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Umwelt Bundesamt

Certificate number: 2704952-ts

TÜV SÜD Industrie Service

CERTIFICATE

of product conformity (QAL 1)

Certificate number: 2704952-ts

Certified AMS	EL3000-Limas23 for NO, NO_2, SO_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 11 pages).

This certificate replaces the certificate 2231669.2-ts dated 14th March 2016.

DIN EN 15267 TÜV SÜD Eignungsprüfung Produktion überwacht Valid until 03/2021

Certificate No.: 2704952-ts

Publication in the German Federal Gazette
dated 14th March 2016

Certificate validity
until 13th March 2021

Umweltbundesamt
Dessau, 09th June 2017

Dr. Marcel Langner
Head of Section II 4.1

TÜV SÜD Industrie Service GmbH
Testing laboratory emission measurement/ calibration
Munich, 08th June 2017

Dr. Michael Waeber

TÜV®

Test report	2231669.2, Rev. 01 from 29th September 2016
Initial certification	14th March 2016
Certificate validity until	13th March 2021 (5 years)
Publication	BAnz AT 14th March 2016 B7, chapter I, No. 4.2

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) 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 more than 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 2231669.2, Rev. 01 from 29th September 2016
- 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. 4.2, UBA publication from 18th February 2016):

AMS:	EL3000-Limas23 for NO, NO_2, SO_2 and O_2
Manufacturer:	ABB Automation GmbH, Frankfurt am Main
Suitability:	Measuring system for plants according to13. and 17. BImSchV and for plants according to TA-Luft.

Measurement ranges in the suitability test:

Component	Certification range	Supplementary measurement range	Unit
NO	0 - 33,5	0 - 200	mg/m³
NO_2	0 - 125	0 - 500	mg/m³
SO_2	0 - 75	0 - 300	mg/m³
O_2, electro chemical	0 - 25	-	Vol.-%

Software version: 3.4.5

Restrictions:

None

Notes:

1. The maintenance interval is two weeks.
2. The AMS should be operated at an interval of 24 hours for automatic alignment. The zero points for components NO, NO_2 and SO_2 and the reference point for O_2 shall be realigned with prepared ambient air.
3. The analyser can be used in the versions EL3020 (19" rack cabinet) and EL3040 (cabinet for wall mounting).

Test report: TÜV SÜD Industrie Service GmbH, Munich
Report No.: 2231669.2, Rev. 01 from 29th September 2016

- Correction in the German Federal Gazette (BAnz AT 15th March 2017 B6, chapter IV, No. 6, UBA publication from 22nd February 2017):

> **6 Correction of the publication by the Umweltbundesamt from 18th February 2016 (BAnz AT 14th March 2016 B7, chapter I number 4.2):**
>
> In the above named publication for the EL3000-Limas23 AMS for NO, NO_2, SO_2 and O_2 from ABB Automation GmbH there is an error:
>
> The suitability publication for the EL3000-Limas23 AMS is based on the TÜV Süd Industrie Service GmbH test report, report- No. 2231669.2 from 30th September 2015. The test report No. 2331669.2 named in the publication is incorrect. The report was also corrected and now bears the report no. 2231669.2, Rev. 01. and is dated 29th September 2016.
>
> Statement of TÜV Süd Industrie Service GmbH from 29th September 2016.

Certified product

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

The entire tested EL3000-Limas23 AMS 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 EL3000-Limas23 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 NO_2 and SO_2 according to the interference filter correlation principle (IFC). The component O_2 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 6 mm), 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, NO_2 and SO_2 and the span point for O_2 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 aluminium. The analyser is available in the versions EL3020 (19" rack cabinet) and EL3040 (cabinet for wall mounting).

The AMS consists of the following components:

Probe	
Manufacturer:	ABB Automation GmbH, D – 60488 Frankfurt
Type:	40 or 42 (heated), with ceramic filter, PFE 3 of the modular system of PFE series, heated to 180 °C
Regulator:	PSG
Heated sampling hose	
Manufacturer:	ABB Automation GmbH, D – 60488 Frankfurt
Heated temperatures:	180 °C
Length:	30 m in the field test
Diameter:	6 mm ID
Controller	
Manufacturer:	Jumo GmbH & Co. KG
Sensor:	PT 100
Compressor cooler	
Manufacturer:	ABB Automation GmbH, D – 60488 Frankfurt
Type:	Advance SCC-C
Sample gas feed unit	
Manufacturer:	ABB Automation GmbH, D – 60488 Frankfurt
Type:	Advance SCC-F
Magnetic valve	
Manufacturer:	Bürkert GmbH & Co. KG
Type:	0124
Analysers	
Manufacturer:	ABB Automation GmbH, D – 60488 Frankfurt
Type:	EL3020- or EL3040-Limas23 (Limas-identification: CEM236A)
Software:	3.4.5
Manuals:	41/24 400 DE Rev. 6 (analyser) 42/23-24 DE Rev. 5 (heated line) 42/23-39 DE Rev. 7 (probe) 42/23-51 DE Rev. 3 (sample gas feed unit) 42/23-55 DE Rev. 2 (sample gas cooler)

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 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: **qal1.de**.

The certification of the measuring system EL3000-Limas23 is based on the following documents and the regular continuous monitoring of the manufacturer's quality management system:

Initial certification in accordance to DIN EN 15267:

Certificate no. 2231669.2-ts	14th March 2016
Certificate validity until	13th March 2021 (5 years)

Report no: 2231669.2 from 30th September 2015,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 14th March 2016 B7, chapter I number 4.2
UBA publication from 18th February 2016

Correction:

Statement from TÜV Süd Industrie Service GmbH from 29th September 2016
Publication: BAnz AT 15th March 2017 B6, chapter IV, correction 6 (error correction in the publication and in the test report)
UBA publication from 22nd February 2017

Report no: 2231669.2, Rev. 01 from 29th September 2016,
TÜV SÜD Industrie Service GmbH

Correction of certificate:

Certificate no. 2704952-ts	14th March 2016
Certificate validity until	13th March 2021 (5 years)

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

Total uncertainty for the measurement component NO in the measuring range 0-33.5 mg/m³

Performance characteristic	*Uncertainty*	*Value standard uncertainty mg/m³*	*Square of standard uncertainty (mg/m³)²*
Lack-of-fit	u_{lof}	0,039	0,0015
Zero drift from field test	$u_{d,z}$	0,155	0,024
Span drift from field test	$u_{d,s}$	-0,309	0,0955
Influence of ambient temperature at span	u_t	0,173	0,0299
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,040	0,0016
Influence of supply voltage	u_v	0,041	0,0017
Cross-sensitivity (interference)	u_i	0,261	0,0682
Repeatability standard deviation at span	$u_r = s_r$	0,023	ur < du
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,249	0,062
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,271	0,0733
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,3577
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,5981	mg/m³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	1,1723	mg/m³
Relativ expanded uncertainty	U	3,6	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 32,6 mg/m³)	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/m³)	20	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component NO_2 in the measuring range 0-125 mg/m³

Performance characteristic	*Uncertainty*	*Value standard uncertainty mg/m³*	*Square of standard uncertainty (mg/m³)²*
Lack-of-fit	u_{lof}	0,664	0,4408
Zero drift from field test	$u_{d,z}$	-2,165	4,6872
Span drift from field test	$u_{d,s}$	-2,093	4,3806
Influence of ambient temperature at span	u_t	0,775	0,6006
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,945	0,893
Influence of supply voltage	u_v	0,153	0,0234
Cross-sensitivity (interference)	u_i	1,415	2,0022
Repeatability standard deviation at span	$u_r = s_r$	0,166	ur < du
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,555	0,308
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	1,010	1,0208
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	14,3566
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	3,789	mg/m³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	7,4264	mg/m³
Relativ expanded uncertainty	U	**14,9**	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 50 mg/m³)	**15**	% ELV
Complied with requirements relating to the measurement uncertainty		**yes**	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 50 mg/m³)	**20**	% ELV
Complied with requirements relating to the measurement uncertainty		**yes**	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component SO_2 in the measuring range 0-75 mg/m³

Performance characteristic	*Uncertainty*	*Value standard uncertainty mg/m³*	*Square of standard uncertainty (mg/m³)²*
Lack-of-fit	u_{lof}	-0,204	0,0414
Zero drift from field test	$u_{d,z}$	0,823	0,6773
Span drift from field test	$u_{d,s}$	1,299	1,6874
Influence of ambient temperature at span	u_t	1,467	2,1521
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,217	0,0469
Influence of supply voltage	u_v	0,221	0,0488
Cross-sensitivity (interference)	u_i	-1,334	1,7787
Repeatability standard deviation at span	$u_r = s_r$	0,196	ur < du
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,413	0,1706
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	6,9707
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	2,6402	mg/m³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	5,1748	mg/m³
Relativ expanded uncertainty	U	**10,3**	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 50 mg/m³)	**15**	% ELV
Complied with requirements relating to the measurement uncertainty		**yes**	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 50 mg/m³)	**20**	% ELV
Complied with requirements relating to the measurement uncertainty		**yes**	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component O_2 in the measuring range 0-25 Vol.-%

Performance characteristic	*Uncertainty*	*Value standard uncertainty Vol.%*	*Square of standard uncertainty Vol.%²*
Lack-of-fit	u_{lof}	-0,046	0,0021
Zero drift from field test	$u_{d,z}$	-0,075	0,0056
Span drift from field test	$u_{d,s}$	-0,081	0,0066
Influence of ambient temperature at span	u_t	0,095	0,0090
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,048	0,0023
Influence of supply voltage	u_v	0,006	0,00000
Cross-sensitivity (interference)	u_i	0,208	0,0432
Repeatability standard deviation at span	$u_r = s_r$	0,061	0,0037
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,055	ud < ur
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	0,0827
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,2876	Vol.%
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,5637	Vol.%
Relativ expanded uncertainty	U	2,3	% 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