

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

P2000 Series Continuous Emission Monitor With Protea Control Unit

Manufactured by:

Protea Limited

2 Venture Park
Bretton
Peterborough
PE3 8YD

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 :

NO ₂	0 to 200 ppm, 0 to 5000 ppm
N ₂ O	0 to 300 ppm, 0 to 5000 ppm
NO	0 to 240 ppm, 0 to 1500 ppm
SO ₂	0 to 150 ppm, 0 to 1500 ppm
CO	0 to 150 ppm, 0 to 3500 ppm
CO ₂	0 to 15 Vol.%, 0 to 25 Vol.%
H ₂ O	0 to 30 Vol.%

Project No. : 70160234
Certificate No : Sira MC050060/13
Initial Certification : 22 July 2005
This Certificate issued : 20 December 2018
Renewal Date : 18 December 2020

Emily Alexander
Environmental Project Engineer

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

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Manufacturer: Protea
 Product Name: Model P2000 Series
 Continuous Emission
 Monitor
 Certificate Number: MC 050060/13



DESIGN SCHEDULE

Version 11 revised
 20/12/2018

Drawing No	Sheets	Issue	Date	Title	Date Authorised
1-0002	NA	1	17/07/2013	P2000 Casting & Reflector Tube Assy (SS) BOM	16/05/2014
1-0151	NA	1	17-08-2004	P2000 Casting & Reflector Tube Assy (Hastelloy) BOM	26/06/2012
1-0150	NA	1	26-02-2003	P2000 Casting & Reflector Tube Assy (C276) BOM	26/06/2012
1-0007E	1	1	03-05-2007	IR Source Element Assembly	26/06/2012
1-0011E	3	1	13-08-2012	P2000 Optical Plate Assembly	13/05/2013
	NA	1	14-08-2012	Analyser Temperature Controlled Cover Assembly BOM	16/05/2014
1-0087	NA	1	01-03-2016	Analyser Temperature Controlled Cover Assembly BOM	13/12/2017
1-0087	NA	2	06-12-2017	Analyser Temperature Controlled Cover Assembly (Fan Cooling) BOM	13/12/2017
1-0167	NA	02	27-11-2018	Analyser temperature Controlled Cover Assembly (Vortex Cooling) BOM	20/12/2018
2-0001C	NA	1	23-03-2012	Transition PCB BOM	26/06/2012
2-0002C	NA	1	01-01-2012	Filter Wheel PCB BOM	13/05/2013
2-0003E	NA	1	29-06-2011	Main Head PCB BOM	26/06/2012
3-0004	1	1	13/10/2006	Lens IR Detector Assembly	26/06/2012
3-0005	1	2	15-08-2018	Lens – Casting Assembly	20/12/2018
15-0021	1	1	26-04-2013	Filter N2O Reference (high)	08/10/2013
15-0004	1	1	04-07-2008	Filter NO2 Measure	26/06/2012
15-0006	1	1	02-10-2008	Filter Water Vapour Measure	26/06/2012
15-0022	1	1	26-04-2013	Filter CO2 Measure for Nitric Acid Applications	08/10/2013
15-0007	1	1	08-07-2008	Filter Water Vapour Measure Nitric Acid Applications	26/06/2012
15-0017	1	1	14-02-2012	Filter N2O Measure	26/06/2012
3-0007	2	1	28-08-2013	Casting Optical Plate Housing Base	16/05/2014
3-0008	1	1	16-05-2003	Sinter Panels (SS)	26/06/2012
3-0012	1	1	20-01-2012	Optical Base Plate	26/06/2012
15-0002	1	1	11-11-2015	Gas Filter Correlation Cell CO	24/05/2016
15-0001	1	1	03-07-2009	Gas Filter Correlation Cell NO	26/06/2012
3-0404	1	1	26-03-2008	Sinter Panels (C276)	26/06/2012
15-0008	1	1	11-06-1995	Filter Matched Pair CO	26/06/2012
15-0009	1	1	25-09-2002	Filter Matched Pair NO	26/06/2012
15-0010	1	1	25-05-2008	Filter CO2 Measure	26/06/2012
15-0011	1	1	28-05-2008	Filter Reference Nitric Acid Applications	26/06/2012
15-0012	1	1	24-11-2004	Filter SO2 Measure	26/06/2012
15-0013	1	1	12-08-2013	Filter SO2 Reference	16/05/2014
15-0020	1	1	26-04-2013	Filter N2O Measure (high)	08/10/2013
15-0018	1	1	26-04-2013	Filter Matched Pair N2O	08/10/2013



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Drawing No	Sheets	Issue	Date	Title	Date Authorised
3-0407	1		24-05-2016	MCERTs Approval Label	24/05/2016
3-0407	1	1	13-12-2017	MCERTs Approval Label	13/12/2017
3-0038	1	2	03-12-2009	IR Source Mirror	26/06/2012
3-0039	1	2	20-11-2017	Lens - Sample	13/12/2017
3-0040	1	1	01-03-2016	Mirror - Sample	24/05/2016
3-0041	1	1	20-04-2006	IR Source Lens	26/06/2012
3-0042	1	1	12-06-2007	Mirror IR Detector Assembly	26/06/2012
15-0019	1	1	26-04-2013	Gas Filter Correlation Cell N2O	08/10/2013
11-0001	1	1	04-07-2008	Sample Temperature Sensor	26/06/2012
11-0003	1	1	02-10-2015	Sample Pressure Sensor	24/05/2016
6-0004	1	1	20-05-2016	IR Detector	24/05/2016
6-0187		1		Motor – Filter Wheel	26/06/2012
-	-	-	04-08-09	SOFTWARE ACWN V2.06	26/06/2012
-	-	-	08-02-10	SOFTWARE ACWN V2.06	26/06/2012
-	-	-	18-03-10	SOFTWARE ACWN V2.07	26/06/2012
-	-	-	27-04-10	SOFTWARE ACWN V2.07	26/06/2012
-	-	-	02-07-10	SOFTWARE ACWN V2.07	26/06/2012
-	-	-	25-10-10	SOFTWARE ACWN V2.08	26/06/2012
-	-	-	02-12-10	SOFTWARE ACWN V2.09	26/06/2012
-	-	-	12-01-11	SOFTWARE ACWN V2.10 issue 00	26/06/2012
-	-	-	12-01-11	SOFTWARE ACWN V2.10 issue 01	26/06/2012
-	-	-	27/02/11	SOFTWARE ACWN V2.10 issue 02	26/06/2012
-	-	-	31/05/11	SOFTWARE ACWN V2.10 issue 03	26/06/2012
-	-	-	01/06/11	SOFTWARE ACWN V2.10 issue 04	26/06/2012
-	-	-	31/10/11	SOFTWARE ACWN V2.10 issue 05	26/06/2012
-	-	-	04/11/11	SOFTWARE ACWN V2.10 issue 06	26/06/2012
-	-	-	10/01/12	SOFTWARE ACWN V2.10 issue 07	26/06/2012
-	-	-	18/01/12	SOFTWARE ACWN V2.10 issue 08	26/06/2012
-	-	-	22/03/12	SOFTWARE ACWN V2.10 issue 09	26/06/2012
-	-	-	29/03/12	SOFTWARE ACWN V2.10 issue 10	26/06/2012
-	-	-	24/12/13	SOFTWARE ACWN V3.00 issue 13	16/05/2016
-	-	-	03/06/14	SOFTWARE ACWN V3.00 issue 14	13/04/2015
-	-	-	Not released	SOFTWARE ACWN V3.00 issue 15	NA
-	-	-	Not released	SOFTWARE ACWN V3.00 issue 16	NA
-	-	-	07/01/16	SOFTWARE ACWN V3.2.0	24/05/2016
-	-	-	Not released	SOFTWARE ACWN V3.3.0	NA



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Continuous Emission
Monitor
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Drawing No	Sheets	Issue	Date	Title	Date Authorised
-	-	-	Not released	SOFTWARE ACWN V3.4.0	NA
-	-	-	21/04/16	SOFTWARE ACWN V3.5.0	24/05/2016
-	-	-	01/03/17	SOFTWARE ACWN V3.6.0	13/12/2017
-	-	-	09/03/17	SOFTWARE ACWN V3.6.1	13/12/2017
-	-	-	03/05/17	SOFTWARE ACWN V3.6.3	13/12/2017
-	-	-	24/05/17	SOFTWARE ACWN V3.6.4	13/12/2017
-	-	-	14/06/17	SOFTWARE ACWN V3.6.5	13/12/2017
4-0001	-	-	31/08/17	Software PC ACWn Version 4.01	13/12/2017
4-0001	-	-	18/10/2017	Software PC ACWn Version 4.02	13/12/2017
4-0001	-	-	20/12/2017	Software PC ACWn Version 4.03	20/12/2018
4-0001	-	-	03/01/2018	Software PC ACWn Version 4.04	20/12/2018
4-0001	-	-	31/05/2018	Software PC ACWn Version 4.05	20/12/2018
4-0001	-	-	31/08/2018	Software PC ACWn Version 4.1.0	20/12/2018

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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:

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 IED Chapter III and IED Chapter IV 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 IED Chapter IV applications, and not more than 2.5X the ELV for IED Chapter III and other types of application.

The field trial was conducted at Aberthaw Power Station in the Vale of Glamorgan for three months.

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:

NPL Report Reference 2009070133/102153/QE2100/MCERTS/ProcalP2000/J1
Dated 9th April 2013

NPL Report Reference 102153/QE2100/Procal 2000 Series MCERTs Field Test
Dated 22nd February 2013

NPL Report Reference 200970133/102153/QE2100/MCERTS/ProcalP2000/J2
Dated 2nd July 2013

NPL Report Reference 105435/QE8400/Procal 2000 Series MCERTs Field Test
Dated 8th May 2013

Sira Test and Certification Report Reference N0328
Environmental (Vibration) Test on a Procal Pulsi Gas Analyser Dated March 2000

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Product Certified

The P2000 series measuring system consists of the following parts:

- P2000 Analyser
- Protea Control Unit

This certificate applies to all instruments fitted with software version 2.7.2 (serial number 8501226M onwards).

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: -20°C to +50°C
Instrument IP rating: IP65

Results are expressed as error % of certification range, unless otherwise stated.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
NO ₂					126s	<200s
N ₂ O					107s	<200s
SO ₂					132s	<200s
NO					136s	<200s
CO					132s	<200s
CO ₂					193s	<200s
H ₂ O					143s	<200s
Repeatability standard deviation at zero point						
NO ₂	0.01					<2.0%
N ₂ O	0.06					<2.0%
SO ₂	0.14					<2.0%
NO	0.16					<2.0%
CO	0.14					<2.0%
CO ₂	0.01					<2.0%
H ₂ O	0.01					<2.0%
Repeatability standard deviation at reference point						
NO ₂	0.20					<2.0%
N ₂ O	0.23					<2.0%
SO ₂	0.13					<2.0%
NO	0.15					<2.0%
CO	0.19					<2.0%
CO ₂	0.08					<2.0%
H ₂ O	0.08					<2.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Lack-of-fit						
NO ₂		0.54				<2.0%
N ₂ O			1.85			<2.0%
SO ₂	-0.27					<2.0%
NO		0.85				<2.0%
CO	0.33					<2.0%
CO ₂		0.63				<2.0%
H ₂ O			1.52			<2.0%
Influence of ambient temperature zero point						
NO ₂	-0.20					<5.0%
N ₂ O	-0.46					<5.0%
SO ₂		0.85				<5.0%
NO				-2.69		<5.0%
CO			1.32			<5.0%
CO ₂	0.15					<5.0%
H ₂ O	-0.32					<5.0%
Influence of ambient temperature reference point						
NO ₂		0.96				<5.0%
N ₂ O				2.41		<5.0%
SO ₂				4.71		<5.0%
NO				-4.65		<5.0%
CO				-4.14		<5.0%
CO ₂				2.41		<5.0%
H ₂ O			1.30			<5.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of sample gas pressure						
NO ₂		0.64				<2.0%
N ₂ O		-0.54				<2.0%
SO ₂	0.42					<2.0%
NO		-0.53				<2.0%
CO	-0.45					<2.0%
CO ₂		-0.80				<2.0%
H ₂ O	-0.46					<2.0%
Influence of voltage variations 190 to 250V						
NO ₂	0.40					<2.0%
N ₂ O	0.14					<2.0%
SO ₂	-0.41					<2.0%
NO	0.25					<2.0%
CO	0.31					<2.0%
CO ₂	0.30					<2.0%
H ₂ O	0.26					<2.0%
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s ²)					No Effect	To be reported
Cross-sensitivity at zero with interferents: O ₂ , H ₂ O, CO, CO ₂ , CH ₄ , N ₂ O, NO, NO ₂ , NH ₃ , SO ₂ , HCl						
NO ₂				3.00		<4.0%
N ₂ O	0.00					<4.0%
SO ₂				-3.33		<4.0%
NO				-2.14		<4.0%
CO				-2.60		<4.0%
CO ₂			1.48			<4.0%
H ₂ O	0.00					<4.0%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Cross-sensitivity at reference with interferents: O ₂ , H ₂ O, CO, CO ₂ , CH ₄ , N ₂ O, NO, NO ₂ , NH ₃ , SO ₂ , HCl						
NO ₂				3.00		<4.0%
N ₂ O				-2.20		<4.0%
SO ₂				2.11		<4.0%
NO				3.01		<4.0%
CO				2.22		<4.0%
CO ₂				3.57		<4.0%
H ₂ O				-3.48		<4.0%
Measurement uncertainty						
NO ₂					7.9%	Guidance - at least 25% below max permissible uncertainty
N ₂ O					4.3%	
SO ₂					11.7%	
NO					11.6%	
CO					7.5%	
CO ₂					6.0%	
H ₂ O					5.2%	
Calibration function (field)						
NO ₂					0.9343	>0.90
N ₂ O					0.9999	>0.90
SO ₂					0.9971	>0.90
NO					0.9822	>0.90
CO					0.9430	>0.90
CO ₂					0.9841	>0.90
H ₂ O					0.9546	>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)						
NO ₂					85s	<200s
N ₂ O					82s	<200s
SO ₂					80s	<200s
NO					78s	<200s
CO					81s	<200s
CO ₂					61s	<200s
H ₂ O					90s	<200s
Lack of fit (field)						
NO ₂			-1.47			<2.0%
N ₂ O		-0.95				<2.0%
SO ₂		-0.87				<2.0%
NO			1.71			<2.0%
CO			1.60			<2.0%
CO ₂			1.86			<2.0%
H ₂ O			-1.57			<2.0%
Maintenance interval					Note 1 1 Month	>8 days
Zero and Span drift requirement	<p>The CEMs have check facilities that can be operated manually or be programmed to be carried out at different time intervals.</p> <p>The automatic zero facility was operating successfully at the specified times. The span test facility gave satisfactory results (and these were also within specification throughout the field test with no adjustment). The status signals operated correctly.</p>					<p>Clause 6.13 & 10.13</p> <p>Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.</p>

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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						
NO ₂		0.80				<3.0%
N ₂ O		0.80				<3.0%
SO ₂				-2.50		<3.0%
NO				-2.30		<3.0%
CO				2.30		<3.0%
CO ₂	0.00					<3.0%
H ₂ O	0.30					<3.0%
Change in reference point over maintenance interval						
NO ₂			1.30			<3.0%
N ₂ O			1.80			<3.0%
SO ₂				-2.90		<3.0%
NO				2.90		<3.0%
CO				2.10		<3.0%
CO ₂				2.90		<3.0%
H ₂ O				2.30		<3.0%
Availability						
SO ₂ , NO, CO, CO ₂ , H ₂ O					95.4%	>95%
NO ₂ N ₂ O					99.2%	>95%
Reproducibility						
NO ₂			1.60			<3.3%
N ₂ O		0.80				<3.3%
SO ₂				2.60		<3.3%
NO				2.60		<3.3%
CO				2.40		<3.3%
CO ₂				2.40		<3.3%
H ₂ O		0.60				<3.3%

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Note 1: The P2000 has a maintenance interval of 1 month. The work details below has to be carried out at regular intervals, depending on local conditions:

Check that the analyser(s) and associated units are functioning correctly by logging and comparing the “test screen” readings with those previously logged.

Select zero gas purge and verify the P2000 indicates zero within 2% of span, then select span gas and verify it is within 2% FSD of the cylinders' certified concentrations.

If the system outputs are connected to a plant DCS verify that the current readings are displayed correctly on the DCS display.

Before leaving site ensure that the system is left in its normal operational mode.

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Description

The P2000 analyser comprises a stack mounted probe and a separate control unit. The analyser performs measurements of the components of stack gases and operates by using the infrared absorption of the gases being measured.

Selected infrared wavelengths signals are sequentially measured by the analyser, seven times per second, each corresponding to an absorption feature of the individual gas.

Both measurement and reference wavelength filters are used together with gas filter correlation cells to determine changes in absorption. These changes are mapped to concentration using a mathematical algorithm, which also corrects for the influence of pressure, temperature and interfering gases. Sample pressure change compensation must be enabled.

The output of the separate analyser control unit can be configured by the user to display transmitted and concentration in various units.

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 V11 for certificate No. Sira MC050060/13
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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