CERTIFICATE

of Product Conformity (QAL1)

Certificate No: 0000025932_03

Certified AMS:	ZFK 8 + ZKM for O_2
Manufacturer:	Fuji Electric Co., Ltd. No. 1, Fuji-machi, Hino-city, Tokyo 191-8502, Japan
Test Institute:	TÜV Rheinland Energy & Environment GmbH

This is to certify that the AMS has been tested and found to comply with the standards EN 15267-1 (2009), EN 15267-2 (2023), EN 15267-3 (2007) as well as EN 14181 (2014).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 8 pages).
The present certificate replaces certificate 0000025932_02 dated 12 February 2020.

TÜVRheinland® CERTIFIED
Suitability Tested
EN 15267
QAL1 Certified
Regular Surveillance
www.tuv.com
ID 0000025932

Publication in the German Federal Gazette (BAnz) of 12 February 2010

This certificate will expire on:
11 February 2030

German Environment Agency
Dessau, 10 February 2025

TÜV Rheinland Energy & Environment GmbH
Cologne, 9 February 2025

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Test institute accredited to EN ISO/IEC 17025 by DAkkS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00.

Test report:	936/21200211/A dated 21 October 2009
Initial certification:	12 February 2010
Expiry date:	11 February 2030
Certificate:	Renewal (of previous certificate 0000025932_02 of 12 February 2020 valid until 11 February 2025)
Publication:	BAnz. 12 February 2010, No. 24, p. 553, chapter II No. 1.1

Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV:2021), chapter IV (waste incineration plants / 17th BImSchV:2023), Directive 2015/2193/EC (44th BImSchV:2022), TA Luft:2021, 30th BImSchV:2022 and 27th BImSchV:2013. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three month field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of -20 °C bis 50 °C.

The notification of suitability of the AMS, performance testing and the uncertainty calculation have been effected on the basis of the regulations applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the emission limit values and oxygen concentration relevant to the application.

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

Note

The legal regulations mentioned correspond to the current state of legislation during certification. Each user should, if necessary, in consultation with the competent authority, ensure that this AMS meets the legal requirements for the intended use. In addition, it cannot be ruled out that legal regulations governing the use of a measuring device for emission monitoring may change during the lifetime of the certificate.

Basis of the certification

This certification is based on:

- Test report 936/21200211/A dated 21 October 2009
  of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
- Suitability announced by the German Federal Environment Agency (UBA)
  as the relevant body
- The ongoing surveillance of the product and the manufacturing process

Publication in the German Federal Gazette: BAnz. 12 February 2010, No. 24, p. 553, chapter II No. 1.1, Announcement by UBA dated 25 January 2010:

AMS designation:
ZFK8 + ZKM for O_2

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

Field of application:
For measurements at plants requiring official approval and plants according to 27th BImSchV.

Measuring ranges during the performance test:

Component	Certification range	Supplementary range	Unit
O_2	0 - 25	0 - 5	Vol.-%

Software version:
2.01d 08/03

Restrictions:
None

Notes:
The maintenance interval is four weeks.

Test Institute:
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Report No.: 936/21200211/A dated 21 October 2009

Publication in the German Federal Gazette: BAnz. 29. July 2011, no. 113, p. 2725, Chapter III, notification 8, Announcement by UBA dated 15 July 2011:

8 Notification as regards Federal Environment Agency notices of 25 January 2010 (BAnz. p. 552, chapter II No. 1.1)

The current software version of the ZFK8 + ZKM measuring system for O_2 manufactured by Fuji Electric Systems Co., Ltd. is:
2.13B

The versions 2.13A, 2.12 and 2.10 are also approved.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 24 March 2011

Publication in the German Federal Gazette: BAnz. 02. March 2012, no. 36, p. 920, Chapter V, notification 4, Announcement by UBA dated 23 February 2012:

4 Notification as regards Federal Environment Agency notices of 25 January 2010 (BAnz. p. 552, chapter II, No. 1.1) and of 15 July 2011 (BAnz. p. 2725, chapter III, notification 8)

The company Fuji Electric Systems Co., Ltd., manufacturer of the ZFK8 + ZKM measuring system for O_2, was renamed. The new company name is:
Fuji Electric Co., Ltd.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 26 September 2011

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, Chapter V notification 21, Announcement by UBA dated 22 July 2015:

21 Notification as regards Federal Environment Agency (UBA) notices of 25 January 2010 (BAnz. p. 552, chapter II number 1.1) and of 23 February 2012 (BAnz. p. 920, chapter V notification 4)

The ZFK8 + ZKM measuring system for O_2, manufactured by Fuji Electric Co., Ltd. has been equipped with a new display. The new display differs from the old version in its background colour.

The current software version for the AMS is: V 3.00

Statement of TÜV Rheinland Energie und Umwelt GmbH of 25 March 2015

Publication in the German Federal Gazette: BAnz AT 17.07.2018 B9, Chap. III notification 12, Announcement by UBA dated 3 July 2018:

12 Notification as regards Federal Environment Agency (UBA) notices of 25 January 2010 (BAnz. p. 552, chapter II number 1.1) and of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V notification 21)

The current software version of the ZFK8 + ZKM measuring system manufactured by Fuji Electric Co., Ltd is:
V 3.05

As an alternative, the measuring system may be equipped with a transducer/ converter, type ZKM-2. In that case, the AMS designation is ZFK8 + ZKM-2 for O_2 with its current software version: VER AC 15/12

Statement issued by TÜV Rheinland Energy GmbH dated 21 February 2018

Publication in the German Federal Gazette: BAnz AT 22.07.2019 B8, Chap. V notification 4, Announcement by UBA dated 28 June 2019:

4 Notification as regards Federal Environment Agency (UBA) notices of 25 January 2010 (BAnz. p. 552, chapter II number 1.1 and of 3 July 2018 (BAnz AT 17.07.2018 B9, chapter III notification 12)

A different insulating material may now be used for the ZFK8/ZKM oxygen analyser manufactured by Fuji Electric Ltd. Moreover, the software of the ZKM-2 converter has been updated.

The latest software version of the ZFK8/ZKM is
VER AG 17/12;
for the ZKM-2 converter it remains V3.05.

Statement issued by TÜV Rheinland Energy GmbH dated 6 March 2019

Certified product

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

The in-situ zirconia oxygen analyser consists of a probe with a sensor unit (ZFK8), a sensor rod which is mounted directly in the stack to send the gas to the sensor, and a converter (ZKM respectively ZKM-2) for controlling the sensor, processing the signal, output/display, and external transfer. Sensor and converter are connected with a cable.

With the help of the converter the measuring- and status-signals can be evaluated. By means of the keyboard, settings and manual calibrations can be made.

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 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 product of the current production does not conform to the certified product, TÜV Rheinland Energy & Environment GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate. This certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy & Environment GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy & Environment GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and its expiration is also accessible on the internet: **qal1.de**.

History of documents
Certification of ZFK 8 + ZKM is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial certification according to EN 15267
Certificate No. 0000025932_00: 10 March 2010
Expiry date of the certificate: 11 February 2015
Test report: 936/21200211/A dated 21 October 2009
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
Publication: BAnz. 12 February 2010, No. 24, p. 553, chapter II number 1.1
UBA announcement dated 25 January 2010

Notifications
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 24 March 2011
Publication: BAnz. 29 July 2011, No. 113, p. 2725, chapter III notification 8
UBA announcement dated 15 July 2011
(Software changes)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 26 September 2011
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter V notification 4
UBA announcement dated 23 February 2012
(New manufacturer name)

Renewal of certificates
Certificate No. 0000025932_01: 2 February 2015
Expiry date of the certificate: 11 February 2020

Notifications
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 25 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 21
UBA announcement dated 22 July 2015
(Soft- and hardware changes)

Statement issued by TÜV Rheinland Energy GmbH dated 21 February 2018
Publication: BAnz AT 17.07.2018 B9, chapter III notification 12
UBA announcement dated 3 July 2018
(Soft- and hardware changes)

Statement issued by TÜV Rheinland Energy GmbH dated 6 March 2019
Publication: BAnz AT 22.07.2019 B8, chapter V notification 4
UBA announcement dated 28 June 2019
(Soft- and hardware changes)

Renewal of certificates
Certificate No. 0000025932_02: 12 February 2020
Expiry date of the certificate: 11 February 2025

Renewal of certificates
Certificate No. 0000025932_03: 12 February 2025
Expiry date of the certificate: 11 February 2030

Umwelt Bundesamt

Certificate:
0000025932_03 / 10 February 2025

TÜVRheinland®
Precisely Right.

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	ZFK8 + ZKM
Serial Number	Q8M3535T / Q8M3534T
Measuring Principle	zirconia
TÜV Data	
Approval Report	936/21200211/A
Editor	Ruth Steinhagen
Date	2009-10-21
Measurement Component	O_2
Certificated range	25 Vol.-%

Evaluation of the cross sensitivity (CS)

Sum of positive CS at zero point	0.000 Vol.-%
Sum of negative CS at zero point	-0.110 Vol.-%
Sum of postive CS at reference point	0.000 Vol.-%
Sum of negative CS at reference point	-0.270 Vol.-%
Maximum sum of cross sensitivities	-0.270 Vol.-%
Uncertainty of cross sensitivity	-0.156 Vol.-%

Calculation of the combined standard uncertainty

Test Value		u	u²
Standard deviation from paired measurements under field conditions *	u_D	0.054 Vol.-%	0.003 (Vol.-%)²
Lack of fit	u_{lof}	0.052 Vol.-%	0.003 (Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.081 Vol.-%	0.007 (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	0.140 Vol.-%	0.020 (Vol.-%)²
Influence of supply voltage	u_v	0.051 Vol.-%	0.003 (Vol.-%)²
Cross sensitivity (interference)	u_i	-0.156 Vol.-%	0.024 (Vol.-%)²
Influence of sample pressure	u_p	0.100 Vol.-%	0.010 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.35 Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1{,}96$	0.68 Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.7**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the range 25 Vol.-%**	**10.0** **
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

** For this component no requirements in the EC-directives 2001/80/EC und 2000/76/EC are given. A value of 10 % was used for this.