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Umwelt Bundesamt

Certificate number: 2333401-ts

TÜV SÜD Industrie Service

CERTIFICATE

of product conformity (QAL 1)

Certificate number: 2333401-ts

Certified AMS	qSYS for NH_3, H_2O and O_2
Manufacturer	SW Technology sagl Via Penate 16 6850 Mendrisio Switzerland

Test institute TÜV SÜD Industrie Service GmbH

This is to certify that the AMS was tested and certified subject to DIN EN 15267-1 (2009), DIN EN 15267-2 (2009), DIN EN 15267-3 (2008) and DIN EN 14181 (2015) standards.

Certification applies to the conditions listed in this certificate (the certificate consists of 10 pages).

DIN EN 15267 TÜV SÜD Valid until 07/2022

Certificate No.: 2333401-ts

Publication in the German Federal Gazette
dated 31th July 2017

Umweltbundesamt
Dessau, 06th September 2017

Dr. Marcel Langner
Head of Section II 4.1

Certificate validity
until 30th July 2022

TÜV SÜD Industrie Service GmbH
Testing laboratory emission measurement/ calibration
Munich, 05th September 2017

Dr. Michael Waeber

TÜV®

Test report	2333401 from 10th October 2016
Initial certification	31th July 2017
Certificate validity until	30th July 2022 (5 years)
Publication	BAnz AT 31th July 2017 B12, chapter I, No. 2.2

Approved application

The AMS tested is suitable for use at plants according to Directive 2010/75/EU, chapter III (13th BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17th BImSchV) and other plants requiring official approval for monitoring the component NH_3 and for measuring the accompanying components H_2O and O_2.

The suitability of the AMS for this application was assessed based on a laboratory test and a field test lasting over three months at a plant of the 17th BImSchV.

The measuring system is authorized for the ambient temperature range from +5 °C to +40 °C.

The AMS publication, the suitability test and the performance of the uncertainty calculations were conducted based on the provisions valid at the time of testing. Due to possible amendments to legal foundations, every user should ensure before use of the AMS that it is suitable for monitoring the applicable limit values.

The operator should consult the manufacturer to ensure that the AMS is suitable for the plant where it is being installed.

Certification basis

This certificate is based on:

- TÜV SÜD Industrie Service GmbH test report 2333401 from 10th October 2016
- Suitability publication by the Umweltbundesamt as responsible body
- Monitoring of the product and the manufacturing process
- Publication in the German Federal Gazette (BAnz AT 31th July 2017 B12, chapter I, No. 2.2, UBA publication from 13th July 2017):

AMS: qSYS for NH_3, O_2 and humidity

Manufacturer: SW Technology sagl, Mendrisio/Switzerland

Suitability: For plants requiring authorisation

Measurement ranges in the suitability test:

Component	Certification range	Supplementary measurement range	Unit
NH_3	0 - 10	0 - 50	mg/m³
H_2O	0 - 30	-	Vol.-%
O_2	0 - 25	-	Vol.-%

Software versions:

qLDX: Software application v1.0.3.1
System firmware: 1.0.5.0

qOXY: Software application v1.0.3.0
System firmware: 1.0.5.0

Restrictions:

The AMS cannot be used in waste incineration plants where there is no proof of a connection between O_2 and CO_2 content.

Notes:

1. The maintenance interval is four weeks.
2. The AMS should be operated at an interval of 24 hours for automatic alignment. The zero points for components NH_3 and H_2O and the reference point for O_2 shall be realigned with prepared ambient air.
3. The AMS determines the gas concentrations for NH_3 in moist measurement gas and for O_2 in dry measurement gas.
4. For cross-sensitivity compensation, the AMS requires the CO_2 concentration. In the case of operation of the AMS at waste incineration plants, the CO_2 maximum value shall be entered in the menu for cross-sensitivity compensation, the CO_2 concentration should be calculated taking into account the measured oxygen concentration.
5. In the case of waste incineration plants with non-defined carbon content, the CO_2 maximum value shall be determined by measuring the CO_2 and O_2 concentrations in flue gas. A representative operating mode should be observed in the waste incineration plant.

Test report: TÜV SÜD Industrie Service GmbH, Munich
Report No.: 2333401 from 10th October 2016

Certified product

The certificate applies to AMS that comply with the following description:

The qSYS AMS is a multi-component gas analysis system for measuring NH_3, H_2O and O_2. The AMS consists of the following main components:

- Sample probe with PTFE filter
- Heating pipe, internal diameter 4 mm, material Teflon
- System cabinet with the following components:
  - qLDX analysis module for NH_3/ H_2O
  - qOXY analysis module for O_2
  - Panel-PC (only for visualisation) (optional)
  - Measurement gas cooler
  - Heating box with measurement gas pump
  - Air conditioner for the control cabinet
  - Heating for the control cabinet
  - Circulation fans
  - PLC control
  - 2 digital flow indicators with limit monitors
  - 3 temperature regulators (2 x measurement gas pipe, heating box)

Sample gas extraction consists of a stainless steel extraction probe, with a PTFE-filter heated to 185 °C. A sample gas pipe heated to 185 °C is attached to the probe, fitted with a PTFE-seal (interior diameter 4 mm). After the heated pipe, the sample gas flows into the heated gas distributor box with measurement gas pump. The engine for the measurement gas pump is flange-mounted outside the heating box. The connection for hot air, the test gas connection and a throttle for volume restriction as well as a measurement gas filter (PTFE) are also in the heating box. The measurement gas is fed from this heated box into the qLDX heat measuring analyser via a short heated line to measure NH_3 and H_2O. The measurement gas flowing from the qLDX analyser via an unheated PTFE line is fed into the first cool level of a two-tier measurement gas cooler to measure the component O_2. Between the first and second cooler level there is a flow indicator with alarm contact for the entire measurement gas flow and a bypass with throttle valve to set the measurement gas flow on the qOXY O_2 analyser. The measurement gas partial flow for oxygen measurement is applied via the second cooler level, which is also downstream of a flow indicator with alarm contact, via a moisture sensor and a fine filter to the qOXY analyser. The measurement unit is installed in a system cabinet with fitted air-conditioning device. To measure NH_3 and H_2O the qLDX analyser works according to the TDLS (Tunable-Diode-Laser-Spectroscopy) principle. The component O_2 is determined in the qOXY analyser using a zirconium dioxide cell. With the exception of the sample gas extraction probe, the heated line and the heated distributor box all system components are in the air-conditioned measurement cabinet.

The AMS consists of the following components:

Probe	
Manufacturer:	JCT – Analysentechnik GmbH, Wiener Neustadt, Austria
Type:	JES 301 35.00, heated to 185 °C
Filter:	JCT Kit 35.9013 PTFE-filter 2 µm
Regulator:	integrated
Heated sampling hose	
Manufacturer:	RACO SaS, Novate Milanese, Italy
Type:	Standard, 100 W/m DN4/6
Heated temperatures:	185 °C
Length:	30 m (PTFE-hose), 7 m in the lab test
Diameter:	6 mm AD / 4 mm ID
Regulator:	KM Controller, Fa. Ascon Tecnologic S.r.l., Italy
Heated sampling hose to the heated box - qLDX	
Manufacturer:	RACO SaS, Novate Milanese, Italy
Type:	Standard, 100 W/m DN4/6
Heated temperatures:	185 °C
Length:	1.5 m (PTFE-hose)
Diameter:	6 mm AD / 4 mm ID
Regulator:	KM Controller, Fa. Ascon Tecnologic S.r.l., Italy
Compressor cooler	
Manufacturer:	JCT – Analysentechnik GmbH, Wiener Neustadt, Austria
Type:	JCT 2 Midi
Measurement gas pump	heated pump head in heated box
Manufacturer:	KNF
Type:	N 86 AT.16E
Solenoid valves	
Manufacturer:	Bürkert GmbH & Co. KG
Type:	0124
Sample gas filter in heated box	
Manufacturer:	Headline Filters Ltd., England
Type:	122 / PTFE-Filter 2 µm
Analyser module	NH_3, H_2O
Manufacturer:	SW Technology sagl, Mendrisio, Schwitzerland
Type:	qLDX
Software:	v1.0.3.1 firmware: 1.0.5.0
Analyser module	O_2
Manufacturer:	SW Technology sagl, Mendrisio, Schwitzerland
Type:	qOXY
Software:	v1.0.3.0 firmware: 1.0.5.0

Flow indicator	digital with limit indicator 2x
Manufacturer:	SMC
Type:	PFM 7
Sample gas filter	downstream of the sample gas cooler - qOxy
Manufacturer:	GMF
Type:	751NC / filter 25-64-60K
Air conditioner	
Manufacturer:	Cosmotec, Stulz S.P.A., Valeggio, Italy
Model:	wall mounting - cooler
Type:	CVE – CVO
Electrical power:	1500 W/230VAC
Circulation van	
Manufacturer:	ebm papst
Type:	D2E 146-HT67
Electrical power:	355 W / 50 Hz
Cabinet heater	
Manufacturer:	Alfa Elektric
Type:	SHT 750
Electrical power:	750 W
Programmable logic controller (PLC)	
Manufacturer:	Siemens
Type:	S71200
Software:	TIA Portal V13
Panel-PC (option)	
Operating system:	Windows 7 Pro / 8 / 10
CPU:	32 / 64 bit
Manuals:	qSYS, Version qSYS-DE-03 (entire system)
	qLDX, Version qLDX-DE-03 (analyser qLDX)
	qOXY, Version Rev.: 09/16 (analyser qOXY)

General notes

This certificate is based on the analyser tested. The manufacturer is responsible for the continuous compliance of the production to the DIN EN 15267 requirements. The manufacturer is obliged to maintain a tested quality management system to control the manufacture of the certified product. Regular monitoring must be conducted on both the product and the quality management systems.

Should the product from the current production series no longer comply with the certified product, the Environmental Service Department of TÜV SÜD Industrie Service GmbH should be informed (address see footnote).

The certification mark, which appears on the certified product or is used in advertising materials, is presented on page 1 of this certificate.

This document and the certification mark shall remain the property of TÜV SÜD Industrie Service GmbH.

Should the publication be revoked, this certificate will become invalid. This document must be returned when the period of validity has elapsed and at the request of TÜV SÜD Industrie Service GmbH and the certification mark may no longer be used.

The current version of the certificate and its validity can also be viewed on the internet page: **qal1.de**.

The certification of the measuring system qSYS is based on the following documents and the regular continuous monitoring of the manufacturer's quality management system:

Initial certification in accordance to DIN EN 15267:

Certificate no. 2333401-ts	31th July 2017
Certificate validity until	30th July 2022 (5 years)

Report no: 2333401 from 10th October 2016,
TÜV SÜD Industrie Service GmbH
Publication: BAnz AT 31th July 2017 B12, chapter I number 2.2
UBA publication from 13th July 2017

Calculation of total uncertainty for QAL1 testing to DIN EN 14181 and DIN EN 15267-3

Total uncertainty for the measurement component NH_3 in the measuring range 0-10 mg/m³

Performance characteristic	*Uncertainty*	*Value standard uncertainty mg/m³*	*Square of standard uncertainty (mg/m³)²*
Lack-of-fit	u_{lof}	0,053	0,003
Zero drift from field test	$u_{d,z}$	0,083	0,007
Span drift from field test	$u_{d,s}$	0,150	0,023
Influence of ambient temperature at span	u_t	0,131	0,017
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	0,089	0,008
Influence of supply voltage	u_v	0,049	0,002
Cross-sensitivity (interference)	u_i	-0,213	0,045
Repeatability standard deviation at span	$u_r = s_r$	0,062	ur < ud
Standard deviation from paired measurements under field cond.	$u_D = s_D$	0,132	0,017
Uncertainty of reference material 2 % by 70% of ZR	u_{rm}	0,081	0,007
Excursion of measurement beam	u_{mp}		
Converter efficiency for AMS measuring NOx	u_{cc}		
Variation of response factors (TOC)	u_{rf}		
		total	0,129
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,359	mg/m³
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,704	mg/m³
Relativ expanded uncertainty	U	10,5	% ELV
Permissible uncertainty of EN 15267-3	(of ELV 6,7 mg/m³)	30	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of ELV 6,7 mg/m³)	40	% ELV
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component H_2O in the measuring range 0-30 Vol.-%

Performance characteristic	*Uncertainty*	*Value standard uncertainty Vol.%*	*Square of standard uncertainty (Vol.%)²*
Lack-of-fit	u_{lof}	0,128	0,016
Zero drift from field test	$u_{d,z}$	0,087	0,008
Span drift from field test	$u_{d,s}$	0,502	0,252
Influence of ambient temperature at span	u_t	0,426	0,181
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,129	0,017
Influence of supply voltage	u_v	0,081	0,007
Cross-sensitivity (interference)	u_i	-0,456	0,208
Repeatability standard deviation at span	$u_r = s_r$	0,064	ur < ud
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,243	0,059
Uncertainty of reference material 2 % by 70% of ZR	u_{im}	0,243	0,059
Excursion of measurement beam	u_{mb}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,807
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,898	Vol.%
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	1,761	Vol.%
Relativ expanded uncertainty	U	5,9	% CR
Permissible uncertainty of EN 15267-3	(of CR 30 Vol.%)	7,5	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of CR 30 Vol.%)	10	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV

Total uncertainty for the measurement component O_2 in the measuring range 0-25 Vol.-%

Performance characteristic	*Uncertainty*	*Value standard uncertainty Vol.%*	*Square of standard uncertainty (Vol.%)²*
Lack-of-fit	u_{lof}	-0,046	0,002
Zero drift from field test	$u_{d,z}$	0,035	0,001
Span drift from field test	$u_{d,s}$	-0,110	0,012
Influence of ambient temperature at span	u_t	0,01	0,0000
Influence of sample gas pressure	u_p		
Influence of sample gas flow	u_f	-0,009	0
Influence of supply voltage	u_v	0,028	0,00100
Cross-sensitivity (interference)	u_i	0,036	0,001
Repeatability standard deviation at span	$u_r = s_r$	0,010	ur < ud
Standard deviation from paired measurements under field cond.	$u_d = s_d$	0,033	0,001
Uncertainty of reference material 1 % by 70% of ZR	u_{rm}	0,101	0,01
Excursion of measurement beam	u_{mp}		
Converter efficiency for AMS measuring NOx	u_{ce}		
Variation of response factors (TOC)	u_{rf}		
		total	0,028
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	0,167	Vol.%
Total expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	0,327	Vol.%
Relativ expanded uncertainty	U	1,3	% CR
Permissible uncertainty of EN 15267-3	(of CR 25 Vol.%)	7,5	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding EN 15267-3
Permissible uncertainty 13. / 17. BImSchV	(of CR 25 Vol.%)	10	% CR
Complied with requirements relating to the measurement uncertainty		yes	regarding 13. / 17. BImSchV