

Declaration of conformity

for the suitability for emission monitoring

for

ABB Gas Analyser AO2000 series

Continuous measuring gas analysers, version AO2020 and version AO2040, equipped with one or a combination of multiple measuring modules:

- NDIR - module Uras26
- Paramagnetic oxygen cell Magnos206
- Electrochemical oxygen sensor

Manufacturer ABB Automation GmbH, Frankfurt, Germany

Suitability test

TÜV SÜD Industrie Service GmbH hereby declares that the modules of AO2000 series has fulfilled the requirements of the suitability test for emission monitoring systems for facilities requiring authorization according to the EU directive 2001/80/EG and 2000/76/EG - as well as for the German 27th and 30th BImSchV and TI-Air regulations. The requirements according to

QAL 1

DIN EN 14181 / DIN EN ISO 14956 / DIN EN 15267-3 are fulfilled.

Measuring components and ranges

Component		Lowest measuring range	Highest measuring range
Uras26	CO	0 – 75 mg/m ³	0 – 4000 mg/m ³
Uras26	NO	0 – 100 mg/m ³	0 – 5000 mg/m ³
Uras26	SO ₂	0 – 75 mg/m ³	0 – 8000 mg/m ³
Uras26	N ₂ O	0 – 100 mg/m ³	0 – 6700 mg/m ³
Uras26	CO ₂	0 – 20 Vol%	
Magnos206	O ₂	0 – 10 Vol%	0 – 25 Vol%
Sensor	O ₂	0 – 10 Vol%	0 – 25 Vol%

The system is able to measure simultaneously 4 IR-components and additionally oxygen.

Availability

> 98 % over a 3 month period for two independent systems including sample conditioning.

Maintenance interval / automatic calibration

The determined maintenance interval in the suitability test was 3 weeks. The internal calibration cells are validated by use of calibration gas once in a year if they are employed for the adjustment of the analyser.

Uras26 If the analyser operates with calibration cells, the concentrations shall be tested with flowing calibration gases in the annual function test (AST).



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Magnos206 and oxygen sensor

Internal automated single point adjustment in the maintenance interval by using ambient air.

Zero points in the oxygen AMS shall be checked using nitrogen in the annual function test (AST).

Report-No. 821029 from 30.06.2006

(Tested according to the guideline VDI 4203, suitability gazetted BMU, BAnz 194 to 2006, page 6715)

Report-No. 1243485b from 14.02.2009

(Tested according to DIN EN 15267-3)

Report-No. 1249694 from 30.03.2009

(Supplementary test according to the guideline VDI 4203, suitability gazetted BMU, BAnz 125 to 2009, page 2932)

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Munich, November 2009

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Calculation of the measurement uncertainty according to DIN EN ISO 14956 for CO, AO2020 CEM 1230KL S3, measuring range 0-75 mg/ m³

Performance Characteristic				Value of uncertainty
Repeatability at zero point				0,23 mg/ m3
Lack of fit				0,14 mg/ m3
Zero drift				0,35 mg/ m3
Span drift				0,46 mg/ m3
Repeatability/ reproducibility				0,31 mg/ m3
Influence of flow				0,02 mg/ m3
Influence of atmospheric pressure				0,58 mg/ m3
Temperature dependent drift of span				1,55 mg/ m3
Influence of voltage				0,35 mg/ m3
Uncertainty of span gas				0,58 mg/ m3
Other influences				
Losses in sampling system				0,00 mg/ m3
Converter efficiency	not relevant			0,00 mg/ m3
Response factors (TOC-analysers)	not relevant			0,00 mg/ m3
Misalignment of light beam	not relevant			0,00 mg/ m3
Contamination of optical surfaces	not relevant			0,00 mg/ m3
Long time drift of calibration standard	not relevant			0,00 mg/ m3
Interferences (Interf.)	Concentration of interfering component			
Sum positive Interf. > Sum negative Interf.				
O2	21	Vol.-%		0,35 mg/ m3
CO	not relevant	mg/m3		0,00 mg/ m3
CO2	15	Vol.-%		0,00 mg/ m3
CH4	50	mg/m3		0,00 mg/ m3
N2O general	not relevant	mg/m3		0,00 mg/ m3
N2O fluidized bed	103	mg/m3		0,55 mg/ m3
NO	339	mg/m3		0,00 mg/ m3
NO2	30	mg/m3		0,04 mg/ m3
NH3	20	mg/m3		0,00 mg/ m3
SO2 general	not relevant	mg/m3		0,00 mg/ m3
SO2 coal without desulfurization	1050	mg/m3		0,00 mg/ m3
HCl general	not relevant	mg/m3		0,00 mg/ m3
HCl coal fired plant	200	mg/m3		0,00 mg/ m3
H2O (hot or inSitu)	not relevant	Vol.-%		0,00 mg/ m3
H2O (gas over cooler)	30	Vol.-%		0,00 mg/ m3
Square sum				4,10
Combined uncertainty u _c				2,02 mg/ m3
Expanded uncertainty U=1,96 x u _c				3,97 mg/ m3
Demanded uncertainty				5,00 mg/ m3
Requirement concerning uncertainty fulfilled				yes
Response time				99 s
Requirement concerning response time fulfilled				yes



Industrie Service

Calculation of the measurement uncertainty according to DIN EN ISO 14956 for NO, AO2020 CEM 1230KL S3, measuring range 0-100 mg/ m³

Performance Characteristic				Value of uncertainty	
Repeatability at zero point				0,07	mg/ m3
Lack of fit				0,05	mg/ m3
Zero drift				0,06	mg/ m3
Span drift				0,51	mg/ m3
Repeatability/ reproducibility				0,94	mg/ m3
Influence of flow				0,01	mg/ m3
Influence of atmospheric pressure				0,38	mg/ m3
Temperature dependent drift of span				0,27	mg/ m3
Influence of voltage				0,48	mg/ m3
Uncertainty of span gas				0,38	mg/ m3
Other influences					
Losses in sampling system				0,00	mg/ m3
Converter efficiency	not relevant			0,00	mg/ m3
Response factors (TOC-analysers)	not relevant			0,00	mg/ m3
Misalignment of light beam	not relevant			0,00	mg/ m3
Contamination of optical surfaces	not relevant			0,00	mg/ m3
Long time drift of calibration standard	not relevant			0,00	mg/ m3
Interferences (Interf.)		Concentration of interfering component			
Sum positive Interf. > Sum negative Interf.					
O2	21	Vol.-%		0,00	mg/ m3
CO	315	mg/m3		0,00	mg/ m3
CO2	15	Vol.-%		0,00	mg/ m3
CH4	50	mg/m3		0,08	mg/ m3
N2O general	not relevant	mg/m3		0,00	mg/ m3
N2O fluidized bed	103	mg/m3		0,11	mg/ m3
NO	not relevant	mg/m3		0,00	mg/ m3
NO2	30	mg/m3		0,52	mg/ m3
NH3	20	mg/m3		0,00	mg/ m3
SO2 general	not relevant	mg/m3		0,00	mg/ m3
SO2 coal without desulfurization	1050	mg/m3		0,11	mg/ m3
HCl general	not relevant	mg/m3		0,00	mg/ m3
HCl coal fired plant	200	mg/m3		0,17	mg/ m3
H2O (hot or inSitu)	not relevant	Vol.-%		0,00	mg/ m3
H2O (gas over cooler)	30	Vol.-%		1,10	mg/ m3
Square sum				3,26	
Combined uncertainty u_c				1,80	mg/ m3
Expanded uncertainty U=1,96 x u_c				3,54	mg/ m3
Demanded uncertainty				6,60	mg/ m3
Requirement concerning uncertainty fulfilled				yes	
Response time				96	s
Requirement concerning response time fulfilled				yes	



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Calculation of the measurement uncertainty according to DIN EN ISO 14956 for SO₂, AO2020 CEM 1230KL S3, measuring range 0-75 mg/ m³

Performance Characteristic				Value of uncertainty
Repeatability at zero point				0,32 mg/ m3
Lack of fit				0,14 mg/ m3
Zero drift				-0,12 mg/ m3
Span drift				0,50 mg/ m3
Repeatability/ reproducibility				0,53 mg/ m3
Influence of flow				0,06 mg/ m3
Influence of atmospheric pressure				0,58 mg/ m3
Temperature dependent drift of span				0,67 mg/ m3
Influence of voltage				2,76 mg/ m3
Uncertainty of span gas				0,58 mg/ m3
Other influences				
Losses in sampling system				0,00 mg/ m3
Converter efficiency	not relevant			0,00 mg/ m3
Response factors (TOC-analysers)	not relevant			0,00 mg/ m3
Misalignment of light beam	not relevant			0,00 mg/ m3
Contamination of optical surfaces	not relevant			0,00 mg/ m3
Long time drift of calibration standard	not relevant			0,00 mg/ m3
Interferences (Interf.)	Concentration of interfering component			
Sum positive Interf.>Sum negative Interf.				
O2	21	Vol.-%		0,00 mg/ m3
CO	315	mg/m3		0,00 mg/ m3
CO2	15	Vol.-%		0,13 mg/ m3
CH4	50	mg/m3		0,91 mg/ m3
N2O general	not relevant	mg/m3		0,00 mg/ m3
N2O fluidized bed	103	mg/m3		0,00 mg/ m3
NO	339	mg/m3		0,00 mg/ m3
NO2	30	mg/m3		0,22 mg/ m3
NH3	20	mg/m3		0,00 mg/ m3
SO2 general	not relevant	mg/m3		0,00 mg/ m3
SO2 coal without desulfurization	not relevant	mg/m3		0,00 mg/ m3
HCl general	not relevant	mg/m3		0,00 mg/ m3
HCl coal fired plant	200	mg/m3		0,00 mg/ m3
H2O (hot or inSitu)	not relevant	Vol.-%		0,00 mg/ m3
H2O (gas over cooler)	30	Vol.-%		0,26 mg/ m3
Square sum				10,38
Combined uncertainty u _c				3,22 mg/ m3
Expanded uncertainty U=1,96 x u _c				6,32 mg/ m3
Demanded uncertainty				10,00 mg/ m3
Requirement concerning uncertainty fulfilled				yes
Response time				162 s
Requirement concerning response time fulfilled				yes



Industrie Service

Calculation of the measurement uncertainty according to DIN EN ISO 14956 for NO, AO2020 CEM S3, measuring range 0-200 mg/ m³

Performance Characteristic				Value of uncertainty
Repeatability at zero point				0,32 mg/ m3
Lack of fit				0,22 mg/ m3
Zero drift				0,08 mg/ m3
Span drift				-2,01 mg/ m3
Repeatability/ reproducibility				1,32 mg/ m3
Influence of flow				0,17 mg/ m3
Influence of atmospheric pressure				1,51 mg/ m3
Temperature dependent drift of span				-2,99 mg/ m3
Influence of voltage				0,92 mg/ m3
Uncertainty of span gas				1,51 mg/ m3
Other influences				
Losses in sampling system				0,00 mg/ m3
Converter efficiency	not relevant			0,00 mg/ m3
Response factors (TOC-analysers)	not relevant			0,00 mg/ m3
Misalignment of light beam	not relevant			0,00 mg/ m3
Contamination of optical surfaces	not relevant			0,00 mg/ m3
Long time drift of calibration standard	not relevant			0,00 mg/ m3
Interferences (Interf.)	Concentration of interfering component			
Sum negative Interf. > Sum positive Interf.				
O2	21	Vol.-%	-1,85	mg/ m3
CO	315	mg/m3	-0,33	mg/ m3
CO2	15	Vol.-%	-0,12	mg/ m3
CH4	50	mg/m3	0,00	mg/ m3
N2O general	not relevant	mg/m3	0,00	mg/ m3
N2O fluidized bed	103	mg/m3	-0,11	mg/ m3
NO	not relevant	mg/m3	0,00	mg/ m3
NO2	30	mg/m3	0,00	mg/ m3
NH3	20	mg/m3	-0,12	mg/ m3
SO2 general	not relevant	mg/m3	0,00	mg/ m3
SO2 coal without desulfurization	1050	mg/m3	-0,11	mg/ m3
H2S	not relevant	mg/m3	0,00	mg/ m3
HCl coal fired plant	200	mg/m3	0,00	mg/ m3
H2O (hot or inSitu)	not relevant	Vol.-%	0,00	mg/ m3
H2O (gas over cooler)	-0,15	Vol.-%	-0,12	mg/ m3
Square sum				23,95
Combined uncertainty u_c				4,89 mg/ m3
Expanded uncertainty U=1,96 x u_c				9,59 mg/ m3
Demanded uncertainty				26,20 mg/ m3
Requirement concerning uncertainty fulfilled				yes
Response time				94 s
Requirement concerning response time fulfilled				yes



Industrie Service

Calculation of the measurement uncertainty according to DIN EN ISO 14956 for N₂O, AO2020 CEM 2450 S3, measuring range 0-100 mg/m³

Performance Characteristic			Value of uncertainty	
Repeatability at zero point			0,32	mg/ m3
Lack of fit			0,58	mg/ m3
Zero drift			-0,35	mg/ m3
Span drift			1,50	mg/ m3
Repeatability/ reproducibility			0,85	mg/ m3
Influence of flow			0,13	mg/ m3
Influence of atmospheric pressure			1,73	mg/ m3
Temperature dependent drift of span			-3,02	mg/ m3
Influence of voltage			0,48	mg/ m3
Uncertainty of span gas			1,73	mg/ m3
Other influences				
Losses in sampling system			0,00	mg/ m3
Converter efficiency	not relevant		0,00	mg/ m3
Response factors (TOC-analysers)	not relevant		0,00	mg/ m3
Misalignment of light beam	not relevant		0,00	mg/ m3
Contamination of optical surfaces	not relevant		0,00	mg/ m3
Long time drift of calibration standard	not relevant		0,00	mg/ m3
Interferences (Interf.)			Concentration of interfering component	
Sum positive Interf. > Sum negative Interf.				
O2	21	Vol.-%	0,29	mg/ m3
CO	210	mg/m3	2,56	mg/ m3
CO2	15	Vol.-%	0,00	mg/ m3
CH4	50	mg/m3	0,00	mg/ m3
N2O general	not relevant	mg/m3	0,00	mg/ m3
N2O fluidized bed	not relevant	mg/m3	0,00	mg/ m3
NO	339	mg/m3	0,00	mg/ m3
NO2	30	mg/m3	0,06	mg/ m3
NH3	20	mg/m3	0,06	mg/ m3
SO2 general	not relevant	mg/m3	0,00	mg/ m3
SO2 coal without desulfurization	1050	mg/m3	0,00	mg/ m3
H2S	20	mg/m3	0,14	mg/ m3
HCl coal fired plant	200	mg/m3	0,06	mg/ m3
H2O (hot or inSitu)	not relevant	Vol.-%	0,00	mg/ m3
H2O (gas over cooler)	30	Vol.-%	0,00	mg/ m3
Square sum			25,25	
Combined uncertainty u _c			5,03	mg/ m3
Expanded uncertainty U=1,96 x u _c			9,85	mg/ m3
Demanded uncertainty			30,00	mg/ m3
Requirement concerning uncertainty fulfilled			yes	
Response time			105	s
Requirement concerning response time fulfilled			yes	