

CERTIFICATE

about Product Conformity (QAL1)

Number of Certificate: 0000025931

Certified AMS: ZRE and ZRE/ZFK7 for CO, NO, SO₂ and O₂

Manufacturer: Fuji Electric Systems Co., Ltd.
No. 1, Fuji-machi, Hino-city
Tokyo 191-8502
Japan

Test Institute: TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

This is certifying that the AMS has been tested and found to comply with:

EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2007
and EN 14181: 2004

Certification is awarded in respect of the conditions stated in this certificate
(see also the following pages).



- EN 15267-3 tested
- QAL1 certified
- TÜV approved
- Annual Inspection

Publication in the German Federal Gazette
(BAnz.) of 2010-02-12

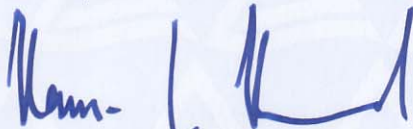
The certificate is valid until: 2015-02-11

Umweltbundesamt

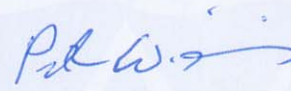
TÜV Rheinland Immissionsschutz
und Energiesysteme GmbH

Dessau, 2010-03-15

Köln, 2010-03-10



i. A. Dr. Hans-Joachim Hummel



i. V. Dr. Peter Wilbring

www.umwelt-tuv.de / www.eco-tuv.com
tie@umwelt-tuv.de
Tel. +49 - 221 - 806 - 2275

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
Am Grauen Stein
51105 Köln

Accreditation according to EN ISO/IEC 17025 and ISO 9001:2000.

Test report: 936/21210059/A of 2009-10-21
First certification: 2010-02-12
Run of validity until: 2015-02-11
Publication BAnz. 2010-02-12, no.: 24, page: 552

Approved application:

The suitability of the product for this application was assessed on the basis of a laboratory test and a field test on a municipal waste incinerator. The instrument can be used in accordance to 2001-80-EC and German Technical Instruction on Air Quality Control as long as the daily mean value for carbon monoxide, sulphur dioxide and nitrogen oxide will be not lower than 120 / 230 /125 mg/m³. The instrument cannot be used at plants where N₂O concentrations higher than 30 mg/m³ will be expected. The AMS is approved for the temperature range from 5 °C to 40 °C.

Any potential user should ensure, in consultation with the manufacturer that this AMS is suitable for the installation on which it will be installed.

Basis of the certification

This certification is based on the test report 936/21210059/A of 2009-10-21 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH and on the relevant bodies (German Umweltbundesamt) assessment and ongoing surveillance of the product and the manufacturing process and the publication in the German Federal Gazette (BAnz.):

AMS name:

ZRE and ZRE/ZFK7 for NO, SO₂, CO and O₂

Manufacturer:

Fuji Electric Systems Co., Ltd., Tokyo, Japan

Approval:

Plants in accordance to directive 2001-80-EC and German Technical Instruction on Air Quality Control

Measuring ranges during the suitability test:

Component	Certification-range	Supplementary range	Unit
CO	0 - 125	0 - 1250	mg/m ³
NO	0 - 268	0 - 2680	mg/m ³
SO ₂	0 - 571	0 - 5710	mg/m ³
O ₂ (Pa.*)	0 - 25	0 - 10	Vol.-%
O ₂ (Zi.**)	0 - 25	0 - 10	Vol.-%

* Pa. = paramagnetic

** Zi. = zirconium oxide

Software version:

1.02

Restrictions:

1. The requirements on measurement uncertainty in accordance with EN 15267-3 are fulfilled for a daily mean limit value of 120 mg/m³ for CO.
2. The requirements on measurement uncertainty in accordance with EN 15267-3 are fulfilled for a daily mean limit value of 230 mg/m³ for SO₂.
3. The requirements on measurement uncertainty in accordance with EN 15267-3 are fulfilled for a daily mean limit value of 125 mg/m³ for NO.
4. The measuring system is not suitable for plants with N₂O concentrations of more than 30 mg/m³.

Remarks:

1. Either the paramagnetic or the zirconia oxygen sensor may be used for measuring O₂:
Version ZRE: NO, SO₂, CO and O₂ (Pa)
Version ZRE/ZFK7: NO, SO₂, CO and O₂ (Zi)
2. The maintenance interval is four weeks.
3. An automatic zero point calibration must be carried out at least once every 24 h.
4. Test gases shall be fed via the dynamic injector at least once every three months (control of the gas line and gas processing).
5. The AMS is distributed identical in design by the company ETA, Rue Einstein, BP60129, 62220 Carvin, France.

Test report:

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln
Report-No.: 936/21210059/A of 2009-10-21

Certified product

This certificate applies to automated measurement systems confirming to the following description:

The AMS is a non-dispersive infrared gas analyser (NDIR analyser) based on the single-beam principle for the determination of CO, SO₂ and NO. A paramagnetic sensor or, alternatively, a zirconia cell (ZFK7) may be installed for the determination of O₂.

The ZRE option consists of a NDIR analyser and paramagnetic O₂ analyser. The measuring gas is divided into three partial flows, one flow passes through the converter and the optical bench to detect the NO, another partial flow passes the optical bench to detect CO and SO₂, the third partial flow passes through the paramagnetic sensor.

The ZRE/ZFK7 option consists of the NDIR analyser and a zirconium sensor to detect O₂. Here the measuring gas is divided in two partial gas flows, one passes the optical bench to detect NO and the other passes the optical bench to detect CO and SO₂ following the zirconium sensor.

The ZFK7 analyser is connected to the ZRE analyser in a way that allows operation, parameterisation and output of all measured values via the ZRE analyser.

The systems are equipped with a probe manufactured by TECNOVA HT PERO-MI (type AGP04), a cooler manufactured by M&C, type ECM-2 G/SR 25.2, converters type ZDL021 manufactured by Fuji Electric Systems Co., Ltd., Japan and as an option with a Scrubber of the AS series manufactured by Permapure if the measuring gas contains NH₃. The cabinet is equipped with a cooling unit.

General notes:

This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the DIN EN 15267. 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 systems shall be subject to regular surveillance.

If a certified product is found no longer to comply with the applicable European Standard, TÜV Rheinland Immissionschutz und Energiesysteme GmbH should be notified at the address shown on page 1.

The certification mark with the ID-Number that can be applied to the product or used in publicity material for the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remains the property of TÜV Rheinland Immissionschutz und Energiesysteme GmbH.

With revocation of the publication the certificate loses its validity.

After the expiration of the validity of the certificate and on requests of the TÜV Rheinland Immissionschutz und Energiesysteme GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and the validity is also seen at the Internet Address: **qal1.de**.

Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	Fuji Electric Systems Co., Ltd
Name of measuring system	ZRE
Serial Number	100AC01 / 100AC02
Measuring Principle	NDIR

TÜV Data

Approval Report	936/21210059/A / 2009-10-21
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Editor	Steinhagen
Date	2009-10-19

Measurement Component

Certificated range	SO ₂	571 mg/m ³
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Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	3.60 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at reference point	19.87 mg/m ³
Sum of negative CS at reference point	-2.97 mg/m ³
Maximum sum of cross sensitivities	19.87 mg/m ³
Uncertainty of cross sensitivity	11.47 mg/m ³

Calculation of the combined standard uncertainty

Test Value

	u	u ²
Standard deviation from paired measurements under field conditions *	u _D 2.108 mg/m ³	4.444 (mg/m ³) ²
Lack of fit	u _{lof} 0.635 mg/m ³	0.403 (mg/m ³) ²
Zero drift from field test	u _{d,z} -2.670 mg/m ³	7.129 (mg/m ³) ²
Span drift from field test	u _{d,s} -7.810 mg/m ³	60.996 (mg/m ³) ²
Influence of ambient temperature at span	u _t 8.307 mg/m ³	69.006 (mg/m ³) ²
Influence of supply voltage	u _v 0.500 mg/m ³	0.250 (mg/m ³) ²
Cross sensitivity (interference)	u _i 11.472 mg/m ³	131.616 (mg/m ³) ²
Influence of sample gas flow	u _p -1.717 mg/m ³	2.948 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 4.615 mg/m ³	21.301 (mg/m ³) ²

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u _c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	17.27 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	33.84 mg/m ³

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC	U in % of the ELV 230 mg/m³	14.7
Requirement of EN 15267-3	U in % of the ELV 230 mg/m ³	20.0
	U in % of the ELV 230 mg/m ³	15.0

Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	Fuji Electric Systems Co., Ltd
Name of measuring system	ZRE
Serial Number	100AC01 / 100AC02
Measuring Principle	NDIR

TÜV Data

Approval Report	936/21210059/A / 2009-10-21
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Editor	Steinhagen
Date	2009-10-19

Measurement Component

Certificated range	CO	125 mg/m ³
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Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	2.15 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at reference point	3.86 mg/m ³
Sum of negative CS at reference point	-0.63 mg/m ³
Maximum sum of cross sensitivities	3.86 mg/m ³
Uncertainty of cross sensitivity	2.23 mg/m ³

Calculation of the combined standard uncertainty

Test Value

	u	u ²
Standard deviation from paired measurements under field conditions *	u _D 1.604 mg/m ³	2.573 (mg/m ³) ²
Lack of fit	u _{lof} 0.289 mg/m ³	0.084 (mg/m ³) ²
Zero drift from field test	u _{d,z} -0.274 mg/m ³	0.075 (mg/m ³) ²
Span drift from field test	u _{d,s} -1.667 mg/m ³	2.779 (mg/m ³) ²
Influence of ambient temperature at span	u _t 2.498 mg/m ³	6.240 (mg/m ³) ²
Influence of supply voltage	u _v 0.346 mg/m ³	0.120 (mg/m ³) ²
Cross sensitivity (interference)	u _i 2.230 mg/m ³	4.973 (mg/m ³) ²
Influence of sample gas flow	u _p -0.361 mg/m ³	0.130 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 1.010 mg/m ³	1.021 (mg/m ³) ²

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u _c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	4.24 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	8.31 mg/m ³

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC	U in % of the ELV 120 mg/m ³	6.9
Requirement of EN 15267-3	U in % of the ELV 120 mg/m ³	10.0
	U in % of the ELV 120 mg/m ³	7.5

Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	Fuji Electric Systems Co., Ltd
Name of measuring system	ZRE
Serial Number	100AC01 / 100AC02
Measuring Principle	NDIR

TÜV Data

Approval Report	936/21210059/A / 2009-10-21
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Editor	Steinhagen
Date	2009-10-19

Measurement Component

Certificated range	NO	268	mg/m ³
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Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	3.59	mg/m ³
Sum of negative CS at zero point	-1.96	mg/m ³
Sum of positive CS at reference point	2.17	mg/m ³
Sum of negative CS at reference point	-2.06	mg/m ³
Maximum sum of cross sensitivities	3.59	mg/m ³
Uncertainty of cross sensitivity	2.07	mg/m ³

Calculation of the combined standard uncertainty

Test Value

		u	u ²
Standard deviation from paired measurements under field conditions *	u _D	1.324 mg/m ³	1.753 (mg/m ³) ²
Lack of fit	u _{lof}	-0.242 mg/m ³	0.059 (mg/m ³) ²
Zero drift from field test	u _{d,z}	1.070 mg/m ³	1.145 (mg/m ³) ²
Span drift from field test	u _{d,s}	4.350 mg/m ³	18.923 (mg/m ³) ²
Influence of ambient temperature at span	u _t	5.689 mg/m ³	32.365 (mg/m ³) ²
Influence of supply voltage	u _v	0.462 mg/m ³	0.213 (mg/m ³) ²
Cross sensitivity (interference)	u _i	2.073 mg/m ³	4.299 (mg/m ³) ²
Influence of sample gas flow	u _p	0.097 mg/m ³	0.009 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm}	2.166 mg/m ³	4.693 (mg/m ³) ²

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u _c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	7.97 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	15.61 mg/m ³

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC	U in % of the ELV 125 mg/m³	12.5
Requirement of EN 15267-3	U in % of the ELV 125 mg/m³	20.0
	U in % of the ELV 125 mg/m³	15.0

Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	Fuji Electric Systems Co., Ltd
Name of measuring system	ZRE
Serial Number	100AC01 / 100AC02
Measuring Principle	Paramagnetism

TÜV Data

Approval Report	936/21210059/A / 2009-10-21
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Editor	Steinhagen
Date	2009-10-19

Measurement Component

Certificated range	O ₂	25	Vol.-%
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Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	0.00	Vol.-%
Sum of negative CS at zero point	0.00	Vol.-%
Sum of positive CS at reference point	0.14	Vol.-%
Sum of negative CS at reference point	0.00	Vol.-%
Maximum sum of cross sensitivities	0.14	Vol.-%
Uncertainty of cross sensitivity	0.08	Vol.-%

Calculation of the combined standard uncertainty

Test Value

	u	u ²
Standard deviation from paired measurements under field conditions *	u _D 0.058 Vol.-%	0.003 (Vol.-%) ²
Lack of fit	u _{lof} 0.040 Vol.-%	0.002 (Vol.-%) ²
Zero drift from field test	u _{d,z} -0.064 Vol.-%	0.004 (Vol.-%) ²
Span drift from field test	u _{d,s} 0.110 Vol.-%	0.012 (Vol.-%) ²
Influence of ambient temperature at span	u _t 0.184 Vol.-%	0.034 (Vol.-%) ²
Influence of supply voltage	u _v 0.020 Vol.-%	0.000 (Vol.-%) ²
Cross sensitivity (interference)	u _i 0.081 Vol.-%	0.007 (Vol.-%) ²
Influence of sample gas flow	u _p 0.075 Vol.-%	0.006 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.202 Vol.-%	0.041 (Vol.-%) ²

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u _c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.33 Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.65 Vol.-%

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC *¹	U in % of the range 25 Vol.-%	2.6
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	10.0
	U in % of the range 25 Vol.-%	7.5

*¹ For this component no requirements in the EC-directives 2001/80/EC und 2000/76/EC are given.

The chosen value was recommended by the certification body.

Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data

Manufacturer	Fuji Electric Systems Co., Ltd
Name of measuring system	ZFK7
Serial Number	100AC01 / 100AC02
Measuring Principle	zirconia

TÜV Data

Approval Report	936/21210059/A / 2009-10-21
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Editor	Steinhagen
Date	2009-10-19

Measurement Component

Certificated range	O ₂	25	Vol.-%
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Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	0.00	Vol.-%
Sum of negative CS at zero point	0.00	Vol.-%
Sum of positive CS at reference point	0.25	Vol.-%
Sum of negative CS at reference point	0.00	Vol.-%
Maximum sum of cross sensitivities	0.25	Vol.-%
Uncertainty of cross sensitivity	0.14	Vol.-%

Calculation of the combined standard uncertainty

Test Value

	u	u ²
Standard deviation from paired measurements under field conditions *	u _D 0.051 Vol.-%	0.003 (Vol.-%) ²
Lack of fit	u _{lof} -0.040 Vol.-%	0.002 (Vol.-%) ²
Zero drift from field test	u _{d,z} -0.052 Vol.-%	0.003 (Vol.-%) ²
Span drift from field test	u _{d,s} 0.098 Vol.-%	0.010 (Vol.-%) ²
Influence of ambient temperature at span	u _t 0.231 Vol.-%	0.053 (Vol.-%) ²
Influence of supply voltage	u _v 0.023 Vol.-%	0.001 (Vol.-%) ²
Cross sensitivity (interference)	u _i 0.144 Vol.-%	0.021 (Vol.-%) ²
Influence of sample gas flow	u _p 0.063 Vol.-%	0.004 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.202 Vol.-%	0.041 (Vol.-%) ²

* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u _c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.37 Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.72 Vol.-%

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC *¹	U in % of the range 25 Vol.-%	2.9
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	10.0
	U in % of the range 25 Vol.-%	7.5

*¹ For this component no requirements in the EC-directives 2001/80/EC und 2000/76/EC are given.
The chosen value was recommended by the certification body.