Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000036945_02

Certified AMS:	DUSTHUNTER SP100 for dust
Manufacturer:	SICK Engineering GmbH Bergener Ring 27 01458 Ottendorf-Okrilla Germany
Test Institute:	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 (2004)

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 11 pages).

TÜVRheinland®
CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000036945

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

German Federal Environment Agency
Dessau, 18 July 2017

Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
19 July 2022

TÜV Rheinland Energy GmbH
Cologne, 17 July 2017

ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu
tre@umwelt-tuv.eu
Tel. + 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.

10/221 2.08

Test report:	936/21219384/B of 27 September 2012
Initial certification:	20 July 2012
Expiry date:	19 July 2022
Certificate:	renewal (previous certificate 0000036945_01 dated from 22 March 2013 with validity up to the 19 July 2017)
Publication:	BAnz AT 05.03.2013 B10, chapter I no. 1.5

Approved application
The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13. BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17. BImSchV), at plants according to the 27. BImSchV 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 thirteenmonth field test at a waste incineration.

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 valid at the time of performance testing. As changes in legal regulations are possible, any potential user should ensure that this AMS is suitable for monitoring the limit value 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 936/21219384/B of 27 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 05.03.2013 B10, chapter I no. 1.5, Announcement by UBA from 12 February 2013:

AMS designation:
DUSTHUNTER SP100 for dust

Manufacturer:
SICK Engineering GmbH, Ottendorf-Okrilla

Field of application:
For measurements at plants requiring official approval and plants according to 27th BImSchV

Measuring ranges during the performance test:

Compo-nent	Certification range	Supplementary range					Unit
dust	0 - 15	0 - 5	0 - 20	0 - 50	0 - 100	0 - 200	SE

15 SE (scattered light units) ≙ 18 mg/m³ dust

Software versions:
MCU Firmware version: 01.08.00
Receiver / transmitter unit 01.03.08
Control software SOPAS ET: 02.32

Restrictions:
None

Remarks:
1. The maintenance interval is six months.
2. Dust concentrations were determined in wet exhaust gas under operating conditions.
3. Requirements with regard to the determination coefficient R^2 of the calibration function in accordance with DIN EN 15267-3 were not satisfied during performance testing.
4. Supplementary testing (extension of the maintenance interval) as regards Federal Environmental Agency notices of 19 February 2009 (Federal Gazette (*BAnz.*) p. 899, chapter I no. 1.2) and of 6 July 2012 (Federal Gazette (*BAnz.*) AT 20.07.2012 B11, chapter IV notification 18).

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21219384/B of 27 September 2012

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chapter V notification 11,
Announcement by UBA from 03 July 2013:

11 Notification as regards Federal Environmental Agency notices of 12 February 2013 Federal Gazette (BAnz AT 05.03.2013 B10, chapter I no. 1.5)

The current software version for the measuring system DUSTHUNTER SP100 for dust as manufactured by SICK Engineering GmbH are:

MCU Firmware: 01.08.00
Software Sensor (measuring head/probe): 01.04.00

The software platform SOPAS ET in a certified version is required for full control of the measuring system.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 22 March 2013

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

13 Notification to the announcement of the German Federal Environmental Agency concerning suitability-tested measuring systems by SICK Engineering GmbH and SICK MAIHAK GmbH
(Excerpt)

Ser. no.	Measuring system/ Manufacturer	Notification	Announcement	Statement of testing body
6	DUSTHUNTER SP100/ SICK Engineering GmbH	with regard to notification 11 of this confirmation	The current software version of the platform SOPAS ET for operating the measuring system is: SOPAS ET 2.38	TÜV Rheinland Energie und Umwelt GmbH of 25 March 2013

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 11,
Announcement by UBA from 22 July 2015:

11 Notification as regards Federal Environment Agency (UBA) notices of 12 February 2013 (Federal Gazette (BAnz.) AT 5.03.2013 B10, chapter I number 1.5) and of 3 July 2013 (Federal Gazette (BAnz.) AT 23.07.2013 B4, chapter V notification 11 and 13)

The current software versions for the DUSTHUNTER SP100 measuring system for dust, manufactured by SICK Engineering GmbH, are:

MCU firmware: 01.12.00
Software sensor: 1.06.02

The SOPAS ET software platform is required in a notified version for operating the AMS. The latest notified version is: SOPAS ET 2.38.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 24 March 2015

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter V notification 12,
Announcement by UBA from 14 July 2016:

12 Notification as regards Federal Environmental Agency (UBA) notices of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter I number 1.5) and of 22 July 2015 (BAnz AT 26.08.2015 B4 chapter V notification 11)

The current software versions of the DUSTHUNTER SP100 particle monitor manufactured by SICK Engineering GmbH are:

MCU Firmware: 01.12.02
Software Sensor: 1.06.02

For the control of the measuring system the SOPAS ET software platform is required in a notified version. The most recent 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 V notification 22,
Announcement by UBA from 22 February 2017:

22 Notification as regards Federal Environment Agency notices of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter I number 1.5) and of 14 July 2016 (BAnz AT 01.08.2016 B11 chapter V notification 12)

The current software versions of the DUSTHUNTER SP100 particle monitor manufactured by SICK Engineering GmbH are:

MCU Firmware:	01.12.02
Software Sensor:	01.06.04

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

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016

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

The measuring system works under the principle of scattered light measurement (forward scattering).

The measured scattered light intensity [SI] is proportional to the dust concentration [c]. However, since the scattered light intensity depends not only on the number and size of the particles but also on their optical properties, the measuring system must be calibrated through gravimetric parallel measurements in order to guarantee an exact measurement of dust concentrations. The determined calibration coefficients can be entered directly into the measuring system according to the following formula:

$c = cc2 \cdot SI^2 + cc1 \cdot SI + cc0$

(Default configuration ex-works: cc2 = 0, cc1 = 1, cc0 = 0).

The hereby tested measuring system DUSTHUNTER SP100 comprises the following parts:

- DHSP-T sender/receiver unit
- signal cable for connecting the sender/receiver unit to the control unit (lengths: 5 m, 10 m)
- flange with tube
- MCU control unit for control, evaluation and output of data from the sender/receiver unit(s) connected via a RS485 interface
  - MCU-P with integrated purge air supply, for internal duct pressure of -50 ... +2 mbar
  - MCU-N without integrated purge air supply (external purge air unit required)
- external purge air unit, for internal duct pressure of -50 ... +30 mbar

Communication between sender/receiver unit and MCU

By default, every sender/receiver unit is connected via signal cable to an individual control unit. Nevertheless, more than one sender/receiver units can be optionally connected to a single MCU-N control unit. In this case, every sender/receiver unit must be supplied with purge air separately.

Sender/Receiver unit

The sender/receiver unit comprises two main modules:

- electronic unit

It contains the optical and electronic modules for sending and receiving the light beam. It also holds the modules for processing and evaluating signals.

- measuring probe

The measuring probe is available in various designs, materials and nominal lengths, as well as for different gas temperature ranges. The used type defines the device version.

Data transfer to the control unit, as well as voltage supply from it (24V DC) is carried out with a 7 pole cable with plug-type connector. A RS485 interface is available for service purposes. A purge air nozzle provides clean air for cooling the probe and avoiding contamination of the optical surfaces.

The sender/receiver unit is mounted to the duct by a flange with tube.

Remarks

- Sender/Receiver units with nominal lengths greater than 735 mm are intended solely for installation at thick-walled or double-walled duct.
- The distance between inner duct wall and measuring opening shall not exceed 450 mm.

Versions

The different versions of the sender/receiver unit are labelled with a type code:

Sender/Receiver unit: DHSP-TXXX

Maximum permissible gas temperature:

- 2: 220 °C
- 4: 400 °C

Material:

Nominal length of measuring probe:

MCU Control unit

The control unit has the following functions:

- control of data traffic and processing of data from the unit(s) connected via RS485 interface
- signal output via analogue output (measured value) and relay outputs (device status)
- signal input via analogue and digital inputs
  - voltage supply to the connected units using a 24 V switching power supply with wide-range input
- communication with supervisory control systems via optional modules

The control unit can be connected to external devices over a USB interface. In this way, the setup of plant and device parameters can be easily and comfortably carried out via laptop with the operating software. The parameters are efficiently saved in the MCU in the event of a power outage. By default, the control unit is housed in a sheet steel enclosure.

Standard interfaces

Analogue outputs:

3 outputs 0/2/4 - 22 mA (galvanically isolated, active) for output of: scattered light intensity, dust concentration (uncalibrated), dust concentration (calibrated), 12 bit resolution

Relay outputs:

5 changeover contacts (120 V, AC, 1A, 30 V DC 2A) for output of status signals:
• Operation/Malfunction • Maintenance • Function check • Service requirement • Limit value

Analogue inputs:

2 inputs 0 ... 20 mA (standard; without galvanic isolation) or 0 ... 5/10 V, 10 bit resolution

Digital inputs:

4 inputs for connecting potential-free contacts, e.g. for connecting a maintenance switch or triggering control cycle

Communication:

• USB 1.1 and RS232 (on grips) for measured value enquiry, parameterisation and software update
• RS485 for sensor connection

Versions

- MCU-N control unit without integrated purge air supply
- MCU-P control unit with integrated purge air supply

This version also contains a purge air blower, an air filter, and purge air nozzles used for connecting the air hose to the sender/receiver unit. The purge air hose is a separate component of the measuring system.

The current software versions are:
MCU Firmware: 01.12.02
Software Sensor: 01.06.04
SOPAS ET: SOPAS ET 2.38
The current version of the manual is: 8012425/YWL2/3-0/2016-06.

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 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 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 Energy GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy 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 DUSTHUNTER SP100 for dust is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Basic test

Test report: 936/21208609/B of 20 October 2008
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 11 March 2009, No. 38, p. 899, chapter I no. 1.2
Announcement by UBA from 19 February 2009

Notifications

Statement of TÜV Rheinland Energie und Umwelt GmbH of 05 October 2010
Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 12
Announcement by UBA from 10 January 2011
(new software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 08 November 2010
Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 30
Announcement by UBA from 10 January 2011
(new software version)

Initial certification according to EN 15267

Certificate No. 0000036945: 20 August 2012
Expiry date of the certificate: 19 July 2017

Statement of TÜV Rheinland Energie und Umwelt GmbH of 20 March 2012
Publication: BAnz AT 20.07.2012 B11, chapter IV notification 18
Announcement by UBA dated 06 July 2012

Supplementary testing according to EN 15267

Certificate No. 0000036945_01: 22 March 2013
Expiry date of the certificate: 19 July 2017

Test report: 936/21219384/B dated 27 September 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 05 March 2013 B10, chapter I no. 1.5
Announcement by UBA from 12 February 2013

Notifications according to EN 15267

Statement of TÜV Rheinland Energie und Umwelt GmbH of 22 March 2013
Publication: BAnz AT 23.07.2013 B4, chapter V notification 11
Announcement by UBA dated 03 July 2013
(new software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 25 March 2013
Publication: BAnz AT 23.07.2013 B4, chapter V notification 13
Announcement by UBA dated 03 July 2013
(SOPAS ET software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 24 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 11
Announcement by UBA dated 22 July 2015
(new software version)

Statement of TÜV Rheinland Energy GmbH of 25 April 2016
Publication: BAnz AT 01.08.2016 B11, chapter V notification 12
Announcement by UBA dated 14 July 2016
(new software version)

Statement of TÜV Rheinland Energy GmbH of 13 October 2016
Publication: BAnz AT 15.03.2017 B6, chapter V notification 22
Announcement by UBA dated 22 February 2017
(new software version)

Renewal of the certificate

Certificate No. 0000036945_02: 18 July 2017
Expiry date of the certificate: 19 July 2022

EN ISO 14956 and EN 15267-3 calculation for QAL1 in EN 14181

Manufacturer data

Manufacturer	Sick Engineering GmbH
Name of measuring system	DH SP100
Serial Number	7478637 / 7478638
Measuring Principle	scattered light

TÜV Data

Approval Report	936 / 21219384/B
Date	27.09.2012
Editor	Baum

Measurement Component	Dust	
certificated range	15	mg/m³

Calculation of the combined standard uncertainty

Test Value		$\Delta X_{max,j}$	u^2
Standard deviation from paired measurements under field conditions	u_{inf}	0.09 mg/m³	0.008
Lack of fit	u_{fit}	0.21 mg/m³	0.015
Zero drift from field test	u_{dz}	-0.03 mg/m³	0.000
Span drift from field test	u_t	-0.42 mg/m³	0.059
Influence of ambient temperature at span	u_n	-0.11 mg/m³	0.004
Influence of supply voltage	u_f	0.09 mg/m³	0.003
Influence of sample pressure	u_i	0.00 mg/m³	0.000
Uncertainty of reference material	u_{rm}	0.30 mg/m³	0.030

* The greater value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.343
Total expanded uncertainty	$U = u_c * k = u_c * 1{,}96$	0.673
Relative total expanded uncertainty	U in % of the ELV 10 mg/m³	6.7
Requirement	U in % of the ELV 10 mg/m³	22.5