

CERTIFICATE

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH

Manufacturer: Sick Maihak GmbH

Measuring System: OMD 41

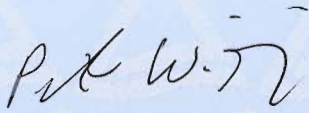
Components: Dust

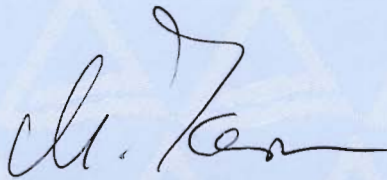
Test Report: RW TÜV 352/0855/93 - 57 89 39/01 1995-07-24

The measurement system fulfils
the requirements of

QAL 1
according to EN 14181 and EN ISO 14956.

Köln, 2007-04-27


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.

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

Manufacturer data

Manufacturer
 Measurement System
 Name
 Serial Number
 Measuring Principle

Sick Maihak GmbH
 Dust Measurement
 OMD 41
 9429 8050 / 9428 8051
 Transmission

TÜV Data

Approval Report
 Date
 Editor

RW TÜV 352/0855/93 - 57 89 39/01 1995-07-24
 27.04.2007
 Dipl.Chem. M. Kerpa

Measurement Component

Dust 25 mg/m³

Evaluation of the cross sensitivity (CS)

to 21 Vol.-% Oxygen
 to 30 Vol.-% Humidity
 to 300 mg/m³ Carbon monoxide
 to 15 Vol.-% Carbon dioxide
 to 50 mg/m³ Methane
 to 20 mg/m³ Dinitrogen monoxide
 to 300 mg/m³ Nitrogen monoxide
 to 30 mg/m³ Nitrogen dioxide
 to 20 mg/m³ Ammonia
 to 200 mg/m³ Sulphur dioxide
 to 50 mg/m³ Hydrogen chloride

CS $X_{max,j}$
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³
 0,00 mg/m³

Sum of positive cross sensitivities
 Sum of negative cross sensitivities

0,00 mg/m³
 0,00 mg/m³

Calculation of the combined standard uncertainty
Test Value

Lack of fit
 Biggest interference (positiv or negativ)
 Span shift in the field test
 Zero shift in the field test
 Sensitivity to sample volume flow
 Sensitivity to sample pressure
 Sensitivity to sample temperature
 Sensitivity to ambient temperature
 Dependence on supply voltage
 Repeatability at span
 Field reproducibility
 Excursion of measurement beam

u_L
 u_I
 $u_{d,s}$
 $u_{d,z}$
 u_v
 u_{sp}
 u_{st}
 u_t
 u_{sv}
 u_s
 u_D
 u_{mb}

$\Delta X_{max,j}$	$u(\Delta X_{max,j}) = \frac{\Delta X}{\sqrt{3}}$	$u(\Delta X_{max,j})^2$
0,18 mg/m ³	0,10 mg/m ³	0,010
0,00 mg/m ³	0,00 mg/m ³	0,000
0,33 mg/m ³	0,19 mg/m ³	0,035
0,25 mg/m ³	0,14 mg/m ³	0,021
0,00 mg/m ³	0,00 mg/m ³	0,000
0,00 mg/m ³	0,00 mg/m ³	0,000
0,00 mg/m ³	0,00 mg/m ³	0,000
-0,05 mg/m ³	-0,03 mg/m ³	0,001
0,00 mg/m ³	0,00 mg/m ³	0,000
0,00 mg/m ³	0,00 mg/m ³	0,000
0,32 mg/m ³	0,18 mg/m ³	0,034
-0,15 mg/m ³	-0,09 mg/m ³	0,008

Combined standard uncertainty (u_c)

u_c

$$u_c = \sqrt{\sum (u_{max,j})^2}$$

0,329

Total expanded uncertainty

$(u_c \cdot k)$

$$U_c = u_c \cdot 1,96$$

0,646

Relative total expanded uncertainty

U_c in % of the limit 10 mg/m³

6,4

Requirement

U_c in % of the limit 10 mg/m³

30,0

Result: Requirements keep to QAL 1 of EN 14181