Product Data Sheet
PDS 103-101M.A01
June, 2004

Continuous Emissions Monitoring (CEMS) Package With NGA 2000 Analyzers

- Packaged approach to measuring up to five gases plus opacity
- Measurement options: CO, CO_2, SO_2, NO, No_x, O_2, THC and Opacity
- Utilizes Emerson's revolutionary NGA 2000 Series Gas Analyzers
- Fully pre-engineered; designed for maximum uptime
- Self-diagnostics
- Manufactured under ISO 9001-certified quality standards
- Optional installation, startup, certification, and on-going service programs available

WORLD CLASS TECHNOLOGY FROM YOUR ONLY SINGLE SOURCE CEMS SUPPLIER

Emerson Process Management offers a cost-effective, pre-engineered Continuous Emissions Monitoring (CEMS) package for those applications where up to five gases and opacity when required, must be monitored for regulatory compliance.

The Rosemount Analytical GMP 1000M CEMS package provides field-proven analyzer technologies coupled with the most ruggedly constructed and dependable sample extraction and conditioning systems in the industry. The GMP 1000M package is backed by the (single source) capability of Emerson which includes comprehensive CEMS support services. These optional services can include installation supervision, startup, certification testing, in-house training and on-going maintenance contracts.

THE GMP 1000M PACKAGE

The basic GMP 1000M package includes:

- NGA 2000 analyzers
- Heated sample probe
- Temperature controllers for both probe and heated sample line
- Non-freon thermoelectric sample conditioner provides unsurpassed analyzer protection and contains integral pre-cooler, sample pump, condensate removal system and water intrusion monitor for sample pump shutdown in the unlikely event of a conditioner failure
- Automatic calibration at user selectable time intervals
- Local/remote calibration capability for diagnostic testing of analyzers and compliance with the EPA's 40 CFR 60, Appendix F and 40 CFR 75
- "Fast Loop" and analyzer flow control
- Optional HVAC and/or probe blowback for enhanced performance over a wider range of applications

ROSEMOUNT® Analytical

EMERSON™ Process Management

GMP 1000M GAS ANALYZERS

NGA 2000 MLT OVERVIEW

At the heart of the GMP 1000M is Emerson's Rosemount Analytical NGA 2000 MLT, an instrument which brings together more than 40 years of analyzer development and application expertise. The MLT uniquely blends the latest sensors, digital signal processing and software technologies to satisfy the most demanding analysis requirement.

The MLT continuously measures up to five components in a single analyzer using a combination of non-dispersive infrared (NDIR), ultraviolet (UV), and/or visible (VIS) spectroscopy and electochemical or paramagnetic oxygen sensors. In addition, utilizing the MLT as the interface for a flame ionization (FID) analyzer module for total hydrocarbon measurements and/or a chemiluminescence (CLD) analyzer module for NO_x measurements allows the GMP 1000M to monitor the following components:

- Carbon monoxide (CO)
- Carbon dioxide (CO_2)
- Sulfur dioxide (SO_2)
- Nitric oxide (NO)
- Oxides of nitrogen (NO_x)
- Oxygen (O_2)
- Total hyrdrocarbons (THC)

When incorporated into the GMP 1000M, the NGA 2000 MLT provides your facility with unsurpassed performance and reliability.

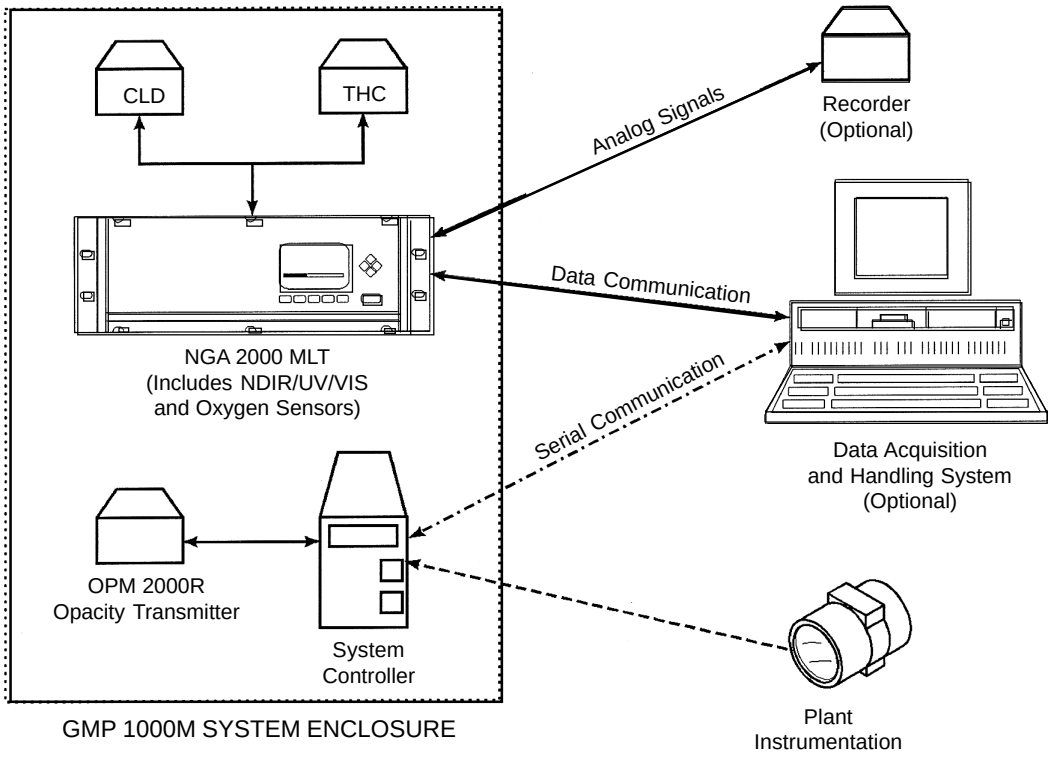
The NGA 2000 MLT offers multiple measurement ranges allowing the GMP 1000M to be used in virtually all applications requiring CEMS. These include:

- Gas turbines
- Natural gas fired boilers
- Fuel oil fired boilers
- Hog fuel boilers*
- Coal fired boilers*
- Process heaters*

The NGA 2000 MLT's specifications for repeatability and zero and span drift surpass all requirements of the U.S. EPA's 40 CFR 60 and 40 CFR 75. In addition, the NGA 2000 MLT fully complies with TUV suitability tests.

* May require additional options. Please consult factory for these applications.

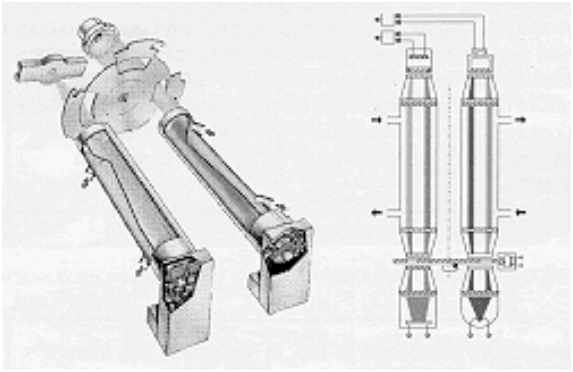
GMP 1000M SYSTEM CONFIGURATION



GMP 1000M GAS ANALYZERS (Cont'd)

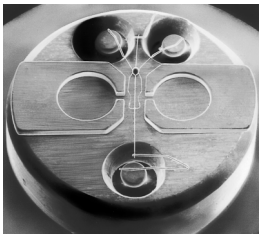
NGA 2000 MLT NDIR/UV/VIS DETECTION METHODS

The MLT's capability to selectively measure multiple components in a compact enclosure is achieved by the use of a unique dual optical bench design.

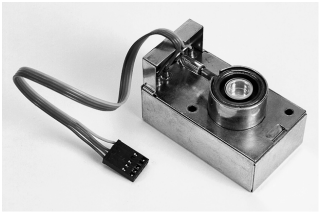


Dual MLT Optical Benches

A Typical Dual MLT Optical Bench (schematic)



Micro-flow Filament (Enlarged)



Micro-flow Detector

Depending on the application, any two combinations of NDIR/UV or VIS channels can be combined on a single chopper motor/dual source assembly. Other application-dependent options include a wide range of sample cell materials optical filters and solid state detectors.

The NDIR micro-flow detector consists of two chambers (measurement and reference) with an interconnected path in which an ultra low flow filament sensor is mounted. During operation, a pulsating flow occurs between the two chambers which is dependent upon sample gas absorption, modulation by the chopper motor and the fill gas of the detector chambers. The gas flow/sensor output is proportional to the measured gas concentration.

The MLT contains a unique eddy current drive chopper motor and source assembly. This design incorporates on board "intelligence" to provide continuous "self test" diagnostics. The brushless motor, long-life bearings, and ultra high rotation speed (120 Hz) ensures long-term reliability, stability, and immunity from power and frequency variations.

Incorporated into the chopper wheel assembly is the patented "Proof-Peak" automatic detector signal compensation feature. This unique feature, operating at 30 times per second, continuously adjusts the detector signal. In addition to providing long term stability, accuracy, and drift free operation this feature facilitates very fast warm-up.

Measuring in the VIS/UV region avoids cross interferences which might occur using IR measurements for some gas mixtures and background components, offering the opportunity for enhanced selectivity and sensitivity.

NGA 2000 MLT Configuration Parameters

COMPONENT	MEASUREMENT TECHNOLOGY	MINIMUM RANGE
Carbon monoxide (CO)	Infrared	0 – 10.0 ppm
Carbon dioxide (CO_2)	Infrared	0 – 5.0 ppm
Sulfur dioxide (SO_2)	Ultraviolet	0 – 25.0 ppm
Nitric oxide (NO)	Infrared	0 – 150.0 ppm
Oxides of nitrogen (NO_x)	Chemiluminescence	0 – 10.0 ppm
Oxygen (O_2)	Paramagnetic	0 – 1%
Oxygen (O_2)	Electrochemical	0 – 1%
Total hydrocarbons (THC)	Flame Ionization	0 – 1.0 ppm

NGA 2000 MLT OXYGEN DETECTION METHODS

Paramagnetic

The determination of oxygen is based on measurement of the magnetic susceptibility of the sample gas. Oxygen is strongly paramagnetic, while other common gases are weakly diamagnetic. The detector used in the MLT is compact, has fast response and a wide dynamic range. The long-life cell is corrosion-resistant, heated and may be easily cleaned as it has rugged self-tensioning suspension and uses a welded "non-glued" construction.

Electrochemical/Galvanic Cell

When sample gas is passed over a selective gas diffusion membrane, the oxygen present diffuses into an electrolyte. The oxygen is absorbed and is reduced to water. Lead oxide is developed at the anode. Electrons generated at the anode flow to the cathode of the cell producing a current that is proportional to the oxygen concentration. The principle offers a cost-effective analysis with negligible interference, ease of maintenance and immunity from vibration.

Oxides of Nitrogen

The NGA 2000 CLD uses the chemiluminescence method of detection for NO_x. First, all NO_2 is reduced to NO, then ozone, which is internally generated and is reacted with the NO to form nitrogen dioxide in an electronically excited state. The excited molecule immediately reverts to the ground state emitting photons (essentially red light). The light is measured by a photodiode. The intensity of the chemiluminescence is directly proportional to the NO_x concentration.

The NGA 2000 CLD has user-selectable full-scale ranges from 0 - 10.0 ppm to 0 - 10,000 ppm.

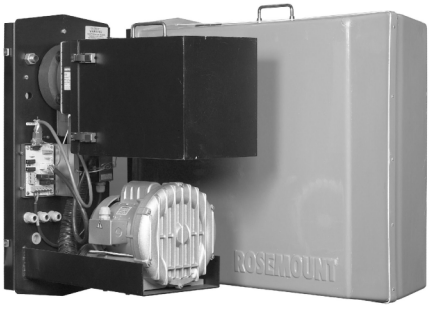
Total Hydrocarbons

The NGA 2000 FID uses the flame ionization method of detection. The sensor is a burner in which a regulated flow of sample gas passes through a flame sustained by regulated flows of fuel gas and air. Within the flame, the hydrocarbon sample stream undergoes a complex ionization that produces electrons and positive ions which are collected by an electrode causing current to flow through a measuring circuit. The ionization current is proportional to the rate at which carbon atoms enter the burner and is therefore a measure of the concentration of hydrocarbons in the sample.

The NGA 2000 FID has user-selectable, full-scale ranges from 0 - 1.0 ppm to 0 - 10%.

Opacity/Dust Density

The OPM 2001 Opacity/Dust Density Transmitter meets EPA 40 CFR, Part 60, Appendix B Performance Specifications. The HART® protocol allows operators to interface with the OPM 2001 from any location where the signal wires terminate and permits single-person calibration. It is the only opacity monitor on the market to utilize a single source, single detector, double pass principle of measurement with no moving parts. Measurement ranges are field adjustable.



SP 110A GAS SAMPLING PROBE

The Model SP 110A Gas Sampling Probe extracts a representative sample from a gas stream for analysis. The probe's external filter reduces particulate in the sample, eliminating blockage of the heated sample line. An optional backpurge feature is designed to rapidly clean the filter and sample tube reducing maintenance.

Sample probe problems are typically caused by corrosive condensate. The SP 110A probe and sample line are heated, maintaining an elevated sample temperature to prevent condensation.

The SP 110A Gas Sampling Probe can extract a representative sample in temperatures up to 1850°F (1010°C).

SPECIFICATIONS [1]

Model GMP 1000M

Dimensions single bay: 71 in. H x 24 in. W x 32 in. D (1778 mm H x 610 mm W x 800 mm D)

Enclosure: NEMA 12

Sample moisture: up to 30% moisture

Sample temperature: less than 1850°F (1010°C)

Sample pressure: -5 to 15 inches (-127 to 381 mm) H_2O

Sample flow rate: 5 L/min from sample probe to conditioning drier. Sample then splits to bypass – providing field selectable flow rate to analyzer(s) from 0.5 to 1 L/m

Ambient temperature range: 45° to 85°F (7° to 29°C) for use in controlled environment 0° to 110°F (-18° to 43°C) with optional HVAC

Ambient humidity: 0 to 95%, non-condensing

Response time: Variable. Time lag for sample transport from probe to analyzer is dependent upon distance. Approximately 0.5 sec/ft.

Power requirements: 110/220 VAC ±10%, 60 Hz ±1.5 Hz, single phase

Power consumption: Approximately 6 kVA with 100 ft. (30 M) of sample line (25 Watts/ft.)

[1] Specifications are subject to change without notification. Our policy is one of continuous improvement, and we reserve the right to change specifications.

ORDERING INFORMATION

Model	Description
GMP 1000M	CEM System with NGA 2000 Analyzers (GMP 1000M)

Level 1	Number of Gases (With sample probe and cond sys, auto cal, and NGA 2000 MLT platform)
1	One Gas
2	Two Gasses
3	Three Gasses
4	Four Gasses
5	Five Gasses

Level 2	Diluent Correction
0	None
1	Diluent Correction

Level 3	Analyzer 1
11	CO: 0-50 ppm A1
12	CO: 0-100 ppm A2
13	CO: 0-1000 ppm A2
14	CO: 0-10000 ppm A4
20	CO_2: 0-5% B5
21	CO_2: 0-20% B5
30	SO_2: 0-30 ppm F0
31	SO_2: 0-400 ppm F1
32	SO_2: 0-800 ppm F1
33	SO_2: 0-3000 ppm F2
50	NO: 0-150 ppm E0
51	NO: 0-250 ppm E1
52	NO: 0-500 ppm E1
53	NO: 0-1000 ppm E1
54	NO: 0-2500 ppm E1
55	NO: 0-10000 ppm E2
60	O_2: 0-5 to 0-25% P02-03
61	O_2: 0-5, 10, 25, 50% E02-02
70	NO_x: 0-10 ppm CAC10B00
71	NO_x: 0-50 ppm CAC10B00
72	NO_x: 0-100 ppm CAC10B00
73	NO_x: 0-500 ppm CAC10B00
80	THC (FID)
99	Special, Other (consult factory)

Level 4	Analyzer 2
00	None
11	CO: 0-50 ppm A1
12	CO: 0-100 ppm A2
13	CO: 0-1000 ppm A2
14	CO: 0-10000 ppm A4
20	CO_2: 0-5% B5
21	CO_2: 0-20% B5
30	SO_2: 0-30 ppm F0
31	SO_2: 0-400 ppm F1
32	SO_2: 0-800 ppm F1
33	SO_2: 0-3000 ppm F2
50	NO: 0-150 ppm E0
51	NO: 0-250 ppm E1
52	NO: 0-500 ppm E1
53	NO: 0-1000 ppm E1
54	NO: 0-2500 ppm E1
55	NO: 0-10000 ppm E2
60	O_2: 0-5 to 0-25% P02-03
61	O_2: 0-5, 10, 25, 50% E02-02
70	NO_x: 0-10 ppm CAC10B00
71	NO_x: 0-50 ppm CAC10B00
72	NO_x: 0-100 ppm CAC10B00
73	NO_x: 0-500 ppm CAC10B00
80	THC (FID)
99	Special, Other (consult factory)

ORDERING INFORMATION (continued)

Level 5	Analyzer 3	
	00	None
	11	CO: 0-50 ppm A1
	12	CO: 0-100 ppm A2
	13	CO: 0-1000 ppm A2
	14	CO: 0-10000 ppm A4
	20	CO_2: 0-5% B5
	21	CO_2: 0-20% B5
	30	SO_2: 0-30 ppm F0
	31	SO_2: 0-400 ppm F1
	32	SO_2: 0-800 ppm F1
	33	SO_2: 0-3000 ppm F2
	50	NO: 0-150 ppm E0
	51	NO: 0-250 ppm E1
	52	NO: 0-500 ppm E1
	53	NO: 0-1000 ppm E1
	54	NO: 0-2500 ppm E1
	55	NO: 0-10000 ppm E2
	60	O_2: 0-5 to 0-25% P02-03
	61	O_2: 0-5, 10, 25, 50% E02-02
	70	NO_x: 0-10 ppm CAC10B00
	71	NO_x: 0-50 ppm CAC10B00
	72	NO_x: 0-100 ppm CAC10B00
	73	NO_x: 0-500 ppm CAC10B00
	80	THC (FID)
	99	Special, Other (consult factory)

Level 6	Analyzer 4	
	00	None
	11	CO: 0-50 ppm A1
	12	CO: 0-100 ppm A2
	13	CO: 0-1000 ppm A2
	14	CO: 0-10000 ppm A4
	20	CO_2: 0-5% B5
	21	CO_2: 0-20% B5
	30	SO_2: 0-30 ppm F0
	31	SO_2: 0-400 ppm F1
	32	SO_2: 0-800 ppm F1
	33	SO_2: 0-3000 ppm F2
	50	NO: 0-150 ppm E0
	51	NO: 0-250 ppm E1
	52	NO: 0-500 ppm E1
	53	NO: 0-1000 ppm E1
	54	NO: 0-2500 ppm E1
	55	NO: 0-10000 ppm E2
	60	O_2: 0-5 to 0-25% P02-03
	61	O_2: 0-5, 10, 25, 50% E02-02
	70	NO_x: 0-10 ppm CAC10B00
	71	NO_x: 0-50 ppm CAC10B00
	72	NO_x: 0-100 ppm CAC10B00
	73	NO_x: 0-500 ppm CAC10B00
	80	THC (FID)
	99	Special, Other (consult factory)

ORDERING INFORMATION (continued)

Level 7	Analyzer 5	
	00	None
	11	CO: 0-50 ppm A1
	12	CO: 0-100 ppm A2
	13	CO: 0-1000 ppm A2
	14	CO: 0-10000 ppm A4
	20	CO_2: 0-5% B5
	21	CO_2: 0-20% B5
	30	SO_2: 0-30 ppm F0
	31	SO_2: 0-400 ppm F1
	32	SO_2: 0-800 ppm F1
	33	SO_2: 0-3000 ppm F2
	50	NO: 0-150 ppm E0
	51	NO: 0-250 ppm E1
	52	NO: 0-500 ppm E1
	53	NO: 0-1000 ppm E1
	54	NO: 0-2500 ppm E1
	55	NO: 0-10000 ppm E2
	60	O_2: 0-5 to 0-25% P02-03
	61	O_2: 0-5, 10, 25, 50% E02-02
	70	NO_x: 0-10 ppm CAC10B00
	71	NO_x: 0-50 ppm CAC10B00
	72	NO_x: 0-100 ppm CAC10B00
	73	NO_x: 0-500 ppm CAC10B00
	80	THC (FID)
	99	Special, Other (consult factory)

Level 8	Cabinet	
	10	NEMA 12
	11	NEMA 12 with HVAC
	21	NEMA 4 with HVAC
	31	NEMA 4X with HVAC

Level 9	OPM2000R	
	0	None
	1	OPM2000R Included Refer to Price List PL 106-200R.uom

Level 10	Probe Blowback	
	0	None
	1	Probe Blowback

Level 11	Heated Sample Line	
	000	None
	XXX	Length of Line Required (price per ft.)

Option Notes	
General Notes:	CEM System with NGA 2000 Analyzers 454 / 1000 kg/lb. shipping weight Applications include: gas- or oil-fired boilers and gas- or oil-fired process heaters. Consult factory for the following applications: municipal, medical or hazardous waste incinerators; cement kilns; glass applications; coal-fired boilers; solid fuel-fired boilers; refinery gas; FFCUs; sulfur units and process heaters. The cost of the OPM 2001 Opacity Transmitter is not included in this sample price.
Level 1:	Option: 1, 2, 3, 4, 5 2 Instruction manuals are included at no charge.
Level 8:	Option: 11, 21, 31 HVAC includes as a minimum 6000 Btu/hr. A/C and 5000W heater, temperature range good for -18 to 43°C (0 to 110°F).

EMERSON SERVICE AND SUPPORT

NATIONAL RESPONSE CENTER

Emerson Process Management is committed to providing world class service and support. For immediate response to your service and support needs, our National Response Center can be reached toll-free, 24 hours a day at 1-800-654-RSMT. A trained Emerson call coordinator will accurately record all pertinent information, access an historical database of service information, and contact a qualified Emerson Process Management service representative. The service representative will then call to assess the situation and will provide immediate assistance over the telephone or schedule a service visit if required.

With distribution centers across the globe, Emerson provides fast turnaround and timely shipping and delivery services.

TRAINING

Training your in-house personnel is an integral part of our ability to be a complete process analytical and CEMS supplier. We offer high quality technical training programs targeted to meet your specific needs. Our training programs may include reference study texts, video tapes, classroom lectures with active participation, hands-on equipment and cooperative development of an on-site preventive maintenance program. You choose the type of training to suit your needs.

FIELD ASSISTANCE

Emerson also provides startup and operational assistance as needed. Our field engineers are certified in accordance with applicable industry standards and are widely known for their expertise in problem solving.

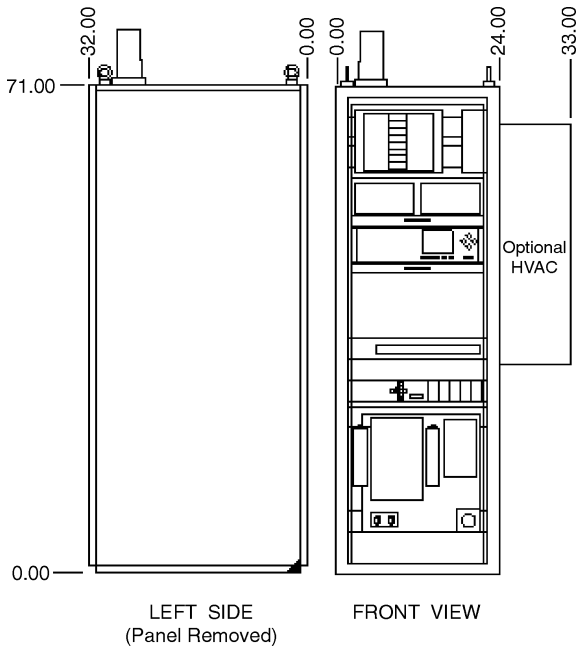
MAINTENANCE TESTING

In order to maximize your analyzer uptime, Rosemount maintains a greater service presence than any other supplier. Our contract maintenance programs provide both preventive and corrective measures to address your particular situation. These measures can be performed exclusively by us or as an adjunct to your personnel.

CERTIFICATION TESTING

The primary requirement of any CEMS system is to help keep your process in compliance with applicable regulations. With that in mind, Emerson Process Management is committed to providing expert consultation to help take you through successful installation, startup, testing, and documentation

DIMENSIONAL DRAWINGS



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