

# CERTIFICATE

## on Product Conformity (QAL1)

Certificate No.: 0000038499

**Certified AMS:** FLOWSIC 100 for velocity

**Manufacturer:** SICK Engineering GmbH  
Bergener Ring 27  
01458 Ottendorf-Okrilla  
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).



- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

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

This certificate will expire on:  
04 March 2018

German Federal Environment Agency  
Dessau, 22 March 2013

TÜV Rheinland Energie und Umwelt GmbH  
Cologne, 21 March 2013



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ppa. Dr. Peter Wilbring

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

<b>Test report:</b>	936/21220596/A of 28 September 2012
<b>Initial certification:</b>	05 March 2013
<b>Expiry date:</b>	04 March 2018
<b>Publication:</b>	BAnz AT 05 March 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 and at waste incineration plants according to EC Directive 2000/76/EC 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 twelvemonth field test at a waste incinerator.

The AMS is approved for an ambient temperature range of -40 °C to +60 °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 936/21220596/A of 28 September 2012 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 05 March 2013 B10, chapter II, No. 2.2



**AMS name:**

FLAWSIC 100 for velocity

**Manufacturer:**

SICK Engineering GmbH, Ottendorf-Okrilla

**Field of application:**

Measurement at plants requiring official approval as well as plants within the scope of 2000/76/EC (waste incineration directive) and 2001/80/EC (large combustion plants directive)

**Measuring ranges during the performance test:**

Component	Certification range	Supplementary range	Unit
velocity	0 - 20	0 - 40	m/s

**Software version:**

Sensor (Version 1 - 3): 21.4.14

Sensor (Version 4 - 10): 1.4.14

MCU: 1.08.01

SOPAS ET: 02.32

**Restrictions:**

None

**Remarks:**

- The following models were performance tested:

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 (transfer to the EN 15267) as regards Federal Environmental Agency notices of 19 February 2009 (Federal Gazette (*BAnz.*) p. 899, chapter II no. 1.1) and of 10 January 2011 (Federal Gazette (*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

**Certified product**

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

The FLOWSIC100 measuring system conducts continuous measurements of gas velocity.

The AMS comprises the following parts:

- FLSE100 sender/receiver unit  
for transmitting and receiving ultrasonic pulses, signal processing and system function control
- flange with tube
- MCU control unit  
for control, evaluation and output of the data of the sensors connected via RS485 interface
- connection cables and connection box
- purge-air unit (optional)  
for using certain sender/receiver units at high gas temperatures and to keep the ultrasonic transducers clean

The FLOWSIC100 gas velocity monitors operate by measuring the transit time difference of ultrasonic pulses. Sender/receiver units are mounted on both sides of a duct/pipeline at a certain angle (45° - 60°) to the gas flow.

These sender/receiver units contain piezoelectric ultrasonic transducers which work as senders and receivers in turn. The sound pulses are emitted at an angle  $\alpha$  towards the flow direction of the gas. Depending on the angle  $\alpha$  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 impulses 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, independently from the sound velocity value. Therefore, changes of sound velocity 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 transmission phase they transform electric energy into kinetic energy, or vice versa during 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.



**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](http://qal1.de).

Certification of FLOWSIC 100 for velocity is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

**Basic test:**

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  
Announcement by UBA from 14 February 2008

**Notifications:**

Publication: BAnz. 12 February 2010, No. 24, p. 552, chapter IV, notification 7  
Announcement by UBA from 25 January 2010 (Software Update)

Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV, notification 15  
Announcement by UBA from 10 January 2011 (Software Update)

Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV, notification 30  
Announcement by UBA from 10 January 2011 (Software Update)

**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  
Announcement by UBA from 12 August 2008

Test report: 936/21206702/E vom 05 October 2008  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: BAnz. 11 March 2009, No. 38, p. 899, chapter II, No. 1.1  
Announcement by UBA from 19 February 2009

**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 March 2013 B10, chapter II, No. 2.2  
Announcement by UBA from 12 February 2013

**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) <sup>2</sup>
Lack of fit	$u_{lof}$	0.173 m/s	0.030 (m/s) <sup>2</sup>
Zero drift from field test	$u_{dz}$	0.092 m/s	0.008 (m/s) <sup>2</sup>
Span drift from field test	$u_{ds}$	0.092 m/s	0.008 (m/s) <sup>2</sup>
Influence of ambient temperature at span	$u_t$	0.000 m/s	0.000 (m/s) <sup>2</sup>
Influence of supply voltage	$u_v$	0.036 m/s	0.001 (m/s) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	$u_{rm}$	0.162 m/s	0.026 (m/s) <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 ( $u_c$ )	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.30 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

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

\*\* For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.  
The chosen value is recommended by the certification body.