

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

Serinus 50 SO₂ Analyser

manufactured by:

ABB S.p.A.

Via L. Lama 33
20099 Sesto S. Giovanni (MI)
Italy

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

**MCERTS Performance Standards for Continuous Ambient Air Quality
Monitoring Systems, Version 6, dated December 2008,**

Certification Ranges :

SO₂ 0 to 400 ppb

Project No: 16A22352
Certificate No: Sira MC100175/03
Initial Certification: 25 February 2010
This Certificate Issued: 15 May 2013
Renewal Date: 24 February 2015

R Cooper | Eng MInst MC

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

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To authenticate the validity of this certificate please visit www.siracertification.com/mcerts
Registered Office: Rake Lane, Eccleston, Chester, UK CH4 9JN*

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

All tests have been conducted in accordance with BS EN 14212. On the basis of these tests this certificate is valid when the instrument is used for urban air quality monitoring and similar applications.

The field trial was conducted on an urban background site for 3 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:

Sira Report 674/0362 dated 17th February 2010

Product Certified

The Serinus 50 SO₂ analyser measuring system consists of the following parts:

- Hydrocarbon 'kicker'
- Lamp
- Reference detector
- Reaction cell
- Photomultiplier tube

This certificate applies to all instruments fitted with software version 1.23.0000 (serial number 10-0141 onwards).

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: 0°C to +30°C

Note: 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.

| Test | Results expressed as % of measured value | | | | Other results | MCERTS specification Note: nmol/mol = ppb |
|--|--|----|------|----|-----------------|--|
| | <0.5 | <1 | <2 | <5 | | |
| Repeatability at zero | | | | | 0.183 nmol/mol | <1 nmol/mol |
| Repeatability at hourly limit value | | | | | 0.435 nmol/mol | <3 nmol/mol |
| Residual lack of fit at zero | | | | | 1.802 nmol/mol | <5 nmol/mol |
| Lack of fit (largest residual from the linear regression line) | | | 1.07 | | | <4% |
| Sensitivity coefficient to sample gas pressure | | | | | 0.595 nmol/mol | <3 nmol/mol/kPa |
| Sensitivity coefficient to sample gas temperature | | | | | 0.313 nmol/mol | <1 nmol/mol/K |
| Sensitivity coefficient to surrounding air temperature | | | | | 0.413 nmol/mol | <1 nmol/mol/K |
| Sensitivity coefficient to electrical supply voltage | | | | | 0.011 nmol/mol | <0.3 nmol/mol/V |
| Interference by H ₂ O (at concentration of 19 nmol/mol) | | | | | 0.538 nmol/mol | <10 nmol/mol |
| Interference by H ₂ S (concentration of 200 nmol/mol) | | | | | 0.646 nmol/mol | <5 nmol/mol |
| Interference by NH ₃ (at concentration of 200 nmol/mol) | | | | | -0.295 nmol/mol | <5 nmol/mol |
| Interference by NO (at concentration of 500 nmol/mol) | | | | | 1.987 nmol/mol | <5 nmol/mol |
| Interference by NO ₂ (at concentration of 200 nmol/mol) | | | | | 0.176 nmol/mol | <5 nmol/mol |
| Interference by m-xylene (at concentration of 1 µmol/mol) | | | | | 2.436 nmol/mol | <10 nmol/mol |

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| Test | Results expressed as % of measured value | | | | Other results | MCERTS specification Note: nmol/mol = ppb |
|--|--|----|------|------|----------------|--|
| | <0.5 | <1 | <2 | <5 | | |
| Averaging effect | | | 1.55 | | | <7% |
| Short term zero drift (over 12h) | | | | | 0.653 nmol/mol | <2 nmol/mol |
| Short term span drift (over 12h) | | | | | 2.565 nmol/mol | <6 nmol/mol |
| Response time (rise) | | | | | 52.5s | 180 s |
| Response time (fall) | | | | | 54.0s | 180 s |
| Difference between rise and fall time | | | | | 6.5s | <10s |
| Reproducibility under field conditions | | | | 4.95 | | <5% averaged over three month period |
| Long term zero drift (over 3months) | | | | | 0.312 nmol/mol | <5 nmol/mol |
| Long term span drift (over 3 months) | | | | 4.39 | | <5% of the max of certification range |
| Period of unattended operation | | | | | 28 days | 3 months not less than 2 weeks |
| Availability (data capture) | | | | | 98.46% | >90% |
| Total expanded uncertainty | | | | | 14.91% | <15% |

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Description:

The measurement of sulphur dioxide (SO₂) in the Serinus 50 analyser is based on classical fluorescence spectroscopy; SO₂ absorbs ultraviolet (UV) light, becomes excited and, as a result, emits light at a different wavelength. The quantity of SO₂ present in the sample is then derived from the intensity of light emitted.

A hydrocarbon kicker is removes hydrocarbons from the sample through the use of a selective permeation device allowing only hydrocarbons to pass through its wall (the SO₂ is unaffected).

The source of the analyzer reaction is a constantly pulsing UV lamp attached to the cell. Directly across the cell from the lamp is a reference detector. The reference detector is used to monitor and correct for any changes in the UV lamp's intensity. Also attached to the reaction cell is the optical bench where the reaction is measured. A photomultiplier tube, housed in a sealed thermo-electrically cooled assembly, is used to measure the reaction.

The analyzer software automatically corrects for gas temperature and pressure changes and is referenced to 0°C, 20°C or 25°C at 1 atmosphere. The analyser can store 8 years of one minute data of up to twelve analyser parameters.

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 MC100168/02
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.

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