

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

AMS CO-NO_x-O₂ with Enox 5

Manufactured by:

Fer Strumenti Srl

via G Ripamonti
58 Seregno (MB)
Italy

has been assessed by CSA Group
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)

Updated 28 August 2024

EN 15267-1:2023, EN15267-2:2023, EN 15267-3:2007

& QAL 1 as defined in EN 14181: 2014

	<i>Certification range</i>	<i>Supplementary range</i>
CO	0 - 50mg/m ³	0 - 300mg/m ³
NO _x *	0 - 76.7mg/m ³	0 - 613.3mg/m ³
O ₂	1 - 22 vol. %	

(*expressed as NO₂, corresponds to 0-50mg/m³ and 0-400mg/m³ expressed as NO, respectively)

Project No.: 80291231
Certificate No: CSA MC210382/03
Initial Certification: 09 April 2021
This Certificate issued: 26 March 2026
Renewal Date: 08 April 2031



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MCERTS is operated on behalf of the Environment Agency by

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The MCERTS certificate consists of this document in its entirety.

For conditions of use, please consider all the information within.

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Approved Site Application

Any potential user should make sure, in consultation with the manufacturer, that the monitoring system is suitable for the intended application. For further information on stack emissions monitoring refer to the Environment Agency's guidance available at www.mcerts.net

This instrument is considered suitable for use on waste incineration and large combustion plants. 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 applications.

The field test was conducted at a power plant, over a three-month period between 11th June 2020 and the 2nd October 2020 for CO and NO_x, and until March 2021 for O₂.

Basis of Certification

This certification is based on the following test report(s) and on CSA Group's assessment and ongoing surveillance of the product and the manufacturing process:

TÜV SÜD Industrie Service GmbH, Niederlassung München, ref. 2448303, dated 03 February 2021
TÜV SÜD Industrie Service GmbH, Niederlassung München, ref. 3441289, dated 05 May 2021

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Product Certified

The 'AMS CO-NO_x-O₂ with Enox 5' measuring system consists of the following parts:

- Fer Strumenti sample probe (type 7030)
- Raco sas heated sample line (type K4842702)
- Bühler Technologies compressor cooler (type EGK½)
- KNF Neuberger GmbH sample gas feeder pump (type N86 KTE)
- Pfannenberg air conditioner unit (type DTI 6X1E)
- Fer Strumenti analysers (Enox 5 multigas NDIR analyser and O₂ analyser E705 zirconium dioxide measurement cell)
- Cabinet

Key components:

- | | |
|------------------------------|--|
| 1. Sample Probe | - Model: Fer Strumenti 7030 |
| 2. Heated Filter | - Model: Fer Strumenti 7030 |
| 3. Heated Sample Line | - Model: Raco sas K4842702, 6mm diameter, 140o-180oC |
| 4. Gas Conditioning | - Model: Bühler Technologies EGK compressor cooler, KNF Neuberger sample gas feeder pump and Pfannenberg air conditioner |
| 5. Analyser | - Model: Fer Strumenti Enox 5 multigas NDIR analyser and E705 zirconium dioxide measurement cell |

Allowable variations could include:

- A different brand or model of sampling system of the same type, provided that there is evidence the alternative system works with similar types of CEMS.
- Additional manifolds and heated valves used to allow more than one analyser to share a sampling system.

For the Enox 5 multigas analyser this certificate applies to all instruments fitted with software GUI version 98, CORE version 140 and COmmMngr version 1000(serial number 0001) onwards.

For the E705 O₂ analyser this certificate applies to all instruments fitted with software version 2.0C (serial number T0121322) onwards.

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient temperature range: 5°C to +40°C

Instrument IP rating: IP40. Therefore, the area of use is restricted to locations with protection from splash water and for temperatures within the tested temperature range(5-40°C).

Note: For outdoor installations the analyser needs to be mounted into an IP65 environment. 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.

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

Test(Laboratory)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
CO (0 - 50mg/m ³)					69s	<200s
CO (0 - 300mg/m ³)					73s	<200s
NO (0 - 50mg/m ³)					135s	<200s
NO (0 - 400mg/m ³)					143s	<200s
O ₂					76s	<200s
Repeatability standard deviation at zero point						
CO	0.21					<2.0%
NO	0.47					<2.0%
O ₂	0.004					<0.20%
Repeatability standard deviation at reference point						
CO		0.64				<2.0%
NO		0.68				<2.0%
O ₂	0.074					<0.20%
Lack-of-fit						
CO (0 - 50mg/m ³)		0.50				<2.0%
CO (0 - 300mg/m ³)			1.90			<2.0%
NO (0 - 50mg/m ³)		-0.95				<2.0%
NO (0 - 400mg/m ³)			-1.89			<2.0%
O ₂	-0.09					<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)						
CO		-0.8				<5.0%
NO		0.8				<5.0%
O ₂	0.064					<0.50%
Influence of ambient temperature reference point (+5°C to +40°C)						
CO		0.8				<5.0%
NO		-0.8				<5.0%
O ₂	0.090					<0.50%
Influence of sample gas flow for extractive CEMS						
CO (zero)			1.49			<2.0%
CO (span)		-0.85				<2.0%
NO (zero)	-0.40					<2.0%
NO (span)	0.15					<2.0%
O ₂ (zero)	0.07					<0.20%
O ₂ (span)	0.17					<0.20%
Influence of voltage variations (range 196 to 253V, 230AV)						
CO (zero)		-0.54				<2.0%
CO (span)		-0.92				<2.0%
NO (zero)			-1.06			<2.0%
NO (span)			-1.10			<2.0%
O ₂ (zero)	0.012					<0.20%
O ₂ (span)	0.036					<0.20%

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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 - 50mg/m ³)				-2.3		<4.0%
CO (0 - 300mg/m ³)			1.1			<4.0%
NO (0 - 50mg/m ³)				-3.7		<4.0%
NO (0 - 400mg/m ³)				-3.3		<4.0%
O ₂	0.15					<0.40%
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 - 50mg/m ³)				3.0		<4.0%
CO (0 - 300mg/m ³)			-1.8			<4.0%
NO (0 - 50mg/m ³)				2.8		<4.0%
NO (0 - 400mg/m ³)				-3.2		<4.0%
O ₂	0.31					<0.40%
Converter Efficiency for CEM measuring NO _x					96.4%	≥95%
Measurement uncertainty					Guidance - at least 25% below max permissible uncertainty	
CO (For an ELV of 40mg/m ³)					7.1%	<7.5% (10%)
NO (For an ELV of 25mg/m ³)					14.5%	<15% (20%)
O ₂ (For an ELV of 21 Vol. -%)					2.8%	<7.5% (10%)

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Test(Field)	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Calibration function (field)						
CO					0.9999	≥0.90
NO					0.9528	≥0.90
O ₂					1.000	≥0.90
Response time (field)						
CO					107s	<200s
NO					169s	<200s
O ₂					156s	<200s
Lack of fit (field)						
CO		0.9				≤2.0%
NO			-1.7			≤2.0%
O ₂	0.20					≤0.20%
Maintenance interval					4 weeks	>8 days
Zero and span drift requirement	The Enox 5 is aligned at certain intervals and after a re-start, as otherwise contamination in the pipes and filters or cooler can falsify the measured values. This involves applying the zero gas at the measurement gas entry point. The maximum possible configurable time frame for automatic zero-alignment is every 600 minutes, with ambient air as zero gas. The standard period for auto -zero in the field test was set to 6 hours. The automatic zero-alignment routine was assessed at this test point. The Enox 5 can be corrected both automatically and manually. For the O ₂ measurement in the E705 analyser the zero/span point is corrected manually.					Clause 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.
Change in zero point over maintenance interval						
CO	0.1					≤3.0%
NO	0.1					≤3.0%
O ₂	0.17					≤0.20%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Change in reference point over maintenance interval						
CO				-2.8		≤3.0%
NO				2.9		≤3.0%
O ₂	0.17					≤0.20%
Availability						
CO and NO					95%	≥95%
O ₂					98%	≥98%
Reproducibility						
CO	0.32					≤3.3%
NO			1.49			≤3.3%
O ₂	0.20					≤0.20%

Notes:

1. The emission limit value for CO matching the maximum uncertainty requirement of EN 15267-3 is 40 mg/m³.
2. The emission limit value for NO matching the maximum uncertainty requirement of EN 15267-3 is 25 mg/m³, corresponding to 38.3 mg/m³ NO₂.
3. The CEMS shall be operated at an interval of 6 hours for the automatic cycle to adjust CO and NO measurement channel at zero point.

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Description

The AMS CO-NO_x with Enox 5 system continuously measures CO and NO_x in flue gas. The system samples the gas and transfers it to the analyzer, following drying and filtration. The infrared sensor within the Enox 5 analyser is controlled at very low temperatures by a Peltier based cooler. The infrared light absorbed from the specific gas within the measuring cell follows the fundamentals of Beer-Lambert's law. The CO-NO_x content is calculated electronically using the sensor output linearized with a 5-point polynomial function, with continuous CO₂ and H₂O compensation and an ambient pressure correction.

The E705 system continuously measures O₂ in flue gas. The system samples the gas and transfers to the analyzer following drying and filtration. The zirconia sensor within the E705 analyser is controlled at approximately 690°C by an integrated heater. The sensor uses a Nernstian response for the ratio of the reference and measured partial pressure of the O₂. The O₂ content is calculated electronically from the temperature compensated sensor.

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 CSA Group Testing UK Ltd Certificates'.
2. The design of the product certified is defined in the CSA Group design schedule for certificate No. CSA MC210382.
3. If a certified product is found not to comply, CSA Group should be notified immediately at the address shown on this certificate.
4. The certification marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of CSA Group Testing UK Ltd Certificates'.
5. This document remains the property of CSA Group and shall be returned when requested by CSA Group.

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