Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000074625_01

AMS designation:	X-CEMS for CO, NO_x, NO, SO_2, CO_2 and O_2
Manufacturer:	Emerson Process Management GmbH & Co. OHG Industriestraße 1 63594 Hasselroth Germany
Test Laboratory:	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) and EN 14181 (2014).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 12 pages).
The present certificate replaces certificate 0000074625_00 of 02 June 2021.

TÜVRheinland®
CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000074625

Publication in the German Federal Gazette (BAnz) of 05 August 2021

This certificate will expire on:
04 August 2026

German Federal Environment Agency
Dessau, 03 September 2021

TÜV Rheinland Energy GmbH
Cologne, 02 September 2021

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TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln

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 certificate D-PL-11120-02-00.

Test Report:	936/21247061/C of 03 May 2021
Initial certification:	02 June 2021
Expiry date:	04 August 2026
Publication:	BAnz AT 05.08.2021 B5, chap. I No. 4.1

Approved application
The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV), chapter IV (17th BImSchV), 30th BImSchV, 44th BImSchV, plants in compliance with TA Luft and plants according to the 27th BImSchV. 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 three-months field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of +5 °C 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 limit values and oxygen concentrations relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

Basis of the certification
This certification is based on:

- Test report 936/21247061/C of 03 May 2021 by 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

Publication in the German Federal Gazette: BAnz AT 05.08.2021 B5, chap. I No. 4.1 ,
UBA announcement dated 29 June 2021 :

AMS designation:
X-CEMS for CO, NO_X, NO, SO_2, CO_2 and O_2

Manufacturer:
Emerson Process Management GmbH & Co. OHG, Hasselroth

Field of application:
Modular measuring system for plants requiring official approval and
for plants according to the 27th BImSchV

Measuring ranges during performance testing:

Component	Certification range	Supplementary range	Unit
CO	0 – 150	0 – 3000	mg/m³
NO_x*	0 – 150	0 – 2000	mg/m³
NO**	0 – 150	0 – 2000	mg/m³
SO_2	0 – 150	0 – 2500	mg/m³
CO_2	0 – 25	-	Vol.-%
O_2 (paramagnetic)	0 – 25	-	Vol.-%
O_2 (electrochemical)	0 – 25	-	Vol.-%

* state as NO, corresponds to 0 – 230 mg/m³ NO_x as NO_2

** without converter

Software version:
1.7.0

Restrictions:
None

Notes:
1. The maintenance interval is four weeks.
2. The SO_2 measuring module is able to monitor limit values above 60 mg/m³.
3. The measuring system can optionally be operated without a converter for the determination of the NO component (instead of NOx). In this case, the sample gas probe, type SP3100, from the company M&C can also be used.
4. Supplementary test (optional omission of the NOx converter and approval of an additional gas sampling probe in this case) as regards the notices of the Federal Environment Agency of 31 March 2021 (BAnz AT 03.05.2021 B9, chapter I number 3.2).

Test Report:
TÜV Rheinland Energy GmbH, Cologne
Report no.: 936/21247061/C of 03 May 2021

Certified product

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

The modular measuring system X-CEMS is an extractive emission measuring device. Depending on the measured component, different measuring principles are used. Non-dispersive infrared absorption (NDIR) is used to determine CO, NO and CO_2; non-dispersive UV absorption (NDUV) is used to determine SO_2. Either a paramagnetic or an electrochemical oxygen measurement is used to determine O_2. If the AMS is to be used to determine the NOx concentration, it must be equipped with the optional NOx converter BÜNOX 2+. Without a converter only the measurement of NO is possible.

The AMS tested here comprises the following components:

- Heated (max. 185 °C, self-regulating) sampling probe M&C SP3100 (filter material: stainless steel, pore size 3 µm)
- Heated (180 °C) sampling line PFA, 4 mm inner diameter, 20 m long;
- Measuring cabinet with temperature-controlled exhaust fan consisting of the following components, mounted on a swivel frame:
  - 2-stage test gas cooler Bühler EKG 2-19
  - Sample gas pump
  - Analyser X-Stream enhanced
  - Optional NOx converter Bühler BÜNOx 2+
  - Condensate pumps and condensate tanks with level monitoring

The analyser X-Stream enhanced can determine a maximum of 5 components. Here there is a choice between 4 photometer channels (CO, NO, SO_2 and CO_2) and an oxygen channel (paramagnetic or electrochemical). A separate optical bench is available for every measured component (except for oxygen). There is no compensation between the separate channels.

General remarks

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 manufacturing process for 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 document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at **qal1.de**.

Document history

Certification of the X-CEMS measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Initial certification according to EN 15267

Certificate no. 0000074625_00: 05 June 2021
Expiry date of the certificate: 02 May 2026
Test report 936/21247061/A dated 10 December 2020
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 03.05.2021 B9, chapter I number 3.2
UBA announcement dated 31 March 2021

Notifications

Publication: BAnz AT 05.08.2021 B5, chapter III Correction 3
UBA announcement dated 29 June 2021
(Correction of CO range in the publication)

Supplementary testing according to EN 15267

Certificate no. 0000074625_01: 03 September 2021
Expiry date of the certificate: 04 August 2026
Test report 936/21247061/C of 03 May 2021
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 05.08.2021 B5, chap. I No. 4.1
UBA announcement dated 29 June 2021 :

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

Measuring system					
Manufacturer			Emerson Process Management GmbH & Co. OHG		
AMS designation			X-CEMS		
Serial number of units under test			3242850 - System 1 / 3242850 - System 2		
Measuring principle			NDIR		
Test report			936/21247061/C		
Test laboratory			TÜV Rheinland		
Date of report			2021-05-03		
Measured component			CO		
Certification range			0 - 150	mg/m³	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			2.81	mg/m³	
Sum of negative CS at zero point			0.00	mg/m³	
Sum of postive CS at span point			2.90	mg/m³	
Sum of negative CS at span point			0.00	mg/m³	
Maximum sum of cross-sensitivities			2.90	mg/m³	
Uncertainty of cross-sensitivity		u_i	1.676	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.264	mg/m³	0.070	$(mg/m^3)^2$
Lack of fit	u_{lof}	0.277	mg/m³	0.077	$(mg/m^3)^2$
Zero drift from field test	$u_{d,z}$	0.173	mg/m³	0.030	$(mg/m^3)^2$
Span drift from field test	$u_{d,s}$	0.693	mg/m³	0.480	$(mg/m^3)^2$
Influence of ambient temperature at span	u_t	0.513	mg/m³	0.263	$(mg/m^3)^2$
Influence of supply voltage	u_v	0.204	mg/m³	0.042	$(mg/m^3)^2$
Cross-sensitivity (interference)	u_i	1.676	mg/m³	2.809	$(mg/m^3)^2$
Influence of sample gas flow	u_n	-0.271	mg/m³	0.073	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range	u_{rm}	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"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,i})^2}$	2.31	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	4.52	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 60 mg/m³**	**7.5**
Requirement of 2010/75/EU	**U in % of the ELV 60 mg/m³**	**10.0**
Requirement of EN 15267-3	U in % of the ELV 60 mg/m³	7.5

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

Measuring system					
Manufacturer			Emerson Process Management GmbH & Co. OHG		
AMS designation			X-CEMS		
Serial number of units under test			3242850 - System 1 / 3242850 - System 2		
Measuring principle			NDIR		
Test report			936/21247061/C		
Test laboratory			TÜV Rheinland		
Date of report			2021-05-03		
Measured component			NOx		
Certification range			0 - 150	mg/m³	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			4.41	mg/m³	
Sum of negative CS at zero point			0.00	mg/m³	
Sum of postive CS at span point			2.28	mg/m³	
Sum of negative CS at span point			-2.28	mg/m³	
Maximum sum of cross-sensitivities			4.41	mg/m³	
Uncertainty of cross-sensitivity		u_i	2.546	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	1.716	mg/m³	2.945	(mg/m³)²
Lack of fit	u_{inf}	0.684	mg/m³	0.468	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.866	mg/m³	0.750	(mg/m³)²
Span drift from field test	$u_{d,s}$	1.992	mg/m³	3.968	(mg/m³)²
Influence of ambient temperature at span	u_t	1.617	mg/m³	2.615	(mg/m³)²
Influence of supply voltage	u_v	0.572	mg/m³	0.327	(mg/m³)²
Cross-sensitivity (interference)	u_i	2.546	mg/m³	6.482	(mg/m³)²
Influence of sample gas flow	u_n	-0.812	mg/m³	0.659	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	1.212	mg/m³	1.470	(mg/m³)²
Converter efficiency for AMS measuring NOx	u_{ce}	3.984	mg/m³	15.872	(mg/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_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	5.96	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	11.69	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 80 mg/m³**	**14.6**
Requirement of 2010/75/EU	**U in % of the ELV 80 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 80 mg/m³	15.0

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

Measuring system					
Manufacturer			Emerson Process Management GmbH & Co. OHG		
AMS designation			X-CEMS		
Serial number of units under test			3242850 - System 1 / 3242850 - System 2		
Measuring principle			NDIR		
Test report			936/21247061/C		
Test laboratory			TÜV Rheinland		
Date of report			2021-05-03		
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			4.41	mg/m³	
Sum of negative CS at zero point			0.00	mg/m³	
Sum of postive CS at span point			2.28	mg/m³	
Sum of negative CS at span point			-2.28	mg/m³	
Maximum sum of cross-sensitivities			4.41	mg/m³	
Uncertainty of cross-sensitivity		u_i	2.546	mg/m³	
Calculation of the combined standard uncertainty					
Tested parameter					u^2
Standard deviation from paired measurements under field conditions *		u_D	1.716	mg/m³	2.945 (mg/m³)²
Lack of fit		u_{lof}	0.684	mg/m³	0.468 (mg/m³)²
Zero drift from field test		$u_{d,z}$	0.866	mg/m³	0.750 (mg/m³)²
Span drift from field test		$u_{d,s}$	1.992	mg/m³	3.968 (mg/m³)²
Influence of ambient temperature at span		u_t	1.617	mg/m³	2.615 (mg/m³)²
Influence of supply voltage		u_v	0.572	mg/m³	0.327 (mg/m³)²
Cross-sensitivity (interference)		u_i	2.546	mg/m³	6.482 (mg/m³)²
Influence of sample gas flow		u_n	-0.812	mg/m³	0.659 (mg/m³)²
Uncertainty of reference material at 70% of certification range		u_{rm}	1.212	mg/m³	1.470 (mg/m³)²
Combined standard uncertainty (u_C)		$u_c = \sqrt{\sum (u_{max,j})^2}$			4.44 mg/m³
Total expanded uncertainty		$U = u_c * k = u_c * 1.96$			8.70 mg/m³

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Relative total expanded uncertainty	**U in % of the ELV 80 mg/m³**	**10.9**
Requirement of 2010/75/EU	**U in % of the ELV 80 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 80 mg/m³	15.0

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

Measuring system					
Manufacturer			Emerson Process Management GmbH & Co. OHG		
AMS designation			X-CEMS		
Serial number of units under test			3242850 - System 1 / 3242850 - System 2		
Measuring principle			NDUV		
Test report			936/21247061/C		
Test laboratory			TÜV Rheinland		
Date of report			2021-05-03		
Measured component			SO_2		
Certification range			0 - 150	mg/m³	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			3.38	mg/m³	
Sum of negative CS at zero point			0.00	mg/m³	
Sum of postive CS at span point			2.81	mg/m³	
Sum of negative CS at span point			-4.40	mg/m³	
Maximum sum of cross-sensitivities			-4.40	mg/m³	
Uncertainty of cross-sensitivity		u_i	-2.537	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	1.007	mg/m³	1.014	$(mg/m^3)^2$
Lack of fit	u_{lof}	0.615	mg/m³	0.378	$(mg/m^3)^2$
Zero drift from field test	$u_{d,z}$	1.126	mg/m³	1.268	$(mg/m^3)^2$
Span drift from field test	$u_{d,s}$	2.078	mg/m³	4.318	$(mg/m^3)^2$
Influence of ambient temperature at span	u_t	1.769	mg/m³	3.129	$(mg/m^3)^2$
Influence of supply voltage	u_v	1.078	mg/m³	1.162	$(mg/m^3)^2$
Cross-sensitivity (interference)	u_i	-2.537	mg/m³	6.436	$(mg/m^3)^2$
Influence of sample gas flow	u_n	-0.902	mg/m³	0.814	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range	u_{rm}	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"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	4.47	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	8.76	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 60 mg/m³**	**14.6**
Requirement of 2010/75/EU	**U in % of the ELV 60 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 60 mg/m³	15.0

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

Measuring system			
Manufacturer		Emerson Process Management GmbH & Co. OHG	
AMS designation		X-CEMS	
Serial number of units under test		3242850 - System 1 / 3242850 - System 2	
Measuring principle		NDIR	
Test report		936/21247061/C	
Test laboratory		TÜV Rheinland	
Date of report		2021-05-03	
Measured component		CO_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		-0.20	Vol.-%
Maximum sum of cross-sensitivities		-0.20	Vol.-%
Uncertainty of cross-sensitivity	u_i	-0.115	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.023	Vol.-%	0.001	(Vol.-%)²
Lack of fit	u_{lof}	0.046	Vol.-%	0.002	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	-0.014	Vol.-%	0.000	(Vol.-%)²
Span drift from field test	$u_{d,s}$	0.217	Vol.-%	0.047	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.102	Vol.-%	0.010	(Vol.-%)²
Influence of supply voltage	u_v	0.020	Vol.-%	0.000	(Vol.-%)²
Cross-sensitivity (interference)	u_i	-0.115	Vol.-%	0.013	(Vol.-%)²
Influence of sample gas flow	u_n	-0.176	Vol.-%	0.031	(Vol.-%)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.202	Vol.-%	0.041	(Vol.-%)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_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.38	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.75	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**3.0**
Requirement of 2010/75/EU	**U in % of the range 25 Vol.-%**	**10.0 ****
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

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

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

Measuring system			
Manufacturer		Emerson Process Management GmbH & Co. OHG	
AMS designation		X-CEMS	
Serial number of units under test		3242850 - System 1 / 3242850 - System 2	
Measuring principle		Paramagnetic	
Test report		936/21247061/C	
Test laboratory		TÜV Rheinland	
Date of report		2021-05-03	
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_i	0.000	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.017	Vol.-%	0.000	(Vol.-%)²
Lack of fit	u_{lof}	0.052	Vol.-%	0.003	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.023	Vol.-%	0.001	(Vol.-%)²
Span drift from field test	$u_{d,s}$	-0.029	Vol.-%	0.001	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.101	Vol.-%	0.010	(Vol.-%)²
Influence of supply voltage	u_v	0.006	Vol.-%	0.000	(Vol.-%)²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000	(Vol.-%)²
Influence of sample gas flow	u_n	-0.098	Vol.-%	0.010	(Vol.-%)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.202	Vol.-%	0.041	(Vol.-%)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_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.26	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.50	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.0**
Requirement of 2010/75/EU	**U in % of the range 25 Vol.-%**	**10.0 ****
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

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

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

Measuring system			
Manufacturer		Emerson Process Management GmbH & Co. OHG	
AMS designation		X-CEMS	
Serial number of units under test		3242850 - System 1 / 3242850 - System 2	
Measuring principle		Electrochemical	
Test report		936/21247061/C	
Test laboratory		TÜV Rheinland	
Date of report		2021-05-03	
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		-0.11	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		-0.11	Vol.-%
Uncertainty of cross-sensitivity	u_i	-0.064	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.067	Vol.-%	0.004	(Vol.-%)²
Lack of fit	u_{lof}	0.058	Vol.-%	0.003	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.035	Vol.-%	0.001	(Vol.-%)²
Span drift from field test	$u_{d,s}$	-0.035	Vol.-%	0.001	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.175	Vol.-%	0.031	(Vol.-%)²
Influence of supply voltage	u_v	0.026	Vol.-%	0.001	(Vol.-%)²
Cross-sensitivity (interference)	u_i	-0.064	Vol.-%	0.004	(Vol.-%)²
Influence of sample gas flow	u_n	-0.088	Vol.-%	0.008	(Vol.-%)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.202	Vol.-%	0.041	(Vol.-%)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_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.31	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.60	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.4**
Requirement of 2010/75/EU	**U in % of the range 25 Vol.-%**	**10.0 ****
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

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