

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

AR 602Z (UV) & AR 650 (IR)
used either independently or in combination

manufactured by:

Opsis AB
P.O. Box 244
S-244 02 Furulund
Sweden

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, EN 15267-2 :2009, EN 15267-3 :2007
& QAL 1 as defined in EN 14181: 2014

Certification ranges:

| | AR 650 (IR) | | AR 602Z (UV) |
|------------------|-----------------------------|------------------|------------------------------|
| CO | - 0 to 75 mg/m ³ | SO ₂ | - 0 to 75 mg/m ³ |
| HCl | - 0 to 15 mg/m ³ | NO ₂ | - 0 to 20 mg/m ³ |
| H ₂ O | - 0 to 30 %vol. | NH ₃ | - 0 to 10 mg/m ³ |
| HF | - 0 to 5 mg/m ³ | NO | - 0 to 150 mg/m ³ |
| | | Formaldehyde | - 0 to 20 mg/m ³ |
| | | Phenol | - 0 to 20 mg/m ³ |
| | | H ₂ O | - 0 to 30 mg/m ³ |

Project number: 80070051
Certificate number: Sira MC020011/08
Initial certification: 01 March 2002
This certificate issued: 15 March 2021
Renewal date: 28 March 2026



Andrew Young
Environmental Team Manager

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 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

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.

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:

Basis of Certification

Original certification:

TÜV Rheinland report 936/804002/NH₃ dated 06/06/94
TÜV Rheinland report 936/800010 dated 27/06/92
TÜV Rheinland report 936/804001 from April 26, 1996 (CO, HCl and H₂O)
TÜV Rheinland report 936/21201391/A from June 30, 2004 (HF)
TÜV Rheinland report 936/80009 from August 02, 1991 (SO₂, NO and NO₂)
TÜV Rheinland report 936/806013 from August 02, 1991 (SO₂, NO and NO₂)
TÜV Rheinland report 936/807024/A from September 30, 1999 (SO₂, NO and NO₂)
TÜV Rheinland report 936/800010 from March 30, 1992 (NH₃)
TÜV Rheinland report 936/802011 from June 06, 1994 (Formaldehyde and Phenol)
TÜV Rheinland report 936/807017 from March 12, 1998 (Formaldehyde)
TÜV Rheinland report 936/800010/2 from March 01, 1993 (H₂O)
Sira report N0393 dated Feb 2002

Recertification:

TÜV Rheinland report 936/21213004/A dated 30/11/2010
TÜV Rheinland report 936/21213004/C dated 30/11/2010
Sira Evaluation Report 16A24051 (AR 650) dated 21/01/2011
Sira Evaluation Report 16A24051 (AR 602Z) dated 21/01/2011

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Product Certified

The AR650/602Z measuring system consists of the following parts:

- Receiver unit (Model RE062)
- Transmitter unit (Model EM 062-A)
- Control unit (analyser)

This certificate applies to all instruments fitted with software version 7.21 onwards (serial number 160 onwards).

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: Stack components -30°C to +60°C
Control unit +5°C to +35°C

IP rating: IP20: Analyser, must be placed in a protected area
IP54: Duct mounted parts (transmitter & receiver unit)

Unless otherwise stated the evaluation was carried out on the certification ranges, CO 0 to 75mg/m³, HCl 0 to 15mg/m³, H₂O 0 to 30 %vol. (IR), HF 0 to 5 mg/m³, SO₂ 0 to 75mg/m³, NO₂ 0 to 20mg/m³, NH₃ 0 to 10mg/m³, NO 0 to 150mg/m³, Formaldehyde 0 to 20 mg/m³, Phenol 0 to 20 mg/m³, H₂O 0 to 30 mg/m³ (UV).

| Test | Results expressed as % of the certification range | | | | Other results | MCERTS specification |
|--|---|-----|-----|----|---------------|----------------------|
| | <0.5 | <1 | <2 | <5 | | |
| Response time | | | | | | |
| CO | | | | | <120s | <200s |
| HCl | | | | | <120s | <400s |
| H ₂ O (30 %vol.) | | | | | <120s | <200s |
| HF | | | | | <120s | <400s |
| SO ₂ | | | | | <180s | <200s |
| NO ₂ | | | | | <180s | <200s |
| NH ₃ | | | | | <180s | <400s |
| NO | | | | | <180s | <200s |
| Formaldehyde | | | | | <180s | <200s |
| Phenol | | | | | <180s | <200s |
| H ₂ O (30 mg/m ³) | | | | | <180s | <200s |
| Repeatability standard deviation at zero point | | | | | | |
| CO | | 0.8 | | | | <2.0% |
| HCl | | | 1.8 | | | <2.0% |
| H ₂ O (30 %vol.) | 0.1 | | | | | <2.0% |
| HF | 0.8 | | | | | <2.0% |
| SO ₂ | 0.1 | | | | | <2.0% |
| NO ₂ | 0.3 | | | | | <2.0% |

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| Test | Results expressed as % of the certification range | | | | Other results | MCERTS specification |
|---|---|-------|-------|----|---------------|----------------------|
| | <0.5 | <1 | <2 | <5 | | |
| NH ₃ | | 0.8 | | | | <2.0% |
| NO | 0.1 | | | | | <2.0% |
| Formaldehyde | 0.5 | | | | | <2.0% |
| Phenol | 0.1 | | | | | <2.0% |
| H ₂ O (30 mg/m ³) | 0.2 | | | | | <2.0% |
| Repeatability standard deviation at reference point | | | | | | |
| CO | 0.4 | | | | | <2.0% |
| HCl | | | 1.3 | | | <2.0% |
| H ₂ O (30 %vol.) | 0.2 | | | | | <2.0% |
| HF | | 0.9 | | | | <2.0% |
| SO ₂ | 0.1 | | | | | <2.0% |
| NO ₂ | 0.2 | | | | | <2.0% |
| NH ₃ | | | 1.2 | | | <2.0% |
| NO | 0.2 | | | | | <2.0% |
| Formaldehyde | 0.4 | | | | | <2.0% |
| Phenol | 0.5 | | | | | <2.0% |
| H ₂ O (30 mg/m ³) | 0.3 | | | | | <2.0% |
| Lack-of-fit | | | | | | |
| CO | | 0.93 | | | | <2.0% |
| HCl | | | 2.00 | | | <2.0% |
| H ₂ O (30 %vol.) | | 0.67 | | | | <2.0% |
| HF | | | -1.80 | | | <2.0% |
| SO ₂ | | 0.63 | | | | <2.0% |
| NO ₂ | | 0.70 | | | | <2.0% |
| NH ₃ | | 0.70 | | | | <2.0% |
| NO | | -0.73 | | | | <2.0% |
| Formaldehyde | | 1.00 | | | | <2.0% |

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|---|---|-------|-------|------|---------------|----------------------|
| | <0.5 | <1 | <2 | <5 | | |
| Phenol | 0.50 | | | | | <2.0% |
| H ₂ O (30 mg/m ³) | | 1.00 | | | | <2.0% |
| Influence of ambient temperature zero point | | | | | | |
| CO | -0.40 | | | | | <5.0% |
| HCl | 0.20 | | | | | <5.0% |
| H ₂ O (30 %vol.) | 0.00 | | | | | <5.0% |
| HF | | | -1.20 | | | <5.0% |
| SO ₂ | -0.20 | | | | | <5.0% |
| NO ₂ | 0.20 | | | | | <5.0% |
| NH ₃ | 0.10 | | | | | <5.0% |
| NO | -0.10 | | | | | <5.0% |
| Formaldehyde | -0.40 | | | | | <5.0% |
| Phenol | 0.10 | | | | | <5.0% |
| H ₂ O (30 mg/m ³) | 0.20 | | | | | <5.0% |
| Influence of ambient temperature reference point | | | | | | |
| CO | | | -1.20 | | | <5.0% |
| HCl | 0.20 | | | | | <5.0% |
| H ₂ O (30 %vol.) | 0.03 | | | | | <5.0% |
| HF | | | | 4.00 | | <5.0% |
| SO ₂ | 0.50 | | | | | <5.0% |
| NO ₂ | -0.50 | | | | | <5.0% |
| NH ₃ | | -1.00 | | | | <5.0% |
| NO | 0.10 | | | | | <5.0% |
| Formaldehyde | -0.50 | | | | | <5.0% |
| Phenol | 0.50 | | | | | <5.0% |
| H ₂ O (30 mg/m ³) | 0.30 | | | | | <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 | | | | | | |
| CO | | -0.53 | | | | <2.0% |
| HCl | | -0.89 | | | | <2.0% |
| H ₂ O (30 % ^{vol.}) | -0.33 | | | | | <2.0% |
| HF | -0.47 | | | | | <2.0% |
| SO ₂ | -0.49 | | | | | <2.0% |
| NO ₂ | | -0.67 | | | | <2.0% |
| NH ₃ | | | 1.21 | | | <2.0% |
| NO | 0.33 | | | | | <2.0% |
| Formaldehyde | -0.50 | | | | | <2.0% |
| Phenol | -0.50 | | | | | <2.0% |
| H ₂ O (30 mg/m ³) | 0.11 | | | | | <2.0% |
| Influence of voltage variations 190 to 250V | | | | | | |
| CO | 0.50 | | | | | <2.0% |
| HCl | | -0.90 | | | | <2.0% |
| H ₂ O (30 % ^{vol.}) | -0.10 | | | | | <2.0% |
| HF | | -0.80 | | | | <2.0% |
| SO ₂ | 0.20 | | | | | <2.0% |
| NO ₂ | 0.50 | | | | | <2.0% |
| NH ₃ | | -1.00 | | | | <2.0% |
| NO | 0.10 | | | | | <2.0% |
| Formaldehyde | | 0.90 | | | | <2.0% |
| Phenol | 0.20 | | | | | <2.0% |
| H ₂ O (30 mg/m ³) | | 0.70 | | | | <2.0% |
| Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s ²) | | | | | Note 1 | 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 with interferents: O ₂ , H ₂ O, CO, CO ₂ , CH ₄ , N ₂ O, NO, NO ₂ , NH ₃ , SO ₂ , HCl | | | | | | |
| CO | -0.44 | | | | | <4.0% |
| HCl | 0.00 | | | | | <4.0% |
| H ₂ O (30 % ^{vol.}) | -0.67 | | | | | <4.0% |
| HF | 0.00 | | | | | <4.0% |
| SO ₂ | | | -1.21 | | | <4.0% |
| NO ₂ | | | | 2.60 | | <4.0% |
| NH ₃ | | | 2.00 | | | <4.0% |
| NO | | | | | Note 2 | <4.0% |
| Formaldehyde | 0.40 | | | | | <4.0% |
| Phenol | | | 2.00 | | | <4.0% |
| H ₂ O (30 mg/m ³) | | | | | Note 2 | <4.0% |
| 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 | | | | | | |
| CO | 0.84 | | | | | <4.0% |
| HCl | 0.94 | | | | | <4.0% |
| H ₂ O (30 % ^{vol.}) | 0.57 | | | | | <4.0% |
| HF | 0.00 | | | | | <4.0% |
| SO ₂ | | | -1.96 | | | <4.0% |
| NO ₂ | | | | -2.85 | | <4.0% |
| NH ₃ | | | | 2.30 | | <4.0% |
| NO | | | | | Note 2 | <4.0% |
| Formaldehyde | 0.50 | | | | | <4.0% |
| Phenol | | | 1.35 | | | <4.0% |
| H ₂ O (30 mg/m ³) | | | | | Note 2 | <4.0% |

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| Test | Results expressed as % of the certification range | | | | Other results | MCERTS specification |
|---|---|-------|-------|------|---------------|----------------------|
| | <0.5 | <1 | <2 | <5 | | |
| Excursion of measurement beam of cross-stack in-situ CEMS | | | | | | |
| CO | | 0.93 | | | | <2.0% |
| HCl | | | | 1.33 | | <2.0% |
| H ₂ O (30 %vol.) | | -0.85 | | | | <2.0% |
| HF | | | -1.25 | | | <2.0% |
| SO ₂ | | -0.64 | | | | <2.0% |
| NO ₂ | | | 1.25 | | | <2.0% |
| NH ₃ | | | 2.00 | | | <2.0% |
| NO | | -0.62 | | | | <2.0% |
| Formaldehyde | | | 1.80 | | | <2.0% |
| Phenol | | 0.70 | | | | <2.0% |
| H ₂ O (30 mg/m ³) | | -0.77 | | | | <2.0% |
| Converter Efficiency | | | | | N/A | >95% |

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|--|---|----|----|----|---------------|----------------------|
| | <0.5 | <1 | <2 | <5 | | |
| Measurement uncertainty | | | | | | |
| CO | | | | | 6.9% | 7.5% |
| HCl | | | | | 12.5% | 30% |
| H ₂ O (30 % ^{vol.}) | | | | | 14.7% | 22.5% |
| HF | | | | | 2.6% | 30% |
| SO ₂ | | | | | 6.7% | 15% |
| NO ₂ | | | | | 6.3% | 15% |
| NH ₃ | | | | | 24.5% | 30% |
| NO | | | | | 5% | 15% |
| Formaldehyde | | | | | 12.7% | 22.5% |
| Phenol | | | | | 6.4% | 22.5% |
| H ₂ O (30 mg/m ³) | | | | | 5.1% | 7.5% |
| Calibration function (field) | | | | | | |
| CO | | | | | 0.99-0.97 | >0.90 |
| HCl | | | | | 0.97-0.93 | >0.90 |
| H ₂ O (30 % ^{vol.}) | | | | | 1.00 | >0.90 |
| HF | | | | | 1.00-0.90 | >0.90 |
| SO ₂ | | | | | 1.00 | >0.90 |
| NO ₂ | | | | | 1.00-0.99 | >0.90 |
| NH ₃ | | | | | 1.00-0.99 | >0.90 |
| NO | | | | | 1.00-0.91 | >0.90 |
| Formaldehyde | | | | | 0.97-0.95 | >0.90 |
| Phenol | | | | | 0.99 | >0.90 |
| H ₂ O (30 mg/m ³) | | | | | 0.97-0.90 | >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) | | | | | | |
| CO | | | | | <120s | <200s |
| HCl | | | | | <120s | <400s |
| H ₂ O (30 % ^{vol.}) | | | | | <120s | <200s |
| HF | | | | | <120s | <400s |
| SO ₂ | | | | | <180s | <200s |
| NO ₂ | | | | | <180s | <200s |
| NH ₃ | | | | | <180s | <400s |
| NO | | | | | <180s | <200s |
| Formaldehyde | | | | | <180s | <200s |
| Phenol | | | | | <180s | <200s |
| H ₂ O (30 mg/m ³) | | | | | <180s | <200s |
| Lack of fit (field) | | | | | | |
| CO | | -0.93 | | | | <2.0% |
| HCl | | 0.67 | | | | <2.0% |
| H ₂ O (30 % ^{vol.}) | | | <2.00 | | Note 3 | <2.0% |
| HF | | | <2.00 | | Note 3 | <2.0% |
| SO ₂ | -0.40 | | | | | <2.0% |
| NO ₂ | | | <2.00 | | Note 3 | <2.0% |
| NH ₃ | | | -1.30 | | | <2.0% |
| NO | | -0.60 | | | | <2.0% |
| Formaldehyde | | 1.00 | | | | <2.0% |
| Phenol | | | 1.50 | | | <2.0% |
| H ₂ O (30 mg/m ³) | | | <2.00 | | Note 3 | <2.0% |

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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 |
| CO | | | | | 6-months | >8 days |
| HCl | | | | | 6-months | >8 days |
| H ₂ O (30 %vol.) | | | | | 6-months | >8 days |
| HF | | | | | 1-month | >8 days |
| SO ₂ | | | | | 6-months | >8 days |
| NO ₂ | | | | | 6-months | >8 days |
| NH ₃ | | | | | 6-months | >8 days |
| NO | | | | | 3-months | >8 days |
| Formaldehyde | | | | | 1-month | >8 days |
| Phenol | | | | | 1-month | >8 days |
| H ₂ O (30 mg/m ³) | | | | | 1-month | >8 days |
| Zero and Span drift requirement | The CEM does not contain an automatic correction of zero and span drift. | | | | | Clause 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift. |

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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 | | | | | | |
| CO | 0.40 | | | | | <3.0% |
| HCl | | 0.60 | | | | <3.0% |
| H ₂ O (30 %vol.) | | | 2.00 | | Note 4 | <3.0% |
| HF | | | 2.00 | | Note 4 | <3.0% |
| SO ₂ | 0.30 | | | | Note 4 | <3.0% |
| NO ₂ | | | 1.50 | | Note 4 | <3.0% |
| NH ₃ | | | 2.00 | | Note 4 | <3.0% |
| NO | 0.50 | | | | Note 4 | <3.0% |
| Formaldehyde | | 1.00 | | | Note 4 | <3.0% |
| Phenol | | 1.00 | | | Note 4 | <3.0% |
| H ₂ O (30 mg/m ³) | | | 1.50 | | Note 4 | <3.0% |
| Change in reference point over maintenance interval | | | | | | |
| CO | | 1.00 | | | | <3.0% |
| HCl | | 1.00 | | | | <3.0% |
| H ₂ O (30 %vol.) | | | | 3.00 | Note 4 | <3.0% |
| HF | | | | 3.00 | Note 4 | <3.0% |
| SO ₂ | | | 2.00 | | Note 4 | <3.0% |
| NO ₂ | | | | 3.00 | Note 4 | <3.0% |
| NH ₃ | | | | 3.00 | Note 4 | <3.0% |
| NO | | | 2.00 | | Note 4 | <3.0% |
| Formaldehyde | | | | 2.30 | Note 4 | <3.0% |
| Phenol | | | 2.00 | | Note 4 | <3.0% |
| H ₂ O (30 mg/m ³) | | | | 3.00 | Note 4 | <3.0% |
| Availability | | | | | >95.4% | >95% (>98% for O ₂) |

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| Reproducibility | | | | | |
|--|--|------|------|------|-------|
| CO | | | | 2.10 | <3.3% |
| HCl | | | 1.20 | | <3.3% |
| H ₂ O (30 % ^{vol.}) | | 0.70 | | | <3.3% |
| HF | | 1.00 | | | <3.3% |
| SO ₂ | | | | 2.20 | <3.3% |
| NO ₂ | | | 1.50 | | <3.3% |
| NH ₃ | | | 1.80 | | <3.3% |
| NO | | | | 2.90 | <3.3% |
| Formaldehyde | | | 1.70 | | <3.3% |
| Phenol | | | | 2.80 | <3.3% |
| H ₂ O (30 mg/m ³) | | | | 2.30 | <3.3% |

Note 1: The instrument exhibited some moderate resonances. Some resonances caused the light source to go out. The effect was only temporary and the system functioned correctly once restored. The instrument did not appear to suffer any mechanical degradation (pre and post calibration).

Note 2: All deviations below 0.5% are considered to be negligible and not reported.

Note 3: Based on field calibration function test and laboratory lack of fit test. The lack of fit in the field must be verified during every check of installation of the CEM.

Note 4: Results taken from original report from initial certification, no additional testing required.

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Description

The OPSIS CEM system is a cross stack flue gas measurement system that uses either an AR602Z (UV) analyser or a AR650 (IR) or a combination of both depending on the range of pollutants to be measured. A combination system was tested for MCERTS.

The AR 602Z is based upon UV absorption techniques for measuring SO₂, NO and NO₂, H₂O, HCl, NH₃, Hg and CO₂.

The AR 650 is based upon IR absorption techniques for measuring CO, HCl, HF and H₂O. The transmitter and receiver units are mounted opposite each other on a duct or stack. The receiver is connected to the control units by fibre optic cable. A common transmitter/receiver assembly is used with both control units.

This certificate applies to the AR602Z (UV) and AR650 (IR) either individually or in combination for the gases listed on page 1 of this certificate only.

Other gases can be measured with this system but were not tested as part of MCERTS.

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 defined in the Sira Design Schedule for certificate No. Sira MC 020011/07
3. 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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