



Certificate number: 2664463-ts



Industrie Service

CERTIFICATE

on Product Conformity (QAL 1)

Certificate number: 2664463-ts

Certified AMS	EasyLine EL3000 series for CO, NO, SO ₂ , N ₂ O, CO ₂ and O ₂
Manufacturer	ABB Automation GmbH Stierstädter Straße 5 60488 Frankfurt 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 17 pages).



Certificate No: 2664463-ts

Publication in the German Federal Gazette
dated 02nd March 2012

Certificate validity
until 01st March 2022

Umweltbundesamt
Dessau, 20th January 2017

TÜV SÜD Industrie Service GmbH
Testing laboratory emission measurement/
calibration
Munich, 19th January 2017

Dr. Marcel Langner
Head of Section II 4.1

Dr. Michael Waeber

Test report	1669640 from 30 th September 2011
Initial certification	02 nd March 2012
Certificate validity until	01 st March 2022 (5 years)
Certificate	Renewed issue (previous certificate 1669640-ts from 2 nd March 2012 valid until 1 st March 2017)
Publication	BAnz 02 nd March 2012, No. 36, page 920, chapter I, No. 4.4

Approved application

The AMS tested is suitable for use at plants according to Directive 2010/75/EU, chapter III (13th BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17th BImSchV), the 27. BImSchV and other plants requiring official approval. The suitability of the AMS for this application was assessed on the basis of a laboratory test and a field test over three months at a plant in compliance with the 17th BImSchV. The 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 conducted based on the provisions valid at the time of testing. Due to possible amendments to legal foundations every user should ensure before use of the AMS that it is suitable for monitoring the applicable 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 1669640 from 30th September 2011
- Suitability publication by the Umweltbundesamt as responsible body
- Monitoring of the product and the manufacturing process
- Publication in the German Federal Gazette (BAnz 02nd March 2012, No. 36, page 920, chapter I, No. 4.4, UBA publication from 23th February 2012):

AMS: EasyLine EL3000 series for CO, NO, SO₂, N₂O, CO₂ and O₂

Manufacturer: ABB Automation GmbH, Frankfurt am Main

Suitability: For plants requiring authorisation and plants in compliance with the 27th BImSchV

Measurement ranges in the suitability test:

Component	Certification range	Supplementary measurement range		Unit
CO	0 - 75	0 - 300	0 - 4000	mg/m ³
NO	0 - 200	0 - 1000	0 - 5000	mg/m ³
NO Version (L)	0 - 100	0 - 200	-	mg/m ³
SO ₂	0 - 75	0 - 300	0 - 8000	mg/m ³
N ₂ O	0 - 100	0 - 6700	-	mg/m ³
CO ₂	0 - 20	-	-	Vol.-%
O ₂	0 - 25	0 - 10	-	Vol.-%

Software version: 3.3.0

Restrictions:

1. The sum of positive influences of interferents (cross-sensitivity) exceeds 4 % of the certification range for CO concentrations above 210 mg/m³ when measuring N₂O in the certification range 0-100 mg/m³. An internal correction using an additional CO measurement channel is possible, as necessary.
2. The sum of positive influences of interferents in the measurement range 0 – 150 mg/m³ exceeds the maximum permissible upper limit of 4 % of this measurement range for N₂O-concentrations over 75 mg/m³ at the CO measurement channel of the module variation without filter cuvette. Use of the filter cuvette or an internal correction by means of an additional N₂O measurement channel is possible, if necessary.
3. The total uncertainty in the certification range at an emission limit value of 50 mg/m³ for the component CO cannot be fulfilled.
4. The total uncertainty in the certification range at an emission limit value of 50 mg/m³ NO₂ for the component NO cannot be fulfilled.

Notes:

1. The EasyLine EL3000 series AMS are equipped with the infrared measurement cell Uras26. They can be constructed without an oxygen measurement cell, with a paramagnetic oxygen measurement cell Magnos206 or alternatively with an electrochemical oxygen measurement cell (sensor).
2. Modules with the measurement range NO (L) must always be equipped with an oxygen measurement cell.
3. Modules with the measurement range for SO₂ from 0 – 75 mg/m³ must always be equipped with an oxygen measurement cell.

4. If the analysers are operated with gas-filled calibration cells, the concentrations in the analysers should be tested in the annual function test with test gases.
5. The zero points for the oxygen measurement equipment should be tested in the annual function test with nitrogen.
6. Modules with the supplement (K) are equipped with a filter cuvette.
7. The maintenance interval is three weeks.
8. The suitability test includes the following module variations

Module variation	Uras26 - identification	Component 1	Component 2	Component 3	Component 4
EL3020/ 3040	CEM1000	CO			
EL3020/ 3040	CEM2000	NO			
EL3020/ 3040	CEM2000L	NO(L)			
EL3020/ 3040	CEM4000	N ₂ O			
EL3020/ 3040	CEM1200	CO	NO		
EL3020/ 3040	CEM1200L	CO	NO(L)		
EL3020/ 3040	CEM1500	CO	CO ₂		
EL3020/ 3040	CEM1400	CO	N ₂ O		
EL3020/ 3040	CEM2300	NO	SO ₂		
EL3020/ 3040	CEM2400	NO	N ₂ O		
EL3020/ 3040	CEM2500	NO	CO ₂		
EL3020/ 3040	CEM2500L	NO(L)	CO ₂		
EL3020/ 3040	CEM4500	N ₂ O	CO ₂		
EL3020/ 3040	CEM1250	CO	NO	CO ₂	
EL3020/ 3040	CEM1250L	CO	NO(L)	CO ₂	
EL3020/ 3040	CEM1230	CO	SO ₂	NO	
EL3020/ 3040	CEM1230K	CO(K)	SO ₂ (K)	NO	
EL3020/ 3040	CEM1230L	CO	SO ₂	NO(L)	
EL3020/ 3040	CEM1230KL	CO(K)	SO ₂ (K)	NO(L)	
EL3020/ 3040	CEM1450	CO	N ₂ O	CO ₂	
EL3020/ 3040	CEM2350	NO	SO ₂	CO ₂	
EL3020/ 3040	CEM2450	NO	N ₂ O	CO ₂	
EL3020/ 3040	CEM1235	CO	SO ₂	NO	CO ₂
EL3020/ 3040	CEM1235K	CO(K)	SO ₂ (K)	NO	CO ₂

An additional statement is provided as to whether an oxygen cell Magnos206 or an electro-chemical sensor has been installed.

9. Supplementary test for transfer to the system DIN EN 15267 to the publications of the Umweltbundesamt from 12th September 2006 (BAnz. P. 6715, chapter I, number 2.2) and from 10th January 2011 (BAnz. P. 294, chapter IV, 28. notification).

Test report:

TÜV SÜD Industrie Service GmbH, Munich
Report-No.: 1669640 from 30th September 2011

- Publication in the German Federal Gazette (BAnz AT 20th July 2012 B11, chapter IV, notification 27, UBA publication from 06th July 2012):

27 Notification to the publication by the Umweltbundesamt from 23rd February 2012 (BAnz page 920, chapter I number 4.4)

The current software version for the analyser module of the EasyLine EL3000 series AMS from ABB Automation GmbH, Frankfurt am Main, is 3.3.2.

Statement from TÜV Süd Industrie Service GmbH from 16th March 2012

- Publication in the German Federal Gazette (BAnz AT 01st April 2014 B12, chapter VI, statement 3, UBA publication from 27th February 2014):

3 Notification to the publication by the Umweltbundesamt from 23rd February 2012 (BAnz. p. 920, chapter I number 4.4) and from 6th July 2012 (BAnz AT 20th July 2012 B11, chapter IV 27. notification)

The current software version for the analyser module of the EasyLine EL3000 series AMS from ABB Automation GmbH, Frankfurt am Main, is 3.4.2.

Statement from TÜV Süd Industrie Service GmbH from 30th September 2013

- Publication in the German Federal Gazette (BAnz AT 2nd April 2015 B5, chapter IV, notification 39, UBA publication from 25th February 2015):

39 Notification to the publication by the Umweltbundesamt from 23rd February 2012 (BAnz. S. 920, chapter I number 4.4) and from 27th February 2014 (BAnz AT 01st April 2014 B12, chapter VI 3. notification)

The current software version for the analyser module of the EasyLine EL3000 series AMS from ABB Automation GmbH, Frankfurt am Main, is 3.4.4.

Statement from TÜV Süd Industrie Service GmbH from 18th September 2014

- Publication in the German Federal Gazette (BAnz AT 1st August 2016 B11, chapter V, Notification 21, UBA publication from 14th July 2016):

21 Notification to the publication by the Umweltbundesamt from 23rd February 2012 (BAnz. P. 920, chapter I number 4.4) and from 25th February 2015 (BAnz AT 2nd April 2015 B5, chapter VI 39. notification)

The current software version for the analyser module of the EasyLine EL3000 series AMS from ABB Automation GmbH, Frankfurt am Main, is 3.4.8.

Statement from TÜV Süd Industrie Service GmbH from 26th February 2016

Certified product

The certificate applies to AMS, which comply with the following description:

The entire tested modular AMS of the EasyLine EL3000 series consists of a sample gas extraction probe, the heated sample hose, the measurement gas cooler, the measurement gas feeder pump and the multi-component analyser EasyLine EL3000 with up to four measurement channels. The modular AMS measures CO, NO, SO₂, CO₂ and N₂O according to the principle of non-dispersive-infrared-absorption (NDIR-procedure). Either an electrochemical or a magneto-mechanical oxygen measurement cell (Magnos206) can be used to measure O₂.

Sample gas is extracted using a stainless steel extraction pipe with a heated ceramic filter. A heated sample hose, fitted with a PTFE core (internal diameter 6 mm) is connected to the probe. After the heated hose the sample gas passes through a magnetic valve (three-way valve) into a compressor cooler. After the cooler there is the sample pump, with integrated rotameter and a flow sensor for setting the measurement gas flow and a fine filter. After the sample pump, the measurement gas flows into the analyser. The magnetic valve is used to switch zero and span gases. Zero points for CO, NO, SO₂, CO₂ and N₂O as well as span point for O₂ are realigned with ambient air using the magnetic valve. This auto calibration is time controlled by the analyser.

The entire system consists of the following components:

Probe

Manufacturer: ABB Automation GmbH, D – 60488 Frankfurt
 Type: PFE 2 with ceramic filter, heated

Heated line

Manufacturer: ABB Automation GmbH, D – 60488 Frankfurt
 Heated temperature: 180 °C
 Length: 25 m in the field test for the suitability test
 Diameter: PTFE hose with 6 mm ID

Regulator

Manufacturer: Jumo GmbH & Co. KG

Compressor cooler

Manufacturer: ABB Automation GmbH, D – 60488 Frankfurt
 Type: Advance SCC-C (2 gas paths)



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Sample pump
Manufacturer: ABB Automation GmbH, D – 60488 Frankfurt
Type: Advance SCC-F (2 gas paths)

Analysers
Manufacturer: ABB Automation GmbH, D – 60488 Frankfurt
Module type: EasyLine EL3000 in the EL3020 or EL3040 versions
Software: 3.4.8

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 EasyLine EL3000 is based on the following documents and the regular continuous monitoring of the manufacturer's quality management system:

Initial test:

Test report: 691317 from 30th June 2006
TÜV SÜD Industrie Service GmbH
Publication: BAnz 14th October 2006, No.194, page 6715, chapter I No. 2.2
UBA Publication from 12th September 2006



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Statement from TÜV Süd Industrie Service GmbH from 26th February 2016
Publication: BAnz AT 01st August 2016 B11, chapter V, notification 21
UBA publication from 14th July 2016 (software modification)

Renewed issue of the certificate:

Certificate no. 2664463-ts
Certificate validity until

02nd March 2017
01st March 2022 (5 years)

Calculation of total uncertainty for QAL1 testing to DIN EN 14181 and DIN EN 15267-3

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

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty/mg/m³</i>	<i>Square of standard uncertainty (mg/m³)²</i>
Lack-of-fit	u_{lof}	-0,074	0,0055
Zero drift from field test	$u_{d,z}$	0,520	0,2704
Span drift from field test	$u_{d,s}$	-0,866	0,75
Influence of ambient temperature at span	u_t	1,164	1,3549
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,281	0,079
Influence of supply voltage	u_v	0,027	0,0007
Cross-sensitivity (interference)	u_i	-1,039	1,0795
Repeatability standard deviation at span	$u_r = s_r$	0,013	$u_d < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,309	0,0955
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	1,050	1,1025
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	4,738
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	2,1767	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	4,2663	mg/m ³
Relativ expanded uncertainty	U	8,5	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 50 mg/m ³)	7,5	% ELV
Complied with requirements relating to the measurement uncertainty		no	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 50 mg/m ³)	10	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component NO in the measuring range 0-100 mg/m³

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty/mg/m³</i>	<i>Square of standard uncertainty (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,133	0,0177
Zero drift from field test	$u_{d,z}$	-0,299	0,0894
Span drift from field test	$u_{d,s}$	1,155	1,334
Influence of ambient temperature at span	u_t	0,599	0,3588
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,294	0,0864
Influence of supply voltage	u_v	0,072	0,0052
Cross-sensitivity (interference)	u_j	-1,963	3,8534
Repeatability standard deviation at span	$u_r = s_r$	0,035	$u_d < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,944	0,8911
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	1,400	1,96
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	8,596
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	2,9319	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	5,7465	mg/m ³
Relativ expanded uncertainty	U	17,6	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 32,6 mg/m ³)	15,0	% ELV
Complied with requirements relating to the measurement uncertainty		no	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 32,6 mg/m ³)	20	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

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

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty/mg/m³</i>	<i>Square of standard uncertainty (mg/m³)²</i>
Lack-of-fit	u_{lof}	-0,087	0,0076
Zero drift from field test	$u_{d,z}$	0,260	0,0676
Span drift from field test	$u_{d,s}$	-1,169	1,3666
Influence of ambient temperature at span	u_t	0,786	0,6178
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,697	0,4858
Influence of supply voltage	u_v	0,135	0,0182
Cross-sensitivity (interference)	u_i	1,689	2,8527
Repeatability standard deviation at span	$u_r = s_r$	0,097	$u_d < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,525	0,2756
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	1,050	1,1025
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	6,7944
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	2,6066	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	5,1089	mg/m ³
Relativ expanded uncertainty	U	10,2	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 50 mg/m ³)	15,0	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 50 mg/m ³)	20	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

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

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty Vol.%</i>	<i>Square of standard uncertainty (Vol.%)²</i>
Lack-of-fit	u_{lof}	0,017	0,0003
Zero drift from field test	$u_{d,z}$	-0,060	0,0036
Span drift from field test	$u_{d,s}$	0,050	0,0025
Influence of ambient temperature at span	u_t	0,226	0,0511
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,035	0,0012
Influence of supply voltage	u_v	0,016	0,00030
Cross-sensitivity (interference)	u_i	0,058	0,0034
Repeatability standard deviation at span	$u_r = s_r$	0,010	$u_d < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,031	0,001
Uncertainty of reference material 1 % by 70% of ZR	u_{rm}	0,175	0,0306
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,094
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,3066	Vol. %
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,6009	Vol. %
Relativ expanded uncertainty	U	2,4	% CR
Permissible uncertainty of EN 15267-3	(of CR 25 Vol.%)	7,5	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of CR 25 Vol.%)	10	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component CO₂ in the measuring range 0-20 Vol.-%

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty Vol.-%</i>	<i>Square of standard uncertainty (Vol.-%)²</i>
Lack-of-fit	u_{lof}	0,040	0,0016
Zero drift from field test	$u_{d,z}$	0,010	0,0001
Span drift from field test	$u_{d,s}$	-0,210	0,0441
Influence of ambient temperature at span	u_t	0,202	0,0408
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,197	0,0388
Influence of supply voltage	u_v	0,000	0,0000
Cross-sensitivity (interference)	u_i	-0,090	0,0081
Repeatability standard deviation at span	$u_r = s_r$	0,010	$u_r < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,031	0,001
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,140	0,0196
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,1541
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,3926	Vol.-%
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,7695	Vol.-%
Relativ expanded uncertainty	U	3,8	% ZR
Permissible uncertainty of EN 15267-3	(of ZR 20 Vol.-%)	7,5	% ZR
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ZR 20 Vol.-%)	10	% ZR
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

**Total uncertainty for the measurement component NO in the measuring range
0-200 mg/m³**

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty/mg/m³</i>	<i>Square of standard uncertainty (mg/m³)²</i>
Lack-of-fit	u_{lof}	-0,831	0,6906
Zero drift from field test	$u_{d,z}$	0,346	0,1197
Span drift from field test	$u_{d,s}$	2,887	8,3348
Influence of ambient temperature at span	u_t	1,315	1,7292
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	1,316	1,7319
Influence of supply voltage	u_v	0,577	0,3329
Cross-sensitivity (interference)	u_i	-2,310	5,3361
Repeatability standard deviation at span	$u_r = s_r$	0,147	$u_r < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	1,325	1,7556
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	2,800	7,84
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	27,8708
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	5,2793	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	10,3474	mg/m ³
Relativ expanded uncertainty	U	7,9	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 130,4 mg/m ³)	15,0	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 130,4 mg/m ³)	20	% ELV

Total uncertainty for the measurement component N₂O in the measuring range 0-100 mg/m³

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty/mg/m³</i>	<i>Square of standard uncertainty (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,064	0,0041
Zero drift from field test	$u_{d,z}$	-0,231	0,0534
Span drift from field test	$u_{d,s}$	1,328	1,7636
Influence of ambient temperature at span	u_t	0,566	0,3204
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,508	0,2581
influence of supply voltage	u_v	0,217	0,0471
Cross-sensitivity (interference)	u_i	2,078	4,3181
Repeatability standard deviation at span	$u_r = s_r$	0,083	$u_r < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,650	0,4225
Uncertainty of reference material 1 % by 70% of ZR	u_{rm}	0,700	0,49
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	7,6773
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	2,7708	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	5,4308	mg/m ³
Relativ expanded uncertainty	U	5,4	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 100 mg/m ³)	15,0	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 100 mg/m ³)	20	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component O₂ in the measuring range 0-25 Vol.-%, (version with magneto mechanical oxygen cell)

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertainty Vol.%</i>	<i>Square of standard uncertainty (Vol.%)²</i>
Lack-of-fit	u_{lof}	0,017	0,0003
Zero drift from field test	$u_{d,z}$	-0,010	0,0001
Span drift from field test	$u_{d,s}$	0,030	0,0009
Influence of ambient temperature at span	u_t	0,055	0,0030
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,081	0,0066
Influence of supply voltage	u_v	0,000	0,00000
Cross-sensitivity (interference)	u_i	-0,060	0,0036
Repeatability standard deviation at span	$u_r = s_r$	0,001	$u_r < u_d$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,044	0,0019
Uncertainty of reference material 1 % by 70% of ZR	u_{rm}	0,175	0,0306
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,047
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,2168	Vol.%
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,4249	Vol.%
Relativ expanded uncertainty	U	1,7	% CR
Permissible uncertainty of EN 15267-3	(of CR 25 Vol.%)	7,5	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of CR 25 Vol.%)	10	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV