

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000062068_03

Certified AMS: MCS200HW for CO, NO, NO₂, N₂O, SO₂, HCl, NH₃, CH₄, H₂O, CO₂, O₂ and TOC

Manufacturer: Endress+Hauser SICK GmbH+Co. KG
Bergener Ring 27
01458 Ottendorf-Okrilla
Germany

Test Institute: TÜV Rheinland Energy & Environment 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 (2023), EN 15267-3 (2007)
as well as EN 14181 (2014).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 24 pages).
The present certificate replaces certificate 0000062068_02 dated 3 July 2024.



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000062068


Publication in the German Federal Gazette
(BAnz) of 31 October 2025

German Environment Agency

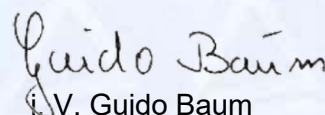
Dessau, 23 March 2026

This certificate will expire on:
22 March 2031

TÜV Rheinland
Energy & Environment GmbH
Cologne, 20 March 2026



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51105 Köln

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:	936/21242470/C of 6 March 2019 and the supplementary examination EuL/21266095/A of 17 February 2025
Initial certification:	26 March 2019
Expiry date:	22 March 2031
Publication:	BAnz AT 31.10.2025 B5, chapter I No. 3.1

Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV:2021), chapter IV (waste incineration plants / 17th BImSchV:2021), Directive 2015/2193/EC (44th BImSchV:2022), TA Luft:2021, 30th BImSchV:2022 and 27th BImSchV:2013. 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 more than twelve-months and more than three months for the modules „CO (low)“, „NO (low)“, „N₂O (low)“ und „NH₃ (low)“ 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 applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the emission limit values and oxygen concentration 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.

Note

The legal regulations mentioned correspond to the current state of legislation during certification. Each user should, if necessary, in consultation with the competent authority, ensure that this AMS meets the legal requirements for the intended use. In addition, it cannot be ruled out that legal regulations governing the use of a measuring device for emission monitoring may change during the lifetime of the certificate.

Basis of the certification

This certification is based on:

- Test report 936/21242470/C of 6 March 2019 of TÜV Rheinland Energy GmbH and the supplementary examination EuL/21266095/A of 17 February 2025 of TÜV Rheinland Energy & Environment 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 31.10.2025 B5, chapter I No. 3.1,
Announcement by UBA dated 27 August 2025:

AMS designation:

MCS200HW for CO, NO, NO₂, N₂O, SO₂, HCl, NH₃, CH₄, H₂O, CO₂, O₂ and TOC

Manufacturer:

Endress+Hauser SICK GmbH + Co. KG, 01458 Ottendorf-Okrilla, Germany

Field of application:

Modular measuring system for plants requiring official approval according to the 13th BImSchV, the 17th BImSchV, the 30th BImSchV, TA-Luft and for plants according to the 27th BImSchV and 44th BImSchV

Measuring ranges during the performance test:

Component	Module name	Certification range	Supplementary range	Unit	Maintenance interval
CO	„CO“	0 – 75	0 – 10,000	mg/m ³	6 Months
CO	„CO (low)“	0 – 30	0 – 10,000	mg/m ³	4 Weeks
NO	„NO“	0 – 150	0 – 2,500	mg/m ³	6 Months
NO	„NO (low)“	0 – 50	0 – 2,500	mg/m ³	4 Weeks
NO ₂	„NO ₂ “	0 – 50	0 – 500	mg/m ³	6 Months
N ₂ O	„N ₂ O“	0 – 100	0 – 2,000	mg/m ³	6 Months
N ₂ O	„N ₂ O (low)“	0 – 45	0 – 2,000	mg/m ³	4 Weeks
SO ₂	„SO ₂ “	0 – 75	0 – 2,500	mg/m ³	6 Months
HCl	„HCl“	0 – 15	0 – 3,000	mg/m ³	6 Months
NH ₃	„NH ₃ “	0 – 10	0 – 500	mg/m ³	6 Months
NH ₃	„NH ₃ (low)“	0 – 7	0 – 500	mg/m ³	4 Weeks
CH ₄	„CH ₄ “	0 – 50	0 – 500	mg/m ³	6 Months
CO ₂	„CO ₂ “	0 – 25	-	Vol.-%	6 Months
H ₂ O	„H ₂ O“	0 – 40	-	Vol.-%	6 Months
O ₂	„O ₂ “	0 – 25	-	Vol.-%	6 Months
TOC	„TOC“	0 – 15	0 – 50 / 150 / 500	mg/m ³	3 Months

Software versions:

MCS200HW: 9264565_1.7.7.4R_1C6E
GMS811 FIDORi: 9230690_4.003
BCU: 9150883_4.006

Restrictions:

None

Notes:

1. The maintenance interval is six months. When using the TOC module, the maintenance interval is three months. When using the "CO (low)", "NO (low)", "N₂O (low)" and "NH₃ (low)" modules, the maintenance interval is 4 weeks.
2. Wet and dry test gases can be used to test HCl and NH₃.
3. The measuring system performs zero point checks once every day. This requires suitable instrument air or synthetic air.
4. The integrated GMS811 FIDORi FID performs zero point checks once every day. An integrated zero air generator (version "i") produces the zero air required for this purpose.
5. The measuring system provides a digital Modbus interface (TCP/IP) in accordance with VDI guideline 4201, parts 1 and 3.
6. Maintenance work must be spread over several days in order to comply with the requirements for outage times specified by the 13th BImSchV and 17th BImSchV.
7. When verifying correct installation and functionality of a certain combination of modules, the maintenance interval must be determined for that specific configuration.
8. The measuring device can be optionally equipped with an air conditioning unit. With an integrated air conditioning unit, the measuring device can be used in an ambient temperature range of 5 °C to 50 °C. Without an integrated air conditioning unit, the measuring device can be used in an ambient temperature range of 5 °C to 40 °C.
9. In addition to the basic display, the measuring system can also be equipped with the larger web display on the front door.
10. The measuring system can also be operated with a revised gas sampling filter (SFU). This can be recognised by the revised housing with protection class IP66.
11. Supplementary test (Reduction of certification areas CO, NO, N₂O und NH₃) as regards Federal Environment Agency notice of 28 June 2019 (BAnz AT 22.07.2019 B8, chapter I number 1.4) and of 2 April 2025 (BAnz AT 19.05.2025 B3, chapter IV notification 20).
12. The supplementary test for the modules "CO (low)", "NO (low)", "N₂O (low)" and "NH₃ (low)" was carried out in accordance with DIN EN 15267-3:2024.
13. The test report is an integral part of the TÜV Rheinland test report with the number 936/21242470/C dated 6 March 2019.

Test Report:

TÜV Rheinland Energy & Environment GmbH, Cologne
Report No.: EuL/21266095/A dated 17 February 2025

Certified product

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

The modular MCS200HW measuring system is a measurement rack equipped with a single-beam infrared photometer using the bi-frequency and gas filter correlation process. The MCS200HW can measure up to 10 IR components present in the flue gas emitted by industrial combustion plants.

The MCS200HW operates extractively: a sampling probe extracts flue gas from the duct which is then transported to the analyser via a sample line. All gas-carrying components from the sampling probe to the cell are heated above the dew point. An ejector pump transports the sample gas.

A zirconium dioxide sensor is used to measure oxygen alongside the IR components. As an option, a GMS811 FIDORi flame ionisation detector can be integrated to measure total organic carbon. The optional use of internal adjustment cells facilitates span point checks.

The AMS under test comprises the following individual components:

- Sampling probe Sick sampling filter SFU-BF NI GL heated to 200 °C with zero gas and back purge connection,
- Sample gas filter made of metal mesh SilicoNert® covered,
- Heated sample line, inner diameter 6 mm, heated to 200 °C,
- Analyser rack manufactured by Rittal c/w:
 - Modular analyser comprising the heated sample gas cell with single-beam infra-red photometer with bi-frequency and gas filter correlation process as well as a zirconium dioxide to measure oxygen,
 - GMS811 FIDORi FID analyser for the determination of total organic carbon with integrated zero air conditioning at the inner door of the analyser rack with (optional) BCU control unit located underneath,
 - Display unit at the outer wall of the analyser rack, measured value display and operation of the analyser system,
 - Active fan unit installed in the rack door and air intake on top of the analyser rack,
 - Pressure reducer to adjust the instrument air,
 - Electronics unit with analogue interfaces for the output of measured signals and status signals,
 - The measuring system provides a digital Modbus interface (TCP/IP) in accordance with VDI standard 4201, Parts 1 and 3 (optional).

The data output is under standard conditions (wet) and without offsetting waste gas moisture.

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 & Environment 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 & Environment GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy & Environment 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 MCS200HW 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. 0000062068_00: 12 June 2019
Expiry date of the certificate: 25 March 2024
Test report: 936/21242470/A dated 8 October 2018
TÜV Rheinland Energy GmbH
Publication: BAnz AT 26.03.2019 B7, chapter I number 2.2
UBA announcement dated 27 February 2019

Supplementary testing according to EN 15267

Certificate No. 0000062068_01: 5 November 2019
Expiry date of the certificate: 21 July 2024
Test report: 936/21242470/C dated 6 March 2019
TÜV Rheinland Energy GmbH
Publication: BAnz AT 22.07.2019 B8, chapter I number 1.4
UBA announcement dated 28 June 2019

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 8 February 2021
Publication: BAnz AT 05.08.2021 B5, chapter IV notification 46
UBA announcement dated 29 June 2021
(Software and hardware changes)

Statement issued by TÜV Rheinland Energy GmbH dated 14 September 2021
Publication: BAnz AT 11.04.2022 B10, chapter VI notification 41
UBA announcement dated 9 March 2022
(Software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 26 April 2022
Publication: BAnz AT 28.07.2022 B4, chapter III notification 26
UBA announcement dated 28 June 2022
(Software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 16 September 2022
Publication: BAnz AT 20.03.2023 B6, chapter IV notification 39
UBA announcement dated 21 February 2023
(Software and hardware changes)

Statement issued by TÜV Rheinland Energy GmbH dated 27 September 2023
Publication: BAnz AT 10.05.2024 B7, chapter V notification 38
UBA announcement dated 19 March 2024
(Software changes)

Renewal of certificates

Certificate No. 0000062068_02: 3 July 2024
Expiry date of the certificate: 21 July 2029

Notifications

Statement issued by TÜV Rheinland Energy & Environment GmbH dated 10 May 2024
Publication: BAnz AT 31.10.2024 B9, chapter IV notification 44
UBA announcement dated 21 August 2024
(Compliance with 44. BImSchV)

Statement issued by TÜV Rheinland Energy & Environment GmbH dated 11 October 2024
Publication: BAnz AT 19.05.2025 B3, chapter IV notification 20
UBA announcement dated 2 April 2025
(New manufacturer name)

Supplementary testing according to EN 15267

Certificate No. 0000062068_03: 23 March 2026
Expiry date of the certificate: 22 March 2031
Test report: EuL/21266095/A dated 17 February 2025
TÜV Rheinland Energy & Environment GmbH
Publication: BAnz AT 31.10.2025 B5, chapter I number 3.1
UBA announcement dated 27 August 2025

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

Measured component

	NO ₂
Certification range	0 - 50 mg/m ³

Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.82 mg/m ³
Sum of negative CS at zero point	-0.71 mg/m ³
Sum of positive CS at span point	1.83 mg/m ³
Sum of negative CS at span point	-1.15 mg/m ³
Maximum sum of cross-sensitivities	1.83 mg/m ³
Uncertainty of cross-sensitivity	u_i 1.057 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u^2	
Repeatability standard deviation at set point *	u_r 0.090 mg/m ³	0.008	(mg/m ³) ²
Lack of fit	u_{lof} 0.289 mg/m ³	0.084	(mg/m ³) ²
Zero drift from field test	$u_{d,z}$ 0.260 mg/m ³	0.068	(mg/m ³) ²
Span drift from field test	$u_{d,s}$ 0.693 mg/m ³	0.480	(mg/m ³) ²
Influence of ambient temperature at span	u_t 0.265 mg/m ³	0.070	(mg/m ³) ²
Influence of supply voltage	u_v 0.137 mg/m ³	0.019	(mg/m ³) ²
Cross-sensitivity (interference)	u_i 1.057 mg/m ³	1.117	(mg/m ³) ²
Influence of sample gas flow	u_b -0.277 mg/m ³	0.077	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 0.404 mg/m ³	0.163	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.44 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	2.83 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 33 mg/m ³	8.6
Requirement of EN 15267-3	U in % of the ELV 33 mg/m ³	20.0
	U in % of the ELV 33 mg/m ³	15.0

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

Measured component

CO	
Certification range	0 - 75 mg/m ³

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	0.40 mg/m ³
Sum of negative CS at span point	0.00 mg/m ³
Maximum sum of cross-sensitivities	0.40 mg/m ³
Uncertainty of cross-sensitivity	u_i 0.229 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0.402 mg/m ³		0.162 (mg/m ³) ²
Lack of fit	u_{lof} -0.117 mg/m ³		0.014 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$ -0.346 mg/m ³		0.120 (mg/m ³) ²
Span drift from field test	$u_{d,s}$ 1.083 mg/m ³		1.173 (mg/m ³) ²
Influence of ambient temperature at span	u_t 0.608 mg/m ³		0.370 (mg/m ³) ²
Influence of supply voltage	u_v 0.070 mg/m ³		0.005 (mg/m ³) ²
Cross-sensitivity (interference)	u_i 0.229 mg/m ³		0.052 (mg/m ³) ²
Influence of sample gas flow	u_b 0.361 mg/m ³		0.130 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 0.606 mg/m ³		0.368 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.55 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.03 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 50 mg/m³	6.1
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	10.0
	U in % of the ELV 50 mg/m³	7.5

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

Measuring system

Manufacturer	Endress+Hauser SICK GmbH + Co. KG
AMS designation	MCS200HW
Serial number of units under test	24070525/24020511
Measuring principle	Bi-frequency and Gas filter correlation

Test report

Test laboratory	TÜV Rheinland
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Measured component

Certification range	CO	0 - 30 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	0.00 mg/m ³
Sum of negative CS at span point	-0.40 mg/m ³
Maximum sum of cross-sensitivities	-0.40 mg/m ³
Uncertainty of cross-sensitivity	u_i -0.232 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u^2
Lack of fit	u_D 0.306 mg/m ³	0.094 (mg/m ³) ²
Zero drift from field test	u_{lof} -0.064 mg/m ³	0.004 (mg/m ³) ²
Span drift from field test	$u_{d,z}$ 0.069 mg/m ³	0.005 (mg/m ³) ²
Influence of ambient temperature at span	$u_{d,s}$ -0.277 mg/m ³	0.077 (mg/m ³) ²
Influence of supply voltage	u_t 0.208 mg/m ³	0.043 (mg/m ³) ²
Cross-sensitivity (interference)	u_v 0.078 mg/m ³	0.006 (mg/m ³) ²
Influence of sample gas flow	u_i -0.232 mg/m ³	0.054 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_b -0.058 mg/m ³	0.003 (mg/m ³) ²
	u_{rm} 0.242 mg/m ³	0.059 (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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.59 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 1.15 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the ELV 20 mg/m ³	5.8
U in % of the ELV 20 mg/m ³	10.0
U in % of the ELV 20 mg/m ³	7.5

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	TÜV Rheinland
Date of report	2019-03-06

Measured component

	NO
Certification range	0 - 150 mg/m ³

Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.92 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at span point	1.20 mg/m ³
Sum of negative CS at span point	-3.20 mg/m ³
Maximum sum of cross-sensitivities	-3.20 mg/m ³
Uncertainty of cross-sensitivity	u_i -1.845 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0.621 mg/m ³	0.386	(mg/m ³) ²
Lack of fit	u_{lof} -0.580 mg/m ³	0.336	(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	$u_{d,s}$ 2.252 mg/m ³	5.072	(mg/m ³) ²
Influence of ambient temperature at span	u_t 1.514 mg/m ³	2.292	(mg/m ³) ²
Influence of supply voltage	u_v 0.405 mg/m ³	0.164	(mg/m ³) ²
Cross-sensitivity (interference)	u_i -1.845 mg/m ³	3.404	(mg/m ³) ²
Influence of sample gas flow	u_b 0.356 mg/m ³	0.127	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 1.212 mg/m ³	1.470	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	3.68 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	7.21 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 98 mg/m³	7.4
Requirement of EN 15267-3	U in % of the ELV 98 mg/m³	20.0
	U in % of the ELV 98 mg/m³	15.0

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

Measured component

Certification range	N ₂ O 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	-0.46 mg/m ³
Sum of positive CS at span point	0.00 mg/m ³
Sum of negative CS at span point	-3.90 mg/m ³
Maximum sum of cross-sensitivities	-3.90 mg/m ³
Uncertainty of cross-sensitivity	u_i -2.252 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0.271 mg/m ³		0.073 (mg/m ³) ²
Lack of fit	u_{lof} -0.064 mg/m ³		0.004 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$ 0.289 mg/m ³		0.084 (mg/m ³) ²
Span drift from field test	$u_{d,s}$ 1.674 mg/m ³		2.802 (mg/m ³) ²
Influence of ambient temperature at span	u_t 0.608 mg/m ³		0.370 (mg/m ³) ²
Influence of supply voltage	u_v 0.404 mg/m ³		0.163 (mg/m ³) ²
Cross-sensitivity (interference)	u_i -2.252 mg/m ³		5.072 (mg/m ³) ²
Influence of sample gas flow	u_b -0.313 mg/m ³		0.098 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 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)	$u_c = \sqrt{\sum (u_{max, j})^2}$	3.05 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	5.98 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the range 100 mg/m³	6.0
Requirement of EN 15267-3	U in % of the range 100 mg/m³	20.0 **
	U in % of the range 100 mg/m ³	15.0

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

A value of 20.0 % was used for this.

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

Measuring system

Manufacturer	Endress+Hauser SICK GmbH + Co. KG
AMS designation	MCS200HW
Serial number of units under test	24070525/24020511
Measuring principle	Bi-frequency and Gas filter correlation

Test report

Test laboratory	EuL/21266095/A TÜV Rheinland
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Measured component

Certification range	N2O 0 - 45 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.29 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	-0.20 mg/m ³
Maximum sum of cross-sensitivities	1.10 mg/m ³
Uncertainty of cross-sensitivity	u_i 0.634 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u^2
Lack of fit	u_D 0.484 mg/m ³	0.234 (mg/m ³) ²
Zero drift from field test	u_{lof} -0.260 mg/m ³	0.068 (mg/m ³) ²
Span drift from field test	$u_{d,z}$ 0.052 mg/m ³	0.003 (mg/m ³) ²
Influence of ambient temperature at span	$u_{d,s}$ 0.208 mg/m ³	0.043 (mg/m ³) ²
Influence of supply voltage	u_t 0.473 mg/m ³	0.224 (mg/m ³) ²
Cross-sensitivity (interference)	u_v 0.163 mg/m ³	0.027 (mg/m ³) ²
Influence of sample gas flow	u_i 0.634 mg/m ³	0.402 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_n -0.058 mg/m ³	0.003 (mg/m ³) ²
	u_{rm} 0.364 mg/m ³	0.132 (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)

$$u_c = \sqrt{\sum (u_{max,i})^2} \quad 1.07 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 2.09 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

U in % of the range 45 mg/m³ 4,6

Requirement of EN 15267-3

U in % of the range 45 mg/m³ 20,0 **

U in % of the range 45 mg/m³ 15,0

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.

A value of 20,0 % was used instead.

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	936/21242470/C
Date of report	TÜV Rheinland
	2019-03-06

Measured component

Certification range	NH ₃	0 - 10 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	-0.06 mg/m ³
Sum of positive CS at span point	0.09 mg/m ³
Sum of negative CS at span point	-0.20 mg/m ³
Maximum sum of cross-sensitivities	-0.20 mg/m ³
Uncertainty of cross-sensitivity	u_i -0.115 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0.057 mg/m ³	0.003 (mg/m ³) ²	
Lack of fit	u_{lof} 0.058 mg/m ³	0.003 (mg/m ³) ²	
Zero drift from field test	$u_{d,z}$ 0.087 mg/m ³	0.008 (mg/m ³) ²	
Span drift from field test	$u_{d,s}$ 0.167 mg/m ³	0.028 (mg/m ³) ²	
Influence of ambient temperature at span	u_t 0.100 mg/m ³	0.010 (mg/m ³) ²	
Influence of supply voltage	u_v 0.066 mg/m ³	0.004 (mg/m ³) ²	
Cross-sensitivity (interference)	u_i -0.115 mg/m ³	0.013 (mg/m ³) ²	
Influence of sample gas flow	u_b -0.051 mg/m ³	0.003 (mg/m ³) ²	
Uncertainty of reference material at 70% of certification range	u_{rm} 0.081 mg/m ³	0.007 (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)

$$u_c = \sqrt{\sum (u_{\max, j})^2} \quad 0.28 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.55 \text{ mg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 10 mg/m³ 5.5

Requirement of 2010/75/EU

U in % of the ELV 10 mg/m³ 40.0 **

Requirement of EN 15267-3

U in % of the ELV 10 mg/m³ 30.0

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

A value of 40.0 % was used for this.

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

Measuring system

Manufacturer	Endress+Hauser SICK GmbH + Co. KG
AMS designation	MCS200HW
Serial number of units under test	24070525/24020511
Measuring principle	Bi-frequency and Gas filter correlation

Test report

Test laboratory	EuL/21266095/A TÜV Rheinland
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Measured component

Certification range	NH ₃ 0 - 7 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	0.04 mg/m ³
Sum of negative CS at span point	-0.27 mg/m ³
Maximum sum of cross-sensitivities	-0.27 mg/m ³
Uncertainty of cross-sensitivity	u_i -0.156 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Lack of fit	u_r 0.030 mg/m ³		0.001 (mg/m ³) ²
Zero drift from field test	u_{lof} 0.063 mg/m ³		0.004 (mg/m ³) ²
Span drift from field test	$u_{d,z}$ 0.052 mg/m ³		0.003 (mg/m ³) ²
Influence of ambient temperature at span	$u_{d,s}$ -0.117 mg/m ³		0.014 (mg/m ³) ²
Influence of supply voltage	u_t 0.084 mg/m ³		0.007 (mg/m ³) ²
Cross-sensitivity (interference)	u_v 0.025 mg/m ³		0.001 (mg/m ³) ²
Influence of sample gas flow	u_i -0.156 mg/m ³		0.024 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_n 0.012 mg/m ³		0.000 (mg/m ³) ²
	u_{rm} 0.057 mg/m ³		0.003 (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)

$$u_c = \sqrt{\sum (u_{max,i})^2} \quad 0.24 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.47 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

U in % of the ELV 4,67 mg/m³ 10,0

Requirement of EN 15267-3

U in % of the ELV 4,67 mg/m³ 40,0 **

U in % of the ELV 4,67 mg/m³ 30,0

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.

A value of 40,0 % was used instead.

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

Measuring system

Manufacturer	Endress+Hauser SICK GmbH + Co. KG
AMS designation	MCS200HW
Serial number of units under test	24070525/24020511
Measuring principle	Bi-frequency and Gas filter correlation

Test report

Test laboratory	TÜV Rheinland
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Measured component

Certification range	NO 0 - 50 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.72 mg/m ³
Sum of negative CS at zero point	-0.29 mg/m ³
Sum of positive CS at span point	0.70 mg/m ³
Sum of negative CS at span point	-1.50 mg/m ³
Maximum sum of cross-sensitivities	-1.50 mg/m ³
Uncertainty of cross-sensitivity	u_i -0.866 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u^2
Lack of fit	u_D 0.693 mg/m ³	0.480 (mg/m ³) ²
Zero drift from field test	u_{lof} -0.202 mg/m ³	0.041 (mg/m ³) ²
Span drift from field test	$u_{d,z}$ 0.231 mg/m ³	0.053 (mg/m ³) ²
Influence of ambient temperature at span	$u_{d,s}$ -0.520 mg/m ³	0.270 (mg/m ³) ²
Influence of supply voltage	u_t 0.551 mg/m ³	0.304 (mg/m ³) ²
Cross-sensitivity (interference)	u_v 0.315 mg/m ³	0.099 (mg/m ³) ²
Influence of sample gas flow	u_i -0.866 mg/m ³	0.750 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_b 0.144 mg/m ³	0.021 (mg/m ³) ²
	u_{rm} 0.404 mg/m ³	0.163 (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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 1.48 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 2.90 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the ELV 33.33 mg/m³ **8.7**

U in % of the ELV 33.33 mg/m³ **20.0**

U in % of the ELV 33.33 mg/m³ 15.0

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW (GMS811 FIDORi)
Serial number of units under test	00823523, 00823524 / 18290107, 18020076
Measuring principle	FID

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

Measured component

Certification range	TOC 0 - 15 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.17 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at span point	0.00 mg/m ³
Sum of negative CS at span point	-0.44 mg/m ³
Maximum sum of cross-sensitivities	-0.44 mg/m ³
Uncertainty of cross-sensitivity	u_i -0.254 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0.033 mg/m ³	0.001 (mg/m ³) ²	
Lack of fit	u_{lof} 0.023 mg/m ³	0.001 (mg/m ³) ²	
Zero drift from field test	$u_{d,z}$ -0.190 mg/m ³	0.036 (mg/m ³) ²	
Span drift from field test	$u_{d,s}$ -0.249 mg/m ³	0.062 (mg/m ³) ²	
Influence of ambient temperature at span	u_t 0.100 mg/m ³	0.010 (mg/m ³) ²	
Influence of supply voltage	u_v 0.083 mg/m ³	0.007 (mg/m ³) ²	
Cross-sensitivity (interference)	u_i -0.254 mg/m ³	0.065 (mg/m ³) ²	
Influence of sample gas flow	u_b -0.094 mg/m ³	0.009 (mg/m ³) ²	
Uncertainty of reference material at 70% of certification range	u_{rm} 0.121 mg/m ³	0.015 (mg/m ³) ²	
Variation of response factors (TOC)	u_{rf} 0.000 mg/m ³	0.000 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.45 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.89 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 10 mg/m ³	8.9
Requirement of EN 15267-3	U in % of the ELV 10 mg/m ³	30.0
	U in % of the ELV 10 mg/m ³	22.5

Measured values presented in blue are taken from the latest test report on performance testing.

The remaining data originate from the TÜV Rheinland report no. 936/21216085/B

dated 10 October 2011 on the test of the GMS810 FIDOR measuring system.

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	zirconium dioxide

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

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	0.11 Vol.-%
Sum of negative CS at span point	-0.11 Vol.-%
Maximum sum of cross-sensitivities	0.11 Vol.-%
Uncertainty of cross-sensitivity	u_i 0.064 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2
Standard deviation from paired measurements under field conditions *	u_D	0.045 Vol.-%		0.002 (Vol.-%) ²
Lack of fit	u_{lof}	-0.017 Vol.-%		0.000 (Vol.-%) ²
Zero drift from field test	$u_{d,z}$	0.075 Vol.-%		0.006 (Vol.-%) ²
Span drift from field test	$u_{d,s}$	-0.098 Vol.-%		0.010 (Vol.-%) ²
Influence of ambient temperature at span	u_t	0.115 Vol.-%		0.013 (Vol.-%) ²
Influence of supply voltage	u_v	0.006 Vol.-%		0.000 (Vol.-%) ²
Cross-sensitivity (interference)	u_i	0.064 Vol.-%		0.004 (Vol.-%) ²
Influence of sample gas flow	u_b	0.054 Vol.-%		0.003 (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)	$u_c = \sqrt{\sum (u_{max,i})^2}$	0.28 Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.55 Vol.-%

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the range 25 Vol.-%	2.2
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	10.0 **
	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	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	TÜV Rheinland
Date of report	2019-03-06

Measured component

Certification range	H ₂ O	0 - 40 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	0.00	Vol.-%
Sum of negative CS at span point	0.00	Vol.-%
Maximum sum of cross-sensitivities	0.00	Vol.-%
Uncertainty of cross-sensitivity	u_i	0.000 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2
Repeatability standard deviation at set point *	u_r	0.160	Vol.-%	0.026 (Vol.-%) ²
Lack of fit	u_{lof}	-0.231	Vol.-%	0.053 (Vol.-%) ²
Zero drift from field test	$u_{d,z}$	-0.023	Vol.-%	0.001 (Vol.-%) ²
Span drift from field test	$u_{d,s}$	0.208	Vol.-%	0.043 (Vol.-%) ²
Influence of ambient temperature at span	u_t	0.058	Vol.-%	0.003 (Vol.-%) ²
Influence of supply voltage	u_v	0.045	Vol.-%	0.002 (Vol.-%) ²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000 (Vol.-%) ²
Influence of sample gas flow	u_b	0.029	Vol.-%	0.001 (Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.323	Vol.-%	0.105 (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)	$u_c = \sqrt{\sum (u_{max, j})^2}$	0.48	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.95	Vol.-%

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the range 40 Vol.-%	2.4
Requirement of EN 15267-3	U in % of the range 40 Vol.-%	10.0 **
		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	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	TÜV Rheinland
Date of report	2019-03-06

Measured component

Certification range	CO 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	0.12	Vol.-%
Sum of negative CS at span point	0.00	Vol.-%
Maximum sum of cross-sensitivities	0.12	Vol.-%
Uncertainty of cross-sensitivity	u_i	0.069 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2
Standard deviation from paired measurements under field conditions *	u_D	0.029	Vol.-%	0.001 (Vol.-%) ²
Lack of fit	u_{lof}	-0.115	Vol.-%	0.013 (Vol.-%) ²
Zero drift from field test	$u_{d,z}$	0.029	Vol.-%	0.001 (Vol.-%) ²
Span drift from field test	$u_{d,s}$	0.072	Vol.-%	0.005 (Vol.-%) ²
Influence of ambient temperature at span	u_t	0.058	Vol.-%	0.003 (Vol.-%) ²
Influence of supply voltage	u_v	0.015	Vol.-%	0.000 (Vol.-%) ²
Cross-sensitivity (interference)	u_i	0.069	Vol.-%	0.005 (Vol.-%) ²
Influence of sample gas flow	u_b	0.060	Vol.-%	0.004 (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)	$u_c = \sqrt{\sum (u_{max,i})^2}$	0.27	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.53	Vol.-%

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the range 25 Vol.-%	2.1
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	10.0 **
		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	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

Measured component

Certification range	CH ₄ 0 - 50 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	0.00 mg/m ³
Sum of negative CS at span point	0.00 mg/m ³
Maximum sum of cross-sensitivities	0.00 mg/m ³
Uncertainty of cross-sensitivity	u_i 0.000 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0.058 mg/m ³		0.003 (mg/m ³) ²
Lack of fit	u_{lof} -0.173 mg/m ³		0.030 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$ 0.173 mg/m ³		0.030 (mg/m ³) ²
Span drift from field test	$u_{d,s}$ -0.635 mg/m ³		0.403 (mg/m ³) ²
Influence of ambient temperature at span	u_t 0.551 mg/m ³		0.304 (mg/m ³) ²
Influence of supply voltage	u_v 0.212 mg/m ³		0.045 (mg/m ³) ²
Cross-sensitivity (interference)	u_i 0.000 mg/m ³		0.000 (mg/m ³) ²
Influence of sample gas flow	u_b -0.150 mg/m ³		0.023 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 0.404 mg/m ³		0.163 (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)	$u_c = \sqrt{\sum (u_{max,i})^2}$	1.00 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.96 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the range 50 mg/m³	3.9
Requirement of EN 15267-3	U in % of the range 50 mg/m³	30.0 **
	U in % of the range 50 mg/m³	22.5

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

A value of 30.0 % was used for this.

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

Measured component

Certification range	HCl 0 - 15 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.30 mg/m ³
Sum of negative CS at zero point	-0.15 mg/m ³
Sum of positive CS at span point	0.48 mg/m ³
Sum of negative CS at span point	-0.08 mg/m ³
Maximum sum of cross-sensitivities	0.48 mg/m ³
Uncertainty of cross-sensitivity	u_i 0.276 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0.101 mg/m ³	0.010	(mg/m ³) ²
Lack of fit	u_{lof} 0.069 mg/m ³	0.005	(mg/m ³) ²
Zero drift from field test	$u_{d,z}$ -0.139 mg/m ³	0.019	(mg/m ³) ²
Span drift from field test	$u_{d,s}$ -0.251 mg/m ³	0.063	(mg/m ³) ²
Influence of ambient temperature at span	u_t 0.173 mg/m ³	0.030	(mg/m ³) ²
Influence of supply voltage	u_v 0.055 mg/m ³	0.003	(mg/m ³) ²
Cross-sensitivity (interference)	u_i 0.276 mg/m ³	0.076	(mg/m ³) ²
Influence of sample gas flow	u_b 0.043 mg/m ³	0.002	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 0.121 mg/m ³	0.015	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.47 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.93 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the ELV 10 mg/m³	9.3
U in % of the ELV 10 mg/m³	40.0
U in % of the ELV 10 mg/m ³	30.0

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

Measuring system

Manufacturer	SICK AG
AMS designation	MCS200 HW
Serial number of units under test	17160001 / 17160002
Measuring principle	bi-frequency and gas filter correlation

Test report

Test laboratory	936/21242470/C TÜV Rheinland
Date of report	2019-03-06

Measured component

	SO ₂
Certification range	0 - 75 mg/m ³

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	-2.11 mg/m ³
Sum of positive CS at span point	0.00 mg/m ³
Sum of negative CS at span point	-0.85 mg/m ³
Maximum sum of cross-sensitivities	-2.11 mg/m ³
Uncertainty of cross-sensitivity	u_i -1.217 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.337 mg/m ³	0.114 (mg/m ³) ²
Lack of fit	u_{lof}	-0.307 mg/m ³	0.094 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$	0.173 mg/m ³	0.030 (mg/m ³) ²
Span drift from field test	$u_{d,s}$	1.212 mg/m ³	1.469 (mg/m ³) ²
Influence of ambient temperature at span	u_t	0.231 mg/m ³	0.053 (mg/m ³) ²
Influence of supply voltage	u_v	0.119 mg/m ³	0.014 (mg/m ³) ²
Cross-sensitivity (interference)	u_i	-1.217 mg/m ³	1.481 (mg/m ³) ²
Influence of sample gas flow	u_b	-0.207 mg/m ³	0.043 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.606 mg/m ³	0.368 (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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.91 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.75 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 50 mg/m³	7.5
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	20.0
	U in % of the ELV 50 mg/m³	15.0