

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000059869_01

AMS designation: HM-1400 TRX 2 for Hg

Manufacturer: DURAG GmbH
Kollastraße 105
22453 Hamburg
Germany

Test Laboratory: 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: 2014

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 6 pages).
The present certificate replaces certificate 0000059869 of 04 September 2018.



Suitability Tested
EN 15267
QAL1 Certified
Regular Surveillance

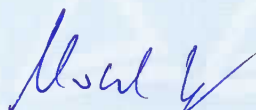
www.tuv.com
ID 0000059869

Publication in the German Federal Gazette
(BAnz) of 22 July 2019

Federal Environment Agency
Dessau, 05 November 2019

Expiry date:
21 July 2024

TÜV Rheinland Energy GmbH
Cologne, 04 November 2019



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Test institute accredited to EN ISO/IEC 17025:2005 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:	936/21245908/A dated 6 May 2019
Initial certification:	28 July 2018
Expiry date:	21 July 2024
Publication:	BAnz AT 22.07.2019 B8, chapter I number 1.3

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapters III (13th BImSchV) and IV (17th BImSchV). 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 field test at a large combustion plant (hard-coal fired) over a period of more than eight months as well as at a waste incineration plant over a period of more than three months.

Depending on the instrument version, the AMS has been approved for different temperature ranges:

- model code HM-1400 TRX 2EC-230-A1LF) +5 °C to +40 °C.
(with housing fan without cabinet heating and cooling unit),
- model code HM-1400 TRX 2EC-230-A1LH, 0 °C to +50 °C.
(with built-in cooling unit and cabinet heating),
- model code HM-1400 TRX 2EC-230-A1LD, +5 °C to +50 °C.
(with built-in cooling unit and without cabinet heating).

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 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.

Basis of the certification

This certification is based on:

- Test report 936/21245908/A dated 6 May 2019 issued by 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 22.07.2019 B8, chapter I number 1.3, UBA announcement dated 22. Juli 2019:

AMS designation:

HM-1400 TRX 2 for mercury

Manufacturer: DURAG GmbH, Hamburg

Field of application:

Measurements at plants according the 13th and 17th BImSchV

Measuring ranges during performance testing:

Component	Certification range	supplementary measuring ranges	Unit
Hg	0–15	0–45 / 0–75	µg/m ³

Software versions:

PLC: 3.04R0000
Display: TRX_3.04R0000

Restrictions: None

Notes:

1. The maintenance interval is three months.
2. Wet test gases should be used for testing mercury.
3. An external test gas generator is needed for regular span checks during the maintenance interval.
4. The length of the sampling line during the performance test (laboratory test and field test at the large combustion plant) was 40 m. The length of the sampling line was 10 m during the field test at the waste incinerator.
5. The zero point was automatically adjusted every two hours using purged ambient air.
6. Manual QAL3 tests and automatic span point checks should not be performed the same day.
7. The permissible ambient temperature range for the standard version of the HM-1400 TRX 2 measuring system (with housing fan without cabinet heating and cooling unit, model code HM-1400 TRX 2EC-230-A1LF) is +5 °C to +40 °C. In the version with built-in cooling unit and cabinet heating, model code HM-1400 TRX 2EC-230-A1LH, the permissible ambient temperature range is 0 °C to +50 °C. In the version with built-in cooling unit and without cabinet heating, model code HM-1400 TRX 2EC-230-A1LD, the permissible ambient temperature range is +5 °C to +50 °C.
8. Supplementary testing (extension of the maintenance interval to three months and approval of an additional housing version) regarding Federal Environment Agency notices of 3 July 2018 (BAnz AT 17.07.2018 B9, chapter I number 2.1) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV notification 77).

Test Report:

TÜV Rheinland Energy GmbH, Cologne
Report no. 936/21245908/A dated 6 May 2019

Certified product

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

The extractive HM-1400 TRX 2 measuring system is an AMS for the continuous analysis of all gaseous mercury compounds emitted by plants subject to monitoring (currently under the 13th and 17th BImSchV) or present in process gases. A dual beam photometer detects the concentration of atomic mercury Hg⁰. In order to determine total mercury Hg (total) in the sample gas, mercury present in the sample gas is first reduced to Hg⁰. This takes place in a thermo-catalytic reactor.

The AMS provides the following control functions:

- Leak test: The AMS tests the leak tightness of the system.
- Zero point checks: The AMS automatically performs zero point checks for an internal re-adjustment of the photometer.
- Span point measurement: With its internal calibration gas generator (AKM), the instrument performs an automatic span point measurement. This feature has not yet been QAL3-approved for regular checks. Thus, the use of the internal AKM does not conform to the certified version of the measuring system.
- Connecting external gas generators: This facilitates to connect external gas generators for checking the photometer and the entire system. In the context of QAL3-compliant performance, this is typically done via an appropriate stub at the sampling probe for dosing test gas upstream of the filter.

The measuring system provides options for sample gas dilution and separate determination of the proportions of Hg species Hg⁰ and Hgⁿ⁺ (specification). As soon as this option is activated, the measuring system does no longer conform to the certified version. Measured values obtained in this operation mode must not be used for continuous emission monitoring.

The essential components of the HM-1400 TRX 2 measuring system include:

- Measuring cabinet c/w photometer (UV dual beam photometer), thermo-catalytic reactor (with two reactor vessels which can be switched automatically), pressure and flow regulator, temperature control and test gas generator
- M&C sample probe SP2000-H with second stub upstream of the filter
- Heated sampling line (185 °C) with two internal lines (6 mm PTFE, one for sucking the sample gas downstream of the filter and one for dosing in zero and test gases upstream of the filter). The sampling line used for the laboratory and field test was 40 m long, for the supplementary test at the waste incinerator, it was 10 m long.
- Software: The AMS has separate pieces of software for the PLC and the display. The software versions are as follows:
PLC: 3.04R000
Display: TRX_3.04R0000

General remarks

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 manufacturing process for the certified product. Both the product and the quality management system 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 document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at qal1.de.

Document history

Certification of the HM-1400 TRX 2 measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Initial certification according to EN 15267

Certificate no. 0000059869_00: 04 September 2018
Expiry date of the certificate: 16 July 2023
Test Report: 936/21238805/C dated 10 May 2018
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 17.07.2018 B9, chapter I number 2.1
UBA announcement dated 3 July 2018

Supplementary testing according to EN 15267

Certificate no. 0000059869_01: 05 November 2019
Expiry date of the certificate: 21 July 2024
Test report: 936/21245908/A dated 6 May 2019
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 22.07.2019 B8, chapter I number 1.3
UBA announcement dated 28 June 2019

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

Measuring system

Manufacturer	DURAG GmbH
AMS designation	HM-1400 TRX 2
Serial number of units under test	755 / 756 / 519 / 520
Measuring principle	Thermocatalytic reaction and cold vapour AAS

Test report

Test laboratory	936/21245908/A
Date of report	TÜV Rheinland 2019-03-06

Measured component

Certification range	Hg 0 - 15 µg/m³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.11 µg/m³
Sum of negative CS at zero point	-0.19 µg/m³
Sum of positive CS at span point	0.22 µg/m³
Sum of negative CS at span point	-0.53 µg/m³
Maximum sum of cross-sensitivities	-0.53 µg/m³
Uncertainty of cross-sensitivity	u_i -0.306 µg/m³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.160 µg/m³	0.026 (µg/m³)²
Lack of fit	u_{lof}	-0.081 µg/m³	0.007 (µg/m³)²
Zero drift from field test	$u_{d,z}$	0.191 µg/m³	0.036 (µg/m³)²
Span drift from field test	$u_{d,s}$	0.251 µg/m³	0.063 (µg/m³)²
Influence of ambient temperature at span	u_t	0.190 µg/m³	0.036 (µg/m³)²
Influence of supply voltage	u_v	0.078 µg/m³	0.006 (µg/m³)²
Cross-sensitivity (interference)	u_i	-0.306 µg/m³	0.094 (µg/m³)²
Influence of sample gas flow	u_p	0.090 µg/m³	0.008 (µg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.121 µg/m³	0.015 (µg/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)

$$u_c = \sqrt{\sum (u_{max, i})^2} \quad 0.54 \text{ µg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 1.06 \text{ µg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 6 µg/m³ **17.6**

Requirement of 2010/75/EU

U in % of the ELV 6 µg/m³ **40.0**

Requirement of EN 15267-3

U in % of the ELV 6 µg/m³ **30.0**