

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000028729\_01

**Certified AMS:** GM700-2 for HF

**Manufacturer:** SICK AG  
Nimburger Str. 11  
79276 Reute  
Germany

**Test Institute:** TÜV Rheinland Energie und Umwelt GmbH

**This is to certify 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).

The present certificate replaces Certificate No. 0000028729 of 9 February 2011

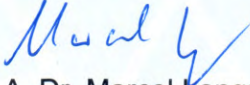


Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000028729

Publication in the German Federal Gazette  
(BAnz.) of 5 August 2014

German Federal Environment Agency  
Dessau, 9 September 2014

  
i. A. Dr. Marcel Langner

This certificate will expire on:  
25 January 2016

TÜV Rheinland Energie und Umwelt GmbH  
Cologne, 8 September 2014

  
ppa. Dr. Peter Wilbring

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51105 Cologne

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

<b>Test report:</b>	936/21210058/B of 2 April 2014
<b>Initial certification:</b>	26 January 2011
<b>Expiry date:</b>	25 January 2016
<b>Publication:</b>	BAnz AT 5 August 2014 B11, chapter I, no. 2.1

#### **Approved application**

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III, at waste incineration plants according to Directive 2010/75/EU, chapter IV and other plants requiring official approval. The measured ranges have been selected considering the wide application range of the AMS.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a twelve-month field test at a tunnel kiln for the production of ceramic roof tiles.

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

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 936/21210058/B of 2 April 2014 of TÜV Rheinland Energie und Umwelt 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 5 August 2014 B11, chapter I, no. 2.1  
UBA announcement of 17 July 2014

**AMS designation:**

GM700-2 for HF

**Manufacturer:**

SICK AG, Reute

**Field of application:**

For measurements at plants requiring official approval (e.g. Directive 2010/75/EU on industrial emissions, chapters III and IV)

**Measuring ranges during the performance test:**

Component	Certification range	Supplementary ranges	Unit
HF	0 - 5	0 - 25	mg/m <sup>3</sup>

**Software versions:**

9105060 VA24 (Measuring head)

9100821 WN42 (Evaluation unit)

9091948 WJ24 (Purge air)

**Restriction:**

The performance criterion for the expanded uncertainty according to EN 15267-3 was not fulfilled.

**Notes:**

1. Wet test gases shall be used for the testing of HF.
2. The maintenance interval is six months.
3. If the range of the ambient temperature is >50 °C it is necessary to adjust the parameterisation of the heating element for the transmitter and receiver unit.
4. Supplementary testing (extension of the maintenance interval) to the announcement of the Federal Environmental Agency (UBA) of 10 January 2011 (Federal Gazette (BAnz) p. 249, chapter I, no. 2.1) and of 3 July 2013 (Federal Gazette (BAnz) AT, 23 July 2013, B4, chapter V, 12<sup>th</sup> notification [no. 1]).

**Test report:**

TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Report no.: 936/21210058/B of 2 April 2014

### Certified product

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

The GM700-2 measuring system is an in-situ laser system for the determination of component HF.

A laser which has been developed specifically for gas analysis is operated as light source of the GM700-2 measuring system. Precise stabilisation of the wavelength and temperature is provided by a Peltier element and a temperature sensor built into the housing of the laser diode.

The laser beam transmitted by the transmitter- / receiver unit passes through the active measuring path and hits the detector at the other end of the gas duct, where it is reflected back to the transmitter- / receiver unit. There, the light is focused onto a photo diode via a light collector.

The light of the laser diode shines through the sample gas and then detected by a photo diode. The wavelength of the laser diode is tuned to a single absorption line of the test gas component. A signal evaluation unit provides the size of the absorption line which is required for the calculation of the gas concentration. This method is called Tunable Diode Laser Spectroscopy (TDLS) or Tunable Diode Laser Absorption Spectroscopy (TDLAS).

The GM700 measuring system is equipped with a closed reference cuvette in order to stabilise the wavelength of the laser. The tested measuring system consists of the following parts:

- **Sender- / receiver unit (SR unit)** containing the optical and electronical components of the measuring system.
- **Triple reflector**
- **Purge air attachments for SR unit and reflector**
- **Purge air unit**
- **Evaluation unit**
  - Output of measured values, calculated data and operation states
  - Communication with the peripheral equipment
  - Output of error messages and other status signals
  - Controlling of automatic test functions and access during service (diagnosis)
- **Probe for temperature and pressure measurement**
- **Zero path with GMK10 test cell**

The certification range is  $5 \text{ mg/m}^3 \cdot \text{m}$ . The length of the measuring path which has been used during the test was 1 m.

**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 Energie und Umwelt 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 can be applied to the product or used in publicity material for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energie und Umwelt GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energie und Umwelt 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**.

Certification of GM700-2 for HF 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. 0000028729: 9 February 2011  
Expiry date of the certificate: 25 January 2016

Test report: 936/21210058/A of 30 September 2010  
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz. 26 January 2011, no. 14, p. 294, chapter I, no. 2.1  
UBA announcement of 10 January 2011

**Supplementary testing according to EN 15267**

Certificate no. 0000028729\_01: 9 September 2014  
Expiry date of the certificate: 25 January 2016

Test report: 936/21210058/B of 2 April 2014  
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 5 August 2014 B11, chapter I, no. 2.1  
UBA announcement of 17 July 2014

**Notifications**

Publication: BAnz AT 20 July 2012 B11, chapter IV, notification 15 (changes to software)  
UBA announcement of 6 July 2012

Publication: BAnz AT 5 March 2013 B10, chapter V, notification 26 (changes to software)  
UBA announcement of 12 February 2013

Publication: BAnz AT 23 July 2013 B4, chapter V, notification 12 (manufacturer renamed)  
UBA announcement of 3 July 2013

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

**Measuring system**

Manufacturer	Sick AG
AMS designation	GM700-2
Serial number of units under test	8308013 / 8308014
Measuring principle	Tuneable Diode Laser Spectroscopy

**Test report**

Test laboratory	936/21210058/B
Date of report	TÜV Rheinland
	2014-04-02

**Measured component**

Certification range	HF	0 - 5 mg/m <sup>3</sup>
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**Evaluation of the cross-sensitivity (CS)**

(system with largest CS)

Sum of positive CS at zero point	0.07 mg/m <sup>3</sup>
Sum of negative CS at zero point	0.00 mg/m <sup>3</sup>
Sum of positive CS at span point	0.18 mg/m <sup>3</sup>
Sum of negative CS at span point	-0.11 mg/m <sup>3</sup>
Maximum sum of cross-sensitivities	0.18 mg/m <sup>3</sup>
Uncertainty of cross-sensitivity	$u_i$ 0.104 mg/m <sup>3</sup>

**Calculation of the combined standard uncertainty**

**Tested parameter**

			$u^2$
Standard deviation from paired measurements under field conditions *	$u_D$	0.065 mg/m <sup>3</sup>	0.004 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	$u_{lof}$	-0.029 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	$u_{d,z}$	0.072 mg/m <sup>3</sup>	0.005 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	$u_{d,s}$	0.084 mg/m <sup>3</sup>	0.007 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	$u_t$	0.060 mg/m <sup>3</sup>	0.004 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	$u_v$	0.017 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross-sensitivity (interference)	$u_i$	0.104 mg/m <sup>3</sup>	0.011 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas pressure	$u_p$	0.050 mg/m <sup>3</sup>	0.003 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	$u_{rm}$	0.040 mg/m <sup>3</sup>	0.002 (mg/m <sup>3</sup> ) <sup>2</sup>
Excursion of measurement beam	$u_{mb}$	0.035 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>

\* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )	$u_c = \sqrt{\sum (u_{max, j})^2}$	0.19 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.38 mg/m <sup>3</sup>

**Relative total expanded uncertainty**

Requirement of 2010/75/EU	<b>U in % of the ELV 1 mg/m<sup>3</sup></b>	<b>37.9</b>
Requirement of EN 15267-3	<b>U in % of the ELV 1 mg/m<sup>3</sup></b>	<b>40.0</b>
	<b>U in % of the ELV 1 mg/m<sup>3</sup></b>	<b>30.0</b>