PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

ULTRAMAT 23 Multi-component gas analyser

Manufactured by:

Siemens AG
DE-76181
Karlsruhe
Germany

has been assessed by Sira Certification Service
And for the conditions stated on this certificate complies with:

MCERTS Performance Standards for Continuous Emission Monitoring Systems (CEMS) and T-CEMS, Version 4 dated July 2018
EN15267-3:2007,
& QAL 1 as defined in EN 14181: 2014

Certification Ranges :

SO_2	0 to 400 mg/m^3		
NO	0 to 100 mg/m^3	to	0 to 750 mg/m^3
NO	0 to 250 mg/m^3	to	0 to 400 mg/m^3
CO	0 to 150 mg/m^3	to	0 to 250 mg/m^3
O_2	0 to 10 % vol.	to	0 to 25 % vol.

Project No.	:	674/0374 & 70211412
Certificate No	:	Sira MC040033/09
Initial Certification	:	25 February 2004
This Certificate issued	:	04 March 2019
Renewal Date	:	24 February 2024

Emily Alexander
Environmental Project Engineer

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service
Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US
Tel: +44 (0)1244 670 900

Form 1335
Issue 5

Certificate Contents

Approved Site Application

Any potential user should ensure, in consultation with the manufacturer, that the monitoring system is suitable for the intended application. For general guidance on stack emission monitoring techniques refer to Environment Agency Technical Guidance Note M2: Monitoring of stack emissions to air. Operators with installations falling under the Large Combustion Plant Directive or Waste Incineration Directive must refer to Technical Guidance Note M20: Quality Assurance of Continuous Emission Monitoring Systems, for guidance on the suitability of CEMS for their installations. M2 and M20 are available on the Agency's website at www.mcerts.net

On the basis of the assessment and the ranges required for compliance with EU Directives this instrument is considered suitable for use on waste incineration and large coal-fired combustion plant applications (See Note 1). This CEM has been proven suitable for its measuring task (parameter and composition of the flue gas) by use of the QAL 1 procedure specified in EN14181, for LCPD and WID applications for the ranges specified. The lowest certified range for each determinand shall not be more than 1.5X the emission limit value (ELV) for WID applications, and not more than 2.5X the ELV for LCPD and other types of application.

The field trial was conducted over 3 months with the Ultramat 23 installed on a coal fired power station. It was conducted for an additional 3 months on a waste incinerator, for the NO range 0-100 mg/m3.

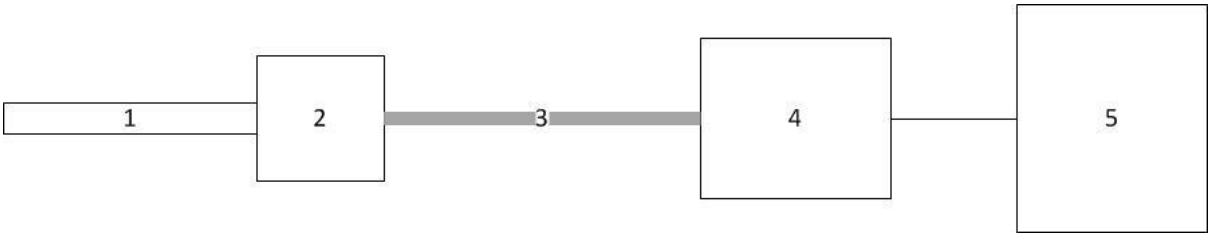
Basis of Certification

This certification is based on the following Test Report(s) and on Sira's assessment and ongoing surveillance of the product and the manufacturing process:

TÜV Süddeutschland	Report Number 24012833 dated August 1997
TÜV Süddeutschland	Report Number 427899 dated February 2005
TÜV Süddeutschland	Report Number 1321306 dated April 2009
TÜV Süddeutschland	Report Number 1701476a dated April 2009
TÜV Süddeutschland	Report Number 2435071 dated September 2015

Product Certified

The ULTRAMAT 23 measuring system consists of the following parts:



1. Sample Probe	2. Heated Filter	3. Heated Sample Line	4. Gas Conditioning	5. Analyser
Model: M&C SP 2000 HR	Model: Integrated in Sample Probe: S-2K-150	Model: H-SO 2615 Length: 16m	Model: M&C/Siemens 7MB1993	Model: Ultramat 23

This certificate applies to all instruments fitted with software version 2 onwards (serial number V0_001) onwards.

Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: +5°C to +40°C
Instrument IP rating: IP20 (can be supplied with an IP40 enclosure)

Note: For outdoor installations the analyser needs to be mounted into an IP65 environment. If the instrument is supplied with an enclosure, then the ambient temperature shall be monitored inside the enclosure to ensure that it stays within the above ambient temperature range.

Unless otherwise stated the evaluation was carried out on the certification range SO_2 0 to 400mg/m^3, NO 0 to 250mg/m^3, CO 0 to 150mg/m^3, O_2 0 to 10%vol

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
SO_2					98s	<200s
NO					68s	<200s
CO					68s	<200s
O_2					76s	<200s
Repeatability standard deviation at zero point						
SO_2	0.5					<2.0%
NO		0.8				<2.0%
CO	0.4					<2.0%
O_2	0.03					<0.2%
Repeatability standard deviation at span point						
SO_2	0.3					<2.0%
NO		0.8				<2.0%
CO			1.1			<2.0%
O_2	0.12					<0.2%

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Test		Results expressed as % of the certification range				Other results	MCERTS specification
		<0.5	<1	<2	<5		
Lack-of-fit							
SO_2	0-400mg/m^3	0.15					<2.0%
NO	0-100 mg/m^3	-0.04					<2.0%
NO	0-250 mg/m^3	-0.25					<2.0%
NO	0-400 mg/m^3	0.21					<2.0%
CO	0-150 mg/m^3	-0.28					<2.0%
CO	0-250 mg/m^3	-0.18					<2.0%
O_2	0-10 % vol	-0.08					<0.2%
O_2	0-25 % vol	-0.04					<0.2%
Influence of ambient temperature zero point							
SO_2				-2.0			<5.0%
NO				-1.05			<5.0%
CO			-0.56				<5.0%
O_2		0.07					<0.50%
Influence of ambient temperature span point							
SO_2					-2.9		<5.0%
NO			0.84				<5.0%
CO			-0.70				<5.0%
O_2		-0.12					<0.50%
Influence of sample gas flow for extractive CEMS							
SO_2		<1.0					<2.0%
NO		<1.0					<2.0%
CO		<1.0					<2.0%
O_2		<0.2					<0.2%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of voltage variations 190 to 250V						<2.0%
SO_2			<2.0			<2.0%
NO	-0.44					<2.0%
CO	-0.31					<2.0%
O_2	0.02					<0.2%
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s^2)					Not tested	To be reported
Cross-sensitivity at zero					Note 1	
SO_2				2.2		<4.0%
NO				3.8		<4.0%
CO				3.3		<4.0%
O_2	-0.07					<0.40%
Cross-sensitivity at span					Note 1	
SO_2				3.9		<4.0%
NO				3.4		<4.0%
CO				3.9		<4.0%
O_2	-0.20					<0.40%
Measurement uncertainty					Guidance - at least 25% below max permissible uncertainty	
SO_2 (for an ELV of 200mg/m^3)					7.86%	15%
NO (for an ELV of 32.6mg/m^3)					10.4%	15%
CO (for an ELV of 80mg/m^3)					7.9%	7.5%
O_2 (for a range 25 %vol)					Note 2 0.58 % vol	-
Calibration function (field)						
SO_2					0.99	>0.90
NO					0.97	>0.90
CO					0.98	>0.90
O_2					1.00	>0.90

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time (field)					Note 3	
SO_2					98s	<200s
NO					68s	<200s
CO					62s	<200s
O_2					81s	<200s
Lack of fit (field)					Note 4	
SO_2			<2.0			<2.0%
NO			<2.0			<2.0%
CO			<2.0			<2.0%
O_2			<0.2			<0.2%
Maintenance interval					Note 5 6 months	>8 days
Zero and Span drift requirement	*Statement from manufacturer:* The zero point is created by purging the measuring cell with an IR-inactive gas (e.g. N2). The resulting spectrum corresponds to measurement on a gas free measurement path. The detector then generates the largest signal U0 (no pre-absorption in the sample chamber). This signal is used as the reference signal for zero point calibration. The relevant measured concentration values are determined by means of the instrument's calibration function. The zero point signal also serves as the initial value for calculating the full-scale span value in the manner shown below: As the concentration of measured component increases, so too does absorption in the sample chamber. As a result of this pre-absorption, the detectable radiation energy in the detector decreases, and thus also the signal voltage. For the single-beam procedure of the ULTRAMAT 23, the mathematical relationship between the concentration of the measured component and the measured voltage can be approximately expressed as the following exponential function:					Clause 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Change in zero point over maintenance interval						
SO_2			1.8			<3.0%
NO		-0.7				<3.0%
CO	0.0					<3.0%
O_2	-0.06					<0.2%
Change in reference point over maintenance interval						
SO_2			2.2			<3.0%
NO			-1.5			<3.0%
CO		-0.8				<3.0%
O_2	-0.02					<0.2%
Availability					98%	>95% (>98% for O_2)
Reproducibility						
SO_2		0.6				<3.3%
NO			1.6			<3.3%
CO			2.2			<3.3%
O_2	0.2					<0.20%

Note 1: Cross sensitivity test has been conducted with the following interferents:
O_2, H_2O, CO, CO_2, CH_4, N_2O, NO, NO_2, NH_3, SO_2 and HCl.

Note 2: The measurement uncertainty for CO passes the requirements of EN14181 (10%) but does not meet the requirements of EN15267-3 – which is 25% below the maximum permissible uncertainty (7.5%).

Note 3: Results stated from laboratory test

Note 4: Test data derived from calibration function test

Note 5: The maintenance interval for the Ultramat 23-7MB2358 is 6 months. The maintenance interval for the Ultramat 23-7MB2355 and 23-7MB2357 is 8 months.

Description

The ULTRAMAT 23 gas analyser is based on the absorption of non-dispersive infrared radiation (NDIR). The attenuation in the radiation that depends on the wavelength is a measure of the respective concentration of the gas. The analyser measures O_2 with an electrochemical measuring cell.

The ULTRAMAT 23 gas analyser can measure up to 4 gas components simultaneously, three being infrared sensitive gases such as CO, NO, or SO_2 and the other O_2. The ULTRAMAT 23 is a 19-inch rack mounted system.

The manufacturer states that as the oxygen sensor is an acetic acid cell this should minimise the effect of acid from the flue gas.

This instrument is MCERTS certified for calibration using autocal with ambient air only, every 6 hours and a full calibration check with test gases required only once per year. The Autocal system uses ambient air (or N_2 for analysers without an oxygen sensor); both the zero and the span are calibrated in the process.

Auto or manual range changing between two ranges is available over a maximum ratio of 5:1 between maximum and minimum ranges. Two alarm limits can be freely configured for each component, for upward or downward violation. There is also a maintenance request alert.

Up to four electrically isolated analogue outputs are available as standard. A PROFIBUS version is available as an option.

General Notes

1. This certificate is based upon the equipment tested. The Manufacturer is responsible for ensuring that on-going production complies with the standard(s) and performance criteria defined in this Certificate. The Manufacturer is required to maintain an approved quality management system controlling the manufacture of the certified product. Both the product and the quality management system shall be subject to regular surveillance according to 'Regulations Applicable to the Holders of Sira Certificates'. The design of the product certified is defined in the Sira Design Schedule for certificate No. Sira MC040033/07

2. If certified product is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.

3. The Certification Marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of Sira Certificates'.

4. This document remains the property of Sira and shall be returned when requested by the company.