

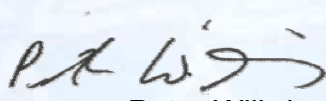
CERTIFICATE

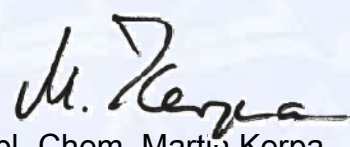
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

Manufacturer: SICK Maihak GmbH
Measuring System: FLOWSIC100
Components: Gas velocity
Test Report: 936/21206702/B, 2008-02-28

The measurement system fulfils
the requirements of
QAL 1
according to EN 14181 and EN ISO 14956.

Köln, 2008-06-20


Dr. rer. nat. Peter Wilbring


Dipl.-Chem. Martin Kerpa

www.umwelt-tuv.de / www.eco-tuv.com
tie@umwelt-tuv.de
Tel. +49 - 221 - 806 - 2275

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
Am Grauen Stein
51105 Köln

The company is accredited to DIN EN ISO/IEC 17025.

EN ISO 14956 and EN 15267-3 calculation for QAL1 in EN 14181

Manufacturer data

Manufacturer	Sick Maihak GmbH
Measurement System	Gas velocity measurement system 1
Name	Flowsic100
Serial Number	SN 07118724
Measuring Principle	Ultrasound

TÜV Data

Approval Report	936/21206702/B
Date	07.11.2007
Editor	Kerpa

Measurement Component

Gas velocity 20 m/s

Calculation of the combined standard uncertainty

Test Value		$\Delta X_{\max, j}$	$u(\Delta X_{\max, j}) = \frac{\Delta X}{\sqrt{3}}$	$u(\Delta X_{\max, j})^2$
Lack of fit	u_L	-0,54 m/s	-0,31 m/s	0,097
Biggest interference (positiv or negativ)	u_I	0,00 m/s	0,00 m/s	0,000
Span shift in the field test	$u_{d,s}$	0,08 m/s	0,05 m/s	0,002
Zero shift in the field test	$u_{d,z}$	0,08 m/s	0,05 m/s	0,002
Sensitivity to ambient temperature	u_t	0,04 m/s	0,02 m/s	0,000
Dependence on supply voltage	u_{sv}	-0,05 m/s	-0,03 m/s	0,001
Repeatability at span	u_s	0,08 m/s	0,05 m/s	0,002
Field reproducibility	u_D	0,06 m/s	0,04 m/s	0,001
Combined standard uncertainty (u_c)	u_c	$u_c = \sqrt{\sum (u_{\max, j})^2}$		0,326
Total expanded uncertainty	$(u_c * k)$	$U_c = u_c * 1,96$		0,640
Relative total expanded uncertainty		Uc in % of the limit 20 m/s		3,2
Requirement		Uc in % of the limit 20 m/s		7,5

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.

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

Manufacturer data

Manufacturer
 Measurement System
 Name
 Serial Number
 Measuring Principle

Sick Maihak GmbH
 Gas velocity measurement system 2
 Flowsic100
 SN 07118726
 Ultrasound

TÜV Data

Approval Report
 Date
 Editor

936/21206702/B
 07.11.2007
 Kerpa

Measurement Component

gas velocity 20 m/s

Calculation of the combined standard uncertainty

Test Value

		$\Delta X_{\max, j}$	$u(\Delta X_{\max, j}) = \frac{\Delta X}{\sqrt{3}}$	$u(\Delta X_{\max, j})^2$
Lack of fit	u_L	-0,66 m/s	-0,38 m/s	0,145
Biggest interference (positiv or negativ)	u_I	0,00 m/s	0,00 m/s	0,000
Span shift in the field test	$u_{d,s}$	0,04 m/s	0,02 m/s	0,001
Zero shift in the field test	$u_{d,z}$	0,02 m/s	0,01 m/s	0,000
Sensitivity to ambient temperature	u_t	0,02 m/s	0,01 m/s	0,000
Dependence on supply voltage	u_{sv}	-0,02 m/s	-0,01 m/s	0,000
Repeatability at span	u_s	0,02 m/s	0,01 m/s	0,000
Field reproducibility	u_D	0,06 m/s	0,04 m/s	0,001
Combined standard uncertainty (u_c)	u_c	$u_c = \sqrt{\sum (u_{\max, j})^2}$		0,384
Total expanded uncertainty	$(u_c * k)$	$U_c = u_c * 1,96$		0,753
Relative total expanded uncertainty		Uc in % of the limit 20 m/s		3,8
Requirement		Uc in % of the limit 20 m/s		7,5

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.