Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000036942_01

Certified AMS:	DUSTHUNTER C200 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 13 pages).

TÜVRheinland® CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000036942

Publication in the German Federal Gazette (BAnz.) of 25 August 2009

This certificate will expire on:
19 July 2022

German Federal Environment Agency
Dessau, 18 July 2017

Dr. Marcel Langner
Head of Section II 4.1

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:	936/21210461/A of 17 March 2009
Initial certification:	20 July 2012
Expiry date:	19 July 2022
Certificate:	renewal (previous certificate 0000036942 dated from 20 August 2012 with validity up to the 19 July 2017)
Publication:	BAnz. 25 August 2009, No. 125, p. 2929, chapter I number 2.1

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 fourteen 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 936/21210461/A of 17 March 2009 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. 25 August 2009, No. 125, p. 2929, chapter I number 2.1,
Announcement by UBA from 03 August 2009:

AMS name:
DUSTHUNTER C200

Manufacturer:
SICK Engineering GmbH, Ottendorf-Okrilla

Approval:
For measurements at plants requiring official approval and plants according to 27th BImSchV

Measuring ranges during the suitability test:
Dust (transmission measurement)
0 – 0,1 Ext. ≙ 15 mg/m³ dust with 5 m measurement path length
as well as
0 – 0,05 Ext.
0 – 0,2 Ext.
0 – 0,5 Ext.
0 – 1,0 Ext.

Dust (scattered light measurement):
0 – 50 scattered light units ≙ 15 mg/m³ dust
as well as
0 – 5 scattered light units
0 – 20 scattered light units
0 – 100 scattered light units
0 – 200 scattered light units

Software versions:
MCU: 1.026,
Sensor: 1.3.04,
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 six-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. 3244) and 19 February 2009 (BAnz. p. 900).

Test report:
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Report No.: 936/21210461/A of 17 March 2009

Publication in the German Federal Gazette: BAnz 26. January 2011, No. 14, p. 294, chapter IV notification 9,
Announcement by UBA from 10 January 2011:

9 Notification to the announcement of the German Federal Environmental Agency of 3 August 2009 (BAnz. p. 2929, chapter I no. 2.1)

The current software versions of the dust concentration measuring system DUSTHUNTER C200 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 notification 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
1	DUSTHUNTER C200/ SICK Engineering GmbH	to announcement 9 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 16,
Announcement by UBA from 06 July 2012:

16 Notification to the announcement of the German Federal Environmental Agency of 3 August 2009 (BAnz. p. 2929, chapter I no. 2.1) and 10 January 2011 (BAnz. p. 294, chapter IV notification 9 and 30)

The measuring system DUSTHUNTER C200 for dust by SICK Engineering GmbH as well as its manufacture and quality management system fulfil the requirements of Standard 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 24,
Announcement by UBA from 12 February 2013:

24 Notification as regards Federal Environmental Agency notices of 3 August 2009 (Federal Gazette (BAnz.) p. 2929, chapter I no. 2.1) and of 6 July 2012 Federal Gazette (BAnz AT 20.07.2012 B11, chapter IV notification 16)

The current software versions of the DUSTHUNTER C200 dust measuring systems 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
5	DUSTHUNTER C200/ SICK Engineering GmbH	of 3 August 2009 Federal Gazette (BAnz. p. 2929, chapter I no. 2.1) and 12 February 2013 Federal Gazette (BAnz AT 05.03.2013 B10, chapter V notification 24)	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 8,
Announcement by UBA from 22 July 2015:

8 Notification as regards Federal Environment Agency (UBA) notices of 3 August 2009 (Federal Gazette (BAnz.) p. 2929, chapter I number 2.1) and of 3 July 2013 (Federal Gazette (BAnz.) AT 23.07.2013 B4, chapter V notification 13, seq. no. 5)

The current software versions for the DUSTHUNTER C200 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 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 8,
Announcement by UBA from 14 July 2016:

8 Notification as regards Federal Environmental Agency (UBA) notices of 3 August 2009 (BAnz. p. 2929, chapter I number 2.1) and of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V notification 8)

The current software versions of the DUSTHUNTER C200 measuring system for dust 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 combines the features of dual transmission measurement and scattered light measurement under the principle of forward scattering.

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

- DHC-T sender/receiver unit
- Signal cable for connecting the sender/receiver unit to the control unit
- DHC-R reflector/scattered light receiver
- Signal cable for connecting the reflector/scattered light receiver to the sender/receiver unit
- 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. For contamination measurement and self-alignment, additional swivel elements are integrated.

A purge air nozzle provides clean air for avoiding contamination of the optical surfaces. The sender/receiver unit is mounted to the duct by a flange with tube.

Reflector/ Scattered light receiver

This unit contains a reflector used for redirecting the sent light beam back to the receiver in the sender/receiver unit (transmission), and a scattered light receiver with light trap. Different unit versions are available in order to match different inner duct diameters. They are labelled with a type code.

Reflector/Scattered light receiver:

DHC-Rx

with x = 0 -> short measurement section (0,5 ... 3 m) and x = 1 -> long measurement section (2,5 ... 8 m)

Both versions of the reflector/scattered light receiver unit differ only in the arrangement of the scattered light receiver tube, reflector opening and light trap. The slightly different arrangement of these elements in version x = 1 (2,5 ... 8 m) serves the purpose of placing the scattered light volume deeper in the duct.

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

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: 8011951/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 C200 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/A of 10 March 2008
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 03 September 2008, No. 133, p. 3243, chapter I no. 1.3
Announcement by UBA from 12 August 2008

Supplementary test

Test report: 936/21207351/D of 10 October 2008
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 11 March 2009, No. 38, p. 899, chapter I no. 1.4
Announcement by UBA from 19 February 2009
(extension of maintenance interval)

Test report: 936/21210461/A of 17 March 2009
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 25 August 2009, No. 125, p. 2929, chapter I no. 2.1
Announcement by UBA from 03 August 2009
(extension of maintenance interval)

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 9
Announcement by UBA from 10 January 2011
(change of software versions)

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
(SOPAS ET software version)

Initial certification according to EN 15267

Certificate No. 0000036942: 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 16
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 24
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 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 8
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 B10, chapter V notification 8
Announcement by UBA dated 14 July 2016
(new software version)

Renewal of the certificate

Certificate No. 0000036942_01: 18 July 2017
Expiry date of the certificate: 19 July 2022

Umwelt Bundesamt

Certificate:
0000036942_01 / 18 July 2017

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Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

Manufacturer data	
Manufacturer	SICK
Name of measuring system	Dusthunter C200
Serial Number	SN 07478637 / -656 / -660 / -638 / -658 / -661 / -580 / -574 / -573 / -583 / -575 / -572
Measuring Principle	Scattered light
TÜV Data	
Approval Report	936/21210461/A 2009-03-17
Editor	Röllig
Date	2009-03-17
Measurement Component	Dust
Certificated range	15 mg/m³

Calculation of the combined standard uncertainty

Test Value	$\Delta X_{max,j}$			u	u²
Repeatability standard deviation at span *	0.06	mg/m³	u_r	0.06	0.004
Lack of fit	0.17	mg/m³	u_{lof}	0.10	0.009
Zero drift from field test	0.00	mg/m³	$u_{d,z}$	0.00	0.000
Span drift from field test	0.39	mg/m³	$u_{d,s}$	0.23	0.051
Influence of ambient temperature at span	0.11	mg/m³	u_t	0.06	0.004
Influence of supply voltage	0.11	mg/m³	u_v	0.06	0.004
Uncertainty of reference material at 70% of certification range	0.21	mg/m³	u_{rm}	0.12	0.015
Excursion of measurement beam	0.30	mg/m³	u_{mb}	0.17	0.030

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

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.34	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1{,}96$	0.67	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**6.7**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the ELV 10 mg/m³**	**30.0**
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	22.5

Umwelt Bundesamt

Certificate:
0000036942_01 / 18 July 2017

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Calculation of overall uncertainty for QAL1 in EN 14181 and EN 15267-3

1

Manufacturer data	
Manufacturer	SICK
Name of measuring system	Dusthunter C200
Serial Number	SN 07478637 / -656 / -660 / -638 / -658 / -661 / -580 / -574 / -573 / -583 / -575 / -572
Measuring Principle	Transmission
TÜV Data	
Approval Report	936/21210461/A 2009-03-17
Editor	Röllig
Date	2009-03-17
Measurement Component	Dust
Certificated range	mg/m³

Calculation of the combined standard uncertainty

Test Value	$\Delta X_{max,j}$			u	u^2
Standard deviation from paired measurements under field conditions *	0.22	mg/m³	u_r	0.22	0.049
Lack of fit	0.15	mg/m³	u_{lof}	0.09	0.008
Zero drift from field test	- 0.08	mg/m³	$u_{d,z}$	-0.04	0.002
Span drift from field test	- 0.44	mg/m³	$u_{d,s}$	-0.25	0.063
Influence of ambient temperature at span	0.11	mg/m³	u_t	0.06	0.004
Influence of supply voltage	0.11	mg/m³	u_v	0.06	0.004
Uncertainty of reference material at 70% of certification range	0.21	mg/m³	u_{rm}	0.12	0.015
Excursion of measurement beam	0.30	mg/m³	u_{mb}	0.17	0.030

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

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.42	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1{,}96$	0.82	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**8.2**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the ELV 10 mg/m³**	**30.0**
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	22.5