Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000074622

Certified AMS:	EM-D5100A for Dust
Manufacturer:	Horiba GmbH Kaplanstraße 5 A-3430 Tuln Österreich
Test Institute:	TÜV Rheinland Energy 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 (2009), EN 15267-3 (2007) and EN 14181 (2004).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 6 pages).

TÜVRheinland® CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000074622

Publication in the German Federal Gazette (BAnz.) of 03 May 2021

German Federal Environment Agency
Dessau, 02 June 2021

Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
02 May 2026

TÜV Rheinland Energy GmbH
Cologne, 01 June 2021

ppa. Dr. Peter Wilbring

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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:	936/21250511/A of 22 August 2020
Initial certification:	03 May 2021
Expiry date:	02 May 2026
Publication:	BAnz AT 03.05.2021 B9, chapter I number 1.2

Approved application
The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17th BImSchV), 27th BImSchV, 30th BImSchV, 44th BImSchV and TA Luft. 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 -40 °C to +60 °C.

The notification of suitability of the AMS, performance testing, and the uncertainty calculation have been effected on the basis of the regulations valid at the time of performance testing. As changes in legal regulations are possible, any potential user should ensure that this AMS is suitable for monitoring the limit value 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.

Basis of the certification
This certification is based on:

- Test report 936/21250511/A of 22 August 2020 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 03.05.2021 B9, chapter I number 1.2, Announcement by UBA dated 31 March 2021:

AMS designation:
EM-D5100A for Dust

Manufacturer:
Horiba GmbH**,** Tuln, Austria

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

Measuring ranges during the performance test:

Component	Certification range	Unit
Dust	0 – 15*	mg/m³

* 0 – 0.1 Ext. equals 0 – 16 mg/m³ with an optical length of 5 m

Component	Supplementary ranges			Unit
Dust	0 – 0.2	0 – 0.5	0 – 1.6	Ext.
Dust			0 - 100	Opac.

Software version:
EM-D5100A: 05.10R004
EM 5800CU: 02.02R0066
D-ESI 100: 01.11R0018

Restrictions:
1. The measuring system may only be employed if the temperature does not fall below dew point.
2. The requirement for the correlation coefficient R^2 of the calibration function in accordance with EN 15267-3 was not satisfied.

Notes:
1. The dust concentration is determined in wet flue gas under operational conditions.
2. The maintenance interval is four weeks.
3. The measuring path length of 5 m and the measuring range of 16 mg/m³ determined during the calibration results in a product of 80 ·mg m/m³ for the field test plant.
4. The measuring system can be operated with the EM5800CU control unit or the EM-D5100TB connection box.
5. The EM5800CU control unit is equipped with the digital interfaces Modbus RTU and Modbus TCP according to VDI 4201 sheets 1 and 3 (EIA-485, serial and TCP / IP, Ethernet).

6. The EM-D5100A measuring device is equipped with an digital Modbus RTU Interface in accordance with VDI 4201 sheets 1 and 3 (EIA-485, serial).
7. When combining the EM-D5100A measuring device with the EM5800CU control unit, the Modbus interface of the EM-D5100A measuring device cannot be used. Instead, the digital Modbus interface of the EM5800CU control unit is used.
8. If the measuring device is not equipped with the EM5800CU control unit, the measuring device is operated with the D-ESI 100 software on a commercially available PC / notebook / tablet.
9. The allowed ambient temperature range for the measuring device is -40 °C to +60 °C.
10. The EM5800CU control unit is available in the following designs:
    - EM5800CU M (standard)
    - EM5800CU C (compact housing)
    - EM5800CU P (with purgeing air fan)
    - EM5800CU R (housing for 19 “ rack installation).

Test report:

TÜV Rheinland Energy GmbH, Cologne
Report No.: 936/21250511/A of 22 August 2020

Certified product

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

The EM-D5100A measuring system uses the two-beam alternate light method, based on the autocollimation principle. The measuring light crosses the measuring path twice. The attenuation of the measuring light beam caused by the dust concentration is measured.

An photo sensor receives the measuring and comparison light beams alternately. The changeover between measuring light and comparison light is performed using a step motor every 2 min for 2 s. There is a common amplifier for signal processing of measuring and comparison light, temperature influences and long-term drift effects of the amplifier are compensated. The measuring light beam is generated by a Super Wide Band Diode (SWBD) without any influence of d.c. light (daylight). With the Wide Band performance of the SWBD the measuring result is independent of temperature and other influences and provides a very stable measurement.

The measurement system EM-D5100A has two analogue outputs. Each of these outputs has two freely selectable extinction and opacity measuring ranges, which are externally changeable. The ranges are freely adjustable from 0.1 to 1.6 Extinction and from 20 to 100% Opacity.

To check proper functioning of the EM-D5100A, a control cycle is performed at adjustable periodic intervals. In this cycle, the contamination of the optical interfaces, the span and the zero point are automatically measured and displayed. The results of the following measurements are corrected by the magnitude of the measured difference (contamination). If the contamination exceeds 6% a status signal is produced. By heating the optical discs, condensation and contamination are reduced as far as possible.

The measuring device consist of the following components:

- Measuring head EM-D5100MH100
- Reflector EM-D5100R100
- Blower unit EM-D5100BL
- Electric connection box EM-D5100TB
  or
- Control unit EM5800CU

When using the EM-D5100TB connection box, the EM-D5100A measuring device is operated using a commercially available PC / notebook / tablet with the D-ESI 100 control software. The EM5800CU control unit enables the measuring device to be operated without a PC and can provide additional data outputs. If the EM-D5100A measuring device is combined with the EM5800CU electronic control unit, the digital interface of the EM5800CU electronic control unit must be used. The EM5800CU control unit is available in the following designs:

- EM5800CU M (standard)
- EM5800CU C (compact housing)
- EM5800CU P (with purge air fan)
- EM5800CU R (housing for 19 “ rack installation.

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 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 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 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 EM-D5100A 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. 0000074622: 02 June 2021
Expiry date of the certificate: 02 May 2026
Test report 936/2120511/A dated 22 August 2020
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 03.05.2021 B9, chapter I number 1.2
Announcement by UBA dated 31 March 2021

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

Measuring system					
Manufacturer			HORIBA GmbH		
AMS designation			EM-D5100A		
Serial number of units under test			406752 (142) / 406753 (158) / 1214444 / 1214434		
Measuring principle			optical transmission		
Test report			936/21250511/A		
Test laboratory			TÜV Rheinland		
Date of report			2020-08-22		
Measured component			Dust		
Certification range			0 - 15 mg/m³		

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.143	mg/m³	0.020	(mg/m³)²
Lack of fit	u_{lof}	0.058	mg/m³	0.003	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.012	mg/m³	0.000	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.017	mg/m³	0.000	(mg/m³)²
Influence of ambient temperature at span	u_t	0.052	mg/m³	0.003	(mg/m³)²
Influence of supply voltage	u_v	0.040	mg/m³	0.002	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.121	mg/m³	0.015	(mg/m³)²
Excursion of measurement beam	u_{mb}	0.167	mg/m³	0.028	(mg/m³)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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.27	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.52	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**5.2**
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