

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000040208_02

AMS designation: MIR 9000H for CO, NO, NO₂, SO₂, NH₃, H₂O, CO₂ and O₂

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 (2004)**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 15 pages).
The present certificate replaces certificate 0000040208_01 of 01 April 2019.



Suitability Tested
EN 15267
QAL1 Certified
Regular Surveillance

www.tuv.com
ID 0000040208

Publication in the German Federal Gazette
(BAnz) of 01 April 2014

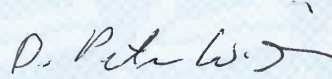
This certificate will expire on:
30 June 2025

German Federal Environment Agency
Dessau, 30 June 2020

TÜV Rheinland Energy GmbH
Cologne, 01 July 2020



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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:	936/21217993/A dated 04 September 2013
Initial certification:	01 April 2014
Expiry date:	30 June 2025
Certificate:	Renewal (of previous certificate 0000040208_01 dated 01 April 2019 valid until 30 June 2020)
Publication:	BAnz AT 01.04.2014 B12, chapter I number 3.5

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, 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 four-months field test at a municipal waste incinerator.

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 no. 936/21217993/A dated 04 September 2013 issued by TÜV Rheinland Energie und Umwelt 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 01.04.2014 B12, chapter I number 3.5, UBA announcement dated 27 February 2014:

AMS designation:

MIR 9000H for CO, NO, NO₂, SO₂, NH₃, H₂O, CO₂ and O₂

Manufacturer:

Environnement S.A., 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 range	Unit
CO	0-75	0-1 000	mg/m ³
NO	0-200	0 - 2000	mg/m ³
NO ₂	0-200	0 - 2000	mg/m ³
SO ₂	0 - 500	0 - 2000	mg/m ³
NH ₃	0-15	0-100	mg/m ³
H ₂ O	0-30	0 - 40	Vol.-%
CO ₂	0-30	0-25	Vol.-%
O ₂	0-25	-	Vol.-%

Software version:

3.4.h

Restrictions:

1. The measuring system did not meet the requirement for total uncertainty as defined in EN 15267-3 for the component CO.
2. The certification range of the measured component SO₂ is unsuitable for the monitoring of daily averages at plants according to Directive 2010/75/EU chapter IV (17th BImSchV).
3. The measuring system must be operated in a lockable measuring room/container.

Notes:

1. The maintenance interval is four weeks.
2. The measuring system performs zero point alignments four times per day.

Test Report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report no.: 936/21217993/A dated 04 September 2013

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 23 , UBA announcement dated 22 July 2015:

23 Notification as regards Federal Environment Agency (UBA) notice of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter I number 3.5).

The latest software version of the MIR9000H measuring system for CO, NO, NO₂, SO₂, NH₃, H₂O, CO₂ und O₂ manufactured by Environnement S.A. is:

v7.1.d (calculation process)
v3.4.r (display process)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 14 March 2015

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B8, chapter V notification 27, UBA announcement dated 21 February 2018:

27 Notification as regards Federal Environment Agency (UBA) notices of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter I number 3.5) and of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V 23rd notification)

The step engine Sanyo 103H548-0444 used for the MIR 9000H measuring system for CO, NO, NO₂, SO₂, NH₃, O₂, CO₂ and H₂O manufactured by Environnement S. A. has been replaced by the successor model Sanyo 103HS5208-0440.

Statement issued by TÜV Rheinland Energy GmbH dated 18 August 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV notification 29, UBA announcement dated 27 February 2019:

29 Notification as regards Federal Environment Agency (UBA) notices of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter I number 3.5) and of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V 27th notification)

The current software version of the MIR 9000H measuring system for NO, NO₂, NO_x, N₂O, CH₄, CO₂ and O₂ manufactured by Environnement S.A. ist:

v7.1.f (calculation process)
v3.8.a (display process)

Statement issued by TÜV Rheinland Energy GmbH dated 27 September 2018

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chapter IV notification 34, UBA announcement dated 24 February 2020:

34 Notification as regards Federal Environment Agency (UBA) notices of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter I number 3.5) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV 29th notification)

Environnement S.A., Poissy, France have changed their company name to ENVEA. Other than that, the MIR 9000H measuring system for CO, NO, NO₂, SO₂, NH₃, CO CO, NO, NO₂, SO₂, NH₃, CO₂, H₂O und O₂, H₂O and O₂ manufactured by ENVEA remains unchanged.

Statement issued by TÜV Rheinland Energy GmbH dated 1 October 2019

Certified product

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

The measuring system is a continuous emission monitoring system for measuring up to 8 components using infrared spectroscopy with gas filter correlation. Oxygen is measured with a zirconium dioxide sensor positioned in the measuring cell.

The gas sample is fed via the sample probe (HOFI-box) and the heated sample gas pipe from the internal pump into the optical multi-reflection chamber. The signal is sensitized due to the increased measuring path of 6 m. The optical measuring chamber is intersected by an infrared beam which is then measured in a detector. A light beam emitted by the IR source passes through the measuring chamber and is directed to an IR detector. Every gas molecule in the path of the light beam absorbs the light on a specific wavelength range that is characteristic for the particular gas. An interferent filter that surrounds a specific wavelength is positioned on the optical path to the measuring chamber.

The MIR 9000H AMS consists of:

- the MIR 9000H analyser
- a sample probe (HOFI-box) heated to 180 °C
- a sample gas pipe (interior diameter 4 mm, PTFE) heated to 180 °C, 10 m length during the performance test
- a distributor for zero gas and test gases

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 gal1.de.

Document history

Certification of the MIR 9000H 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. 0000040208: 29 April 2014
Expiry date of the certificate: 31 March 2019
Test report: 936/21217993/A dated 4 September 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 01.04.2014 B12, chapter I number 3.5
UBA announcement dated 27 February 2014

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 14 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 23
UBA announcement dated 22 July 2015
(software updates)

Statement issued by TÜV Rheinland Energy GmbH dated 18 August 2017
Publication: BAnz AT 26.03.2018 B8, chapter V notification 27
UBA announcement dated 21 February 2018
(Design changes)

Renewal of the certificate

Certificate no. 0000040208_01: 01 April 2019
Expiry date of the certificate: 30 June 2020

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energy GmbH dated 27 September 2018
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 29
UBA announcement dated 27 February 2019
(software updates)

Statement issued by TÜV Rheinland Energy GmbH dated 1 October 2019
Publication: BAnz AT 24.03.2020 B7, chapter IV notification 34
UBA announcement dated 24 February 2020
(new company name)

Renewal of the certificate

Certificate no. 0000040208_02: 01 July 2020
Expiry date of the certificate: 30 June 2025

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

Measuring system

Manufacturer	Environnement-S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	IR- Gasfiltercorrelation

Test report

Test laboratory	TÜV Rheinland
Date of report	2013-09-04

Measured component

Certification range	CO 0 - 75 mg/m³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.68 mg/m³
Sum of negative CS at zero point	0.00 mg/m³
Sum of positive CS at span point	1.40 mg/m³
Sum of negative CS at span point	-0.70 mg/m³
Maximum sum of cross-sensitivities	1.40 mg/m³
Uncertainty of cross-sensitivity	0.805 mg/m³

Calculation of the combined standard uncertainty

Tested parameter

			u²
Standard deviation from paired measurements under field conditions *	u _D	0.834 mg/m³	0.696 (mg/m³)²
Lack of fit	u _{lof}	0.229 mg/m³	0.052 (mg/m³)²
Zero drift from field test	u _{d,z}	0.589 mg/m³	0.347 (mg/m³)²
Span drift from field test	u _{d,s}	1.299 mg/m³	1.687 (mg/m³)²
Influence of ambient temperature at span	u _t	0.458 mg/m³	0.210 (mg/m³)²
Influence of supply voltage	u _v	0.157 mg/m³	0.025 (mg/m³)²
Cross-sensitivity (interference)	u _i	0.805 mg/m³	0.649 (mg/m³)²
Influence of sample gas flow	u _g	-0.334 mg/m³	0.112 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u _{rm}	0.606 mg/m³	0.368 (mg/m³)²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 2.04 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 3.99 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the ELV 50 mg/m³	8.0
U in % of the ELV 50 mg/m³	10.0
U in % of the ELV 50 mg/m³	7.5

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

Measuring system

Manufacturer	Environnement-S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	IR- Gasfiltercorrelation

Test report

Test laboratory	TÜV Rheinland
Date of report	2013-09-04

Measured component

Certification range	NO 0 - 200 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	7.08 mg/m ³
Sum of negative CS at zero point	-3.76 mg/m ³
Sum of positive CS at span point	5.60 mg/m ³
Sum of negative CS at span point	-3.30 mg/m ³
Maximum sum of cross-sensitivities	7.08 mg/m ³
Uncertainty of cross-sensitivity	4.088 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u ²
Standard deviation from paired measurements under field conditions *	u _D	2.022 mg/m ³	4.088 (mg/m ³) ²
Lack of fit	u _{lof}	1.155 mg/m ³	1.334 (mg/m ³) ²
Zero drift from field test	u _{dz}	1.253 mg/m ³	1.570 (mg/m ³) ²
Span drift from field test	u _{ds}	3.464 mg/m ³	11.999 (mg/m ³) ²
Influence of ambient temperature at span	u _t	1.041 mg/m ³	1.084 (mg/m ³) ²
Influence of supply voltage	u _v	1.267 mg/m ³	1.605 (mg/m ³) ²
Cross-sensitivity (interference)	u _i	4.088 mg/m ³	16.709 (mg/m ³) ²
Influence of sample gas flow	u _g	-0.265 mg/m ³	0.070 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm}	1.617 mg/m ³	2.613 (mg/m ³) ²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 6.41 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 12.56 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the ELV 100 mg/m³	12.6
U in % of the ELV 100 mg/m³	20.0
U in % of the ELV 100 mg/m³	15.0

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

Measuring system

Manufacturer	Environnement-S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	IR- Gasfiltercorrelation

Test report

Test laboratory	TÜV Rheinland
Date of report	2013-09-04

Measured component

Certification range	NO ₂ 0 - 200 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	7.28 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at span point	5.00 mg/m ³
Sum of negative CS at span point	-1.00 mg/m ³
Maximum sum of cross-sensitivities	7.28 mg/m ³
Uncertainty of cross-sensitivity	4.203 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u ²
Repeatability standard deviation at set point *	u _r 1.207 mg/m ³	1.457 (mg/m ³) ²
Lack of fit	u _{lof} 0.808 mg/m ³	0.653 (mg/m ³) ²
Zero drift from field test	u _{dz} 1.542 mg/m ³	2.378 (mg/m ³) ²
Span drift from field test	u _{ds} 3.464 mg/m ³	11.999 (mg/m ³) ²
Influence of ambient temperature at span	u _t 1.300 mg/m ³	1.690 (mg/m ³) ²
Influence of supply voltage	u _v 1.349 mg/m ³	1.820 (mg/m ³) ²
Cross-sensitivity (interference)	u _i 4.203 mg/m ³	17.666 (mg/m ³) ²
Influence of sample gas flow	u _g 0.433 mg/m ³	0.187 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 1.617 mg/m ³	2.613 (mg/m ³) ²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 6.36 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 12.47 \text{ mg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 200 mg/m³ 6.2

Requirement of 2010/75/EU

U in % of the ELV 200 mg/m³ 20.0

Requirement of EN 15267-3

U in % of the ELV 200 mg/m³ 15.0

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

Measuring system

Manufacturer	Environnement-S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	IR- Gasfiltercorrelation

Test report

Test laboratory	TÜV Rheinland
Date of report	2013-09-04

Measured component

Certification range	SO ₂ 0 - 500 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	-5.45 mg/m ³
Sum of positive CS at span point	0.00 mg/m ³
Sum of negative CS at span point	0.00 mg/m ³
Maximum sum of cross-sensitivities	-5.45 mg/m ³
Uncertainty of cross-sensitivity	-3.147 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u ²
Repeatability standard deviation at set point *	u _r 5.963 mg/m ³	35.557 (mg/m ³) ²
Lack of fit	u _{lof} -2.887 mg/m ³	8.335 (mg/m ³) ²
Zero drift from field test	u _{dz} 4.030 mg/m ³	16.241 (mg/m ³) ²
Span drift from field test	u _{ds} 8.660 mg/m ³	74.996 (mg/m ³) ²
Influence of ambient temperature at span	u _t 3.579 mg/m ³	12.809 (mg/m ³) ²
Influence of supply voltage	u _v 2.272 mg/m ³	5.162 (mg/m ³) ²
Cross-sensitivity (interference)	u _i -3.147 mg/m ³	9.901 (mg/m ³) ²
Influence of sample gas flow	u _g -0.902 mg/m ³	0.814 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 4.041 mg/m ³	16.333 (mg/m ³) ²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 13.42 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 26.31 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the ELV 200 mg/m³	13.2
U in % of the ELV 200 mg/m³	20.0
U in % of the ELV 200 mg/m³	15.0

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

Measuring system

Manufacturer	Environnement-S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	IR- Gasfiltercorrelation

Test report

Test laboratory	936/21217993/A
Date of report	TÜV Rheinland
	2013-09-04

Measured component

Certification range	NH ₃	0 - 15 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.39 mg/m ³
Sum of negative CS at zero point	-0.10 mg/m ³
Sum of positive CS at span point	0.20 mg/m ³
Sum of negative CS at span point	-0.10 mg/m ³
Maximum sum of cross-sensitivities	0.39 mg/m ³
Uncertainty of cross-sensitivity	0.226 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u ²
Standard deviation from paired measurements under field conditions *	u _D	0.070 mg/m ³	0.005 (mg/m ³) ²
Lack of fit	u _{lof}	0.139 mg/m ³	0.019 (mg/m ³) ²
Zero drift from field test	u _{d,z}	0.069 mg/m ³	0.005 (mg/m ³) ²
Span drift from field test	u _{d,s}	0.144 mg/m ³	0.021 (mg/m ³) ²
Influence of ambient temperature at span	u _t	0.058 mg/m ³	0.003 (mg/m ³) ²
Influence of supply voltage	u _v	0.065 mg/m ³	0.004 (mg/m ³) ²
Cross-sensitivity (interference)	u _i	0.226 mg/m ³	0.051 (mg/m ³) ²
Influence of sample gas flow	u _n	0.029 mg/m ³	0.001 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm}	0.121 mg/m ³	0.015 (mg/m ³) ²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.35 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.69 \text{ mg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 10 mg/m³ 6.9

Requirement of 2010/75/EU

U in % of the ELV 10 mg/m³ 40.0 **

Requirement of EN 15267-3

U in % of the ELV 10 mg/m³ 30.0

**For this component no requirements in the EC-directive 2010/75/EU is given.
The chosen value is recommended by the certification body.

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

Measuring system

Manufacturer	Environnement-S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	IR- Gasfiltercorrelation

Test report

Test laboratory	TÜV Rheinland
Date of report	2013-09-04

Measured component

Certification range	H ₂ O	0 - 30 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	-0.21	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	-0.21	Vol.-%
Uncertainty of cross-sensitivity	-0.121	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2
Standard deviation from paired measurements under field conditions *	u_D	0.174	Vol.-%	0.030 (Vol.-%) ²
Lack of fit	u_{lof}	-0.116	Vol.-%	0.013 (Vol.-%) ²
Zero drift from field test	$u_{d,z}$	0.173	Vol.-%	0.030 (Vol.-%) ²
Span drift from field test	$u_{d,s}$	0.173	Vol.-%	0.030 (Vol.-%) ²
Influence of ambient temperature at span	u_t	0.208	Vol.-%	0.043 (Vol.-%) ²
Influence of supply voltage	u_v	0.111	Vol.-%	0.012 (Vol.-%) ²
Cross-sensitivity (interference)	u_i	-0.121	Vol.-%	0.015 (Vol.-%) ²
Influence of sample gas flow	u_n	0.022	Vol.-%	0.000 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.242	Vol.-%	0.059 (Vol.-%) ²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.48 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.95 \text{ Vol.-%}$$

Relative total expanded uncertainty

U in % of the range 30 Vol.-% **3.2**

Requirement of 2010/75/EU

U in % of the range 30 Vol.-% **10.0 ****

Requirement of EN 15267-3

U in % of the range 30 Vol.-% **7.5**

**For this component no requirements in the EC-directive 2010/75/EU is given.
The chosen value is recommended by the certification body.

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

Measuring system

Manufacturer	Environnement S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	IR- Gasfiltercorrelation

Test report

Test laboratory	936/21217993/A
Date of report	TÜV Rheinland
	2013-09-04

Measured component

Certification range	CO ₂
	0 - 30 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	0.60	Vol.-%
Sum of negative CS at span point	-0.20	Vol.-%
Maximum sum of cross-sensitivities	0.60	Vol.-%
Uncertainty of cross-sensitivity	0.348	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2
Standard deviation from paired measurements under field conditions *	u_D	0.435	Vol.-%	0.189 (Vol.-%) ²
Lack of fit	u_{lof}	-0.144	Vol.-%	0.021 (Vol.-%) ²
Zero drift from field test	$u_{d,z}$	0.387	Vol.-%	0.150 (Vol.-%) ²
Span drift from field test	$u_{d,s}$	0.520	Vol.-%	0.270 (Vol.-%) ²
Influence of ambient temperature at span	u_t	0.153	Vol.-%	0.023 (Vol.-%) ²
Influence of supply voltage	u_v	0.012	Vol.-%	0.000 (Vol.-%) ²
Cross-sensitivity (interference)	u_i	0.348	Vol.-%	0.121 (Vol.-%) ²
Influence of sample gas flow	u_p	0.047	Vol.-%	0.002 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.242	Vol.-%	0.059 (Vol.-%) ²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max, j})^2} \quad 0.91 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 1.79 \text{ Vol.-%}$$

Relative total expanded uncertainty

U in % of the range 30 Vol.-% **6.0**

Requirement of 2010/75/EU

U in % of the range 30 Vol.-% **10.0****

Requirement of EN 15267-3

U in % of the range 30 Vol.-% **7.5**

**For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.

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

Measuring system

Manufacturer	Environnement-S.A.
AMS designation	MIR 9000H
Serial number of units under test	2507 / 2508
Measuring principle	Zirkoniumdioxide

Test report

Test laboratory	TÜV Rheinland
Date of report	2013-09-04

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	0.000	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2
Standard deviation from paired measurements under field conditions *	u_D	0.057	Vol.-%	0.003 (Vol.-%) ²
Lack of fit	u_{lof}	0.014	Vol.-%	0.000 (Vol.-%) ²
Zero drift from field test	u_{dz}	-0.058	Vol.-%	0.003 (Vol.-%) ²
Span drift from field test	u_{ds}	0.058	Vol.-%	0.003 (Vol.-%) ²
Influence of ambient temperature at span	u_t	0.040	Vol.-%	0.002 (Vol.-%) ²
Influence of supply voltage	u_v	0.031	Vol.-%	0.001 (Vol.-%) ²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000 (Vol.-%) ²
Influence of sample gas flow	u_n	-0.012	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 span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.23 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.45 \text{ Vol.-%}$$

Relative total expanded uncertainty

U in % of the range 25 Vol.-% **1.8**

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**

**For this component no requirements in the EC-directive 2010/75/EU is given.
The chosen value is recommended by the certification body.