Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000056507

AMS designation:	GM32 LowNO_X GMP for NO and SO_2
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 certified according to 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 7 pages).

TÜVRheinland®
CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000056507

Publication in the German Federal Gazette (BAnz) of 26 March 2018

This certificate will expire on:
25 March 2023

German Federal Environment Agency
Dessau, 13 April 2018

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 12 April 2018

ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu tre@umwelt-tuv.eu Phone: + 49 221 806-5200	TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln

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:	936/21239647/A dated 4 October 2017
Initial certification:	26 March 2018
Expiry date:	25 March 2023
Publication:	BAnz AT 26.03.2018 B8, chapter I number 3.3

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), the 27th BImSchV, 30th 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 -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 installation at which it will be installed.

Basis of the certification
This certification is based on:

- Test report 936/21239647/A dated 4 October 2017
  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 26.03.2018 B8, chapter I number 3.3, UBA announcement dated 21 February 2018:

AMS designation:
GM32 LowNO_X GMP for NO and SO_2

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
SO_2	0–75	0–1 000	0–2 500	mg/m³·m*
NO	0–70	0–700	0–1 302	mg/m³·m*

* at a measurement path length of 1 m

Software versions:
9246548_YXI6_160914
Operating software: SOPAS ET 3.2.4

Restrictions:
none

Notes:
1. The maintenance interval is four weeks.
2. The influence of vibration was assessed with a GMP measuring rod of 2 m in length.

Test Report:
TÜV Rheinland Energy GmbH, Cologne
Report no.: 936/21239647/A dated 4 October 2017

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

The GM32 LowNO_X GMP In-Situ gas analyser continually monitors NO and SO_2 concentrations in gas ducts.

The GM32 LowNO_X GMP In-Situ gas analyser, GMP measuring probe version, relies on the in-situ technology with direct opto-electronic measurement. Measured values are collected directly and contactless in the gas flow via an open measurement path of the GMP measuring probe which extends into the duct.

The measuring system under test consisted of:

- Sender/receiver unit (SR unit)
- GMP measuring probe
- Purge air attachment for SR unit and reflector
- SLV4 purge air unit for SR unit and reflector
- Connection unit c/w I/O modules
- SICK SOPAS ET parameterisation software
- Heated filter box

Active measurement path or open measurement path and factors:

Measuring gap in mm	Factor for the upper range value (URV)	Available rod lengths (nominal) in mm
250	URV* 4	900, 1500, 2000, 2500
500	URV* 2	1500, 2000, 2500
750	URV* 1.333	1500, 2000, 2500
1000	URV* 1	1500, 2000, 2500
1250	URV* 0.8	2000, 2500
1500	URV* 0.666	2000, 2500
1750	URV* 0.571	2500

The current software version is:

9246548_YXI6_160914.
Operating software: SOPAS ET 3.2.4

The current manual version is:

8012706/ZVF0/V2-1/2018-02.

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**.

Certification of the GM32 LowNO_X GMP 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. 0000056507: 13 April 2018
Expiry date of the certificate: 25 March 2023

Test report: 936/21239647/A dated 4 October 2017
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 26.03.2018 B8, chapter I number 3.3
UBA announcement dated 21 February 2018

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

Measuring system			
Manufacturer		Sick AG	
AMS designation		GM32 LowNOx GMP	
Serial number of units under test		16308009 / 16308010 / 16278029 / 16278030	
Measuring principle		DOAS	
Test report		936/21239647/A	
Test laboratory		TÜV Rheinland	
Date of report		2017-10-04	
Measured component		NO	
Certification range		0 - 70	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.45	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		1.69	mg/m³
Sum of negative CS at span point		-1.97	mg/m³
Maximum sum of cross-sensitivities		-1.97	mg/m³
Uncertainty of cross-sensitivity	u_i	-1.136	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.476	mg/m³	0.227	(mg/m³)²
Lack of fit	u_{lof}	-0.287	mg/m³	0.082	(mg/m³)²
Zero drift from field test	$u_{d,z}$	-0.121	mg/m³	0.015	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.606	mg/m³	0.367	(mg/m³)²
Influence of ambient temperature at span	u_t	0.153	mg/m³	0.023	(mg/m³)²
Influence of supply voltage	u_v	0.074	mg/m³	0.005	(mg/m³)²
Cross-sensitivity (interference)	u_i	-1.136	mg/m³	1.290	(mg/m³)²
Influence of sample gas pressure	u_p	0.785	mg/m³	0.616	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.566	mg/m³	0.320	(mg/m³)²
Excursion of measurement beam	u_{mb}	0.370	mg/m³	0.137	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.76	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.44	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 50 mg/m³**	**6.9**
Requirement of 2010/75/EU	**U in % of the ELV 50 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	15.0

Umwelt Bundesamt

Certificate:
0000056507 / 13 April 2018

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

Measuring system			
Manufacturer		Sick AG	
AMS designation		GM32 LowNOx GMP	
Serial number of units under test		16308009 / 16308010 / 16278029 / 16278030	
Measuring principle		DOAS	
Test report		936/21239647/A	
Test laboratory		TÜV Rheinland	
Date of report		2017-10-04	
Measured component		SO_2	
Certification range		0 - 75	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.00	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		1.66	mg/m³
Sum of negative CS at span point		0.00	mg/m³
Maximum sum of cross-sensitivities		1.66	mg/m³
Uncertainty of cross-sensitivity	u_i	0.957	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.417	mg/m³	0.174	(mg/m³)²
Lack of fit	u_{lof}	-0.342	mg/m³	0.117	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.173	mg/m³	0.030	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.303	mg/m³	0.092	(mg/m³)²
Influence of ambient temperature at span	u_t	0.473	mg/m³	0.224	(mg/m³)²
Influence of supply voltage	u_v	0.139	mg/m³	0.019	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.957	mg/m³	0.916	(mg/m³)²
Influence of sample gas pressure	u_p	0.853	mg/m³	0.728	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.606	mg/m³	0.368	(mg/m³)²
Excursion of measurement beam	u_{mb}	0.337	mg/m³	0.114	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.67	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.27	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 50 mg/m³**	**6.5**
Requirement of 2010/75/EU	**U in % of the ELV 50 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	15.0