

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000036946\_01

**Certified AMS:** DUSTHUNTER T100 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 12 pages).



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

[www.tuv.com](http://www.tuv.com)  
ID 0000036946

Publication in the German Federal Gazette  
(BAnz.) of 11 March 2009

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](http://www.umwelt-tuv.eu)  
[tre@umwelt-tuv.eu](mailto: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.

**Certificate:**  
0000036946\_01 / 18 July 2017

**Test report:** 936/21210076/A of 24 October 2008  
**Initial certification:** 20 July 2012  
**Expiry date:** 19 July 2022  
**Certificate:** renewal (previous certificate 0000036946 dated from 20 August 2012 with validity up to the 19 July 2017)  
**Publication:** BAnz. 11 March 2009, No. 38, p. 899, 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 six months field test at 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 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 936/21210076/A of 24 October 2008 of TÜV Rheinland Immissionsschutz und Energiesysteme 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. 11 March 2009, No. 38, p. 899, chapter I no. 1.5,  
Announcement by UBA from 19 February 2009:

**AMS name:**

DUSTHUNTER T100

**Manufacturer:**

SICK Engineering GmbH, Ottendorf-Okrilla

**Approval:**

For measurements at plants requiring official approval and plants according to 27<sup>th</sup> BImSchV

**Measuring ranges during the suitability test:**

Dust (Transmission measurement) Certification range:

0 – 0,1 Ext.  $\pm$  15 mg/m<sup>3</sup> dust at 5 m measurement path length

as well as

0 – 0,05 Ext.

0 – 0,2 Ext.

0 – 0,5 Ext.

0 – 1,0 Ext.

**Software versions:**

MCU: 1.026,

Sensor: 1.3.04,

Operating software SOPAS ET: 02.16

**Restriction:**

The measuring system shall only be employed if a fall below the dew point can be excluded.

**Remarks:**

1. A three-month period has been specified as maintenance interval.
2. Dust concentrations are measured in wet stack gas under operating conditions.
3. Complementary test to the announcement of the German Federal Environmental Agency of 12 August 2008 (BAnz. p. 3243) for the T200 measuring system.
4. In contrast to the T200 measuring system, T100 features no automatic deflection compensation and only a one-sided contamination measurement. With exception of these two differences, both measuring systems are identical in design.

**Test report:**

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne  
Report No.: 936/21210076/A of 24 October 2008

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 13,  
Announcement by UBA from 10 January 2011:

**13 Notification to the announcement of the German Federal Environmental Agency of 19 February 2009 (BAnz. p. 899, chapter I no. 1.5)**

The current software versions of the dust concentration measuring system DUSTHUNTER T100 by SICK Engineering GmbH are:

MCU Firmware: 01.04.00  
MCU Hardware: 1.8  
Software Sensor (measuring head): 01.06.00

A notified version of the software platform SOPAS ET is necessary to ensure a full operation of the measuring system.

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 5 October 2010

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chapter IV no-tification 30,

Announcement by UBA from 10 January 2011:

**30 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
...	...	...	...	...
5	DUSTHUNTER T100/ SICK Engineering GmbH	to announce-ment 13 of this notification	The current software version of the platform SOPAS ET for operating the measuring system is: SOPAS ET 2.32	TÜV Rheinland Energie und Umwelt GmbH of 8 November 2010
...	...	...	...	...

Publication in the German Federal Gazette: BAnz AT 20.07.2012 B11, chapter IV notification 17,  
Announcement by UBA from 06 July 2012:

**17 Notification to the announcement of the German Federal Environmental Agency of 19 February 2009 (BAnz. p. 899, chapter I no. 1.5) and 10 January 2011 (BAnz. p. 294, chapter IV notification 13 and 30)**

The measuring system DUSTHUNTER T100 for dust by SICK Engineering GmbH as well as its manufacture and quality management system fulfil the requirements of Directive EN 15267.

Concerning the application of EN 15267 to this measuring system, the following remark is added: The requirements of suitability testing according to EN 15267-3 regarding the determination coefficient  $R^2$  of the calibration function were not fulfilled.

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 20 March 2012

Publication in the German Federal Gazette: BAnz AT 05.03.2013 B10, chapter V notification 22,  
Announcement by UBA from 12 February 2013:

**22 Notification as regards Federal Environmental Agency notices of 19 February 2009 (Federal Gazette (BAnz.) p. 899, chapter I no. 1.5) and of 6 July 2012 (Federal Gazette (BAnz AT 20.07.2012 B11, chapter IV notification 17)**

The current software versions of the DUSTHUNTER T100 dust measuring system manufactured by SICK Engineering GmbH are:

MCU Firmware: 01.08.00  
MCU Hardware: 1.8  
Software Sensor (measuring head): 01.09.00

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 15 October 2012

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 as regards Federal Environmental Agency notices regarding performance tested AMS manufactured by SICK Engineering GmbH and by SICK AG  
(Excerpt)**

Ser. no.	Measuring system/ Manufacturer	Notification	Announcement	Statement of testing body
1	DUSTHUNTER T100/ SICK Engineering GmbH	of 19 February 2009 Federal Gazette (BAnz. p. 899, chapter I no. 1.5) and 12 February 2013 Federal Gazette (BAnz AT 05.03.2013 B10, chapter V notification 22)	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 12,  
Announcement by UBA from 22 July 2015:

**12 Notification as regards Federal Environment Agency (UBA) notices of 19 February 2009 (Federal Gazette (BAnz.) p. 899, chapter I number 1.5) and of 3 July 2013 (Federal Gazette (BAnz.) AT 23 July 2013 B4, chapter V notification 13, seq. no. 1)**

The current software versions for the DUSTHUNTER T100 measuring system for dust, manufactured by SICK Engineering GmbH, are:

MCU firmware: 01.12.00  
Software sensor: 1.10.02

The SOPAS ET software platform is available 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 10,  
Announcement by UBA from 14 July 2016:

**10 Notification as regards Federal Environmental Agency (UBA) notices of 19 February 2009 (BAnz. p. 899, chapter I number 1.5) and of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V notification 12)**

The current software versions of the DUSTHUNTER T100 particle monitor manufactured by SICK Engineering GmbH are:

MCU Firmware: 01.12.02  
Software Sensor: 1.10.02

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

### Certified product

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

The measuring system uses the measured quantities of transmission, opacity and extinction, wherein transmission is determined as the primary optical quantity. The other measured quantities are derived thereof.

The DUSTHUNTER T100 measuring system comprises the following parts in its tested device version:

- DHT-T sender/receiver unit
- Signal cable for connecting the sender/receiver unit to the control unit
- DHT-R reflector
- MCU control unit for control, evaluation and output of data
  - with integrated purge air supply, for internal duct pressure of -50 ... +2 mbar
  - without integrated purge air supply, in this case the following is required:
- external purge air unit, for internal duct pressure of -50 ... +30 mbar

### Sender/Receiver unit

The sender/receiver unit contains the optical and electronic modules for sending and receiving the reflected light beam during transmission measurement. It also holds the modules for processing and evaluating signals. An integrated swivel element serves to measure contamination.

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.

### Reflector

This unit contains a reflector used for redirecting the sent light beam back to the receiver in the sender/receiver unit.

### **MCU Control unit**

The control unit has the following functions:

- Control of data traffic and processing of data from the connected unit(s)
- 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
- Communication with external systems, e.g. over 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.

### **Standard interfaces**

Analogue outputs:

3 outputs 0/2/4 - 22 mA (active, galvanically isolated) for output of transmission and scattered light intensity, 12 bit resolution

Relay outputs:

5 changeover contacts (120 V AC, 1 A, 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

### **External purge air unit**

In the event that the internal duct pressure exceeds +2 mbar, the integrated purge air supply can no longer be used. In this case, the "external purge air unit" shall be employed. It comprises a powerful blower and can be used at overpressures in the duct of up to 30 mbar.

The MCU with integrated purge air supply (MCU-P) was used during the field test.



### Auxiliary equipment for device testing

#### Testing materials for linearity test

The linearity test serves for checking the correct functioning of transmission measurement (see service manual). In order to do this, filter glasses with predetermined transmission values are inserted in the beam path. The values of the filter glasses are subsequently compared with those measured by DUSTHUNTER T100. If they are within the permissible tolerance range, it means that the measuring system works correctly.

#### Adjustment mounts for normalisation

In order to test measurements on smoke-free measurement sections, adjustment mounts with built-on sender/receiver and reflector units are used. These are placed at a defined distance from one another and directed in a way that the optical axes coincide. The thereby determined transmission value is set to 100 %, providing the standard for measurement in the section loaded with dust.

#### Waste gas free section for normalisation

Instead of adjustment mounts, the measuring system can be normalised inserting a tube with the exact length of the duct between sender/receiver and reflector units, thus creating a waste gas free measurement section. The assembling and alignment of the sender/receiver and reflector units on a smoke-free section becomes thereby easy and precise. The tube can be sealed off with end caps when not at use, in order to avoid infiltration of dust. The tube is especially recommended if a dust-free environment cannot be provided for normalisation.

The current software versions are:

MCU Firmware: 01.12.02  
Software Sensor: 1.10.02  
SOPAS ET: SOPAS ET 2.38

The current version of the manual is: 8012427/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](http://qal1.de).

Certification of DUSTHUNTER T100 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: 936/21207351/F of 10 March 2008 (DUSTHUNTER T200)  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne  
Report on supplementary testing: 936/21210076/A of 24 October 2008 (DUSTHUNTER T100)  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne  
Publication: BAnz. 11 March 2009, No. 38, p. 899, chapter I no. 1.5  
Announcement by UBA from 19 February 2009

#### **Notifications**

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 5 October 2010  
Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 13  
Announcement by UBA from 10 January 2011  
(new software versions)

Statement of TÜV Rheinland Energie und Umwelt GmbH dated 8 November 2010  
Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 30  
Announcement by UBA from 10 January 2011  
(SOPAS ET software version)

#### **Initial certification according to EN 15267**

Certificate No. 0000036946: 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 17  
Announcement by UBA dated 06 July 2012

#### **Notifications according to EN 15267**

Statement of TÜV Rheinland Energie und Umwelt GmbH of 15 October 2012  
Publication: BAnz AT 05.03.2013 B10, chapter V notification 22  
Announcement by UBA dated 12 February 2013  
(new software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 25 March 2013  
Publication: BAnz AT 05.07.2013 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 12  
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 10  
Announcement by UBA dated 14 July 2016  
(new software version)

**Renewal of the certificate**

Certificate No. 0000036946\_01: 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	DUSTHUNTER T100
Serial Number	Geräte 03 /04/ 05 /06
Measuring Principle	Transmissionsmessung

**TÜV Data**

Approval Report	936/21210076/A
Date	24.10.2008
Editor	Röllig

**Measurement Component**

certificated range	Staub 15 mg/m <sup>3</sup>
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**Calculation of the combined standard uncertainty**

Test Value	$\Delta X_{max, j}$	$U^2$
Standard deviation from paired measurements under field conditions $u_{inf}$	0.21 mg/m <sup>3</sup>	0.045
Lack of fit $u_{d.z}$	0.15 mg/m <sup>3</sup>	0.008
Zero drift from field test $u_{d.s}$	0.06 mg/m <sup>3</sup>	0.001
Span drift from field test $u_t$	-0.39 mg/m <sup>3</sup>	0.051
Influence of ambient temperature at span $u_n$	0.02 mg/m <sup>3</sup>	0.000
Influence of supply voltage $u_f$	-0.12 mg/m <sup>3</sup>	0.005
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
Excursion of measurement beam $u_{mb}$	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 ( $u_c$ )	$u_c = \sqrt{\sum (u_{max, j})^2}$	0.411
Total expanded uncertainty	$U = u_c * k = u_c * 1,96$	0.805
Relative total expanded uncertainty	U in % of the ELV 10 mg/m <sup>3</sup>	8.1
Requirement	U in % of the ELV 10 mg/m <sup>3</sup>	22.5