PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

PG-350E Multi-component Gas Analyser

Manufactured by:

Horiba Europe GmbH

Julius Kronenberg Straße 9
42799 Leichlingen
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, Annex F; Transportable Systems, EN15267-3:2007,
& QAL 1 as defined in EN 14181: 2004

Certification Ranges:

CO	0 to 75 mg/m^{3*}, 0 to 6250mg/m^3
CO_2	0 to 20 Vol.%
NO_x	0 to 134 mg/m^{3*}
O2	0 to 25 Vol.%,* 0 to 10Vol.%
SO_2	0 to 143 mg/m^3, 0 to 8580mg/m^3

*(Additional testing for these gases has been conducted for certification to Annex F)

Project No:	16A29871/70174727
Certificate No:	Sira MC130223/02
Initial Certification:	28 February 2013
This Certificate issued:	27 February 2018
Renewal Date:	27 February 2023

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
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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 as an SRM and for verifying and calibrating installed CEMS, according to the requirements of EN14181. This portable analyser is also considered suitable for use as a back-up CEM, excluding the measurement of daily mean SO_2 values for plants that operate within the scope of the 2000/76/EC (WID) Directive.

The field test was conducted on a municipal waste incinerator.

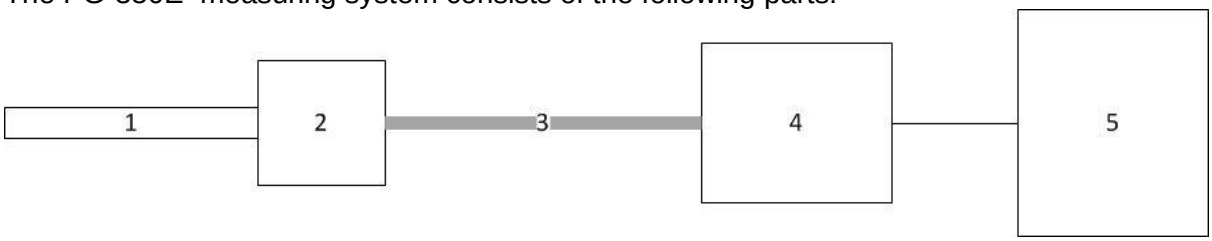
Basis of Certification

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 report 936/21217617/A_en_draft dated 5th October 2012
- TUV report 936/20130327 dated 27th March 2013
- TUV report 936/21221241/A dated 26th February 2013 (SRM data for CO)
- TUV report 936/21221241/B dated 26th February 2013 (SRM data for NO_x)
- TUV report 936/21221241/C dated 26th February 2013 (SRM data for O_2)

Product Certified

The PG-350E 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 type PSP 4000-H/C sampling probe	N/A – (Integrated with sample probe)	Model: : M&C type PSP-W 4M Heated Sample Line (5m)	Model: M&C type PSS 5 Condensing dryer / Horiba PD-100 permeation dryer (Note 1)	Model: PG-350 Analyser

Note 1: For measurements of SO_2 the Horiba PD-100 permeation dryer must be used.

This certificate applies to all instruments fitted with software version P2001009001A / 1.01 (serial number VC4DFKB9 onwards).

Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: +5°C to +40°C
Instrument IP rating: IP40

Results are expressed as error % certification range. The results in the table below relate to the requirements of EN 15267-3.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
NO_x					31s	<200s
SO_2					86s	<200s
CO					28s	<200s
CO_2					29s	<200s
O_2					41s	<200s
Repeatability standard deviation at zero point						
NO_x	0.00					<2.0%
SO_2	0.00					<2.0%
CO	0.10					<2.0%
CO_2	0.00					<2.0%
O_2	0.02					<0.20%
Repeatability standard deviation at reference point						
NO_x	0.10					<2.0%
SO_2	0.30					<2.0%
CO	0.20					<2.0%
CO_2	0.10					<2.0%
O_2	0.02					<0.20%
Lack-of-fit						
NO_x		0.75				<2.0%
SO_2		0.70				<2.0%
CO		0.61				<2.0%
CO_2			-1.00			<2.0%
O_2	-0.10					<0.20%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of ambient temperature zero point (+5°C to +40°C)						
NO_x	0.00					<5.0%
SO_2				2.10		<5.0%
CO	-0.20					<5.0%
CO_2	-0.20					<5.0%
O_2	-0.40					<0.50%
Influence of ambient temperature reference point (+5°C to +40°C)						
NO_x			1.80			<5.0%
SO_2				2.40		<5.0%
CO				2.00		<5.0%
CO_2			1.00			<5.0%
O_2	-0.15					<0.50%
Influence of sample gas flow for extractive CEMS						
NO_x	0.10					<2.0%
SO_2	0.30					<2.0%
CO	0.10					<2.0%
CO_2	0.10					<2.0%
O_2	-0.01					<0.20%
Influence of voltage variations (190 to 250V)						
NO_x	0.40					
SO_2			1.00			<2.0%
CO		0.50				(<0.20% for O_2)
CO_2	0.40					
O_2	0.02					
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s^2)					Not applicable	To be reported

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_20, CO, CO_2, CH_4, N_2O, NO, NO_2, NH_3, SO_2 & HCl						
NO_x		0.63				<4.0%
SO_2	-0.48					<4.0%
CO	-0.48					<4.0%
CO_2	0.00					<4.0%
O_2	0.00					<0.40%
Cross-sensitivity at reference with interferents: O_2, H_20, CO, CO_2, CH_4, N_2O, NO, NO_2, NH_3, SO_2 & HCl						
NO_x		-0.52				<4.0%
SO_2			-1.82			<4.0%
CO		-0.87				<4.0%
CO_2		-0.55				<4.0%
O_2	0.00					<0.40%
Converter Efficiency					95.8%	>95%
Measurement uncertainty						
NO_x					6.6%	Guidance - at least 25% below max permissible uncertainty
SO_2					13.8%	
CO					6.7%	
CO_2					4.2%	
O_2					2.0%	

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Calibration function (field)						
NO_x					0.9842	>0.90
SO_2					0.9847	>0.90
CO					0.9013	>0.90
CO_2					0.9960	>0.90
O_2					0.9989	>0.90
Response time (field)						
NO_x					58s	<200s
SO_2					68s	<200s
CO					57s	<200s
CO_2					55s	<200s
O_2					56s	<200s
Lack of fit (field)						
NO_x		0.75				<2.0%
SO_2	0.42					<2.0%
CO		0.53				<2.0%
CO_2			-1.00			<2.0%
O_2	0.05					<0.2%
Maintenance interval					Note 2 4 weeks	>8 days
Zero and Span drift requirement	The device allows for recording of zero and span drift and thus fulfils the requirements of QAL3 according to EN 14181.					Clause 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Change in zero point over maintenance interval						
NO_x	0.37					<3.0%
SO_2				2.38		<3.0%
CO			1.94			<3.0%
CO_2				2.31		<3.0%
O_2	0.13					<0.20%
Change in reference point over maintenance interval						
NO_x				2.63		<3.0%
SO_2				-2.63		<3.0%
CO			-1.56			<3.0%
CO_2				2.06		<3.0%
O_2	-0.16					<0.20%
Availability						
All Gasses					99%	>95% (>98% for O_2)
Reproducibility						
NO_x			1.30			<3.3%
SO_2			1.80			<3.3%
CO			1.60			<3.3%
CO_2	0.20					<3.3%
O_2	0.12					<0.20%

Note 2: The Horiba PG-350E has a maintenance interval of 4 weeks. The work detailed below has to be carried out at regular intervals, depending on local conditions:

- Measured values checked for plausibility on a regular basis.
- Visual inspection at regular intervals including temperature checks of heated gas paths, flow checks and checks for error warnings of the analyser during measurements.
- If operated with the condensing drier with its own test gas pump, sufficient gas oversupply behind the test gas cooler needs to be ensured.
- Weekly inspections of test gas filters, gas processing systems, test gas lines and gas connections.
- If used for mobile applications, zero and span point of the analyser need to be tested before and after measurement by applying test gases.

Additional testing for Annex F; Transportable systems according to; EN 15058 for CO (0 to 75 mg/m^3) EN 14792 for NO_x (0 to 134 as NO and 0 to 205 as NO_2) & EN 14789 for O_2 (0 to 25 Vol.-%)

Results are expressed as error % certification range, unless stated otherwise. Results in the table below relate to Annex F; Transportable Systems, of the MCERTS standard.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
CO					30s	<200s
NO_x					31s	<200s
O_2					41s	<200s
Detection Limit						
CO	0.43				NOTE 3	<2.0%
NO_x	0.07					<2.0%
O_2	0.12					<0.20%
Lack of fit						
CO		0.61				<2.0%
NO_x		0.75				<2.0%
O_2	0.10					<0.30%
Zero drift						
CO	0.38					<2.0%
NO_x	-0.04					<2.0%
O_2	-0.04					<0.20%
Span drift						
CO	0.17					<2.0%
NO_x	0.15					<2.0%
O_2	0.04					<0.20%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Sensitivity to atmospheric pressure						
CO	0.22					<1.5%
NOx	0.10					<1.5%
O2	0.19					<1.5%
Sensitivity to sample gas flow						
CO	0.10					<1.0%
NOx	0.10					<1.0%
O2	0.10					<1.0%
Sensitivity to ambient temperature at zero						
CO	-0.20					<3.0%
NO_x	0.04					<3.0%
O_2	-0.21					<0.30%
Sensitivity to ambient temperature at span						
CO				2.00		<3.0%
NO_x			1.53			<3.0%
O_2	0.11					<0.30%
Sensitivity to electrical voltage						
CO	-0.35					<2.0%
NO_x	-0.23					<2.0%
O_2	0.02					<0.10%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Cross sensitivity						
CO		0.53			NOTE 4	<4.0%
NO_x	0.00					<4.0%
O_2	0.00					<0.20%
Converter Efficiency						
NO_x					95.7%	>95%
Repeatability at zero						
CO	0.10					<1.0%
NO_x	0.00					<1.0%
O_2	0.03					<0.20%
Repeatability at span						
CO	0.20					<1.0%
NO_x	0.10					<1.0%
O_2	0.02					<0.20%
Combined Uncertainty						
CO				4.63		<6.0%
NO_x				4.52		<10.0%
O_2					5.03	<6.0%
Response time in the field						
CO					57s	<200s
NO_x					55s	<200s
O_2					56s	<200s
Losses and Leakages						
CO		0.53				<2.0%
NO_x	0.29					<2.0%
O_2	0.27					<2.0%

Note 3: Limit of detection testing was only conducted in the laboratory testing.
Note 4: Interferents used during testing; CO Interferents – O_2,CO_2,CH_4,N_2O
NO_x Interferents – NH_3, CO_2
O_2 Interferents – NO, NO_2. CO_2

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Description

The PG-350E is a portable gas analyser that uses an extractive system for measuring CO, NO or NOx, SO2, CO2 and O2. The analyser uses three measurement principles, chemiluminescence for NO, non-dispersive infrared (NDIR) for the measurement CO, CO2, SO2. O2 is measured using a paramagnetic sensor. The instrument measures a maximum of five gas components.

The PG350E system contains the analyser unit with sampling pump; a built-in electronic cooler for water removal in the internal reference gas stream; a condensate separator; an NO2 to NO converter for NOx measurement; a heated sample probe; a 5 metre heated line. A supplementary cooler must be used. This can be an M & C type PSS 5 or a similar type. A permeation dryer Horiba PD-100 with inlet temperature <120°C is applicable when SO2 measurements are required.

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 MC130223/00

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.