PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

MGAprime Q

manufactured by:

MRU GmbH

Fuchshalde 8
Neckarsulm, 74172
Germany

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"
- Transportable Continuous Emissions Monitoring Systems(T-CEMS)
Published 20 October 2020
EN 15267-1:2009, EN 15267-2:2009, EN 15267-4:2017
QAL 1

	Certification ranges:	Supplementary ranges:
CO	0 - 220 mg/m^3	0 - 3,750 mg/m^3
CO_2	0 - 20 vol. %	
NO	0 - 270 mg/m^3	0 - 2,680 mg/m^3
NO_2	0 - 308 mg/m^3	0 - 1,025 mg/m^3
O_2	0 - 25 vol. %	

Project number:	80049732
Certificate number:	Sira MC200366/00
Initial certification:	22 December 2020
This certificate issued:	22 December 2020
Renewal date:	21 December 2025

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service
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UKAS PRODUCT CERTIFICATION 0011

Form 1335
Issue 9

Certificate contents

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 technical guidance on monitoring, available at www.mcerts.net

On the basis of the assessment this instrument is considered suitable for use with standard reference methods and for verifying and calibrating installed CEMS, according to the requirements of EN 14181, provided it meets the certified range requirements specified by legislation.

Any potential user should ensure that the monitoring system meets the certified range requirements specified by legislation.

The field test was conducted at five different plants, including a coal fired and a biomass heating plant.

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 Rheinland Energy GmbH, Report no.: 936/21245785/A_EN, Cologne, 2 March 2020

Product certified

The MGAprime Q measuring system consists of the following parts:

- the HPI sample probe and heating hose (3.0m)
- the MGAprime Q analyser
- APE unit (for injecting phosphoric acid into the test gas cooler
- The heated line and the sample inlet

This certificate applies to all instruments fitted with software version: v1.001.029 and serial number 63107 onwards.

Certified performance

The instrument was evaluated for use under the following conditions:

Ambient temperature range: +5°C to +40°C
Instrument IP rating: IP42

Note: IP degree of protection – IP42 complies with the minimum requirements as the system is designed for mounting at sheltered sites where no more than dripping water at an incline can be expected.

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		
Laboratory Testing - Response time						
CO (0 – 220 mg/m^3)					95s	<200s
CO (0 – 3,750 mg/m^3)					125s	<200s
CO_2 (0 – 20 vol. %)					136s	<200s
NO (0 – 270 mg/m^3)					110s	<200s
NO (0 – 2,680 mg/m^3)					106s	<200s
NO_2 (0 – 308 mg/m^3)					128s	<200s
NO_2 (0 – 1,025 mg/m^3)					98s	<200s
O_2 (0 – 25 vol. %)					52s	<200s
Repeatability standard deviation at zero point						
CO (0 – 220 mg/m^3)	0.1					<2.0%
CO_2 (0 – 20 vol. %)	0.1					<2.0%
NO (0 – 270 mg/m^3)	0.3					<2.0%
NO_2 (0 – 308 mg/m^3)	0.1					<2.0%
O_2 (0 – 25 vol. %)	0.07					<0.2%
Repeatability standard deviation at span point						
CO (0 - 220mg/m^3)	0.4					<2.0%
CO_2 (0 – 20 vol. %)	0.1					<2.0%
NO (0 – 270 mg/m^3)		0.7				<2.0%
NO_2 (0 – 308 mg/m^3)	0.2					<2.0%
O_2 (0 – 25 vol. %)	0.01					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Lack of fit						
CO (0 – 220 mg/m^3)	0.45					<2.0%
CO (0 – 3,750 mg/m^3)	-0.29					<2.0%
CO_2 (0 – 20 vol. %)			1.00			<2.0%
NO (0 – 270 mg/m^3)		0.74				<2.0%
NO (0 – 2,680 mg/m^3)		-0.52				<2.0%
NO_2 (0 – 308 mg/m^3)		-0.62				<2.0%
NO_2 (0 – 1,025 mg/m^3)	0.49					<2.0%
O_2 (0 – 25 vol. %)	0.02					<0.3%
Influence of ambient temperature zero point (+5°C to +40°C)						
CO (0 - 220 mg/m^3)	-0.4					<5.0%
CO_2 (0 - 20 vol. %)	0.1					<5.0%
NO (0 - 270 mg/m^3)	0.4					<5.0%
NO_2 (0 - 308 mg/m^3)	0.2					<5.0%
O_2 (0 - 25 vol. %)	-0.04					<0.5%
Influence of ambient temperature span point (+5°C to +40°C)						
CO (0 - 220mg/m^3)			-1.1			<5.0%
CO_2 (0 - 20 vol. %)		-0.5				<5.0%
NO (0 - 270 mg/m^3)			1.1			<5.0%
NO_2 (0 - 308 mg/m^3)				2.5		<5.0%
O_2 (0 - 25 vol. %)	0.1					<0.5%
Short-term zero drift						
CO (0 - 220mg/m^3)	0.0					<2.0%
CO_2 (0 - 20 vol. %)	0.1					<2.0%
NO (0 - 270 mg/m^3)	-0.1					<2.0%
NO_2 (0 - 308 mg/m^3)	0.0					<2.0%
O_2 (0 - 25 vol. %)	0.01					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Short-term span drift						
CO (0 - 220mg/m^3)	-0.3					<2.0%
CO_2 (0 - 20 vol. %)			1.9			<2.0%
NO (0 - 270 mg/m^3)		-0.6				<2.0%
NO_2 (0 - 308 mg/m^3)			-1.1			<2.0%
O_2 (0 - 25 vol. %)	0.06					<0.2%
Influence of sample gas flow for extractive CEMS						
CO (0 - 220mg/m^3)	-0.3					<2.0%
CO_2 (0 - 20 vol. %)			-1.0			<2.0%
NO (0 - 270 mg/m^3)			-1.0			<2.0%
NO_2 (0 - 308 mg/m^3)	-0.2					<2.0%
O_2 (0 - 25 vol. %)	0.05					<0.2%
Influence of voltage variations (196V to 253V)						
CO (0 - 220mg/m^3)	0.4					<2.0%
CO_2 (0 - 20 vol. %)		-0.6				<2.0%
NO (0 - 270 mg/m^3)		0.6				<2.0%
NO_2 (0 - 308 mg/m^3)		-0.8				<2.0%
O_2 (0 - 25 vol. %)	0.10					<0.2%
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s^2)						
CO (0 - 220mg/m^3)			-1.2			<2.0%
CO_2 (0 - 20 vol. %)		-0.5				<2.0%
NO (0 - 270 mg/m^3)		-0.6				<2.0%
NO_2 (0 - 308 mg/m^3)			1.3			<2.0%
O_2 (0 - 25 vol. %)	0.09					<0.2%

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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_2O, CH_4, CO_2, N_2O, NO, NO_2, NH_3, SO_2, HCl,						
CO (0 - 220mg/m^3)		-0.96				<4.0%
CO_2 (0 - 20 vol. %)	0.00					<4.0%
NO (0 - 270 mg/m^3)			1.66			<4.0%
NO_2 (0 - 308 mg/m^3)	0.00					<4.0%
O_2 (0 - 25 vol. %)	0.00					<0.4%
Cross-sensitivity at span with interferents: O_2, H_2O, CH_4, CO_2, N_2O, NO, NO_2, NH_3, SO_2, HCl,						
CO (0 - 220mg/m^3)			-1.39			<4.0%
CO_2 (0 - 20 vol. %)			1.50			<4.0%
NO (0 - 270 mg/m^3)				2.75		<4.0%
NO_2 (0 - 308 mg/m^3)				-2.27		<4.0%
O_2 (0 - 25 vol. %)	0.29					<0.4%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Field Testing - Calibration function (field) – equivalence with SRM						
Field Test 1						
CO 0 - 220					0.9999	
CO_2 0 - 20					0.9991	
NO 0 - 270					0.9954	>0.90
NO_2 0 - 308					0.9990	
O_2 0 - 25					0.9995	
Field test 2						
CO 0 - 220					0.9992	
CO_2 0 - 20					0.9554	
NO 0 - 270					0.9962	>0.90
NO_2 0 - 308					0.9857	
O_2 0 - 25					0.9991	
Field test 3						
CO 0 - 220					0.9999	
CO_2 0 - 20					0.9976	
NO 0 - 270					0.9904	>0.90
NO_2 0 - 308					0.9991	
O_2 0 - 25					0.9989	
Field test 4						
CO 0 - 220					0.9976	
CO_2 0 - 20					0.9973	
NO 0 - 270					0.9943	>0.90
NO_2 0 - 308					0.9984	
O_2 0 - 25					0.9999	
Field test 5						
CO 0 - 220					0.9995	
CO_2 0 - 20					0.9983	
NO 0 - 270					0.9966	>0.90
NO_2 0 - 308					0.9990	
O_2 0 - 25					0.9706	

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time (field)						
Field Test 1						
CO 0 - 220					105s	
CO_2 0 - 20					128s	
NO 0 - 270					110s	<200s
NO_2 0 - 308					138s	
O_2 0 - 25					60s	
Field Test 2						
CO 0 - 220					101s	
CO_2 0 - 20					151s	
NO 0 - 270					112s	<200s
NO_2 0 - 308					141s	
O_2 0 - 25					58s	
Field Test 3						
CO 0 - 220					144s	
CO_2 0 - 20					161s	
NO 0 - 270					114s	<200s
NO_2 0 - 308					127s	
O_2 0 - 25					67s	
Field Test 4						
CO 0 - 220					120s	
CO_2 0 - 20					141s	
NO 0 - 270					119s	<200s
NO_2 0 - 308					148s	
O_2 0 - 25					59s	
Field Test 5						
CO 0 - 220					129s	
CO_2 0 - 20					161s	
NO 0 - 270					119s	<200s
NO_2 0 - 308					124s	
O_2 0 - 25					55s	

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Short term zero drift (field)						
Field Test 1						
CO 0 - 220		0.6				
CO_2 0 - 20	0.1					<5.0%
NO 0 - 270	0.4					
NO_2 0 - 308		-0.6				
O_2 0 - 25	0.03					<0.2%
Field Test 2						
CO 0 - 220	-0.2					
CO_2 0 - 20	0.1					<5.0%
NO 0 - 270	-0.1					
NO_2 0 - 308	0.1					
O_2 0 - 25	-0.01					<0.2%
Field Test 3						
CO 0 - 220	-0.2					
CO_2 0 - 20	0.1					<5.0%
NO 0 - 270	0.4					
NO_2 0 - 308	-0.1					
O_2 0 - 25	-0.02					<0.2%
Field Test 4						
CO 0 - 220	0.2					
CO_2 0 - 20	0.1					<5.0%
NO 0 - 270			1.4			
NO_2 0 - 308	-0.1					
O_2 0 - 25	0.00					<0.2%
Field Test 5						
CO 0 - 220	-0.1					
CO_2 0 - 20	-0.1					<5.0%
NO 0 - 270	-0.3					
NO_2 0 - 308	0.1					
O_2 0 - 25	-0.01					<0.2

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Short term span drift (field)						
Field Test 1						
CO 0 - 220			1.2			
CO_2 0 - 20		-0.5				<5.0%
NO 0 - 270			1.9			
NO_2 0 - 308			-1.7			
O_2 0 - 25	-0.19					<0.2%
Field Test 2						
CO 0 - 220			1.2			
CO_2 0 - 20			1.1			<5.0%
NO 0 - 270	0.3					
NO_2 0 - 308			1.9			
O_2 0 - 25	0.00					<0.2%
Field Test 3						
CO 0 - 220		-0.6				
CO_2 0 - 20	-0.1					<5.0%
NO 0 - 270		-1.2				
NO_2 0 - 308		0.9				
O_2 0 - 25	0.03					<0.2%
Field Test 4						
CO 0 - 220		0.9				
CO_2 0 - 20	-0.1					<5.0%
NO 0 - 270		0.8				
NO_2 0 - 308			-1.4			
O_2 0 - 25	0.03					<0.2%
Field Test 5						
CO 0 - 220			-1.1			
CO_2 0 - 20			-1.0			
NO 0 - 270			1.1			<5.0%
NO_2 0 - 308			-1.4			
O_2 0 - 25	-0.03					<0.2%
Reproducibility (field)						
CO 0 - 220		0.5				
CO_2 0 - 20			1.1			
NO 0 - 270			1.5			<3.3%
NO_2 0 - 308			1.0			
O_2 0 - 25	0.11					<0.2%

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Field and Laboratory - Measurement uncertainty (10mg/m^3 limit value)					Guidance - at least 25% below max permissible uncertainty	
Field Test 1						
CO 0 - 220					5.9%	
CO_2 0 - 20					3.3%	
NO 0 - 270					9.4%	
NO_2 0 - 308					8.3%	
O_2 0 - 25					2.6%	
Field Test 2						
CO 0 - 220					5.4%	
CO_2 0 - 20					2.6%	
NO 0 - 270					7.9%	
NO_2 0 - 308					8.2%	
O_2 0 - 25					1.8%	
Field Test 3						
CO 0 - 220					5.4%	
CO_2 0 - 20					3.0%	
NO 0 - 270					9.9%	<22.5% (30%)
NO_2 0 - 308					8.8%	
O_2 0 - 25					2.3%	
Field Test 4						
CO 0 - 220					5.2%	
CO_2 0 - 20					2.6%	
NO 0 - 270					9.2%	
NO_2 0 - 308					7.4%	
O_2 0 - 25					2.0%	
Field Test 5						
CO 0 - 220					5.7%	
CO_2 0 - 20					3.4%	
NO 0 - 270					8.4%	
NO_2 0 - 308					7.4%	
O_2 0 - 25					2.5%	

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Note 1: Operation of the T-CEMS requires that the pump provided by the manufacturer injects a 10% phosphoric acid solution into the instrument cooler.

Note 2: Work in the maintenance interval

- check test gas filter, gas conditioning system, sample gas lines and gas inlets regularly before commissioning.
- check zero and span drift using certified test gases on each measuring day.
- the manufacturer's instructions in addition to status and maintenance signals must be taken into account.
- replace dust filter in the probe head and at the instrument in the event of a flow alarm
- be mindful of status signals – phosphoric acid warning/flow alarm
- regular quality assurance in accordance with the relevant standard reference guidelines
- consumables should be checked by the manufacturer annually (such as sample gas pump and acid pumps)
- replace particle filter at the front regularly after flow alarm or visible contaminations, lifespan of sample gas pump (according to manufacturer) ~4000 hours.
- Always refer and consider the manufacturer's recommendations.

Note 3: Calibration

- Check of leak tightness by feeding zero and test gas to the tip of the probe before commissioning.
- Perform zero and span point checks by applying test gases before every measurement and after every measuring day.
- During a measuring day, the relevant boundary conditions that are important for the calculation of the measurement uncertainty must be considered.
- The temperature curve must be recorded on each measuring day.
- Should the temperature vary by more than 6^0C on any given measuring day, it is recommended that a check on the zero and span point drift is carried out to ensure the overall uncertainty is maintained.

Description

The MGAprime Q consists of the heated gas sampling probe, the heating hose, the acid injection unit APE and the analyzer in an IP42 protective bag. The analyzer contains a gas conditioning unit consisting of gas cooler, filter and sample gas pump as well as a paramagnetic oxygen sensor and an NDIR bench for the gas components. In the NDIR measuring bench the gas concentrations are determined by the absorption of light in the infrared spectrum from selected wavelength ranges for each gas component.
The values of all sensors are calculated in a computer unit and displayed on the touch display, which is used to operate the whole device.
The operation of the MGAprime Q requires a continuous injection of 10% phosphoric acid in order to maintain the operating conditions in the gas cooler constant with a low washout of sample gas components.

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 held and maintained by TÜV Rheinland Energy GmbH for certificate No. Sira MC200366/00.

3. If a certified product is found not to comply, Sira 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 Sira certificates'.

5. This document remains the property of Sira and shall be returned if requested by Sira.