

**APPENDICE B
CERTIFICATI E SPECIFICHE TECNICHE DEI COMPONENTI DELLO SME**

Model 42i NO-NO₂-NO_x Analyzer

Chemiluminescent gas analyzer with enhanced communication capabilities for ambient air and source emissions monitoring



A change is in the air

The industry's new best-of-breed. Our customers told us exactly what they're looking for in a gas monitoring solution: reliability, simplicity, ease of use. The new *i*Series platform delivers on all counts - and then goes a step farther. The flagship product in Thermo's new *i*Series product line is the Model 42i NO-NO₂-NO_x analyzer.

Using chemiluminescence technology, the Model 42i measures the amount of nitrogen oxides in the air from sub-ppb levels up to 100ppm. The Model 42i is a single Chamber, single photomultiplier tube design that cycles between the NO and NO_x modes.

The 42i has independent outputs for NO, NO₂, and Nox and each can be calibrated separately. Dual range and Auto range are standard features as well. If required, the instrument can be operated

continuously in either the NO or NO_x modes allowing for response times of less than 5 seconds.

Temperature and pressure correction are standard features. User settable alarm levels for concentration and for a wide variety of internal diagnostics are available from an easy to follow menu structure.

This state-of-the-art gas analyzer offers features such as an ethernet port as well as flash memory for increased data storage.

Ethernet connectivity provides efficient remote access, allowing the user to download measurement information directly from the instrument without having to be on-site.

You can easily program soft-keys to allow you to jump directly to frequently accessed functions, menus or screens. The larger interface screen can display up to five lines of measurement information.

Key Features

- ◆ Ethernet connectivity for efficient remote access
- ◆ Enhanced user interface with one button programming and large display screen
- ◆ Flash memory for increased data storage and user downloadable software
- ◆ Enhanced electronics design optimizes product commonality
- ◆ Improved layout for easier accessibility to components

Comprehensive Service Solutions

To maintain optimal product performance, you need immediate access to experts worldwide, as well as priority status when your air quality equipment needs repair or replacement. Thermo Electron offers comprehensive, flexible support solutions for all phases of the product lifecycle. Through predictable, fixed-cost pricing, Thermo services help protect the return on investment and total cost of ownership of your Thermo Electron air quality products.

Product Specifications

Preset Ranges	0-0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50 and 100 ppm 0-0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100 and 150 mg/m ³
Custom Ranges	0-0.05 to 100 ppm 0-0.1 to 150 mg/m ³
Zero Noise	0.20 ppb RMS (60 second averaging time)
Lower Detectable Limit	0.40 ppb (60 second averaging time)
Zero Drift (24 hour)	< 0.40 ppb
Span Drift (24 hour)	+/-1% full scale
Response Time	40 seconds (10 second average time) 80 seconds (60 second average time) 300 seconds (300 second average time)
Precision	+/-0.4 ppb (500 ppb range)
Linearity	+/-1% full scale
Sample Flow Rate	0.6 liters/min.
Operating Temperature	15°C - 35°C
Power Requirements	100 vac, 115 vac, 220-240 vac +/-10% @ 300W
Size and Weight	16.75"(W) x 8.62"(H) x 23"(D), 55 lbs. (25 kg)
Outputs	Selectable Voltage, RS232/RS485, TCP/IP, 10 Status Relays, and Power Fail Indication (standard). 0-20 or 4-20 mA Isolated Current Outout (optional)
Inputs	16 Digital Inputs (standard), 8 0-10Vdc Analog Inputs (optional)

Ordering Information

Model 42i NO-NO₂-NO_x Analyzer

Choose from the following configurations/options to customize your own Model 42i

Voltage options:

A = 120 Vac 50/60 Hz (standard)
B = 220 Vac 50/60 Hz
J = 100 Vac 50/60 Hz

Internal zero / span:

N = No zero / span assembly (standard)
Z = Internal zero span assembly
P = Internal permeation span source with zero/span assembly

Converter options:

M = Molybdenum (standard)
S = Stainless steel

Sample handling:

S = Standard plumbing (standard)
A = Ammonia scrubber

Ozone handling:

D = Drierite scrubber (standard)
P = Permeation dryer

Optional I/O:

A = None (standard)
C = I/O expansion board
(4-20mA outputs - 6 channels, 0-10v inputs - 8 channels)

Mounting Hardware:

A = Bench mounting (standard)
B = Ears & handles, EIA
C = Ears & handles, Retrofit

Your Order Code: 42i - _ _ _ _ _



Other options:

- Teflon particulate filter
- Ozone particulate filter
- Rack mounts
- Rear extender

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Bericht über die Eignungsprüfung der Immissionsmesseinrichtung
Analysator Modell 42i der Firma Thermo Electron Corporation für die
Komponente NO, NO₂ und NO_x

Geprüfte Messeinrichtung:	Analysator Modell 42i
Gerätehersteller:	Thermo Electron Corporation 27 Forge Parkway Franklin, MA 02038 USA Frauenauracher Straße 96 91056 Erlangen Germany
Prüfzeitraum:	Februar 2005 bis September 2005
Berichtsdatum:	05.01.2006
Berichtsnummer:	936/21203248/C
Berichtsumfang:	insgesamt 550 Seiten Anhang ab Seite 104 Handbuch ab Seite 132 mit 418 Seiten

Anhang 1 : Anforderungen nach EN 14211

Tabelle 45: Leistungsanforderungen nach DIN EN 14211

Leistungskenngröße	Leistungskriterium	Prüfergebnis	ein- gehal- ten	Seite
8.4.5 Wiederholstandardabweichung bei null	$\leq 1,0 \text{ nmol/mol}$	Wiederholstandardabweichung 0,21 nmol/mol	ja	42
8.4.5 Wiederholstandardabweichung bei der Konzentration ct	$\leq 3,0 \text{ nmol/mol}$	Wiederholstandardabweichung 1,21 nmol/mol	ja	42
8.4.6 „lack of fit“ (Abweichung von der linearen Regression)	Größte Abweichung von der linearen Regressionsfunktion bei Konzentration größer als null ≤ 4 % des Messwertes Abweichung bei null $\leq 5,0 \text{ nmol/mol}$	Abweichung von der linearen Regression: Am Nullpunkt $< 0,6 \mu\text{g/m}^3$ Am Referenzpunkt $< 12,4 \mu\text{g/m}^3$ entspricht 9,9 nmol/mol (ca. 1 %)	ja	37
8.4.7 Empfindlichkeitskoeffizient des Probengasdruckes	$\leq 8,0 \text{ nmol/mol/kPa}$	0,09 $\mu\text{g/m}^3/\text{kPa}$ entspricht 0,07 nmol/mol/kPa	ja	91
8.4.8 Empfindlichkeitskoeffizient der Probengas-temperatur	$\leq 3,0 \text{ nmol/mol/K}$	0,09 $\mu\text{g/m}^3$ entspricht 0,07 nmol/mol/K	ja	93
8.4.9 Empfindlichkeitskoeffizient der Umgebungs-temperatur	$\leq 3,0 \text{ nmol/mol/K}$	Am Nullpunkt maximal 0,10 nmol/mol/K Am Referenzpunkt maximal 0,39 nmol/mol/K	ja	50
8.4.10 Empfindlichkeitskoeffizient der elektrischen Spannung	$\leq 0,3 \text{ nmol/mol/V}$	$< 0,02 \text{ nmol/mol/V}$	ja	75
8.4.11 Störkomponenten bei null und der Konzentration ct	H ₂ O $\leq 5,0 \text{ nmol/mol}$ CO ₂ $\leq 5,0 \text{ nmol/mol}$ O ₃ $\leq 2,0 \text{ nmol/mol}$ NH ₃ $\leq 5,0 \text{ nmol/mol}$	H ₂ O max. 0,87 nmol/mol am Nullpunkt H ₂ O max. -1,33 nmol/mol am Spannungspunkt CO ₂ max. -0,1 nmol/mol am Nullpunkt CO ₂ max. -2,33 nmol/mol am Spannungspunkt O ₃ max. -0,20 nmol/mol am Nullpunkt O ₃ max. -0,33 nmol/mol am Spannungspunkt NH ₃ max. 0,07 nmol/mol am Nullpunkt NH ₃ max. -1,0 nmol/mol am Spannungspunkt	ja	66

Leistungskenngröße	Leistungskriterium	Prüfergebnis	eingehalten	Seite
8.4.12 Mittelungseinfluss	≤ 7,0 % des Messwertes	Gerät 1: 2,69 % Gerät 2: 1,09 %	ja	74
8.4.3 Einstellzeit (Anstieg)	≤ 180 s	Max. 81 s	ja	47
8.4.3 Einstellzeit (Abfall)	≤ 180 s	Max. 83 s	ja	47
8.4.3 Differenz zwischen Anstiegs und Abfallzeit	≤ 10 % relative Differenz oder 10 s, je nachdem, welcher Wert größer ist	3 s absolute Differenz	ja	47
8.4.14 Konverterwirkungsgrad	≥ 98%	98 %	ja	84
8.5.6 Kontrollintervall	3 Monate oder weniger, falls der Hersteller eine kürzere Zeitspanne angibt, aber nicht weniger als 2 Wochen	3 Monate	ja	86
8.5.7 Verfügbarkeit des Messgerätes	> 90 %	98 %	ja	82
8.5.5 Vergleichsstandardabweichung unter Feldbedingungen	≤ 5,0 % des Mittels über einen Zeitraum von drei Monaten	Vergleichsstandardabweichung = 3,1 %	ja	69
8.5.4 Langzeitdrift bei null	≤ 5,0 nmol/mol	Max. 1,2 µg/m ³ entspricht 1 nmol/mol	ja	58
8.5.4 Langzeitdrift beim Spanniveau	≤ 5,0 % des Maximums des Zertifizierungsbereiches	Max. 3 µg/m ³ entspricht 2,4 nmol/mol	ja	62
8.4.4 Kurzzeitdrift bei null	≤ 2,0 nmol/mol über 12 h	- 0,5 µg/m ³ entspricht -0,4 nmol/mol	ja	58
8.4.4 Kurzzeitdrift beim Spanniveau	≤ 6,0 nmol/mol über 12 h	0,6 µg/m ³ entspricht 0,5 nmol/mol	ja	62

Tabelle 46: *Erweiterte Unsicherheit aus den Ergebnissen der Laborprüfung nach DIN EN 14211*

Nr.	Leistungskenngröße	Anforderung [nmol/mol]	Ergebnis [nmol/mol]	Teilunsicherheit [nmol/mol]	Quadrat der Teilunsicherheit
1	Wiederholstandardabweichung bei Null	1,0	0,21	0,032	0,001
2	Wiederholstandardabweichung bei der Konzentration ct	3,0	1,21	0,149	0,022
3	„lack of fit“ (Abweichung von der linearen Regression)	4% des Messwertes	1 %	2,916	8,501
4	Empfindlichkeitskoeffizient des Probengasdruckes	8,0	0,07	1,531	2,343
5	Empfindlichkeitskoeffizient der Probengastemperatur	3,0	0,07	3,061	9,372
6	Empfindlichkeitskoeffizient der Umgebungstemperatur	3,0	0,39	6,878	47,301
7	Empfindlichkeitskoeffizient der elektrischen Spannung	0,3	0,02	0,392	0,154
8	Störkomponenten bei Null und der Konzentration ct				
8a	H ₂ O	5,0	-1,33	-0,700	0,490
8b	CO ₂	5,0	-2,3	-1,092	
8c	O ₃	2,0	-0,33	-0,177	
8d	NH ₃	5,0	-1	-0,463	
	Summe CO ₂ , O ₃ , NH ₃			-1,73	2,99
9	Mittelungseinfluss	7,0%	2,7%	7,872	61,971
18	Differenz Proben-/ Kalibreingang	1,0%	0	0,000	0,000
21	Konverterwirkungsgrad	98,0%	98	5,831	34,003
21	Unsicherheit des Prüfgases	3,0%	2,0%	1,200	1,440
22	Anstieg der NO ₂ Konzentration	4 nmol/mol	2,2	6,414	41,144
	kombinierte Unsicherheit				14,48 nmol/mol
	erweiterte Unsicherheit				28,96 nmol/mol
	tatsächliche erweiterte Unsicherheit				5,7%
	maximale erweiterte Unsicherheit				15%

Tabelle 47: *Erweiterte Unsicherheit aus den Ergebnissen der Labor- und Feldprüfungen nach DIN EN 14211*

Nr.	Leistungskenngröße	Anforderung [nmol/mol]	Ergebnis [nmol/mol]	Teilunsicherheit [nmol/mol]	Quadrat der Teilunsicherheit
1	Wiederholstandardabweichung bei Null	1,0	0,21	0,032	0,001
2	Wiederholstandardabweichung bei der Konzentration ct	3,0	1,21	0,149	0,022
3	„lack of fit“ (Abweichung von der linearen Regression)	4% des Messwertes	1%	2,916	8,501
4	Empfindlichkeitskoeffizient des Probengasdruckes	8,0	0,07	1,531	2,343
5	Empfindlichkeitskoeffizient der Probengastemperatur	3,0	0,07	3,061	9,372
6	Empfindlichkeitskoeffizient der Umgebungstemperatur	3,0	0,39	6,878	47,301
7	Empfindlichkeitskoeffizient der elektrischen Spannung	0,3	0,02	0,392	0,154
8	Störkomponenten bei Null und der Konzentration ct				
8a	H ₂ O	5,0	-1,33	-0,700	0,490
8b	CO ₂	5,0	-2,3	-1,092	
8c	O ₃	2,0	-0,33	-0,177	
8d	NH ₃	5,0	-1	-0,463	
	Summe CO ₂ , O ₃ , NH ₃			-1,73	2,99
9	Mittelungseinfluss	7,0%	2,7%	7,8722	61,9711
18	Differenz Proben-/ Kalibreingang	1,0%	0	0,0000	0,0000
21	Konverterwirkungsgrad	98,0%	98	5,831	34,003
10	Vergleichstandardabweichung unter Feldbedingungen	5 % des Mittelwertes	3,1%	15,655	245,079
11	Langzeitdrift bei Null	5,0	1	0,577	0,333
12	Langzeitdrift beim Spannniveau	5 % des Messbereiches	2,4	6,997	48,965
21	Unsicherheit des Prüfgases	3,0%	2,0%	1,200	1,440
22	Anstieg der NO ₂ Konzentration	4 nmol/mol	2,2	6,4144	41,144
kombinierte Unsicherheit					22,45 nmol/mol
erweiterte Unsicherheit					44,91 nmol/mol
tatsächliche erweiterte Unsicherheit					8,9%
maximale erweiterte Unsicherheit					15%

Model 48i CO Analyzer

Gas filter correlation gas analyzer with enhanced communication capabilities for ambient air and source emissions monitoring



Key Features

- ◆ Ethernet connectivity for efficient remote access
- ◆ Enhanced user interface with one button programming and large display screen
- ◆ Flash memory for increased data storage and user downloadable software
- ◆ Enhanced electronics design optimizes product commonality
- ◆ Improved layout for easier accessibility to components

A change is in the air

The industry's new best-of-breed. Our customers told us exactly what they're looking for in a gas monitoring solution: reliability, simplicity, ease of use. The new *iSeries* platform delivers on all counts - and then goes a step farther.

A core product in Thermo's new *iSeries* product line is the Model 48i CO analyzer.

Using gas filter correlation technology, the Model 48i measures the amount of carbon monoxide in the air. The Model 48i is based on the principle that carbon monoxide (CO) absorbs infrared radiation at a wavelength of 4.6 microns. Because infrared absorption is a nonlinear measurement technique, it is necessary for the instrument electronics to transform the basic analyzer signal into a linear output. The Model 48i uses an exact calibration

curve to accurately linearize the instrument output over any range up to a concentration of 10,000ppm.

This state-of-the-art gas analyzer offers features such as an ethernet port as well as flash memory for increased data storage.

Ethernet connectivity provides efficient remote access, allowing the user to download measurement information directly from the instrument without having to be on-site.

You can easily program soft-keys to allow you to jump directly to frequently accessed functions, menus or screens. The larger interface screen can display up to five lines of measurement information while primary screen remains visible.

Comprehensive Service Solutions

To maintain optimal product performance, you need immediate access to experts worldwide, as well as priority status when your air quality equipment needs repair or replacement. Thermo Electron offers comprehensive, flexible support solutions for all phases of the product lifecycle. Through predictable, fixed-cost pricing, Thermo services help protect the return on investment and total cost of ownership of your Thermo Electron air quality products.

Product Specifications

Preset Ranges	0-1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000 and 10000 ppm 0-1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000 and 10000 mg/m ³
Custom Ranges	0-1 to 10000 ppm 0-1 to 10000 mg/m ³
Zero Noise	0.02 ppm RMS (60 second averaging time)
Lower Detectable Limit	0.04 ppm
Zero Drift (24 hour)	< 0.1 ppm
Span Drift (24 hour)	+/-1% full scale
Response Time	60 seconds (30 second average time)
Precision	+/-0.1 ppm
Linearity	+/-1% full scale ≤ 1000 ppm +/-2.5% full scale > 1000 ppm
Sample Flow Rate	0.5-2 liters/min.
Operating Temperature	20°C - 30°C
Power Requirements	100 vac, 115 vac, 220-240 vac +/-10% @ 275W
Size and Weight	16.75"(W) x 8.62"(H) x 23"(D), 49 lbs. (22.2 kg)
Outputs	Selectable Voltage, RS232/RS485, TCP/IP, 10 Status Relays, and Power Fail Indication (standard). 0-20 or 4-20 mA Isolated Current Outout (optional)
Inputs	16 Digital Inputs (standard), 8 0-10Vdc Analog Inputs (optional)

Ordering Information

Model 48i CO Analyzer

Choose from the following configurations/options to customize your own Model 48i

Voltage options:

A = 120 Vac 50/60 Hz
B = 220 Vac 50/60 Hz
J = 100 Vac 50/60 Hz

Internal zero /span:

N = No zero / span valve
A = No zero / span valve w/zero air scrubber
Z = Internal zero / span valves
C = Internal zero / span valves w/zero air scrubber

Filter Wheel Purge:

S = Standard plumbing (standard)
P = Filter wheel purge set-up

Optional I/O:

A = No optional I/O (standard)
C = 0-20, 4-20mA current output - 6 channels, 0-10v analog input - 8 channels

Mounting hardware:

A = Bench mounting (standard)
B = Ears & handles, EIA
C = Ears & handles, retrofit

Your Order Code: 48i - _ _ _ _ _

Other options:

- Teflon particulate filter
- Rack mounts
- Rear extender



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Bericht über die Eignungsprüfung der Immissionsmesseinrichtung CO
Analysator Modell 48i der Firma Thermo Electron Corporation für die
Komponente Kohlenmonoxid

Geprüfte Messeinrichtung:	CO Analysator Modell 48i
Gerätehersteller:	Thermo Electron Corporation 27 Forge Parkway Franklin, MA 02038 USA Frauenauracher Straße 96 91056 Erlangen Germany
Prüfzeitraum:	Juni 2005 bis Dezember 2005
Berichtsdatum:	05.01.2006
Berichtsnummer:	936/21203248/A
Berichtsumfang:	insgesamt 455 Seiten Anhang ab Seite 89 Handbuch ab Seite 113 mit 342 Seiten

Anhang 1 : Anforderungen nach EN 14626

Tabelle 38: Zusammenfassung der Leistungskenngrößen nach EN 14526

Leistungskenngröße	Leistungskriterium	Prüfergebnis	ein- gehal- ten	Seite
8.4.5 Wiederholstandardab- weichung bei null	$\leq 1,0 \mu\text{mol/mol}$	Wiederholstandardabweichung 0,09 mg/m ³ entspricht 0,08 $\mu\text{mol/mol}$	ja	39
8.4.5 Wiederholstandardab- weichung bei der Kon- zentration ct	$\leq 3,0 \mu\text{mol/mol}$	Wiederholstandardabweichung 0,1 mg/m ³ entspricht 0,09 $\mu\text{mol/mol}$	ja	39
8.4.6 „lack of fit“ (Abwei- chung von der linearen Regression)	Größte Abweichung von der linearen Regressi- onsfunktion bei Konzent- ration größer als null ≤ 4 % des Messwertes Abweichung bei null $\leq 0,2 \mu\text{mol/mol}$	Abweichung von der linearen Regres- sion: Am Nullpunkt < 0,15 mg/m ³ entspricht 0,13 $\mu\text{mol/mol}$ Am Referenzpunkt < 0,32 mg/m ³ ent- spricht 0,3 $\mu\text{mol/mol}$	ja	35
8.4.7 Empfindlichkeitskoeffi- zient des Probengas- druckes	$\leq 0,7 \mu\text{mol/mol/kPa}$	0,1 mg/m ³ entspricht 0,09 $\mu\text{mol/mol/kPa}$	ja	80
8.4.8 Empfindlichkeitskoeffi- zient der Probengas- temperatur	$\leq 0,3 \mu\text{mol/mol/K}$	0,05 mg/m ³ entspricht 0,04 $\mu\text{mol/mol/K}$	ja	82
8.4.9 Empfindlichkeitskoeffi- zient der Umgebungs- temperatur	$\leq 0,3 \mu\text{mol/mol/K}$	Am Nullpunkt zwischen -0,012 und 0,005 mg/m ³ /K entspricht -0,01 – 0,004 $\mu\text{mol/mol/K}$ Am Referenzpunkt zwischen -0,07 und 0,03 mg/m ³ /K entspricht -0,06 – 0,03 $\mu\text{mol/mol/K}$	ja	43
8.4.10 Empfindlichkeitskoeffi- zient der elektrischen Spannung	$\leq 0,3 \mu\text{mol/mol/V}$	= 0,0 nmol/mol/V	ja	65
8.4.11 Störkomponenten bei null und der Konzentra- tion ct	H ₂ O $\leq 1,0 \mu\text{mol/mol}$ CO ₂ $\leq 0,5 \mu\text{mol/mol}$ NO $\leq 0,5 \mu\text{mol/mol}$ N ₂ O $\leq 0,5 \mu\text{mol/mol}$	H ₂ O max. 0,2 mg/m ³ entspricht 0,17 $\mu\text{mol/mol}$ am Nullpunkt H ₂ O max. -0,07 mg/m ³ entspricht 0,06 $\mu\text{mol/mol}$ am Spanpunkt CO ₂ max. 0,02 mg/m ³ entspricht 0,02 $\mu\text{mol/mol}$ am Nullpunkt CO ₂ max. -0,13 mg/m ³ entspricht 0,11 $\mu\text{mol/mol}$ am Spanpunkt NO max. 0,01 mg/m ³ entspricht 0,01 $\mu\text{mol/mol}$ am Nullpunkt NO max. 0,1 mg/m ³ entspricht 0,1 $\mu\text{mol/mol}$ am Spanpunkt N ₂ O max. 0,03 mg/m ³ entspricht 0,03 $\mu\text{mol/mol}$ am Nullpunkt	ja	56

		N ₂ O max. 0,13 mg/m ³ entspricht 0,11 µmol/mol am Spannpunkt		
8.4.12 Mittelungseinfluss	≤ 7,0 % des Messwertes	Gerät 1: 1,94 % Gerät 2: 2,22 %	ja	63
8.4.3 Einstellzeit (Anstieg)	≤ 180 s	Max. 50 s	ja	41
8.4.3 Einstellzeit (Abfall)	≤ 180 s	Max. 56 s	ja	41
8.4.3 Differenz zwischen An- stiegs und Abfallzeit	≤ 10 % relative Differenz oder 10 s, je nachdem, welcher Wert größer ist	9 % relative Differenz aber 6 s absolute Differenz	ja	41
8.5.6 Kontrollintervall	3 Monate oder weniger, falls der Hersteller eine kürzere Zeitspanne an- gibt, aber nicht weniger als 2 Wochen	34 Tage	ja	75
8.5.7 Verfügbarkeit des Messgerätes	> 90 %	98 %	ja	72
8.5.5 Vergleichstandardab- weichung unter Feld- bedingungen	≤ 5,0 % des Mittels über einen Zeitraum von drei Monaten	Vergleichsstandardabweichung = 5 %	ja	59
8.5.4 Langzeitdrift bei null	≤ 0,5 µmol/mol	Max. 0,56 mg/m ³ entspricht 0,5 µmol/mol	ja	50
8.5.4 Langzeitdrift beim Spanniveau	≤ 5,0 % des Maximums des Zertifizierungsberei- ches	Max. 2,6 mg/m ³ entspricht 2,2 µmol/mol	ja	53
8.4.4 Kurzzeitdrift bei null	≤ 0,1 µmol/mol über 12 h	0 mg/m ³ entspricht 0 µmol/mol	ja	50
8.4.4 Kurzzeitdrift beim Spanniveau	≤ 0,6 µmol/mol über 12 h	0,3 mg/m ³ entspricht - 0,1 µmol/mol	ja	53

Tabelle 39 Erweiterte Unsicherheit aus Ergebnissen der Laborprüfung nach DIN EN 14626

Nr.	Leistungskenngröße	Anforderung [µmol/mol]	Ergebnis [µmol/mol]	Teilunsicherheit [µmol/mol]	Quadrat der Teilunsicherheit
1	Wiederholstandardabweichung bei Null	1,0	0,08	0,010	0,000
2	Wiederholstandardabweichung bei der Konzentration ct	3,0	0,09	0,011	0,000
3	„lack of fit“ (Abweichung von der linearen Regression)	4% des Messwertes	0,7%	0,035	0,001
4	Empfindlichkeitskoeffizient des Probengasdruckes	0,7	0,09	0,103	0,011
5	Empfindlichkeitskoeffizient der Probengastemperatur	0,3	0,04	0,092	0,008
6	Empfindlichkeitskoeffizient der Umgebungstemperatur	0,3	0,06	0,137	0,019
7	Empfindlichkeitskoeffizient der elektrischen Spannung	0,3	0	0,000	0,000
8	Störkomponenten bei Null und der Konzentration ct				
8a	H ₂ O	1,0	0,06	-0,032	0,001
8b	CO ₂	0,5	0,11	0,086	
8c	NO	0,5	0,1	0,055	
8d	N ₂ O	0,5	0,11	0,061	
	Summe aus CO ₂ , NO, N ₂ O			0,203	0,041
9	Mittelungseinfluss	7,0%	2,22%	0,110	0,012
18	Differenz Proben-/Kalibrieringang	0,5 %	0	0	0
21	Unsicherheit des Prüfgases	3,0%	2,0%	0,086	0,007
				kombinierte Unsicherheit	0,318 µmol/mol
				erweiterte Unsicherheit	0,636 µmol/mol
				tatsächliche erweiterte Unsicherheit	7,4%
				erlaubte erweiterte Unsicherheit	15%

Tabelle 40: Erweiterte Unsicherheit aus den Ergebnissen der Labor- und Feldprüfungen nach DIN EN 14626

Nr.	Leistungskenngröße	Anforderung [µmol/mol]	Ergebnis [µmol/mol]	Teilunsicherheit [µmol/mol]	Quadrat der Teilunsicherheit
1	Wiederholstandardabweichung bei Null	1,0	0,08	0,010	0,000
2	Wiederholstandardabweichung bei der Konzentration ct	3,0	0,09	0,011	0,000
3	„lack of fit“ (Abweichung von der linearen Regression)	4% des Messwertes	0,7 %	0,035	0,001
4	Empfindlichkeitskoeffizient des Probengasdruckes	0,7	0,09	0,103	0,011
5	Empfindlichkeitskoeffizient der Probengastemperatur	0,3	0,04	0,092	0,008
6	Empfindlichkeitskoeffizient der Umgebungstemperatur	0,3	0,06	0,137	0,019
7	Empfindlichkeitskoeffizient der elektrischen Spannung	0,3	0	0,000	0,000
8	Störkomponenten bei Null und der Konzentration ct				
8a	H ₂ O	1,0	0,06	-0,032	0,001
8b	CO ₂	0,5	0,11	0,086	
8c	NO	0,5	0,1	0,055	
8d	N ₂ O	0,5	0,11	0,061	
	Summe aus CO ₂ , NO, N ₂ O			0,203	0,041
9	Mittelungseinfluss	7,0%	2,22 %	0,1102	0,0122
10	Vergleichstandardabweichung unter Feldbedingungen	5 % des Mittelwertes	5 %	0,430	0,185
11	Langzeitdrift bei Null	0,5	0,5	0,289	0,083
12	Langzeitdrift beim Spannniveau	5 % des Messbereiches	2,2	0,110	0,012
18	Differenz Proben-/Kalibriereingang	0,5 %	0	0	0
21	Unsicherheit des Prüfgases	3,0%	2,0%	0,086	0,007
				kombinierte Unsicherheit	0,617 µmol/mol
				erweiterte Unsicherheit	1,235 µmol/mol
				tatsächliche erweiterte Unsicherheit	14,4%
				erforderliche erweiterte Unsicherheit	15%

ECO PHYSICS CLD 822 M h

Application examples



Burners and Boilers
Manufacturers of gas turbines
Certification and calibration authorities
DeNOx plants
Refining of fuels and lubricants
Tobacco industry
Research and development

The solution for simultaneously measured NO and NO_x has got a name: CLD 822 M h. The heated inlet copes with hot and humid gas samples – no gas cooler required!



A fascinating technology.

The analyzer is not only a state-of-the-art product in terms of precision and reliability. Its technological base also sets the trend for others. The integrated hot tubing (h) allows the direct measurement of hot and moist gases. An external

preconditioning of the sample gas is not required. Naturally occurring pressure variations in the sample flow are balanced out by means of an electronic and mechanical bypass system (r).

Many options can be integrated without any problem to satisfy the need for non-standardized applications. The advantage of compact design: the CLD 822 Mh includes everything inside the case – even the vacuum pump and the ozone scrubber.

Two instead of one.

The CLD 822 M h nitrogen oxide analyzer is optimized for its use in systems which require reliable NO₂ measurements or the control of two sample gases in parallel.

The outstanding feature is the concept of two parallel reaction chambers. They guarantee simultaneous meas-



The CLD 822 M h with slides is perfectly prepared for rack mounting.

urement of NO and NO_x in order to generate the precise value of NO₂.

The analyzer is capable of coping with two separate measurement tasks. This may include the task of comparing the values at the inlet and the outlet of a process or the direct comparison of two independent samples. The analyzer simply requires a dual inlet feature option (d) and one additional converter.

User friendliness is a top priority.

The analyzer can be operated by means of the integrated keypad or remotely from a personal computer. The clear layout of the menu structure guides the user and enables him to take advantage of all analyzer functions with simple commands. Integrating the analyzer in larger systems is possible by including runners in the standard chassis design.

- Four freely selectable measurement ranges [with option (d) two per channel]
- Choice between several types and numbers of converters from 0 to 2 according to the application
- Error message coded and in full text
- Rapid system integration
- Virtually maintenance-free even in continuous operation.



CLD 822 M h

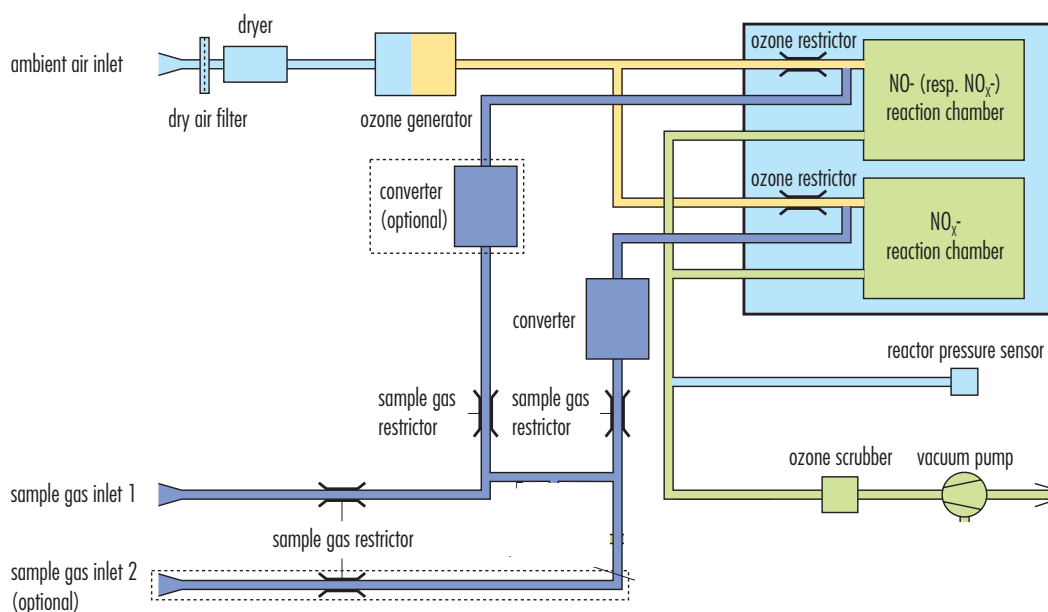
Specifications

Measuring ranges	four freely selectable ranges from 5–5000 ppm, with option d two per channel	Supply voltage	100-230 V/50–60 Hz
Min. detectable concentration	0.25 ppm*	Interface	RS 232 (standard)
Noise at zero point (1 σ)	0.125 ppm*	Analog output	4–20 mA into 500 Ω max.; 0–1 V; 0–10 V
Lagtime	<1 sec	Dimensions	height: 133 mm (5 1/4 ") width: 450 mm (19 ") with moulding: 495 mm depth: 545 mm
Rise time (0–90%)	<1 sec	Weight	26 kg
Temperature range	5–40 °C	Delivery includes	CLD 822 S h analyzer, power cable, analog signal cable, manual
Humidity tolerance	5–95% rel. h (non-condensing, ambient air and sample gas)	Standard	CLD 822 M h
Quenching (with gas cooler)	for H ₂ O: <1.5% of meas. value for CO ₂ : <0.3%/vol.-% CO ₂	Options	S steel converter d dual sample gas inlet MM d dual channel NO _x /NO _x
Sample flow rate	0.1 l/min		
Input pressure	externally stabilized within ± 3 mbar		
Dry air use for O₃ generator	internally generated (no external supply gas required)		
Power required	400 VA (incl. membrane pump and ozone scrubber)		

* depending on filter setting

ECO PHYSICS reserves the right to change these specifications without notice.

Flow diagram



ECO PHYSICS



Industrie Service

Certificate

TÜV Süd Industrie Service GmbH

Laboratory for Environmental Services
(Laboratorium Umwelt Service)

accredited according DIN EN ISO/IEC 17025 DAP-PL-2885.99

CLD 82 M h

Gas Analyser for NO_x or NO
Report Nr. 555720 (December 2005)

Manufacturer:

ECO PHYSICS AG, Duernten, Switzerland

TÜV Süd Industrie Service GmbH is herewith certifying that the analyser CLD 822 M h is in accordance with DIN EN ISO 14956, Jan. 2003 and fulfils QAL1 of EN 14181 for the following range of measurement or for higher ranges:

Component	C _{test} (daily emission limit value) mg/ m ³ NO	Range of measurement mg/ m ³ NO	Expanded uncertainty mg/ m ³ NO
NO _x or NO	33	0-100	6,3

The expanded uncertainty shall not exceed 20 % of the daily emission limit value (6,6 mg/ m³).
The response time was with 134 s lower than the demanded value of 200 s.

The calculation according DIN EN ISO 14956 was performed on the basis of the results of the investigations for report Nr. 555720 (December 2005) for the German suitability test and under consideration of DIN EN 15267-3 draft, August 2005. The following performance characteristics were regarded: response time; lower detection limit; lack of fit; instability/ drift; repeatability; sensitivity to ambient temperature, ambient pressure, voltage supply and gas flow; sample losses, selectivity/ interfering components; uncertainty of calibration gas, response factors

Munich, February 2006

Dr. D. Fiederer

Dr. A. Brandl

Laboratorium Umwelt Service, TÜV Süd Industrie Service GmbH, IS-US3-MUC,
Westendstrasse 199, D-80686 München



PRODUCT CONFORMITY CERTIFICATE

This is certify that the

Servomex 4900 Multigas Analyser

manufactured by:

Servomex Group Ltd

Jarvis Brook
Crowborough
East Sussex
TN6 3DU
UK

has been assessed by Sira Certification Service
and found to comply with:

MCERTS Performance Standards for Continuous Emission Monitoring Systems (March 2002)

Certification Ranges :

SO ₂	0 – 572mg/m ³	CO	0 – 75mg/m ³
NO	0 – 268mg/m ³	O ₂	0 – 25%

Certification is awarded in respect of the conditions stated in this certificate

Certificate No: Sira MC030013/01
Initial Certification: 03 July 2003
This Certificate Issued: 05 May 2005
Renewal Date: 02 July 2008


Chief Executive

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

South Hill, Chislehurst, Kent, BR7 5EH, England
Tel: 020 8467 2636 Fax: 020 8468 1841



Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: Stack mounted Components -10°C to +55°C
Control Unit +5°C to +40°C

Performance values are expressed as a percentage of the certification range, except for availability and analysis function, and '✓' Indicates compliance with MCERTS requirements.

Test	Results expressed as % of max of certification range				Other results	MCERTS* specification
	<0.5	<1	<2	<4		
Linearity (O ₂)	✓					<0.3%
Linearity (NO, CO, SO ₂)			✓			<2%
Time dependent zero drift						<2%/week
O ₂	✓					<0.2%/week
Other gases			✓			
Time dependent span drift						<4%/week
O ₂	✓					<0.2%/week
Other gases				✓		
Ambient temperature: Zero shift	✓					<0.3% per °C
Ambient temperature: Span shift	✓					<0.3% per °C
Response time					<30s	<200s
Detection limit						<0.2%
O ₂	✓					<2%
Other gases		✓				
Cross-sensitivity				✓		<±4%
Maintenance Interval: (field test)					At least 8 days	Not specified
Availability (field test)					98.9%	>95%
Accuracy (analysis function)						
O ₂					>95%/<5%	>95%/<5%
Other gases					>95%/<10%	>95%/<10%
Vibration 10-150Hz at 19.6m/s ²					No effect	Not specified
Effect of gas flow	✓					10-60/h +

* MCERTS performance limit Version 2 March 2002 +German UBA performance limit

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Approved Site Application

The instrument is approved for use on large combustion plant and incineration plant for the ranges specified on page 1 of this certificate.

The field test was carried out over six months at a waste incinerator equipped with an electrostatic precipitator and lime injection, with a stack-gas temperature of 140°C.

The manufacturer states that the Servomex 4900 is not suitable for use with corrosive samples.

Potential interference's are site specific and may vary from stack to stack.

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. The MCERTS standard gives guidance of process conditions for some other types of plant.

Test Reports

This certification is based on the following Test Reports:

TÜV Essen Report: RWTÜV-3.5.2/0784/95//674377/01 dated 1997
RWTÜV-3.5.2/0784/95//597632/01 dated 1996
RWTÜV-5.0.2/0784/94//20363886 dated 1999

SIRA Report: N 0415 dated 2002

The 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' (Feb 2001)

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Description:

The Servomex 4900 samples flue gas via an extractive process. The analyser measures oxygen by a magnetodynamic paramagnetic sensor and NO, CO and SO₂ by infrared gas filter correlation technology.

The Servomex 4900 series system tested consisted of a Servomex 4995 Sample Conditioning System and two Servomex 4900 analysers to both measure NO, CO, SO₂ and O₂. The system also included a heated filter probe model JES 300 (located within the stack) and a heated line model JH3F, both are manufactured by JCT Consulting & Trading GmbH. The configuration of analysers and sample conditioning system can be varied depending upon the application and customer requirements.

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 systems shall be subject to regular surveillance according to Sira Certification Service (SCS) regulations. The design of the product certified is defined in the SCS Design Schedule for certificate No. Sira MC 030013/01.
2. If certified product is found not to comply, Sira Certification Service should be notified immediately at the address shown on page 1.
3. The Certification Marks that can be applied to the product or used in publicity material are defined in SCS regulations.
4. This document remains the property of SCS and shall be returned when requested by the company.

Certificate No: Sira MC030013/01
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