



# CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000081152 01

Certified AMS:

EL3000-Uras26 for CO, NO, SO<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub>

Manufacturer:

ABB AG

Stierstädter Str. 5 60488 Frankfurt/Main

Germany

**Test Institute:** 

TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and found to comply with the standards EN 15267-1 (2009), EN 15267-2 (2009), EN 15267-3 (2007) as well as EN 14181 (2014).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 14 pages).

The present certificate replaces certificate 0000081152\_00 dated 25 April 2023.



Suitability Tested EN 15267 QAL1 Certified Regular Surveillance

www.tuv.com ID 0000081152

Publication in the German Federal Gazette (BAnz) of 02 August 2023

German Environment Agency Dessau, 05 September 2023 This certificate will expire on: 01 August 2028

TÜV Rheinland Energy GmbH Cologne, 04 September 2023

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Test institute accredited to EN ISO/IEC 17025 by DAkkS (German Accreditation Body).

This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00.



0000081152\_01 / 05 September 2023



**Test report:** 

936/21247320/C dated 31 January 2023

Initial certification:

20 March 2023

**Expiry date:** 

01 August 2028

**Publication:** 

BAnz AT 02.08.2023 B7, chapter I No. 3.2

#### Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BlmSchV:2021), chapter IV (waste incineration plants / 17th BlmSchV:2021), Directive 2015/2193/EC (44th BlmSchV:2022), 30th BlmSchV:2019, TA Luft:2021 and 27th BlmSchV:2013. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a twelve month field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of +5 ° to 40 °C.

The notification of suitability of the AMS, performance testing and the uncertainty calculation have been effected on the basis of the regulations applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the emission limit values and oxygen concentration relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the installation at which it will be installed.

#### Note:

The legal regulations mentioned correspond to the current state of legislation during certification. Each user should, if necessary, in consultation with the competent authority, ensure that this AMS meets the legal requirements for the intended use. In addition, it cannot be ruled out that legal regulations governing the use of a measuring device for emission monitoring may change during the lifetime of the certificate.

#### Basis of the certification

This certification is based on:

- Test report 936/21247320/C dated 31 January 2023 of TÜV Rheinland Energy GmbH
- Suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- The ongoing surveillance of the product and the manufacturing process



0000081152\_01 / 05 September 2023



Publication in the German Federal Gazette: BAnz AT 02.08.2023 B7, chapter I No. 3.2, Announcement by UBA dated 05 July 2023:

#### AMS designation:

EL3000-Uras26 for CO, NO, SO<sub>2</sub>, CO<sub>2</sub> and O<sub>2</sub>

#### Manufacturer:

ABB AG, Frankfurt am Main, Germany

#### Field of application:

Modular measuring system for plants requiring official approval and plants according to the 27th BlmSchV.

#### Measuring ranges during the performance test:

Component	Certification range	Additional range	Unit	Maintenance interval*
СО	0 - 75	0 - 4,000	mg/m³	6 months
NO	0 - 150	0 - 5,000	mg/m³	6 months
SO <sub>2</sub>	0 - 75	0 - 8,000	mg/m³	6 months
CO <sub>2</sub>	0 - 20	-	Vol%	6 months
O <sub>2</sub> electrochemical	0 - 25	- 7	Vol%	4 weeks
O <sub>2</sub> paramagnetic	0 - 25	-	Vol%	4 weeks

<sup>\*</sup> The maintenance interval is determined on the module configuration.

#### Software version:

AMC 3.9.8

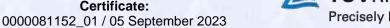
#### Restrictions:

None

#### Notes:

- 1. The maintenance interval must be determined depending on the module configuration.
- 2. The analyser can be used in the housing variants EL3020 (19" housing for rack mounting) and EL3040 (housing for wall mounting).
- 3. The measuring systems of the EL3000-Uras26 series can be equipped without an oxygen measuring cell, with the paramagnetic oxygen measuring cell, EL3000-Magnos28 or alternatively with the electrochemical oxygen measuring cell from the Limas23.
- 4. The adjustment/calibration cells are not part of the performance test.







5. The performance test covers the following instrument variants:

		_			
Instrument variant	Uras-26 identifier	Component 1	Component 2	Component 3	Component 4
EL3020/3040	CEM1000N	СО			
EL3020/3040	CEM2000N	NO		1 11	4
EL3020/3040	CEM3000N	SO <sub>2</sub>			
EL3020/3040	CEM1200N	CO	NO		
EL3020/3040	CEM1300N	СО	SO <sub>2</sub>		
EL3020/3040	CEM2300N	NO	SO <sub>2</sub>		
EL3020/3040	CEM2500N	NO	CO <sub>2</sub>		
EL3020/3040	CEM1230N	СО	NO	SO <sub>2</sub>	
EL3020/3040	CEM2350N	NO	SO <sub>2</sub>	CO <sub>2</sub>	
EL3020/3040	CEM1235N	СО	NO	SO <sub>2</sub>	CO <sub>2</sub>

In addition, the nameplate of the measuring system indicates whether an EL3000-Magnos28 oxygen measuring cell or an electrochemical sensor is installed.

6. Supplementary test (maintenance interval extension) with regard to the announcement of the Federal Environment Agency (UBA) of 21 February 2023 (BAnz AT 20.03.2023 B6, chapter I number 3.2).

#### **Test institute:**

TÜV Rheinland Energy GmbH, Cologne

Report No.: 936/21247320/C dated 31 January 2023



# **Certificate:** 0000081152\_01 / 05 September 2023



### **Certified product**

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

The measuring device is a modular measuring device. The EL3000-Uras26 measuring device uses the method of non-dispersive infrared photometry (NDIR) to measure the components CO, NO, CO<sub>2</sub> and SO<sub>2</sub>. Oxygen concentration can be measured using a paramagnetic measurement principle through the already suitability-tested Magnos28. Alternatively, the electrochemical oxygen sensor from the already suitability-tested Limas23 can be installed. However, on the basis of the modular design of the measuring system, the most unfavorable variant with the Magnos28 was selected, as this was assumed to have the greatest influence on the Uras26.

With the NDIR principle mentioned above, the radiation absorption caused by the sample gas is recorded. The photometer consists of a thermal IR source whose radiation is passed through a measuring cuvette. The detected radiation then passes through a filter cuvette and the interference filter to the detector.

The detector is constructed as a two-layer receiver and has an optically transparent window on the back. This allows the remaining radiation to enter a second detector, which is filled with a gas corresponding to a measurement component. By selectively measuring gas-specific absorption lines (at corresponding wavelengths), individual gas components can be identified; the strength of the absorption is then a direct measure of the gas concentration. By setting up a second beam path, several measurement components can be detected simultaneously in the measurement cuvettes.

The measuring system has a modular design. Depending on the selected measurement components, different variants of the analyzer setup result. From this, as described in Table 1, all further combination possibilities can be derived.

Table 1: Possible device configurations of the EL3000 modular measuring device

Uras26 identifier	Component 1	Component 2	Component 3	Component 4
CEM1000 N	СО		TPANE	
CEM2000 N	NO			
CEM3000 N	SO <sub>2</sub>			
CEM1200 N	СО	NO		
CEM1300 N	СО	SO <sub>2</sub>		
CEM2300 N	NO	SO <sub>2</sub>		
CEM2500 N	NO	CO <sub>2</sub>	TANK TANK	
CEM1230 N	СО	NO	SO <sub>2</sub>	WIT SU
CEM2350 N	СО	NO	CO <sub>2</sub>	
CEM1235 N	СО	NO	SO <sub>2</sub>	CO <sub>2</sub>

Note: A Magnos28 or alternatively the electrochemical sensor from the Limas23 can be installed to measure the oxygen concentration.

The sample gas for the Uras26 is taken via the heated sampling probes and cooled down to 3 °C in the SCC-C sample gas cooler with Wt125 for moisture separation. The two heat exchangers installed are connected in series. The concentration is determined in the actual analyzer of the system using the NDIR photometry described above.



# **Certificate:** 0000081152\_01 / 05 September 2023



#### **General notes**

This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the EN 15267. The manufacturer is required to maintain an approved quality management system controlling the manufacture of the certified product. Both the product and the quality management systems shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate. This certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and its expiration is also accessible on the internet: **gal1.de**.

#### **History of documents**

Certification of EL3000-Uras26 is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

#### Initial certification according to EN 15267

Certificate No. 0000081152\_00: 25 April 2023 Expiry date of the certificate: 19 March 2028 Test report: 936/21247320/A dated 31 August 2022

TÜV Rheinland Energy GmbH

Publication: BAnz AT 20.03.2023 B6, chapter I number 3.2

UBA announcement dated 21 February 2023

#### Supplementary testing according to EN 15267

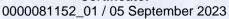
Certificate No. 0000081152\_01: 05 September 2023 Expiry date of the certificate: 01 August 2028 Test report: 936/21247320/C dated 31 January 2023

TÜV Rheinland Energy GmbH

Publication: BAnz AT 02.08.2023 B7, chapter I number 3.2

UBA announcement dated 5 July 2023







Measuring system		
Manufacturer	ABB AG	
AMS designation	EL3000-Uras26 CEM1235N	
Serial number of units under test	33728609/33728619	
Measuring principle	NDIR	
Test report	936/21247320/C	
Test laboratory	TÜV Rheinland Energy	
Date of report	2023-01-31	
Measured component	СО	
Certification range	0 - 75 mg/m³	
Evaluation of the cross-sensitivity (CS)		
(system with largest CS)		
Sum of positive CS at zero point	0.36 mg/m³	
Sum of negative CS at zero point	-1.07 mg/m <sup>3</sup>	
Sum of postive CS at span point	0.60 mg/m <sup>3</sup>	
Sum of negative CS at span point	0.00 mg/m <sup>3</sup>	
Maximum sum of cross-sensitivities	-1.07 mg/m³	
Uncertainty of cross-sensitivity	u <sub>i</sub> -0.619 mg/m³	
Calculation of the combined standard uncertainty		
Tested parameter	U <sup>2</sup>	
	$u_D$ 0.350 mg/m <sup>3</sup> 0.123 (m	g/m³)²
Lack of fit		g/m³)²
Zero drift from field test	$u_{d,z}$ -0.303 mg/m <sup>3</sup> 0.092 (m	g/m³)²
Span drift from field test	u <sub>d.s</sub> 1.256 mg/m <sup>3</sup> 1.578 (m	g/m³)²
Influence of ambient temperature at span	u <sub>t</sub> 0.451 mg/m³ 0.203 (m	g/m³)2
Influence of supply voltage	u, 0.074 mg/m³ 0.005 (m	g/m³)²
Cross-sensitivity (interference)		g/m³)²
Influence of sample gas flow	·	g/m³)²
Uncertainty of reference material at 70% of certification range	5	g/m³)²
* The larger value is used :     "Repeatability standard deviation at set point" or     "Standard deviation from paired measurements under field conditions"		
Combined standard uncertainty (u <sub>C</sub> )	$u_c = \sqrt{\sum \left(u_{\text{max j}}\right)^2}$ 1.69 mg	<sub>3</sub> /m <sup>3</sup>
Total expanded uncertainty		g/m³
Relative total expanded uncertainty	U in % of the ELV 50 mg/m³	6,6
Requirement of 2010/75/EU	U in % of the ELV 50 mg/m <sup>3</sup>	10,0
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	7,5





0000081152\_01 / 05 September 2023

Measuring system		
Manufacturer	ABB AG	
AMS designation	EL3000-Uras26 CEM1235N	
Serial number of units under test	33728609/33728619	
Measuring principle	NDIR	
31 17		
Test report	936/21247320/C	
Test laboratory	TÜV Rheinland Energy	
Date of report	2023-01-31	
Measured component	CO <sub>2</sub>	
Certification range	0 - 20 Vol%	
Evaluation of the cross-sensitivity (CS)		
(system with largest CS)		
Sum of positive CS at zero point	0.00 Vol%	
Sum of negative CS at zero point	0.00 Vol%	
Sum of postive CS at span point	0.00 Vol%	
Sum of negative CS at span point	-0.17 Vol%	
Maximum sum of cross-sensitivities	-0.17 Vol%	
Uncertainty of cross-sensitivity	u <sub>i</sub> -0.098 Vol%	
Calculation of the combined standard uncertainty		
Tested parameter	u	2
		03 (Vol%) <sup>2</sup>
Lack of fit	u <sub>lof</sub> 0.150 Vol% 0.02	` '
Zero drift from field test	u <sub>d.z</sub> 0.058 Vol% 0.00	` '
Span drift from field test	u <sub>d.s</sub> 0.346 Vol% 0.12	` '
Influence of ambient temperature at span		62 (Vol%) <sup>2</sup>
Influence of supply voltage		00 (Vol%) <sup>2</sup>
Cross-sensitivity (interference)	•	10 (Vol%) <sup>2</sup>
Influence of sample gas flow		00 (Vol%) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub> 0.162 Vol% 0.02	26 (Vol%) <sup>2</sup>
* The larger value is used :		
"Repeatability standard deviation at set point" or		
"Standard deviation from paired measurements under field conditions		
Combined standard uncertainty (u <sub>c</sub> )	$u_{c} = \sqrt{\sum \left(u_{\text{max, j}}\right)^{2}} $ 0.5	50 Vol%
Total expanded uncertainty		97 Vol%
Total Operated anothernty	0.0 - 4 <sub>0</sub> N = 4 <sub>0</sub> 1.00	J. 701. 70
Relative total expanded uncertainty	U in % of the range 20 Vol%	4,9
Requirement of 2010/75/EU	U in % of the range 20 Vol%	10,0 **
Requirement of EN 15267-3	U in % of the range 20 Vol%	7,5
Requirement of EN 10207 0	O III /0 OI THE TAILIGE ZU VOI70	7,5

<sup>\*\*</sup> The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component. A value of 10,0 % was used instead.



Requirement of 2010/75/EU

Requirement of EN 15267-3

# Certificate:





20,0

15,0

U in % of the ELV 98 mg/m³

U in % of the ELV 98 mg/m<sup>3</sup>

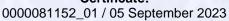
Measuring system						
Manufacturer	ABB	-				
AMS designation			6 CEM1235N			
Serial number of units under test	33728	8609/337	28619			
Measuring principle	Infarc	tspektrol	kopie			
Test report		1247320				
Test laboratory		Rheinland	d Energy			
Date of report	2023-	-01-31				
Measured component	NO					
Certification range	0 -	150	mg/m³			
Evaluation of the cross-sensitivity (CS)						
(system with largest CS)						
Sum of positive CS at zero point		4 92	mg/m³			
Sum of negative CS at zero point			mg/m³			
Sum of postive CS at zero point  Sum of postive CS at span point			mg/m³			
Sum of negative CS at span point			mg/m³			
Maximum sum of cross-sensitivities			mg/m³			
Uncertainty of cross-sensitivity	u <sub>i</sub>		mg/m³			
Shoottamy of Grood Conditivity	ui	0.2-10	g/			
Calculation of the combined standard uncertainty						
Tested parameter				U <sup>2</sup>		
	$u_D$	0.617	mg/m³	0.381	$(mg/m^3)^2$	
Lack of fit	u <sub>lof</sub>	0.580	•	0.336	(mg/m³)²	
Zero drift from field test	U <sub>d.z</sub>		mg/m³	0.367		
Span drift from field test	U <sub>d.s</sub>	2.511	_	6.305		
Influence of ambient temperature at span	U <sub>t</sub>	1.050	_	1.103		
Influence of supply voltage	u <sub>v</sub>		mg/m³	0.430	$(mg/m^3)^2$	
Cross-sensitivity (interference)	u <sub>i</sub>	-3.248		10.550	$(mg/m^3)^2$	
Influence of sample gas flow	u <sub>n</sub>	0.808	mg/m³	0.653	(mg/m³)²	
Uncertainty of reference material at 70% of certification range	U <sub>rm</sub>		mg/m³	1.470	(mg/m³)²	
* The larger value is used :	Silli.					
"Repeatability standard deviation at set point" or						
"Standard deviation from paired measurements under field conditions"						
	- 11 -	$\sqrt{\sum (u_m)}$	72			
Combined standard uncertainty (u <sub>C</sub> )				4.65	3	
Total expanded uncertainty	U = u	$_{c}$ * k = $u_{c}$	c 1.96	9.11	mg/m³	
Relative total expanded uncertainty	Uin	% of the	ELV 98 mg/m	13	9,3	1
	O	,		•	5,0	



Requirement of 2010/75/EU

Requirement of EN 15267-3

# Certificate:





# Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system						
Manufacturer	ABB					
AMS designation	EL30	00-Uras2	6 CEM2300N			
Serial number of units under test	3372	8509/337	28519			
Measuring principle	NDIR					
Test report		21247320				
Test laboratory		Rheinland	I Energy			
Date of report	2023	-01-31				
Measured component	NO					
Certification range	0 -	150	mg/m³			
Evaluation of the cross-sensitivity (CS)						
(system with largest CS)						
Sum of positive CS at zero point			mg/m³			
Sum of negative CS at zero point			mg/m³			
Sum of postive CS at span point			mg/m³			
Sum of negative CS at span point			mg/m³			
Maximum sum of cross-sensitivities			mg/m³			
Uncertainty of cross-sensitivity	u <sub>i</sub>	-3.196	mg/m³			
Calculation of the combined standard uncertainty						
Tested parameter				U <sup>2</sup>		
	$u_D$	1.157	mg/m³	1.339	$(mg/m^3)^2$	
Lack of fit	U <sub>lof</sub>	0.580	mg/m³	0.336	(mg/m³) <sup>2</sup>	
Zero drift from field test	U <sub>d.z</sub>		mg/m³	0.367	- i - T i	
Span drift from field test	u <sub>d.s</sub>	1.645	mg/m³	2.706	$(mg/m^3)^2$	
Influence of ambient temperature at span	U <sub>t</sub>	1.090	mg/m³	1.188	$(mg/m^3)^2$	
Influence of supply voltage	u <sub>v</sub>	0.487	mg/m³	0.237	$(mg/m^3)^2$	
Cross-sensitivity (interference)	u <sub>i</sub>	-3.196	mg/m³	10.214	$(mg/m^3)^2$	
Influence of sample gas flow	$u_{D}$	0.173	mg/m³	0.030	$(mg/m^3)^2$	
Uncertainty of reference material at 70% of certification range	U <sub>rm</sub>	1.212	mg/m³	1.470	$(mg/m^3)^2$	
* The larger value is used :						
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"						
			12			
Combined standard uncertainty (u <sub>C</sub> )		$\sqrt{\sum} (u_m)$			mg/m³	
Total expanded uncertainty	U = u	$u_c * k = u_c$	* 1.96	8.29	mg/m³	
Relative total expanded uncertainty	U in '	% of the	ELV 98 mg/r	n³	8,5	١,

U in % of the ELV 98 mg/m³

U in % of the ELV 98 mg/m<sup>3</sup>

20,0

15,0



Requirement of EN 15267-3

# Certificate:





15,0

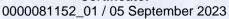
U in % of the ELV 50 mg/m<sup>3</sup>

Measuring system						
Manufacturer	ABB	AG				
AMS designation		-	6 CEM1235N			
Serial number of units under test		8609/337				
Measuring principle	NDIR					
Test report	936/2	21247320	/C			
Test laboratory	ΤÜV	Rheinland	I Energy			
Date of report	2023	-01-31				
Massurad component	200					
Measured component Certification range	SO <sub>2</sub>	75	mg/m³			
Evaluation of the cross-sensitivity (CS)						
(system with largest CS)						
Sum of positive CS at zero point			mg/m³			
Sum of negative CS at zero point			mg/m³			
Sum of postive CS at span point			mg/m³			
Sum of negative CS at span point			mg/m³			
Maximum sum of cross-sensitivities			mg/m³			
Uncertainty of cross-sensitivity	u <sub>i</sub>	-1.585	mg/m³			
Calculation of the combined standard uncertainty						
Tested parameter				U <sup>2</sup>		
	$u_D$	0.484	mg/m³	0.234	$(mg/m^3)^2$	
Lack of fit	U <sub>lof</sub>	-0.229	mg/m³	0.052	$(mg/m^3)^2$	
Zero drift from field test	u <sub>d.z</sub>	-0.823	mg/m³	0.677	(mg/m <sup>3</sup> ) <sup>2</sup>	
Span drift from field test	$u_{d,s}$	1.212	mg/m³	1.469	$(mg/m^3)^2$	
Influence of ambient temperature at span	Ut	0.265	mg/m³	0.070	$(mg/m^3)^2$	
Influence of supply voltage	u <sub>v</sub>	0.145	mg/m³	0.021	$(mg/m^3)^2$	
Cross-sensitivity (interference)	u <sub>i</sub>	-1.585	mg/m³	2.512	$(mg/m^3)^2$	
Influence of sample gas flow	U <sub>D</sub>	0.289	mg/m³	0.084	$(mg/m^3)^2$	
Uncertainty of reference material at 70% of certification range	U <sub>rm</sub>	0.606	mg/m³	0.368	$(mg/m^3)^2$	
<ul> <li>The larger value is used:</li> <li>"Repeatability standard deviation at set point" or</li> <li>"Standard deviation from paired measurements under field conditions"</li> </ul>						
			13			
Combined standard uncertainty (u <sub>C</sub> )	$u_c =$	$\sqrt{\sum (u_m)}$	ax, j ) <sup>*</sup>	2.34	mg/m³	
Total expanded uncertainty	U = u	$l_c * k = u_c$	* 1.96	4.59	mg/m³	
Relative total expanded uncertainty	U in <sup>c</sup>	% of the	ELV 50 mg/m <sup>3</sup>		9,2	
Requirement of 2010/75/EU			ELV 50 mg/m <sup>3</sup>		20,0	
D (EN 45007.0					4-0	



Requirement of EN 15267-3

# Certificate:





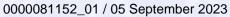
# Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system						
Manufacturer	ABB	ΔG				
AMS designation		-	6 CEM2300N			
Serial number of units under test		8509/337				
Measuring principle	NDIR		20010			
modesting principle	110111					
Test report	936/2	1247320	/C			
Test laboratory	TÜV	Rheinland	I Energy			
Date of report	2023-	-01-31				
Measured component	SO <sub>2</sub>					
Certification range	0 -	75	mg/m³			
Evaluation of the cross-sensitivity (CS)						
(system with largest CS)						
Sum of positive CS at zero point		2.06	mg/m³			
Sum of negative CS at zero point			mg/m³			
Sum of postive CS at span point			mg/m³			
Sum of negative CS at span point			mg/m³			
Maximum sum of cross-sensitivities			mg/m³			
Uncertainty of cross-sensitivity	U <sub>i</sub>		mg/m³			
Calculation of the combined standard uncertainty						
Tested parameter				U <sup>2</sup>		
resteu parameter		0.416	mg/m³	0.173	(mg/m³)²	
Lack of fit	u <sub>D</sub>		mg/m³	0.020		
Zero drift from field test	U <sub>lof</sub>		mg/m³	0.270	, , ,	
Span drift from field test	u <sub>d.z</sub> u <sub>d.s</sub>		mg/m³	1.578		
Influence of ambient temperature at span	u <sub>d.s</sub> u <sub>t</sub>		mg/m³	0.203		
Influence of supply voltage	u,		mg/m³	0.048		
Cross-sensitivity (interference)	u <sub>v</sub>		mg/m³	2.866		
Influence of sample gas flow	u <sub>n</sub>		mg/m³	0.019	(mg/m³) <sup>2</sup>	
Uncertainty of reference material at 70% of certification range	u <sub>n</sub>		mg/m³		(mg/m³)²	
* The larger value is used :	u <sub>rm</sub>	0.000	g,	0.000	(9/)	
"Repeatability standard deviation at set point" or						
"Standard deviation from paired measurements under field conditions"						
Combined standard uncertainty (u <sub>c</sub> )	$u_c =$	$\sqrt{\sum (u_m)}$	ax i) <sup>2</sup>	2.35	mg/m³	
Total expanded uncertainty		$\int_{C} k = u_{c}$			mg/m³	
				/ 1	3	
Poletive total expanded upcertainty	11.5-	0/ of the	ELV 60 / 2		0.0	
Relative total expanded uncertainty Requirement of 2010/75/EU			ELV 50 mg/m <sup>3</sup>		9,2 20,0	
Requirement of 2010/13/EU	U in	% or the	ELV 50 mg/m <sup>3</sup>		20,0	

U in % of the ELV 50 mg/m<sup>3</sup>

15,0



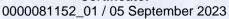




Measuring system						
Manufacturer	ABB	Automation	on GmbH			
AMS designation	EL30	00-Magn	os28			
Serial number of units under test	3363	3146 / 32	679405 / 33	633136 / 336	33156	
Measuring principle	Para	magentisr	m			
Test report	936/2	21235093	/C			
Test laboratory	TÜV	Rheinland	t			
Date of report	2018	-03-07				
Measured component	$O_2$					
Certification range	0 -	25	Vol%			
Evaluation of the cross-sensitivity (CS)						
(system with largest CS)						
Sum of positive CS at zero point		0.00	Vol%			
Sum of negative CS at zero point		0.00	Vol%			
Sum of postive CS at span point		0.00	Vol%			
Sum of negative CS at span point		0.00	Vol%			
Maximum sum of cross-sensitivities		0.00	Vol%			
Uncertainty of cross-sensitivity	u <sub>i</sub>	0.000	Vol%			
Calculation of the combined standard uncertainty						
Tested parameter				U <sup>2</sup>		
Standard deviation from paired measurements under field condition	ne *	0.056	Vol%	-	(Vol%) <sup>2</sup>	
Lack of fit	- 13		Vol%		(Vol%) <sup>2</sup>	
Zero drift from field test	U <sub>lof</sub>		Vol%		(Vol%) <sup>2</sup>	
Span drift from field test	U <sub>d.z</sub>		Vol%		(Vol%) <sup>2</sup>	
Influence of ambient temperature at span	u <sub>d.s</sub>		Vol%		(Vol%) <sup>2</sup>	
Influence of supply voltage	u <sub>t</sub>		Vol%		(Vol%) <sup>2</sup>	
Cross-sensitivity (interference)	u <sub>v</sub>		Vol%		(Vol%) <sup>2</sup>	
Influence of sample gas flow	u <sub>i</sub>		Vol%		(Vol%) <sup>2</sup>	
Uncertainty of reference material at 70% of certification range	u <sub>D</sub>		Vol%	0.003	,	
* The larger value is used :	u <sub>rm</sub>	0.202	VOI76	0.041	( VOI70)-	
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"						
Combined standard uncertainty (u <sub>C</sub> )	$u_c =$	$\sqrt{\sum (u_m)}$	)2 av i)2	0.27	Vol%	
Total expanded uncertainty		$u_c * k = u$			Vol%	
				5.51	,	
Relative total expanded uncertainty	U in	% of the	range 25 Vo	l%	2.1	
Requirement of 2010/75/EU	U in	% of the	range 25 Vo	l%	10.0 **	
Requirement of EN 15267-3	U in 9	% of the r	ange 25 Vol	%	7.5	

<sup>\*\*</sup> The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component. A value of 10.0 % was used instead.







# 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.%*
Lack-of-fit	Ulof	-0,046	0,0021
Zero drift from field test	Udż	-0,075	0,0056
Span drift from field test	Ud,s	-0,081	0,0066
Influence of ambient temperature at span	u <sub>t</sub>	0,095	0,0090
influence of sample gas pressure	ц		
influence of sample gas flow	ur	-0,048	0,0023
Influence of supply voltage	u <sub>w</sub>	0,006	0,00000
Cross-sensitivity (interierence)	u <sub>i</sub>	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 <sub>mn</sub>	0,101	0,0102
Excursion of measurement beam	Umb		
Converter efficiency for AMS measuring NOx	Uoe		
Variation of response factors (TOC)	u <sub>rt.</sub>		
		total	0,0827
Combined standard uncertainty	$u_{\pm} = \sqrt{\sum_{i} (u_{\perp})^2}$	0,2876	Vol.%
Total expanded uncertainty	U <sub>0,95</sub> = 1,96 x U <sub>C</sub>	0,5637	Vol.%
Relativ expanded uncertainty	U	2,3	% CR
Permissible uncertainly 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. BlmSchV	(of CR 25 Val %)	10	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding 13.717. BlmSchV

<sup>&</sup>quot;) Note: The table shown for the uncertainty of the oxygen component is taken from the Test report TÜV Süd No. 2231669.2 Table 101 from September 2015.