

QAL1 Evaluation acc. to DIN EN 14956

Tested AMS:

D-FL 100

Component

Flow

Suitability test report:

Report-#. 128CU11650 dated 29.03.1996, TÜV North

QAL1 test report in

English

Measuring range (MBE Mess)	20	m/s
Measuring range during suitability test (MBE EP)	20	m/s
Limit value ctest acc. to EN ISO 14956	20	m/s
95% Confidence interval	N/A	%
95% Confidence interval	N/A	m/s
95% Confidence interval calculated result	N/A	m/s
95% Requirement of confidence range met	N/A	

Range of influencing parameters	Min	Max	Delta	Unit
Pressure range	990	1030	40	hPa
Temperature range	-20	50	70	°C
Flow influence	0	0	0	l/h
Mains range	11	30	19	V

Unit data acc. to suitability test		Value	Unit	Reference	Deviation at ctest	Unit
Lack of fit		1,00	%	of MBE EP	0,20	m/s
Flow influence	per 10 l/h	0,00	%	of MBE EP	0,00	m/s
Detection limit		1,30	%	of MBE EP	0,26	m/s
Drift at Zero		0,50	%	of MBE EP	0,10	m/s
Drift at ctest		1,70	%	of MBE EP	0,34	m/s
Pressure influence	per hPa	0,00	%	of MBE EP	0,00	m/s
Temperature influence at Zero	per 10 K	0,87	%	of MBE EP	0,17	m/s
Temperature influence at ctest	per 10 K	0,87	%	of MBE EP	0,17	m/s
Mains influence	per 10 V	0,00	%	of MBE EP	0,00	m/s
Test gas uncertainty		0,00	%	of MBE EP	0,00	m/s
Soiling uncertainty		0,00	%	of MBE EP	0,00	m/s
Deviation uncertainty		0,00	%	of MBE EP	0,00	m/s
Sample line loss		0,00	%	of MBE EP	0,00	m/s
Repeated precision at ctest		1,07	%	of MBE EP	0,21	m/s
Long term stability of calibration standards		0,00	%	of MBE EP	0,00	m/s

Cross sensitivities

Component	Unit	lower concentration	upper concentration	Test concentration	Influence suitability test % of MBE EP	Uncertainty acc. 14956 m/s
CO	mg/m3	0	300	420	0	0,000
CO2	%	0	15	21	0	0,000
CH4	mg/m3	0	50	420	0	0,000
N2O	mg/m3	0	20	20,6	0	0,000
NO	mg/m3	0	300	39	0	0,000
NO2	mg/m3	0	30	39	0	0,000
NH3	mg/m3	0	20	505	0	0,000
SO2	mg/m3	0	200	218	0	0,000
HCl	mg/m3	0	50	36	0	0,000
H2O	g/m3	0	150	150	0	0,000
Positive sum						0,000
Negative sum						0,000

Uncertainties at ctest		
Detection limit	m/s	0,150
Linearity	m/s	0,115
Drift at Zero	m/s	0,058
Drift at ctest	m/s	0,196
Repeated precision at ctest	m/s	0,107
Pressure	m/s	0,000
Temperature	m/s	0,000
Flow	m/s	0,000
Mains	m/s	0,000
Test gas	m/s	0,000
Soiling	m/s	0,000
Deviation	m/s	0,000
Sample line loss	m/s	0,000
CO	m/s	0,000
CO2	m/s	0,000
CH4	m/s	0,000
N2O	m/s	0,000
NO	m/s	0,000
NO2	m/s	0,000
NH3	m/s	0,000
SO2	m/s	0,000
HCl	m/s	0,000
H2O	m/s	0,000
Combined uncertainty	m/s	0,258
Extended uncertainty	m/s	0,516

Calculated sAMS at Zero	m/s	0,396
Calculated sAMS at ctest	m/s	0,438
sAMS at Zero, corrected	m/s	0,600
sAMS at ctest, corrected	m/s	0,600



ENVIRONMENT
AGENCY

PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

D-FL 100 Flow Monitor

manufactured by:

DURAG GmbH

Kollastraße 105
22453 Hamburg
Germany

has been assessed by Sira Certification Service
and for the conditions stated on this certificate complies with:

**MCERTS Performance Standards for Continuous Emission
Monitoring Systems, Version 2, Revision 1 (April 2003)**

Certification Range :

Gas Velocity 0 to 20 m/s

Project No:	674/0067
Certificate No:	Sira MC 060071/00
Initial Certification:	29 September 2006
This Certificate Issued:	29 September 2006
Renewal Date:	28 September 2011


Technical Director

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

12 Acorn Industrial Park, Crayford Road,
Crayford, Dartford, Kent DA1 4AL
Tel: +44 (0)1322 520500 Fax: +44 (0)1322 520501

Page 1 of 5

This certificate remains the property of Sira and shall be returned when requested. It may only be reproduced in its entirety and without change.

Registered Office: Europa House, 310 Europa Boulevard, Gemini Business Park, Westbrook, Warrington WA5 7YQ



Approved Site Application

On the basis of the assessment this instrument is considered suitable for use on applications including waste incineration and large coal-fired combustion plant applications.

Any potential user should ensure, in consultation with the manufacturer, that the emission monitoring system is suitable for the process on which it will be installed. For general guidance on stack emission monitoring techniques refer to Environment Agency Technical Guidance Note M2: Monitoring of stack emissions to air. This is available on the Agency's website at www.environment-agency.gov.uk

Basis of Certification

This certification is based on the following Test Report(s) and on Sira's assessment and ongoing surveillance of the product and the manufacturing process:

TÜV Nord	Report No: 128CU11650 dated 29 March 1996
Sira Report	Report No: C1243 September 2006
Sira Report	Report No: C1241 August 2006

TÜV reports are accepted on the basis of the Environment Agency's document 'MCERTS – Guidance on the acceptance of German type approval test reports for CEMS' Version 2 (October 2003)

Product Certified

The D-FL 100 system consists of the following parts:

- Measuring probe – Flowbar (differential pressure bar). Probe Type I, II, III
- Differential pressure transducer ABB Hartman & Braun Contrans ASA 800 (used to be manufactured by Schoppe & Faser and Elsag Bailey) or ABB 265DS
- Evaluation unit Model D-FL100-10 (optional)

This certificate applies to all instruments fitted with software version 2.0 onwards (serial number 159435502488 onwards)

Certificate No:	Sira MC 060071/00
This Certificate Issued:	29 September 2006

Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: -20°C to +50°C

Unless otherwise stated the evaluation was carried out on the certification range 0 to 20 m/s. Tests performed on ASA800 dp transmitter unless otherwise stated.

Test	Results expressed as % of max of certification range				Other results	MCERTS* specification
	<0.5	<1	<2	<4		
Linearity				2.2		<±3%
Cross sensitivity					See note 1	<±4%
Detection limit:					15% (3m/s)	≤20% of indicating range
ASA800 dp transmitter						
Ambient temperature: zero shift:	-0.5				See note 2	<0.3%/°C
Ambient temperature: span shift:	-0.1					<0.3%/°C
265DS dp transmitter						
Ambient temperature: zero shift:	-0.3					<0.3%/°C
Ambient temperature: span shift:	0.2					<0.3%/°C
Response time:					See note 3	≤10s
Reproducibility R _D :					80	≥30
Analysis function ^{Note 7}					99.8%	>95%
Availability ^{Note 7}					99.9%	≥95%
Vibration test (10 to 60Hz (±0.4mm), 60 to 150Hz at 19.6m/s ²)					See note 4 No effect	To be reported
Sample gas pressure					See note 5	To be reported
Sample gas temperature					See note 5	To be reported
Maintenance Interval ^{Note 7}					3 month See note 6	To be reported

Note 1: Test not applicable.

Certificate No: Sira MC 060071/00
This Certificate Issued: 29 September 2006

- Note 2: In the case of zero shift, the measured result is outside the specification limit by a margin less than the measurement uncertainty based on a confidence level of approximately 95%. As a result, it has been assessed that the equipment complies with the specification at the measured points, due allowance having been made for the uncertainty of measurements. The original evaluation report by TUV reported a maximum zero shift 0.03%/°C for ASA800 dp transmitter.
- Note 3: The response time of the differential pressure transmitter is between 0 and 60 seconds. Response time can also be adjusted on the flow computer.
- Note 4: Test performed on ABB 265DS dp transmitter.
- Note 5: Sample gas pressure and sample gas temperatures have an influence to the measuring signal because the measuring result depends on the density of the measuring gas. The principle of the measurement is based on the standard reference method for the measurement of waste gas velocity with the Pitot tube. Temperature and pressure correction are not part of the standard DFL system and the uncertainty associated with these measurements is not included in the MCERTS calculations.
- Note 6: Maintenance interval was evaluated on $<30\text{mg/m}^3$ application and no back-purge cleaning was required. The maintenance interval can vary depending on the application, a back-purge is recommended if the dust load is $>30\text{mg/m}^3$.
- Note 7: Field test: The DFL100 was assessed on the basis of a three month field trial mounted on a waste incinerator.

Certificate No: Sira MC 060071/00
This Certificate Issued: 29 September 2006

Description:

The D-FL 100 flow monitor is an in-situ measuring device that determines the flue gas velocity using the differential pressure principle. The measuring system consists of a sensor probe installed inside the duct over the whole diameter. The probe has two separate chambers, between which a pressure difference caused by the flow in the duct builds up. The differential pressure resulting at the probe is proportional to the square of the gas velocity. The D-FL 100 is not suitable for sites with a flow $<3\text{m/s}$.

An automatic back-flushing unit can be used for keeping the probe clean at high dust concentration applications (typically $>30\text{mg/m}^3$). The sensor probe is available in three different diameters depending on the stack diameter. For Stack diameters from 400 to 2000 mm Type I is used (or applications $<30\text{mg/m}^3$), for Stack diameters from 2000 to 4000 mm Type II is used (for applications $>30\text{mg/m}^3$) and for Stack diameters bigger than 4000 mm Type III is used. The differential pressure transmitter can be placed directly onto the probe or can be connected via flexible hoses to the probe.

The manual back-flushing facility is part of the basic system but was not evaluated. This manual action can be performed automatically as an option. The D-FL 100 is also available in an Ex version.

General Notes

1. This certificate is based upon the equipment tested. The Manufacturer is responsible for ensuring that on-going production complies with the standard(s) and performance criteria defined in this Certificate. 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 system shall be subject to regular surveillance according to 'Regulations Applicable to the Holders of Sira Certificates'. The design of the product certified is defined in the Sira Design Schedule for certificate No. Sira MC 060071/00.
2. If certified product is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.
3. The Certification Marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of Sira Certificates'.
4. This document remains the property of Sira and shall be returned when requested by the company.

Certificate No: Sira MC 050071/00
This Certificate Issued: 29 September 2006

CERTIFICATE

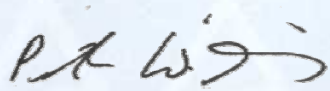
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

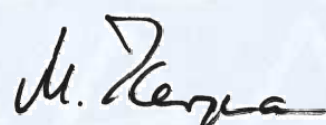
Manufacturer:	DURAG Industrie Elektronik GmbH & Co. KG
Measuring System:	D-FL 100
Components:	Volume flow
Test Report:	128CU11650 TÜV Nord 1996-03-29

The measurement system fulfils
the requirements of
QAL 1

according to EN 14181 and EN ISO 14956,
as long as the waste gas velocity is higher than 3 m/s.

Köln, 2008-10-16


Dr. rer. nat. Peter Wilbring


Dipl.-Chem. Martin Kerpa

EN ISO 14956 and prEN 15267-3 calculation for QAL 1 in EN 14181

Manufacturer data

Manufacturer
 Measurement System
 Name
 Serial Number
 Measuring Principle

DURAG Industrie Elektronik GmbH&Co. KG
 flow rate
 D-FL 100
 15943S540288, BF9412-900528
 differential pressure

TÜV Data

Approval Report
 Date
 Editor

128CU11650 29.03.1996
 26.09.2008
 C. Landgraf

Measurement Component

volume flow 20 m/s

Calculation of the combined standard uncertainty

Test Value

Lack of fit
 Span shift in the field test
 Zero shift in the field test
 Sensitivity to sample volume flow
 Sensitivity to ambient temperature
 Dependence on supply voltage
 Repeatability at span
 Field reproducibility

	$\Delta X_{\max, j}$	$u(\Delta X_{\max, j}) = \frac{\Delta X}{\sqrt{3}}$	$u(\Delta X_{\max, j})^2$
u_L	0,51 m/s	0,29 m/s	0,086
$u_{d,s}$	0,34 m/s	0,20 m/s	0,039
$u_{d,z}$	0,34 m/s	0,20 m/s	0,039
u_v	0,00 m/s	0,00 m/s	0,000
u_t	0,17 m/s	0,10 m/s	0,010
u_{sv}	0,00 m/s	0,00 m/s	0,000
u_s	0,00 m/s	0,00 m/s	0,000
u_D	0,08 m/s	0,05 m/s	0,002

Combined standard uncertainty (u_c)
 Total expanded uncertainty
 Relative total expanded uncertainty
 Requirement

u_c	$u_c = \sqrt{\sum(u_{\max, j})^2}$	0,419
$(u_c \cdot k)$	$U_c = u_c \cdot 1,96$	0,821
	Uc in % of the limit 25 m/s	3,3
	Uc in % of the limit 25 m/s	10,0

Result: Requirements keep to QAL 1 of EN 14181

Attention: For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.