

# CERTIFICATE

## on Product Conformity (QAL1)

Certificate No.: 0000036945\_01

**Certified AMS:** Dusthunter SP100 for dust

**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).

The present certificate replaces Certificate No. 0000036945 of 20 August 2012



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

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

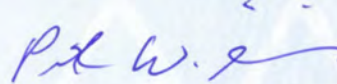
German Federal Environment Agency  
Dessau, 22 March 2013



i. A. Dr. Marcel Langner

This certificate will expire on:  
19 July 2017

TÜV Rheinland Energie und Umwelt GmbH  
Cologne, 21 March 2013



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>	936/21219384/B of 27 September 2012
<b>Initial certification:</b>	20 July 2012
<b>Expiry date:</b>	19 July 2017
<b>Publication:</b>	BAnz AT 05 March 2013 B10, chapter I, No. 1.5

#### **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 thirteenmonth field test at a waste incineration.

The AMS is approved for an ambient temperature range of -20 °C to +50 °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 936/21219384/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 March 2013 B10, chapter I, No. 1.5

**AMS designation:**

Dusthunter SP100 for dust

**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
		0 - 5	0 - 20	0 - 50	0 - 100	0 - 200	
dust	0 - 15	0 - 5	0 - 20	0 - 50	0 - 100	0 - 200	SE

15 SE (scattered light units)  $\hat{=}$  18 mg/m<sup>3</sup> 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<sup>2</sup> 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, Köln  
Report No.: 936/21219384/B dated 27 September 2012

### **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.

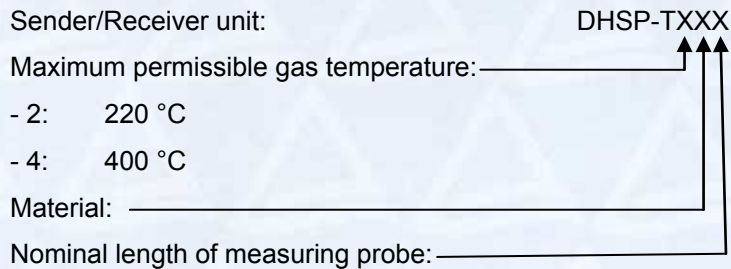
### Remarks

- 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.

**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**.

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:

**Initial 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

**Notification:**

Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV, notification 12 and notification 30  
Announcement by UBA from 10 January 2011

**Initial certification according to EN 15267:**

Certificate No. 0000036945: 20 August 2012

Expiry date of the certificate: 19. Juli 2017

Opinion of TÜV Rheinland Energie und Umwelt GmbH of 20 March 2012

Publication: BAnz AT 20 July 2012 B11, chapter IV, notification 18  
Announcement by UBA from 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

**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**

certificated range	Dust
	15 mg/m <sup>3</sup>

**Calculation of the combined standard uncertainty**

**Test Value**

	$D X_{max, j}$	$u^2$
Standard deviation from paired measurements under field conditions $u_{inf}$	0.09 mg/m <sup>3</sup>	0.008
Lack of fit $u_{n \neq}$	0.21 mg/m <sup>3</sup>	0.015
Zero drift from field test $u_{n \leq}$	-0.03 mg/m <sup>3</sup>	0.000
Span drift from field test $u_t$	-0.42 mg/m <sup>3</sup>	0.059
Influence of ambient temperature at span $u_n$	-0.11 mg/m <sup>3</sup>	0.004
Influence of supply voltage $u_f$	0.09 mg/m <sup>3</sup>	0.003
Influence of sample pressure $u_i$	0.00 mg/m <sup>3</sup>	0.000
Uncertainty of reference material $u_{rm}$	0.30 mg/m <sup>3</sup>	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/m <sup>3</sup>	6.7
Requirement	U in % of the ELV 10 mg/m <sup>3</sup>	22.5