 000 mg/m³ for the Ultramat 23-7MB2357 module for the component CO in the modular AMS Set CEM CERT 7 MB1957 from Siemens AG stated in the table „Measurement range in the suitability test “ is incorrect. This measurement range was not tested in the suitability test and supplementary tests and will be deleted without replacement.

The measurement ranges for the Ultramat 23-7MB2357 module are correct as follows:

Component	Certification range	additional measurement ranges		Unit
CO	0 - 200	0 - 1250	-	mg/m ³

The above mentioned publication is based on the supplementary test report from TÜV Süd Industrie Service GmbH with the number 2219424 and the corresponding annex with the number 2333430, with creation date 20th March 2015 respectively. The test report as well as the corresponding annex were corrected with regard to the above mentioned error and now bear the creation date 1st September 2015 and the number 2219424, rev. 01 or 2333430, rev. 01 and replace the documents from 20th March 2015.

Statement from TÜV Süd Industrie Service GmbH from 15th October 2015

Certified product

The certificate applies to AMS that comply with the following description:

The entire tested modular AMS Set CEM CERT 7MB1957 consists of a heated sample gas extraction probe, heated sample hose, a dual-level measurement gas cooler, a measurement gas feeder pump and of a maximum of two Ultramat 23-7MB2355, Ultramat 23-7MB2357, Ultramat 23-7MB2358 and SIPROCESS UV600-7MB2621 analyser modules. The Ultramat 23 module measures CO, NO and SO₂ according to the principle of non-dispersive-infrared-absorption (NDIR procedure). Either an electrochemical or paramagnetic oxygen measurement cell can be used to measure O₂. The SIPROCESS UV600-7MB2621 module uses the gas filter correlation procedure (GFC) to measure NO and the interference filter correlation (IFC) to measure NO₂ and SO₂, both in the UV range.

To regulate measurement gas flow there is a measurement gas pipe with integrated gas recirculation between the first and second cooler level. In the cooler casing there is another fine filter for separating fine dust. After the measurement gas cooler the gas path separates into either two or three pipe sections, each supplying both analyser module, which are arranged parallel to each other, with measurement gas. Any excess gas is diverted away via a bypass. There is a condensation filter directly before the analyser module, which closes the gas path on penetration of any humidity, to protect the analyser. The converter is switched on before the condensation filter to measure NO_x in the Ultramat 23 analyser modules. To regulate zero gas for setting an automatic zero point (AutoCal) a three way valve has been installed before the pump, which can be switched on using LOGO!®.

To regulate zero/sample gas another three way valve has been installed after the pump, which can offer the relevant gas as necessary for automatic alignment of zero and span point and is time controlled using LOGO!®. The sample gases can alternatively be applied manually using a third three way valve.

The entire system is made up of the following components:

Probe

Manufacturer: Bühler Technologies GmbH, D - 40880 Ratingen
Type: GAS 222.20-Cal-twin with ceramic filter

Alternative Probe

Manufacturer: M&C TechGroup Germany GmbH, D - 40885 Ratingen
Type: SP2000-H with ceramic filter
Controller: M&C TechGroup Germany GmbH, D - 40885 Ratingen

Heated sampling hose

Manufacturer: Winkler GmbH, D-69126 Heidelberg
Heated temperature: 2 PTFE connection (ID: 4 mm), heated to 180 °C, length in the suitability test 35 or 50 m (longer connections should be considered in the check of correct installation)

Controller

Manufacturer: Siemens AG
Type: SIRIUS, PT 100

Compressor cooler

Manufacturer: M&C TechGroup Germany GmbH, D - 40885 Ratingen
Type: CSS V1-S

Alternative compressor cooler

Manufacturer: Bühler Technologies GmbH, D-40880 Ratingen
Type: EGK 2-19

Measurement gas feeder pump

Manufacturer: Bühler Technologies GmbH, D-40880 Ratingen
Type: P 2.3

NO_x converter

Manufacturer: M&C TechGroup Germany GmbH, D - 40885 Ratingen
Type: Gas converter CG-2

Analyser

Ultramat 23-7MB2355, Ultramat 23-7MB2357 Ultramat 23-7MB2358
Software version 2.15.05

SIPROCESS UV600-7MB2621

Software version

BCU: 9150883_3.003

Gasmodul: 9137582_3.002

UV-Modul: 9139736_3.003

Software version SPS Set CEM CERT Rev. 1.0

General comments

This certificate is based on the analyser tested. The manufacturer is responsible for the continuous compliance of the production to the DIN EN 15267 requirements. The manufacturer is obliged to maintain a tested quality management system to control the manufacture of the certified product. Regular monitoring must be conducted on both the product and the quality management systems.

Should the product from the current production series no longer comply with the certified product, the Environmental Service Department of TÜV SÜD Industrie Service GmbH should be informed (Address see footnote).

The certification mark, which appears on the certified product or is used in advertising materials, is presented on page 1 of this certificate.

This document and the certification mark shall remain the property of TÜV SÜD Industrie Service GmbH.

Should the publication be revoked, this certificate will become invalid. This document must be returned when the period of validity has elapsed and at the request of TÜV SÜD Industrie Service GmbH and the certification mark may no longer be used.

The current version of the certificate and its validity can also be viewed on the internet page: **qa11.de**.

The certification of the modular measuring system Set CEM CERT 7MB1957 is based on the following documents and the regular continuous monitoring of the manufacturer's quality management system:

Initial certification to DIN EN 15267:

Certificate No. 1630664-ts	5 th March 2013
Certificate validity until	4 th March 2018 (5 years)

Test report: 1630664 from 15th September 2012,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 05.03.2013 B10, chapter I no. 6.1
UBA publication from 12th February 2013

Supplementary test to DIN EN 15267:

Certificate No. 1630664.2-ts	23 rd July 2013
Certificate validity until	4 th March 2018 (5 years)

Test report: 1630664-2 from 15th March 2013,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 23.07.2013 B4, chapter I, no. 4.1
UBA publication from 3rd July 2013

Supplementary test to DIN EN 15267:

Certificate No. 1630664.3-ts 1st April 2014
Certificate validity until 4th March 2018 (5 years)
Test report: 1630664-3 from 18th December 2013,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 01.04.2014 B12, chapter I, no. 4.2
UBA publication from 27th February 2014

Supplementary test to DIN EN 15267:

Certificate No. 1630664.4a-ts 5th August 2014
Certificate validity until 4th March 2018 (5 years)

Test report: 1630664-4a from 28th February 2014,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 05.08.2014 B11, chapter I, no. 5.3
UBA publication from 17th July 2014

Supplementary test to DIN EN 15267:

Certificate No. 1630664.4b-ts 5th August 2014
Certificate validity until 4th March 2018 (5 years)

Test report: 1630664-4b from 28th February 2014,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 05.08.2014 B11, chapter I, no. 5.4
UBA publication from 17th July 2014

Supplementary test to DIN EN 15267:

Certificate No. 1797266-ts 14th April 2015
Certificate validity until 4th March 2018 (5 years)

Test report: 1797266 from 18th September 2014,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 02.04.2015 B5, chapter I, no. 4.1
UBA publication from 25th February 2015

Supplementary test to DIN EN 15267:

Certificate No. 2219424-ts 08th September 2015
Certificate validity until 4th March 2018 (5 years)

Test report: 2219424 from 20th March 2015,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 26.08.2015 B4, chapter I, no. 3.2
UBA publication from 22th July 2015

Supplementary test to DIN EN 15267:

Certificate No. 2435071-ts

14th March 2016

Certificate validity until

04th March 2018 (5 years)

Test report: 2435071 from 30th September 2015,

TÜV SÜD Industrie Service GmbH

Publication: BAnz AT 14.03.2016 B7, chapter I, no. 5.1

UBA publication from 18th February 2016

Notifications:

TÜV Süd Industrie Service GmbH statement from 17th March 2013

Publication: BAnz AT 23.07.2013 B4, chapter V, notification 26 (new software)

UBA publication from 3rd July 2013

TÜV Süd Industrie Service GmbH statement from 19th March 2014

Publication: BAnz AT 05.08.2014 B11, chapter V, notification 3 (new software)

UBA publication from 17th July 2014

TÜV Süd Industrie Service GmbH statement from 18th September 2015

Publication: BAnz AT 02.04.2015 B5, chapter IV, notification 43 (new software)

UBA publication from 25th February 2015

Correction:

Correction to the Umweltbundesamt from 22nd July 2015

Publication: BAnz AT 26.08.2015 B4, chapter IV, correction 1 (missing second additional measurement range for NO_x for the Ultramat 23-7MB2357-Z-T13 module)

UBA publication from 22nd July 2015

Statement from TÜV Süd Industrie Service GmbH from 15th October 2015

Publication: BAnz AT 14.03.2016 B7, chapter IV, correction 1 (second additional measurement range for CO for the Ultramat 23-7MB2357-Z-T13 module deleted)

UBA publication from 18th February 2016

Calculation of total uncertainty for QAL1 testing to DIN EN 14181 and DIN EN 15267-3 for the Ultramat 23-7MB2358 module
Total uncertainty for the measurement component CO in the measurement range 0-250 mg/m³ for modules 1/ 2

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,678	0,4597
Zero point drift	$u_{d,z}$	1,443	2,0822
Span point drift	$u_{d,s}$	1,443	2,0822
Influence of ambient temperature at span point	u_t	0,781	0,61
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,217	0,0471
Influence of voltage	u_v	1,392	1,9377
Cross-sensitivity	u_i	2,165	4,6872
Repeatability standard deviation at span point	$u_r = s_r$	0,094	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	1,656	2,7423
Uncertainty of the test gas (2% at 70% CR)	u_{tm}	2,0207	4,0832
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	18,7316
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	4,328	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	8,4829	mg/m ³
Relative expanded uncertainty	U	8,5	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 100 mg/m ³)	7,5	%ELV
Requirement concerning uncertainty fulfilled		no	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 100 mg/m ³)	10	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

**Total uncertainty for the measurement component NO in the measurement range
0-400 mg/m³ for modules 1/ 2**

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	-0,393	0,1544
Zero point drift	$u_{d,z}$	3,233	10,4523
Span point drift	$u_{d,s}$	3,695	13,653
Influence of ambient temperature at span point	u_t	2,177	4,7393
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,277	0,0767
Influence of voltage	u_v	1,688	2,8493
Cross-sensitivity	u_j	-6,928	47,9972
Repeatability standard deviation at span point	$u_r = s_r$	0,232	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	1,750	3,0625
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	3,233	10,4536
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	93,4383
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	9,6663	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	18,9459	mg/m ³
Relative expanded uncertainty	U	14,5	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 130,4 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 130,4 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component SO₂ in the measurement range 0-400 mg/m³ for modules 1 / 2

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	2,102	4,4184
Zero point drift	$u_{d,z}$	6,235	38,8752
Span point drift	$u_{d,s}$	4,85	23,5225
Influence of ambient temperature at span point	u_t	6,498	42,224
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-2,215	4,9062
Influence of voltage	u_v	2,217	4,9151
Cross-sensitivity	u_i	-6,928	47,9972
Repeatability standard deviation at span point	$u_r = s_r$	0,794	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	2,475	6,1256
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	3,2332	10,4536
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	183,4378
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	13,5439	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	26,546	mg/m ³
Relative expanded uncertainty	U	13,3	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 200 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 200 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component O₂ in the measurement range 0-25 Vol.-% (in the version with paramagnetic oxygen measurement) for modules 1 / 2

Performance characteristic	Uncertainty	Value of standard uncertainty in mg/m ³	Square sum of standard uncertainty in (mg/m ³) ²
Lack-of-fit	u_{lof}	0,017	0,0003
Zero point drift	$u_{d,z}$	-0,092	0,0085
Span point drift	$u_{d,s}$	-0,081	0,0066
Influence of ambient temperature at span point	u_t	0,044	0,0019
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,017	0,0003
Influence of voltage	u_v	0,051	0,0026
Cross-sensitivity	u_i	0,162	0,0262
Repeatability standard deviation at span point	$u_r = s_r$	0,012	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,081	0,0066
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	0,230	0,0529
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	0,1059
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,3254	Vol.%
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,6378	Vol.%
Relative expanded uncertainty	U	2,6	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 25 Vol.%)	7,5	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 25 Vol.%)	10	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

**Total uncertainty for the measurement component CO in the measurement range
0-250 mg/m³ for modules 3/ 4**

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,678	0,4597
Zero point drift	$u_{d,z}$	1,443	2,0822
Span point drift	$u_{d,s}$	1,443	2,0822
Influence of ambient temperature at span point	u_t	1,285	1,6512
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,303	0,0918
Influence of voltage	u_v	1,568	2,4586
Cross-sensitivity	u_i	2,165	4,6872
Repeatability standard deviation at span point	$u_r = s_r$	0,094	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	1,656	2,7423
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	2,0207	4,0832
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	20,3384
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	4,5098	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	8,8392	mg/m ³
Relative expanded uncertainty	U	8,8	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 100 mg/m ³)	7,5	%ELV
Requirement concerning uncertainty fulfilled		no	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 100 mg/m ³)	10	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component NO in the measurement range 0-400 mg/m³ for modules 3/ 4

Performance characteristic	Uncertainty	Value of standard uncertainty in mg/m ³	Square sum of standard uncertainty in (mg/m ³) ²
Lack-of-fit	u_{lof}	-0,393	0,1544
Zero point drift	$u_{d,z}$	3,233	10,4523
Span point drift	$u_{d,s}$	3,695	13,653
Influence of ambient temperature at span point	u_t	1,712	2,9309
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,531	0,282
Influence of voltage	u_v	2,824	7,975
Cross-sensitivity	u_j	-6,928	47,9972
Repeatability standard deviation at span point	$u_r = s_r$	0,232	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	1,750	3,0625
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	3,233	10,4536
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	96,9609
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	9,8469	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	19,2999	mg/m ³
Relative expanded uncertainty	U	14,8	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 130,4 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 130,4 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component SO₂ in the measurement range 0-400 mg/m³ for modules 3/ 4

Performance characteristic	Uncertainty	Value of standard uncertainty in mg/m ³	Square sum of standard uncertainty in (mg/m ³) ²
Lack-of-fit	u _{lof}	2,102	4,4184
Zero point drift	u _{d,z}	6,235	38,8752
Span point drift	u _{d,s}	4,85	23,5225
Influence of ambient temperature at span point	u _t	9,96	99,2016
Influence of sample gas pressure	u _p		
Influence of sample gas flow	u _f	-2,215	4,9062
Influence of voltage	u _v	2,564	6,5741
Cross-sensitivity	u _i	-6,928	47,9972
Repeatability standard deviation at span point	u _r = s _r	0,794	u _r < du
Standard deviation from paired measurements	u _d = s _d	2,475	6,1256
Uncertainty of the test gas (2% at 70% CR)	u _{rm}	3,2332	10,4536
Excursion of measurement beam	u _{mb}		
Converter efficiency for NOx	u _{ce}		
Response factors (TOC)	u _{rf}		
		Sum	242,0744
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	15,5587	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	30,4951	mg/m ³
Relative expanded uncertainty	U	15,2	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 200 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		no	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 200 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component O₂ in the measurement range 0-25 Vol.-% (in the version with electrochemical oxygen measurement) for modules 3/ 4

Performance characteristic	Uncertainty	Value of standard uncertainty in mg/m ³	Square sum of standard uncertainty in (mg/m ³) ²
Lack-of-fit	U_{lof}	0,035	0,0012
Zero point drift	$U_{d,z}$	0,167	0,0279
Span point drift	$U_{d,s}$	0,098	0,0096
Influence of ambient temperature at span point	u_t	0,021	0,0004
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,029	0,0008
Influence of voltage	u_v	0,009	0,0001
Cross-sensitivity	u_i	0,167	0,0279
Repeatability standard deviation at span point	$u_r = s_r$	0,016	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,056	0,0031
Uncertainty of the test gas (2% at 70% CR)	u_{tm}	0,230	0,0529
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	0,1239
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,352	Vol.%
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,6899	Vol.%
Relative expanded uncertainty	U	2,8	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 25 Vol.%)	7,5	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 25 Vol.%)	10	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Calculation of total uncertainty for QAL1 testing to DIN EN 14181 and DIN EN 15267-3 for the Ultramat 23-7MB2355 and Ultramat 23-7MB 2357 modules
Total uncertainty for the measurement component CO in the measurement range 0-200 mg/m³

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	-0,254	0,0645
Zero point drift	$u_{d,z}$	1,155	1,334
Span point drift	$u_{d,s}$	1,27	1,6129
Influence of ambient temperature at span point	u_t	0,578	0,3341
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,107	0,0114
Influence of voltage	u_v	0,484	0,2343
Cross-sensitivity	u_i	1,998	3,992
Repeatability standard deviation at span point	$u_r = s_r$	0,107	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,588	0,3457
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	1,6166	2,6134
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	10,5423
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	3,2469	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	6,3639	mg/m ³
Relative expanded uncertainty	U	6,4	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 100 mg/m ³)	7,5	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 100 mg/m ³)	10	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component NO in the measurement range 0-150 mg/m³

Performance characteristic	Uncertainty	Value of standard uncertainty in mg/m ³	Square sum of standard uncertainty in (mg/m ³) ²
Lack-of-fit	u_{lof}	-0,719	0,517
Zero point drift	$u_{d,z}$	0,779	0,6068
Span point drift	$u_{d,s}$	2,252	5,0715
Influence of ambient temperature at span point	u_t	0,585	0,3422
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,381	0,1452
Influence of voltage	u_v	1,108	1,2277
Cross-sensitivity	u_j	-3,464	11,9993
Repeatability standard deviation at span point	$u_r = s_r$	0,335	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,619	0,3832
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	1,212	1,4699
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	21,7628
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	4,6651	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	9,1436	mg/m ³
Relative expanded uncertainty	U	14,0	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 65,2 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 65,2 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component O₂ in the measurement range 0-25 Vol.-% (in the version with paramagnetic oxygen measurement)

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,017	0,0003
Zero point drift	$u_{d,z}$	-0,092	0,0085
Span point drift	$u_{d,s}$	-0,081	0,0066
Influence of ambient temperature at span point	u_t	0,044	0,0019
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,017	0,0003
Influence of voltage	u_v	0,051	0,0026
Cross-sensitivity	u_i	0,162	0,0262
Repeatability standard deviation at span point	$u_r = s_r$	0,012	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,081	0,0066
Uncertainty of the test gas (2% at 70% CR)	u_{tm}	0,230	0,0529
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	0,1059
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,3254	Vol.%
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,6378	Vol.%
Relative expanded uncertainty	U	2,6	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 25 Vol.%)	7,5	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 25 Vol.%)	10	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component O₂ in the measurement range 0-25 Vol.-% (in the version with electrochemical oxygen measurement)

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,035	0,0012
Zero point drift	$u_{d,z}$	0,167	0,0279
Span point drift	$u_{d,s}$	0,098	0,0096
Influence of ambient temperature at span point	u_t	0,021	0,0004
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,029	0,0008
Influence of voltage	u_v	0,009	0,0001
Cross-sensitivity	u_i	0,167	0,0279
Repeatability standard deviation at span point	$u_r = s_r$	0,016	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,056	0,0031
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	0,230	0,0529
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	0,1239
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,352	Vol.%
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,6899	Vol.%
Relative expanded uncertainty	U	2,8	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 25 Vol.%)	7,5	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 25 Vol.%)	10	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Calculation of total uncertainty for QAL1 testing to DIN EN 14181 and DIN EN 15267-3 for the SIPROCESS UV600-7MB2621 module
Total uncertainty for the measurement component NO in the measurement range 0-50 mg/m³

Performance characteristic	Uncertainty	Value of standard uncertainty in mg/m ³	Square sum of standard uncertainty in (mg/m ³) ²
Lack-of-fit	U_{lof}	-0,309	0,0955
Zero point drift	$U_{d,z}$	0,866	0,75
Span point drift	$U_{d,s}$	-0,693	0,4802
Influence of ambient temperature at span point	u_t	0,124	0,0154
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,136	0,0185
Influence of voltage	u_v	0,096	0,0092
Cross-sensitivity	u_j	0,967	0,9351
Repeatability standard deviation at span point	$u_r = s_r$	0,225	$u_r < du$
Standard deviation from paired measurements	$U_d = s_d$	0,35	0,1225
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	0,4041	0,1633
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	2,5897
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	1,6093	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	3,1542	mg/m ³
Relative expanded uncertainty	U	9,7	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 32,6 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 32,6 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component NO₂ in the measurement range 0-50 mg/m³

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of standard uncertainty in mg/m³</i>	<i>Square sum of standard uncertainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,280	0,0784
Zero point drift	$u_{d,z}$	0,606	0,3672
Span point drift	$u_{d,s}$	-0,808	0,6529
Influence of ambient temperature at span point	u_t	0,776	0,6022
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,075	0,0056
Influence of voltage	u_v	0,2	0,04
Cross-sensitivity	u_j	1,065	1,1342
Repeatability standard deviation at span point	$u_r = s_r$	0,053	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,372	0,1384
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	0,4041	0,1633
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	3,1822
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	1,7839	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	3,4964	mg/m ³
Relative expanded uncertainty	U	7,0	%ELV
Demanded uncertainty according to EN 15267-3	(at ELV 50 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(at ELV 50 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV

Total uncertainty for the measurement component SO₂ in the measurement range 0-75 mg/m³

Performance characteristic	Uncertainty	Value of standard uncertainty in mg/m ³	Square sum of standard uncertainty in (mg/m ³) ²
Lack-of-fit	u_{lof}	0,403	0,1624
Zero point drift	$u_{d,z}$	-1,212	1,4689
Span point drift	$u_{d,s}$	-1,256	1,5775
Influence of ambient temperature at span point	u_t	1,424	2,0278
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,264	0,0697
Influence of voltage	u_v	0,179	0,032
Cross-sensitivity	u_i	1,589	2,5249
Repeatability standard deviation at span point	$u_r = s_r$	0,242	$u_r < du$
Standard deviation from paired measurements	$u_d = s_d$	0,586	0,3434
Uncertainty of the test gas (2% at 70% CR)	u_{rm}	0,6062	0,3675
Excursion of measurement beam	u_{mb}		
Converter efficiency for NOx	u_{ce}		
Response factors (TOC)	u_{rf}		
		Sum	8,5741
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	2,9282	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	5,7393	mg/m ³
Relative expanded uncertainty	U	11,5	%ELV
Demanded uncertainty according to EN 15267-3	(bei ELV 50 mg/m ³)	15	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to EN 15267-3
Demanded uncertainty 13. / 17. BImSchV	(bei ELV 50 mg/m ³)	20	%ELV
Requirement concerning uncertainty fulfilled		yes	concerning to 13. / 17. BImSchV