

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000074624

Certified AMS: DST-X for NO and O₂

Manufacturer: Dongwoo Optron Co., Ltd
102-8, Hoean-Daero
Opo-Eup, Gwangju-Si
South Korea 12798

Test Institute: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested
and found to comply with the standards:
EN 15267-1 (2009), EN 15267-2 (2009), EN 15267-3 (2007)
and EN 14181 (2014).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 7 pages).



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000074624

Publication in the German Federal Gazette
(BAnz.) of 03 May 2021

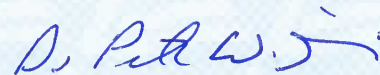
This certificate will expire on:
02 May 2026

German Federal Environment Agency
Dessau, 02 June 2021

TÜV Rheinland Energy GmbH
Cologne, 01 June 2021



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Test institute accredited to EN ISO/IEC 17025 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.

Test report: 936/21239652/C of 28 August 2020
Initial certification: 03 May 2021
Expiry date: 02 May 2026
Publication: BAnz AT 03.05.2021 B9, chapter I number 3.1

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17th BImSchV), 27th BImSchV, 30th BImSchV, 44th BImSchV and TA Luft. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a five-month field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of +5 °C to +40 °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 values and the oxygen concentrations 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 936/21239652/C of 28 August 2020 of TÜV Rheinland Energy 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 03.05.2021 B9, chapter I number 3.1,
Announcement by UBA dated 31 March 2021:

AMS designation:

DST-X for NO and O₂

Manufacturer:

Dongwoo Optron Co., Ltd, Gwangju-Si, South Korea

Field of application:

For measurements at plants requiring official approval and plants according to 27. BIm-SchV

Measuring ranges during the performance test:

Component	Certification range	Supplementary measurement ranges	Unit
NO	0 - 100	0 - 1000	mg/m ³
O ₂	0 - 25	-	Vol.-%

Software version:

10000-29

Restrictions:

none

Note:

The maintenance interval is four weeks.

Test report:

TÜV Rheinland Energy GmbH, Cologne
Report No.: 936/21239652/C of 28 August 2020

Certified product

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

The AMS DST-X consists of a main control unit (MU) and a pre-treatment system.

The main unit consists of a UV cell (deuterium lamp), a paramagnetic O₂ sensor, a measuring gas chamber and a control board. The pretreatment system consists of the sample gas probe with filter (made of ceramic), a sampling line, a sample gas cooler and a sample gas pump. With the exception of the heated sampling probe and heated sample gas line, all components are located together with the power distribution and the analogue modules in a lockable measuring cabinet.

All gas concentrations of the individual measuring components to be measured as well as status signals are shown on the display of the main unit. The display is equipped with a touchscreen. The system has a number of outputs, such as for analogue signals and digital outputs, which display status and error messages. The length of the heated sample gas line was 12 m in the laboratory test and in the field test.

The software version 10000-29 did not change over the entire test period.

The measuring system tested here consists of:

- DST-X gas detector main unit (MU)
- UV source (deuterium lamp)
- O₂ sensor (paramagnetic)
- Sampling probe with ceramic filter
- Heated sample gas line, max. 190 ° C, material PTFE, max. length during the test 12 m
- Sample gas cooler DPC-100
- Sample gas pump
- Software version 10000-29

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 certification mark may be applied to the product or used in advertising materials 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.

History of documents

Certification of DST-X is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial certification according to EN 15267

Certificate No. 0000074624: 02 June 2021

Expiry date of the certificate: 02 May 2026

Test report 936/21239652/C dated 28 August 2020

TÜV Rheinland Energy GmbH, Cologne

Publication: BAnz AT 03.05.2021 B9, chapter I number 3.1

Announcement by UBA dated 31 March 2021

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system

Manufacturer	Dongwoo Optron Co., Ltd.
AMS designation	DST-X
Serial number of units under test	DSM-17-003-NOX-SOX-O2 / DSM-17-004-NOX-SOX-O2
Measuring principle	paramagnetic

Test report

Test laboratory	936/21239652/C TÜV Rheinland
Date of report	2020-08-28

Measured component

Certification range	O ₂ 0 - 25 Vol.-%
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00 Vol.-%
Sum of negative CS at zero point	0.00 Vol.-%
Sum of positive CS at span point	0.22 Vol.-%
Sum of negative CS at span point	-0.37 Vol.-%
Maximum sum of cross-sensitivities	-0.37 Vol.-%
Uncertainty of cross-sensitivity	u_i -0.214 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.090 Vol.-%		0.008	(Vol.-%) ²
Lack of fit	u_{inf}	0.006 Vol.-%		0.000	(Vol.-%) ²
Zero drift from field test	$u_{d,z}$	0.046 Vol.-%		0.002	(Vol.-%) ²
Span drift from field test	$u_{d,s}$	-0.087 Vol.-%		0.008	(Vol.-%) ²
Influence of ambient temperature at span	u_t	0.123 Vol.-%		0.015	(Vol.-%) ²
Influence of supply voltage	u_v	0.000 Vol.-%		0.000	(Vol.-%) ²
Cross-sensitivity (interference)	u_i	-0.214 Vol.-%		0.046	(Vol.-%) ²
Influence of sample gas flow	u_n	0.023 Vol.-%		0.001	(Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.202 Vol.-%		0.041	(Vol.-%) ²

* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.35 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.68 \text{ Vol.-%}$$

Relative total expanded uncertainty

U in % of the range 25 Vol.-% **2.7**

Requirement of 2010/75/EU

U in % of the range 25 Vol.-% **10.0 ****

Requirement of EN 15267-3

U in % of the range 25 Vol.-% **7.5**

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.

A value of 10.0 % was used for this.

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system

Manufacturer	Dongwoo Optron Co., Ltd.
AMS designation	DST-X
Serial number of units under test	DSM-17-003-NOX-SOX-O2 / DSM-17-004-NOX-SOX-O2
Measuring principle	UV Absorption

Test report

Test laboratory	936/21239652/C TÜV Rheinland
Date of report	2020-08-28

Measured component

Certification range	NO 0 - 100 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at span point	1.10 mg/m ³
Sum of negative CS at span point	0.00 mg/m ³
Maximum sum of cross-sensitivities	1.10 mg/m ³
Uncertainty of cross-sensitivity	u_i 0.635 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u^2
Standard deviation from paired measurements under field conditions *	u_D 1.120 mg/m ³	1.254 (mg/m ³) ²
Lack of fit	u_{lof} 0.196 mg/m ³	0.038 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$ 0.520 mg/m ³	0.270 (mg/m ³) ²
Span drift from field test	$u_{d,s}$ 1.443 mg/m ³	2.082 (mg/m ³) ²
Influence of ambient temperature at span	u_t 1.442 mg/m ³	2.079 (mg/m ³) ²
Influence of supply voltage	u_v 0.340 mg/m ³	0.116 (mg/m ³) ²
Cross-sensitivity (interference)	u_i 0.635 mg/m ³	0.403 (mg/m ³) ²
Influence of sample gas flow	u_p -0.289 mg/m ³	0.084 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_m 0.808 mg/m ³	0.653 (mg/m ³) ²

* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{\max, j})^2} \quad 2.64 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c \cdot k = u_c \cdot 1.96 \quad 5.18 \text{ mg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 67 mg/m³ **7.7**

Requirement of 2010/75/EU

U in % of the ELV 67 mg/m³ **20.0**

Requirement of EN 15267-3

U in % of the ELV 67 mg/m³ **15.0**