Product Data Sheet
PDS 103-640.A01
March, 2008

CLD NO/NO_x Analyzer Module

- Thermoelectrically-cooled solid-state detector insures high stability
- Modular design provides mounting and system expansion flexibility
- Fast response-90% fullscale within 1 second
- Four (4) user-selectable ranges from 0 to 10,000 ppm
- Automated ozonator shutoff on loss of air pressure
- Remote control and automatic calibration
- On-line diagnostic capabilities
- Sample flow measurement available
- Efficient, interferent-free vitreous carbon NO_2 converter

Modular design and network communication are the key characteristics of the NGA CLD NO/NO_x analyzer module. The CLD analyzer module provides quick and accurate measurement of oxides of nitrogen (NO/NO_x) over a wide dynamic range from 0 to 10 ppm through 0 to 10,000 ppm.

Designed for such varied applications as continuous emissions monitoring systems (CEMS), process gas analysis and internal combustion engine emissions (ICEE), the CLD analyzer module exceeds performance and reliability expectations.

Emerson's Rosemount Analytical NGA CLD NO/NO_x analyzer module was the industry's first modular chemiluminescence analyzer. It is a self-contained unit complete with detector and electronics. The modular design allows for easy system integration. The CLD analyzer module may be a "stand alone" analysis instrument with the addition of our input/output (I/O) module and platform or it can be integrated into a sophisticated multi-component analysis network.

What makes the NGA series analyzer modules unique is their built-in intelligence and their ability to share that intelligence. Embedded in the NGA architecture is an advanced digital communication network (LON) which allows interaction between other analyzer modules in the system. The network carries all pertinent analyzer outputs and diagnostic variables to a centralized display panel on the platform or remote PC. Because of this distinctive feature, the CLD analyzer module may be incorporated into a panel/rack or it can be placed near the sample source up to a mile away, thereby greatly reducing sample handling requirements.

ROSEMOUNT® Analytical

EMERSON™ Process Management

FEATURES

Microprocessor-based operation, advanced diagnostics and the incorporation of technological advancements are distinctive attributes of the CLD analyzer module. New refinements added to the CLD detector have enhanced overall performance.

One of these improvements is the addition of a solid-state detector (silicon photodiode). This photodiode replaces the expensive and bulky photomultiplier tube found in traditional chemiluminescence analyzers. The photodiode improves stability and reduce maintenance due to the extended life of this component. The addition of a two-stage thermoelectric cooler inside the photo-diode detector assembly further improves stability and the signal-to-noise ratio because the detector is operated at low temperature.

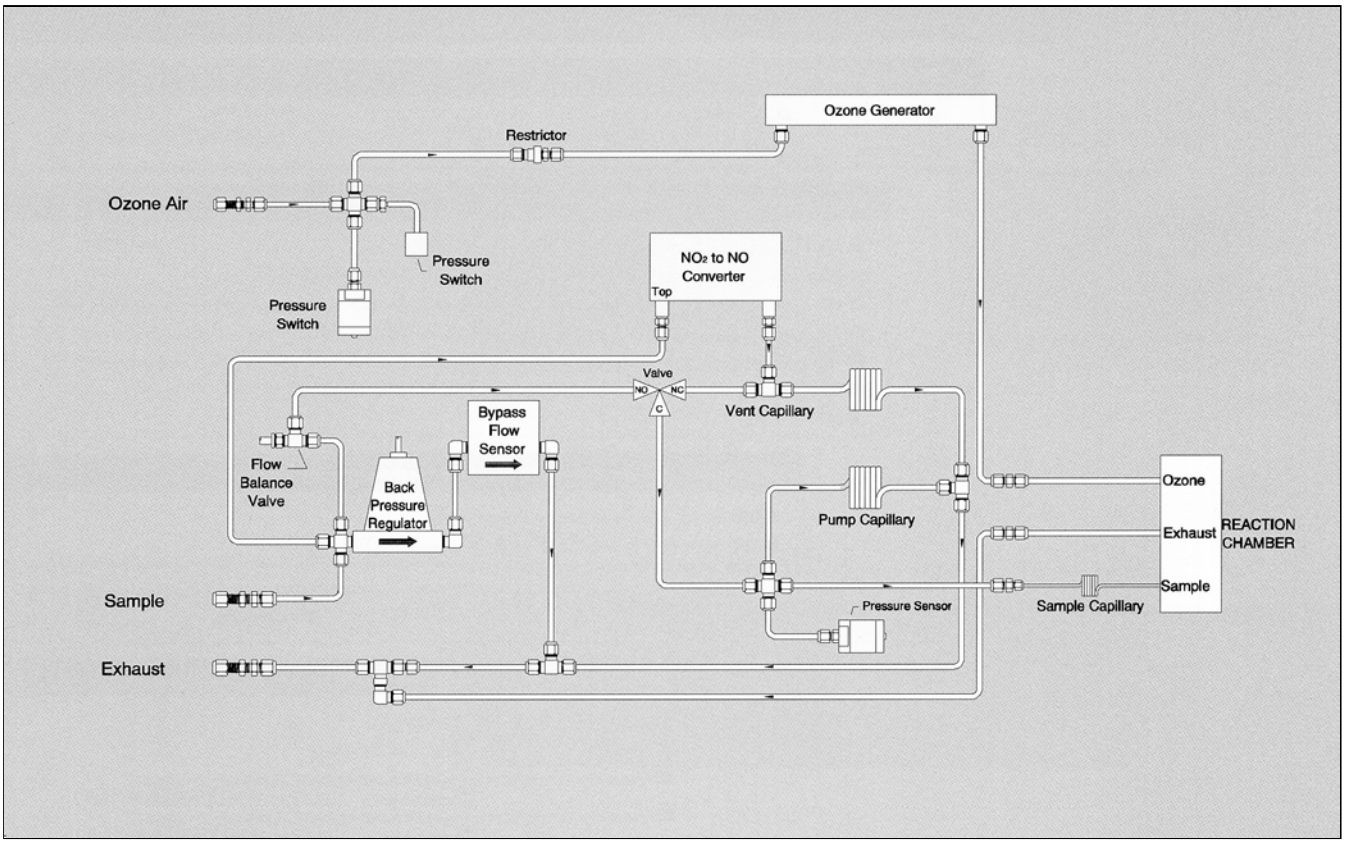
Emerson's innovative ozone generator also improves measurement stability by providing tighter temperature control. The CLD analyzer module incorporates a pressure monitor which automatically turns off the ozonator upon loss of air or oxygen source gas. This feature prevents the possibility of ozone diffusion and the consequent corrosion of metallic elements in the detector.

Sample flowrate and pressure, ozonator air pressure and converter temperature monitoring are standard features of this module. On-line availability of these parameters along with advanced diagnostic information such as power supply voltages, detector block temperature, last calibration values, etc. provide improved performance and serviceability. Maintenance checks on the instrument can be performed remotely without having to take the unit out of service to test internal components.

For applications where remote operation is desired, the analyzer can be controlled through its I/O module or the LON network. I/O module capabilities include analog outputs, three alarm relays, remote range change and identification, auto range change, remote NO/NO_x mode switching and ozonator operation and auto calibration sequence timing including zero/span gas valve control. The LON network carries all analyzer variables and diagnostics. Network connection can be made to the NGA platform or PC up to a mile away from the analyzer module.

As technology changes, we allow upgrade of your analyzer module with the latest advancement without further change to other modules. This flexible and expandable modular approach creates a gas analysis system resistant to obsolescence that will provide the solution to your measurement requirements now and into the next century.

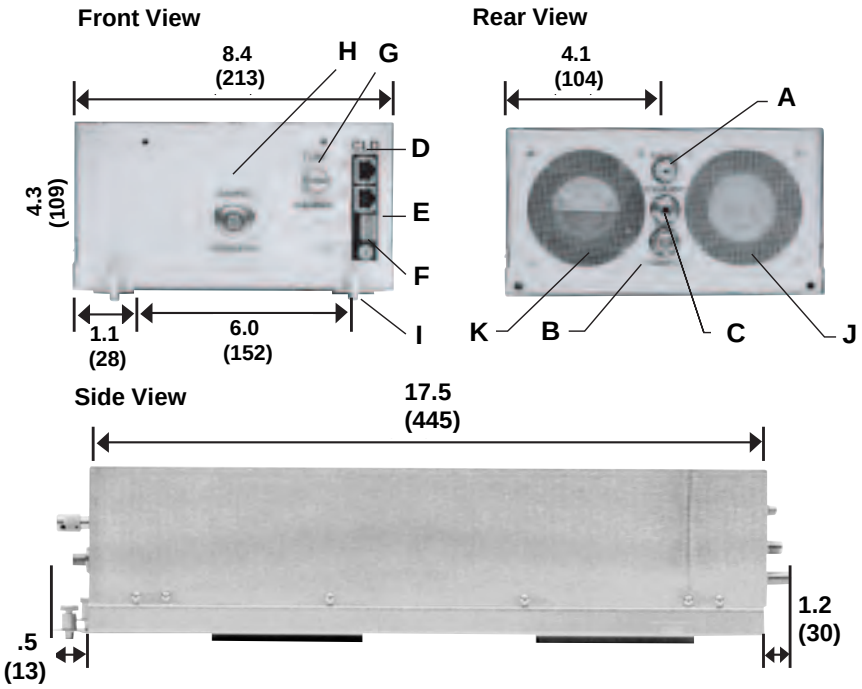
FLOW DIAGRAM



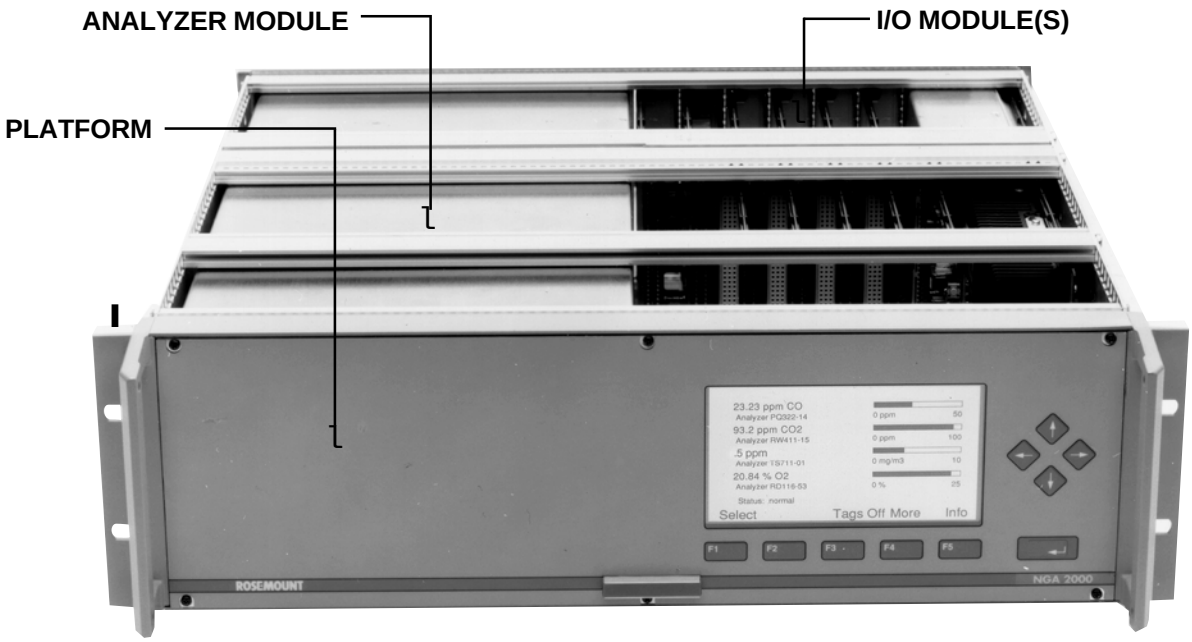
OUTLINE AND MOUNTING DIMENSIONS

A. Ozone air
B. Exhaust
C. Sample
D. Network cable connections to platform
E. 24 VDC power cable to platform
F. Fuse
G. Flow balance adjust
H. Regulator adjust
I. Mounting feet
J. Intake fan
K. Exhaust fan

Dimensions in Inches
(mm in parenthesis)



Platform with internal analyzer module. Several analyzer modules may be integrated with a single platform, either mounted inside or located externally. (Platform shown here with top removed.)



TYPICAL APPLICATIONS

The NGA CLD analyzer module can be used for a variety of applications. Typical applications include:

- NO/NO_x emissions from combustion of fossil fuels in:
  - Incinerators
  - Boilers
  - Gas appliances
  - Vehicle engine exhaust (Meets EPA regulations for NO_x monitoring per 40 CFR.)
- Turbine exhaust
- Nitric acid plant emissions
- Selective catalytic reduction (SCR) process control and efficiency monitoring
- NO emissions from landfill decomposition

PRINCIPLE OF OPERATION

The key benefit of the NGA CLD analyzer is the versatility of the modular approach combined with the sensitivity and stability associated with Emerson's Rosemount Analytical chemiluminescence measurement technology. The CLD module is a complete analytical instrument housing the ozone generator, chemiluminescence reaction chamber, solid-state photodiode detector and signal processing electronics. The reaction chamber operates at atmospheric pressure, thus eliminating the need for the bulky vacuum pump found in other chemiluminescence instruments. The chemiluminescence reaction between ozone and nitric oxide is used to determine the presence of oxides of nitrogen (NO_x) in a sample gas. The chemiluminescence measurement involves the following reaction:

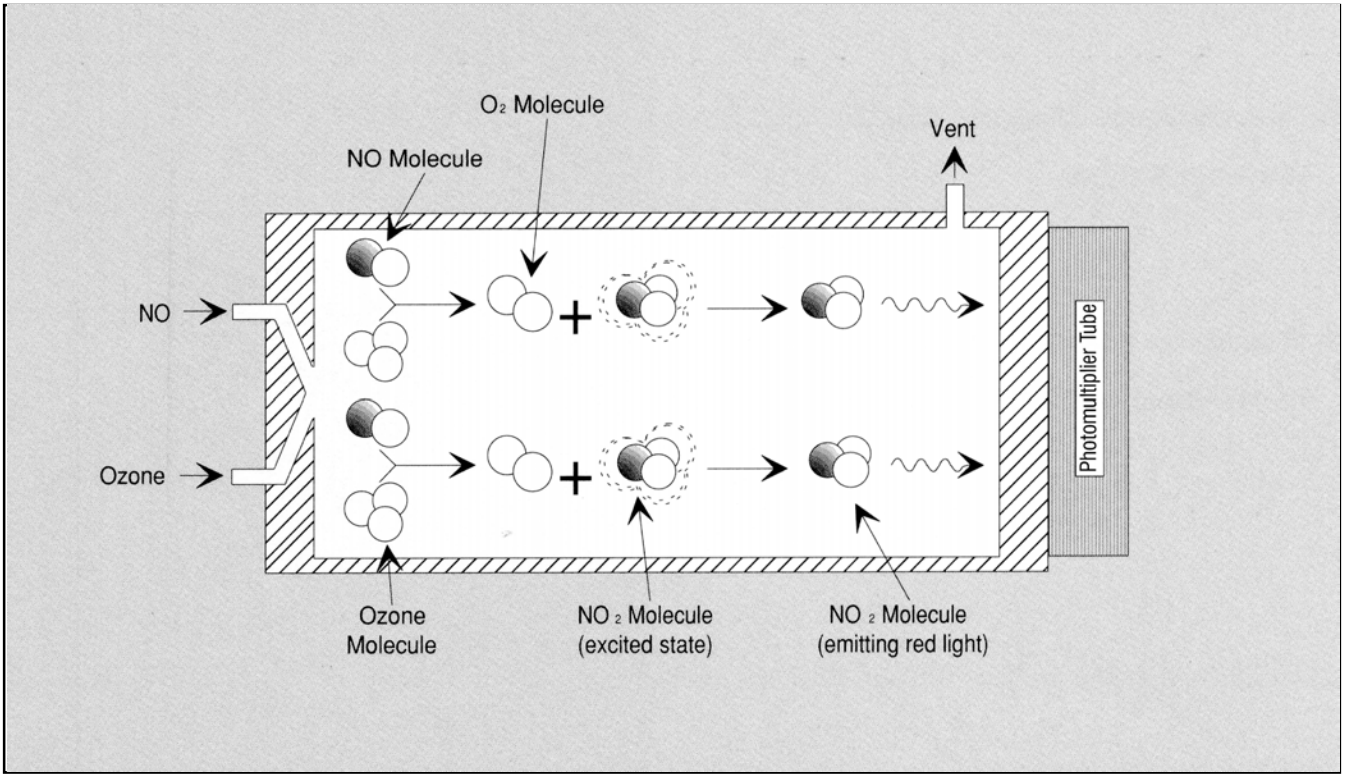
$$NO + O_3 = NO_2^* + O_2 \qquad (1)$$

$$NO_2^* = NO_2 + hv \text{ (red light)} \qquad (2)$$

In reaction (1), nitric oxide and ozone (O_3) readily react to form nitrogen dioxide in an electrically excited (NO_2^*) state. In reaction (2), the excited NO_2^* immediately reverts to the ground state, emitting photons (red light). The light intensity is measured by the photodiode detector. An integral back pressure regulator and capillary tube are used to maintain constant sample pressure and flow rate in the reaction chamber. Combining this controlled flow of sample gas with an excess of ozone insures that the intensity of the resultant chemiluminescence reaction (2) is directly proportional to NO concentration in the sample.

The technique for NO_x (NO/NO_2) measurement is identical to that described above for NO except that before the sample gas is reacted with ozone, any NO_2 in the sample is converted to NO by a heated vitreous carbon bed. Any NO initially present in the sample passes through this converter stage unchanged before being routed to the reaction chamber.

CHEMILUMINESCENCE REACTION



CLD ANALYZER SPECIFICATIONS

GENERAL SPECIFICATIONS

Measurement Species: NO/NO_x

Ranges: 0 to 10...500 ppm through 0 to 250...10,000 ppm, NO/NO_x with four (4) fullscale selectable output ranges; special ranges on request, (maximum 500 ppm NO_2)

Repeatability: +/- 0.5% of fullscale (at constant temperature)

Noise: <1% of fullscale, peak to peak

Linearity: +/- 1% of fullscale

Response Time: < 1 second for 90% of fullscale for ranges of 0 to 25 ppm and greater
< 3 second for 90% of fullscale for ranges less than 0 to 25 ppm

Drift:
Zero: < +/- 1% of fullscale/24 hrs., <+/- 2% of fullscale/week (at constant temperature)

Span: < +/- 1% of fullscale/24 hrs., < +/- 3% of fullscale/week (at constant temperature)

Effect of Temperature: < +/- 2% of fullscale over any 10°C change, maximum rate of change 10°C/hour

Ambient Operating Temperature: 5° to 40°C (41° to 104°F)

ELECTRICAL SPECIFICATIONS

Supply Voltage and Frequency: AC: 85 to 264 VAC, 47 to 63 Hz, 150 W maximum via platform
or
DC: 24 VDC +/- 5%, 120 W, 5A maximum, direct to analyzer module
Ripple and noise: <100 mVpp
Load regulation: < +/- 1%

Outputs:
Analog: 0 to 5 VDC, 0/4 to 20 mA isolated

Digital: Refer to I/O module bulletin and analyzer module matrix for options

GAS CONNECTIONS

Ozone Air: 1/4" O.D. tube fitting, brass

Exhaust: 1/4" O.D. tube fitting, stainless steel

Sample: 1/4" O.D. tube fitting, stainless steel

GAS REQUIREMENTS

Sample Temperature: 0° to 55°C (32° to 131°F)

Sample Flow Rate: 900 ml/minute to 2000 ml/minute

Ozonator Gas: USP breathing grade dry air (up to 2500 ppm NO) or oxygen

Ozonator Gas Flow Rate: 1 L/min. maximum

Sample Pressure: 12 psig +/- 3 psig (826 hPa ±207 hPa)

Ozonator Gas Pressure: 12.5 psig ± 0.5 psig (860 hPa ± 35 hPa)

Particulates: Filtered to < 2 microns

Sample Dewpoint/ Dryness: Sample dewpoint 5.5°C (10°F) below ambient temperature, free of entrained liquid

Materials in Contact with Sample: Stainless steel, Teflon*, brass, neoprene and glass; option: stainless steel, Teflon* and glass

PHYSICAL SPECIFICATIONS

Case Classification: General purpose for installation in weather-protected area

Agency Approvals: CSA-C/US, CE including EMC, low voltage, RWTUV, TUEV Rheinland, BRML, PAC, CCC

Maximum Separation: 1600 m (5280 ft.) (analyzer module to platform)

Weight:
Analyzer Module: 8.2 kg (18 lbs.)

Dimensions:
Analyzer Module: 109 mm x 213 mm x 445 mm (4.3" x 8.4" x 17.5") HWD

Analyzer Module with Platform: 133.4 mm x 482.6 mm x 508.0 mm (5.25" x 19.0"x 20.0") HWD

Mounting: Inside platform (19.0" rack mountable) or custom installed in a panel

Teflon* is a Registered Trademark of E.I. duPont de Nemours Co.

ORDERING INFORMATION

Model	Description
CLD	Process Chemiluminescence NO/NO_x Analyzer Module (CLD)

Level 1	Language
0	English
1	German
2	French
K	English (TUEV/MCERTS approved)
L	German (TUEV/MCERTS approved)
M	French (TUEV/MCERTS approved)

Level 2	Software
2	Software 2.2.1
3	Software 3.3.x
6	Software 3.6.x
7	Software 3.7.x (till September 2005)
9	Actual Standard Software 3.9.x
A	Software 2.3

Level 3	Configuration
C	Calibrated Low Ranges: 0-10, 0-50, 0-100, 0-500 ppm
D	Calibrated High Ranges: 0-250, 0-1000, 0-2500, 0-10000 ppm
G	Calibrated Low Ranges: 0-10, 0-30, 0-100, 0-300 ppm
H	Calibrated Low Ranges: 0-5, 0-10, 0-25, 0-100 ppm
I	Calibrated Low Ranges: 0-50, 0-100, 0-250, 0-500 ppm
K	Calibrated High Ranges: 0-100, 0-500, 0-1000, 0-2500 ppm
L	Calibrated High Ranges: 0-100, 0-500, 0-2000, 0-5000 ppm
M	Calibrated Low Ranges: 0-10, 0-50, 0-100, 0-800 ppm

Level 4	Materials
1	Brass and Neoprene Back Pressure Regulator – 5 psi
2	Brass and Neoprene Back Pressure Regulator – 2 psi
3	Stainless Steel and Viton Back Pressure Regulator – 5 psi
4	Stainless Steel and Viton Back Pressure Regulator – 2 psi
5	Brass and Neoprene Back Pressure Regulator – pump capillary 2 psi

Level 5	Flow Sensor
01	Standard (No Flow Sensor)
02	With Flow Sensor

Level 6	Special
00	None Required
G1	Customer Option (consult factory)
M1	Mounted with vented cooling fan in lower compartment of MLT 2 (power supply included, no CSA certificate)
M2	Mounted with internal cooling fan in lower compartment of MLT 2 (power supply included, no CSA certificate)
XX	Special (consult factory)

Level 7	External Power Supply
0	None Required
4	PS, 10 A, 24 VDC, for cabinet mounting on supporting rails TS35
5	PS, 10 A, 230 VAC, 24 VDC, table-top version
6	PS, 10 A, 230 VAC, 24 VDC, rear panel rack-mount
7	PS, 10 A, 120 VAC, 24 VDC, table-top
8	PS, 10 A, 120 VAC, 24 VDC, rear panel rack-mount
F	PS, 20 A, 230 VAC, 24 VDC, for cabinet mount on supporting rails
G	PS, 20 A, 120 VAC, 24 VDC, for cabinet mount on supporting rails

Level 8	Power Supply Cable
0	None Required
5	Connection of AM with table-top/rack PS, 1 m
6	Connection of AM with table-top/rack PS, 2 m
7	Connection of AM with cabinet PS, 1.5 m

Option Notes	
Level 3:	Option: C, D, G, H Ranges indicated within the configuration identifier are standard. Non-standard ranges within the identifier can be changed by the user or factory calibrated for an additional charge. Indicate an “X” in last position and specify ranges.
Level 7:	Option: 0 Cabinet Power Supply, 10 A, manual switch: 120 VAC or 230 VAC Power Supply, 20 A, Cabinet mount: BxHxT=227 mm x 125 mm x 103 mm

Accessories	
1101588-002ENG	Tag SS (engraved)

Spare Parts	
904910	Peristaltic Tubing

WORLD HEADQUARTERS

Emerson Process Management
Rosemount Analytical Inc.
6565 P Davis Industrial Parkway
Solon, OH 44139 USA
T 440.914.1261
Toll Free in US and Canada
800.433.6076
F 440.914.1271
e-mail: gas.csc@EmersonProcess.com
www.raihome.com

ASIA-PACIFIC

Emerson Process Management
Asia Pacific Private Limited
1 Pandan Crescent
Singapore 128461
Republic of Singapore
T 65 6 777 8211
F 65 6 777 0947
e-mail: analytical@ap.emersonprocess.com

ROSEMOUNT ANALYTICAL EUROPE

Emerson Process Management
GmbH & Co. OHG
Industriestrasse 1
63594 Hasselroth
Germany
T 49 6055 884 0
F 49 6055 884209

EUROPE, MIDDLE EAST AND AFRICA

Emerson Process Management
Shared Services Limited
Heath Place
Bognor Regis
West Sussex PO22 9SH
England
T 44 1243 863121
F 44 1243 845354