

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000038499_01

AMS designation: FLOWSIC 100 for velocity

Manufacturer: SICK Engineering GmbH
Bergener Ring 27
01458 Ottendorf-Okrilla
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,
EN 14181 (2004) and EN ISO 16911-2 (2013)

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 10 pages).

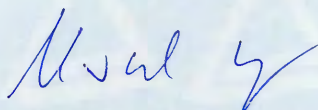


Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000038499

Publication in the German Federal Gazette
(BAnz) of 05 March 2013

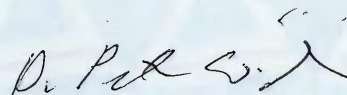
German Federal Environment Agency
Dessau, 05 March 2018



Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
04 March 2023

TÜV Rheinland Energy GmbH
Cologne, 04 March 2018



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TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln

Test institute accredited to EN ISO/IEC 17025:2005 by DAkS (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:	936/21220596/A dated 28 September 2012
Initial certification:	05 March 2013
Expiry date:	04 March 2023
Certificate:	Renewal (of previous certificate 0000038499 dated 22 March 2013 valid until 04 March 2018)
Publication:	BAnz AT 05.03.2013 B10, chapter II no. 2.2

Approved application

The tested AMS is suitable for use at combustion plants according to EC Directive 2001/80/EC (13th BImSchV), at waste incineration plants according to EC Directive 2000/76/EC (17th BImSchV), the 27th BImSchV, the 30th BImSchV and TA Luft. The measured ranges have been selected so as to cater for 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 twelve-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 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 flow velocities 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 936/21220596/A dated 28 September 2012 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 05.03.2013 B10, chapter II no. 2.2,
UBA announcement dated 12 February 2013:

AMS designation:

FLAWSIC 100 for velocity

Manufacturer:

SICK Engineering GmbH, Ottendorf-Okrilla

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 range	Unit
Flow velocity	0–20	0–40	m/s

Software versions:

Sensor (Version 1–3): 21.4.14

Sensor (Version 4–10): 1.4.14

MCU: 1.08.01

SOPAS ET: 02.32

Restrictions:

None

Notes:

- The following versions were tested as part of the performance test:

1	FLAWSIC100 PR	6	FLAWSIC100 H
2	FLAWSIC100 PR-AC	7	FLAWSIC100 H-AC
3	FLAWSIC100 S	8	FLAWSIC100 PM
4	FLAWSIC100 M	9	FLAWSIC100 PH
5	FLAWSIC100 M-AC	10	FLAWSIC100 PH-S

- The maintenance interval is six months.
- Supplementary testing (migration to standard EN 15267) as regards Federal Environment Agency (UBA) notices of 19 February 2009 (BAnz p. 899, chapter II no. 1.1) and of 10 January 2011 (BAnz p. 294, chapter IV notifications 15 and 30).

Test Report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne

Report no.: 936/21220596/A dated 28 September 2012

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chapter IV correction 3, UBA announcement dated 03 July 2013:

3 Correction of Federal Environment Agency (UBA) notice of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter II number 2.2)

The current MCU Firmware version of the Flowsic 100 measuring system for flow velocity manufactured by SICK Engineering GmbH should read as follows:

MCU Firmware: 01.08.00 (instead of 01.08.01)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 28 May 2013

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chapter V notification 13, UBA announcement dated 03 July 2013:

13 Notification as regards Federal Environment Agency notices regarding performance tested AMS manufactured by SICK Engineering GmbH and by SICK AG (excerpt)

Item no.	AMS designation/Manufacturer	Notice	Notification	Statement test laboratory
7	FLAWSIC100/SICK Engineering GmbH	as regards notification 14 of this notice	The current software version of the SOPAS ET platform for AMS control is: SOPAS ET 2.38.	TÜV Rheinland Energie und Umwelt GmbH of 25 March 2013
...

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chapter V notification 14, UBA announcement dated 03 July 2013:

14 Notification as regards Federal Environment Agency (UBA) notices of 14 February 2008 (BAnz p. 901, chapter II number 1.1) and of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter II number 2.2)

The current software versions of the FLOWSIC 100 measuring the gas flow velocity manufactured by SICK Engineering GmbH are:

MCU Firmware: 01.08.00

Software Sensor: - Type PR, PR-AC and S: 21.04.16
- Type M, M-AC, H, H-AC, PM, PH, PH-S: 1.04.16

To ensure full functionality of the AMS, the use of the SOPAS ET software platform in one of its notified versions is required.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 26 March 2013

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 3,
UBA announcement dated 22 July 2015:

3 Notification as regards Federal Environment Agency notices of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter II number 2.2) and of 3 July 2013 (BAnz AT 23.07.2013 B10 chapter IV 14th notification)

The current software versions of the Flosic 100 measuring system for flow velocity manufactured by SICK Engineering GmbH are:

MCU Firmware:	01.12.00
Software Sensor Type PR, PR-AC and S:	1.06.00
Type M, M-AC, H, H-AC, PM, PH, PH-S:	21.06.00

To ensure full functionality of the AMS, the use of the SOPAS ET software platform in one of its notified versions is required. The version most recently announced is SOPAS ET 2.38. The Flowsic 100 velocity measuring system also meets the requirements of EN ISO 16911-2 (Issue: June 2013).

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 24 March 2015

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter V notification 14,
UBA announcement dated 14 July 2016:

14 Notification as regards Federal Environment Agency notices of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter II number 2.2) and of 22 July 2015 (BAnz AT 26.08.2015 B4 chapter V 3rd notification)

The current software versions of the FLOWSIC 100 measuring the gas flow velocity manufactured by SICK Engineering GmbH are:

MCU Firmware:	01.12.02
Software Sensor: Type PR, PR-AC and S:	1.06.00
Type M, M-AC, H, H-AC, PM, PH, PH-S:	21.06.00

For the control of the measuring system the SOPAS ET software platform is required in a publically notified version. The most recent publically notified version is: SOPAS ET 2.38

Statement issued by TÜV Rheinland Energy GmbH dated 25 April 2016

Publication in the German Federal Gazette: BAnz AT 15.03.2017 B6, chapter IV correction 4, UBA announcement dated 22 February 2017:

4 Correction of Federal Environment Agency notice of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V 3rd notification)

In the above-mentioned notice regarding the FLOWSIC 100 measuring system for velocity manufactured by SICK Engineering GmbH, the assignment of the software versions to the instrument types is as follows:

Software Sensor:

Type PR, PR-AC and S: 21.06.00
Type M, M-AC, H, H-AC, PM, PH, PH-S: 1.06.00

Statement issued by TÜV Rheinland Energy GmbH dated 10 October 2016

Publication in the German Federal Gazette: BAnz AT 15.03.2017 B6, chapter IV correction 5, UBA announcement dated 22 February 2017:

5 Correction of Federal Environment Agency notice of 14 July 2016 (BAnz AT 01.08.2016 B11, chapter V 14th notification)

In the above-mentioned notice regarding the FLOWSIC 100 measuring system for velocity manufactured by SICK Engineering GmbH, the assignment of the software versions to the instrument types is as follows:

Software Sensor:

Type PR, PR-AC and S: 21.06.00
Type M, M-AC, H, H-AC, PM, PH, PH-S: 1.06.00

Statement issued by TÜV Rheinland Energy GmbH dated 10 October 2016

Certified product

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

The FLOWSIC100 measuring system continuously monitors the flow velocity.

The measuring system consists of the following components:

- Sender/Receiver unit FLSE100
for emitting and detecting ultra sound pulses and for controlling system functions
- flange c/w tube
- MCU control unit:
control, evaluation and output of data via sensors connected to the RS485 interface
- connecting cable and box
- purge air unit (optional)
for use of certain E/R units at high gas temperatures and for cleaning the ultrasonic transducer

The FLOWSIC100 uses ultrasonic transit times to measure flow velocity. Emitter / receiver units are installed at both sides of the duct/tube at an inclination angle of 45° to 60° in relation to the gas flow.

The emitter/receiver units are made up of piezoelectric ultrasonic transducers which alternately function as emitter or as receiver. Sound pulses are emitted at an angle of α in relation to the flow direction. Depending on the angle α and the gas velocity v , the transit time of the respective sound direction varies as a result of "acceleration and braking effects". The difference in transit times of the sound pulses increases as a consequence of higher gas velocities and smaller angles in relation the flow direction of the gas.

The gas velocity v is calculated from the difference between both transit times regardless of the speed of sound. Therefore, changes in the speed of sound caused by pressure or temperature fluctuations do not affect the calculated gas velocity with this method of measurement.

Ultrasonic transducers are electromechanical oscillation devices whose essential properties are defined by geometry. A pair of piezoelectric rings is always used as impulse. During the transmission phase they transform electric energy into kinetic energy, or vice versa during the reception phase. Their resonance behaviour is characterised by the frequency-dependent transformer current and the frequency-dependent phase between impulse voltage and transformer current. The transformers are scaled according to the frequency of operation depending on the conditions of the application.

The current software versions are:

MCU Firmware:	01.12.02	
Software Sensor:	Type PR, PR-AC and S:	21.06.00
	Type M, M-AC, H, H-AC, PM, PH, PH-S:	1.06.00

The current manual version is: 2-1 version 2016-07

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 FLOWSIC 100 measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Basic testing

Test report: 936/21206702/A dated 05 November 2007
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 07 March 2008 no. 38, p. 901, chapter II no. 1.1
UBA announcement dated 14 February 2008

Supplementary testing

Test report: 936/21206702/B dated 28 February 2008
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 03 September 2008 no. 133, P. 3243, chapter II no. 1.1
UBA announcement dated 12 August 2008

Test report: 936/21206702/E dated 05 October 2008
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 11 March 2009 no. 38, p. 899, chapter II no. 1.1
UBA announcement dated 19 February 2009

Notifications

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH dated 29 October 2009
Publication: BAnz. 12 February 2010, no. 24, p. 552, chapter IV notification 7
UBA announcement dated 25 January 2010
(Software Update)

Statements issued by TÜV Rheinland Energie und Umwelt GmbH dated 5 October 2010 and 8 November 2010

Publication: BAnz. 26 January 2011, no. 14, p. 294, chapter IV notifications 15 and 30 item no. 7

UBA announcement dated 10 January 2011
(Software Update)

Initial certification according to EN 15267

Certificate no. 0000038499: 22 March 2013
Expiry date of the certificate: 04 March 2018

Test report: 936/21220596/A dated 28 September 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 05.03.2013 B10, chapter II no. 2.2
UBA announcement dated 12 February 2013

Notifications in accordance with EN 15267

Statements issued by TÜV Rheinland Energie und Umwelt GmbH dated 25 March 2013 and 26 March 2013

Publication: BAnz AT 23.07.2013 B4, chapter V notification 13 item no. 7 and notification 14
UBA announcement dated 3 July 2013
(New software version for SOPAS ET, new firmware versions)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 24 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 3
UBA announcement dated 22 July 2015
(New software version)

Statement issued by TÜV Rheinland Energy GmbH dated 25 April 2016
Publication: BAnz AT 01.08.2016 B11, chapter V notification 14
UBA announcement dated 14 July 2016
(New software version)

Corrections

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 28 May 2013
Publication: BAnz AT 23.07.2013 B4, chapter IV correction 3
UBA announcement dated 3 July 2013
(New MCU firmware version)

Statement issued by TÜV Rheinland Energy GmbH dated 10 October 2016
Publication: BAnz AT 15.03.2017 B6, chapter IV corrections 4 and 5
UBA announcement dated 22 February 2017
(assignment of the software versions)

Renewal of the certificate

Certificate no. 0000038499_01: 05 March 2018
Expiry date of the certificate: 04 March 2023

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

Measuring system

Manufacturer	SICK Engineering GmbH
Name of measuring system	FLAWSIC 100
Serial number of the candidates	06248850 / 06248851 / 07068737 / 07068738
Measuring principle	Ultrasonic

Test report

Test laboratory	TÜV Rheinland
Date of report	2012-09-28

Measured component

Certification range	Velocity 0 - 20 m/s
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Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.119 m/s	0.014 (m/s) ²
Lack of fit	u_{lof}	0.173 m/s	0.030 (m/s) ²
Zero drift from field test	$u_{d,z}$	0.092 m/s	0.008 (m/s) ²
Span drift from field test	$u_{d,s}$	0.092 m/s	0.008 (m/s) ²
Influence of ambient temperature at span	u_t	0.000 m/s	0.000 (m/s) ²
Influence of supply voltage	u_v	0.036 m/s	0.001 (m/s) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.162 m/s	0.026 (m/s) 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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.30 m/s
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.58 m/s

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC

Requirement of EN 15267-3

U in % of the range 20 m/s	2.9
U in % of the range 20 m/s	10.0 **
U in % of the range 20 m/s	7.5

** EU Directives 2001/80/EG and 2000/76/EG do not define requirements for this component.

A value of 10.0% was used for this.