Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000028729_03

AMS designation:	GM700-2 for HF
Manufacturer:	SICK AG Nimburger Straße 11 79276 Reute 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 (2004).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 9 pages).
The present certificate replaces certificate 0000028729_02 of 21 January 2016.

TÜVRheinland® CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000028729

Publication in the German Federal Gazette (BAnz) of 05 August 2014

This certificate will expire on:
25 January 2026

German Federal Environment Agency
Dessau, 25 January 2021

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 24 January 2021

ppa. Dr. Peter Wilbring

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51105 Köln

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 certificate D-PL-11120-02-00.

Test Report:	936/21210058/B dated 2 April 2014
Initial certification:	26 January 2011
Expiry date:	25 January 2026
Certificate:	Renewal (of previous certificate 0000028729_02 dated 21 January 2016 valid until 25 January 2021)
Publication:	BAnz AT 05.08.2014 B11, chapter I number 2.1

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV), chapter IV (17th BImSchV), 30th BImSchV, 44th BImSchV, plants in compliance with TA Luft and plants according to the 27th 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 these applications was assessed on the basis of a laboratory test and a twelve-months field test at a tunnel kiln for the production of roof tiles.

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 limit values relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

Basis of the certification

This certification is based on:

- Test report 936/21210058/B dated 2 April 2014 issued by 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 05.08.2014 B11, chapter I number 2.1, UBA announcement dated 17 July 2014:

AMS designation:
GM700-2 for HF

Manufacturer:
SICK AG, Reute

Field of application:
For plants requiring official approval and for plants according to the 27th BImSchV

Measuring ranges during performance testing:

Component	Certification range	supplementary measuring ranges	Unit
HF	0–5	0–25	mg/m³

Software versions:
9105060 VA24 (sampling head)
9100821 WN42 (evaluation unit)
9091948 WJ24 (purge air)

Restriction:
The measuring system did not meet the requirement for total uncertainty as defined in EN 15267-3.

Notes:
1. Wet test gases should be used for testing HF.
2. The maintenance interval is six months.
3. If the ambient temperature range is > 50 °C, the parameterization of the heating element for the sender-/receiver unit must be adjusted.
4. Supplementary test (extension of the maintenance interval) as regards Federal Environment Agency notice of 10 January 2011 (BAnz. p. 294, chapter I number 2.1) and of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter V 12th notification [number 1]).

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

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 7, UBA announcement dated 22 July 2015:

7 Notification as regards Federal Environment Agency (UBA) notice of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 2.1)

The latest software versions of the GM700-2 measuring system for HF manufactured by SICK AG are:

9105060 YEK0 (sampling head)
9100821 WN42 (evaluation unit)
9091948 WJ24 (purge air)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 27 March 2015

Publication in the German Federal Gazette: BAnz AT 14.03.2016 B7, chapter V notification 29, UBA announcement dated 18 February 2016:

29 Notification as regards Federal Environment Agency (UBA) notices of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 2.1) and of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V 7th notification)

The latest hardware and software versions of the GM700-2 measuring system for HF manufactured by SICK AG are:

9105060 YEK0 (sampling head)
9100821 YKI0 (evaluation unit)
9091948 WJ24 (purge air)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 21 October 2015

Publication in the German Federal Gazette: BAnz AT 31.07.2017 B12, chapter II notification 19, UBA announcement dated 13 July 2017:

19 Notification as regards Federal Environment Agency (UBA) notices of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 2.1) and of 27 February 2016 (BAnz AT 14.03.2016 B7, chapter V 29th notification)

The GM700-2 measuring system for HF manufactured by SICK AG has been equipped with a new housing for the sampling head. The housing is now 10 mm wider and equipped with a handle and quick release fasteners. The service interface is now accessible from the outside and the insulation has been optimised.

The latest software versions of the GM700-2 measuring system for HF manufactured by SICK AG are:
9105060 YVB8 (sampling head)
9100821 YKI0 (evaluation unit)
9091948 WJ24 (purge air)

Statement issued by TÜV Rheinland Energy GmbH dated 8 March 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B9, Chapter IV correction 2, UBA announcement dated 21 February 2018

2 Correction as regards Federal Environment Agency (UBA) notices of 27 July 2016 (BAnz AT 14.03.2016 B7, chapter V 29th notification) and of 13 February 2017 (BAnz AT 31.07.2017 B7, chapter II 19th notification)

The notifications cited above indicate incorrect software versions for the GM700-2 manufactured by SICK AG. The correct software versions of the measuring system are as follows:

9105060 YVB8 (sampling head)
9100821 WN42 (evaluation unit)
9091948 WJ24 (purge air)

The software version 9100821 YKI0 published by mistake is irrelevant.

Statement issued by TÜV Rheinland Energy GmbH dated 8 December 2017

Certified product
This certification 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 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 ensured 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 GM700-2 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 mg/m³ * m. The length of the measuring path which has been used during the test was 1 m.

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 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 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 GM700-2 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. 0000028729: 09 February 2011
Expiry date of the certificate: 25 January 2016
Test Report: 936/21210058/A dated 30 September 2010
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz. 26 January 2011, no. 14, p. 294, chapter I number 2.1
UBA announcement dated 10 January 2011

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 14 March 2012
Publication: BAnz AT 20.07.2012 B11, chapter IV notification 15
UBA announcement dated 6 July 2012
(software updates)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 6 October 2012
Publication: BAnz AT 05.03.2013 B10, chapter V notification 26
UBA announcement dated 12 February 2013
(software updates)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 25 March 2013
Publication: BAnz AT 23.07.2013 B4, chapter V notification 12
UBA announcement dated 3 July 2013
(new manufacturer name)

Supplementary testing according to EN 15267

Certificate no. 0000028729_01: 09 September 2014
Expiry date of the certificate: 25 January 2016
Test Report: 936/21210058/B dated 2 April 2014
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 05.08.2014 B11, chapter I number 2.1
UBA announcement dated 17 July 2014

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 27 March 2015
Publication BAnz AT 26.08.2015 B4, chapter V notification 7
UBA announcement dated 22 July 2015
(software updates)

Renewal of the certificate
Certificate no. 0000028729_02: 21 January 2016
Expiry date of the certificate: 25 January 2021

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 21 October 2015
Publication: BAnz AT 14.03.2016 B7, chapter V notification 29
UBA announcement dated 18 February 2016
(software updates)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 08 March 2017
Publication: BAnz AT 31.07.2017 B12, chapter II notification 19
UBA announcement dated 13 July 2017
(Software changes, new housing of the sample head)

Statement issued by TÜV Rheinland Energy GmbH dated 8 December 2017
Publication: BAnz AT 26.03.2018 B9, chapter IV notification 2
UBA announcement dated 21 February 2018
(software updates)

Renewal of the certificate

Certificate no. 0000028729_03: 25 January 2021
Expiry date of the certificate: 25 January 2026

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		936/21210058/B	
Test laboratory		TÜV Rheinland	
Date of report		2014-04-02	
Measured component		HF	
Certification range		0 - 5	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.07	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		0.18	mg/m³
Sum of negative CS at span point		-0.11	mg/m³
Maximum sum of cross-sensitivities		0.18	mg/m³
Uncertainty of cross-sensitivity	u_i	0.104	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.065	mg/m³	0.004	(mg/m³)²
Lack of fit	u_{lof}	-0.029	mg/m³	0.001	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.072	mg/m³	0.005	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.084	mg/m³	0.007	(mg/m³)²
Influence of ambient temperature at span	u_t	0.060	mg/m³	0.004	(mg/m³)²
Influence of supply voltage	u_v	0.017	mg/m³	0.000	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.104	mg/m³	0.011	(mg/m³)²
Influence of sample gas pressure	u_p	0.050	mg/m³	0.003	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.040	mg/m³	0.002	(mg/m³)²
Excursion of measurement beam	u_{mb}	0.035	mg/m³	0.001	(mg/m³)²

* 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/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.38	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 1 mg/m³**	**37.9**
Requirement of 2010/75/EU	**U in % of the ELV 1 mg/m³**	**40.0**
Requirement of EN 15267-3	U in % of the ELV 1 mg/m³	30.0