

CERTIFICATE

of Product Conformity (QAL1)

Certificate No: 0000069252_01

Certified AMS: ZFDM-4 for dust

Manufacturer: Fuji Electric France S.A.S.
46, Rue Georges Besse, ZI du Brézet
63039 Clermont-Ferrand Cedex 2,
France

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 0000069252_00 dated 4 June 2020.



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000069252

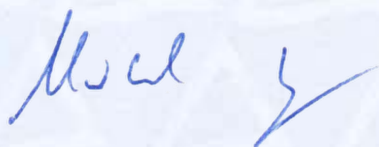
Publication in the German Federal Gazette
(BAnz) of 24 March 2020

German Environment Agency

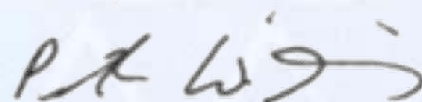
Dessau, 20 March 2025

This certificate will expire on:
23 March 2030

TÜV Rheinland Energy &
Environment GmbH
Cologne, 18 March 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: | 936/21246878/A dated 2 October 2019 |
| Initial certification: | 24 March 2020 |
| Expiry date: | 23 March 2030 |
| Certificate: | Renewal (of previous certificate 0000069252_00 of 4 June 2020 valid until 23 March 2025) |
| Publication: | BAnz AT 24.03.2020 B7, chapter I No. 2.1 |

Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV:2017), Directive 2015/2193/EC (44th BImSchV:2022), TA Luft:2002, 44. 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 four-months field test at a municipal waste incinerator.

The AMS is approved for an ambient temperature range of -20 °C to 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 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 936/21246878/A dated 2 October 2019 of TÜV Rheinland Energy 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 AT 24.03.2020 B7, chapter I No. 2.1,
Announcement by UBA dated 24 February 2020:

AMS designation:

ZFDM-4 for dust

Manufacturer:

Fuji Electric France S.A.S, Clermont-Ferrand, France

Field of application:

For plants according to the 13th and 27th BImSchV as well as TA Luft

Measuring ranges during the performance test:

| Component | Certification range | Unit |
|-----------|---------------------|-------------------|
| Dust | 0 - 20 | mg/m ³ |

| Component | Supplementary measurement ranges | | Unit |
|-----------|----------------------------------|-----------------------|------|
| Dust | 0 - 15 ¹⁾ | 0 - 100 ²⁾ | SE |

*1 corresponds to ~ 0 to 9 mg/m³ of dust

*2 corresponds to ~ 0 to 60 mg/m³ of dust

Software version:

V 1.3

Restrictions:

None

Notes:

1. The maintenance interval is two weeks.
2. During performance testing in accordance with EN 15267-3, the requirement for the determination coefficient R² of the calibration function was not fulfilled.

Test Institute:

TÜV Rheinland Energy GmbH, Cologne

Report No.: 936/21246878/A dated 2 October 2019

Publication in the German Federal Gazette: BAnz AT 28.07.2022 B4, Chap. III notification 12, Announcement by UBA dated 28 June 2022:

12 Notification as regards Federal Environment Agency (UBA) notice of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter I number 2.1)

The current software version of the ZFDM-4 dust measuring device from Fuji Electric France S.A.S. is:
V1.4.4.

Furthermore, the software versions V1.4.1, V1.4.2 and V1.4.3 are approved.

Statement issued by TÜV Rheinland Energy GmbH dated 28 April 2022

Publication in the German Federal Gazette: BAnz AT 31.10.2024 B9, Chap.IV notification 19, Announcement by UBA dated 31 August 2024:

19 Notification as regards Federal Environment Agency (UBA) notice of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter I number 2.1) and of 28 June 2022 (BAnz AT 28.07.2022 B4, chapter III, notification 12)

The current software version of the ZFDM-4 dust measuring device from Fuji Electric France S.A.S. is:
V1.4.5.

To check the linearity of the measuring device, a control or adjustment block can also be used, in which 3 different filters and a zero point stage are integrated.

Statement issued by TÜV Rheinland Energy & Environment GmbH dated 21 February 2024

Certified product

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

The ZFDM-4 is a dust measuring system which uses a scattered light measuring principle (backwards scattering). The measuring system comprises the following main components:

- Electronic switch box with LED light source, receiver unit, processing electronics and control unit
- Two fibre optic cables for the transmission of emitted and received light
- A sensor for attachment of the fibre optic cables at the waste gas channel including heat resistance, temperature sensor and mounting flange
- Instrument software and control blocks

The two fibre optic cables (available at 1.20 m and 2.20 m length) are fastened in the sensor. This sensor in turn is mounted to the flue gas duct on a rectangular flange.

Particles in the duct reflect the light entering the measuring volume at a 45° angle in different directions. Part of the reflected light hits the tip of the receiver cable. The intensity of the reflected light compared to the intensity of the emitted light depends on the angle between sender and receiver as well as the shape, colour and size of the particles. For any given type of dust, the light intensity received is proportional to the dust concentration present.

The light transmitted via the emitter cable is modulated by a generator at a frequency of 1000 Hz to prevent light interference.

Two separately adjustable fixed measuring ranges serve the purpose of data output.

Thanks to the optical fibre cables, it is possible to install the electronic switch box separately from the sensor. The electronic switch box contains the main board with the logical functions for control and supply. It comprises a micro-processor which carries out the following functions:

- Evaluation of measurement data
- Monitoring of emitted light and sensor temperature
- Management of instrument display and 4–20 mA analogue outputs
- Manage warnings and errors

The measuring system is equipped with a purge air supply at the sensor. To prevent condensation, purge air is heated. It is also used to distribute heat inside the sensor. Temperatures at the sensor can be set to 130 °C to 400 °C. The optical fibres have been designed for a permanent maximum temperature of 250 °C.

Three control or adjustment blocks as well as a zero point block are required for the purpose of lack-of-fit tests and drift checks, which are delivered by the manufacturer. The centre of the adjustment block contains tempered, pigmented glass. The thickness of the glass is proportional to the optical density.

In the context of performance testing, the measuring system was operated with a moving average over 10 s.

The measuring system can perform zero checks automatically every 24 h or manually. Span checks can only be performed manually with the help adjustment blocks. Instead of automatic zero checks, zero checks can also be performed with the help of a calibration block.

In the event of demanding measurement conditions (small duct diameter, reflection inside the waste gas duct etc.), the zero point in the absence of dust concentrations may be moved. The measuring system provides an offset correction for such situations.

The measuring system provides a compensation for contamination. For deviations of at least 10 %, it is possible to calculate correction factors. This correction factor is used to correct output data for the following measuring values. The correction factor can be switched on and off.

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 ZFDM-4 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. 0000069252_00: 4 June 2020

Expiry date of the certificate: 23 March 2025

Test report: 936/21246878/A dated 2 October 2019

TÜV Rheinland Energy GmbH

Publication: BAnz AT 24.03.2020 B7, chapter I number 2.1

UBA announcement dated 24 February 2020

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 28 April 2022

Publication: BAnz AT 28.07.2022 B4, chapter III notification 12

UBA announcement dated 28 June 2022

(Software changes)

Statement issued by TÜV Rheinland Energy & Environment GmbH dated 21 February 2024

Publication: BAnz AT 31.10.2024 B9, chapter IV notification 19

UBA announcement dated 31 August 2024

(Soft- and hardware changes)

Renewal of certificates

Certificate No. 0000069252_01: 20 March 2025

Expiry date of the certificate: 23 March 2030

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system

| | |
|-----------------------------------|--|
| Manufacturer | Fuji Electric France S.A.S |
| AMS designation | ZFDM-4 |
| Serial number of units under test | 11090001 / 11090002 / 11090016 / 11090017 |
| Measuring principle | scattered light measuring (reverse scattering) |

Test report

| | |
|-----------------|---------------|
| Test laboratory | TÜV Rheinland |
| Date of report | 2019-08-07 |

Measured component

| | | |
|---------------------|------|--------------------------|
| Certification range | Dust | 0 - 20 mg/m ³ |
|---------------------|------|--------------------------|

Calculation of the combined standard uncertainty

Tested parameter

| | | | u^2 | |
|--|-----------|--------------------------|-------|-----------------------------------|
| Standard deviation from paired measurements under field conditions * | u_D | 0.314 mg/m ³ | 0.099 | (mg/m ³) ² |
| Lack of fit | u_{lof} | 0.035 mg/m ³ | 0.001 | (mg/m ³) ² |
| Zero drift from field test | $u_{d,z}$ | 0.000 mg/m ³ | 0.000 | (mg/m ³) ² |
| Span drift from field test | $u_{d,s}$ | -0.346 mg/m ³ | 0.120 | (mg/m ³) ² |
| Influence of ambient temperature at span | u_t | -0.454 mg/m ³ | 0.206 | (mg/m ³) ² |
| Influence of supply voltage | u_v | 0.114 mg/m ³ | 0.013 | (mg/m ³) ² |
| Influence of sample gas pressure | u_p | 0.000 mg/m ³ | 0.000 | (mg/m ³) ² |
| Uncertainty of reference material at 70% of certification range | u_{rm} | 0.162 mg/m ³ | 0.026 | (mg/m ³) ² |

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)
Total expanded uncertainty

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.68 \text{ mg/m}^3$$

$$U = u_c * k = u_c * 1.96 \quad 1.34 \text{ mg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 10 mg/m³ 13.4

Requirement of 2010/75/EU

U in % of the ELV 10 mg/m³ 30.0

Requirement of EN 15267-3

U in % of the ELV 10 mg/m³ 22.5