



CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000040335 03

AMS designation: CEMSelect OEM for CO, NO, SO₂, CO₂, NO₂, NO_X and O₂

Manufacturer: Bühler Technologies GmbH

Harkortstraße 29 40880 Ratingen

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 35 pages).

The present certificate replaces certificate 0000040335 02 of 04 June 2020.



Suitability Tested EN 15267 QAL1 Certified Regular Surveillance

www.tuv.com ID 0000040335

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

German Federal Environment Agency Dessau, 03 September 2021 04 August 2026

TÜV Rheinland Energy Gmbh

This certificate will expire on:

TÜV Rheinland Energy GmbH Cologne, 02 September 2021

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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 certificate D-PL-11120-02-00.





Test Report: 936/21251815/A dated 03 May 2021

Initial certification: 09 September 2014

Expiry date: 04 August 2026

Publication: BAnz AT 05.08.2021 B5, chapter I number 4.3

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV), plants in compliance with TA Luft and plants according to the 27th BImSchV. When equipped with the module SIPROCESS UV600-7MB2621 for monitoring the components NO, NO₂ and SO₂ and when equipped with the module Ultramat 6, Ultramat 6-2K, Ultramat / Oxymat 6 for the components CO, NO and SO₂ as well as when equipped with the module Ultramat 23 / BA 5000-7MB2355-Z-T25 / T35, Ultramat 23 / BA 5000-7MB2357-Z-T25 / T35 and Ultramat 23 / BA 5000-7MB2358-Z-T35 for the component SO₂, the measuring system is fit for use at plants according to the 17th 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 several field tests test at various waste incineration plants.

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 936/21251815/A dated 03 May 2021 issued 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, chapter I number 4.3, UBA announcement dated 29 June 2021:

AMS designation:

CEMSelect OEM for CO, NO, SO₂, CO₂, NO₂, NO_X and O₂

Manufacturer:

Bühler Technologies GmbH, Ratingen

Field of application:

Modular measuring system for plants requiring official approval and for plants according to the 27^{th} BImSchV

Measuring ranges in the performance test and maintenance intervals determined:

Component	Modul Type	Certification range	Additiona	al ranges	Unit	Maintenence Interva
ĊO	Ultramat 23 / BA 5000-7MB2355 - Z - T13 / T23 / T33	0 - 200	0 - 1250		mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2357 - Z - T13 /T23 / T33	0 - 200	0 - 1250	-	mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2358 - Z - T13 / T23	0 - 375	0 - 1250		mg/m³	6 Months
	Ultramat 23 / BA 5000-7MB2355 - Z - T14 / T24 / T34	0 - 1250	0 - 6000		mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2357 - Z - T14 / T24 / T34	0 - 1250	0 - 6000	7-10	mg/m³	12 Months
	Ultramat 6 LR - Z + Y27	0 - 75	0 - 1250	0 - 3000	mg/m³	6 Months
	Ultramat 6-2K LR - Z + Y27 + Y 28	0 - 75	0 - 1250	0 - 3000	mg/m³	6 Months
	Ultramat/Oxymat 6 LR - Z + Y27 + Y28	0 - 75	0 - 1250	0 - 3000	mg/m³	6 Months
	Ultramat 6 HR - Z + Y27	0 - 1000	0 - 10000		mg/m³	6 Months
	Ultramat 6-2K HR - Z + Y27 + Y 28	0 - 1000	0 - 10000	- 1	mg/m³	6 Months
	Ultramat/Oxymat 6 HR - Z + Y27 + Y28	0 - 1000	0 - 10000		mg/m³	6 Months
	Ultramat 6-2K LR - HR - Z - Y27 + Y28	0 - 75 ³⁾ 0 - 1000 ⁴⁾	0 - 1250 ³⁾ 0 - 10000 ⁴⁾		mg/m³	6 Months
NOx	Ultramat 23 / BA 5000-7MB2355 - Z - T13 / T23 / T33	0 - 150 ¹⁾ 0 - 230 ²⁾	0 - 750 ¹⁾	0 - 2000 ¹⁾ 0 - 3067 ²⁾	mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2357 - Z - T13 /T23 / T33	0 - 150 ¹⁾ 0 - 230 ²⁾	0 - 1150 ²⁾ 0 - 400 ¹⁾ 0 - 613 ²⁾	0 - 2000 ¹⁾ 0 - 3067 ²⁾	mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2358 - Z - T13 / T23	0 - 400 ¹⁾ 0 - 613 ²⁾	0 - 2000 ¹⁾ 0 - 3067 ²⁾	-	mg/m³	6 Months
NO	SIPROCESS UV600-7MB2621 - Z - Y17	0 - 50	0 - 200	0 - 2000	mg/m³	2 Weeks
	Ultramat 23 / BA 5000-7MB2355 - Z - T14 / T24 / T34	0 - 600	0 - 3000	1	mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2357 - Z - T14 / T24 / T34	0 - 600	0 - 3000		mg/m³	12 Months
	Ultramat 6 LR - Z + Y27	0 - 100	0 - 2000	-	mg/m³	6 Months
	Ultramat 6-2K LR - Z + Y27 + Y 28	0 - 100	0 - 2000	- 1	mg/m³	6 Months
	Ultramat/Oxymat 6 LR - Z + Y27 + Y28	0 - 100	0 - 2000	-	mg/m³	6 Months
	Ultramat 6 HR - Z + Y27	0 - 1000	0 - 10000	-	mg/m³	6 Months
	Ultramat 6-2K HR- Z + Y27 + Y 28	0 - 1000	0 - 10000		mg/m³	6 Months
	Ultramat/Oxymat 6 HR - Z + Y27 + Y28	0 - 1000	0 - 10000	-	mg/m³	6 Months
	Ultramat 6-2K LR - HR - Z - Y27 + Y28	0 - 100 ³⁾ 0 - 1000 ⁴⁾	0 - 2000 ³⁾ 0 - 10000 ⁴⁾	"	mg/m³	6 Months





Component	Modul Type	Certification range	supplemen	tary ranges	Unit	Maintenence Intervall
NO ₂	SIPROCESS UV600-7MB2621 - Z - Y17	0 - 50	0 - 500		mg/m³	3 Months with a weekl adjustment with the calibration cell, otherwise 2 weeks
7.6	Ultramat 23 / BA 5000-7MB2355 - Z - T25 / T35	0 - 50	0 - 1000	11.	mg/m³	4 Weeks
	Ultramat 23 / BA 5000-7MB2357 - Z - T25 / T35	0 - 50	0 - 1000	-	mg/m³	4 Weeks
	Ultramat 23 / BA 5000-7MB2358 - Z - T35	0 - 50	0 - 1000		mg/m³	4 Weeks
SO ₂	Ultramat 23 / BA 5000-7MB2355 - Z - T13 / T23 / T33	0 - 400	0 - 2000	0 - 7000	mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2357 - Z - T13 / T23 / T33	0 - 400	0 - 2000	0 - 7000	mg/m³	12 Months
	Ultramat 23 / BA 5000-7MB2358 - Z - T13 / T23	0 - 400	0 - 2000	0 - 7000	mg/m³	6 Months
	SIPROCESS UV600-7MB2621 - Z - Y17	0 - 75	0 - 130	0 - 2000	mg/m³	3 Months with a weekl adjustment with the calibration cell, otherwise 2 weeks
	Ultramat 6 LR - Z + Y27	0 - 75	0 - 1500		mg/m³	6 Months
	Ultramat 6-2K LR - Z + Y27 + Y 28	0 - 75	0 - 1500	3.4	mg/m³	6 Months
	Ultramat/Oxymat 6 LR - Z + Y27 + Y28	0 - 75	0 - 1500	-	mg/m³	6 Months
	Ultramat 23 / BA 5000-7MB2355 - Z - T25 / T35	0 - 70	0 - 75	0 - 1250	mg/m³	4 Weeks
	Ultramat 23 / BA 5000-7MB2357 - Z - T25 / T35	0 - 70	0 - 75	0 - 1250	mg/m³	4 Weeks
	Ultramat 23 / BA 5000-7MB2358 - Z - T35	0 - 70	0 -75	0 - 1250	mg/m³	4 Weeks
CO ₂	Ultramat 23 / BA 5000-7MB2355 - Z - T13 / T23 / T33	0 - 25	- 1	-	Vol%	12 Months
	Ultramat 23 / BA 5000-7MB2357 - Z - T13 / T23 / T33	0 - 25	-		Vol%	12 Months
O ₂	Ultramat 23 / BA 5000-7MB2355 - Z - T13 / T14	0 - 25	-		Vol%	12 Months
(paramagnetic)	Ultramat 23 / BA 5000-7MB2357 - Z - T13 / T14	0 - 25	-		Vol%	12 Months
	Ultramat 23 / BA 5000-7MB2358 - Z - T13 / T14	0 - 25	-	A E	Vol%	6 Months
	Oxymat 6 - Z + Y27	0 - 25	0 - 5		Vol%	6 Months
	Ultramat / Oxymat 6 - Z + Y27 + Y28	0 - 25	0 - 5		ELI	6 Months
O ₂	Ultramat 23 / BA 5000-7MB2355 - Z - T23 / T24 / T25	0 - 25	0 - 5		Vol%	12 Months
(electrochemic)	Ultramat 23 / BA 5000-7MB2357 - Z - T23 / T24 / T25	0 - 25	0 - 5		Vol%	12 Months
	Ultramat 23 / BA 5000-7MB2358 - Z - T23 / T24 / T25	0 - 25	0 - 5	-	Vol%	6 Months

1 stated as NO

3) low range (LR)

4) high range (HR)

- Z - T13 = O₂ paramagentic Cell ochemical Cell

Softwarez versions intergrated

- Z - T14 = Op paramagentic Cella and high range (HR)

Ultramat - 23-27-W B-2-35-5-cal Cell 44-02-08 (HR)

Ultramat - 23-27-W B-2-35-5-rical cell 44-02-08 (HR)

Ultramat - 23-27-W B-2-35-5-rical cell 44-10-20-08 (HR) Ultramat 23-7MB2358 4.02.08 for SO₂ and NO₂

 $\begin{array}{ll} Ultramat_{v28}^{YB} = \text{channel 1 certified according to} & \text{ENR} 15267 \\ Ultramat 6-2K & 4.8.8 \end{array}$ Oxymat 6 4.8.8

Ultramat / Oxymat 6 4.8.8

SIEMENS SIMATIC Set CEM CERT 7MB1957 Rev. 1.0

SIPROCESS UV600-7MB2621

BCU: 9150883_3.003 Gas module: 9137582 3.002 **UV Module:** 9139736 3.005

Restriction:

When using the Ultramat 23-7MB2355, Ultramat 23-7MB2357 or Ultramat 23-7MB2358 and BA 5000-7MB2355, BA 5000-7MB2357 and BA 5000-7MB2358 modules respectively, the system cabinet must be equipped with an A/C unit.



Certificate:

0000040335_03 / 03 September 2021



Notes:

- 1. The CEMSelect OEM AMS, when equipped with the module SIPROCESS UV600-7MB2621 for monitoring the components NO, NO₂ and SO₂ and when equipped with the module Ultramat 6, Ultramat 6-2K, Ultramat / Oxymat 6 for the components CO, NO and SO₂ as well as when equipped with the module Ultramat 23 / BA 5000-7MB2355-Z-T25 / T35, Ultramat 23 / BA 5000-7MB2357-Z-T25 / T35 and Ultramat 23 / BA 5000-7MB2358-Z-T35 for the component SO₂ can also be used on installations according to the 17th BImSchV.
- 2. For automatic zero adjustments, the modules of the Ultramat 23/BA 5000 series must be operated at a 24h interval. The modules of the Ultramat 6 series must be operated at a one-week interval for automatic span point adjustments.
- 3. In order to optimise the cross-sensitivity of the CO measurement channel in relation to CO₂, the modules Ultramat 23 / BA 5000-7MB2355, Ultramat 23 / BA 5000-7MB2357 and Ultramat 23 / BA 5000-7MB2358 of the CEMSelect OEM measuring system will be distributed with a modified CO-receptor starting from the production month April 2014. A serial number starting with E4 in the central block will be used for identification purposes.
- 4. The modules Ultramat 23 / BA 5000-7MB2355, Ultramat 23 / BA 5000-7MB2357 and Ultramat 23 / BA 5000-7MB2358 must be operated with the Thermo-AUTOCAL function.
- The modular CEMSelect OEM measuring system may alternatively be equipped with a sampling probe (SP2000H) manufactured by M&C TechGroup Germany GmbH and a sample gas cooler (EGK 2-19) manufactured by Bühler Technologies GmbH.
- The sample gas cooler (EGK 2-19) manufactured by Bühler Technologies GmbH implemented in the modular CEMSelect OEM measuring system may be equipped with a PVDF or glass cooling element. In any case, a glass cooling element shall be used for the SIPROCESS UV600-7MB2621 module.
- 7. The modular CEMSelect OEM measuring system for determining NO_x is equipped with an NO_x type gas converter CG-2 manufactured by M&C Tech Group Germany GmbH.
- 8. When adding additional modules to the CEMSelect OEM measuring system, each combination of modules needs to be checked for functionality as part of testing proper installation and the maintenance interval has to be determined. Maintenance work must be spread over several days in order to comply with the requirements for outage times specified by the 13th and 17th BImSchV.
- 9. The Ultramat 6, Ultramat 6-2K, Ultramat/Oxymat 6 and Oxymat 6 modules need to be operated with weekly AUTO zero and AUTO span adjustments using test gases from pressurised gas bottles.
- 10. A system cabinet with a degree of protection of IP40 is part of the modular CEM-Select OEM measuring system. The system cabinet can be equipped with an air conditioning unit or a ventilator unit.
- 11. It is possible to integrate the central unit of the QAL1 certified LDS 6 7MB6121 NH₃ and LDS 6 7MB6121 HCl measuring systems from Siemens AG as measuring modules into the system cabinet of the CEMSelect OEM measuring system.
- 12. Supplementary test (approval of further measurement modules, integration of the system LDS6 7MB6121 of Siemens AG, re-evaluation of total uncertainty Ultramat 23 / BA 5000-7MB2358 for the component CO, update of the software version) as regards the notices of the Federal Environment Agency of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter I number 3.2) and of 31 March 2021 (BAnz AT 03.05.2021 B9, chapter III 6th notification).

Test Report:

TÜV Rheinland Energy GmbH, Cologne

Report no.: 936/21251815/A dated 03 May 2021





Certified product

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

The complete modular CEMSelect OEM measuring system comprises a heated sampling probe, a heated sample gas line, a two-stage sample gas cooler, a delivery pump and a maximum of three multi-component analysers from the ULTRAMAT 6, ULTRAMAT 6 2-K, OXYMAT 6, ULTRAMAT/OXYMAT 6, ULTRAMAT 23 / BA 5000-7MB2355, ULTRAMAT 23 / BA 5000-7MB2357, ULTRAMAT 23 / BA 5000-7MB2358 or SIPROCESS UV600-7MB2621.

A system cabinet with housing protection class IP40 is part of the modular CEMSelect OEM measuring system. The system cabinet can be equipped with an air conditioning unit or a ventilator unit.

For the measurement of CO, NO and SO₂ in the ULTRAMAT 23 or BA 5000 analysers, the modular measuring system operates according to the principle of non-dispersive infrared absorption (NDIR method) or, for NO₂ and SO₂, alternatively according to the principle of UV absorption measurement. For measuring oxygen either an electrochemical or a paramagnetic oxygen measuring cell is used. The SIPROCESS UV600 analyser of the modular measuring system uses gas filter correlation (GFC) to measures NO and interference filter correlation (IFC) to measure NO₂ and SO₂.

A sample gas pump with integrated vapour recovery for the purpose of controlling sample gas flows is situated between the first and the second stage of cooling. A fine particle filter for dust separation is integrated in the cooler housing. Downstream of the sample gas cooler, the gas flow is divided into two to three partial flows to simultaneously supply analyser modules arranged in parallel with sample gas. Gas oversupply is led out via a bypass. A condensate filter is placed immediately upstream of each analyser modules which blocks the gas path in the event of moisture coming through in order to protect the analysers. In the ULTRAMAT 23 measuring modules, a (heated) converter is placed upstream of the condensate filter for measuring NO_x . A three-way valve is placed in front of the pump which serves to feed zero gas for automatic zero gas adjustment (AutoCal) and is controlled via the SIMATIC.

A second three-way valve is installed downstream of the pump which, controlled by SIMATIC, is able to time the supply of zero/test gases for automatic adjustments of zero and span points. Test gases may alternatively be fed manually via a third three-way valve.





The modular measuring system consists of the following components:

Measuring cabinet	CEMSelect OE	M system cabinet
<u>Probe</u>	Manufacturer	Bühler Technologies GmbH
	Туре	Gas 222.20-Cal-twin incl. ceramic filter
Alternative probe	Manufacturer	M&C TechGroup Germany GmbH
A I	Туре	SP2000-H incl. ceramic filter (length 100 cm), heated to 180 °C
Heated sample gas line	Temperature	180 °C
	Length:	50 m in the field, 10 m in the lab
A A	Diameter	(inner):4 mm
	Material	PTFE
Compressor cooler	Manufacturer	M&C TechGroup Germany GmbH
AND BUILDING	Туре	CSS V1-S
Alternative cooler	Manufacturer	Bühler Technologies GmbH
	Туре	EGK 2-19, 2 stage, dew point 3 °C
Sample gas pump	Manufacturer	Bühler Technologies GmbH
	Туре	P2.3:
NO _x converter	Manufacturer	M&C TechGroup Germany GmbH
	Туре	Gas Konverter CG-2
Analyser modules	Manufacturer	Siemens AG / Bühler Technologies GmbH
	Туре	ULTRAMAT 6 ULTRAMAT 6 2-K OXYMAT 6 ULTRAMAT / OXYMAT 6 ULTRAMAT 23 / BA 5000-7MB2355 ULTRAMAT 23 / BA 5000-7MB2357 ULTRAMAT 23 / BA 5000-7MB2358 SIPROCESS UV600





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 CEMSelect OEM 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. 0000040335_00: 09 September 2014 Expiry date of the certificate: 04 August 2019 Test Report: 936/21224909/A of 03 April 2014

TÜV Rheinland Energy GmbH, Cologne

Publication: BAnz AT 05.08.2014 B11, chapter I number 5.2

UBA announcement dated 17 July 2014

Supplementary testing according to EN 15267

Certificate no. 0000040335_01: 30 September 2015 Expiry date of the certificate: 04 August 2019 Test Report: 936/21224909/B of 26 March 2015

TÜV Rheinland Energy GmbH, Cologne

Publication: BAnz AT 26.08.2015 B4, chapter I number 3.1

UBA announcement dated 22 July 2015

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016 Publication: BAnz AT 15 March 2017 B6, chapter IV correction 1 UBA announcement dated 22 February 2017 (Correction of a mistake in the public announcement)





Supplementary testing according to EN 15267

Statement issued by TÜV Rheinland Energy GmbH dated 07 March 2017

Test Report: 936/21239467/A of 07 March 2017

Publication: BAnz AT 31.07.2017 B12, chapter I number 3.2

UBA announcement dated 13 July 2017

(Supplementary testing)

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 06 October 2017

Test Report: 936/21239467/B of 05 October 2017

Publication: BAnz AT 02.02.2018 B5, chapter I notification 1

UBA announcement dated 17 January 2018 (Correction of the public announcement)

Statement issued by TÜV Rheinland Energy GmbH dated 08 December 2017

Publication: BAnz AT 26.03.2018 B8, chapter V notification 21

UBA announcement dated 21 February 2018

(Software updates)

Supplementary testing according to EN 15267

Certificate no. 0000040335_02:

04 June 2020

Expiry date of the certificate:

23 March 2025

Test Report: 936/21247820/A of 24 September 2019 TÜV Rheinland Energy GmbH, Cologne

Publication: BAnz AT 24.03.2020 B7, chapter I number 3.2

UBA announcement dated 24 February 2020

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 14 July 2020

Publication: BAnz AT 03.05.2021 B9, chapter III number 6

UBA announcement dated 31 March 2021

(Software updates)

Supplementary testing according to EN 15267

Certificate no. 0000040335_03:

03 September 2021

Expiry date of the certificate:

04 August 2026

Test Report: 936/21251815/A dated 03 May 2021 TÜV Rheinland Energy GmbH, Cologne

Publication: BAnz AT 05.08.2021 B5, chapter I number 4.3

UBA announcement dated 29 June 2021:





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

Measuring system					
Manufacturer	Bühler Technologies GmbH				
AMS designation	CEMSelect OEM Ultramat 6				
Serial number of units under test	Syste	em 1 / Sy	stem 3 / System	2 / Syste	em 4
Measuring principle	NDIR				
Test report	936/2	21247820)/A		
Test laboratory	TÜV	Rheinland	t		
Date of report	2019	-09-24			
Measured component	CO				
Certification range	0 -	75	mg/m³		
Evaluation of the groce consitivity (CS)					
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		0.32	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 _i		mg/m³		
	,				
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u_D		mg/m³	0.377	$(mg/m^3)^2$
Lack of fit	U _{lof}		mg/m³	0.052	(mg/m³)²
Zero drift from field test	$\mathbf{u}_{\mathrm{d.z}}$		mg/m³	0.423	(mg/m³)²
Span drift from field test	$u_{d.s}$		mg/m³	0.367	(mg/m³)²
Influence of ambient temperature at span	Ut		mg/m³	0.854	(mg/m³)²
Influence of supply voltage	u_v		mg/m³	0.007	(mg/m³)²
Cross-sensitivity (interference)	u _i		mg/m³	0.332	(mg/m³)²
Influence of sample gas flow	U _n		mg/m³ mg/m³	0.006 0.368	(mg/m³)²
Uncertainty of reference material at 70% of certification range * The larger value is used :	u _{rm}	0.000	mg/m	0.300	(mg/m³)²
"Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
			12		
Combined standard uncertainty (u _C)		$\sqrt{\sum (u_m)}$			mg/m³
Total expanded uncertainty	U = u	$l_c * k = u$	_c * 1.96	3.27	mg/m³
Relative total expanded uncertainty			ELV 50 mg/m³		6.5
Requirement of 2010/75/EU			ELV 50 mg/m³		10.0
Requirement of EN 15267-3	U in 9	% of the I	ELV 50 mg/m³		7.5





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

Measuring system								
Manufacturer	Bühler Technologies GmbH							
AMS designation	CEN	//Select Of						
Serial number of units under test	Sys	tem 1 / Sy	stem 3 / Sy	stem 2 / Sys	tem 4			
Measuring principle	NDIF	₹						
Test report	936/	21247820/	Ά					
Test laboratory	TÜV	Rheinland	1					
Date of report	2019	9-09-24						
Measured component	CO							
Certification range	0 -	1000	mg/m³					
Evaluation of the cross-sensitivity (CS)								
(system with largest CS)								
Sum of positive CS at zero point		0.00	mg/m³					
Sum of negative CS at zero point		0.00	mg/m³					
Sum of postive CS at span point		8.60	mg/m³					
Sum of negative CS at span point		-4.20	mg/m³					
Maximum sum of cross-sensitivities		8.60	_					
Uncertainty of cross-sensitivity	ui	4.965	mg/m³					
Calculation of the combined standard uncertainty								
Tested parameter				U ²				
Standard deviation from paired measurements under field conditions	* u _D	2.042	mg/m³	4.170	(mg/m³)²			
Lack of fit	u_{lof}	-1.732	mg/m³	3.000	(mg/m³)²			
Zero drift from field test	$u_{d,z}$	3.464	•	11.999	(mg/m³)²			
Span drift from field test	$u_{d,s}$	-13.279		176.332	(mg/m³)²			
Influence of ambient temperature at span	u _t		mg/m³	32.490	(mg/m³)²			
Influence of supply voltage	u_v		mg/m³	12.595	(mg/m³)²			
Cross-sensitivity (interference)	ui	4.965	_	24.651	(mg/m³)²			
Influence of sample gas flow	u_p		mg/m³	0.709	(mg/m³)²			
Uncertainty of reference material at 70% of certification range	u _{rm}	8.083	mg/m³	65.333	(mg/m³)²			
* The larger value is used :								
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"								
Standard deviation from paired measurements under field conditions								
Combined standard uncertainty (u _C)	u. =	$=\sqrt{\sum (u_{ma})}$.)2	18.20	mg/m³			
Total expanded uncertainty	II =	$u_c * k = u$	×, j / * 1.96	35.67	_			
Total expanded uncertainty		It u	1.00	55.07	iiig/iii			
Relative total expanded uncertainty	Uin	% of the	ELV 500 m	n/m³	7.1			
Requirement of 2010/75/EU			ELV 500 m	_	10.0			
Requirement of EN 15267-3			ELV 500 mg		7.5			
requirement of ETT 10201 0	O III	70 OI LINE L	-L v 500 III (<i>y</i> /111	7.0			
During performance testing, the tests were carried out with the Siem	ens Se	et CEM CE	RT 7MB19	57 measuring	system.			





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

Measuring system								
Manufacturer	Bühl	er Technol	ogies GmbH	1				
AMS designation	CEMSelect OEM Ultramat 23							
Serial number of units under test	Syst	em 1 / Sys	stem 3 / Sys	stem 2 / Syst	em 4			
Measuring principle	NDIF							
Test report	036/	21247820//	Δ					
			`					
Test laboratory		Rheinland 9-09-24						
Date of report	2019	9-09-24						
Measured component	СО							
Certification range	0 -	1250	mg/m³					
Evaluation of the cross-sensitivity (CS) (system with largest CS)								
Sum of positive CS at zero point		0.00	mg/m³					
Sum of negative CS at zero point		0.00	mg/m³					
Sum of postive CS at span point		7.75	mg/m³					
Sum of negative CS at span point		-23.38	mg/m³					
Maximum sum of cross-sensitivities		-23.38	mg/m³					
Uncertainty of cross-sensitivity	ui	-13.496	mg/m³					
Calculation of the combined standard uncertainty Tested parameter				U ²				
Standard deviation from paired measurements under field conditions *	\mathbf{u}_{D}	2.228	mg/m³	4.964	(mg/m³)²			
Lack of fit	U _{lof}	3.464	mg/m³	11.999	(mg/m³)²			
Zero drift from field test	$u_{d,z}$	3.608	mg/m³	13.018	(mg/m³)²			
Span drift from field test	$u_{d,s}$	7.939	mg/m³	63.028	(mg/m³)²			
Influence of ambient temperature at span	u _t	8.609	mg/m³	74.115	(mg/m³)²			
Influence of supply voltage	u_{v}	0.688	mg/m³	0.473	(mg/m³)²			
Cross-sensitivity (interference)	ui	-13.496	mg/m³	182.142	(mg/m³)²			
Influence of sample gas flow	u_p	0.000	mg/m³	0.000	(mg/m³)²			
Uncertainty of reference material at 70% of certification range	u _{rm}	10.104	mg/m³	102.083	(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. =	$\sqrt{\sum (u_{max})}$.)2	21.26	mg/m³			
Total expanded uncertainty	U = I	$u_c * k = u_c$	* 1.96		mg/m³			
Total expanded directality		ae it ae	, 1.00	41.00	mg/m			
Relative total expanded uncertainty	U in	% of the E	ELV 600 mg	ı/m³	6.9			
Requirement of 2010/75/EU			ELV 600 mg		10.0			
Requirement of EN 15267-3			LV 600 mg/		7.5			
During performance testing, the tests were carried out with the Siemer	ns Se	t CEM CFI	RT 7MB1957	7 measuring s	system.			





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

Magazzina austam					
Measuring system	Dübler Teebrologies CmbH				
Manufacturer	Bühler Technologies GmbH CEMSelect OEM Ultramat 6				
AMS designation			0 / 0		
Serial number of units under test			ystem 3 / System	n 2 / Sy	stem 4
Measuring principle	NDIR				
Test report		21247820			
Test laboratory		Rheinlan	d		
Date of report	2019	-09-24			
Measured component	NO	400			
Certification range	0 -	100	mg/m³		
Evaluation of the areas considuity (CS)					
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
		3.06	ma/m³		
Sum of positive CS at zero point			mg/m³		
Sum of negative CS at zero point		0.00	3		
Sum of positive CS at span point		3.20	3		
Sum of negative CS at span point Maximum sum of cross-sensitivities		-0.50			
		3.20	mg/m³		
Uncertainty of cross-sensitivity	ui	1.848	mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u _D	0.628	mg/m³	0.394	(mg/m³)²
Lack of fit	u _{lof}	-0.924	mg/m³	0.854	(mg/m³)²
Zero drift from field test	u _{d.z}	1.386		1.921	(mg/m³)²
Span drift from field test	u _{d,s}	0.751		0.564	(mg/m³)²
Influence of ambient temperature at span	u _{d,S}		mg/m³	0.803	(mg/m³)²
Influence of supply voltage	u _v		mg/m³	0.339	(mg/m³)²
Cross-sensitivity (interference)	u _i		mg/m³	3.415	(mg/m³)²
Influence of sample gas flow	u _p	-0.120	mg/m³	0.014	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u _{rm}	0.808	mg/m³	0.653	(mg/m³)²
* The larger value is used :	GIIII	0.000	9	0.000	(9)
"Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
			\2		
Combined standard uncertainty (u _C)	$u_c =$	$\sqrt{\sum}$ (u_m	ax, j)² u _c * 1.96	2.99	mg/m³
Total expanded uncertainty	U = t	ı _c * k =	u _c * 1.96	5.87	mg/m³
Relative total expanded uncertainty	U in	% of the	ELV 40 mg/m ³		14.7
Requirement of 2010/75/EU	U in	% of the	ELV 40 mg/m ³		20.0
Requirement of EN 15267-3	U in '	% of the	ELV 40 mg/m ³		15.0





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

Measuring system						
Manufacturer	Bühler Technologies GmbH					
AMS designation	CEM	CEMSelect OEM Ultramat 6				
Serial number of units under test	Syst	em 1 / Sy	stem 3 / Sy	stem2 / Syst	em 4	
Measuring principle	NDIF	₹				
Test report	936/2	21247820/	Α			
Test laboratory	TÜV	Rheinland				
Date of report	2019	-09-24				
Measured component	NO					
Certification range	0 -	1000	mg/m³			
Evaluation of the cross-sensitivity (CS)						
(system with largest CS)						
Sum of positive CS at zero point		0.00	mg/m³			
Sum of negative CS at zero point		0.00	mg/m³			
Sum of postive CS at span point		0.00	mg/m³			
Sum of negative CS at span point		-33.10	mg/m³			
Maximum sum of cross-sensitivities		-33.10	mg/m³			
Uncertainty of cross-sensitivity	Ui	-19.110	mg/m³			
Calculation of the combined standard uncertainty						
Tested parameter				u²		
Standard deviation from paired measurements under field conditions *	\mathbf{u}_{D}	5.941	mg/m³	35.295	(mg/m³)²	
Lack of fit	u_{lof}	4.041	_	16.330	(mg/m³)²	
Zero drift from field test	$u_{d,z} \\$	5.774	mg/m³	33.339	(mg/m³)²	
Span drift from field test	$u_{\text{d},\text{s}}$	10.970	mg/m³	120.341	(mg/m³)²	
Influence of ambient temperature at span	u _t	6.275	mg/m³	39.376	(mg/m³)²	
Influence of supply voltage	u_{v}	1.851	mg/m³	3.426	(mg/m³)²	
Cross-sensitivity (interference)	Ui	-19.110	mg/m³	365.192	$(mg/m^3)^2$	
Influence of sample gas flow	u_p	-0.722	mg/m³	0.521	(mg/m³)²	
Uncertainty of reference material at 70% of certification range	U _{rm}	8.083	mg/m³	65.333	(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 (v.)		$\sqrt{\sum (u_{max})}$	1/2	00.00	, 2	
Combined standard uncertainty (u _C)	u _c –	$\sqrt{2} (u_{max})$ $u_c * k = u$	x, j / * 4.00		mg/m³	
Total expanded uncertainty	U = 1	u _c " K = U	c 1.96	51.08	mg/m³	
Relative total expanded uncertainty			ELV 500 m	_	10.2	
Requirement of 2010/75/EU			ELV 500 m	_	20.0	
Requirement of EN 15267-3	U in	% of the E	LV 500 mg	ı/m³	15.0	
		0514.65	DT 714D 404			



Requirement of 2010/75/EU

Requirement of EN 15267-3

Certificate: 0000040335_03 / 03 September 2021



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

Measuring system Manufacturer AMS designation Serial number of units under test Measuring principle	CEM			stem 4	
Test report Test laboratory Date of report	ΤÜV	21247820 Rheinlan -09-24			
Measured component	NO	000			
Certification range	0 -	600	mg/m³		
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		0.00	mg/m³		
Sum of negative CS at zero point		0.00	mg/m³		
Sum of postive CS at span point		0.00	3		
Sum of negative CS at span point		-17.04			
Maximum sum of cross-sensitivities		-17.04	_		
Uncertainty of cross-sensitivity	ui	-9.838	mg/m³		
Calculation of the combined standard uncertainty Tested parameter				u²	
Standard deviation from paired measurements under field conditions *	u _D	2.338	mg/m³	5.466	(mg/m³)²
Lack of fit	Ulof	1.732	•	3.000	(mg/m³)²
Zero drift from field test	u _{d,z}	4.850		23.523	(mg/m³)²
Span drift from field test	U _{d,s}	6.582	mg/m³	43.323	(mg/m³)²
Influence of ambient temperature at span	Ut		mg/m³	9.030	(mg/m³)²
Influence of supply voltage	U _v	1.787	mg/m³	3.193	(mg/m³)²
Cross-sensitivity (interference)	ui	-9.838	mg/m³	96.786	$(mg/m^3)^2$
Influence of sample gas flow	u_p	0.577	mg/m³	0.333	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	u _{rm}	4.850	mg/m³	23.520	(mg/m³)²
Combined standard uncertainty (u _C)	U =	$\sqrt{\sum (u_m)}$.)2	14.43	mg/m³
Total expanded uncertainty	U = (√ <u>/</u> (a _m	u _c * 1.96	28.28	-
Relative total expanded uncertainty	U in	% of the	ELV 200	mg/m³	14.1

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.

U in % of the ELV 200 mg/m³

U in % of the ELV 200 mg/m³

20.0

15.0





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

Measuring system		
Manufacturer	Bühler Technologies GmbH	
AMS designation	CEMSelect OEM Ultramat 6	
Serial number of units under test	System 1 / System 3 / System 2 /	System 4
Measuring principle	NDIR	.,
- State of the sta		
Test report	936/21247820/A	
Test laboratory	TÜV Rheinland	
Date of report	2019-09-24	
Measured component	SO ₂	
Certification range	0 - 75 mg/m ³	
Evaluation of the cross-sensitivity (CS)		
(system with largest CS)		
Sum of positive CS at zero point	1.99 mg/m³	
Sum of negative CS at zero point	-0.84 mg/m ³	
Sum of postive CS at span point	1.10 mg/m³	
Sum of negative CS at span point	-2.80 mg/m³	
Maximum sum of cross-sensitivities	-2.80 mg/m³	
Uncertainty of cross-sensitivity	u _i -1.615 mg/m³	
Calculation of the combined standard uncertainty		
Tested parameter		U ²
Standard deviation from paired measurements under field conditions *	u _D 1.066 mg/m³ 1	.136 (mg/m³)²
Lack of fit	u _{lof} -0.637 mg/m ³ 0	.406 (mg/m³)²
Zero drift from field test	$u_{\rm dz} = 0.953 \text{mg/m}^3 = 0$.908 (mg/m³)²
Span drift from field test	u _{d.s} 0.996 mg/m³ 0	.992 (mg/m³)²
Influence of ambient temperature at span	u _t 1.277 mg/m³ 1	.631 (mg/m³)²
Influence of supply voltage	u _v 0.448 mg/m³ 0	.201 (mg/m³)²
Cross-sensitivity (interference)	u _i -1.615 mg/m³ 2	.608 (mg/m³)²
Influence of sample gas flow	u _p -0.135 mg/m³ 0	.018 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u _m 0.606 mg/m³ 0	.368 (mg/m³)²
* The larger value is used :		
"Repeatability standard deviation at set point" or		
"Standard deviation from paired measurements under field conditions"		
O-military distance of the first of the firs	$u_{c} = \sqrt{\sum \left(u_{\text{max, j}}\right)^{2}}$	0.00 / 3
Combined standard uncertainty (u _C)		2.88 mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	5.64 mg/m³
Polative total expanded upportainty	II in 9/ of the ELV 50 mm/m²	11.3
Relative total expanded uncertainty	U in % of the ELV 50 mg/m ³	20.0
Requirement of 2010/75/EU	U in % of the ELV 50 mg/m³	
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	15.0





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

Measuring system					
Manufacturer	Bühle	er Techno	logies GmbH		
AMS designation	esignation CEMSelect OEM Ultramat 23				
Serial number of units under test				/ Syste	m 4
Measuring principle	NDIR			,	
Test report	936/2	21247820)/A		
Test laboratory	TÜV	Rheinland	d		
Date of report	2019	-09-24			
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		0.10	Vol%		
Sum of negative CS at span point		-0.30	Vol%		
Maximum sum of cross-sensitivities		-0.30	Vol%		
Uncertainty of cross-sensitivity	U _i	-0.173	Vol%		
Calculation of the combined standard uncertainty					
Tested parameter				u²	
Standard deviation from paired measurements under field conditions *	u_D		Vol%		(Vol%) ²
Lack of fit	U _{lof}		Vol%		(Vol%) ²
Zero drift from field test	$U_{d.z}$		Vol%		(Vol%) ²
Span drift from field test	$U_{d.s}$		Vol%		(Vol%) ²
Influence of ambient temperature at span	u _t		Vol%		(Vol%) ²
Influence of supply voltage	u_{v}		Vol%		(Vol%) ²
Cross-sensitivity (interference)	u _i		Vol%		(Vol%) ²
Influence of sample gas flow	u _o		Vol%		(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"					
Standard deviation from paired measurements under neid conditions					
Combined standard uncertainty (u _C)	u =	$\sqrt{\sum (u_m)}$)2	0.93	Vol%
Total expanded uncertainty		$u_c * k = u$			Vol%
. otal orpanisos anortainty	0	-U I. U		1.02	. 51. 70
Relative total expanded uncertainty	U in	% of the	range 25 Vol%		7.3
Requirement of 2010/75/EU			range 25 Vol%		10.0 **
Requirement of EN 15267-3			range 25 Vol%		7.5
					-

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.

** EU Directive 2010/75/EU 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	Bühler Technologies GmbH					
AMS designation	CEMSelect OEM Oxymat 6					
Serial number of units under test	System 1 / System 3 / System			em 2 / Syste	em 4	
Measuring principle	Para	magnetic				
Test report	936/2	21247820)/A			
Test laboratory	TÜV	Rheinland	t			
Date of report	2019	-09-24				
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	Ui	0.000	Vol%			
Calculation of the combined standard uncertainty						
Tested parameter				U ²		
Standard deviation from paired measurements under field conditions *	u_D	0.083	Vol%	0.007	(Vol%) ²	
Lack of fit	U _{lof}	-0.012	Vol%	0.000	(Vol%) ²	
Zero drift from field test	$u_{d.z}$	-0.035	Vol%	0.001	(Vol%) ²	
Span drift from field test	$u_{d.s}$		Vol%	0.005	(Vol%) ²	
Influence of ambient temperature at span	u _t		Vol%	0.007	(Vol%) ²	
Influence of supply voltage	u_v		Vol%		(Vol%) ²	
Cross-sensitivity (interference)	u _i		Vol%		(Vol%) ²	
Influence of sample gas flow	$u_{\rm p}$		Vol%		(Vol%) ²	
Uncertainty of reference material at 70% of certification range The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	U _{rm}	0.202	Vol%	0.041	(Vol%) ²	
			\2			
Combined standard uncertainty (u _C)	$u_c =$	$\sqrt{\sum (u_m)}$	ax, j) ²	0.25	Vol%	
Total expanded uncertainty		u _c * k = u		0.49	Vol%	
	X					
Relative total expanded uncertainty			range 25 Vol.		2.0	
Requirement of 2010/75/EU			range 25 Vol.		10.0 **	
Requirement of EN 15267-3	U in ^o	% of the r	ange 25 Vol	%	7.5	

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.

** EU Directive 2010/75/EU 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					
AMS designation		er Techno Select O			
Serial number of units under test	Syste	em 1 / Sy	2 / Syste	em 4	
Measuring principle	-	rochemic		_, _, _,	
Test report	936/2	21247820)/A		
Test laboratory	TÜV	Rheinland	d		
Date of report	2019-09-24				
Measured component	O_2				
Certification range	0 -	25	Vol%		
Evaluation of the avera consistivity (CS)					
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			Vol%		
· ·			Vol%		
Sum of positive CS at span point					
Sum of negative CS at span point			Vol%		
Maximum sum of cross-sensitivities			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	0.050	Vol%		(Vol%) ²
Lack of fit	u _{lof}		Vol%		(Vol%) ²
Zero drift from field test	U _{d.z}		Vol%		(Vol%) ²
Span drift from field test			Vol%		(Vol%) ²
Influence of ambient temperature at span	u _{d.s}		Vol%		(Vol%) ²
Influence of supply voltage	u _t		Vol%		(Vol%) ²
Cross-sensitivity (interference)	u _v		Vol%		(Vol%) ²
, ,	u _i		Vol%		(Vol%) ²
Influence of sample gas flow	u _D		Vol%		
Uncertainty of reference material at 70% of certification range	U _{rm}	0.202	VOI70	0.041	(Vol%) ²
* The larger value is used : "Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
)2		
Combined standard uncertainty (u _C)		$\sqrt{\sum (u_m)}$		0.27	Vol%
Total expanded uncertainty	U = u	$l_c * k = u$	l _c * 1.96	0.53	Vol%
Relative total expanded uncertainty	II in i	0/ of the	rango 25 Vol. 9/		2.1
			range 25 Vol%		10.0 **
Requirement of 2010/75/EU			range 25 Vol%	,	
Requirement of EN 15267-3	U in 9	% of the i	range 25 Vol%		7.5

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.

** EU Directive 2010/75/EU 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	Bühler Technologies GmbH
AMS designation	CEMSelcet OEM
Serial number of units under test	TÜV 1 / TÜV 2
Measuring principle	NDIR
Test report	936/2127820/A
Test laboratory	TÜV Rheinland
Date of report	2019-09-24
Measured component	CO
Certification range	0 - 200 mg/m³
Fundamental and the same and their (OO)	
Evaluation of the cross-sensitivity (CS)	
(system with largest CS)	0.00
Sum of positive CS at zero point	0.00 mg/m³
Sum of negative CS at zero point	0.00 mg/m³
Sum of postive CS at span point	0.00 mg/m³
Sum of negative CS at span point	0.00 mg/m³
Maximum sum of cross-sensitivities	0.00 mg/m³
Uncertainty of cross-sensitivity	u _i 1.998 mg/m³
Calculation of the combined standard uncertainty	
Tested parameter	u²
Standard deviation from paired measurements under field conditions *	u _D 0.588 mg/m³ 0.346 (mg/m³)²
Lack of fit	u_{lof} -0.924 mg/m ³ 0.854 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$ 1.848 mg/m³ 3.415 (mg/m³) ²
Span drift from field test	$u_{d.s}$ -1.732 mg/m ³ 3.000 (mg/m ³) ²
Influence of ambient temperature at span	u _t 0.493 mg/m³ 0.243 (mg/m³)²
Influence of supply voltage	u _v 0.484 mg/m³ 0.234 (mg/m³)²
Cross-sensitivity (interference)	u _i 1.998 mg/m ³ 3.992 (mg/m ³) ²
Influence of sample gas flow	$u_{\rm p}$ -0.107 mg/m ³ 0.011 (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 set point" or	
"Standard deviation from paired measurements under field conditions"	
Campbined standard uncertainty (v.)	$u_{c} = \sqrt{\sum (u_{\text{max j}})^{2}}$ 3.84 mg/m ³
Combined standard uncertainty (u _C)	$U_c = \sqrt{\sum_i (U_{max,j})^2}$ 3.84 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$ 7.52 mg/m ³
Relative total expanded uncertainty	U in % of the ELV 100 mg/m ³ 7.5
Requirement of 2010/75/EU	U in % of the ELV 100 mg/m ³ 10.0
Requirement of EN 15267-3	U in % of the ELV 100 mg/m ³ 7.5
Troguitorion of Lit 10207 0	O III 70 OI the LLV 100 mg/m 7.0

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system						
Manufacturer	Bühle	er Techno				
AMS designation			EM Ultramat 23			
Serial number of units under test		1 / TÜV 2				
Measuring principle	NDIR	}				
Test report	936/2	21251815	5/A			
Test laboratory	TÜV	Rheinland	t			
Date of report	2021	-02-22				
Measured component	СО					
Certification range	0 -	375	mg/m³			
Evaluation of the cross-sensitivity (CS)						
(system with largest CS)		0.00				
Sum of positive CS at zero point			mg/m³			
Sum of negative CS at zero point Sum of postive CS at span point			mg/m³ mg/m³			
Sum of negative CS at span point			mg/m³			
Maximum sum of cross-sensitivities			mg/m³			
Uncertainty of cross-sensitivity	U _i		mg/m³			
Chock tallity of Grood Scholavity	ui	2.100	mg/m			
Calculation of the combined standard uncertainty						
Tested parameter				U ²		
Standard deviation from paired measurements under field conditions *	u_D		mg/m³	2.742	$(mg/m^3)^2$	
Lack of fit	U _{lof}	-1.155	mg/m³	1.334	(mg/m³)²	
Zero drift from field test	$u_{d.z}$		mg/m³	2.082	$(mg/m^3)^2$	
Span drift from field test	$u_{d.s}$		mg/m³	2.082	(mg/m³)²	
Influence of ambient temperature at span	u _t		mg/m³	1.631	(mg/m³)²	
Influence of supply voltage	u_{v}		mg/m³	1.938	(mg/m³)²	
Cross-sensitivity (interference)	U _i		mg/m³	4.687	(mg/m³)²	
Influence of sample gas flow	u_{p}		mg/m³	0.047	$(mg/m^3)^2$	
Uncertainty of reference material at 70% of certification range	U _{rm}	3.031	mg/m³	9.188	(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)	$u_c =$	$\sqrt{\sum (u_m)}$	ax, j)²	5.07	mg/m³	
Total expanded uncertainty		$I_c * k = u$		9.94	mg/m³	
Relative total expanded uncertainty			ELV 150 mg/m ³		6.6	
Requirement of 2010/75/EU			ELV 150 mg/m ³		10.0	
Requirement of EN 15267-3	U in S	% of the E		7.5		





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

Measuring system					
Manufacturer	Bühle	er Techno			
AMS designation			EM Ultramat 23		
Serial number of units under test	TÜV	3 / TÜV 4	1		
Measuring principle	NDIF	₹			
Test report	936/2	21251815	5/A		
Test laboratory	TÜV	Rheinland	t		
Date of report	2021	-02-22			
Measured component	CO				
Certification range	0 -	375	mg/m³		
Evaluation of the groce consitivity (CS)					
Evaluation of the cross-sensitivity (CS) (system with largest CS)					
Sum of positive CS at zero point		0.00	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 _i		mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	\mathbf{u}_{D}	1.656	mg/m³	2.742	$(mg/m^3)^2$
Lack of fit	U _{lof}		mg/m³	1.334	(mg/m³)²
Zero drift from field test	$\mathbf{u}_{\mathrm{d.z}}$		mg/m³	2.082	(mg/m³)²
Span drift from field test	$U_{d.s}$		mg/m³	2.082	(mg/m³)²
Influence of ambient temperature at span	u _t		mg/m³	1.631	(mg/m³)²
Influence of supply voltage	u_{v}		mg/m³	2.459	(mg/m³)²
Cross-sensitivity (interference)	U _i		mg/m³	4.687	(mg/m³)²
Influence of sample gas flow	u _o	3.031	mg/m³ mg/m³	0.092	(mg/m³)²
Uncertainty of reference material at 70% of certification range * The larger value is used :	U _{rm}	3.031	mg/m	9.188	(mg/m³)²
"Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
			12		
Combined standard uncertainty (u _C)		$\sqrt{\sum (u_m)}$		5.13	mg/m³
Total expanded uncertainty	U = t	$u_c * k = u$	_c * 1.96	10.05	mg/m³
Relative total expanded uncertainty			ELV 150 mg/m ³		6.7
Requirement of 2010/75/EU			ELV 150 mg/m³		10.0
Requirement of EN 15267-3	U in '	% of the I		7.5	





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

Measuring system					
Manufacturer	Bühle				
AMS designation			EM Ultramat 23		
Serial number of units under test	TÜV	1 / TÜV 2	2		
Measuring principle	NDIR	2			
Test report	936/2	21247820)/A		
Test laboratory	TÜV	Rheinland	t		
Date of report	2019	-09-24			
Managed	NO				
Measured component	NO	450			
Certification range	0 -	150	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point		0.00	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		0.00	mg/m³		
Maximum sum of cross-sensitivities			mg/m³		
Uncertainty of cross-sensitivity	u _i	-3.464	mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u_D		mg/m³	0.383	(mg/m³)²
Lack of fit	U _{lof}		mg/m³	0.567	(mg/m³)²
Zero drift from field test	$u_{d.z}$		mg/m³	1.469	(mg/m³)²
Span drift from field test	$u_{d.s}$		mg/m³	5.072	$(mg/m^3)^2$
Influence of ambient temperature at span	u _t		mg/m³ mg/m³	0.694 1.228	(mg/m³)² (mg/m³)²
Influence of supply voltage Cross-sensitivity (interference)	u _v		mg/m³	11.999	(mg/m³)²
Influence of sample gas flow	U _i		mg/m³	0.145	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u _D		mg/m³	1.470	(mg/m³)²
* The larger value is used :	U _{rm}	1.212	mg/m	1.470	(mg/m/)
"Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
	1	$\sum f_{ij}$	<u>\2</u>		
Combined standard uncertainty (u _C)		$\sqrt{\sum (u_m)}$		4.80	mg/m³
Total expanded uncertainty	U = u	$I_c * k = u$	_c * 1.96	9.41	mg/m³
Polative total expanded uncertainty	11 :	0/ of th-	ELV GE O market	.3	14.4
Relative total expanded uncertainty Requirement of 2010/75/EU			ELV 65,2 mg/m		20.0
Requirement of EN 15267-3			ELV 65,2 mg/m ELV 65,2 mg/m ³		15.0
requirement of LN 10207-0	UIII	13.0			

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Manufacturer	Measuring system							
Serial number of units under test NDIR	Manufacturer	Bühle	Bühler Technologies GmbH					
Measuring principleNDIRTest report936/21247820//A TÜV Rheinland 2019-09-24Date of report $2019-09-24$ Measured component Certification rangeNO $0 - 400 \text{ mg/m}^3$ Evaluation of the cross-sensitivity (CS) (system with largest CS)Sum of positive CS at zero point 0.00 mg/m^3 Sum of positive CS at zero point 0.00 mg/m^3 Sum of positive CS at span point 0.00 mg/m^3 Sum of positive CS at span point 0.00 mg/m^3 Maximum sum of cross-sensitivities 0.00 mg/m^3 Uncertainty of cross-sensitivity 0.00 mg/m^3 Calculation of the combined standard uncertainty 0.00 mg/m^3 Tested parameter 0.00 mg/m^3 Standard deviation from paired measurements under field conditions and the field conditions and the field test 0.00 mg/m^3 Lack of fit 0.00 mg/m^3 0.00 mg/m^3 Lack of fit 0.00 mg/m^3 0.00 mg/m^3 Lack of fit 0.00 mg/m^3 0.00 mg/m^3 Lack of fit 0.00 mg/m^3 0.00 mg/m^3 Lack of fit 0.00 mg/m^3 0.00 mg/m^3 Lack of fit 0.00 mg/m^3 0.00 mg/m^3 Span drift from field test 0.00 mg/m^3 0.00 mg/m^3 Lack of fit 0.00 mg/m^3 0.00 mg/m^3 Span drift from field test 0.00 mg/m^3 0.00 mg/m^3 Influence of supply voltage 0.00 mg/m^3 0.00 mg/m^3 Cross-sensitivity (interference)	AMS designation	CEM	Select O	EM Ultramat 2	23			
Test report Test laboratory Date of report Measured component Certification range NO	Serial number of units under test	TÜV	1 / TÜV 2	2				
TÜV Rheinland 2019-09-24	Measuring principle	NDIF	2					
Test laboratory Date of report								
Date of report Measured component NO 0 - 400 mg/m³								
Measured component Certification range NO 0 - 400 mg/m³ Evaluation of the cross-sensitivity (CS) (system with largest CS) Sum of positive CS at zero point Sum of positive CS at zero point 0.00 mg/m³ Sum of positive CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of postive CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³ 0.00 mg/m³ Sum of negative CS at span point Sum pd/m³ 0.00 mg/m³ 0.00 mg/	• • • • • • • • • • • • • • • • • • • •			t				
	Date of report	2019	9-09-24					
	Massurad component	NO						
Evaluation of the cross-sensitivity (CS) (system with largest CS) Sum of positive CS at zero point 0.00 mg/m³ Sum of negative CS at zero point 0.00 mg/m³ Sum of positive CS at span point 0.00 mg/m³ Sum of positive CS at span point 0.00 mg/m³ Sum of negative CS at span point 0.00 mg/m³			400	ma/m³				
(system with largest CS) Sum of positive CS at zero point Sum of negative CS at zero point Sum of positive CS at zero point Sum of positive CS at zero point Sum of positive CS at span point Sum of positive CS at span point Sum of negative CS at span point Sum of positive CS at zero point Sum of negative CS at zero point Sum of neg/m³ Sun of negative CS at zero point Sum of neg/m³ Sun of negative CS at zero point Sum of neg/m³ Sum of negative CS at zero point Sum of neg/m³ Sum of negative CS at zero point Sum of neg/m³ Sum of negative CS at zero point Sum of neg/m³ Sum of negative CS at zero point Sum of neg/m³ Sum of negative CS at zero point Sum of neg/m³ Sum of negative CS at zero point Sum of neg/m³ Sum of negrative CS at zero point Sum of neg/m³ Sum of neg/m³ Sum of negrative CS at zero point Sum of neg/m³ Sum of negrative CS at zero point Sum of neg/m³ Sum of negrative CS at zero point Sum of neg/m³ Sum of negrative CS at zero point Sum of neg/m³ Sum of negrative CS at zero point Sum of neg/m³ Sum of n	Certification range	0 -	400	mg/m				
(system with largest CS) Sum of positive CS at zero point Sum of negative CS at zero point Sum of positive CS at zero point Sum of positive CS at zero point Sum of positive CS at span point Sum of positive CS at span point Sum of negative CS at span point Sum of positive CS at zero point Sum of negative Sum yard Sum of negati	Evaluation of the cross-sensitivity (CS)							
Sum of positive CS at zero point 0.00 mg/m^3 Sum of negative CS at zero point 0.00 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 Sum o								
Sum of negative CS at span point 0.00 mg/m^3 Sum of postive CS at span point 0.00 mg/m^3 Sum of negative Sum of negative CS at span point Sum of negative CS and negative Sum of negative CS and negative Sum of negative CS and negative Sum of nega			0.00	mg/m³				
Sum of postive 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 0.00 mg/m^3 Uncertainty of cross-sensitivity 0.00 mg/m^3 Uncertainty $0.00 m$								
Sum of negative CS at span point Maximum sum of cross-sensitivities 0.00 mg/m^3 $0.00 \text{ mg/m}^$	Sum of postive CS at span point		0.00					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
Calculation of the combined standard uncertainty Tested parameter Standard deviation from paired measurements under field conditions * u_0 1.750 mg/m³ 3.063 (mg/m³)² Lack of fit u_{lof} -1.155 mg/m³ 1.334 (mg/m³)² Zero drift from field test u_{17} 3.233 mg/m³ 10.452 (mg/m³)² Span drift from field test u_{18} 3.695 mg/m³ 13.653 (mg/m³)² Influence of ambient temperature at span u_{18} 3.695 mg/m³ 4.739 (mg/m³)² Influence of supply voltage u_{19} 1.688 mg/m³ 2.849 (mg/m³)² Cross-sensitivity (interference) u_{19} 1.688 mg/m³ 2.849 (mg/m³)² Influence of sample gas flow u_{19} 0.277 mg/m³ 47.997 (mg/m³)² Uncertainty of reference material at 70% of certification range u_{19} 3.233 mg/m³ 10.453 (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_{19} 0.73 mg/m³ 0.74 mg/m³ 4.68 Relative total expanded uncertainty Uin % of the ELV 130,4 mg/m³ 14.6	Maximum sum of cross-sensitivities		0.00	mg/m³				
Standard deviation from paired measurements under field conditions * Up 1.750 mg/m³ 3.063 (mg/m³)² Lack of fit $U_{lof} - 1.155 mg/m³ 1.334 (mg/m³)² 2.270 drift from field test U_{lof} - 1.155 mg/m³ 1.334 (mg/m³)² 2.270 drift from field test U_{lof} - 1.155 mg/m³ 1.345 (mg/m³)² 2.270 drift from field test U_{lof} - 1.155 mg/m³ 1.345 (mg/m³)² 2.270 drift from field test U_{lof} - 1.155 mg/m³ 1.345 (mg/m³)² 2.270 drift from field test U_{lof} - 1.155 mg/m³ 1.345 (mg/m³)² 2.270 drift from field test U_{lof} - 1.155 mg/m³ 1.345 (mg/m³)² 2.270 mg/m³ 1.345 (mg/m³)² 1.3$	Uncertainty of cross-sensitivity	U _i	-6.928	mg/m³				
Tested parameteru²Standard deviation from paired measurements under field conditions * Lack of fit u_{b} 1.750 mg/m³3.063 (mg/m³)²Lack of fit u_{lof} -1.155 mg/m³1.334 (mg/m³)²Zero drift from field test $u_{d_{1}}$ 3.233 mg/m³10.452 (mg/m³)²Span drift from field test $u_{d_{1}}$ 3.695 mg/m³13.653 (mg/m³)²Influence of ambient temperature at span u_{1} 2.177 mg/m³4.739 (mg/m³)²Influence of supply voltage u_{v} 1.688 mg/m³2.849 (mg/m³)²Cross-sensitivity (interference) u_{1} -6.928 mg/m³47.997 (mg/m³)²Influence of sample gas flow u_{0} 0.277 mg/m³0.077 (mg/m³)²Uncertainty of reference material at 70% of certification range u_{m} 3.233 mg/m³10.453 (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} $\sqrt{\sum_{i=1}^{n}} (u_{max_{i,j}})^{2}$ 9.73 mg/m³Total expanded uncertainty u_{c} u_{c} u_{c} u_{c} 1.9619.07 mg/m³								
Standard deviation from paired measurements under field conditions * Lack of fit								
Lack of fit $ U_{lof} -1.155 mg/m^3 \qquad 1.334 (mg/m^3)^2 $ Zero drift from field test $ U_{d_1z} = 3.233 mg/m^3 \qquad 10.452 (mg/m^3)^2 $ Span drift from field test $ U_{d_1z} = 3.233 mg/m^3 \qquad 10.452 (mg/m^3)^2 $ Influence of ambient temperature at span $ U_{d_1s} = 3.695 mg/m^3 \qquad 13.653 (mg/m^3)^2 $ Influence of supply voltage $ U_v = 1.688 mg/m^3 \qquad 2.849 (mg/m^3)^2 $ Influence of sample gas flow $ U_i = -6.928 mg/m^3 \qquad 47.997 (mg/m^3)^2 $ Influence of sample gas flow $ U_0 = 0.277 mg/m^3 \qquad 0.077 (mg/m^3)^2 $ Uncertainty of reference material at 70% of certification range $ U_m = 3.233 mg/m^3 \qquad 10.453 (mg/m^3)^2 $ Uncertainty of reference material at 70% of certification range $ U_m = 3.233 mg/m^3 \qquad 10.453 (mg/m^3)^2 $ Combined standard deviation at set point" or "Standard deviation from paired measurements under field conditions" $ U_c = \sqrt{\sum \left(U_{max,j} \right)^2} \qquad 9.73 mg/m^3 $ Total expanded uncertainty $ U = U_c * k = U_c * 1.96 \qquad 19.07 mg/m^3 $ Relative total expanded uncertainty $ U = u_c * k = U_c * 1.96 \qquad 19.07 mg/m^3 $								
Zero drift from field test $u_{d,z} = 3.233 mg/m^3 = 10.452 (mg/m^3)^2$ Span drift from field test $u_{d,s} = 3.695 mg/m^3 = 13.653 (mg/m^3)^2$ Influence of ambient temperature at span $u_{t} = 2.177 mg/m^3 = 4.739 (mg/m^3)^2$ Influence of supply voltage $u_{t} = 1.688 mg/m^3 = 2.849 (mg/m^3)^2$ Cross-sensitivity (interference) $u_{t} = -6.928 mg/m^3 = 47.997 (mg/m^3)^2$ Influence of sample gas flow $u_{t} = -6.928 mg/m^3 = 0.077 (mg/m^3)^2$ Uncertainty of reference material at 70% of certification range $u_{t} = -6.928 mg/m^3 = 0.077 (mg/m^3)^2$ Uncertainty of reference material at 70% of certification range $u_{t} = -6.928 mg/m^3 = 0.077 (mg/m^3)^2$ The larger value is used: $u_{t} = -6.928 mg/m^3 = 0.077 (mg/m^3)^2$ Total expanded deviation at set point" or "Standard deviation from paired measurements under field conditions" $u_{t} = -\sqrt{\sum_{t} \left(u_{max,t}\right)^2} \qquad 9.73 mg/m^3$ Total expanded uncertainty $u_{t} = -\sqrt{\sum_{t} \left(u_{max,t}\right)^2} \qquad 9.73 mg/m^3$ Total expanded uncertainty $u_{t} = -\sqrt{\sum_{t} \left(u_{max,t}\right)^2} \qquad 9.73 mg/m^3$ Relative total expanded uncertainty $u_{t} = -\sqrt{\sum_{t} \left(u_{max,t}\right)^2} \qquad 9.73 mg/m^3$		\mathbf{u}_{D}		_				
Span drift from field test $ u_{d.s.} 3.695 mg/m^3 \qquad 13.653 (mg/m^3)^2 $ Influence of ambient temperature at span $ u_{t.} \qquad 2.177 mg/m^3 \qquad 4.739 (mg/m^3)^2 $ Influence of supply voltage $ u_{t.} \qquad 1.688 mg/m^3 \qquad 2.849 (mg/m^3)^2 $ Cross-sensitivity (interference) $ u_{t.} \qquad -6.928 mg/m^3 \qquad 47.997 (mg/m^3)^2 $ Influence of sample gas flow $ u_{t.} \qquad 0.277 mg/m^3 \qquad 0.077 (mg/m^3)^2 $ Uncertainty of reference material at 70% of certification range $ u_{t.} \qquad 3.233 mg/m^3 \qquad 10.453 (mg/m^3)^2 $ The larger value is used:		U _{lof}		•				
Influence of ambient temperature at span $ \begin{array}{ccccccccccccccccccccccccccccccccccc$		$U_{d,z}$		-		. •		
Influence of supply voltage $u_v = 1.688 mg/m^3 = 2.849 (mg/m^3)^2$ Cross-sensitivity (interference) $u_i = -6.928 mg/m^3 = 47.997 (mg/m^3)^2$ Influence of sample gas flow $u_o = 0.277 mg/m^3 = 0.077 (mg/m^3)^2$ Uncertainty of reference material at 70% of certification range $u_m = 3.233 mg/m^3 = 10.453 (mg/m^3)^2$ * 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) $u_c = \sqrt{\sum (u_{max,j})^2} = 9.73 mg/m^3$ Total expanded uncertainty $U = u_c * k = u_c * 1.96 = 19.07 mg/m^3$ Relative total expanded uncertainty				-				
Cross-sensitivity (interference) $u_{i} = -6.928 mg/m^{3} \qquad 47.997 (mg/m^{3})^{2}$ Influence of sample gas flow $u_{o} = 0.277 mg/m^{3} \qquad 0.077 (mg/m^{3})^{2}$ Uncertainty of reference material at 70% of certification range		•		•		, ,		
Influence of sample gas flow $ u_{b} = 0.277 mg/m^{3} = 0.077 (mg/m^{3})^{2} $ Uncertainty of reference material at 70% of certification range $ u_{m} = 3.233 mg/m^{3} = 10.453 (mg/m^{3})^{2} $ * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions" $ u_{c} = \sqrt{\sum \left(u_{max,j}\right)^{2}} = 9.73 mg/m^{3} $ Total expanded uncertainty $ u_{c} = u_{c} \times k = u_{c} \times 1.96 $ 19.07 mg/m ³ Relative total expanded uncertainty $ u_{c} = u_{c} \times k = u_{c} \times 1.96 $ 19.07 mg/m ³ 14.6				_		. •		
Uncertainty of reference material at 70% of certification range $u_{rm} = 3.233 \text{ mg/m}^3 = 10.453 \text{ (mg/m}^3)^2$ * 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) Total expanded uncertainty $u_c = \sqrt{\sum (u_{max,j})^2} = 9.73 \text{ mg/m}^3$ $u_c = \sqrt{\sum (u_{max,j})^2} = 9.73 \text{ mg/m}^3$ Total expanded uncertainty $u_c = \sqrt{\sum (u_{max,j})^2} = 9.73 \text{ mg/m}^3$ Relative total expanded uncertainty U in % of the ELV 130,4 mg/m³ 14.6								
* The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"				•				
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"		u _{rm}	3.233	mg/m	10.433	(mg/m/)		
Combined standard uncertainty (u_c) Total expanded uncertainty $u_c = \sqrt{\sum (u_{\text{max},j})^2}$ $u_c = \sqrt{\sum (u_{\text{max},j})$								
Total expanded uncertainty $U = u_c * k = u_c * 1.96$ 19.07 mg/m³ Relative total expanded uncertainty $U = u_c * k = u_c * 1.96$ 19.07 mg/m³ 14.6	"Standard deviation from paired measurements under field conditions"							
Total expanded uncertainty $U = u_c * k = u_c * 1.96$ 19.07 mg/m³ Relative total expanded uncertainty $U = u_c * k = u_c * 1.96$ 19.07 mg/m³ 14.6				12				
Relative total expanded uncertainty U in % of the ELV 130,4 mg/m³ 14.6	3 (9)					•		
	Total expanded uncertainty	U = 1	$J_c * k = u$	_c * 1.96	19.07	mg/m³		
	Polotive total expended upports in the	11.5	0/ 06 11-	ELV 400 4	a. /3	44.0		
Dequirement of 2040/75/511 11 in 0/ of the 51 \/ 400 4/2 200 0					_			
Requirement of 2010/75/EU U in % of the ELV 130,4 mg/m³ 20.0 Requirement of EN 15267-3 U in % of the ELV 130,4 mg/m³ 15.0					•			
Requirement of EN 15267-3 U in % of the ELV 130,4 mg/m³ 15.0	Negalienieni di EN 19207-3	U In	U in % of the ELV 130,4 mg/m³					

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system					
Manufacturer	Bühl				
AMS designation	CEN	Select OF	EM Ultramat	23	
Serial number of units under test	TÜV	1 / TÜV 2	2		
Measuring principle	NDIF	3			
Test report	936/	2127820/	A		
Test laboratory	TÜV	Rheinland	b		
Date of report	2019	-09-24			
Measured component	NO				
Certification range	0 -	400	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Uncertainty of cross-sensitivity	Ui	-6.928	mg/m³		
Calculation of the combined standard uncertainty				2	
Tested parameter		4.750		U ²	(/3)2
Standard deviation from paired measurements under field conditions *	u_D	1.750	mg/m³	3.063	(mg/m³)²
Lack of fit	u_{lof}	-1.155	mg/m³	1.334	(mg/m³)²
Zero drift from field test	$u_{d.z}$	3.233	mg/m³	10.452	(mg/m³)²
Span drift from field test	$u_{d.s}$		mg/m³	13.653	(mg/m³)²
Influence of ambient temperature at span	Ut	2.117		4.482	(mg/m³)²
Influence of supply voltage	u_v	2.824	0	7.975	(mg/m³)²
Cross-sensitivity (interference)	u _i	-6.928	mg/m³	47.997	(mg/m³)²
Influence of sample gas flow	u_n	0.531	mg/m³	0.282	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	3.233	mg/m³	10.453	(mg/m³)²
* The larger value is used : "Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
Ctandard dovidation from paired medicaronionic and a field contained					
Combined standard uncertainty (u _C)	$u_c =$	$\sqrt{\sum (u_m)}$	ax, j)2	9.98	mg/m³
Total expanded uncertainty	U = 1	$u_c * k = u$	ı _c * 1.96	19.57	mg/m³
		4 T,			
Relative total expanded uncertainty	U in	% of the	ELV 130.4 i	mg/m³	15.0
Requirement of 2010/75/EU	U in	% of the	ELV 130.4 i	mg/m³	20.0
Requirement of EN 15267-3	U in	% of the I	ELV 130.4 m	ng/m³	15.0

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system	-				
Manufacturer			logies Gmb		
AMS designation				CESS UV 600	
Serial number of units under test		1 / TÜV :	2		
Measuring principle	UV-F	RAS			
	000/	.4047000			
Test report		21247820			
Test laboratory		Rheinlan	d		
Date of report	2019	-09-24			
Magazired component	NO				
Measured component	NO	50	, ,		
Certification range	0 -	50	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point		0.00	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 _i		mg/m³		
Checklandy of cross constantly	uį	0.007	mg/m		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u_D	0.350	mg/m³	0.123	(mg/m³)²
Lack of fit	U _{lof}	-0.289	mg/m³	0.084	(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}	-0.693	mg/m³	0.480	$(mg/m^3)^2$
Influence of ambient temperature at span	Ut	0.624	mg/m³	0.389	(mg/m³)²
Influence of supply voltage	u_{v}	0.096	mg/m³	0.009	(mg/m³)²
Cross-sensitivity (interference)	U _i	0.967	mg/m³	0.935	$(mg/m^3)^2$
					1312
Influence of sample gas flow	u _p	-0.136	mg/m³	0.018	(mg/m³)²
Influence of sample gas flow Uncertainty of reference material at 70% of certification range	U _D		mg/m³ mg/m³	0.018	(mg/m³)² (mg/m³)²
	_		•		, ,
Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or	_		•		, ,
Uncertainty of reference material at 70% of certification range * The larger value is used :	_		•		, ,
Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	U _{rm}	0.404	mg/m³	0.163	(mg/m³)²
Uncertainty of reference material at 70% of certification range * 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 _{rm}	0.404 $\sqrt{\sum (u_m)}$	$\frac{g}{mg/m^3}$	0.163	(mg/m³)²
Uncertainty of reference material at 70% of certification range * The larger value is used : "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"	u _{rm}	0.404	$\frac{g}{mg/m^3}$	0.163	(mg/m³)²
Uncertainty of reference material at 70% of certification range * 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 _{rm}	0.404 $\sqrt{\sum (u_m)}$	$\frac{g}{mg/m^3}$	0.163	(mg/m³)²
Uncertainty of reference material at 70% of certification range * 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) Total expanded uncertainty	u _{rm} u _c = U = U	0.404 $\sqrt{\sum_{c} \left(u_{rr}\right)}$ $u_{c} * k = u$	mg/m³	0.163 1.72 3.37	(mg/m³)² mg/m³ mg/m³
Uncertainty of reference material at 70% of certification range * 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) Total expanded uncertainty Relative total expanded uncertainty	u _{rm} u _c = U = U	0.404 $\sqrt{\sum_{c} \left(u_{rr}\right)^{2}} \left(u_{rr}\right)^{2}$ % of the	mg/m³ max j) ² lo * 1.96 ELV 32,6 m	0.163 1.72 3.37	(mg/m³)² mg/m³ mg/m³ 10.3
Uncertainty of reference material at 70% of certification range * 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) Total expanded uncertainty	u _m $u_c = U = u$ U in U in	0.404 $\sqrt{\sum_{c} (u_{rr})^{2}} = u_{c}$ % of the % of the	mg/m³	0.163 1.72 3.37 ng/m³	(mg/m³)² mg/m³ mg/m³

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system		
Manufacturer	Bühler Technologies Gmbł	H
AMS designation	CEMSelect OEM SIPROC	ESS UV 600
Serial number of units under test	TÜV 1 / TÜV 2	
Measuring principle	UV-RAS	
Test report	936/21247820/A	
Test laboratory	TÜV Rheinland	
Date of report	2019-09-24	
Measured component	NO_2	
Certification range	0 - 50 mg/m ³	
	3	
Evaluation of the cross-sensitivity (CS)		
(system with largest CS)		
Sum of positive CS at zero point	0.00 mg/m³	
Sum of negative CS at zero point	0.00 mg/m³	
Sum of postive CS at span point	0.00 mg/m³	
Sum of negative CS at span point	0.00 mg/m ³	
Maximum sum of cross-sensitivities	0.00 mg/m ³	
Uncertainty of cross-sensitivity	u _i 1.065 mg/m ³	
Calculation of the combined standard uncertainty		
Tested parameter		U ²
Standard deviation from paired measurements under field conditions *	u _D 0.372 mg/m³	0.138 (mg/m³) ²
Lack of fit	u _{lof} 0.231 mg/m³	0.053 (mg/m³) ²
Zero drift from field test	u _{d,z} 0.606 mg/m³	0.367 (mg/m³) ²
Span drift from field test	u _{d.s} -0.808 mg/m³	0.653 (mg/m³)²
Influence of ambient temperature at span	u _t 0.643 mg/m³	0.413 (mg/m³)²
Influence of supply voltage	u _v 0.200 mg/m ³	0.040 (mg/m³)²
Cross-sensitivity (interference)	u _i 1.065 mg/m ³	1.134 (mg/m³)²
Influence of sample gas flow	u _p -0.075 mg/m ³	0.006 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.404 mg/m ³	0.163 (mg/m³)²
* The larger value is used :		
"Repeatability standard deviation at set point" or		
"Standard deviation from paired measurements under field conditions"		
	$u_c = \sqrt{\sum (u_{\text{max, i}})^2}$	4.70
Combined standard uncertainty (u _C)		1.72 mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.38 mg/m³
Relative total expanded uncertainty	U in % of the ELV 50 mg/	
Requirement of 2010/75/EU	U in % of the ELV 50 mg/	
Requirement of EN 15267-3	U in % of the ELV 50 mg/n	n³ 15.0

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system					
Manufacturer	Bühle	er Techno	logies GmbH		
AMS designation	CEM	Select O	EM SIPROCESS	UV 600	
Serial number of units under test	TÜV	1 / TÜV 2	2		
Measuring principle	UV-R	RAS			
Test report	936/2	21247820)/A		
Test laboratory	TÜV	Rheinland	t		
Date of report	2019	-09-24			
Measured component	SO ₂				
Certification range	0 -	75	mg/m³		
5 1 1 (00)					
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)		0.00	ma ar / ma 3		
Sum of positive CS at zero point			mg/m³ mg/m³		
Sum of negative CS at zero point			mg/m³		
Sum of postive CS at span point Sum of negative CS at span point			mg/m³		
Maximum sum of cross-sensitivities		0.00			
Uncertainty of cross-sensitivity	u _i		mg/m³		
Shortainty of dross scribitivity	u _i	1.505	1119/111		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u_D	0.586	mg/m³	0.343	(mg/m³)²
Lack of fit	U _{lof}	0.403	mg/m³	0.162	$(mg/m^3)^2$
Zero drift from field test	$u_{d,z}$	-1.212	mg/m³	1.469	$(mg/m^3)^2$
Span drift from field test	$U_{d.s}$	-1.256	mg/m³	1.578	(mg/m³)²
Influence of ambient temperature at span	u _t	0.872	mg/m³	0.760	(mg/m³)²
Influence of supply voltage	u_v	0.179	mg/m³	0.032	(mg/m³)²
Cross-sensitivity (interference)	u _i	1.589	mg/m³	2.525	(mg/m³)²
Influence of sample gas flow	U _n	-0.264		0.070	(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 set point" or "Standard deviation from paired measurements under field conditions"					
Standard deviation from paired measurements under field conditions			<u> </u>		
Combined standard uncertainty (u _C)	$u_c =$	$\sqrt{\sum (u_m)}$	ax i) ²	2.70	mg/m³
Total expanded uncertainty		$I_c * k = u$		5.30	mg/m³
Relative total expanded uncertainty	U in	% of the	ELV 50 mg/m ³		10.6
Requirement of 2010/75/EU	U in	% of the	ELV 50 mg/m ³		20.0
Requirement of EN 15267-3	U in S	% of the E	ELV 50 mg/m³		15.0

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system						
Manufacturer	Bühle	r Techno	logies GmbH			
AMS designation	CEM	Select Of	EM Ultramat 23			
Serial number of units under test	TÜV	1 / TÜV 2				
Measuring principle	NDIR					
Test report	936/2	1247820	/A			
Test laboratory	TÜV	Rheinland	1 1			
Date of report	2019	-09-24				
Measured component	SO_2					
Certification range	0 -	400	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		0.00	mg/m³			
Sum of postive CS at span point		0.00	mg/m³			
Sum of negative CS at span point			mg/m³			
Maximum sum of cross-sensitivities			mg/m³			
Uncertainty of cross-sensitivity	ui	-6.928	mg/m³			
Calculation of the combined standard uncertainty						
Tested parameter				U ²		
Standard deviation from paired measurements under field conditions *	u_D		mg/m³	6.126	$(mg/m^3)^2$	
Lack of fit	U _{lof}	-2.309		5.331	(mg/m³)²	
Zero drift from field test	U _{d.7}		mg/m³	38.875	(mg/m³)²	
Span drift from field test	$u_{d.s}$		mg/m³	23.523	(mg/m³)²	
Influence of ambient temperature at span	u _t		mg/m³	19.483	(mg/m³)²	
Influence of supply voltage	u_v		mg/m³	4.915	(mg/m³)²	
Cross-sensitivity (interference)	u _i	-6.928	•	47.997	(mg/m³)²	
Influence of sample gas flow	U _n	-2.215	•	4.906	(mg/m³)²	
Uncertainty of reference material at 70% of certification range	U_{rm}	3.233	mg/m³	10.453	(mg/m³)²	
* The larger value is used :						
"Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions"						
otalidata deviation nom paired medisarements under nela conditions			<u> </u>			
Combined standard uncertainty (u _C)	$u_c =$	$\sqrt{\sum (u_m)}$	ax i)2	12.71	mg/m³	
Total expanded uncertainty		.* k = u		24.92	_	
Relative total expanded uncertainty	U in '	% of the	ELV 200 mg/m ³		12.5	
Requirement of 2010/75/EU			ELV 200 mg/m ³		20.0	
Requirement of EN 15267-3			ELV 200 mg/m³		15.0	
	,					

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system						
Manufacturer	Bühle	Bühler Technologies GmbH				
AMS designation			EM Ultramat 2	23		
Serial number of units under test	TÜV	3 / TÜV 4	1			
Measuring principle	NDIF	2				
Test report	936/	21247820)/A			
Test laboratory		Rheinland	t			
Date of report	2019	-09-24				
Measured component	SO ₂					
Certification range	0 -	400	mg/m³			
ocitinoation range		400	mg/m			
Evaluation of the cross-sensitivity (CS) (system with largest CS)						
Sum of positive CS at zero point		0.00	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 _i		mg/m³			
	~		ŭ			
Calculation of the combined standard uncertainty						
Tested parameter				U ²		
Standard deviation from paired measurements under field conditions	* u _D	2.475	mg/m³	6.126	(mg/m³)²	
Lack of fit	U _{lof}		mg/m³	5.331	(mg/m³)²	
Zero drift from field test	$u_{d.z}$	6.235	mg/m³	38.875	(mg/m³)²	
Span drift from field test	$u_{d.s}$		mg/m³	23.523	$(mg/m^3)^2$	
Influence of ambient temperature at span	Ut		mg/m³	19.483	(mg/m³)²	
Influence of supply voltage	u_{v}		mg/m³	6.574	(mg/m³)²	
Cross-sensitivity (interference)	u _i		mg/m³	47.997	(mg/m³)²	
Influence of sample gas flow	U _n		mg/m³	4.906	(mg/m³)²	
Uncertainty of reference material at 70% of certification range	u _{rm}	3.233	mg/m³	10.453	(mg/m³)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 _C)		$\sqrt{\sum (u_m)}$		12.78	mg/m³	
Total expanded uncertainty	U = t	$J_c * k = u$	_c * 1.96	25.04	mg/m³	
Relative total expanded uncertainty	Hin	% of the	ELV 200 mg/	m3	12.5	
Requirement of 2010/75/EU			ELV 200 mg/		20.0	
Requirement of EN 15267-3			ELV 200 mg/n ELV 200 mg/n		15.0	
requirement of Liv 10207-0	UIII	70 OI LITE E	_L v 200 mg/m	- 1	13.0	

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system					
Manufacturer	Bühler Technologies GmbH				
AMS designation		Select O			
Serial number of units under test			stem 3 / System	2 / Syste	em 4
Measuring principle	NDIF				
Test report	936/2	21247820)/A		
Test laboratory	TÜV	Rheinland	d		
Date of report	2019	-09-24			
Managed	20				
Measured component	SO ₂	75			
Certification range	0 -	75	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point		1.99	mg/m³		
Sum of negative CS at zero point			mg/m³		
Sum of postive CS at span point		1.10	mg/m³		
Sum of negative CS at span point		-2.80	mg/m³		
Maximum sum of cross-sensitivities		-2.80	mg/m³		
Uncertainty of cross-sensitivity	u _i	-1.615	mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u_{D}	1 066	mg/m³	1.136	(mg/m³)²
Lack of fit	u _D U _{lof}		mg/m³	0.406	(mg/m³)²
Zero drift from field test	U _{d.z}		mg/m³	0.908	(mg/m³)²
Span drift from field test	U _{d.s}		mg/m³	0.992	$(mg/m^3)^2$
Influence of ambient temperature at span	U _t	1.277	mg/m³	1.631	(mg/m³)²
Influence of supply voltage	u _v	0.448	mg/m³	0.201	$(mg/m^3)^2$
Cross-sensitivity (interference)	ui	-1.615	mg/m³	2.608	$(mg/m^3)^2$
Influence of sample gas flow	u _n	-0.135	mg/m³	0.018	$(mg/m^3)^2$
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 set point" or "Standard deviation from paired measurements under field conditions"					
Standard deviation from paired measurements under field conditions		9.4			
Combined standard uncertainty (u _C)	$u_c =$	$\sqrt{\sum (u_m)}$)2	2.88	mg/m³
Total expanded uncertainty		ւ _c * k = u		5.64	mg/m³
	X I			3.01	
Relative total expanded uncertainty	U in % of the ELV 50 mg/m ³				11.3
Requirement of 2010/75/EU	U in % of the ELV 50 mg/m³				20.0
Requirement of EN 15267-3	U in ^o	% of the I		15.0	





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

Measuring system		
Manufacturer	Bühler Technologies GmbH	
AMS designation	CEMSelect OEM SIPROCESS UV 600	
Serial number of units under test	TÜV 1 / TÜV 2	
Measuring principle	UV-RAS	
Test report	936/21247820/A	
Test laboratory	TÜV Rheinland	
Date of report	2019-09-24	
Measured component	NO ₂	
Certification range	0 - 50 mg/m³	
	· · · · · · · · · · · · · · · · · · ·	
Evaluation of the cross-sensitivity (CS)		
(system with largest CS)		
Sum of positive CS at zero point	0.00 mg/m³	
Sum of negative CS at zero point	0.00 mg/m³	
Sum of postive CS at span point	0.00 mg/m³	
Sum of negative CS at span point	0.00 mg/m³	
Maximum sum of cross-sensitivities	0.00 mg/m³	
Uncertainty of cross-sensitivity	u _i 1.065 mg/m³	
Calculation of the combined standard uncertainty		
Tested parameter	u²	
Standard deviation from paired measurements under field conditions *	u _D 0.372 mg/m³ 0.138 (mg/m³))2
Lack of fit	u _{lof} 0.231 mg/m³ 0.053 (mg/m³)) ²
Zero drift from field test	u _{d,z} 0.606 mg/m³ 0.367 (mg/m³))2
Span drift from field test	u _{d.s} -0.808 mg/m³ 0.653 (mg/m³))2
Influence of ambient temperature at span	u _t 0.643 mg/m³ 0.413 (mg/m³)) ²
Influence of supply voltage	u _v 0.200 mg/m³ 0.040 (mg/m³)) ²
Cross-sensitivity (interference)	u _i 1.065 mg/m³ 1.134 (mg/m³)) ²
Influence of sample gas flow	u _o -0.075 mg/m³ 0.006 (mg/m³)) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.404 mg/m³ 0.163 (mg/m³)) ²
* The larger value is used :		
"Repeatability standard deviation at set point" or		
"Standard deviation from paired measurements under field conditions"		
On white and a transferred connection (c.)	$u_c = \sqrt{\sum \left(u_{\text{max j}}\right)^2}$ 1.72 mg/m³	
Combined standard uncertainty (u _C)	· -	
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$ 3.38 mg/m ³	
Polative total expanded uncertainty	Him 0/ of the FLV FO market	
Relative total expanded uncertainty	,	6.8 0.0
Requirement of 2010/75/EU	,	
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³ 15	5.0

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.





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

Measuring system					
Manufacturer	Bühler Technologies GmbH				
AMS designation		Select OI	_		
Serial number of units under test		1 / TÜV 2			
Measuring principle		rochemic			
modeling principle	Liecti ochemicai				
Test report	936/21247820/A				
Test laboratory	TÜV	Rheinland	1		
Date of report	2019	-09-24			
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			Vol%		
Sum of negative CS at zero point			Vol%		
Sum of postive CS at span point			Vol%		
Sum of negative CS at span point			Vol%		
Maximum sum of cross-sensitivities			Vol%		
Uncertainty of cross-sensitivity	ui	0.167	Vol%		
Calculation of the combined standard uncertainty					
Tested parameter				U ²	
Standard deviation from paired measurements under field conditions *	u_{D}	0.056	Vol%		(Vol%) ²
Lack of fit	U _{lof}		Vol%		(Vol%) ²
Zero drift from field test	U _{d.z}		Vol%		(Vol%) ²
Span drift from field test	U _{d.s}		Vol%		(Vol%) ²
Influence of ambient temperature at span	U _t	0.040	Vol%		(Vol%) ²
Influence of supply voltage	u _v	0.009	Vol%		(Vol%) ²
Cross-sensitivity (interference)	u _i		Vol%		(Vol%) ²
Influence of sample gas flow	u _n		Vol%	0.001	(Vol%) ²
Uncertainty of reference material at 70% of certification range	u _{rm}	0.202	Vol%	0.041	
* The larger value is used :					
"Repeatability standard deviation at set point" or					
"Standard deviation from paired measurements under field conditions"					
Orankin distantant amendalists (c.)	ш –	$\sum (u$)2	0.04	1/-1 0/
Combined standard uncertainty (u _C)	$u_{c} = \sqrt{\sum \left(u_{\text{max, j}}\right)^{2}}$				Vol%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$		0.67	Vol%	
Relative total expanded uncertainty	U in % of the range 25 Vol%				2.7
Requirement of 2010/75/EU	U in % of the range 25 Vol%				25.0 **
Requirement of EN 15267-3	U in % of the range 25 Vol%				7.5
1.040.0	0 111	, o Oi tile i	unge 20 voi. 3/0		7.0

During performance testing, the tests were carried out with the Siemens Set CEM CERT 7MB1957 measuring system.

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component. A value of 25 % was used for this.





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

Measuring system	
Manufacturer	Bühler Technologies GmbH
AMS designation	CEMSelect OEM (Ultramat 23)
Serial number of units under test	JN-820 / JN-821
Measuring principle	UV Absorption
Test report	936/21251815/A
Test laboratory	TÜV Rheinland
Date of report	2021-02-22
Measured component	NO_2
Certification range	0 - 50 mg/m³
Evaluation of the cross-sensitivity (CS)	
(system with largest CS)	
Sum of positive CS at zero point	1.61 mg/m³
Sum of negative CS at zero point	0.00 mg/m³
Sum of postive CS at span point	0.30 mg/m³
Sum of negative CS at span point	-0.70 mg/m³
Maximum sum of cross-sensitivities	1.61 mg/m³
Uncertainty of cross-sensitivity	u _i 0.930 mg/m³
Calculation of the combined standard uncertainty	
Tested parameter	u^2
Standard deviation from paired measurements under field conditions *	$u_D = 0.096 \text{ mg/m}^3 = 0.009 \text{ (mg/m}^3)^2$
Lack of fit	u_{lof} 0.346 mg/m³ 0.120 (mg/m³)²
Zero drift from field test	$u_{dz} = 0.173 \text{ mg/m}^3 = 0.030 \text{ (mg/m}^3)^2$
Span drift from field test	$u_{d.s}$ -0.751 mg/m ³ 0.564 (mg/m ³) ²
Influence of ambient temperature at span	u _t 0.473 mg/m³ 0.224 (mg/m³)²
Influence of supply voltage	u _v 0.031 mg/m³ 0.001 (mg/m³)²
Cross-sensitivity (interference)	u_i 0.930 mg/m³ 0.865 (mg/m³)²
Influence of sample gas flow	$u_{\rm p} = 0.030 \text{mg/m}^3 = 0.001 (\text{mg/m}^3)^2$
Uncertainty of reference material at 70% of certification range	$u_{rm} = 0.404 \text{ mg/m}^3 = 0.163 \text{ (mg/m}^3)^2$
* 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)	$u_{c} = \sqrt{\sum \left(u_{\text{max, j}}\right)^{2}}$ 1.41 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$ 2.76 mg/m³
Total orpaniasa unbortainty	2.70 mg/m
Relative total expanded uncertainty	U in % of the ELV 33,3 mg/m ³ 8.3
Requirement of 2010/75/EU	U in % of the ELV 33,3 mg/m ³ 20.0
Requirement of EN 15267-3	U in % of the ELV 33,3 mg/m³ 15.0

Page 34 of 35





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

Measuring system						
Manufacturer	Bühle					
AMS designation			EM (Ultramat 23)			
Serial number of units under test		20 / JN-82	` ,			
Measuring principle	UV AI	osorption				
Test report	936/2					
Test laboratory		Rheinland				
Date of report	2021-	02-22				
Measured component	SO ₂					
Certification range	0 -	70	mg/m³			
5 L (1 (1)						
Evaluation of the cross-sensitivity (CS) (system with largest CS)						
Sum of positive CS at zero point		2.29	mg/m³			
Sum of negative CS at zero point		0.00				
Sum of postive CS at span point			mg/m³			
Sum of negative CS at span point		-1.90	_			
Maximum sum of cross-sensitivities		2.29	3			
Uncertainty of cross-sensitivity	U _i		mg/m³			
	~					
Calculation of the combined standard uncertainty						
Tested parameter				U ²		
Standard deviation from paired measurements under field conditions *	\mathbf{u}_{D}	0.286	mg/m³	0.082	(mg/m³)²	
Lack of fit	U _{lof}	0.230	mg/m³	0.053	(mg/m³)²	
Zero drift from field test	$u_{d.z}$		mg/m³	0.104	, ,	
Span drift from field test	$u_{d.s}$		mg/m³	1.190	, ,	
Influence of ambient temperature at span	u _t		mg/m³	0.430	, ,	
Influence of supply voltage	u_v		mg/m³	0.026	(mg/m³)²	
Cross-sensitivity (interference)	U _i		mg/m³	1.748	(mg/m³)²	
Influence of sample gas flow	U _n	0.051	mg/m³	0.003	$(mg/m^3)^2$	
The larger value is used: "Repeatability standard deviation at set point" or "Standard deviation from paired measurements under field conditions".	U _{rm}	0.566	mg/m³	0.320	(mg/m³)²	
"Standard deviation from paired measurements under field conditions"			10 1.14			
Combined standard uncertainty (u _c)	$u_c = -$	$\sqrt{\sum} (u_m)$	ax, j) ²	1.99	mg/m³	
Total expanded uncertainty		* k = u		3.90	mg/m³	
Relative total expanded uncertainty	U in 9	% of the	ELV 46,6 mg/m ³		8.4	
Requirement of 2010/75/EU	U in % of the ELV 46,6 mg/m³				20.0	
Requirement of EN 15267-3	U in % of the ELV 46,6 mg/m³					