

CERTIFICATE

of product conformity (QAL 1)

Certificate number: 3307340_01-ts

Certified AMS AO2000-Limas21 for NO, NO₂, SO₂ and O₂**Manufacturer** ABB AG
Stierstädter Str. 5
60488 Frankfurt
Germany**Test institute** TÜV SÜD Industrie Service GmbH

This is to certify that the AMS has been tested and found to comply with the standards
DIN EN 15267-1:2009, DIN EN 15267-2:2023, DIN EN 15267-3:2008 and
DIN EN 14181:2015.

Certification applies to the conditions listed in this certificate
(the certificate consists of 18 pages).

This certificate replaces certificate 3307340-ts dated
01 December 2020.



Certificate No.: 3307340_01-ts

Publication in the German Federal Gazette
(BAnz) of 26 April 2017

This certificate will expire on:
13 March 2031

Umweltbundesamt
Dessau, 12 March 2026

TÜV SÜD Industrie Service GmbH
Testing laboratory emission measurement/
calibration
Munich, 11 March 2026



Dr. Marcel Langner
Head of Section II 4



Simon Gerstlacher

Certificate number: 3307340_01-ts

Test report	2694203 from 1 March 2017
Initial certification	14 March 2016
Certificate validity until	13 March 2031 (5 years)
Certificate	Re-issuance (previous certificate No. 3307340-ts dated 01 December 2020, valid until 13 March 2026)
Publication	BAnz AT 26 March 2017 B9, chapter I, no. 1.1

Approved application

The tested AMS is suitable for use at plants requiring authorisation (13. BImSchV:2021, the 17. BImSchV:2024 and the TA-Luft:2021) and plants in accordance with the 44. BImSchV:2021. The Limas21 variant CEM200Q measuring system is suitable for installations in accordance with the 13. BImSchV:2021 that meet the requirements of § 17 section 4, and for installations in accordance with the 17. BImSchV:2024 that meet the requirements of § 16 Section 3.

The suitability for this application was assessed based on a laboratory test and a field test of the AMS AO2000-Limas21 lasting over more than three months at plant according to Directive 2010/75/EU chapter IV (17. BImSchV). The measuring system is approved for ambient temperatures between +5 °C bis +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 values.

The operator should consult the manufacturer to ensure that the AMS is suitable for the plant at which it is to be installed.

Note / Disclaimer

The cited legal regulations do not necessarily reflect the current state of legislation at the time of certification in all cases. Each user should, if necessary and in coordination with the competent authority, ensure that this AMS meets the legal requirements for the intended purpose of use. Furthermore, it cannot be ruled out that legal regulations governing the use of a measuring device for monitoring emissions may change during the validity period of the certificate.

Certification basis

This certificate is based on:

- TÜV SÜD Industrie Service GmbH test report 2694203 from 1 March 2017
- Suitability announcement by the German Federal Environmental Agency as relevant body
- The ongoing surveillance of the product and the manufacturing process

- Publication in the German Federal Gazette (BAnz AT 14 March 2016 B7, chapter I, no. 4.2, UBA publication from 18 February 2016)

AMS: AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂

Manufacturer: ABB Automation GmbH, Frankfurt am Main

Suitability: Measuring system with Limas21-version CEM200Q for plants according to 13. BImSchV which meet the requirements of § 20 section 4, and plants according to 17. BImSchV which meet the requirements of § 16 section 3

Measuring systems with Limas21-versions CEM236Q and CEM260Q for plants requiring official approval

Measurement ranges in the suitability test:

Limas21-identification *)	Component	Certification range	Supplementary measurement range	unit
CEM236Q	NO	0 - 25	0 - 200	mg/m ³
	NO ₂	0 - 50	0 - 500	mg/m ³
	SO ₂	0 - 75	0 - 300	mg/m ³
	O ₂ , electro-chemical	0 - 25	-	Vol.-%
CEM260Q	NO	0 - 25	0 - 200	mg/m ³
	NO ₂	0 - 50	0 - 500	mg/m ³
	O ₂ , electro-chemical	0 - 25	-	Vol.-%
CEM200Q	NO	0 - 25	0 - 200	mg/m ³
	O ₂ , electro-chemical	0 - 25	-	Vol.-%

*) Limas21-identification relates to the UV-photometer

Software versions: Central unit: 5.1.4
Analyser module: 3.7.0

Restrictions:

- The minimum requirement for cross-sensitivity for the component NO was not fulfilled in the CEM200Q Limas21-version in the suitability test according to DIN EN 15267-3 in the certification range at NO₂ concentrations >8 mg/m³. In the supplementary measurement range, the NO₂ concentration shall not exceed 64 mg/m³.
- The AMS can only be used in the Limas21 CEM200Q-version in plants in accordance with the 13. and 17. BImSchV for which the responsible authorities waive the continuous measurement of nitrogen dioxide and have authorised the determination through calculations, as due to the input substances (13. BImSchV) or the waste or materials used according to paragraph 1 section 1 of the 17. BImSchV, the design, the mode of operation or due to the individual measurements, the result is a nitrogen dioxide share in the nitrogen oxide emissions that is under 5% (13. BImSchV) or under 10% (17. BImSchV).

Notes:

1. The maintenance interval is four weeks.
2. The AMS should be operated at an interval of 24 hours for automatic alignment. The zero points for components NO, NO₂ and SO₂ and the reference point for O₂ shall be realigned with prepared ambient air.
3. The analyser can be used in the AO2020 (19"- rack cabinet) and AO2040 (cabinet for wall mounting).
4. The AMS can be equipped with analysers with the Limas21 CEM200Q and CEM260Q.
5. The measuring system AO2000-Limas21 UV is not suitable for use in coal-fired plants without desulfurization in the Limas21-versions CEM200Q and CEM260Q.
6. Supplementary suitability test (approval of a further Limas21 analyser (CEM200Q)) to the publication by the German Federal Environmental Agency dated from 22 February 2017 (BAnz AT 15 March 2017 B6, chapter I number 3.4).

Test report: TÜV SÜD Industrie Service GmbH, Munich
Report no.: 2694203 from 01 March 17

- Publication in the German Federal Gazette (BAnz AT 15 March 2017 B6, chapter V, no. 31, UBA publication from 22 February 2017):

31 Notification to the publications by the German Federal Environmental Agency from 18 February 2016 (BAnz AT 14 March 2016 B7, chapter I number 4.1)

The current software version for the analyzer module (AMC) of the AO2000-Limas21 UV measuring system for NO, NO₂, SO₂ and O₂ from ABB Automation GmbH, Frankfurt am Main, is version 3.7.0.

The current software version for the central unit Syscon III of the AO2000-Limas21 UV measuring system from ABB Automation GmbH, Frankfurt am Main, is version 5.1.10. Versions 5.1.6, 5.1.7 and 5.1.8 are included therein.

Statement by TÜV SÜD Industrie Service GmbH dated 27 September 2016

- Publication in the German Federal Gazette (BAnz AT 31 July 2017 B12, chapter II, 6. notification, UBA publication from 13 July 2017):

6 Notification to the publications by the German Federal Environmental Agency from 22 February 2017 (BAnz AT 15 March 2017, B6, chapter I number 3.4 and chapter V notification 31) and from 18 April 2017 (BAnz AT 26 April 2017 B9, 6 chapter I no. 1.1):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB Automation GmbH is:

Limas21 (AMC-Board): 3.8.0
Syscon: 5.1.12

The Inpotron power supply, type PSU-0261-12-14, can be used as a 24-volt power supply.

Statement from TÜV Rheinland Energy GmbH from 7 March 2017

Certificate number: 3307340_01-ts

- Publication in the German Federal Gazette (BAnz AT 26 March 2018 B8, chapter V, 19. notification, UBA publication from 21 February 2018):

19 Notification to the publications by the German Federal Environmental Agency from 22 February 2017 (BAnz AT 15 March 2017, B6, chapter I number 3.4 and chapter V notification 31) and from 13 July 2017 (BAnz AT 31 July 2017 B12, chapter II 6. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB Automation GmbH is:

Limas21 (AMC-Board): 3.8.2
Syscon: 5.1.14

The U-remote modules from Weidmüller or the KL series modules from Beckhoff may be used as analog output modules.

Statement from TÜV Rheinland Energy GmbH from 7 December 2017

- Publication in the German Federal Gazette (BAnz AT 17 July 2018 B9, chapter III, 7. notification, UBA publication from 3 July 2018):

7 Notification to the publications by the German Federal Environmental Agency from 18 April 2017 (BAnz AT 26 April 2017, B9, chapter I number 1.1) and from 21 February 2018 (BAnz AT 26 March 2018 B8, chapter II 19. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB Automation GmbH is:

Limas21 (AMC-Board): 3.8.6
Syscon: 5.1.16

The version 3.8.4 of the AMC-Board is included herein.

Statement from TÜV Rheinland Energy GmbH from 2 May 2018

- Publication in the German Federal Gazette (BAnz AT 24 March 2020 B7, chapter IV,3. notification, UBA publication from 24 February 2020):

3 Notification to the publications by the German Federal Environmental Agency from 18 April 2017 (BAnz AT 26 April 2017, B9, chapter I number 1.1) and from 3 July 2018 (BAnz AT 17 July 2018 B9, chapter III 7. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB Automation GmbH is:

Limas21 (AMC-Board): 3.9.0
Syscon: 5.1.18

Statement from TÜV Rheinland Energy GmbH from 13 September 2019

Certificate number: 3307340_01-ts

- Publication in the German Federal Gazette (BAnz AT 05 August 2021 B5, chapter IV, 21. notification, UBA publication from 29 June 2021):

21 Notification to the publications by the German Federal Environmental Agency from 18 April 2017 (BAnz AT 26 April 2017, B9, chapter I number 1.1) and from 24 February 2020 (BAnz AT 24 March 2020 B7, chapter IV 3. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB Automation GmbH is:

Limas21 (AMC-Board): 3.9.3
Syscon: 5.1.20

Statement from TÜV Rheinland Energy GmbH from 19 February 2021

- Publication in the German Federal Gazette (BAnz AT 11 April 2022 B10, chapter VI, 24. notification, UBA publication from 09 March 2022):

24 Notification to the publications by the German Federal Environmental Agency from 18 April 2017 (BAnz AT 26 April 2017, B9, chapter I number 1.1) and from 29 June 2021 (BAnz AT 05 August 2021 B5, chapter IV 22. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB Automation GmbH is:

Limas21 (AMC-Board): 3.9.2
Syscon: 5.1.22

The measuring system may alternatively also be operated with hardware version 08 of the pressure sensor assembly.

As of 13 September, ABB Automation GmbH has been merged with its parent company ABB AG. The new manufacturer's name is ABB AG.

Statement from TÜV Rheinland Energy GmbH from 14 September 2021

- Publication in the German Federal Gazette (BAnz AT 11 March 2023 B6, chapter IV, 4. notification, UBA publication from 21 February 2023):

4 Notification to the publications by the German Federal Environmental Agency from 18 April 2017 (BAnz AT 26 April 2017, B9, chapter I number 1.1) and from 9 March 2022 (BAnz AT 11 April 2022 B10, chapter VI 24. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB AG is:

Limas21 (AMC-Board): 3.9.8
Syscon: 5.1.22

The version 3.9.6 of the AMC-Board is included herein.

Statement from TÜV Rheinland Energy GmbH from 5 September 2022

Certificate number: 3307340_01-ts

- Publication in the German Federal Gazette (BAnz AT 31 October 2024 B9, chapter IV, 7. notification, UBA publication from 31 October 2024):

7 Notification to the publications by the German Federal Environmental Agency from 18 April 2017 (BAnz AT 26 April 2017, B9, chapter I number 1.1) and from 21 February 2023 (BAnz AT 20 March 2023 B6, chapter IV 4. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB AG is:

Limas21 (AMC-Board):	3.9.10
Syscon:	5.1.22

Statement from TÜV Rheinland Energy GmbH from 20 February 2024

- Publication in the German Federal Gazette (BAnz AT 19 May 2025 B3, chapter IV, 31. notification, UBA publication from 2 April 2025):

31 Notification to the publications by the German Federal Environmental Agency from 18 April 2017 (BAnz AT 26 April 2017, B9, chapter I number 1.1) and from 21 August 2024 (BAnz AT 31 October 2024 B9, chapter IV 7. notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB AG is:

Limas21 (AMC-Board):	3.9.12
Syscon:	5.1.24

Statement from TÜV Rheinland Energy GmbH from 20 February 2024

- Publication in the German Federal Gazette (BAnz AT 10 July 2026 B5, Chapter VI, 14. Notification, UBA publication from 18 May 2026)

14 Notification regarding the announcement of the German Environment Agency from 18 February 2016 (BAnz AT 14 March 2016, B7, chapter I number 4.2) and from 2 April 2025 (BAnz AT 19 May 2025 B3, chapter IV 31. Notification):

The current software version for the AMS AO2000-Limas21 UV for NO, NO₂, SO₂ and O₂ from ABB AG is:

Limas21 (AMC-Board):	3.9.14
Syscon III:	5.1.26

Statement from TÜV Rheinland Energy GmbH from 24 September 2025

Certified Product

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

The entire tested AO2000-Limas21 UV consisted of a heated sampling probe, the heated measurement gas line, the magnetic valve (3-way valve), sample gas cooler, sample gas feed unit and the analyser from the AO2000-Limas21 UV product series with up to three UV measurement channels and oxygen. To measure NO, the analyser works according to the gas filter correlation principle (GFC), to measure NO₂ and SO₂, according to the interference filter correlation principle (IFC). The component O₂ is determined using an electro-chemical oxygen measurement cell.

The sample gas extraction consists of a stainless-steel extraction probe with a heated ceramic filter. A heated sample gas pipe, fitted with a PTFE-seal (interior diameter 6mm), is attached to the probe. After the heated pipe, the sample gas flows through the magnetic valve (3-way valve) into a compressor cooler. The sample gas feed unit with integrated rotameter and flow sensor for setting measurement gas flow and a fine filter can be found after the cooler. After the gas feed unit, the measured gas flows into the analyser. The magnetic valve activates the flow of zero and test gases. The zero points for the components NO, NO₂ and SO₂ and the span point for O₂ are realigned via the magnetic valve with ambient air. This auto-alignment is triggered at an interval of 24 hours by the analyser. Alternatively, zero gas / test gas can be applied manually via the second gas connection on the probe. The analyser is equipped with a measurement gas cuvette made of quartz glass. The analyser is available in the versions AO2020 (19" rack cabinet) and AO2040 (cabinet for wall mounting).

The AMS consists of the following components:

Probe

Manufacturer: ABB Automation GmbH, 60488 Frankfurt, Germany
 Type: 40 or 42 (heated), with ceramic filter, PFE 3 of the modular system of PFE series
 Regulator: PSG

Heated sampling hose

Manufacturer: ABB Automation GmbH, 60488 Frankfurt, Germany
 Heated temperatures: 180 °C
 Length: 30 m in the field test
 Diameter: 6 mm ID (PTFE)
 Controller
 Manufacturer: Jumo GmbH & Co. KG
 Sensor: PT 100

Compressor cooler

Manufacturer: ABB Automation GmbH, 60488 Frankfurt, Germany
 Type: Advance SCC-C

Sample gas feed unit

Manufacturer: ABB Automation GmbH, 60488 Frankfurt Germany
 Type: Advance SCC-F

Magnetic valve

Manufacturer: Bürkert GmbH & Co. KG
 Type: 0124

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Analyser

Manufacturer: ABB Automation GmbH, 60488 Frankfurt, Germany
Type: AO2020- or AO2040-Limas21 UV
(Limas-identification: CEM200Q, CEM260Q, CEM236Q)
Software: Syscon: 5.1.18
Limas21 (AMC Board): 3.9.0

General notes

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 required to maintain an approved 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.

If the product from the current production series no longer complies with the certified product, the Environmental Engineering Department of TÜV SÜD Industrie Service GmbH must be informed (address see footnote).

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 on the product or used in publicity material for the certified product.

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 expiration is also accessible on the internet at qal1.de.

Document History:

The certification of the AO2000-Limas21 UV measuring system is based on the following documents and the regular continuous monitoring of the manufacturer's quality management system:

Initial certification in accordance with DIN EN 15267:

Certificate no. 2231669.1-ts	14 March 2016
Certificate validity until	13 March 2021 (5 years)

Report no.: 2231669.1 from 1 September 2015,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 14 March 2016 B7, chapter I no. 4.1
UBA publication from 18 February 2016

Supplementary testing according to DIN EN 15267:

Report no.: 2532547 from 04 July 2016,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 15 March 2017 B6, chapter I no. 3.4
UBA publication from 12 February 2017

Certificate number: 3307340_01-ts

Supplementary testing according to DIN EN 15267:

Certificate no. 2694203-ts

09 June 2017

Certificate validity until

13 March 2021 (5 years)

Report no.: 2694203 from 01 March 2017,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 26 April 2017 B9, chapter I no. 1.1
UBA publication from 18 April 2017

Notification:

Statement from TÜV Rheinland Energy GmbH from 27 September 2016
Publication: BAnz AT 15 March 2017 B6, chapter V, notification 31,
UBA publication from 22 February 2017 (software modification)

Notification:

Statement from TÜV Rheinland Energy GmbH from 07 March 2017
Publication: BAnz AT 31 July 2017 B12, chapter II, notification 6,
UBA publication from 13 July 2017 (software and hardware modification)

Notification:

Statement from TÜV Rheinland Energy GmbH from 07 December 2017
Publication: BAnz AT 26 March 2018 B8, chapter V, notification 19,
UBA publication from 21 February 2018 (software and hardware modification)

Notification:

Statement from TÜV Rheinland Energy GmbH from 02 May 2018
Publication: BAnz AT 17 July 2018 B9, chapter III, notification 7,
UBA publication from 03 July 2018 (software modification)

Notification:

Statement from TÜV Rheinland Energy GmbH from 13 September 2019
Publication: BAnz AT 24 March 2020 B7, chapter IV, notification 3,
UBA publication from 24 February 2020 (software modification)

Certificate re-issuance:

Certificate-No. 3307340-ts

01.12.2020

Certificate valid until

13.03.2026

Notification:

Statement from TÜV Rheinland Energy GmbH from 19 February 2021
Publication: BAnz AT 05 August 2021 B5, chapter IV, notification 21,
UBA publication from 29 June 2021 (software modification)

Notification:

Statement from TÜV Rheinland Energy GmbH from 14 September 2021
Publication: BAnz AT 11 April 2022 B10, chapter VI, notification 24,
UBA publication from 9 March 2022 (software modification, company merge)

Certificate number: 3307340_01-ts

Notification:

Statement from TÜV Rheinland Energy GmbH from 05 September 2022
Publication: BAnz AT 20 March 2023 B6, chapter IV, notification 4,
UBA publication from 21 February 2023 (software modification)

Notification:

Statement from TÜV Rheinland Energy & Environment GmbH from 20 February 2024
Publication: BAnz AT 31 October 2024 B9, chapter IV, notification 7,
UBA publication from 21 August 2024 (software modification)

Notification:

Statement from TÜV Rheinland Energy & Environment GmbH from 20 Dezember 2024
Publication: BAnz AT 19 May 2025 B3, chapter IV, notification 31,
UBA publication from 02 April 2025 (software modification)

Notification

Statement from TÜV Rheinland Energy & Environment GmbH from 24 September 2025
Publication: BAnz AT 10.07.2026 B5, Chapter VI, Notification 14,
UBA publication dated 18 May 2026 (software modification)

Certificate re-issuance:

Certificate-No. 3299856_01-ts 14.03.2026
Certificate valid until 13.03.2031 (5 Years)

Calculation of total uncertainty for QAL 1 testing according to DIN EN 14181 and DIN EN 15267-3

Total uncertainty for the measurement component NO in the measuring range 0-25 mg/m³, Limas21 CEM236Q

<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}	-0,058	0,0033
Zero drift from field test	$u_{d,z}$	0,332	0,1102
Span drift from field test	$u_{d,s}$	0,245	0,06
Influence of ambient temperature at span	u_t	0,176	0,031
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,033	0,0011
Influence of supply voltage	u_v	0,065	0,0042
Cross-sensitivity (interference)	u_i	0,391	0,153
Repeatability standard deviation at span	$u_r = s_r$	0,068	$u_r < du$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,400	0,16
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,202	0,0408
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,5636
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,7507	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	1,4714	mg/m ³
Relativ expanded uncertainty	U	4,5	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 32,6 mg/m ³)	15	% ELV
Complied with requirements relating to the measurement uncertainty		yes	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 NO₂ in the measurement range 0-50 mg/m³, Limas21 CEM236Q

<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}	0,268	0,0721
Zero drift from field test	$u_{d,z}$	-0,491	0,2411
Span drift from field test	$u_{d,s}$	-0,491	0,2411
Influence of ambient temperature at span	u_t	0,791	0,6257
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,192	0,0369
Influence of supply voltage	u_v	0,152	0,0231
Cross-sensitivity (interference)	u_i	1,149	1,32
Repeatability standard deviation at span	$u_r = s_r$	0,057	$u_r < du$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,263	0,0692
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,404	0,1633
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	2,7925
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	1,6711	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	3,2754	mg/m ³
Relativ expanded uncertainty	U	6,6	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 50 mg/m ³)	15	% 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 SO₂ in the measurement range 0-75 mg/m³, Limas21 CEM236Q

<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}	0,372	0,1387
Zero drift from field test	$U_{d,z}$	-1,256	1,5775
Span drift from field test	$U_{d,s}$	1,299	1,6874
Influence of ambient temperature at span	U_t	0,485	0,2352
Influence of sample gas pressure	U_p		
Influence of sample gas flow	U_f	-0,126	0,0158
Influence of supply voltage	U_v	0,287	0,0824
Cross-sensitivity (interference)	U_i	1,256	1,5769
Repeatability standard deviation at span	$u_r = s_r$	0,209	$u_r < du$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,530	0,2809
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,606	0,3675
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	5,9623
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	2,4418	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	4,7859	mg/m ³
Relativ expanded uncertainty	U	9,6	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 50 mg/m ³)	15	% 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

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Total uncertainty for the measurement component O₂ in the measurement range 0-25 Vol.-%

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value standard uncertaintyVol.%</i>	<i>Square of standard uncertaintyVol.%²</i>
Lack-of-fit	u_{lof}	-0,092	0,0085
Zero drift from field test	$u_{d,z}$	-0,110	0,0121
Span drift from field test	$u_{d,s}$	0,035	0,0012
Influence of ambient temperature at span	u_t	0,240	0,0576
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,021	0,0004
Influence of supply voltage	u_v	0,004	0,00000
Cross-sensitivity (interference)	u_i	0,196	0,0385
Repeatability standard deviation at span	$u_r = s_r$	0,032	0,001
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,028	$u_d < u_r$
Uncertainty of reference material 1 % by 70% of ZR	u_{rm}	0,101	0,0102
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,1295
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,3599	Vol.%
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,7054	Vol.%
Relativ expanded uncertainty	U	2,8	% 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

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Total uncertainty for the measurement component NO in the measurement range 0-25 mg/m³, Limas21 CEM200Q

<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}	-0,058	0,0033
Zero drift from field test	$u_{d,z}$	0,332	0,1102
Span drift from field test	$u_{d,s}$	0,245	0,06
Influence of ambient temperature at span	u_t	0,176	0,031
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,033	0,0011
Influence of supply voltage	u_v	0,065	0,0042
Cross-sensitivity (interference)	u_i	0,556	0,3091
Repeatability standard deviation at span	$u_r = s_r$	0,068	$u_r < du$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,400	0,16
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,202	0,0408
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,7197
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,8484	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	1,6629	mg/m ³
Relativ expanded uncertainty	U	10,0	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 16,7 mg/m ³)	15	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 16,7 mg/m ³)	20	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

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Total uncertainty for the measurement component NO in the measurement range 0-25 mg/m³, Limas21 CEM260Q

<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}	0,268	0,0721
Zero drift from field test	$u_{d,z}$	-0,491	0,2411
Span drift from field test	$u_{d,s}$	-0,491	0,2411
Influence of ambient temperature at span	u_t	0,791	0,6257
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,192	0,0369
Influence of supply voltage	u_v	0,152	0,0231
Cross-sensitivity (interference)	u_i	-0,927	0,8593
Repeatability standard deviation at span	$u_r = s_r$	0,057	$u_r < du$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,263	0,0692
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,404	0,1633
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	2,3318
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	1,527	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	2,9929	mg/m ³
Relativ expanded uncertainty	U	9,0	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 33,3 mg/m ³)	15	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 33,3 mg/m ³)	20	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

Certificate number: 3307340_01-ts

Total uncertainty for the measurement component NO₂ in the measurement range 0-50 mg/m³, Limas21 CEM260Q

<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}	0,268	0,0721
Zero drift from field test	$u_{d,z}$	-0,491	0,2411
Span drift from field test	$u_{d,s}$	-0,491	0,2411
Influence of ambient temperature at span	u_t	0,791	0,6257
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,192	0,0369
Influence of supply voltage	u_v	0,152	0,0231
Cross-sensitivity (interference)	u_i	-0,927	0,8593
Repeatability standard deviation at span	$u_r = s_r$	0,057	$u_r < du$
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,263	0,0692
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,404	0,1633
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	2,3318
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	1,527	mg/m ³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	2,9929	mg/m ³
Relativ expanded uncertainty	U	9,0	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 33,3 mg/m ³)	15	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 33,3 mg/m ³)	20	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV