PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

MCS 100 FT

manufactured by:

SICK AG

Rengoldshauser Str. 17 a
88662 Überlingen

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

Environment Agency Guidance
"MCERTS for stack emissions monitoring equipment at industrial installations"
- Continuous emissions monitoring systems(CEMS)
Published 20 October 2020
EN 15267-1:2009, EN15267-2:2009, EN 15267-3:2007
& QAL 1 as defined in EN 14181: 2014

Certification ranges:

SO_2	0 to 75 mg/m^3	to	0 to 300 mg/m^3
NO	0 to 200 mg/m^3	to	0 to 400 mg/m^3
CO	0 to 75 mg/m^3	to	0 to 300 mg/m^3
HCl	0 to 15 mg/m^3	to	0 to 90 mg/m^3
HF	0 to 3 mg/m^3	to	0 to 10 mg/m^3
TOC	0 to 15 mg/m^3	to	0 to 50 mg/m^3
NH_3	0 to 10 mg/m^3	to	0 to 50mg/m^3
CO_2	0 to 25 % vol.		
H_2O	0 to 40 % vol.		
NO_2	0 to 100 mg/m^3		
N_2O	0 to 50 mg/m^3		
CH_4	0 to 50 mg/m^3		
O_2	0 to 21 % vol.		

See description for additional measuring ranges

Project number:	80059007
Certificate number:	Sira MC100184/07
Initial certification:	17 December 2010
This certificate issued:	21 December 2020
Renewal date:	16 December 2025

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Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

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Form 1335
Issue 9

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 monitoring techniques refer to the Environment Agency technical guidance on monitoring, available at www.mcerts.net

This instrument is considered suitable for use on waste incineration and large combustion plant applications. This CEMS 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. The lowest certified range for each determinand shall not be more than 1.5 times the daily average emission limit value (ELV) for incineration plants, and not more than 2.5 times the ELV for other types of application.

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TÜV Rheinland Report Number 936/21206925/A dated 20 October 2008 - *SUPERSEDED*
TÜV Rheinland Report Number 936/21211742/A dated 26 October 2009 Inclusion of parameter O2 - *SUPERSEDED*
TÜV Rheinland Report Number 936/21210511/A dated 22 March 2010 Inclusion of parameters NH_3 and TOC.
TÜV Rheinland Report Number 936/21214593/A dated 01 October 2010 – Inclusion of supplementary NH_3 range.

Product certified

The MCS 100FT measuring system consists of the following parts:

- Heated sampling probe with heated filter, sample gas feeding and back-flushing
- Heated sampling line
- Analysis cabinet with interface modules, heated sample gas cell, FTIR analyser (interferometer), electric unit and SCU (system control unit) operating unit

This certificate applies to all instruments fitted with software version 9114688_TJ59 (MCS 100 FT firmware) and 9125028_T825 (SCU installation package) (serial number 1012 0111 onwards).

Certified performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: +5°C to +40°C
Instrument IP rating: IP23

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.

A heated sampling line of 36m was used for performance testing

Unless otherwise stated the evaluation was carried out on the certification range SO_2 0 to 75mg/m^3, NO 0 to 200mg/m^3, CO 0 to 75mg/m^3, HCl 0 to 15 mg/m^3, CO_2 0 to 25%vol, H_2O 0 to 40%vol, NO_2 0 to 100mg/m^3, HF 0 to 3 mg/m^3, N_2O 0 to 50mg/m^3, and CH_4 0 to 50 mg/m^3, TOC 0-15 mg/m^3, O_2 0-21 %vol and NH_3 0-10 mg/m^3

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
SO_2					177s	<200s
NO					176s	<200s
CO					178s	<200s
HCl					188s	<400s
CO_2					182s	<200s
H_2O					176s	<200s
NO_2					186s	<200s
HF					190s	<400s
N_2O					175s	<200s
CH_4					177s	<200s
TOC					49s	<200s
NH_3					199s	<400s
O_2					136s	<200s
SO_2 (0 to 300 mg/m^3)					183s	<200s
SO_2 (0 to 1500 mg/m^3)					183s	<200s
NO (0 to 400 mg/m^3)					172s	<200s
NO (0 to 2000 mg/m^3)					174s	<200s
CO (0 to 300 mg/m^3)					172s	<200s

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
CO (0 to 1500 mg/m^3)					147 s	<200s
HCl (0 to 90 mg/m^3)					191s	<400s
HCl (0 to 150 mg/m^3)					188s	<400s
NO_2 (0 to 500 mg/m^3)					198s	<200s
HF (0 to 10 mg/m^3)					202s	<400s
CH_4 (0 to 150 mg/m^3)					174s	<200s
TOC (0 to 50 mg/m^3)					48s	<200s
TOC (0 to 150 mg/m^3)					44s	<200s
TOC (0 to 500 mg/m^3)					44s	<200s
NH_3 (0 to 50mg/m^3)					188s	<400s
Repeatability standard deviation at zero point						
SO_2	0.16					<2.0%
NO	0.19					<2.0%
CO	0.21					<2.0%
HCl	0.27					<2.0%
CO_2	0.12					<2.0%
H_2O	0.05					<2.0%
NO_2	0.19					<2.0%
HF			1.33			<2.0%
N_2O	0.08					<2.0%
CH_4	0.02					<2.0%
TOC	0.00					<2.0%
NH_3	0.23					<2.0%
O_2	0.01					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Repeatability standard deviation at reference point						
SO_2	0.21					<2.0%
NO	0.39					<2.0%
CO	0.29					<2.0%
HCl		1.00				<2.0%
CO_2	0.20					<2.0%
H_2O	0.15					<2.0%
NO_2	0.47					<2.0%
HF			1.67			<2.0%
N_2O	0.50					<2.0%
CH_4	0.10					<2.0%
TOC	0.08					<2.0%
NH_3		0.65				<2.0%
O_2	0.01					<0.2%
Lack-of-fit						
SO_2		-1.0				<2.0%
NO		-0.7				<2.0%
CO			-1.7			<2.0%
HCl			2.0			<2.0%
CO_2		0.7				<2.0%
H_2O			1.6			<2.0%
NO_2		0.7				<2.0%
HF			-1.7			<2.0%
N_2O	0.5					<2.0%
CH_4		-0.7				<2.0%
TOC		0.7				<2.0%
NH_3		-0.6				<2.0%
O_2	-0.14					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
SO_2 (0 to 300 mg/m^3)			1.1			<2.0%
SO_2 (0 to 1500 mg/m^3)		-0.7				<2.0%
NO (0 to 400 mg/m^3)			1.5			<2.0%
NO (0 to 2000 mg/m^3)			1.4			<2.0%
CO (0 to 300 mg/m^3)			-2.0			<2.0%
CO (0 to 1500 mg/m^3)			-1.5			<2.0%
NO_2 (0 to 500 mg/m^3)			1.4			<2.0%
HCl (0 to 90 mg/m^3)			-1.5			<2.0%
HCl (0 to 150 mg/m3)			1.3			<2.0%
HF (0 to10 mg/m^3)			1.4			<2.0%
N_2O (0 to 500 mg/m^3)		1.0				<2.0%
CH_4 (0 to 150 mg/m^3)			1.7			<2.0%
TOC (0 to 50 mg/m^3)	-0.2					<2.0%
TOC (0 to 150 mg/m^3)	-0.2					<2.0%
TOC (0 to 500 mg/m^3)	0.4					<2.0%
NH_3 (0 to 50mg/m^3)	-0.6					<2.0%
Influence of ambient temperature zero point (+5°C to +40°C)						
SO_2			1.3			<5.0%
NO	-0.4					<5.0%
CO	0.2					<5.0%
HCl		0.8				<5.0%
CO_2	0.3					<5.0%
H_2O	0.3					<5.0%
NO_2			1.3			<5.0%
HF				-3.7		<5.0%
N_2O	0.2					<5.0%
CH_4	-0.1					<5.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
TOC			1.4			<5.0%
NH_3	-0.5					<5.0%
O_2	0.02					<0.5%
Influence of ambient temperature reference point (+5°C to +40°C						
SO_2			-1.5			<5.0%
NO			-1.5			<5.0%
CO			-1.7			<5.0%
HCl				-3.5		<5.0%
CO_2				2.1		<5.0%
H_2O			1.2			<5.0%
NO_2		0.9				<5.0%
HF				4.7		<5.0%
N_2O			-1.1			<5.0%
CH_4			1.4			<5.0%
TOC			-1.3			<5.0%
NH_3			-1.4			<5.0%
O_2	0.24					<0.5%
Influence of sample gas flow for extractive CEMS						
CO	0.1				Note 1	<2.0%
TOC		-0.7				<2.0%
O_2	-0.02					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of voltage variations (190V to 250V)						
SO_2		-0.8				<2.0%
NO		-0.8				<2.0%
CO	0.3					<2.0%
HCl		0.7				<2.0%
CO_2	0.4					<2.0%
H_2O	0.2					<2.0%
NO_2		-0.6				<2.0%
HF			1.3			<2.0%
N_2O	0.4					<2.0%
CH_4	0.2					<2.0%
TOC	0.5					<2.0%
NH_3		0.7				<2.0%
O_2	-0.1					<0.2%
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s^2)					*Test not applicable to extractive systems*	To be reported

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Cross-sensitivity at zero					Note 2	
SO_2				2.7		<4.0%
NO				-2.6		<4.0%
CO			-1.8			<4.0%
HCl				3.9		<4.0%
CO_2				-2.9		<4.0%
H_2O			2.0			<4.0%
NO_2				4.0		<4.0%
HF				4.0		<4.0%
N_2O				3.9		<4.0%
CH_4			1.1			<4.0%
TOC				3.1		<4.0%
NH_3				4.0		<4.0%
O_2	0.0					<0.4%
Cross-sensitivity at reference					Note 2	
SO_2				4.0		<4.0%
NO				3.4		<4.0%
CO				-3.5		<4.0%
HCl				3.3		<4.0%
CO_2				3.2		<4.0%
H_2O			1.98			<4.0%
NO_2				4.0		<4.0%
HF				-3.5		<4.0%
N_2O				3.5		<4.0%
CH_4				2.7		<4.0%
TOC				-2.1		<4.0%
NH_3				-2.9		<4.0%
O_2	0.0					<0.4%

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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	
SO_2 (for an ELV of 50mg/m^3)					10.5%	<15%
NO (for an ELV of 130mg/m^3)					9.5%	<15%
CO (for an ELV of 50mg/m^3)					8.7%	<7.5%
					Note 3	
HCl (for an ELV of 10mg/m^3)					12.2%	<30%
CO_2 (for an ELV of 25%vol)					6.7%	<7.5%
H_2O (for an ELV of 40%vol)					5.7%	<7.5%
NO_2 (for an ELV of 70mg/m^3)					10.6%	<15%
HF (for an ELV of 1mg/m^3)					30.3%	<30%
					Note 3	
N_2O (for an ELV of 20 mg/m^3)					13.6%	<15%
CH_4 (for an ELV of 20 mg/m^3)					15.6%	<22.5%
TOC (for an ELV of 10 mg/m^3)					21.0%	<22.5%
NH_3 (for an ELV of 10 mg/m^3)					6.4%	<30%
O_2 (for an ELV of 21 %vol.)					2.8%	<7.5%
Calibration function (field)						
SO_2					0.95	>0.90
NO					0.98	>0.90
CO					0.97	>0.90
HCl					0.88	>0.90
					Note 4	
CO_2					0.97	>0.90
H_2O					0.96	>0.90
NO_2					0.82	>0.90
					Note 4	
HF					0.99	>0.90
N_2O					0.91	>0.90
CH_4					0.97	>0.90
TOC					0.99	>0.90

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
NH_3					0.96	>0.90
O_2					0.99	>0.90
Response time (field)						
SO_2					182s	<200s
NO					180s	<200s
CO					180s	<200s
HCl					188s	<400s
CO_2					185s	<200s
H_2O					185s	<200s
NO_2					194s	<200s
HF					190s	<400s
N_2O					181s	<200s
CH_4					185s	<200s
TOC					55s	<200s
Lack of fit (field)						
SO_2		0.7				<2.0%
NO		0.9				<2.0%
CO		-1.0				<2.0%
HCl			1.7			<2.0%
CO_2	0.5					<2.0%
H_2O			1.1			<2.0%
NO_2		0.9				<2.0%
HF			1.7			<2.0%
N_2O	-0.5					<2.0%
CH_4		0.6				<2.0%
TOC			-1.4			<2.0%
NH_3			1.8			<2.0%
O_2	0.16					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Maintenance interval						>8 days
SO_2, NO, CO, HCl, H_2O, NO_2, N_2O, CH_4					6 months	>8 days
CO_2, HF, NH_3					3 months	>8 days
TOC					2 months	>8 days
O2					4 weeks	>8 days
Zero and Span drift requirement	Statement from Manufacturer: *Recording zero and span drift is possible and complies with the QAL3 requirements of EN14181. The device is equipped with automatic zero point check and correction (daily recording of a "background spectrum"). A status signal is set as soon as the automatic drift correction limits are reached. In addition, the measuring system for the FTIR components has test equipment for automatic determination and checking of the span point display within the scope of the QAL3 activities. The device sends a status message when the drift range is exceeded; automatic span point adjustment does not take place.* See Note 5					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						
SO_2				-2.5		<3.0%
NO			1.8			<3.0%
CO		0.7				<3.0%
HCl				-2.4		<3.0%
CO_2				2.1		<3.0%
H_2O				-2.6		<3.0%
NO_2				-2.3		<3.0%
HF				-3.0		<3.0%
N_2O	-0.4					<3.0%
CH_4				-2.5		<3.0%
TOC			1.8			<3.0%
NH_3	0.5					<3.0%
O_2	0.18					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Change in reference point over maintenance interval						
SO_2				3.0		<3.0%
NO				-3.0		<3.0%
CO			-1.8			<3.0%
HCl				-2.9		<3.0%
CO_2				2.5		<3.0%
H_2O				-2.7		<3.0%
NO_2				3.0		<3.0%
HF				-3.0		<3.0%
N_2O			-1.8			<3.0%
CH_4				-2.9		<3.0%
TOC				-2.8		<3.0%
NH_3				2.9		<3.0%
O_2	-0.2					<0.3%
Availability					98.7%	>95%
Reproducibility						
SO_2				3.1		<3.3%
NO			1.9			<3.3%
CO			1.8			<3.3%
HCl				2.1		<3.3%
CO_2				2.8		<3.3%
H_2O			1.9			<3.3%
NO_2				2.1		<3.3%
HF				2.5		<3.3%
N_2O		0.7				<3.3%
CH_4				2.1		<3.3%
TOC		0.6				<3.3%
NH_3			1.5			<3.3%
O2	0.18					<0.2%

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Note 1: An influence of sample gas flow on the measured signal is not to be expected as long as the pressure conditions in the cuvette are constant. A status signal is set when the sample gas flow is below the lower limit. This was demonstrated with the component CO, TOC and O_2, as all components are subject to the same pressure control.

Note 2: Cross sensitivity 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 & HCl.

Note 3: The measurement uncertainty results for CO and HF meet the requirements of EN14181 and EN 15267-3, but not this recommendation within EN 15267-3.

Note 4: The calibration function results for HCl and NO2 meet the variability test requirements in EN14181, but do not meet the required value of the calibration specified EN15267-3 for HCl and NO2. However, for these two determinands, this was due to the very low emission results measured during the field test, and not due to the instrument itself. For HCl and NO2 one out of four calibration results was slightly out of specification (r2 = 0.88 and 0.82 instead of >0.90, respectively).

Note 5: For the span point check (QAL3) of components CO, SO_2, NO, HCl, CH_4, N_2O, H_2O, CO_2, HF and NH_3 an internal automatic adjustment can be used as an alternative to test gases.

Description

MCS 100 FT is a multi-component analyser system. The gas to be measured is taken by means of a sample gas probe from the flue gas. To provide the analyser system with the sample gas from the probe a heated sample gas line is used. A Fourier transform infrared-spectrometer (FTIR-spectrometer) serves for the spectral analysis of the gas concentrations.

The sample gas is delivered by an ejector pump. The sample gas probe offers in its standard configuration the functions of automatic zero gas provision, automatic back-flush with zero adjustment and filter cleaning. The system has an independent temperature control system for all heated parts in order to prevent any condensation of flue gas within the system.

The control and evaluation system SCU (System Control Unit) is designed and adjusted to satisfy the requirements of emission control purposes as well as the requests of process measurement technology and offers standard interfaces as CAN-Bus and Field-BUS systems, as well as ModBus or ProfiBus.

An Ethernet interface for the remote control of the entire measuring system facilitates the data transfer via internal and external TCP/IP networks. In this way remote control and remote service of the measuring system are also possible using the software package SOPAS ET.

The tested AMS consists of the following single components:

- heated sampling probe with heated filter, test gas port and back-flush possibility,
- heated sample gas line,
- analyser cabinet MCS 100 FT containing interface modules, heated measuring cell FTIR-analyser (Interferometer), electronics unit and the SCU control and evaluation unit,
- integrated oxygen measuring device using the zirconium dioxide principle,
- integrated flame ionisation detector for TOC measurement.

Additional measuring ranges

Component	Certification range	Additional measuring ranges			Unit
		Measuring range 1	Measuring range 2	Measuring range 3	
O_2	0 - 21	-	-	-	% by vol.
CO	0 - 75	0 - 300	0 - 1500	-	mg/m³
SO_2	0 - 75	0 - 300	0 - 1500	-	mg/m³
NO	0 - 200	0 - 400	0 - 2000	-	mg/m³
NO_2	0 - 100	-	0 - 500	-	mg/m³
HCl	0 - 15	0 - 90	0 - 150	-	mg/m³
HF	0 - 3	0 - 10	-	-	mg/m³
CH_4	0 - 50	-	0 - 150	-	mg/m³
CO_2	0 - 25	-	-	-	% by vol.
H_2O	0 - 40	-	-	-	% by vol.
N_2O	0 - 50	-	0 - 500	-	mg/m³
NH_3	0 - 10	0 - 50	-	-	mg/m³
TOC	0 - 15	0 - 50	0 - 150	0 - 500	mg/m³

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'.

2. The design of the product certified is held and maintained by TUV Rheinland for certificate No. Sira MC100184/07.

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

4. 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'.

5. This document remains the property of Sira and shall be returned if requested by Sira.