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PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

***GM35 In-situ Gas Analyser, Model Cross-Duct
GM35 In-situ Gas Analyser, Model Measuring Probe GMP***

manufactured by:

SICK MAIHAK GmbH
*Analysen- und Prozessmesstechnik
Nimburger Straße 11
79276 Reute
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 2, Revision 1 (April 2003)

Certification Ranges :

CO	0 to 75 mg/m ³ *	0 to 225 mg/m ³ **
CO ₂	0 to 15 %vol *	0 to 22.5 %vol **
H ₂ O	0 to 25 %vol *	0 to 25 %vol **

* Model Cross Duct with a minimum active measuring path length of 3m (CO), 1.5m (CO₂) and 1m (H₂O) determined during the field test.

** Model Measuring Probe GMP with an active measuring path length of 1m.

Project No: 674/0234
Certificate No: Sira MC 070097/01
Initial Certification: 16 January 2007
This Certificate Issued: 18 July 2008
Renewal Date: 15 January 2012

Technical Director

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

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Approved Site Application

Any potential user should ensure, in consultation with the manufacturer, that the emission monitoring system is suitable for the process on which it will be installed. For general guidance on stack emission monitoring techniques refer to Environment Agency Technical Guidance Note M2: Monitoring of stack emissions to air. This is 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.

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 Koln Report No: 936/21202726/A dated 30/06/05
TÜV Koln Report No: 936/21204254/A dated 01/06/06
TÜV Koln Report No: 936/212004254/B dated 01/09/06

TÜV reports are accepted on the basis of the Environment Agency's document 'MCERTS – Guidance on the acceptance of German type approval test reports for CEMS' Version 2 (October 2003)

Product Certified

There are two different system configurations for the GM35 measuring system:
The GM35 in-situ gas analyser, Model Cross-Duct system consists of the following parts:

- Sender/receiver unit (S-R unit) containing the main optical and electronic modules
- Measurement reflector - a gold-plated hollow triple
- Purge air units (SLV4 for SR-unit and reflector)
- Evaluation unit

The GM35 in-situ gas analyser, Model Measuring Probe GMP system consists of the following parts:

- Measuring Probe GMP with open slot and vertical purge air outlet
- Sender/receiver unit (S-R unit) containing the main optical and electronic modules
- Evaluation unit

This certificate applies to all instruments fitted with software version S-R unit 9062244 PH18, Evaluation unit 9062243 PA18, Purge air unit 9091948 P517 onwards.

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: -20°C to $+50^{\circ}\text{C}$

Unless otherwise stated the evaluation was carried out on the certification range CO 0 to 75 mg/m^3 , CO₂ 0 to 15%vol, H₂O 0 to 25%vol. The evaluation was performed with an active measuring path length of 5.12m.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<4		
Linearity						
CO			1.1			<2%
CO ₂			1.3			<2%
H ₂ O			1.6			<2%
Cross-sensitivity (O ₂ , H ₂ O, CO, CO ₂ , CH ₄ , N ₂ O, NO, NO ₂ , NH ₃ , SO ₂ , HCl)						
CO				-2.63		<4%
CO ₂				-2.94		<4%
H ₂ O				-2.31		<4%
Temperature dependent zero shift						
CO	0.03					<0.3%/°C
CO ₂	<0.1					<0.3%/°C
H ₂ O	0.03					<0.3%/°C
Temperature dependent upper reference point shift						
CO	0.06					<0.3%/°C
CO ₂	0.03					<0.3%/°C
H ₂ O	-0.04					<0.3%/°C
Response time						
CO					35s	<200s
CO ₂					34s	<200s
H ₂ O					35s	<200s

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<4		
Detection Limit (measuring path 5.12m)						
CO		0.88				<2%
CO ₂	0.30					<2%
H ₂ O	0.22					<2%
Detection Limit (measuring path 3m CO, 1.5m CO ₂ and 1m H ₂ O)						
CO			1.50			<2%
CO ₂			1.02			<2%
H ₂ O			1.12			<2%
Vibration test (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s ²)					No effect See note 1	To be reported
Mains voltage (190V to 250V)		0.9				Not specified
Excursion of the measurement beam	0.27					<2%
Sample gas pressure					See note 2	To be reported
Sample gas temperature					See note 2	To be reported
Analysis function (field) ^{Note 3}						
CO, H ₂ O					98%	>95%
CO ₂					100%	>95%
Availability ^{Note 3}					99.6%	>95%
Zero drift during field trial ^{Note 3}						
CO	<0.5					<2%
CO ₂	0.0					<2%
H ₂ O	<0.2					<2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<4		
Upper reference point drift during field trial ^{Note 3}						
CO	0.4					<4%
CO ₂	0.2					<4%
H ₂ O	0.2					<4%
Maintenance Interval ^{Note 3}					12 weeks	To be reported

Note 1: Test performed on the GM35 In-situ analyser Model Cross-Duct.

Note 2: Test not performed.

Note 3: Field test: The GM35 analyser Model Cross-Duct system was assessed on the basis of a six months field trial mounted on a power plant application.

Description:

The GM35 in-situ system allows continuous measurement of CO, CO₂ and H₂O in waste gas channels. The in-situ measurement is carried out directly in the gas stream across the entire duct cross-section via a measuring probe. The light from the sender/receiver unit passes through the active measuring path and is reflected. The reflected light is then directed by the lens-splitting mirror through a filter or cell wheel to detectors. By filtering the light received into its spectral components, the receiver elements record the absorption of the gas molecules at characteristic points of the spectrum in the IR range 1.6 to 4.9µm. The algorithms of the GM35 electronics process the measurement signals from the receiver elements along with the associated parameters in accordance with the correlation procedure with optical filters for CO₂ and H₂O and gas-filled cells for CO.

There are two different configurations of the GM35 system. The GM35 in-situ analyser, Model Cross-Duct collects the measured values directly in the gas duct across the entire duct cross-section. The system consists of a sender/receiver unit, measurement reflector, purge air unit and evaluation unit.

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The GM35 in-situ analyser, Model Measuring Probe GMP collects the measured values directly in the gas duct with the help of a measuring probe, which is installed in the duct. The measuring probe contains an open slot which is the active measuring path and the gas is measured by passing through this slot. The required reflector is installed at the end of the probe. A continuous supply of purge air is required for the operation of the GMP measuring probe. The output of air into the duct is performed at an angle of 90° to the direction of the gas flow. The purge air supply is identical to the one in the Cross-Duct version except only one supply unit is required due to the design. The sender/receiver unit and evaluation unit are identical for both configurations and are operated with the same software.

The GM35 measuring system has automatic check cycles to monitor zero and reference point stability. The zero point is first determined by positioning a zero point reflector in the beam path. Reference filters are then moved into position to calculate the reference check point. If the check cycles reveal that the system is not functioning in accordance with the specifications, the GM35 measuring system outputs the appropriate error and warning messages.

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 070097/01.
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.

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