



# CERTIFICATE

## about Product Conformity (QAL1)

	Number of Certificate: 0000025926_03
Certified AMS:	MCS 100 FT for O <sub>2</sub> , CO, SO <sub>2</sub> , NO, NO <sub>2</sub> , HCl, HF, CH <sub>4</sub> , CO <sub>2</sub> , H <sub>2</sub> O, N <sub>2</sub> O, NH <sub>3</sub> and TOC
Manufacturer:	SICK MAIHAK GmbH Dr. Zimmermann Str. 18 88709 Meersburg Germany
Test Institute:	TÜV Rheinland Energie und Umwelt GmbH
	This is certifying that the AMS has been tested and found to comply with:
DIN	EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2007 and EN 14181: 2004
	cation is awarded in respect of the conditions stated in this certificate (see also the following pages). In certificate replaces Certificate No. 0000025926_02 of 9 February 2011
	NNW.tuv.com EN 15267-3 tested QAL1 certified

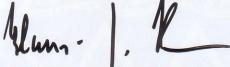
- TUV approved
- Annual inspection

Publication in the German Federal Gazette (BAnz.) of 26 January 2011

TÜVRheinland

0000025926

Umweltbundesamt Dessau, 19 August 2011



i. A. Dr. Hans-Joachim Hummel

The certificate is valid until: 11 February 2015

TÜV Rheinland Energie und Umwelt GmbH Köln, 17 August 2011

Pet a. 2

ppa. Dr. Peter Wilbring

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Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

info@qal1.de





Test report: First certification: Run of validity until: Publication 936/21214593/A of 01 October 2010
12 February 2010
11 February 2015
BAnz. 26 January 2011, No 14, page 294, chapter I No 3.1

#### Authorised application

The tested AMS is suitable for use at combustion plants according to EC directive 2001-80-EC, at waste incinerations plants according to EC directive 2000-76-EC and other plants requiring official permission. The tested measurement ranges have been chosen with respect to the wide application range of the AMS.

The suitability of the AMS for this application was assessed on basis of a laboratory test and three field tests (field test during the original approval test with a duration of more than one year at a municipal waste incinerator 1, a second field test during the first additional test of more than six months duration at a municipal waste incinerator 1 and a third field test of the second additional test of more than 6 months at a municipal waste incinerator 2) of MCS 100 FT.

The AMS is approved for the temperature range from +5 °C to +40 °C.

Any potential user should ensure, in consultation with the manufacturer that this AMS is suitable for the installation on which it will be installed.

#### Basis of the certification

This certification is based on:

- test report 936/21214593/A of TÜV Rheinland Energie und Umwelt GmbH of 01 October 2010
- test reports

936/21210511/A of 22 March 2010,

936/21211742/A of 26 October 2009,

936/21206925/A of 20 October 2008 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

- suitability announced by the German Environmental Agency (UBA) as relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz. 26 January 2011, No 14, p. 294, chapter I No 3.1: UBA publication from 10 January 2011)
- publication in the German Federal Gazette (BAnz. 29 July 2011, No 113, p. 2725, chapter III, notification 18, UBA publication of 15 July 2011)





## AMS name:

MCS 100 FT for O<sub>2</sub>, CO, SO<sub>2</sub>, NO, NO<sub>2</sub>, HCI, HF, CH<sub>4</sub>, CO<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>O, NH<sub>3</sub> and TOC

#### Manufacturer:

SICK MAIHAK GmbH, Meersburg

#### Suitability:

For measurements at plants requiring official permission (i. e. plants in 2000-76-EC, waste incineration directive and 2001-80-EC, large combustion plants directive)

Component	Certification-	Supplemen	tary measureme	Unit	
Component	range	Range 1	Range 2	Range 3	15-
O <sub>2</sub>	0 - 21	-		-	Vol%
СО	0- 75	0 - 300	0 - 1500		mg/m³
SO <sub>2</sub>	0 - 75	0 - 300	0 - 1500		mg/m³
NO	0 - 200	0 - 400	0 - 2000	-7.5	mg/m³
NO <sub>2</sub>	0 - 100	-	0 - 500		mg/m³
HCI	0 - 15	0 - 90	0 - 150		mg/m³
HF	0- 3	0 - 10			mg/m³
CH <sub>4</sub>	0 - 50		0 - 150	X	mg/m³
CO <sub>2</sub>	0 - 25	201 <b>-</b> 11 - 27	- /		Vol%
H <sub>2</sub> O	0 - 40	-			Vol%
N <sub>2</sub> O	0 - 50	-	0 - 500	-	mg/m³
NH <sub>3</sub>	0- 10	0 - 50		9.44	mg/m³
тос	0 - 15	0 - 50	0 - 150	0 - 500	mg/m³

#### Measuring ranges during the suitability test:

#### Software versions:

MCS 100 FT Firmware 9114688\_TJ59 SCU Installationspaket 9125028\_T825

#### **Restrictions:**

None

#### **Remarks:**

- 1. The measuring system MCS 100 FT displays its measuring values related to dry gas under normal conditions.
- 2. The maintenance interval amounts to four weeks, if the components O<sub>2</sub> is integrated, if the component TOC is integrated the maintenance interval amounts to two months, if the components CO<sub>2</sub>, HF and NH<sub>3</sub> are integrated the maintenance interval amounts to three months, otherwise it is six months.
- 3. For the components NO<sub>2</sub> and HCl the requirements for the correlation coefficient R<sup>2</sup> according to DIN EN 15267-3 have not been fulfilled at the suitability test procedure.





- 4. For the components CO and HF the requirements for the total uncertainty according to DIN EN 15267-3 have not been fulfilled at the suitability test procedure.
- 5. For the span check (QAL3) of the components CO, SO<sub>2</sub>, NO, HCI, CH<sub>4</sub>, N<sub>2</sub>O, H<sub>2</sub>O, CO<sub>2</sub>, HF and NH<sub>3</sub> instead of test gases the automatic internal adjustment unit can be used.
- Supplementary test (extension of the maintenance interval for the components NH<sub>3</sub> and TOC and supplementary range 0 – 50 mg/m<sup>3</sup> for NH<sub>3</sub>) to the announcement of the German Federal Environmental Agency dated 12 July 2010 (BAnz. p. 2597, chapter I, No. 1.2)

#### Test report:

TÜV Rheinland Energie und Umwelt GmbH, Köln Report-No: 936/21214593/A of 01 October 2010

18 notification on announcements of the Federal Environment Agency of 10 January 2011 (BAnz. p. 294, chapter I No 3.1 and chapter IV 30 notification).
The current software version of the AMS MCS 100 FT of SICK MAIHAK GmbH are:
MCS 100 FT: 9114688 UG07
SCU: 9125028 UP50
FID: 9140300
Statement of TÜV Rheinland Energie und Umwelt GmbH of 30 March 2011

#### **Certified product**

This certificate applies to automatic measurement systems confirming to the following description:

MCS 100 FT is a multi component analyser system. The gas to be measured is taken by means of a sample gas probe from the flue gas. To provide the analyser system with the sample gas from the probe a heated sample gas line is used. A Fourier transform infrared-spectrometer (FTIR-spectrometer) serves for the spectral analysis of the gas concentrations.

The sample gas is delivered by an ejector pump. The sample gas probe offers in its standard configuration the functions as automatic zero gas provision, automatic back-flush with zero adjustment and filter cleaning. The system has an independent temperature control system for all heated parts in order to prevent any condensation of flue gas within the system.

The control and evaluation system SCU (System Control Unit) is designed and adjusted to satisfy the requirements of emission control purposes as well as the requests of process measurement technology and offers standard interfaces as CAN-Bus and Field-BUS systems, as well as ModBus or ProfiBus. An Ethernet interface for the remote control of the entire measuring system facilitates the data transfer via internal and external TCP/IP networks. In this way also remote control and remote service of the measuring system are possible using the software package SOPAS ET.

The tested AMS consists of the following single components:

- heated sampling probe (SFU-BF SPB) with heated filter (2 µm sintered metal special alloy), test gas port and back-flush possibility
- heated sample gas line (185 °C, PTFE Ø<sub>i</sub> = 4mm, length during the approval testing procedure: 36 m)
- analyser cabinet MCS 100 FT containing interface modules, heated measuring cell FTIRanalyser (Interferometer), electronics unit and the SCU control unit
- integrated oxygen measuring device using the zirconium-dioxide principle
- integrated TOC measurement with flame ionisation detector





• software versions:

MCS 100 FT: SCU: FID: 9114688\_UG07 9125028\_UP50 9140300

#### **General notes**

This certificate is based upon the equipment tested. The manufacturer is responsible for a long-lasting compliance of the ongoing production process with the requirements of EN 15267. The manufacturer is obliged to maintain a certified quality management system to control the production of the certified product. Both product and quality management system shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energie und Umwelt GmbH must be notified at the given address on page 1.

The certification mark with the product specific ID-Number which may be applied to the product or used in promotion material of the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remain property of TÜV Rheinland Energie und Umwelt GmbH. Upon revocation of the announcement the certificate loses validity. After expiration of the validity of the certificate or on request of the TÜV Rheinland Energie und Umwelt GmbH this document shall be returned and the certification mark shall longer be used.

The current version of this certificate and its validity is also listed at the Internet Address: **qal1.de**.





Certification of MCS 100 FT for  $O_2$ , CO, SO<sub>2</sub>, NO, NO<sub>2</sub>, HCl, HF, CH<sub>4</sub>, CO<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>O, NH<sub>3</sub> and TOC is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

#### **First suitability test**

Test report: 936/21206925/A of 20 October 2008 without  $O_2$ ,  $NH_3$  and TOC TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln

Publication: BAnz. 11 March 2009, No 38, p. 901, chapter I No 2.2: Announcement by UBA from 19 February 2009.

#### Initial certification according to EN 15267

Certificate No 0000025926 of: 15 March 2010

Validity of the certificate until: 11 February 2015

Test report: 936/21211742/A of 26 October 2009, TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln

Publication: BAnz. 12 February 2010, No 24, p. 553, chapter I No 1.3: Announcement by UBA from 25 January 2010.

#### Supplementary testing according to EN 15267

Certificate No 0000025926\_01 of: 02 August 2010

Validity of the certificate until: 11 February 2015

Test report: 936/21210511/A of 22 March 2010, Extension about Components  $NH_3$  and TOC TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln

Publication: BAnz. 28 July 2010, No 111, p. 2597, chapter I No 1.2: Announcement by UBA from 12 July 2010.

#### Supplementary testing according to EN 15267

Certificate No 0000025926\_02 of: 09 February 2011

Validity of the certificate until: 11 February 2015

Test report: 936/21214593/A of 01 October 2010, Maintenance interval extension for the components  $NH_3$  and TOC and supplementary range  $0 - 50 \text{ mg/m}^3$  for  $NH_3$ TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 26 January 2011, No 14, p. 294, chapter I No 3.1: Announcement by UBA from 10 January 2011.

#### Notification according to EN 15267

Certificate No 0000025926\_03 of: 19 August 2011

Validity of the certificate until: 11 February 2015

Statement of TÜV Rheinland Energie und Umwelt GmbH from 30 March 2011 (new Software)

Publication: BAnz. 29 July 2011, No 113, p. 2725, chapter III notification 18: Announcement by UBA from 15 July 2011.





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

Manufacturer data Manufacturer Name of measuring system Serial Number Measuring Principle		MCS 1	/AIHAK GmbH 00 FT 1, TUEV 2, TUE\	/ 3, TUEV 4
<b>TÜV Data</b> Approval Report		936/21	211742A / 2009-	10-26
Editor		Röllig		
Date		2009-1	0-26	
Measurement Component		O <sub>2</sub>		
Certificated range		21	Vol%	
Evaluation of the cross sensitivity (CS)		0.00		
Sum of positive CS at zero point			Vol%	
Sum of negative CS at zero point Sum of postive CS at reference point			Vol% Vol%	
Sum of negative CS at reference point			Vol%	
Maximum sum of cross sensitivities			Vol%	
Uncertainty of cross sensitivity			Vol%	
Calculation of the combined standard uncertainty Test Value		u		U <sup>2</sup>
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>	0.092	Vol%	0.008 (Vol%) <sup>2</sup>
Lack of fit	Ulof	-0.081	Vol%	0.007 (Vol%) <sup>2</sup>
Zero drift from field test	$\mathbf{u}_{d,z}$		Vol%	0.011 (Vol%) <sup>2</sup>
Span drift from field test	U <sub>d,s</sub>		Vol%	0.013 (Vol%) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub>		Vol%	0.017 (Vol%) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub>		Vol%	0.003 (Vol%) <sup>2</sup>
Cross sensitivity (interference) Influence of sample gas flow	Ui		Vol% Vol%	0.000 (Vol%) <sup>2</sup> 0.000 (Vol%) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>p</sub> u <sub>rm</sub>		Vol%	0.029 (Vol%) <sup>2</sup>
* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"	um	0.170	VOI70	0.020 (00170)
Combined standard uncertainty (u <sub>c</sub> )	$u_c = 1$	$\sqrt{\sum (u_{ma})}$	$\frac{1}{(x,i)^2}$	0.30 Vol%
Total expanded uncertainty	U = u <sub>c</sub>	* k = u <sub>c</sub>	* 1.96	0.58 Vol%
Relative total expanded uncertainty	U in %	6 of the r	ange 21 Vol%	2.8
Requirement of 2000/76/EC and 2001/80/EC**			ange 21 Vol%	10.0
Requirement of EN 15267-3	U in %	of the ra	ange 21 Vol%	7.5





Manufacturer data Manufacturer		Sick M	laihak GmbH			
Name of measuring system		MCS 100 FT				
Serial Number	TUEV 1, TUEV 2, TUE			V 3 THEV 4		
Measuring Principle		FTIR	1, 102 2, 102	V 0, TOLV 4		
Medsuning Finicipie		1 THX				
TÜV Data						
Approval Report		936/21	206925A / 2008	3-10-20		
Editor		C. Lan	dgraf			
Date		2009-1	10-26			
Measurement Component		CO				
Certificated range		75	mg/m³			
Evaluation of the cross sensitivity (CS)						
Sum of positive CS at zero point			mg/m³			
Sum of negative CS at zero point			mg/m³			
Sum of postive CS at reference point			mg/m³			
Sum of negative CS at reference point			mg/m³			
Maximum sum of cross sensitivities			mg/m³			
Uncertainty of cross sensitivity		-1.52	mg/m³			
Calculation of the combined standard uncertainty						
Test Value		u		U <sup>2</sup>		
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>		mg/m³	0.476 (mg/m <sup>3</sup>	)2	
Lack of fit	Ulof		mg/m <sup>3</sup>	0.548 (mg/m <sup>3</sup>	,	
Zero drift from field test	U <sub>d.z</sub>		mg/m <sup>3</sup>	0.608 (mg/m <sup>3</sup>		
Span drift from field test	U <sub>d.s</sub>		mg/m <sup>3</sup>	0.090 (mg/m <sup>3</sup>	·	
Influence of ambient temperature at span	U <sub>t</sub>		mg/m <sup>3</sup>	0.548 (mg/m <sup>3</sup>	<b>,</b>	
Influence of supply voltage	uv	0.130	mg/m <sup>3</sup>	0.017 (mg/m <sup>3</sup>	<i>,</i>	
Cross sensitivity (interference)	u	-1.518	mg/m <sup>3</sup>	2.306 (mg/m <sup>3</sup>	) <sup>2</sup>	
Influence of sample gas flow	Up	0.000	mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup>		
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub>	0.606	mg/m <sup>3</sup>	0.368 (mg/m <sup>3</sup>		
* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"						
Combined standard uncertainty (u <sub>c</sub> )	U = 4	$\sqrt{\sum (u_{ma})}$	<u>}</u> 2	2.23 mg/m <sup>3</sup>		
Total expanded uncertainty		$k = u_c$		4.37 mg/m <sup>3</sup>		
	U U <sub>C</sub>		1.00	4.07 mg/m		
Relative total expanded uncertainty	U in %	% of the I	ELV 50 mg/m <sup>3</sup>	8	3.7	
Requirement of 2000/76/EC and 2001/80/EC			ELV 50 mg/m <sup>3</sup>		0.0	
Requirement of EN 15267-3			LV 50 mg/m <sup>3</sup>		7.5	
			5			





Manufacturer data Manufacturer Name of measuring system		MCS 1						
Serial Number				TUEV 1, TUEV 2, TUEV 3, TUEV 4				
Measuring Principle		FTIR						
TÜV Data		026/24	206925A / 2008	10.20				
Approval Report		930/21	200925A72000	5-10-20				
Editor		C. Lan	doraf					
Date		2009-1	•					
Measurement Component		SO <sub>2</sub>						
Certificated range		75	mg/m³					
Evaluation of the cross sensitivity (CS)								
Sum of positive CS at zero point			mg/m³					
Sum of negative CS at zero point			mg/m³					
Sum of postive CS at reference point			mg/m³					
Sum of negative CS at reference point			mg/m³					
Maximum sum of cross sensitivities			mg/m³					
Uncertainty of cross sensitivity		1.73	mg/m³					
Calculation of the combined standard uncertainty Test Value		u		U <sup>2</sup>				
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>		mg/m³	u 0.063 (mg/m <sup>3</sup>	12			
Lack of fit	u <sub>D</sub> U <sub>lof</sub>		mg/m <sup>3</sup>	0.185 (mg/m <sup>3</sup>	,			
Zero drift from field test	U <sub>d.z</sub>		mg/m <sup>3</sup>	1.796 (mg/m <sup>3</sup>	,			
Span drift from field test	U <sub>d,z</sub>		mg/m <sup>3</sup>	1.166 (mg/m <sup>3</sup>	<i>'</i>			
Influence of ambient temperature at span	U <sub>d,s</sub> U <sub>t</sub>		mg/m <sup>3</sup>	0.423 (mg/m <sup>3</sup>				
Influence of supply voltage			mg/m <sup>3</sup>	0.123 (mg/m <sup>3</sup>				
Cross sensitivity (interference)	u,		mg/m <sup>3</sup>	3.000 (mg/m <sup>3</sup>				
Influence of sample gas flow	u <sub>p</sub>		mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup>	'			
Uncertainty of reference material at 70% of certification range	um		mg/m <sup>3</sup>	0.368 (mg/m <sup>3</sup>	,			
<ul> <li>* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"</li> </ul>								
Combined standard upportainty (u_)		$\sqrt{\sum (u_{max})}$	1/2	2.67 mg/m <sup>3</sup>				
Combined standard uncertainty (u <sub>c</sub> )		√∠_(u <sub>ma</sub> .*k = u <sub>c</sub>	ax, j / * 1.06	5.23 mg/m <sup>3</sup>				
Total expanded uncertainty	0 – u <sub>c</sub>	, K – U <sub>c</sub>	1.90	5.23 mg/m <sup>2</sup>				
Relative total expanded uncertainty	ll in 9	of the	ELV 50 mg/m <sup>3</sup>	40	0.5			
Requirement of 2000/76/EC and 2001/80/EC			ELV 50 mg/m <sup>3</sup>		0.0			
Requirement of EN 15267-3			LV 50 mg/m <sup>3</sup>		5.0			
	0 111 70		2 v 50 mg/m		5.0			





Manufacturer data Manufacturer Name of measuring system Serial Number Measuring Principle		Sick Maihak GmbH MCS 100 FT TUEV 1, TUEV 2, 1 FTIR	
TÜV Data Approval Report		936/21206925A / 2	008-10-20
and the second			
Editor		C. Landgraf	
Date		2009-10-26	
Measurement Component		NO	
Certificated range		200 mg/m <sup>3</sup>	
Evaluation of the cross sensitivity (CS)			
Sum of positive CS at zero point		1.40 mg/m <sup>3</sup>	
Sum of negative CS at zero point		-5.20 mg/m <sup>3</sup>	
Sum of postive CS at reference point		6.80 mg/m <sup>3</sup>	
Sum of negative CS at reference point		-4.80 mg/m <sup>3</sup>	
Maximum sum of cross sensitivities		6.80 mg/m <sup>3</sup>	
Uncertainty of cross sensitivity		3.93 mg/m <sup>3</sup>	
Calculation of the combined standard uncertainty			
Test Value		u	U <sup>2</sup>
Repeatability standard deviation at set point *	Ur	0.780 mg/m <sup>3</sup>	0.608 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	Ulof	0.810 mg/m <sup>3</sup>	0.656 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	U <sub>d,z</sub>	2.080 mg/m <sup>3</sup>	4.326 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub>	-3.460 mg/m <sup>3</sup>	11.972 (mg/m³)²
Influence of ambient temperature at span	ut	-1.730 mg/m <sup>3</sup>	2.993 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	uv	-0.920 mg/m <sup>3</sup>	0.846 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross sensitivity (interference)	ui	3.926 mg/m <sup>3</sup>	15.413 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	u <sub>p</sub>	0.000 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub>	1.617 mg/m <sup>3</sup>	2.613 (mg/m <sup>3</sup> ) <sup>2</sup>
The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"			
Combined standard uncertainty $(u_{\rm C})$	$u_c = d$	$\sqrt{\sum (u_{max, j})^2}$	6.28 mg/m <sup>3</sup>
Total expanded uncertainty	U = u	$k = u_c * 1,96$	12.31 mg/m <sup>3</sup>
Relative total expanded uncertainty	U in 9	% of the ELV 130 mg/	m³ 9.5
Requirement of 2000/76/EC and 2001/80/EC	U in 🤋	% of the ELV 130 mg/	m³ 20.0
Requirement of EN 15267-3	U in %	% of the ELV 130 mg/n	n³ <b>15.0</b>





Manufacturer data Manufacturer Name of measuring system		Sick Ma MCS 1	aihak GmbH 00 FT		
Serial Number		TUEV '	1, TUEV 2, TUE	V 3, TUEV 4	
Measuring Principle		FTIR			
TÜV Data					
Approval Report		936/21	206925A / 2008	-10-20	
Editor		C. Land	•		
Date		2009-1	0-26		
Measurement Component		NO <sub>2</sub>			
Certificated range		100	mg/m <sup>3</sup>		
Certificated range		100	ing/in		
Evaluation of the cross sensitivity (CS)					
Sum of positive CS at zero point		4.00	mg/m³		
Sum of negative CS at zero point		-2.40			
Sum of postive CS at reference point			mg/m <sup>3</sup>		
Sum of negative CS at reference point		-3.60	mg/m <sup>3</sup>		
Maximum sum of cross sensitivities		4.00	mg/m³		
Uncertainty of cross sensitivity		2.31	mg/m³		
Calculation of the combined standard uncertainty					
Test Value		U		U <sup>2</sup>	
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>		mg/m <sup>3</sup>	3.028 (mg/m <sup>3</sup> ) <sup>2</sup>	
Lack of fit Zero drift from field test	Ulof		mg/m <sup>3</sup> mg/m <sup>3</sup>	$0.656 \ (mg/m^3)^2$	
Span drift from field test	U <sub>d,z</sub> U <sub>d.s</sub>	-1.330	0	2.250 (mg/m <sup>3</sup> ) <sup>2</sup> 1.769 (mg/m <sup>3</sup> ) <sup>2</sup>	
Influence of ambient temperature at span	U <sub>d,s</sub> Ut		mg/m <sup>3</sup>	0.563 (mg/m <sup>3</sup> ) <sup>2</sup>	
Influence of supply voltage	u <sub>v</sub>		mg/m <sup>3</sup>	0.123 (mg/m <sup>3</sup> ) <sup>2</sup>	
Cross sensitivity (interference)	u,		mg/m <sup>3</sup>	5.333 (mg/m <sup>3</sup> ) <sup>2</sup>	
Influence of sample gas flow	u <sub>p</sub>		mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>	
Uncertainty of reference material at 70% of certification range	um		mg/m³	0.653 (mg/m <sup>3</sup> ) <sup>2</sup>	
* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"					
			)2		
Combined standard uncertainty (u <sub>C</sub> )	$u_c = \gamma$	$\sum (u_{max})$	x, j) <sup>2</sup>	3.79 mg/m <sup>3</sup>	
Total expanded uncertainty	$U = u_c$	* k = u <sub>c</sub>	* 1,96	7.43 mg/m <sup>3</sup>	
Deletive total evenended uncertainty		of the F	1 1/ 70 m m/m - 3	10	~
Relative total expanded uncertainty			LV 70 mg/m <sup>3</sup>	10.	
Requirement of 2000/76/EC and 2001/80/EC Requirement of EN 15267-3			LV 70 mg/m <sup>3</sup> LV 70 mg/m <sup>3</sup>	<b>20</b> . 15.	
Requirement of EN 15207-5	0111 %	or the El		15.	.0





Manufacturer data Manufacturer Name of measuring system Serial Number Measuring Principle TÜV Data Approval Report	Sick Maihak GmbH MCS 100 FT TUEV 1, TUEV 2, TUEV 3, TUEV 4 FTIR 936/21206925A / 2008-10-20	
Editor Date	C. Landgraf 2009-10-26	
Measurement Component Certificated range	HCI 15 mg/m³	
Evaluation of the cross sensitivity (CS) Sum of positive CS at zero point Sum of negative CS at zero point Sum of postive CS at reference point Sum of negative CS at reference point Maximum sum of cross sensitivities Uncertainty of cross sensitivity	0.59 mg/m <sup>3</sup> 0.08 mg/m <sup>3</sup> 0.50 mg/m <sup>3</sup> 0.08 mg/m <sup>3</sup> 0.59 mg/m <sup>3</sup> 0.34 mg/m <sup>3</sup>	
Calculation of the combined standard uncertainty Test Value	u u²	
Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
Combined standard uncertainty (u <sub>C</sub> ) Total expanded uncertainty	$u_{c} = \sqrt{\sum (u_{max, j})^{2}}$ 0.62 mg/m <sup>3</sup> U = $u_{c} * k = u_{c} * 1,96$ 1.22 mg/m <sup>3</sup>	
Relative total expanded uncertainty Requirement of 2000/76/EC and 2001/80/EC Requirement of EN 15267-3	U in % of the ELV 10 mg/m³         12.2           U in % of the ELV 10 mg/m³         40.0           U in % of the ELV 10 mg/m³         30.0	0





Manufacturer data Manufacturer Name of measuring system Serial Number		Sick Maihak GmbH MCS 100 FT TUEV 1, TUEV 2, 1	
Measuring Principle		FTIR	
<b>TÜV Data</b> Approval Report		936/21206925A / 2	008-10-20
Editor		C. Landgraf	
Date		2009-10-26	
Measurement Component		HF	
Certificated range		3 mg/m³	
Evaluation of the cross sensitivity (CS)			
Sum of positive CS at zero point		0.12 mg/m <sup>3</sup>	
Sum of negative CS at zero point		-0.08 mg/m <sup>3</sup>	
Sum of postive CS at reference point		0.05 mg/m <sup>3</sup>	
Sum of negative CS at reference point		-0.11 mg/m³	
Maximum sum of cross sensitivities		0.12 mg/m <sup>3</sup>	
Uncertainty of cross sensitivity		0.07 mg/m <sup>3</sup>	
Calculation of the combined standard uncertainty			
Test Value		u	U <sup>2</sup>
Repeatability standard deviation at set point *	Ur	0.050 mg/m <sup>3</sup>	0.003 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	Ulof	-0.029 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	U <sub>d,z</sub>	-0.059 mg/m <sup>3</sup>	0.003 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	U <sub>d,s</sub>	-0.068 mg/m <sup>3</sup>	0.005 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	ut	0.081 mg/m <sup>3</sup>	0.007 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	Uv	0.023 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross sensitivity (interference)	ui	0.069 mg/m <sup>3</sup>	0.005 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	u <sub>p</sub>	0.000 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub>	0.024 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>
The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"			
Combined standard uncertainty (u <sub>c</sub> )	u _ = .	$\sqrt{\sum (u_{max, j})^2}$	0.15 mg/m <sup>3</sup>
Total expanded uncertainty		$k = u_c * 1,96$	0.30 mg/m <sup>3</sup>
Relative total expanded uncertainty	U in 9	% of the ELV 1 mg/m <sup>3</sup>	3 30.3
Requirement of 2000/76/EC and 2001/80/EC	U in 9	% of the ELV 1 mg/m <sup>3</sup>	40.0
Requirement of EN 15267-3		6 of the ELV 1 mg/m <sup>3</sup>	30.0





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

Manufacturer data Manufacturer Name of measuring system Serial Number		MCS 1	laihak GmbH 00 FT 1, TUEV 2, TUE	EV 3, TUEV 4
Measuring Principle		FTIR		
<b>TÜV Data</b> Approval Report		936/21	206925A / 2008	-10-20
Editor		C. Lan	dgraf	
Date		2009-1		
Measurement Component		CH₄		
Certificated range		50	mg/m³	
Evaluation of the cross sensitivity (CS)				
Sum of positive CS at zero point		0.55	mg/m³	
Sum of negative CS at zero point			mg/m <sup>3</sup>	
Sum of postive CS at reference point			mg/m <sup>3</sup>	
Sum of negative CS at reference point			mg/m <sup>3</sup>	
Maximum sum of cross sensitivities		1.35	mg/m <sup>3</sup>	
Uncertainty of cross sensitivity		0.78	mg/m³	
Calculation of the combined standard uncertainty Test Value		u		u²
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>	0.540	mg/m³	0.292 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	Ulof	-0.200	mg/m³	0.040 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	U <sub>d,z</sub>	-0.720	mg/m³	0.518 (mg/m³)²
Span drift from field test	U <sub>d,s</sub>		mg/m³	0.757 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub>		mg/m³	0.160 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub>		mg/m³	0.004 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross sensitivity (interference)	Ui		mg/m³	0.608 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	u <sub>p</sub>		mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range * The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"	U <sub>rm</sub>	0.404	mg/m³	0.163 (mg/m³)²
Combined standard uncertainty (u <sub>c</sub> )	$u_c = 1$	$\sum (u_{ma})$	$\left(\frac{1}{2}\right)^2$	1.59 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c$	* k = u <sub>c</sub>	* 1.96	3.12 mg/m <sup>3</sup>
	Ū	Ĭ		J. J
Relative total expanded uncertainty	U in %	of the E	ELV 20 mg/m <sup>3</sup>	15.6
Requirement of 2000/76/EC and 2001/80/EC**	U in %	of the E	ELV 20 mg/m <sup>3</sup>	30.0
Requirement of EN 15267-3	U in %	of the E	LV 20 mg/m <sup>3</sup>	22.5





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

Manufacturer data Manufacturer Name of measuring system Serial Number Measuring Principle		MCS 1	aihak GmbH 00 FT 1, TUEV 2, TUE∖	′ 3, TUEV 4
<b>TÜV Data</b> Approval Report		936/21	206925A / 2008- <sup>.</sup>	10-20
Editor Date		C. Lan 2009-1		
Measurement Component Certificated range		CO <sub>2</sub> 25	Vol%	
Evaluation of the cross sensitivity (CS) Sum of positive CS at zero point Sum of negative CS at zero point Sum of postive CS at reference point Sum of negative CS at reference point Maximum sum of cross sensitivities Uncertainty of cross sensitivities Uncertainty of cross sensitivity Calculation of the combined standard uncertainty Test Value Standard deviation from paired measurements under field conditions * Lack of fit Zero drift from field test Span drift from field test Influence of ambient temperature at span Influence of supply voltage Cross sensitivity (interference) Influence of sample gas flow Uncertainty of reference material at 70% of certification range * The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"	UD Ulof Ud,z Ud,s Ut Uv Ui Up Urm	-0.73 0.80 -0.78 0.80 0.46 u 0.360 0.100 0.300 0.300 0.300 0.300 0.060 0.462 0.000	Vol% Vol% Vol% Vol% Vol% Vol% Vol% Vol% Vol% Vol% Vol% Vol% Vol%	u² 0.130 (Vol%)² 0.010 (Vol%)² 0.090 (Vol%)² 0.152 (Vol%)² 0.090 (Vol%)² 0.004 (Vol%)² 0.213 (Vol%)² 0.000 (Vol%)² 0.001 (Vol%)²
Combined standard uncertainty (u <sub>C</sub> ) Total expanded uncertainty	$u_c = \sqrt{U}$ U = u <sub>c</sub>	$\sqrt{\sum_{k \in U_{ma}} (u_{ma})}$	,, j)² * 1,96	0.85 Vol% 1.67 Vol%
Relative total expanded uncertainty Requirement of 2000/76/EC and 2001/80/EC** Requirement of EN 15267-3	U in %	of the r	ange 25 Vol% ange 25 Vol% inge 25 Vol%	6.7 10.0 7.5





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

Manufacturer data Manufacturer Name of measuring system Serial Number Measuring Principle			Sick Maihak GmbH MCS 100 FT TUEV 1, TUEV 2, TUEV 3, TUEV 4 FTIR				
<b>TÜV Data</b> Approval Report		936/21	206925A / 2008-	10-20			
Editor		C. Lan	dgraf				
Date		2009-1	0-26				
Measurement Component		H <sub>2</sub> O					
Certificated range		40	Vol%				
Evaluation of the cross sensitivity (CS)							
Sum of positive CS at zero point			Vol%				
Sum of negative CS at zero point			Vol%				
Sum of postive CS at reference point			Vol%				
Sum of negative CS at reference point			Vol%				
Maximum sum of cross sensitivities			Vol%				
Uncertainty of cross sensitivity		0.46	Vol%				
Calculation of the combined standard uncertainty Test Value		u		U <sup>2</sup>			
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>	0.160	Vol%	0.026 (Vol%	$(5)^{2}$		
Lack of fit	Ulof	0.370	Vol%	0.137 (Vol%	$(5)^{2}$		
Zero drift from field test	u <sub>d,z</sub>	-0.600	Vol%	0.360 (Vol%	$(a)^2$		
Span drift from field test	U <sub>d,s</sub>	0.670	Vol%	0.449 (Vol%	$(a)^2$		
Influence of ambient temperature at span	ut	0.280	Vol%	0.078 (Vol%	5) <sup>2</sup>		
Influence of supply voltage	uv	0.050	Vol%	0.003 (Vol%	5) <sup>2</sup>		
Cross sensitivity (interference)	Ui	0.462	Vol%	0.213 (Vol%			
Influence of sample gas flow	up	0.000	Vol%	0.000 (Vol%			
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub>	0.323	Vol%	0.105 (Vol%	5) <sup>2</sup>		
* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"							
Combined standard uncertainty (u <sub>c</sub> )	$u_c = 1$	$\sum (u_{ma})$	$(x, y)^2$	1.17 Vol%			
Total expanded uncertainty	U = u.	$* k = u_c$	* 1.96	2.29 Vol%			
Relative total expanded uncertainty	U in %	of the r	ange 40 Vol%		5.7		
Requirement of 2000/76/EC and 2001/80/EC**	U in % of the range 40 Vol%				10.0		
Requirement of EN 15267-3			ange 40 Vol%		7.5		





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

Manufacturer data Manufacturer Name of measuring system Serial Number Measuring Principle		Sick Maihak GmbH MCS 100 FT TUEV 1, TUEV 2, TU FTIR	JEV 3, TUEV 4		
		T THX			
<b>TÜV Data</b> Approval Report		936/21206925A / 200	08-10-20		
Editor Date		C. Landgraf 2009-10-26			
Measurement Component Certificated range		N <sub>2</sub> O 50 mg/m³			
Evaluation of the cross sensitivity (CS)					
Sum of positive CS at zero point		1.95 mg/m <sup>3</sup>			
Sum of negative CS at zero point		-0.70 mg/m <sup>3</sup>			
Sum of postive CS at reference point Sum of negative CS at reference point		1.75 mg/m³ -0.80 mg/m³			
Maximum sum of cross sensitivities		1.95 mg/m <sup>3</sup>			
Uncertainty of cross sensitivity		1.13 mg/m <sup>3</sup>			
Calculation of the combined standard uncertainty Test Value		u	u <sup>2</sup>		
Repeatability standard deviation at set point *	Ur	0.250 mg/m <sup>3</sup>	0.063 (mg/m <sup>3</sup> ) <sup>2</sup>		
Lack of fit	Ulof	0.140 mg/m <sup>3</sup>	0.020 (mg/m <sup>3</sup> ) <sup>2</sup>		
Zero drift from field test	U <sub>d,z</sub>	-0.120 mg/m <sup>3</sup>	0.014 (mg/m <sup>3</sup> ) <sup>2</sup>		
Span drift from field test	U <sub>d,s</sub>	-0.520 mg/m <sup>3</sup>	0.270 (mg/m <sup>3</sup> ) <sup>2</sup>		
Influence of ambient temperature at span	u <sub>t</sub>	-0.320 mg/m <sup>3</sup>	0.102 (mg/m <sup>3</sup> ) <sup>2</sup>		
Influence of supply voltage	u <sub>v</sub>	0.120 mg/m <sup>3</sup>	0.014 (mg/m <sup>3</sup> ) <sup>2</sup>		
Cross sensitivity (interference)	ui	1.126 mg/m <sup>3</sup>	1.268 (mg/m <sup>3</sup> ) <sup>2</sup>		
Influence of sample gas flow	u <sub>p</sub>	0.000 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>		
Uncertainty of reference material at 70% of certification range * The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"	Urm	0.404 mg/m <sup>3</sup>	0.163 (mg/m³)²		
Combined standard uncertainty (u <sub>c</sub> )	$u_c = c$	$\sqrt{\sum (u_{max, j})^2}$	1.38 mg/m <sup>3</sup>		
Total expanded uncertainty	U = u,	$v = u_c * 1.96$	2.71 mg/m <sup>3</sup>		
Relative total expanded uncertainty	U in 9	% of the ELV 20 mg/m <sup>3</sup>	13.6		
Requirement of 2000/76/EC and 2001/80/EC**		% of the ELV 20 mg/m <sup>3</sup>			
Requirement of EN 15267-3	U in %	15.0			





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

Manufacturer data Manufacturer Name of measuring system Serial Number Measuring Principle TÜV Data Approval Report		SICK MAIHAK Gmbl MCS 100 FT TUEV 1, TUEV 2, TU FTIR 936/21210511/A / 20	JEV 3, TUEV 4
Editor		Steinhagen	
Date		2010-03-01	
Measurement Component		$NH_3$	
Certificated range		10 mg/m³	
Evaluation of the cross sensitivity (CS)			
Sum of positive CS at zero point		0.40 mg/m <sup>3</sup>	
Sum of negative CS at zero point		0.00 mg/m <sup>3</sup>	
Sum of postive CS at reference point		0.00 mg/m <sup>3</sup>	
Sum of negative CS at reference point		-0.29 mg/m <sup>3</sup>	
Maximum sum of cross sensitivities		0.40 mg/m <sup>3</sup>	
Uncertainty of cross sensitivity		0.23 mg/m <sup>3</sup>	
Calculation of the combined standard uncertainty Test Value		u	U <sup>2</sup>
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>	0.076 mg/m <sup>3</sup>	0.006 (mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	Ulof	-0.035 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub>	0.030 mg/m <sup>3</sup>	0.001 (mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub>	0.170 mg/m <sup>3</sup>	0.029 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	ut	0.072 mg/m <sup>3</sup>	0.005 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	uv	0.072 mg/m <sup>3</sup>	0.005 (mg/m <sup>3</sup> ) <sup>2</sup>
Cross sensitivity (interference)	ui	0.231 mg/m <sup>3</sup>	0.053 (mg/m <sup>3</sup> ) <sup>2</sup>
Influence of sample gas flow	u <sub>p</sub>	0.000 mg/m <sup>3</sup>	0.000 (mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>m</sub>	0.081 mg/m <sup>3</sup>	0.007 (mg/m <sup>3</sup> ) <sup>2</sup>
* The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions"			
Combined standard uncertainty $(u_c)$	u <sub>c</sub> = .	$\sqrt{\sum (u_{max, j})^2}$	0.33 mg/m³
Total expanded uncertainty	U = u <sub>c</sub>	* k = u <sub>c</sub> * 1.96	0.64 mg/m³
Relative total expanded uncertainty	U in %	% of the range mg/m³	6.4
Requirement of 2000/76/EC and 2001/80/EC**	U in %	% of the range mg/m <sup>3</sup>	40.0
Requirement of EN 15267-3	U in %	30.0	





Manufacturer Name of measuring systemSICK MAIHAK GmbH MCS 100 FT TUEV 3, TUEV 4Name of measuring principleFIDTÜV Data Approval Report936/21210511/A / 2010-03-22Editor DateSteinhagen 2010-03-01Date2010-03-01Measuring PrincipleTOC Certificated rangeEditor DateSteinhagen 2010-03-01Sum of positive CS at zero point0.46 0.00 mg/m²Sum of positive CS at zero point0.00 0.00 mg/m²Sum of positive CS at zero point0.00 0.02 mg/m²Sum of opsitive CS at zero point0.00 0.02 mg/m²Sum of opsitive CS at zero point0.00 0.02 mg/m²Sum of negative CS at zero point0.00 0.02 mg/m²Sum of negative CS at reference point0.00 0.02 mg/m²Sum of negative CS at reference point0.00 0.02 mg/m²Calculation of the combined standard uncertainty test ValueuCalculation form paired measurements under field conditions * ulor 2 car drift from field test ulor 2 car drift from field test ulor 0.003 (mg/m²)²Span drift from field test ulor via train from field test ulor via train with via train wit	Manufacturer data							
Name of measuring system       MCS 100 FT         Serial Number       TUEV 3, TUEV 4         Measuring Principle       FID <b>TÚ V Data</b> Spairot 11/1 / 2010-03-22         Approval Report       Steinhagen         Date       2010-03-01 <b>Measurement Component</b> TOC         Certificated range       15       mg/m³ <b>Evaluation of the cross sensitivity (CS) U</b> 0.00       mg/m³         Sum of positive CS at zero point       0.046       mg/m³       Sum of nogative CS at reference point       0.00       mg/m³         Sum of nogative CS at reference point       0.00       mg/m³       Sum of nogative CS at reference point       0.00       mg/m³         Sum of nogative CS at reference point       0.046       mg/m³       0.000 (mg/m³)²       Unor of coss sensitivity       0.27       mg/m³         Sum of nogative CS at reference point       0.046       mg/m³       0.000 (mg/m³)²       Unor 0.058 mg/m³       0.000 (mg/m³)²         Sum of nogative CS at reference point       0.028       mg/m³       0.000 (mg/m³)²       Unor 0.058 mg/m³ <t< th=""><th>Manufacturer</th><th></th><th>SICK N</th><th>AIHAK Gmbl</th><th>H</th><th></th><th></th></t<>	Manufacturer		SICK N	AIHAK Gmbl	H			
Serial Number       TUEV 3, TUEV 4         Measuring Principle       FID         TÚV Data       936/21210511/A / 2010-03-22         Approval Report       936/21210511/A / 2010-03-22         Editor       Steinhagen         Date       2010-03-01         Measurement Component       TOC         Certificated range       TOC         Sum of positive CS at zero point       0.46       mg/m³         Sum of positive CS at zero point       0.00       mg/m³         Sum of positive CS at zero point       0.00       mg/m³         Sum of positive CS at reference point       0.00       mg/m³         Sum of positive CS at reference point       0.00       mg/m³         Sum of positive CS at reference point       0.00       mg/m³         Sum of forse sensitivity       0.27       mg/m³         Sum of forse sensitivity       0.27       mg/m³       0.002 (mg/m³)²         Sum of field test       u_dz       0.028       mg/m³       0.003 (mg/m³)²         Standard deviation from paired measurements under field conditions *       u_p       0.046 mg/m³       0.002 (mg/m³)²         Span drift from field test       u_dz       0.028 mg/m³       0.003 (mg/m³)²       0.003 (mg/m³)²       0.003 (mg/m³)²       0.003 (mg/								
Measuring Principle         FID           TÜV Data Approval Report         936/21210511/A / 2010-03-22           Editor Date         Steinhagen 2010-03-01           Measurement Component Certificated range         TOC 15 mg/m <sup>2</sup> Evaluation of the coros sensitivity (CS) Sum of positive CS at zero point Sum of positive CS at zero point Sum of positive CS at reference point Maximum sum of cross sensitivities         0.46 mg/m <sup>2</sup> 0.00 mg/m <sup>3</sup> Sum of negative CS at reference point Maximum sum of cross sensitivities         0.46 mg/m <sup>2</sup> 0.000 mg/m <sup>3</sup> Calculation of the combined standard uncertainty Uncertainty of cross sensitivities         0.46 mg/m <sup>2</sup> 0.002 (mg/m <sup>3</sup> ) <sup>2</sup> Standard deviation from paired measurements under field conditions * Uncertainty of cross sensitivity         0.27 mg/m <sup>3</sup> 0.003 (mg/m <sup>3</sup> ) <sup>2</sup> Calculation of the combined standard uncertainty Uncertainty of trofs mg/m <sup>3</sup> 0.002 (mg/m <sup>3</sup> ) <sup>2</sup> 0.024 mg/m <sup>3</sup> 0.002 (mg/m <sup>3</sup> ) <sup>2</sup> Calculation of the combined standard uncertainty Uncertainty of trofs mg/m <sup>3</sup> 0.003 (mg/m <sup>3</sup> ) <sup>2</sup> 0.024 mg/m <sup>3</sup> 0.003 (mg/m <sup>3</sup> ) <sup>2</sup> Coros sensitivity Influence of supply voltage Cross sensitivity (interference) Influence of supply voltage Cross sensitivity (interference) Influence of ''. "Repeatability standard deviation range W <sub>1</sub> 0.022 mg/m <sup>3</sup> 0.003 (mg/m <sup>3</sup> ) <sup>2</sup> 0.003 (mg/m <sup>3</sup> ) <sup>2</sup> * The bigger value of: "Repeatability standard deviation range Watation of response factors (TOC)         U <sub>1</sub> = $\sqrt{\sum_{i=1}^{2} (U_{max_i}, \int_{i=1}^{1} 0.7 mg/m2}        $								
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Approval Report       936/21210511/A / 2010-03-22         Editor       Steinhagen         Date       2010-03-01         Measurement Component       TOC         Certificated range       15 mg/m³         Evaluation of the cross sensitivity (CS)       0.00 mg/m³         Sum of positive CS at zero point       0.02 mg/m³         Sum of negative CS at reference point       0.26 mg/m³         Sum of negative CS at reference point       0.00 mg/m³         Sum of negative CS at reference point       0.00 mg/m³         Uncertainty of cross sensitivities       0.46 mg/m³         Calculation of the combined standard uncertainty       0.27 mg/m³         Calculation of the standard uncertainty       0.152 mg/m³       0.003 (mg/m³)²         Span drift from field test       U <sub>dx</sub> 0.058 mg/m³       0.002 (mg/m³)²         Span drift from field test       U <sub>dx</sub> 0.053 mg/m³       0.003 (mg/m³)²         Influence of supply voltage       U <sub>dx</sub> 0.053 mg/m³       0.004 (mg/m³)²         Uncertainty of response factors (TOC)       U <sub>dx</sub> 0.053 mg/m³       0.004 (mg/m³)²         Variation of response factors (TOC)       U <sub>dx</sub> 0.053 mg/m³       0.060 (mg/m³)²         Vincertainty of reference material at 70% of certification range       U <sub>m</sub> <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>								
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Test Valueu $u^2$ Standard deviation from paired measurements under field conditions * $u_D$ $0.046 \text{ mg/m}^3$ $0.002 \text{ (mg/m}^3)^2$ Lack of fit $u_{lof}$ $0.058 \text{ mg/m}^3$ $0.003 \text{ (mg/m}^3)^2$ Zero drift from field test $u_{d,z}$ $0.152 \text{ mg/m}^3$ $0.023 \text{ (mg/m}^3)^2$ Span drift from field test $u_{d,s}$ $-0.244 \text{ mg/m}^3$ $0.060 \text{ (mg/m}^3)^2$ Influence of ambient temperature at span $u_t$ $0.100 \text{ mg/m}^3$ $0.010 \text{ (mg/m}^3)^2$ Influence of supply voltage $u_v$ $0.053 \text{ mg/m}^3$ $0.003 \text{ (mg/m}^3)^2$ Cross sensitivity (interference) $u_i$ $0.270 \text{ mg/m}^3$ $0.073 \text{ (mg/m}^3)^2$ Influence of sample gas flow $u_p$ $-0.063 \text{ mg/m}^3$ $0.004 \text{ (mg/m}^3)^2$ Uncertainty of reference material at 70% of certification range $u_r$ $0.121 \text{ mg/m}^3$ $0.015 \text{ (mg/m}^3)^2$ Variation of response factors (TOC) $u_r$ $0.980 \text{ mg/m}^3$ $0.960 \text{ (mg/m}^3)^2$ *The bigger value of: "Repeatability standard deviation at span" or "Standard deviation from paired measurements under field conditions" $1.07 \text{ mg/m}^3$ Combined standard uncertainty (u_c) $u_c * k = u_c * 1.96$ $1.07 \text{ mg/m}^3$ Total expanded uncertaintyU in % of the ELV mg/m³ $2.10 \text{ mg/m}^3$								
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		0 - u <sub>c</sub>	K – U <sub>C</sub>	1.50	2.10	mg/m		
	Polotive total expanded upportainty	11 : 0/	of the F	IV melm3		24.0		
Requirement of 2000/70/EC and 2007/00/EC U In % of the ELV mg/m <sup>2</sup> 30.0		-						
Requirement of EN 15267-3 U in % of the ELV mg/m <sup>3</sup> 22.5	· ·	U in % of the ELV mg/m <sup>3</sup>						
Requirement of EN 15267-3U in % of the ELV mg/m³22.5	Requirement of EN 15207-5	0 11 %	of the EL	.v my/m		22.0		