PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

MCA 04 Multi Component Analyser

Manufactured by:

Dr. Födisch Umweltmesstechnik AG

Zwenkauer Straße 159
D-04420 Markranstädt / OT Kulwitz
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, Version 3.5 dated June 2016
EN15267-3:2007,
& QAL 1 as defined in EN 14181: 2004

Certification Ranges :

CO	0 to 75 mg/m^3	0 to 300 mg/m^3
NO	0 to 200 mg/m^3	0 to 395 mg/m^3
SO_2	0 to 75 mg/m^3	0 to 300 mg/m^3
HCl	0 to 15 mg/m^3	0 to 90 mg/m^3
NH_3	0 to 30 mg/m^3	0 to 75 mg/m^3
N_2O	0 to 50 mg/m^3	0 to 1000 mg/m^3
NO_2	0 to 50 mg/m^3	0 to 1000 mg/m^3
H_2O	0 to 40 %$^{vol.}$	
CO_2	0 to 20 %$^{vol.}$	
O_2	0 to 25 %$^{vol.}$	

Project No.:	16A28794/ 70145000
Certificate No.:	Sira MC070115/02
Initial Certification:	02 July 2007
This Certificate issued::	13 December 2017
Renewal Date:	01 July 2022

Joe Prince MSc, MInst MC
Certification Manager

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 3

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 monitoring techniques refer to the Environment Agency Monitoring Technical Guidance Notes available 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. 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, WID and IED applications for the ranges specified. The lowest certified range for each determinand shall not be more than 1.5X the daily average emission limit value (ELV) for WID applications, and not more than 2.5X the ELV for LCPD and other types of application.

Of the components N_2O, NO_2, H_2O, HCl, CO, NO, SO_2, NH_3 and CO_2 up to 8 components can be measured simultaneously. The measuring device works with wet exhaust gas.

HCl was tested at the range 20 mg/m^3 for cross sensitivity to N_2O and so the instrument is unsuitable for fluidised-bed firing applications for the measurement of HCl.

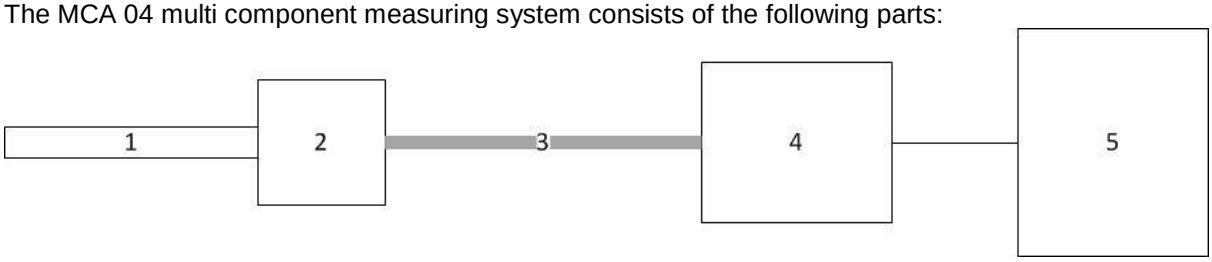
Basis of Certification

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 Rheinland Report Number: 936/21203173/A dated 13 July 2005
TÜV Rheinland Report Number: 936/21203173/B dated 23 December 2005
TÜV Rheinland Report Number: 936/21204231/C dated 22 June 2007
TÜV Rheinland Report Number: 936/21221599/A dated 25 September 2013
TÜV Rheinland Report Number: 936/21223835/A dated 19 December 2013

Product Certified

The MCA 04 multi component measuring system consists of the following parts:



1. Sample Probe	2. Heated Filter	3. Heated Sample Line	4. Gas Conditioning	5. Analyser
Model: Dr. Födisch AG ETL 8211 sampling tube	Model: M&C products SP-2000 sampling probe	Model: Winkler PTFE inner core at 200°C	Model: KNF type PM20157-012.11 or PM 22172-024.11 gas conveyance via pump	Model: Dr. Födisch AG MCA 04

Allowable variations could include:

- A different brand or model of sampling system of the same type, provided that there is evidence the alternative system works with similar types of CEM.
- Additional manifolds and heated valves used to allow more than one analyser to share a sampling system.

This certificate applies to all instruments fitted with software version MC3 V1.83 onwards (serial number 05002 onwards).

Certified Performance

The instrument was evaluated for use under the following conditions:
Ambient Temperature Range: +5ºC to +40ºC
Instrument IP rating: IP55 analyser cabinet is used (the analyser itself is IP 52)

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.

Results are expressed as % of certification ranges for CO 0 to 75 mg/m^3, NO 0 to 200 mg/m^3, CO_2 0 to 20 %$^{vol.}$, O_2 0 to 25 %$^{vol.}$, N_2O 0 to 50 mg/m^3, SO_2 0 to 75 mg/m^3, NO_2 0 to 50 mg/m^3, HCl 0 to 15 mg/m^3, NH_3 0 to 30 mg/m^3 & H_2O 0 to 40 %$^{vol.}$ unless otherwise stated.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
CO (0 to 75 mg/m^3)					177s	<200s
CO (0 to 300 mg/m^3)					174s	<200s
NO (0 to 200 mg/m^3)					176s	<200s
NO (0 to 395 mg/m^3)					166s	<200s
CO_2 (0 to 20 %$^{vol.}$)					179s	<200s
O_2 (0 to 25 %$^{vol.}$)					56s	<200s
N_2O (0 to 50 mg/m^3)					167s	<200s
N_2O (0 to 1000 mg/m^3)					163s	<200s
SO_2 (0 to 75 mg/m^3)					175s	<200s
SO_2 (0 to 300 mg/m^3)					191s	<200s
NO_2 (0 to 50 mg/m^3)					174s	<200s
NO_2 (0 to 1000 mg/m^3)					171s	<200s
HCl (0 to 15 mg/m^3)					197s	<400s
HCl (0 to 90 mg/m^3)					170s	<400s
NH_3 (0 to 30 mg/m^3)					182s	<400s
NH_3 (0 to 75 mg/m^3)					173s	<400s
H_2O (0 to 40 %$^{vol.}$)					175s	<200s
Repeatability standard deviation at zero point						
CO	0.0					<2.0%
NO	0.10					<2.0%
CO_2	0.0					<2.0%
O_2	0.01					<0.2%
N_2O	0.0					<2.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
SO_2	0.0					<2.0%
NO_2	0.40					<2.0%
HCl		0.70				<2.0%
NH_3	0.0					<2.0%
H_2O	0.0					<2.0%
Repeatability standard deviation at reference point						
CO	0.40					<2.0%
NO	0.20					<2.0%
CO_2		0.50				<2.0%
O_2	0.10					<0.2%
N_2O	0.10					<2.0%
SO_2	0.10					<2.0%
NO_2	0.10					<2.0%
HCl		0.90				<2.0%
NH_3	0.30					<2.0%
H_2O	0.30					<2.0%
Lack-of-fit						
CO (0 to 75 mg/m^3)		-0.90				<2.0%
CO (0 to 300 mg/m^3)	0.33					<2.0%
NO (0 to 200 mg/m^3)	0.30					<2.0%
NO (0 to 395 mg/m^3)			1.3			<2.0%
CO_2 (0 to 20 $\%^{vol.}$)			1.0			<2.0%
O_2 (0 to 25 $\%^{vol.}$)	0.10					<0.2%
N_2O (0 to 50 mg/m^3)	0.20					<2.0%
N_2O (0 to 1000 mg/m^3)			1.0			<2.0%
SO_2 (0 to 75 mg/m^3)		0.80				<2.0%
SO_2 (0 to 300 mg/m^3)			-1.0			<2.0%
NO_2 (0 to 50 mg/m^3)			1.8			<2.0%
NO_2 (0 to 1000 mg/m^3)		-0.80				<2.0%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
HCl (0 to 15 mg/m^3)		0.70				<2.0%
HCl (0 to 90 mg/m^3)		0.90				<2.0%
NH_3 (0 to 30 mg/m^3)		0.93				<2.0%
NH_3 (0 to 75 mg/m^3)		0.80				<2.0%
H_2O (0 to 40 %$^{vol.}$)		0.90				<2.0%
Influence of ambient temperature zero point						
CO	0.10					<5.0%
NO		0.50				<5.0%
CO_2	0.30					<5.0%
O_2	0.02					<0.50%
N_2O		0.60				<5.0%
SO_2			1.7			<5.0%
NO_2		-0.50				<5.0%
HCl				3.9		<5.0%
NH_3		0.60				<5.0%
H_2O	-0.10					<5.0%
Influence of ambient temperature reference point						
CO			-1.6			<5.0%
NO			1.3			<5.0%
CO_2		-0.50				<5.0%
O_2	-0.09					<0.50%
N_2O			1.4			<5.0%
SO_2				-2.9		<5.0%
NO_2		-0.80				<5.0%
HCl				-3.3		<5.0%
NH_3			-1.7			<5.0%
H_2O			-1.3			<5.0%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of sample gas flow for extractive CEMS						
CO		-0.70				<2.0%
NO			1.0			<2.0%
CO_2			-1.9			<2.0%
O_2	-0.18					<0.2%
N_2O	0.20					<2.0%
SO_2	-0.30					<2.0%
NO_2	-0.40					<2.0%
HCl		-0.90				<2.0%
NH_3		-0.90				<2.0%
H_2O			-1.0			<2.0%
Influence of voltage variations 196 to 230V						
CO		0.70				<2.0%
NO	0.40					<2.0%
CO_2		-0.80				<2.0%
O_2	-0.09					<0.2%
N_2O		-0.80				<2.0%
SO_2		0.90				<2.0%
NO_2		-0.80				<2.0%
HCl		-0.90				<2.0%
NH_3			1.0			<2.0%
H_2O		0.40				<2.0%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Cross-sensitivity at zero with interferents: O_2, H_2O, CO, CO_2, CH_4, N_2O, NO, NO_2, NH_3, SO_2 & HCl						
CO	0.0					<4.0%
NO				-3.1		<4.0%
CO_2				-2.0		<4.0%
O_2	-0.0					<0.40%
N_2O				-3.5		<4.0%
SO_2			1.7			<4.0%
NO_2				3.3	Note 1	<4.0%
HCl				-2.1		<4.0%
NH_3				3.6		<4.0%
H_2O	0.0					<4.0%
Cross-sensitivity at reference with interferents: O_2, H_2O, CO, CO_2, CH_4, N_2O, NO, NO_2, NH_3, SO_2 & HCl						
CO				-3.2		<4.0%
NO				-4.0		<4.0%
CO_2				-2.5		<4.0%
O_2	-0.0					<0.40%
N_2O				2.8		<4.0%
SO_2				3.7		<4.0%
NO_2				3.5	Note 1	<4.0%
HCl				3.1		<4.0%
NH_3				4.0		<4.0%
H_2O			1.0			<4.0%

Test		Results expressed as % of the certification range				Other results	MCERTS specification
		<0.5	<1	<2	<5		
Measurement uncertainty						Guidance - at least 25% below max permissible uncertainty	
CO	(For an ELV of 50 mg/m^3)					7.5%	<7.5% (10%)
NO	(For an ELV of 131 mg/m^3)					8.5%	<15% (20%)
CO_2	(For an ELV of 20 Vol.-%)					4.8%	<7.5% (10%)
O_2	(For an ELV of 25 Vol.-%)					2.3%	<7.5% (10%)
N_2O	(For an ELV of 50 mg/m^3)					12.0%	<15% (20%)
SO_2	(For an ELV of 50 mg/m^3)					11.4%	<15% (20%)
NO_2	(For an ELV of 20 mg/m^3)					12.4%	<15% (20%)
HCl	(For an ELV of 10 mg/m^3)					12.5%	<30% (40%)
NH_3	(For an ELV of 10 mg/m^3)					22.4%	<30% (40%)
H_2O	(For an ELV of 40 Vol.-%)					3.0%	<7.5% (10%)
Calibration function (field)							
	CO					>0.9890	>0.90
	NO					>0.9254	>0.90
	CO_2					>0.9544	>0.90
	O_2					>0.9944	>0.90
	N_2O					>0.9849	>0.90
	SO_2					>0.9782	>0.90
	NO_2					>0.9020	>0.90
	HCl					>0.7847 Note 2	>0.90
	NH_3					>0.7089 Note 2	>0.90
	H_2O					>0.9883	>0.90
Response time (field)							
	CO					<180s	<200s
	NO					<160s	<200s
	CO_2					<165s	<200s
	O_2					<20s	<200s
	N_2O					<178s	<200s

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
SO_2					<180s	<200s
NO_2					<174s	<200s
HCl					<165s	<400s
NH_3					<160s	<400s
H_2O					<165s	<200s
Lack of fit (field)						
CO			1.9			<2.0%
NO			1.5			<2.0%
CO_2			1.5			<2.0%
O_2	0.10					<0.2%
N_2O			1.6		Note 3	<2.0%
SO_2		0.80				<2.0%
NO_2				2.0		<2.0%
HCl			1.3			<2.0%
NH_3			1.6			<2.0%
H_2O			1.8			<2.0%
Maintenance interval					Note 4	>8 days
Zero and Span drift requirement	Every 24 hours an automatic zero adjustment is carried out by the MCA 04. When taking the zero points for each of the measurement components, a check is performed. Within this check, two plausibility measures are carried out: 1 - When a relative drift of more than 6% for an individual component occurs at the zero point, a status signal is set. 2 - If more than a 10% drop is measured in the IR sensitive channel, a status signal is set.					Clause 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.
Change in zero point over maintenance interval						
CO	0.20					<3.0%
NO		0.50				<3.0%
CO_2	0.20					<3.0%
O_2	0.18					<0.2%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
N_2O			1.4			<3.0%
SO_2			1.9			<3.0%
NO_2	-0.40					<3.0%
HCl			-1.8			<3.0%
NH_3		0.60				<3.0%
H_2O	0.0					<3.0%
Change in reference point over maintenance interval						
CO			-1.6			<3.0%
NO			1.2			<3.0%
CO_2			1.9			<3.0%
O_2	0.16					<0.2%
N_2O				2.0		<3.0%
SO_2				-2.3		<3.0%
NO_2				3.0		<3.0%
HCl				2.9		<3.0%
NH_3				-3.0		<3.0%
H_2O		0.80				<3.0%
Availability					>98.2%	>95% (>98% for O_2)
Reproducibility						
CO			1.2			<3.3%
NO			1.9			<3.3%
CO_2		0.50				<3.3%
O_2	0.15					<0.2%
N_2O		0.50				<3.3%
SO_2				3.1		<3.3%
NO_2		0.30				<3.3%
HCl				3.1		<3.3%
NH_3				3.3		<3.3%
H_2O	0.40					<3.3%

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Note 1: HCl was tested at the range 20 mg/m^3 for cross sensitivity to N_2O and so the instrument is unsuitable for fluidised-bed firing applications for the measurement of HCl.

Note 2: Although the worst-case results did not meet requirements for EN 15267-3, the value for R^2 were variable and depended on the test conditions. When there was a good spread of data, the values of R^2 were typically above 0.99 for both NH_3 and HCl. However, when the results were clustered and when the spread of data was not as even, the values for R^2 fell. In all cases, the system passed the variability tests required by EN 14181.

Note 3: Lack of fit in the field for N_2O test conducted over a range of 0 to 1000 mg/m^3, rather than the certification range of 0 to 50 mg/m^3.

Note 4: The maintenance interval for the MCA 04 measurement device is 3 months. The work described below must be performed in the specified intervals:

• The readings of the measuring device should be checked

• The sample gas filter, gas purification system, the sample gas lines and gas connections should be checked

• The QAL3 activities for N_2O and NO_2 are to be performed at least every three months. Any necessary checks or adjustments the measuring device should be performed by the device manufacturer or experienced service personnel.

• The QAL3 activities for H_2O, HCl, CO, NO, SO_2, NH_3, CO and O_2 are to be performed at least every three months. Any necessary checking and adjustment and initial calibration of the measuring device should be performed by the device manufacturer or experienced service personnel. In addition, the probe filter including the seals of the heated sampling probe must be replaced and evaluated using test gases if the cuvette-filters are replaced.

• Every six months, the diaphragm of the gas pump has to be replaced; additionally, the instrument air-conditioning and gas lines should be checked and cleaned if necessary.

• Each year, the cuvette-filters must be assessed with test gas measurements. The oxygen cell should be assessed and replaced if necessary.

Description

The multi-component MCA 04 system is an absorption-spectrometric multi-gas sensor for flue gas measurement and can measure up to 8 components.

The MCA04 analyser extracts sample gas from the stack via a heated probe and heated line to the analyser which is a heated IR analyser. All components of the MCA04 system are heated to a temperature above the acid dew point to allow monitoring on various applications.
The MCA04 analyser uses gas filter correlation and a bi-frequency measuring principle depending on the components being measured. For the oxygen measurement a zirconia sensor is used.

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 MC 070115/02.

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.