

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000074621_00

AMS designation: MIR 9000e for CO, NO_x, N₂O, SO₂, CH₄, O₂ and CO₂

Manufacturer: ENVEA
111 Boulevard Robespierre
78304 Poissy Cedex
France

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).



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000074621

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

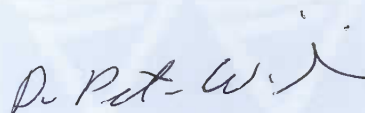
This certificate will expire on:
04 August 2026

German Federal Environment Agency
Dessau, 03 September 2021

TÜV Rheinland Energy GmbH
Cologne, 02 September 2021



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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: 936/21246251/B of 03 May 2021
Expiry date: 04 August 2026
Publication: BAnz AT 05.08.2021 B5, chap. I No. 3.1

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 936/21246251/B 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. 3.1 ,
UBA announcement dated 29 June 2021 :

AMS designation:

MIR9000e for the components CO, NO_x as NO₂, N₂O, SO₂, CH₄, CO₂ und O₂

Manufacturer:

ENVEA, Poissy, France

Field of application:

For plants requiring official approval and for plants according to the 27th BImSchV

Measuring ranges during performance testing:

Component	Certification range	Supplementary measuring ranges		Unit
CO	0 - 75	0 - 3.000	-	mg/m ³
NO _x as NO ₂	0 - 100*	0 - 1.500	-	mg/m ³
N ₂ O	0 - 50	0 - 100	0 - 200	mg/m ³
SO ₂	0 - 75	0 - 1.500	-	mg/m ³
CH ₄	0 - 50	0 - 100	0 - 200	mg/m ³
O ₂	0 - 25	-	-	Vol.-%
CO ₂	0 - 20	0 - 30	-	Vol.-%

* correspond to 65 mg/m³ NO

Software version: 1.0.a

Restriction:

None

Note:

1. The maintenance interval is four weeks.
2. The performance test covers the version MIR 9000e (equipped with NO_x converter type ENVEA NO_x-CONVe) as well as the version MIR 9000e* (equipped with NO_x converter, type CG-2M, from the company M&C).

Test Report:

TÜV Rheinland Energy GmbH, Cologne
Report no.: 936/21246251/B of 03 May 2021

Certified product

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

The MIR9000e measuring system is an extractive multi-component analysis system for continuous monitoring of flue gases.

The extractive AMS tested here consists of the following components:

- Heated sampling probe, type M&C Techgroup SP2000, heated to 200 °C
- Sampling line, heated to 180 ° (length 10m in laboratory test und 20m in field test)
- Test gas cooler, Typ CSS-V2-E, manufacturer M&C Techgroup, dew point 4 °C
- NOx converter Typ CG-2M, manufacturer M&C Techgroup, heated to 350 °C
- Alternative NOx converter Typ ENVEA NOx converter
- Analyser MIR9000e
- Manual in the German language

With the exception of the heated sampling probe and the heated sample gas line, all components together with the electrical distribution and the analogue modules are located in a lockable measurement cabinet.

The sample gas (approx. 3.0 l/min) is taken from the exhaust gas flow with a heated probe and fed to the measuring system. The probe is heated to 200 °C and equipped with a ceramic filter. The probe leads the sample gas to the measurement cabinet via a PTFE line, heated to 180 °C. The line lengths were 10 m in the laboratory test and 20 m in the field test. In the measuring cabinet, the sample gas is passed over a test gas cooler and cooled to +4 °C. A condensate pump discharges the moisture which is separated here. Downstream of the test gas cooler, a partial flow (approx. 0.5 l/min) of the dried sample gas is fed into the analysis module. The remaining sample gas is discharged via a bypass.

The clean and dry gas sample is pumped by the analyzer module's internal pump into the multi-reflection chamber, whose sensitivity is increased by the length of the optical path (path length: 8 m). The optics chamber is traversed by the radiation emitted by an infrared source. The semiconductor detector receives the optical beam after it passes through several interference filters and gas cells mounted on a wheel rotating at high speed.

The signal output by the detector is amplified and electronically processed. The concentration is displayed in real time according to a response time pre-programmed by the user.

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 MIR 9000e 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. 0000074621_00: 03 September 2021
Expiry date of the certificate: 04 August 2026
Test report 936/21246251/B of 03 May 2021
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 05.08.2021 B5, chap. I No. 3.1
UBA announcement dated 29 June 2021 :

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

Measuring system

Manufacturer	ENVEA
AMS designation	MIR9000e
Serial number of units under test	21 / 24
Measuring principle	NDIR

Test report

Test laboratory	936/21246251/B
Date of report	TÜV Rheinland
	2021-05-03

Measured component

Certification range	CO	0 - 75 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	1.52 mg/m ³
Sum of negative CS at zero point	-0.42 mg/m ³
Sum of positive CS at span point	2.33 mg/m ³
Sum of negative CS at span point	0.00 mg/m ³
Maximum sum of cross-sensitivities	2.33 mg/m ³
Uncertainty of cross-sensitivity	u_i 1.347 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.252 mg/m ³	0.064 (mg/m ³) ²
Lack of fit	u_{inf}	0.329 mg/m ³	0.108 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$	0.303 mg/m ³	0.092 (mg/m ³) ²
Span drift from field test	$u_{d,s}$	0.433 mg/m ³	0.187 (mg/m ³) ²
Influence of ambient temperature at span	u_t	0.346 mg/m ³	0.120 (mg/m ³) ²
Influence of supply voltage	u_v	0.168 mg/m ³	0.028 (mg/m ³) ²
Cross-sensitivity (interference)	u_i	1.347 mg/m ³	1.814 (mg/m ³) ²
Influence of sample gas flow	u_n	0.156 mg/m ³	0.024 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.606 mg/m ³	0.368 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.67 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.28 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 50 mg/m ³	6.6
Requirement of EN 15267-3	U in % of the ELV 50 mg/m ³	10.0
	U in % of the ELV 50 mg/m ³	7.5

Berechnung der Gesamtunsicherheit nach DIN EN 14181 und DIN EN 15267-3

Messeinrichtung

Hersteller	ENVEA
Bezeichnung der Messeinrichtung	MIR9000e
Seriennummer der Prüflinge	21 / 24
Messprinzip	NDIR

Prüfbericht

Prüfinstitut	936/21246251/B
Berichtsdatum	TÜV Rheinland
	03.05.2021

Messkomponente

Zertifizierungsbereich ZB	NOx	0 - 100 mg/m³
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Bewertung der Querempfindlichkeiten (QE)

(System mit größter QE)

Summe positive QE am Null-Punkt	1,55 mg/m³
Summe negative QE am Null-Punkt	-1,36 mg/m³
Summe positive QE am Ref.-Punkt	2,08 mg/m³
Summe negative QE am Ref.-Punkt	-1,58 mg/m³
Maximale Summe von Querempfindlichkeiten	2,08 mg/m³
Messunsicherheit der Querempfindlichkeit	u_i 1,201 mg/m³

Berechnung der erweiterten Messunsicherheit

Prüfgröße

Prüfgröße		u^2
Standardabweichung aus Doppelbestimmungen *	u_D 0,567 mg/m³	0,321 (mg/m³)²
Linearität / Lack-of-fit	u_{lof} -0,577 mg/m³	0,333 (mg/m³)²
Nullpunktdrift aus Feldtest	$u_{d,z}$ -0,289 mg/m³	0,084 (mg/m³)²
Referenzpunktdrift aus Feldtest	$u_{d,s}$ -0,981 mg/m³	0,962 (mg/m³)²
Einfluss der Umgebungstemperatur am Referenzpunkt	u_t 0,493 mg/m³	0,243 (mg/m³)²
Einfluss der Netzspannung	u_v 0,284 mg/m³	0,081 (mg/m³)²
Querempfindlichkeit	u_i 1,201 mg/m³	1,442 (mg/m³)²
Einfluss des Probengasvolumenstrom	u_n 0,173 mg/m³	0,030 (mg/m³)²
Unsicherheit des Referenzmaterials bei 70% des ZB	u_{rm} 0,808 mg/m³	0,653 (mg/m³)²
Konverterwirkungsgrad für AMS zur Messung von NOx	u_{ce} 1,905 mg/m³	3,630 (mg/m³)²

* Der größere der Werte wird verwendet:

"Wiederholstandardabweichung am Referenzpunkt" oder
"Standardabweichung aus Doppelbestimmungen"

Kombinierte Standardunsicherheit (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 2,79 \text{ mg/m}^3$$

Erweiterte Unsicherheit

$$U = u_c * k = u_c * 1,96 \quad 5,47 \text{ mg/m}^3$$

Relative erweiterte Messunsicherheit

Anforderung nach 2010/75/EU

U in % vom Grenzwert 66 mg/m³ **8,3**

Anforderung nach DIN EN 15267-3

U in % vom Grenzwert 66 mg/m³ **20,0**

U in % vom Grenzwert 66 mg/m³ **15,0**

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

Measuring system

Manufacturer	ENVEA
AMS designation	MIR9000e
Serial number of units under test	21 / 24
Measuring principle	NDIR

Test report

Test laboratory	936/21246251/B
Date of report	TÜV Rheinland
	2021-05-03

Measured component

Certification range	SO ₂
	0 - 75 mg/m ³

Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.74 mg/m ³
Sum of negative CS at zero point	-0.80 mg/m ³
Sum of positive CS at span point	2.78 mg/m ³
Sum of negative CS at span point	-1.70 mg/m ³
Maximum sum of cross-sensitivities	2.78 mg/m ³
Uncertainty of cross-sensitivity	u_i 1.606 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.936 mg/m ³	0.876 (mg/m ³) ²
Lack of fit	u_{inf}	0.637 mg/m ³	0.406 (mg/m ³) ²
Zero drift from field test	$u_{t,z}$	0.996 mg/m ³	0.992 (mg/m ³) ²
Span drift from field test	$u_{d,s}$	1.299 mg/m ³	1.687 (mg/m ³) ²
Influence of ambient temperature at span	u_t	0.321 mg/m ³	0.103 (mg/m ³) ²
Influence of supply voltage	u_v	0.279 mg/m ³	0.078 (mg/m ³) ²
Cross-sensitivity (interference)	u_i	1.606 mg/m ³	2.579 (mg/m ³) ²
Influence of sample gas flow	u_n	0.231 mg/m ³	0.053 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.606 mg/m ³	0.368 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	2.67 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	5.24 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 50 mg/m ³	10.5
Requirement of EN 15267-3	U in % of the ELV 50 mg/m ³	20.0
	U in % of the ELV 50 mg/m ³	15.0

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

Measuring system

Manufacturer	ENVEA
AMS designation	MIR9000e
Serial number of units under test	21 / 24
Measuring principle	NDIR

Test report

Test laboratory	936/21246251/B
Date of report	TÜV Rheinland
	2021-05-03

Measured component

Certification range	N ₂ O	0 - 50 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00 mg/m ³
Sum of negative CS at zero point	-1.48 mg/m ³
Sum of positive CS at span point	0.34 mg/m ³
Sum of negative CS at span point	-1.64 mg/m ³
Maximum sum of cross-sensitivities	-1.64 mg/m ³
Uncertainty of cross-sensitivity	u_i -0.947 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.581 mg/m ³	0.338 (mg/m ³) ²
Lack of fit	u_{inf}	0.289 mg/m ³	0.084 (mg/m ³) ²
Zero drift from field test	$u_{t,z}$	0.231 mg/m ³	0.053 (mg/m ³) ²
Span drift from field test	$u_{t,s}$	0.722 mg/m ³	0.521 (mg/m ³) ²
Influence of ambient temperature at span	u_t	0.400 mg/m ³	0.160 (mg/m ³) ²
Influence of supply voltage	u_v	0.178 mg/m ³	0.032 (mg/m ³) ²
Cross-sensitivity (interference)	u_i	-0.947 mg/m ³	0.897 (mg/m ³) ²
Influence of sample gas flow	u_b	0.115 mg/m ³	0.013 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.404 mg/m ³	0.163 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.50 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	2.95 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the range 50 mg/m³	5.9
U in % of the range 50 mg/m³	20.0 **
U in % of the range 50 mg/m ³	15.0

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.
A value of 20 % was used instead.

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

Measuring system

Manufacturer	ENVEA
AMS designation	MIR9000e
Serial number of units under test	21 / 24
Measuring principle	NDIR

Test report

Test laboratory	936/21246251/AB
Date of report	TÜV Rheinland
	2021-05-03

Measured component

Certification range	CH ₄	0 - 50 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.78 mg/m ³
Sum of negative CS at zero point	-0.87 mg/m ³
Sum of positive CS at span point	1.74 mg/m ³
Sum of negative CS at span point	-0.69 mg/m ³
Maximum sum of cross-sensitivities	1.74 mg/m ³
Uncertainty of cross-sensitivity	u_i 1.005 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.546 mg/m ³	0.298 (mg/m ³) ²
Lack of fit	u_{lof}	-0.173 mg/m ³	0.030 (mg/m ³) ²
Zero drift from field test	$u_{t,z}$	0.173 mg/m ³	0.030 (mg/m ³) ²
Span drift from field test	$u_{t,s}$	-0.722 mg/m ³	0.521 (mg/m ³) ²
Influence of ambient temperature at span	u_t	0.208 mg/m ³	0.043 (mg/m ³) ²
Influence of supply voltage	u_v	0.215 mg/m ³	0.046 (mg/m ³) ²
Cross-sensitivity (interference)	u_i	1.005 mg/m ³	1.010 (mg/m ³) ²
Influence of sample gas flow	u_b	-0.058 mg/m ³	0.003 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.404 mg/m ³	0.163 (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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 1.46 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c \cdot k = u_c \cdot 1.96 \quad 2.87 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

U in % of the range 50 mg/m³

5.7

Requirement of EN 15267-3

U in % of the range 50 mg/m³

30.0 **

U in % of the range 50 mg/m³

22.5

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.

A value of 30 % was used instead.

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

Measuring system

Manufacturer	ENVEA
AMS designation	MIR9000e
Serial number of units under test	21 / 24
Measuring principle	NDIR

Test report

Test laboratory	936/21246251/B
Date of report	TÜV Rheinland
	2021-05-03

Measured component

Certification range	CO ₂
	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 positive 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
Repeatability standard deviation at set point *	u_r	0.080	Vol.-%	0.006 (Vol.-%) ²
Lack of fit	u_{of}	0.058	Vol.-%	0.003 (Vol.-%) ²
Zero drift from field test	$u_{t,z}$	0.012	Vol.-%	0.000 (Vol.-%) ²
Span drift from field test	$u_{t,s}$	0.127	Vol.-%	0.016 (Vol.-%) ²
Influence of ambient temperature at span	u_t	0.058	Vol.-%	0.003 (Vol.-%) ²
Influence of supply voltage	u_v	0.047	Vol.-%	0.002 (Vol.-%) ²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000 (Vol.-%) ²
Influence of sample gas flow	u_b	0.006	Vol.-%	0.000 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.162	Vol.-%	0.026 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.24	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.47	Vol.-%

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the range 20 Vol.-%	2.4
Requirement of EN 15267-3	U in % of the range 20 Vol.-%	10.0 **
	U in % of the range 20 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	ENVEA
AMS designation	MIR9000e
Serial number of units under test	21 / 24
Measuring principle	Zirconiumdioxide

Test report

Test laboratory	936/21246251/B
Date of report	TÜV Rheinland
	2021-05-03

Measured component

Certification range	O ₂	0 - 25 Vol.-%
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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 positive 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	0.085 Vol.-%	0.007 (Vol.-%) ²
Lack of fit	u _{of}	0.058 Vol.-%	0.003 (Vol.-%) ²
Zero drift from field test	u _{t,z}	-0.087 Vol.-%	0.008 (Vol.-%) ²
Span drift from field test	u _{t,s}	0.035 Vol.-%	0.001 (Vol.-%) ²
Influence of ambient temperature at span	u _t	0.045 Vol.-%	0.002 (Vol.-%) ²
Influence of supply voltage	u _v	0.058 Vol.-%	0.003 (Vol.-%) ²
Cross-sensitivity (interference)	u _i	0.000 Vol.-%	0.000 (Vol.-%) ²
Influence of sample gas flow	u _b	0.017 Vol.-%	0.000 (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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.26 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c \cdot k = u_c \cdot 1.96 \quad 0.50 \text{ Vol.-%}$$

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.