

# CERTIFICATE

die TÜV Immissionsschutz und  
Energiesysteme GmbH  
TÜV Rheinland Group

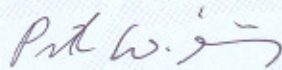
**Manufacturer:** Emerson Process Management GmbH &  
Co. OHG

**Emission Measuring System:** **TFID of NGA 2000 Series**

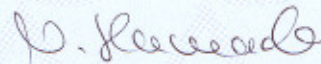
**Test Report:** 936/807004/FID from 26.02.1997

fulfills the requirements of the QAL 1  
for the component:  
Total-Organic-Carbon  
according to EN 14181 und EN ISO 14956.

Cologne, 13.10.2005



Dr. P. Wilbring



Nicole Hamacher

TIE-ID: 248768\_004

TÜV Immissionsschutz und Energiesysteme GmbH  
TÜV Rheinland Group  
Am Grauen Stein, 51105 Köln  
tie@umwelt-tuv.de



DAP-PL-3856.99

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

Manufacturer	Emerson Process Management GmbH & Co. OHG
Measurement System	Gas measuring device
Name	TFID of NGA 2000 Series
Serial Number	3300196, 3300796, 3300496
Measuring Principle	FID

**TÜV Data**

TÜV Report	936 / 807004 / FID
Date	13.10.2005
Editor	Fr. Hamacher

**Measurement Component** TOC 15 mg/m<sup>3</sup>

**Evaluation of the cross sensitivity (CS)**

	CS	$X_{max, j}$
to 3 Vol.-% Oxygen	-0,53	mg/m <sup>3</sup>
to 21 Vol.-% Oxygen	0,00	mg/m <sup>3</sup>
to 30 Vol.-% Humidity	0,00	mg/m <sup>3</sup>
to 300 mg/m <sup>3</sup> Carbon monoxide	0,16	mg/m <sup>3</sup>
to 15 Vol.-% Carbon dioxide	0,00	mg/m <sup>3</sup>
to 50 mg/m <sup>3</sup> Methane	0,00	mg/m <sup>3</sup>
to 20 mg/m <sup>3</sup> Dinitrogen monoxide	0,10	mg/m <sup>3</sup>
to 100 mg/m <sup>3</sup> Dinitrogen oxide	0,00	mg/m <sup>3</sup>
to 300 mg/m <sup>3</sup> Nitrogen monoxide	0,00	mg/m <sup>3</sup>
to 30 mg/m <sup>3</sup> Nitrogen dioxide	0,00	mg/m <sup>3</sup>
to 20 mg/m <sup>3</sup> Ammonia	0,00	mg/m <sup>3</sup>
to 200 mg/m <sup>3</sup> Sulphur dioxide	0,00	mg/m <sup>3</sup>
to 1000 mg/m <sup>3</sup> Sulphur dioxide	-0,14	mg/m <sup>3</sup>
to 50 mg/m <sup>3</sup> Hydrogen chloride	0,00	mg/m <sup>3</sup>
to 200 mg/m <sup>3</sup> Hydrogen chloride	0,00	mg/m <sup>3</sup>
Sum of positive cross sensitivities	0,26	mg/m <sup>3</sup>
Sum of negative cross sensitivities	-0,67	mg/m <sup>3</sup>

**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	$u_L$	0,06 mg/m <sup>3</sup>	0,03 mg/m <sup>3</sup>	0,001
Interference	$u_I$	0,26 mg/m <sup>3</sup>	-0,38 mg/m <sup>3</sup>	0,148
Span shift in the field test	$u_{d,s}$	0,26 mg/m <sup>3</sup>	0,15 mg/m <sup>3</sup>	0,022
Zero shift in the field test	$u_{d,z}$	0,23 mg/m <sup>3</sup>	0,13 mg/m <sup>3</sup>	0,017
Sensitivity to sample volume flow	$u_V$	0,00 mg/m <sup>3</sup>	0,00 mg/m <sup>3</sup>	0,000
Sensitivity to sample pressure	$u_{sp}$	0,00 mg/m <sup>3</sup>	0,00 mg/m <sup>3</sup>	0,000
Sensitivity to sample temperature	$u_{st}$	0,00 mg/m <sup>3</sup>	0,00 mg/m <sup>3</sup>	0,000
Sensitivity to ambient temperature	$u_t$	0,70 mg/m <sup>3</sup>	0,40 mg/m <sup>3</sup>	0,164
Repeatability at zero	$u_z$	0,39 mg/m <sup>3</sup>	0,23 mg/m <sup>3</sup>	0,051
Repeatability at span	$u_r$	0,00 mg/m <sup>3</sup>	0,00 mg/m <sup>3</sup>	0,000
Dependence on supply voltage	$u_{sv}$	0,00 mg/m <sup>3</sup>	0,00 mg/m <sup>3</sup>	0,000
Field reproducibility	$u_D$	0,17 mg/m <sup>3</sup>	0,10 mg/m <sup>3</sup>	0,009
NOx converter efficiency adjustment	$u_{NOx}$	0,00 mg/m <sup>3</sup>	0,00 mg/m <sup>3</sup>	0,000
Variation of response factors (TOC)	$u_{R, TOC}$	2,27 mg/m <sup>3</sup>	1,31 mg/m <sup>3</sup>	1,710
Excursion of measurement beam	$u_{mb}$	0,00 mg/m <sup>3</sup>	0,00 mg/m <sup>3</sup>	0,000
Combined standard uncertainty ( $u_c$ )	$u_c$	$u_c = \sqrt{\sum(u_{max, j})^2}$		1,456
Total expanded uncertainty	$(u_c \cdot k)$	$U_c = u_c \cdot 1,96$		2,855
Relative total expanded uncertainty		Uc in % of the limit 10 mg/m <sup>3</sup>		28,5
Requirement		Uc in % of the limit 10 mg/m <sup>3</sup>		30,0

**Result: Fulfils the requirements for QAL 1 of EN 14181**