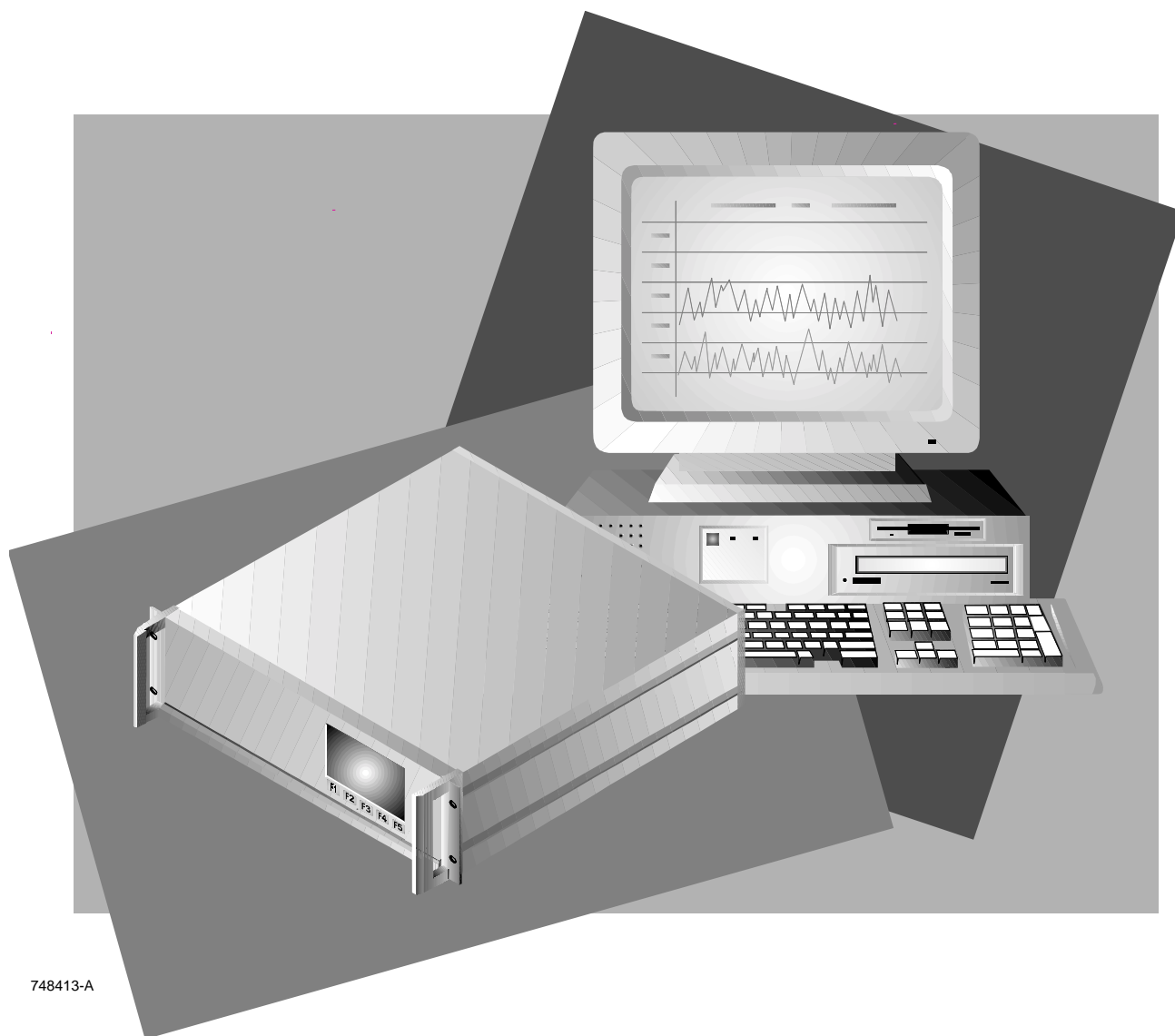


# FAST RESPONSE PARAMAGNETIC DETECTOR ANALYZER MODULE



# **NOTICE**

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The information contained in this document is subject to change without notice.

This manual is based on the production version of the Fast Response Paramagnetic Detector Analyzer Module. Hardware and/or software changes may have occurred since this printing.

Rosemount Analytical's NGA 2000 system of Modular Gas Analyzers and Controllers are patented, under U.S. Patent 5.787.015.

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Manual Part Number 748413-A  
August 1999  
Printed in U.S.A.

**Rosemount Analytical Inc.**  
4125 East La Palma Avenue  
Anaheim, California 92807-1802

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## PURPOSE/SAFETY SUMMARY

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The purpose of this manual is to provide the procedures for the installation, operation and maintenance of this NGA 2000 module.

Some sections may describe equipment not used in your NGA 2000 system configuration. The user should become thoroughly familiar with the operation of this module before operating it. Read this instruction manual completely.



***To avoid explosion, loss of life, personal injury and damage to this equipment and on-site property, all personnel authorized to install, operate and service the this equipment should be thoroughly familiar with and strictly follow the instructions in this manual. SAVE THESE INSTRUCTIONS.***

***If this equipment is used in a manner not specified in these instructions, protective systems may be impaired.***

---

**DANGER** is used to indicate the presence of a hazard which **will** cause **severe** personal injury, death, or substantial property damage if the warning is ignored

**WARNING** is used to indicate the presence of a hazard which **can** cause **severe** personal injury, death, or substantial property damage if the warning is ignored.

**CAUTION** is used to indicate the presence of a hazard which **will** or **can** cause **minor** personal injury or property damage if the warning is ignored.

**NOTE** is used to indicate installation, operation, or maintenance information which is important but not hazard-related.

---



### **WARNING: ELECTRICAL SHOCK HAZARD**

***Do not operate without covers secure. Servicing requires access to live parts which can cause death or serious injury. Refer servicing to qualified personnel.***

***For safety and proper performance this instrument must be connected to a properly grounded three-wire source of power.***

---



---

**WARNING: POSSIBLE EXPLOSION HAZARD**

*This equipment is not designed for and should not be used in the analysis of flammable samples. Use of this equipment in this way could result in explosion and death.*

---



---

**WARNING: POSSIBLE EXPLOSION HAZARD**

*Verify that all gas connections are made as labeled and are leak free. Improper gas connections could result in explosion or death.*

---

**NOTE**

*Apply leak test liquid to cell or detectors only as a last resort.*

---



---

**WARNING: PARTS INTEGRITY**

*Tampering or unauthorized substitution of components may adversely affect safety of this product. Use only factory documented components for repair*

---



---

**WARNING: OVER-VOLTAGE SPIKING**

*If this Analyzer Module is used with a non-Rosemount Analytical power supply, adding Rosemount Analytical PN 90331 Current Protector in series with the 24 V positive line will prevent over-voltage spiking and resultant fuse blowing when powering up the instrument.*

---



---

**CAUTION: PRESSURIZED GAS**

*This module requires periodic calibration with a known standard gas. See General Precautions for Handling and Storing High Pressure Gas Cylinders in the rear of this manual.*

---





**CAUTION: HAND INJURY HAZARD**

*Do not place hands or fingers in Platform front handles when the front panel is open. Dropping front panel while hand or fingers are inside either handle can cause serious injury.*

---



**CAUTION: OVERBALANCE HAZARD**

*This Analyzer Module may tip instrument over if it is pulled out too far and the Platform is not properly supported.*

---

---

## **GLOSSARY**

---

### ***Analyzer Module***

Self contained analysis modules that are designed to be installed into the NGA 2000 System. One Analyzer Module can be installed into a Single Enclosure containing the Platform Module. Two Analyzer Modules can be installed into a Dual Enclosure. The simplest NGA 2000 System consists of one Analyzer Module.

### ***Backplane***

The interconnect circuit board which the Controller Board, Power Supply Board, I/O Board(s) and Expansion Board(s) are plugged into the Backplane

### ***Control module***

The operator interface plus the Controller Board.

### ***Controller Board***

The Controller Board in the Platform which runs the software program that operates the Display, Keypad and Network Manager. The Controller Board plugs into the Backplane.

### ***Distribution Assembly***

The Distribution Assembly consists of the Backplane and the card cages in the Platform Module that contain I/O Module(s) and Expansion Module(s).

### ***Expansion Board***

The Expansion Board performs special features not related to I/O functions. The Expansion Board plugs into the Backplane from the Platform front.

### ***I/O Module***

An auxiliary module that provides some sort of interface to the outside world. I/O modules may include analog outputs, relay contacts, and digital interfaces. In general, they are mounted in platforms as options.

### ***Operator Interface***

The Display and Keyboard of the Platform.

***Platform***

Any combination of the NGA case, the display and computer board, power supply, and I/O modules. In general, it could be considered to be anything in the NGA system other than the analyzer modules.

***Power Supply***

Any of a variety of components that provide conditioned power to other NGA 2000 components, from the Power Supply Board that plugs into the Backplane in a stand-alone instrument to several larger ones that can power larger collections of modules and components.

***Primary Variable***

The measured species concentration value from an Analyzer Module.

***Secondary Variable***

The current status data placed on the network by an Analyzer Module. This includes sample flow, source voltage and other diagnostic information.

***Softkeys***

The five function keys located below the front panel display. The menu function for each softkey is displayed directly above it and is controlled by the software.

***System***

A NGA 2000 System consisting of one (or more) Analyzer Modules, an optional Platform, one or more optional I/O Boards, an optional Expansion Board and an optional Supplemental Power Supply.

---

## SPECIFICATIONS

---

<b>MEASUREMENT SPECIES:</b>	Oxygen
<b>RANGES:</b>	0 to 100% oxygen; four fullscale selections (for suppressed ranges, consult factory)
<b>REPEATABILITY:</b>	±1% of fullscale (at constant temperature)
<b>MINIMUM DETECTABLE LEVEL:</b>	0.01% oxygen
<b>NOISE:</b>	<1% of fullscale, peak-to-peak
<b>LINEARITY:</b>	±1% of fullscale
<b>RESPONSE TIME:</b>	0 to 90% of fullscale in 2 seconds or less
<b>DRIFT (ZERO AND SPAN):</b>	<±2% of fullscale/week of fullscale/week at constant temperature; <±1% of fullscale/24 hours of fullscale at constant temperature
<b>EFFECT OF TEMPERATURE:</b>	<±1% of fullscale over any 10°C interval for rate of change no greater than 10°C per hour
<b>ENVIRONMENT:</b>	Location - Class B controlled, indoor, non-hazardous
<b>AMBIENT TEMPERATURE:</b>	0 to 45°C (32 to 113°F)
<b>EFFECT OF FLOW:</b>	<1% of range when sample flow rate is changed by 100 ml/min.
<b>POWER REQUIREMENTS:</b>	24 VDC ±5%, 50 W max.; ripple and noise: <100 mV peak-to-peak; line and load regulations: <±1%

---

## SPECIFICATIONS – SAMPLE

---

<b>TEMPERATURE:</b>	10 to 66°C (50 to 150°F)
<b>FLOW RATE:</b>	800 to 1400 ml/min.
<b>EXHAUST PRESSURE:</b>	-345 to 690 hPa-gauge (-5 to 10 psig)
<b>PARTICLES:</b>	filtered to <2 microns
<b>DEWPOINT:</b>	below 43°C (110°F), no entrained liquid
<b>MATERIALS IN CONTACT WITH SAMPLE:</b>	Glass, 316 stainless steel, epoxy resin, Viton A, platinum, polypropylene

---

**SPECIFICATIONS - PHYSICAL**

---

<b>CASE CLASSIFICATION:</b>	General purpose for installation in weather-protected areas
<b>DIMENSIONS:</b>	See Outline and Mounting Dimensions, Figure 2-4
<b>WEIGHT:</b>	9 kg (19.8 lbs.)
<b>MOUNTING:</b>	Inside a Platform or custom-installed in a panel
<b>MAXIMUM LENGTH OF LON CABLE:</b>	1600 m (1 mile) between Analyzer Module and Platform

**See the Preface section of the Platform Components manual for specifications regarding Platform-related components (e.g., case dimensions) and the Preface of the I/O Module manual for specifications regarding I/O (e.g., relay outputs).**

---

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### ***CUSTOMER SERVICE, TECHNICAL ASSISTANCE AND FIELD SERVICE***

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For order administration, replacement Parts, application assistance, on-site or factory repair, service or maintenance contract information, contact:

**Rosemount Analytical Inc.  
Process Analytical Division  
Customer Service Center  
1-800-433-6076**

---

### ***RETURNING PARTS TO THE FACTORY***

---

Before returning parts, contact the Customer Service Center and request a Returned Materials Authorization (RMA) number. Please have the following information when you call: *Model Number, Serial Number, and Purchase Order Number or Sales Order Number.*

Prior authorization by the factory must be obtained before returned materials will be accepted. Unauthorized returns will be returned to the sender, freight collect.

When returning any product or component that has been exposed to a toxic, corrosive or other hazardous material or used in such a hazardous environment, the user must attach an appropriate Material Safety Data Sheet (M.S.D.S.) or a written certification that the material has been decontaminated, disinfected and/or detoxified.

Return to:

**Rosemount Analytical Inc.  
4125 East La Palma Avenue  
Anaheim, California 92807-1802**

---

### ***TRAINING***

---

A comprehensive Factory Training Program of operator and service classes is available. For a copy of the *Current Operator and Service Training Schedule* contact the Technical Services Department at:

**Rosemount Analytical Inc.  
Phone: 1-718-986-7600  
FAX: 1-714-577-8006**

---

## **DOCUMENTATION**

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The following Fast Response Paramagnetic Detector Analyzer Module instruction materials are available. Contact Customer Service or the local representative to order.

748413 Instruction Manual (this document)

---

## **COMPLIANCES**

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This product may carry approvals from several certifying agencies, including Factory Mutual and the Canadian Standards Association (which is also an OSHA accredited, Nationally Recognized Testing Laboratory), for use in non-hazardous, indoor locations



Rosemount Analytical Inc. has satisfied all obligations from the European Legislation to harmonize the product requirements in Europe.



This product complies with the standard level of NAMUR EMC. Recommendation (May 1993).

**NAMUR**

This product satisfies all obligations of all relevant standards of the EMC framework in Australia and New Zealand.



# ***PREFACE***

---

---

## ***NOTES***

---



---

## **1.1 OVERVIEW**

---

This manual describes the Fast Response Paramagnetic Detector (FR-PMD) Analyzer Module of Rosemount Analytical's NGA 200 Series of gas analysis components.

The FR-PMD Analyzer Module is designed to continuously determine the concentration of oxygen in a flowing gaseous mixture. The concentration is expressed in ppm or percent volume oxygen.

The Analyzer Module is designed as a slide-in module (if configured in stand-alone instrument fashion), removable from the front of the Platform, with gas connections made from the rear. All electronics relative to sample detection and conditioning are included in this module.

---

## **1.2 TYPICAL APPLICATIONS**

---

FR-PMD Analyzer Module applications include:

- engine exhaust (ICEE) analysis
- certain chemical production processes

---

## **1.3 FEATURES**

---

Among the features incorporated into the FR-PMD Analyzer Module are:

- Improved shock and vibration resistance
- Insensitivity to sample flow variation
- Improved sample transport time

## 1.4 THEORY OF TECHNOLOGY

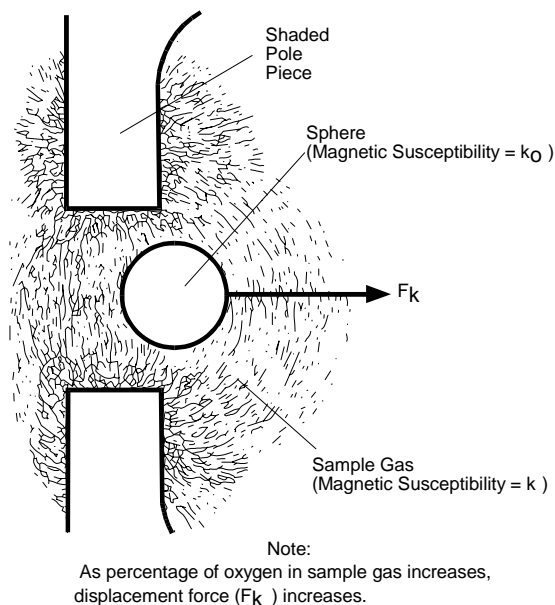
Oxygen is strongly paramagnetic (i.e., capable of becoming a temporary magnet when placed in a magnetic field) while most other common gases are weakly diamagnetic (i.e., tend to be non-magnetic). See Figure 1-1.

The magnetic susceptibility of the flowing gas sample is sensed in the detector/magnet assembly. As shown in Figure 1-2, a dumbbell shaped, nitrogen-filled, hollow gas test body is suspended on a platinum/nickel alloy ribbon in a non-uniform magnetic field.

Because of a "magnetic buoyancy" effect, the spheres of the test body are subjected to displacement forces, resulting in a displacement torque proportional to the magnetic susceptibility of the gas surrounding the test body.

Measurement is accomplished by a null-balance system, whereby the displacement torque is opposed by an equal and opposite restorative torque. The restoring current is automatically maintained at the correct level by an electro-optical feedback system. A beam of light from the source LED is reflected off the square mirror attached to the test body onto a bi-cell (dual photodiode).

The current required to keep the test body to the null position is a linear function of the total magnetic susceptibility of the sample gas.



**FIGURE 1-1. SPHERICAL BODY IN NON-UNIFORM MAGNETIC FIELD**

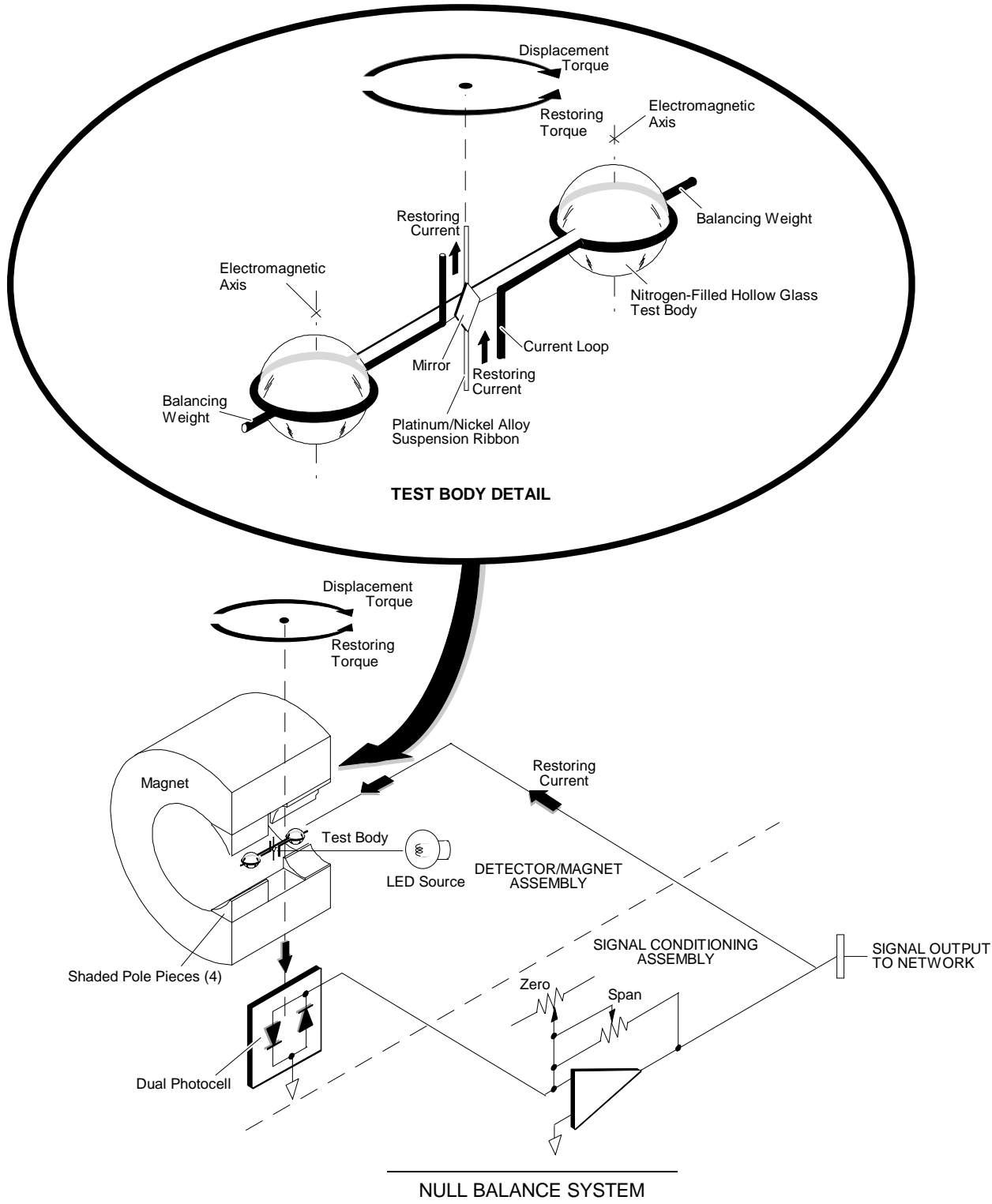
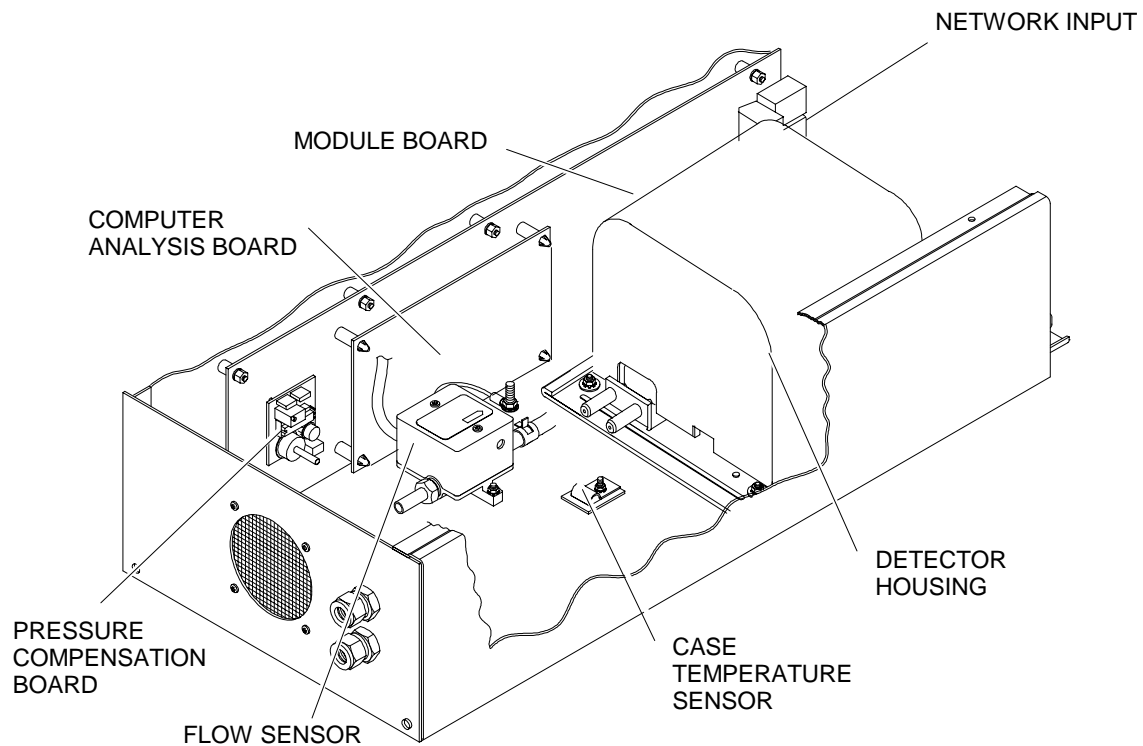


FIGURE 1-2. PARAMAGNETIC DETECTOR TECHNOLOGY



**FIGURE 1-3. FAST RESPONSE PARAMAGNETIC DETECTOR ANALYZER MODULE - TOP VIEW**

## 2.1 UNPACKING

If the Fast Response Paramagnetic Analyzer Module is received as a separate unit, carefully examine the shipping carton and contents for signs of damage. Immediately notify the shipping carrier if the carton or contents is damaged. Retain the carton and packing material until all components associated with the Analyzer Module are operational.

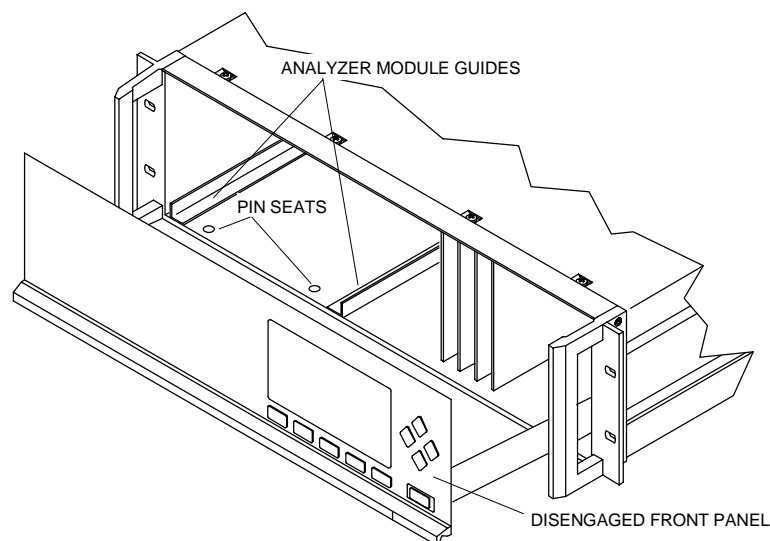
## 2.2 ASSEMBLY

If the Analyzer Module requires assembly with other components (e.g., the Platform and associated I/O Modules), do so at this time. Following the guides on the bottom left and bottom center of the Platform, carefully slide the Analyzer Module halfway into place.



### **CAUTION: HAND INJURY HAZARD**

*Do not place hands or fingers in the Platform front handles when front panel is open. Dropping the front panel of the Platform while hand or fingers are inside either handle can cause serious injury.*



**FIGURE 2-1. ANALYZER MODULE INSTALLATION INTO INSTRUMENT PLATFORM**

Lift the spring-loaded pins on the front of the Analyzer Module, and carefully slide it the rest of the distance. Secure the module in position by releasing the pins, which seat in the available holes in the bottom of the case (see Figure 2-1). If the module and Platform are difficult to assemble, remove the module, ensure the top cover of the module is firmly seated on the hold-down screws, and repeat the assembly procedure.

Install I/O Module(s) according to guidelines in the I/O manual. After startup and calibration have been performed, secure the front panel with the six screws provided.

---

### 2.3 LOCATION

---

Install the Analyzer Module in a clean, non-hazardous, weather protected, vibration free location free from extreme temperature variations. For best results, either install the module near the sample stream to minimize sample transport time or supply a flow greater than necessary and route only the appropriate amount through the Analyzer Module.

Observing these requirements are critical. Note the following:

Excessive vibration can cause a noisy readout. To minimize vibration effects, the detector/magnet assembly is enveloped in a shock-mounted compartment.

The user should ensure, when making any internal electrical connections, that no cables are placed in contact with the detector assembly or associated internal sample inlet and outlet tubing.

Magnetic susceptibilities and partial pressures of gases vary with temperature. Permissible ambient temperature range is 32°F to 113°F (0°C to 45°C).

The interior of the Detector Assembly is maintained at approximately 144°F (62°C) by an electronically controlled heater. Prior to entering the detector assembly, the sample is heated in a coiled tubing to match the detector's temperature.

---

## 2.4 GASES

---

### 2.4.1 REQUIREMENTS

#### **Calibration Gases**

Analyzer Module calibration requires the establishment of zero and span calibration points. This requires a zero standard gas to set the zero point span gas to establish a calibration point at or near the upper range limit.

An oxygen-free gas, typically nitrogen, is required for use as the zero standard gas. Recommendations for span calibration gases, based on various operating ranges, are tabulated in Table 3-2. Air (20.93% oxygen) can be used as span gas regardless of the ranges used for sampling, although very low ranges may lose accuracy.

#### **Sample Gas**

Sample gas should be non-flammable.

#### **Temperature**

Sample temperature at the inlet should be from 50°F to 150°F (10°C to 66°C). A maximum entry temperature of 110°F (43°C) is recommended to prevent cooling of the sample and possible internal condensation. Such condensation could damage some components of the Analyzer Module. This recommendation can be ignored if a thoroughly dry sample is examined.

#### **Pressure**

Sample exhaust pressure limits are -5 to 10 psig (-345 to 690 hPa-gauge). Normal operation is in the positive range, between 0 and 10 psig (0 and 690 hPa-gauge). Negative gauge pressures are not normally recommended, but may be used in certain special applications.

To prevent over-pressurization, insert a pressure relief valve into the sample inlet line. A check valve should also be placed in the outlet line if the Analyzer Module is connected to a manifold associated with a flare or other apparatus that does not operate at atmospheric pressure.

The outlet port is commonly vented to the atmosphere. Any change in barometric pressure has a directly proportional effect on the indicated percent of oxygen, and should be neutralized through manual or computer correction of data. Note the following example:

Range = 0% to 5% oxygen

## 2 INSTALLATION

Barometric pressure change after calibration = 1%

Analyzer Module measurement = 5% oxygen

Measurement error =  $0.01 \times 5\%$  oxygen

Fullscale span = 5% oxygen

0.05% oxygen error = 1% of fullscale

The error is more significant for suppressed range 99% to 100%.

An optional barometric pressure compensation board is available to automatically perform this correction.

A general rule regarding calibration gas pressure is that it should be the same as the expected sample gas pressure during routine operation.

The above requirement increases the difficulty of operation at negative gauge pressure. A suction pump can be connected to the outlet port for drawing sample through the Analyzer Module. Such operation necessitates special precautions to ensure accurate readout, including the following:

The need for equilibrium between sample and gas calibration pressures.

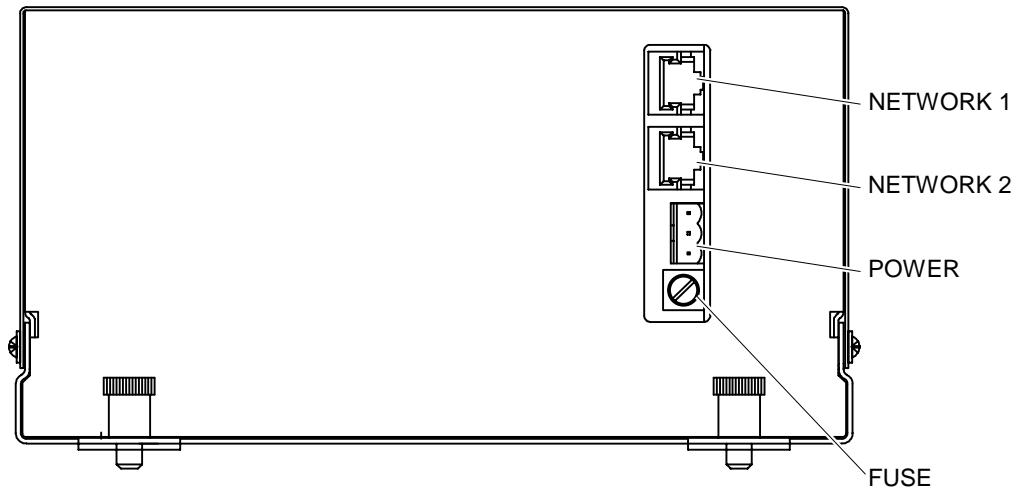
Any leakage in the sample handling system will decrease readout accuracy.

### **Flow Rate**

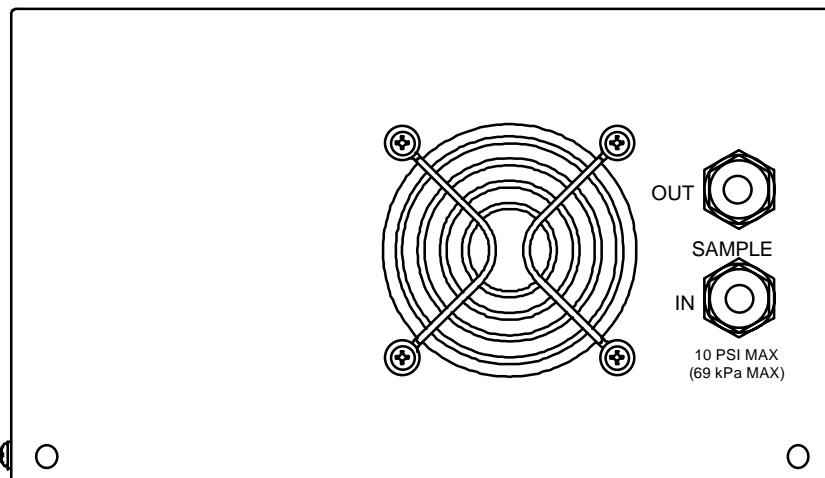
Recommended sample flow rate is 800 to 1400 ml/min.,  $\pm 40$  ml/min. Optimum flow rate is 1100 ml/min.

If flow is held to within tolerance and operating pressure remains constant, zero and span drift will meet specified limits.





**FIGURE 2-2. FR-PMD FRONT PANEL CONNECTIONS**



**FIGURE 2-3. FR-PMD BACK PANEL CONNECTIONS**

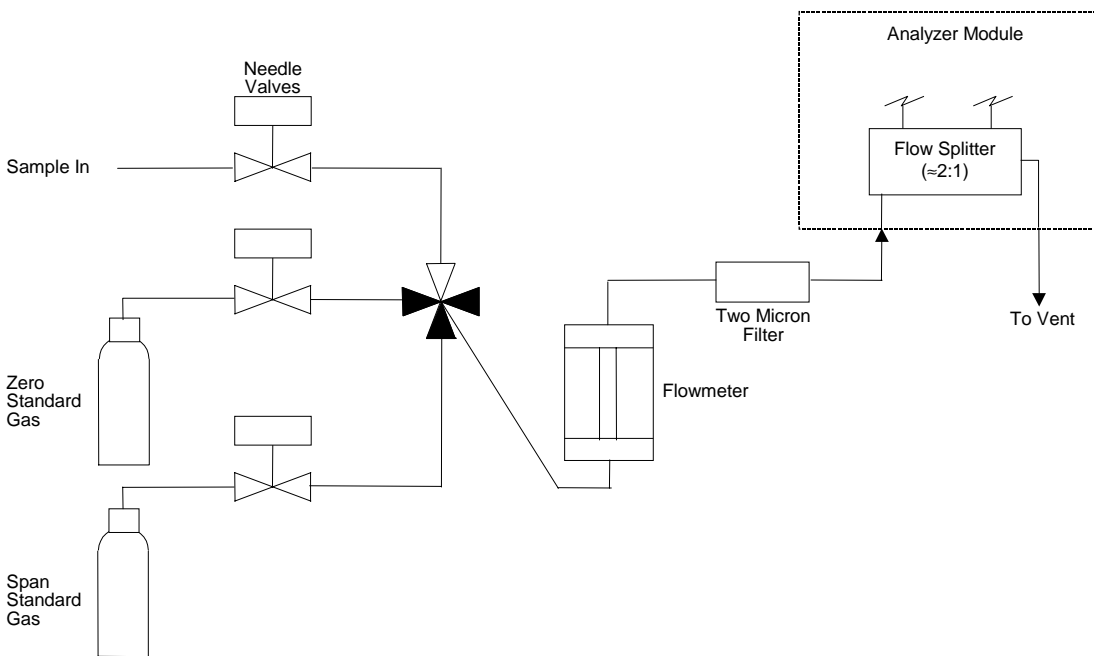
## 2.4.2 CONNECTIONS

(See Figure 2-3) Connect inlet and outlet lines for sample gas to appropriately labeled fittings on the rear panel. Both connections are 1/4 inch ferrule-type compression fittings.

Zero and span gases use the same inlet and outlet as the sample. Figure 2-4 shows a typical external sample handling manifold for gas selection. Particulates must be filtered down to two microns, gases generally require pressurization, and flow measurement metering **MUST** be present.

## 2.4.3 LEAK TEST

The Analyzer Module is thoroughly tested at the factory for gas leakage. The user is responsible for testing for leakage only at the inlet and outlet fittings on the rear panel. The user is also responsible for internal leak testing periodically and if any internal pneumatic components are adjusted or replaced (with a test procedure selected by the user).



**FIGURE 2-4. INTERCONNECTION OF TYPICAL GAS MANIFOLD TO FR-PMD ANALYZER MODULE**

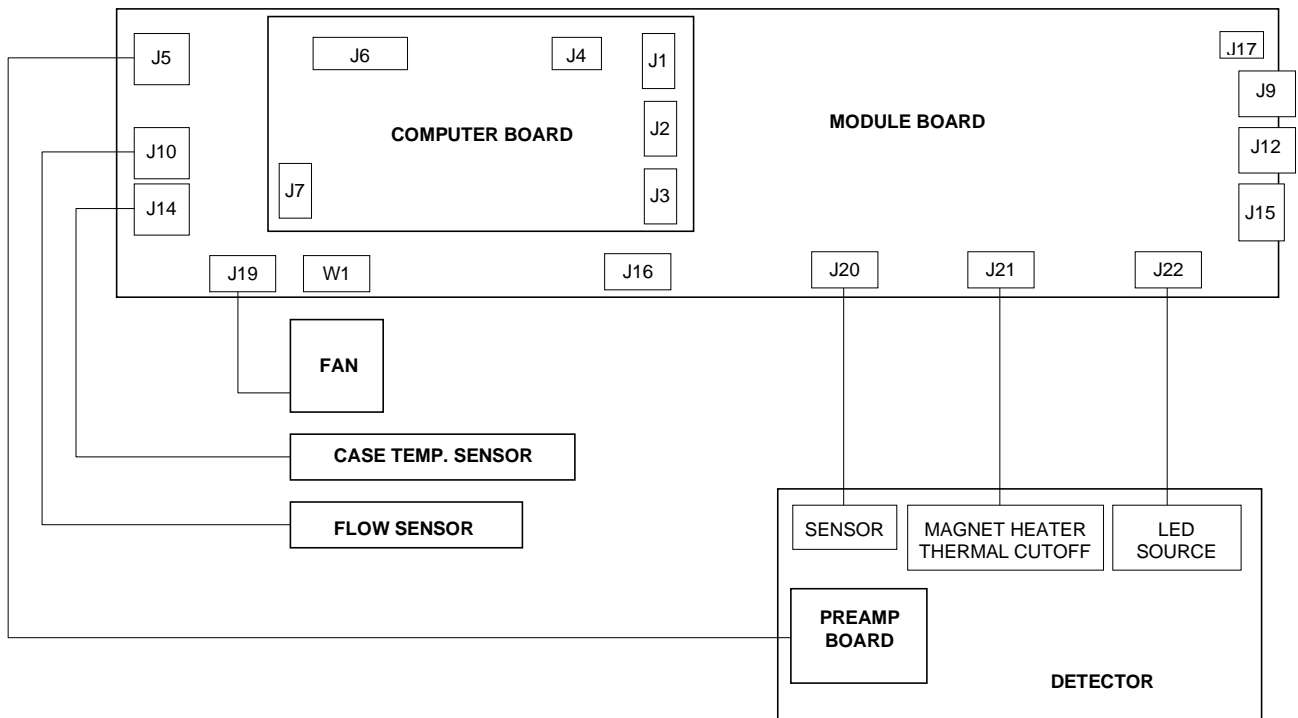
## 2.5 ELECTRICAL CONNECTIONS

### NOTE

**Electrical connections must be in compliance with National Electrical Code (ANSI/NFPA 70) and/or any applicable national or electrical codes.**

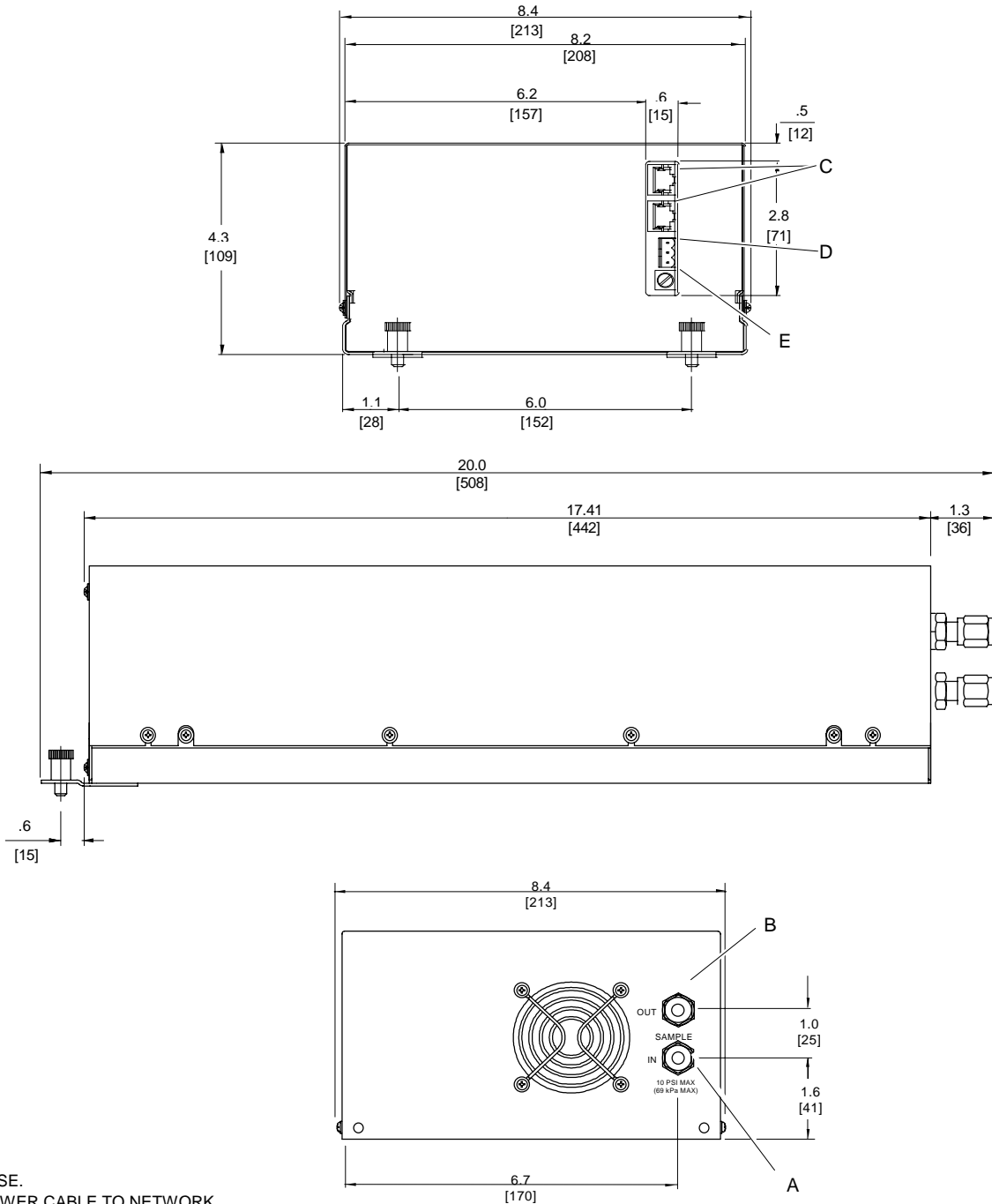
Two electrical connections are required on the Analyzer Module; POWER and NETWORK. See Figure 2-2. On the Analyzer Module, two NETWORK connections are available, either of which is appropriate for : 1) interconnection with Backplane of the Platform (see Platform instruction manual) or 2) "daisy chaining" with other NGA 2000 components.

Connect Analyzer Module POWER 24 VDC power source, either the Platform or external power source.



**FIGURE 2-5. FR-PMD WIRING DIAGRAM**

# 2 INSTALLATION



- E. FUSE.
- D. POWER CABLE TO NETWORK.
- C. NETWORK CABLE CONNECTIONS TO PLATFORM.
- B. SAMPLE OUT: 1/4" O.D. TUBE FITTING.
- A. SAMPLE IN: 1/4" O.D. TUBE FITTING.

- 5. MODULE TO BE INSTALLED WITHIN  $\pm 15^\circ$  OF HORIZONTAL..
- 4. POWER REQUIREMENTS: 24 VDC 3.5 A.
- 3. ELECTRICAL INSTALLATION MUST BE IN COMPLIANCE WITH NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND/OR ANY APPLICABLE NATIONAL OR LOCAL CODES.
- 2. MODULE IS NOT WEATHERPROOF.
- 1. APPROXIMATE WEIGHT: 15 LB (6.8 Kg).

DIMENSIONS

INCH  
[mm]

**FIGURE 2-6 OUTLINE AND MOUNTING DIMENSIONS**

---

## **3.1 OVERVIEW**

---

Prior to initial startup, the user should perform the leak test procedure outlined in Section 2.

For the remainder of this section, Analyzer Module interconnection with a Platform or some interfacing component will be assumed. Display and keypad information shall refer to that which the user can expect to see and do with regard to the front panel of the Platform.

For a complete description of the Platform front panel controls and indicators, see the Platform instruction manual.

---

## **3.2 DISPLAYS**

---

Three kinds of Display screens are available to the user:

- Run Mode
- Menu
- Help

---

## **3.3 RUN MODE DISPLAY**

---

The Run Mode is the normal mode of operation. In this mode, the Display (see Figure 3-1) will show current gas measurement, the component of interest, the current operations of the softkeys, and a graphic bar representing the displayed concentration as ppm or as a percent of oxygen.

If more than one Analyzer Module is connected to the system, the Run Mode display will show as many as four gas measurements on screen. Alarm messages may also appear on the display (See Table 3-1).

### 3 STARTUP AND OPERATION

MESSAGE DISPLAY	DESCRIPTION	TYPE
BAROMETER	System Barometer	WARNING
CASE TEMP	Case Temperature	WARNING
CRUDE NOISE	Calculated Noise	WARNING
CURRENTRNNGHI	Current, High Range	WARNING
CURRENTRNGL0	Current, Low Range	WARNING
DET TEM	Detector Temperature	WARNING
FAN FET	Fan Current	WARNING
HEATER FET	Heater Current	WARNING
LED CURRENT	LED Current	WARNING
LIN ERROR	Linearizer Error	WARNING
LOOP CURRENT	PMD Loop Current	WARNING
N15 VOLTS	Power Supply, -15V	WARNING
P15 VOLTS	Power Supply, +15V	WARNING
P24 VOLTS	Power Supply, +24V	WARNING
P5 VOLTS	Power Supply, +5v	WARNING
RAW SIGNAL	Raw Signal	WARNING
SAMP PRES	Sample Pressure	WARNING
SVFLOW	Sample Bypass Flow	WARNING
BICELLA	PMD Photo Sensor	FAILURE
BICELLB	PMD Photo Sensor	FAILURE
SW ERROR	Software Error	FAILURE

**TABLE 3-1. FR-PMD ANALYZER MODULE ALARMS**

### 3.4 MENU DISPLAYS

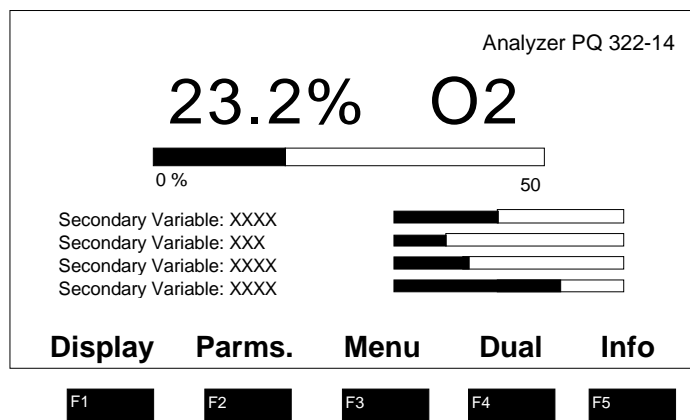
The menu structure enables the user to access data and functions, and put information onto the network.

The Main Menu (Figure 3-2) is subdivided into three levels of control based generally on which personnel is likely to use it: Basic Controls, Expert Controls and Setup, and Technical Level Configuration. See Figures 3-3, 3-4, and 3-5. Many layers of the menu structure are described at appropriate places throughout this manual.

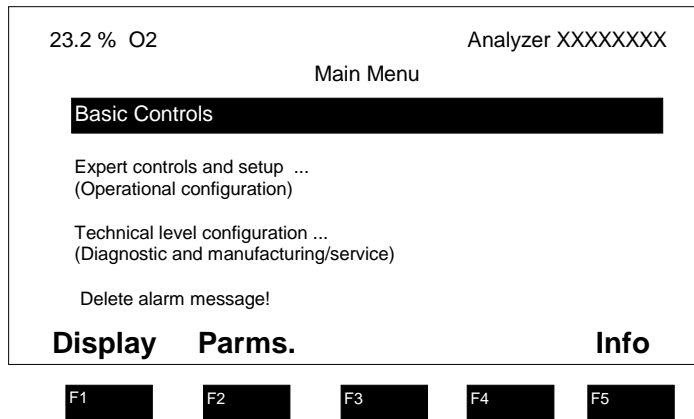
From the Run Mode display, press the MENU softkey to enter the Main Menu (Figure 3-2).

### 3.5 HELP DISPLAYS

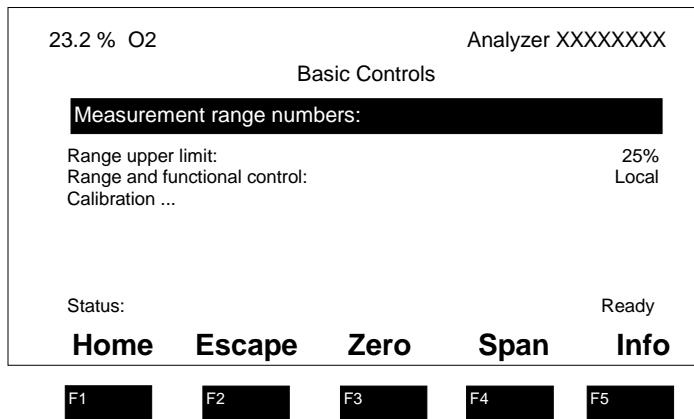
The Help structure is intended to be an on-line "tutorial," context sensitive and topic-interconnected, so that the user can practically operate NGA 2000 without need of an instruction manual (Figure 3-6).



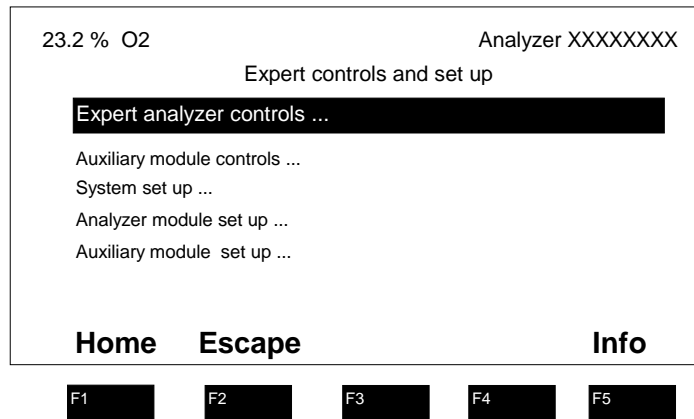
**FIGURE 3-1. RUN MODE DISPLAY**



**FIGURE 3-2. MAIN MENU DISPLAY**

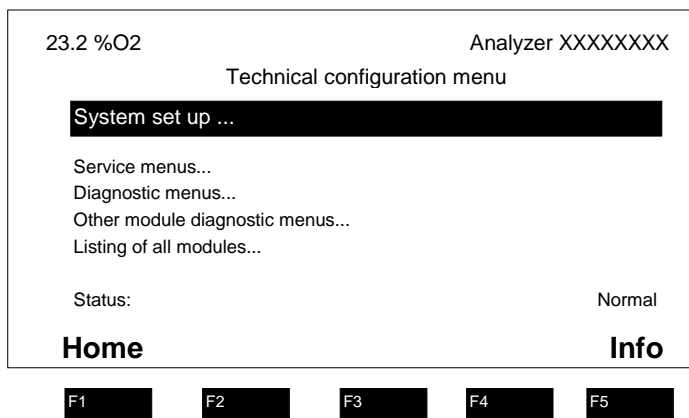


**FIGURE 3-3. BASIC CONTROLS MENU**

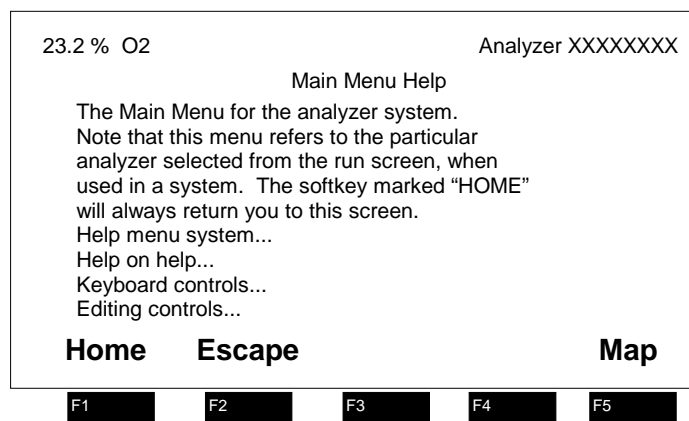


**FIGURE 3-4. EXPERT CONTROLS AND SETUP MENU**





**FIGURE 3-5. TECHNICAL LEVEL CONFIGURATION MENU**



**FIGURE 3-6. TYPICAL HELP SCREEN**

---

## **3.6 STARTUP PROCEDURE**

---

Introduce a suitable on-scale gas (NOT actual sample) into sample inlet.

Apply power to the FR-PMD Analyzer Module. If it is associated with a Platform, do this by plugging in the Platform to a power source. The Platform has no ON/OFF power switch. Once power is supplied to the Platform, the FR-PMD Analyzer Module will be energized.

If the user's system contains only one Analyzer Module, all system components, the Controller Board and the network "self-install" (bind together) during initial startup. If the system contains more than one Analyzer Module, the startup sequence will interrogate the network to locate and identify all components on the network. The user will have to bind appropriate combinations of components after the startup sequence.

After the warm-up period, approximately one hour for FR-PMD Module, all modules are completely functional.

Enter appropriate data in the Calibration Gas List (by making the following display selections: Main Menu, Expert Controls and Setup [enter security code, if necessary], Analyzer Module setup, Calibration Gas List). Also, enter appropriate values in the Calibration Parameters menu (by making the following display selections: Main Menu, Expert Controls and Setup [enter security code, if necessary], Analyzer Module Setup, Calibration Parameters), particularly data related to which ranges are to be zeroed together and how the Analyzer Module is expected to calibrate ranges (separately or otherwise).

The Analyzer Module will not allow the user to increase the upper limit of a range beyond the "maximum range" software setting. To change the "maximum range" value, select the following from the Main Menu: Technical Configuration Menu, Service Menu, Manufacturing Data, Analyzer Module Data. Select Maximum Range, and use the arrow keys to scroll the indicated value. The same applies for "minimum range" settings.

---

## **3.7 BINDING**

---

To achieve full coordination between Analyzer Modules and associated I/O Modules, the user must bind those components together in the System Setup portion of the Technical Configuration Menu in software. See Section 1.5 of the I/O Modules Manual for binding instructions.

---

### 3.8 CALIBRATION

---

Calibration consists of establishing zero and span calibration points. Generally, zero and span calibration should be performed on the range that will be used during sample analysis.

To calibrate the FR-PMD Analyzer Module, introduce zero gas into the SAMPLE INLET, and do the following:

1. If the *Multi-Analyzer Module*, split *Run Mode* display is shown, press the *DISPLAY* softkey until the desired Analyzer's *Run Mode* display is acquired.
2. Press the *MENUS* softkey to enter the *Main Menu*.
3. Press the *ENTER* key to enter the *Basic Controls menu*.
4. Press the *ZERO* softkey to enter the Zero/Span Calibration menu.
5. Press the *ZERO* softkey and wait.
6. Introduce span gas (Table 3-2) into the SAMPLE INLET.
7. Press the *SPAN* softkey and wait.
8. Press the *HOME* softkey to re-enter the *Main Menu*.
9. Press the *DISPLAY* softkey for the *Run Mode* display.

If the user is unable to calibrate the Analyzer Module (i.e., when ZERO or SPAN is initiated, nothing happens), a possible solution relates to the use of an incorrect gas for zeroing or spanning (e.g., using a high concentration gas to zero or a zero gas to span the Analyzer Module). Recalibrating with the appropriate gas(es) WILL NOT correct the problem because the ZERO OFFSET or SPAN FACTOR has been set to an extreme value in the process.

To remedy the problem, do the following:

1. Select the following from the Main Menu: Expert Controls and Setup (enter security code if necessary), Analyzer Module Setup, and Calibration Parameters.
2. Using the down arrow, select Zero Ranges, press ENTER and, using the up/down arrows, toggle to SEPARATE. Do the same for the Span Ranges selection. Do not press ESCAPE at any time unless retention of prior settings is desired.
3. Return to the Main Menu (HOME) and make the following selections: Expert Controls and Setup (enter security code if necessary), Expert Analyzer Controls, Zero/Span, Calibration Factors, and Range 1 (2, 3, 4) Factors. (Do steps 4 and 5 for each range.)

### 3 STARTUP AND OPERATION

4. Select Zero Offset, press ENTER, adjust the value to 525000 with the up/down arrow keys, and press ENTER. Do not press ESCAPE at any time unless retention of prior settings is desired.
5. Select Span Factor, press ENTER, adjust the value to 0.000015 with the up/down arrow keys, and press ENTER. Do not press ESCAPE unless retention of prior settings is desired.
6. Attempt to recalibrate the Analyzer Module according to the procedure outlined at the beginning of Section 3.8. If re-calibration fails, return to the Range Factors menu, readjust factors, and attempt calibration again.

<b>RANGE % OXYGEN</b>	<b>RECOMMENDED ZERO STANDARD GAS</b>	<b>RECOMMENDED SPAN STANDARD GAS</b>
0 to 1	Nitrogen	0.9% O <sub>2</sub> , balance N <sub>2</sub>
0 to 2.5	Nitrogen	2.3% O <sub>2</sub> , balance N <sub>2</sub>
0 to 5	Nitrogen	4.5% O <sub>2</sub> , balance N <sub>2</sub>
0 to 10	Nitrogen	9% O <sub>2</sub> , balance N <sub>2</sub>
0 to 25	Nitrogen	Air (20.93% O <sub>2</sub> )
0 to 50	Nitrogen	45% O <sub>2</sub> , balance N <sub>2</sub>
0 to 100	Nitrogen	100% O <sub>2</sub>

**TABLE 3-2. CALIBRATION RANGE FOR VARIOUS ZERO BASED OPERATING RANGES**

---

### 3.9 BACKGROUND GAS COMPENSATION

---

Any gas having a composition other than 100% oxygen contains background gas, that is, non-oxygen components. Sometimes, the FR-PMD Module response to background gas is significant, depending largely on the span and range used.

If the operator uses zero and span gases that contain the same background gas as the sample, calibration procedures automatically compensate. No adjustments are necessary.

If the background gas in the sample is different from that in the zero and/or span gases, the operator must take into consideration background effects to ensure correct readout. During entry of zero and span gas values in the Calibration Gas List, the instrument is not set to indicate the true oxygen content of the zero and span standard gases. It is set to indicate a slightly different value, relative to background gas, calculated to provide correct readout during subsequent analysis of sample gas.

#### **Oxygen Equivalent Values of Gases**

For computation of background corrections, the analyzer's response to each component of the sample must be known. Table 3-3 lists the percentage oxygen equivalent values for many common gases. For a more comprehensive list of oxygen equivalent values, refer to a resource text such as the *Handbook of Chemistry and Physics* for tables of magnetic susceptibility of substances. The percentage oxygen equivalent of a gas can be determined by the following equation, assuming both gases are supplied at the same pressure:

$$\% \text{ O}_2 \text{ Equivalent of Gas} = \frac{\text{Analyzer Response to Gas}}{\text{Analyzer Response to O}_2} \times 100\%$$

For example, if the analyzer's response to oxygen is +100%, the response to xenon would be -1.34%.

The oxygen equivalent of a gas mixture is the sum of the contribution of the individual gas components.

#### **Example: Zero Based Range**

At lower range limit (i.e., 0% O<sub>2</sub>), composition of sample is: 80% CO<sub>2</sub>, 20% N<sub>2</sub>.

From Table 3-3, the percent oxygen equivalents are: CO<sub>2</sub> -0.623%, N<sub>2</sub> -0.358%.

The percent oxygen equivalent of the mixture =

$$0.8(-0.623) + 0.2(-0.358) = (-0.4984) + (-0.0716) = -0.570\% \text{ O}_2.$$

## Computing Adjusted Values for Calibration Gas List

Before calibrating the Analyzer Module, values in the Calibration Gas List must be adjusted to correct for magnetic susceptibility of background gas. In the equation that follows, the quantities are defined as follows:

**BGGst** = oxygen equivalent of background gas in standard gas (Table 3-3).

**BGGs** = oxygen equivalent of background gas in sample (Table 3-3).

**OP** = operating pressure. Unless special pressure corrections are to be made, the zero standard, span standard and sample gases must all be admitted at the same pressure.

Use the following equation to compute the adjusted settings for the Calibration Gas List:

$$\text{Adjusted percent oxygen for standard gas} = \frac{(A)[100 + (B-C)] - 100[B-C]}{100}$$

Where:

A = true percent oxygen of standard gas

B = BGGs

C = BGGst

*Example:*

Background gas in sample is CO<sub>2</sub>, oxygen equivalent = -0.623%.

Zero gas is 100% N<sub>2</sub>.

Span standard gas is air: 21% O<sub>2</sub>, 79% N<sub>2</sub>.

Background gas in zero and span standard gases is N<sub>2</sub>, oxygen equivalent = 0.358%.

With N<sub>2</sub> zero standard gas flowing, zero gas value in the Calibration Gas List would be 0.265% O<sub>2</sub> (as determined by the following):

$$\frac{0[100+(-0.623-(-0.358))] - 100\{-0.623-(-0.358)\}}{100} = 0.265\% \text{ O}_2$$

With air flowing, span gas value in the Calibration Gas List would be 21.21% oxygen (as determined by the following):

$$\frac{21(100 - 0.265) - 100 (-0.265)}{100} = 21.209\% \text{ O}_2 \cong 21.21 \text{ O}_2$$

In two limiting cases, the general equation is reduced to simpler forms.

If the span standard gas is 100% oxygen, the adjusted oxygen value is the same as the true value (i.e., 100% O<sub>2</sub>).

If the zero standard is an oxygen-free zero gas, the adjusted value for setting the ZERO Control = BGGst-BGGs. (If the oxygen-free zero gas is more diamagnetic than the background gas in the sample, this difference is negative. The negative value may be entered in the Calibration Gas List.)

Alternately, the user can avoid these compensation calculations by using zero and span gases which have been specially prepared to contain the expected amounts of background gas. Calibration of the analyzer module will then factor in background gas effects in the same proportions as normal run mode measurement.

### 3 STARTUP AND OPERATION

GAS	EQUIV. % AS O <sub>2</sub>	GAS	EQUIV. % AS O <sub>2</sub>
Acetylene, C <sub>2</sub> H <sub>2</sub>	-0.612	Hydrogen Bromide, Hbr	-0.968
Allene, C <sub>3</sub> H <sub>4</sub>	-0.744	Hydrogen Chloride, HC <sub>1</sub>	-0.650
Ammonia, NH <sub>3</sub>	-0.479	Hydrogen Fluoride, HF	-0.253
Argon, A	-0.569	Hydrogen Iodide, HI	-1.403
Bromine, Br <sub>2</sub>	-0.83	Hydrogen Sulfide, H <sub>2</sub> S	-0.751
1,2-Butadiene, C <sub>4</sub> H <sub>6</sub>	-1.047	Krypton, Kr	-0.853
1,3-Butadiene, C <sub>4</sub> H <sub>6</sub>	-0.944	Methane, CH <sub>4</sub>	-0.512
n-Butane, C <sub>4</sub> H <sub>10</sub>	-1.481	Neon, Ne	-0.205
iso-Butane, C <sub>4</sub> H <sub>10</sub>	-1.485	Nitric Oxide, NO	+44.2
Butene-1, C <sub>4</sub> H <sub>8</sub>	-1.205	Nitrogen, N <sub>2</sub>	-0.358
cis Butene-2, C <sub>4</sub> H <sub>8</sub>	-1.201	Nitrogen Dioxide, NO <sub>2</sub>	+28.7
iso-Butene, C <sub>4</sub> H <sub>8</sub>	-1.274	Nitrous Oxide, N <sub>2</sub> O	-0.560
trans Butene-2, C <sub>4</sub> H <sub>8</sub>	-1.274	n-Octane, C <sub>8</sub> H <sub>18</sub>	-2.840
Carbon Dioxide, CO <sub>2</sub>	-0.623	Oxygen, O <sub>2</sub>	+100.0
Carbon Monoxide, CO	-0.354	n-Pentane, C <sub>5</sub> H <sub>12</sub>	-1.810
Ethane, C <sub>2</sub> H <sub>6</sub>	-0.789	iso-Pentane, C <sub>5</sub> H <sub>12</sub>	-1.853
Ethylene, C <sub>2</sub> H <sub>4</sub>	-0.553	neo-Pentane, C <sub>5</sub> H <sub>12</sub>	-1.853
Helium, He	-0.059	Propane, C <sub>3</sub> H <sub>8</sub>	-1.135
n-Heptane, C <sub>7</sub> H <sub>16</sub>	-2.508	Propylene, C <sub>3</sub> H <sub>6</sub>	-0.903
n-Hexane, C <sub>6</sub> H <sub>14</sub>	-2.175	Water, H <sub>2</sub> O	-0.381
cyclo-Hexane, C <sub>6</sub> H <sub>12</sub>	-1.915	Xenon, Xe	-0.340
Hydrogen, H <sub>2</sub>	-0.117		

**TABLE 3-3. OXYGEN EQUIVALENTS OF COMMON GASES**





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**WARNING: QUALIFIED PERSONNEL**

*This equipment should not be adjusted or repaired by anyone except properly qualified service personnel.*

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## 4.1 OVERVIEW

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FR-PMD Analyzer components that may require replacement include:

- All printed circuit board
- Thermal fuse inside Detector
- Case temperature sensor
- Flow sensor
- Power fuse
- Detector
- Module fan

The LED bi-cell assembly source requires adjustment (rotation) anytime the detector is disassembled. Refer to Figures 4-1 through 4-5 for locations of these components.

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## 4.2 PRINTED CIRCUIT BOARD REPLACEMENT

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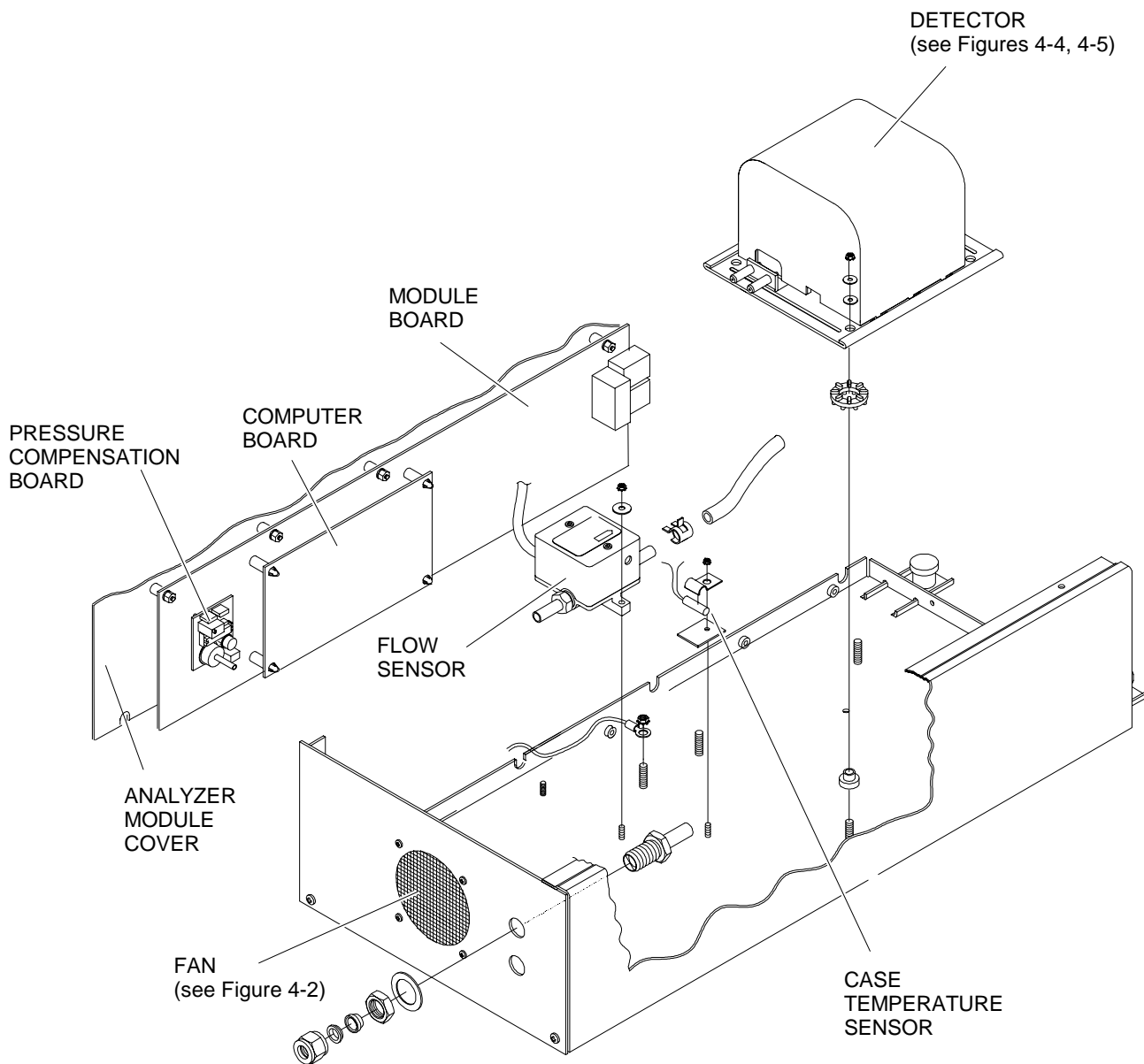
Refer to Figure 4-1 for locations of the Module, Computer, and (optional) Pressure Compensation Boards.

The Module Board is secured to the inside of the analyzer module cover and the Computer and Compensation Boards mount onto the Module Board. See Figure 4-1.

To remove individual boards, label and unplug all interconnection wiring, and remove securing hardware. Reverse this procedure for installation.

## 4.3 FLOW SENSOR REPLACEMENT

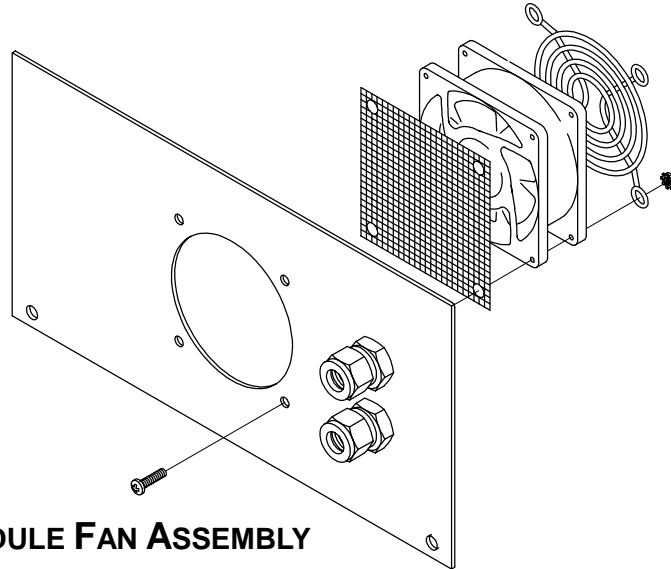
See Figure 4-1 for location of Flow Sensor. To replace the sensor, remove connections to sample gas line and disconnect securing hardware. Reassemble in reverse order.



**FIGURE 4-1. FR-PMD MODULE - EXPLODED VIEW**

## 4.4 MODULE FAN REPLACEMENT

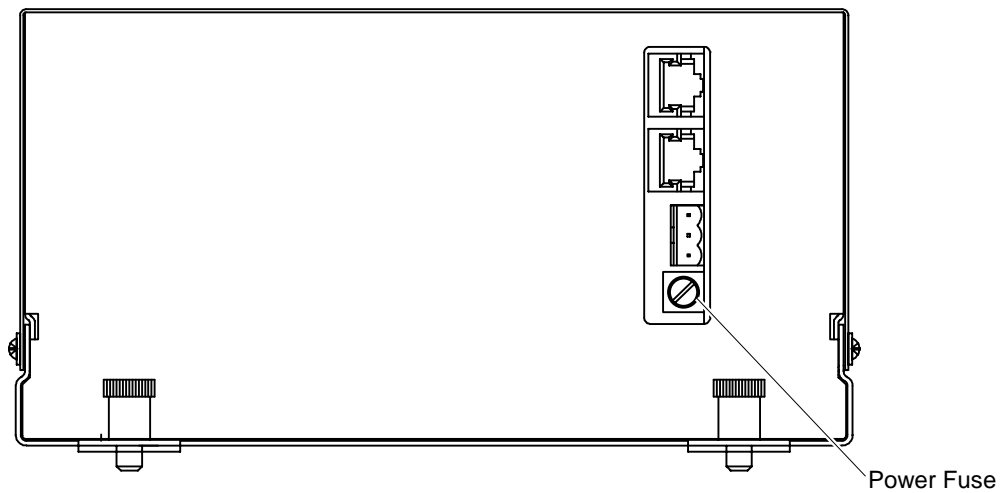
The Analyzer Module fan assembly is disassembled as shown in Figure 4-2.



**FIGURE 4-2. MODULE FAN ASSEMBLY**

## 4.5 POWER FUSE REPLACEMENT

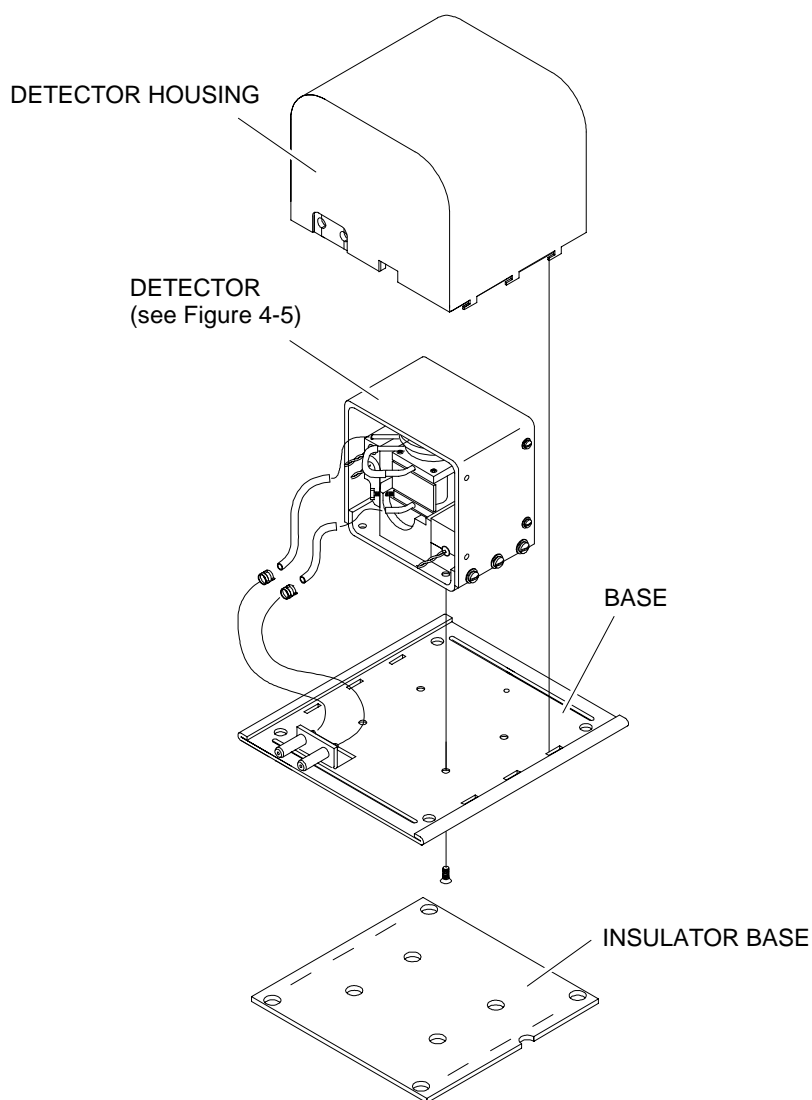
The power fuse is accessible through the front panel of the FR-PMD Analyzer. See Figure 4-3. To remove the fuse, push and turn the fuseholder cap 1/4 turn counterclockwise. Verify that the replacement fuse is the same type and rating.



**FIGURE 4-3. POWER FUSE LOCATION**

## 4.6 THERMAL FUSE REPLACEMENT

1. Remove Detector Assembly from chassis per Figure 4-1.
2. Remove Detector from Detector housing per Figure 4-4.
3. See Figure 4-5 for location of the Detector Thermal Fuse
4. Reassemble in reverse order.



**FIGURE 4-4. DETECTOR ASSEMBLY**

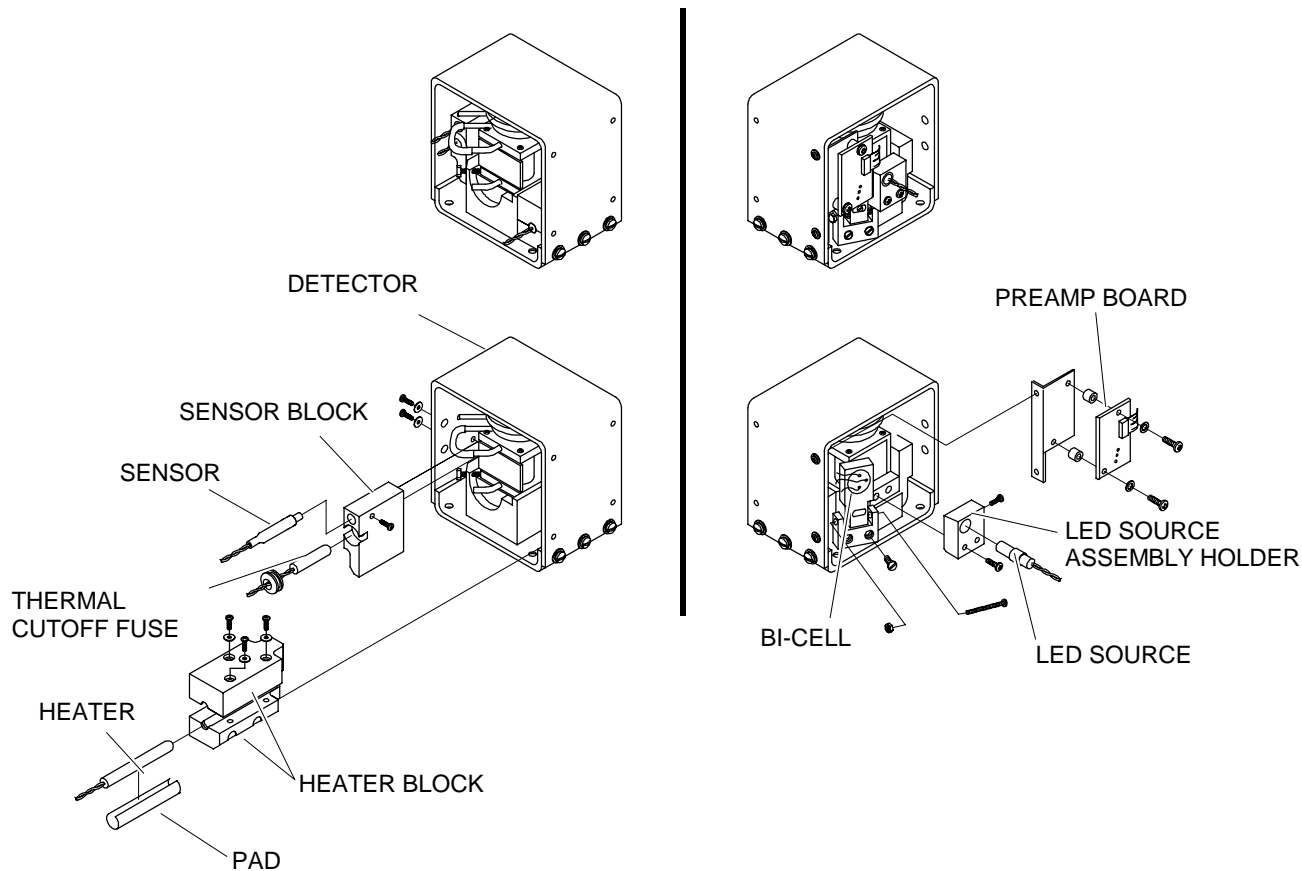


FIGURE 4-5. DETECTOR - EXPLODED VIEW

# **4** MAINTENANCE AND TROUBLESHOOTING

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## **NOTES**

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**WARNING: PARTS INTEGRITY**

*Tampering with or unauthorized substitution of components may adversely affect safety of this product. Use only factory-approved components for repair.*

**5.1 REPLACEMENT PARTS**

622917 <sup>1</sup>	Sensor, RTD - Detector
655520	Computer Board
655670	Pressure Compensation Board
655856 <sup>1</sup>	Source/Holder Assembly
655893	Fan
656576	Sensor, Case Temperature
657217 <sup>1</sup>	Preamp Board
657253	Detector Assembly
657262 <sup>1</sup>	Bi-Cell
657892	Module Board
898733 <sup>1</sup>	Thermal Cutoff Fuse, Detector
902931	Sensor, Flow
903347	Fuse, Time-Delay 6A 250 VAC

<sup>1</sup> Included in 657253 Detector Assembly

# 5 REPLACEMENT PARTS

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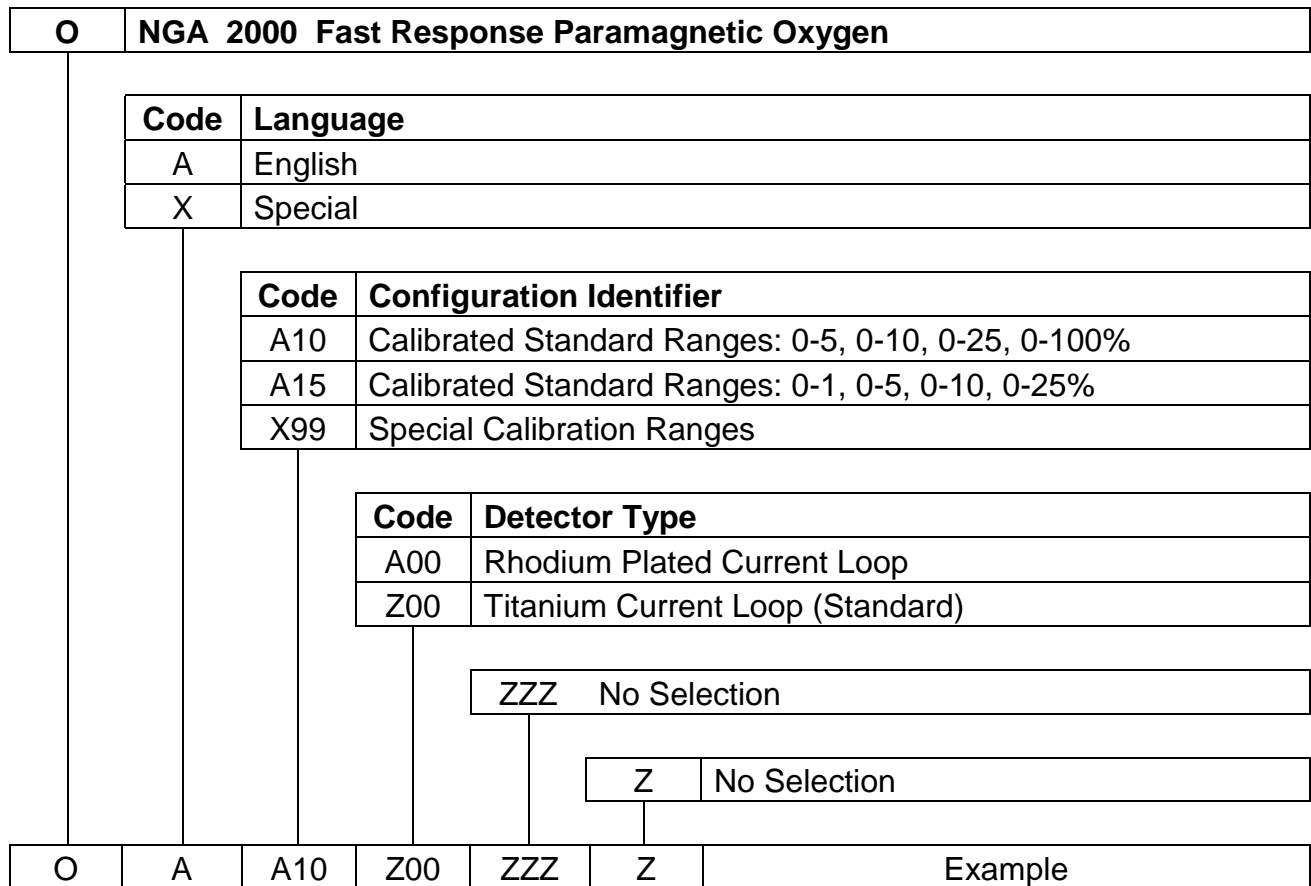
## NOTES

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Each analyzer is configured per the customer sales order. Below is the FR-PMD sales matrix which lists the various configurations available.

To identify the configuration of an analyzer, locate the analyzer name-rating plate. The 12-position sales matrix identifier number appears on the analyzer name-rating plate.



# **A** *FR-PMD IDENTIFICATION MATRIX*

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## **NOTES**

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# GENERAL PRECAUTIONS FOR HANDLING AND STORING HIGH PRESSURE GAS CYLINDERS

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*Edited from selected paragraphs of the Compressed  
Gas Association's "Handbook of Compressed Gases"  
published in 1981*

*Compressed Gas Association  
1235 Jefferson Davis Highway  
Arlington, Virginia 22202  
Used by Permission*

1. Never drop cylinders or permit them to strike each other violently.
2. Cylinders may be stored in the open, but in such cases, should be protected against extremes of weather and, to prevent rusting, from the dampness of the ground. Cylinders should be stored in the shade when located in areas where extreme temperatures are prevalent.
3. The valve protection cap should be left on each cylinder until it has been secured against a wall or bench, or placed in a cylinder stand, and is ready to be used.
4. Avoid dragging, rolling, or sliding cylinders, even for a short distance; they should be moved by using a suitable hand-truck.
5. Never tamper with safety devices in valves or cylinders.
6. Do not store full and empty cylinders together. Serious suckback can occur when an empty cylinder is attached to a pressurized system.
7. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). A flame should never be permitted to come in contact with any part of a compressed gas cylinder.
8. Do not place cylinders where they may become part of an electric circuit. When electric arc welding, precautions must be taken to prevent striking an arc against the cylinder.

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**Rosemount Analytical Inc.**

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# WARRANTY

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Goods and part(s) (excluding consumables) manufactured by Seller are warranted to be free from defects in workmanship and material under normal use and service for a period of twelve (12) months from the date of shipment by Seller. Consumables, glass electrodes, membranes, liquid junctions, electrolyte, o-rings, etc., are warranted to be free from defects in workmanship and material under normal use and service for a period of ninety (90) days from date of shipment by Seller. Goods, part(s) and consumables proven by Seller to be defective in workmanship and/or material shall be replaced or repaired, free of charge, F.O.B. Seller's factory provided that the goods, part(s) or consumables are returned to Seller's designated factory, transportation charges prepaid, within the twelve (12) month period of warranty in the case of goods and part(s), and in the case of consumables, within the ninety (90) day period of warranty. This warranty shall be in effect for replacement or repaired goods, part(s) and the remaining portion of the ninety (90) day warranty in the case of consumables. A defect in goods, part(s) and consumables of the commercial unit shall not operate to condemn such commercial unit when such goods, part(s) and consumables are capable of being renewed, repaired or replaced.

The Seller shall not be liable to the Buyer, or to any other person, for the loss or damage directly or indirectly, arising from the use of the equipment or goods, from breach of any warranty, or from any other cause. All other warranties, expressed or implied are hereby excluded.

IN CONSIDERATION OF THE HEREIN STATED PURCHASE PRICE OF THE GOODS, SELLER GRANTS ONLY THE ABOVE STATED EXPRESS WARRANTY. NO OTHER WARRANTIES ARE GRANTED INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitations of Remedy. SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT UNDER THE STANDARD WARRANTY CLAUSE. IN NO CASE, REGARDLESS OF THE FORM OF THE CAUSE OF ACTION, SHALL SELLER'S LIABILITY EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED BY SELLER GIVING RISE TO THE CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY EXTEND TO INCLUDE INCIDENTAL OR CONSEQUENTIAL DAMAGES. CONSEQUENTIAL DAMAGES SHALL INCLUDE, BUT ARE NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE, COST OF CAPITAL AND DAMAGE OR LOSS OF OTHER PROPERTY OR EQUIPMENT. IN NO EVENT SHALL SELLER BE OBLIGATED TO INDEMNIFY BUYER IN ANY MANNER NOR SHALL SELLER BE LIABLE FOR PROPERTY DAMAGE AND/OR THIRD PARTY CLAIMS COVERED BY UMBRELLA INSURANCE AND/OR INDEMNITY COVERAGE PROVIDED TO BUYER, ITS ASSIGNS, AND EACH SUCCESSOR INTEREST TO THE GOODS PROVIDED HEREUNDER.

Force Majeure. Seller shall not be liable for failure to perform due to labor strikes or acts beyond Seller's direct control.

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# FIELD SERVICE AND REPAIR FACILITIES

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Field service and repair facilities are located worldwide.

## ***U.S.A.***

To obtain field service on-site or assistance with a service problem, contact (24 hours, 7 days a week):

**National Response Center  
1-800-654-7768**

## ***INTERNATIONAL***

Contact your local Rosemount Sales and Service office for service support.

## ***FACTORY***

For order administration, replacement Parts, application assistance, on-site or factory repair, service or maintenance contract information, contact:

**Rosemount Analytical Inc.  
Process Analytical Division  
Customer Service Center  
1-800-433-6076**

## ***RETURNING PARTS TO THE FACTORY***

Before returning parts, contact the Customer Service Center and request a Returned Materials Authorization (RMA) number. Please have the following information when you call: *Model Number, Serial Number, and Purchase Order Number or Sales Order Number.*

Prior authorization by the factory must be obtained before returned materials will be accepted. Unauthorized returns will be returned to the sender, freight collect.

When returning any product or component that has been exposed to a toxic, corrosive or other hazardous material or used in such a hazardous environment, the user must attach an appropriate Material Safety Data Sheet (M.S.D.S.) or a written certification that the material has been decontaminated, disinfected and/or detoxified.

Return to:

**Rosemount Analytical Inc.  
4125 East La Palma Avenue  
Anaheim, California 92807-1802**

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# Rosemount Analytical

## ADDENDUM

### FR-PMD INSTRUCTION MANUAL 748413

This addendum serves as an amendment to the FR-PMD Instruction Manual 748413. The following information should be considered part of the manual, and supersedes any conflicting information in the body of the manual.

*Read this information and note the conflicts.*

## MENU DISPLAYS

Menu: 0 ANALOP

**Expert controls**

Measurement range number:	000.0
Range lower limit:	000.0
Range upper limit:	000.0
Linearizer:	000.0
Range and functional control:	000.0
Zero/Span calibration...	
Ranges with valid calibration:	000.0

HOME   ESCAPE   CAL   CAL DATA   INFO

Menu: 1 ANALSET

**Analyzer module set up**

Calibration gas list...

Calibration Parameters...

Concentration alarms...

Gas measurement parameters...

Analyzer parameter list...

Physical measurement parameters...

Displayed parameters...

HOME   ESCAPE   INFO

Menu: 2 FLOCHEK

Secondary Measurements	
Sample flow:	000.0
Flow lower limit:	000.0
Flow upper limit:	000.0
Sample pressure:	000.0
Case temperature:	000.0

**HOME**   **ESCAPE**   **INFO**

Menu: 3 ZERO1

**Zero/Span Calibration help**  
This allows manual control of the zero and span. Flow zero gas, and make sure the gas value is correct: press the zero key to make the analyzer zero itself. Or select Edit measurement using zero offset, then scroll the reading with the up and down keys. In this way you can make the analyzer read what you want. Then do the same with span gas. If the zero was not a real zero, the span action will change the zero reading; the last zero reading shows you what it would have been on the zero gas with the current span.

**HOME**   **ESCAPE**   **MORE**   **INFO**

Menu: 4 SPAN1

**Span Calibration help**  
Use this screen to perform a span calibration. Either directly adjust the reading with the up and down arrow keys, or press the SPAN softkey to force a span calibration to the span gas concentration.

You should do a zero calibration before

**HOME**   **ESCAPE**   **MORE**   **BACK**   **INFO**

## Menu: 5 FLOCHEK1

**Secondary Measurements help**

This screen shows the auxiliary measurements made by the analyzer module. The limits may be set by the user as warning alarms.

These readings are updated only when they change.

**HOME****ESCAPE****INFO**

## Menu: 6 ANALOP11

**Basic controls help**

This screen selects immediately available functions. Lines that are not editable refer to variables set up elsewhere.

To zero or span the analyzer, flow the correct gas and press the zero or span button.

Remote control does not disable local control.

This screen does not control an autocal module.  
Calibration info...

**HOME****ESCAPE****INFO**

## Menu: 7 ACALSET

**Calibration Parameters**

Calibration adjustment limits:	000.0
Calibration averaging time:	000.0
Calibration failure alarm:	000.0
Cal failure error allowed:	000.0
Calibration time out:	000.0
Zero ranges:	000.0
Span ranges:	000.0

**HOME****ESCAPE****INFO**

Menu: 8 LINSET

**Gas measurement parameters**

Linearization parameters...  
Response time/delay parameters...  
Range setting...  
Units...  
Linearization functions...

**HOME**   **ESCAPE**   **INFO**

Menu: 9 APARLST

**Analyzer Parameter List**

Analyzer tag:	000.0
First line's parameter:	000.0
Second line's parameter:	000.0
Third line's parameter:	000.0
Fourth line's parameter:	000.0

**HOME**   **ESCAPE**   **NEXT**   **LAST**   **INFO**

Menu: 10 ANALSET11

**Measurement Parameters**

This lists the operational parameters that can be set up by the user. More detailed information can be seen in the diagnostic menus.

**HOME**   **ESCAPE**   **INFO**

## Menu: 11 CALLIST

## Calibration Gas List

Zero gas - range 1:	000.0
Span gas - range 1:	000.0
Zero gas - range 2:	000.0
Span gas - range 2:	000.0
Zero gas - range 3:	000.0
Span gas - range 3:	000.0
Zero gas - range 4:	000.0
Span gas - range 4:	000.0

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INFO

## Menu: 12 CALLIST1

## Calibration Gas List

Zero and span gases for each range are shown. Edit these to correspond to the contents of the appropriate calibration gas bottles.

Enter the values of concentration on the bottles of gas used for calibration.

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INFO

## Menu: 13 ACALSET1

## Calibration Parameter help

Factors that control how the calibration works.

Calibration mode allows calibration to be initiated through this screen (local), through an IO module or gateway (remote), or automatically by an auto-calibration module (auto).

Calibration averaging time sets the time used by the analyzer to average its reading. A longer time will give a

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Menu: 14 APARLSTI1

**Analyzer Parameter List**  
This is a listing of all the user  
editable parameters in the current  
parameter set.

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Menu: 15 AMMAN

**Analyzer manufacturing data**

More...

Bench configuration code:	000.0
Minimum range:	000.0
Maximum range:	000.0
Measured gas:	000.0

**HOME**   **ESCAPE**   **RESET**   **STORE**   **INFO**

Menu: 16 AMMANI1

**Analyzer manufacturing data**  
Shows manufacturing data. Edit at your own risk!  
The tag is the tag of this analyzer module, and may be  
modified as desired by the user. This appears at the  
top of this screen, but it won't be updated until you  
re-enter the menus from the display screen.

**RESET erases ALL EEPROM data!**  
**Re-initialize the system after RESET!**

**HOME**   **ESCAPE**   **INFO**

Menu: 17 AMSVC

**Analyzer module service history**

Manufacturing date:	000.0
In service date:	000.0
Last zero calibration date:	000.0
Last span calibration date:	000.0
Last service date:	000.0
List notes...	

HOME
ESCAPE
ManData
INFO

Menu: 18 AMSVC11

**Analyzer module service notes**

Add notes as desired. See the control module service screen info for a list of the service note abbreviations.

HOME
ESCAPE
INFO

Menu: 19 ADIAG

**Analyzer Diagnostics**

- Power supply voltages...
- Primary variable parameters...
- Physical Measurements...
- Temperature control parameters...
- Miscellaneous control parameters...
- Trend display control...
- Barometric pressure parameters...
- Software diagnostics...

HOME
ESCAPE
REBOOT
INIT
INFO

Menu: 20 AMPWR

Analyzer diagnostics	
Power supply voltages	
+15V analog is:	000.0
+15V analog was:	000.0
-15V analog is:	000.0
-15V analog was:	000.0
+5V digital is:	000.0
+5V digital was:	000.0
+24V power is:	000.0
+24V power was:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	

Menu: 21 AM1V

Primary variable parameters	
Raw measurement signal:	000.0
Bicell #1 signal:	000.0
Bicell #2 signal:	000.0
Pk-pk noise:	000.0
Loop current:	000.0
Calibration factors...	
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	

Menu: 22 AMTEMP

Temperature control	
Fan lower set point:	000.0
Fan upper set point:	000.0
Minimum fan duty cycle:	000.0
Case temperature:	000.0
Detector set point:	000.0
Detector P gain:	000.0
Detector I gain:	000.0
Detector bias:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	





Menu: 26 RANGESETAM

Range Settings	
Minimum range:	000.0
Maximum range:	000.0
Range 1 lower limit:	000.0
Range 1 upper limit:	000.0
Range 2 lower limit:	000.0
Range 2 upper limit:	000.0
Range 3 lower limit:	000.0
Range 3 upper limit:	000.0
Range 4 lower limit:	000.0

**HOME**    **ESCAPE**    **INFO**

Menu: 27 RANGESSETI1

**Range Settings**  
Set the upper and lower limits of the reportable ranges. These values are copied into the output module and used for calculating the analog output. The analyzer uses them to select the closest linearizer polynomial to use if any.

**HOME**    **ESCAPE**    **INFO**

Menu: 28 SPAN12

**Span Calibration help**  
The calibration is performed on the range selected by the range  
If the calibration set up selected the ranges to be calibrated together, all the ranges will be calibrated at once by the first calibration. Otherwise they must be calibrated individually.  
The line showing what the last zero gas would read shows the effect of the most

**HOME**    **ESCAPE**    **BACK**    **INFO**

Menu: 29 ACALSETI2

**Calibration Parameter help**

Calibration alarms will only work if warning alarms are enabled.

Calibration info...

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Menu: 30 ZEROI2

**Zero Calibration help**

Make sure that zero gas is flowing through the analyzer. When the reading has stabilized, either adjust the reading to the zero gas concentration, or, if the zero gas concentration shown is correct, select the automatic zero function. Then if desired, do a span calibration.

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Menu: 31 LINRANGE1

**Linearity coefficients**

Curve 1	
A0 coefficient:	000.0
A1 coefficient:	000.0
A2 coefficient:	000.0
A3 coefficient:	000.0
A4 coefficient:	000.0
Curve upper limit:	000.0
Curve over-range:	000.0
Curve under-range:	000.0

**HOME    ESCAPE    NEXT    LAST    INFO**

Menu: 32 LINRANGE2

Linearity coefficients	
Curve 2	
A0 coefficient:	000.0
A1 coefficient:	000.0
A2 coefficient:	000.0
A3 coefficient:	000.0
A4 coefficient:	000.0
Curve upper limit:	000.0
Curve over-range:	000.0
Curve under-range:	000.0

HOME   ESCAPE   NEXT   BACK   INFO

Menu: 33 LINRANGE3

Linearity coefficients	
Curve 3	
A0 coefficient:	000.0
A1 coefficient:	000.0
A2 coefficient:	000.0
A3 coefficient:	000.0
A4 coefficient:	000.0
Curve upper limit:	000.0
Curve over-range:	000.0
Curve under-range:	000.0

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Menu: 34 LINRANGE4

Linearity coefficients	
Curve 4	
A0 coefficient:	000.0
A1 coefficient:	000.0
A2 coefficient:	000.0
A3 coefficient:	000.0
A4 coefficient:	000.0
Curve upper limit:	000.0
Curve over-range:	000.0
Curve under-range:	000.0

HOME   ESCAPE   FIRST   BACK   INFO

## Menu: 35 LINRANGE0

**Linearization parameters**

Range 1 linearizer:	000.0
If enabled, uses curve no.:	000.0
Range 2 linearizer:	000.0
If enabled, uses curve no.:	000.0
Range 3 linearizer:	000.0
If enabled, uses curve no.:	000.0
Range 4 linearizer:	000.0
If enabled, uses curve no.:	000.0
Case temperature for coefficients:	000.0

**HOME****ESCAPE****INFO**

## Menu: 36 AMPWRI1

**Analyzer diagnostics****Power supply voltages**

The

the power supplies as described. The

unit was manufactured. Changes of more than a few percent should be noted.

The 24V supply may differ substantially if the unit is used on anything but a

Rosemount power supply.

**HOME****ESCAPE****INFO**

## Menu: 37 FLOCHEK111

**Physical Measurements**

These are the measurements made by the analyzer module to make sure that it is working correctly, and that sample and support gases if any are flowing.

The various temperatures are controlled to values set up in the diagnostic menus

**HOME****ESCAPE****INFO**

Menu: 38 FILTER

Response time/delay parameters	
Range 1 t90 time:	000.0
Range 2 t90 time:	000.0
Range 3 t90 time:	000.0
Range 4 t90 time:	000.0
LON update rate:	000.0
Output delay time:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	

Menu: 39 AM1VI1

Primary variable parameters	
Shows the parameters used to calculate the primary reading.	
The bicell readings are the individual outputs of the two photcells. The instrument responds to the difference between them, but each signal should be as large as possible without saturating.	
The pk-pk noise is a measure of the standard deviation of the signal.	
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	

Menu: 40 AMTEMP11

Temperature control	
These are the variables used to define the operation of the PID algorithms used for temperature control. Adjust them at your own risk!	
This analyzer controls its detector temperature, while keeping its case temperature within rather wide limits.	
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	

Menu: 41 AM2VA

<b>Physical Measurements</b>	
Sample flow:	000.0
Sample pressure:	000.0
Case temperature:	000.0
Detector temperature:	000.0
Flow limits...	
Pressure limits...	
<b>HOME</b>	<b>ESCAPE</b>
	<b>INFO</b>

Menu: 42 PLIMITSA

<b>Pressure Limits</b>	
Sample pressure upper limit:	000.0
Sample pressure lower limit:	000.0
<b>HOME</b>	<b>ESCAPE</b>
	<b>INFO</b>

Menu: 43 TLIMITSA

<b>Temperature limits</b>	
Case upper limit:	000.0
Case lower limit:	000.0
<b>HOME</b>	<b>ESCAPE</b>
	<b>INFO</b>

Menu: 44 AMMISC1

**Miscellaneous control parameters**  
These are diagnostic variables used to determine if the analyzer is operating correctly.

Enable alarms if desired.

**HOME**   **ESCAPE**   **INFO**

Menu: 45 ANALSIMPLE

**Basic Controls**

Measurement range number:	000.0
Range upper limit:	000.0
Range and functional control:	000.0
Zero gas concentration:	000.0
Span gas concentration:	000.0
Sample flow:	000.0
Ranges with valid calibration:	000.0
Calibration status:	000.0

**HOME**   **ESCAPE**   **ZERO**   **SPAN**   **INFO**

Menu: 46 FILTER1

**Filter and Delay Parameters**  
This screen sets the final filtering for the analyzer primary variable output. This is in addition to the inherent filtering in the analyzer.  
The time delay simply delays the output by that time, allowing the fastest responding analyzer systems to be synchronized with the slowest.

**HOME**   **ESCAPE**   **INFO**



Menu: 47 LINSET111

**Primary Variable Parameters**

Allows the setting of linearizer coefficients, definition of parameter sets, and filtering and delay. These all apply to the reporting of the analyzer primary variable.

**HOME****ESCAPE****INFO**

Menu: 48 LINRANGE011

**Set Linearity curve**

The linearizer polynomials act over a certain range, not the same as the measurement range. The system uses the linearizer polynomial appropriate for the measurement range chosen. This is the polynomial with the next higher linearizer range than the measurement range.

Polynomial coefficients may be edited for custom curves.

**HOME****ESCAPE****INFO**

Menu: 49 PLIMITSA11

**Pressure and flow Limits**

These are settable limits on the sample gas pressure and flow. They force alarms to occur and also act as end points on the bar graph display of their variable.

**HOME****ESCAPE****INFO**

Menu: 50 CALFACTORS

Calibration Factors	
Range 1 factors...	
Range 2 factors...	
Range 3 factors...	
Range 4 factors...	
Zero compensation factor:	000.0
Span compensation factor:	000.0
<b>HOME</b> <b>ESCAPE</b> <b>INFO</b>	

Menu: 51 R1FACTORS

Range 1 Factors	
Zero offset:	000.0
Span factor:	000.0
Full scale range at calibration:	000.0
Measurement range number:	000.0
Hardware zero offset:	000.0
Raw measurement signal:	000.0
<b>HOME</b> <b>STORE</b> <b>NEXT</b> <b>HISTORY</b> <b>INFO</b>	

Menu: 52 RN2FACTORS

Range 2 Factors	
Zero offset:	000.0
Span factor:	000.0
Full scale range at calibration:	000.0
Measurement range number:	000.0
Hardware zero offset:	000.0
Raw measurement signal:	000.0
<b>HOME</b> <b>STORE</b> <b>NEXT</b> <b>HISTORY</b> <b>INFO</b>	

## Menu: 53 RN3FACTORS

Range 3 Factors	
Zero offset:	000.0
Span factor:	000.0
Full scale range at calibration:	000.0
Measurement range number:	000.0
Hardware zero offset:	000.0
Raw measurement signal:	000.0
<b>HOME</b>	<b>STORE</b>
<b>NEXT</b>	<b>HISTORY</b>
<b>INFO</b>	

## Menu: 54 RN4FACTORS

Range 4 Factors	
Zero offset:	000.0
Span factor:	000.0
Full scale range at calibration:	000.0
Measurement range number:	000.0
Hardware zero offset:	000.0
Raw measurement signal:	000.0
<b>HOME</b>	<b>STORE</b>
<b>FIRST</b>	<b>HISTORY</b>
<b>INFO</b>	

## Menu: 55 RFACTORSI

Range Factors	
Shows the calibration factors for this range. Modify the zero factor for zero calibration, and the span factor for spanning this range. They take effect as soon as you press the enter key.	
With zero gas, the raw reading should be the same as the zero offset.	
Then do a complete recalibration.	
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	

Menu: 56 AMHELPINDEX

**Analyzer Module Help**  
**Paramagnetic Oxygen detector**  
This device uses the paramagnetic nature of oxygen as a measurement technique. Other gases are usually diamagnetic and the detector responds only weakly to them. Nitrogen oxides are the only common exceptions.  
The analyzer is sensitive to vibration and should be installed with care.

**HOME**   **ESCAPE**   **INFO**

Menu: 57 LINRANGE111

**Linearity coefficients**  
Edit the polynomial coefficients as desired. Make sure that the curve upper limit is correct, this is the limit of the range that this polynomial will correct.  
The status line selects whether the curve is in use.

**HOME**   **ESCAPE**   **INFO**

Menu: 58 CALFACTORS11

**Calibration Factors**  
The analyzer uses calibration factors for each range. You can adjust them while viewing the reading, to achieve an accurate calibration. Make sure the factors are correct for the range you are on. You will not see a change in the reading if you use the wrong ones, but you'll find out when you change the range! You cannot adjust all ranges at the same time, you must adjust them one by one.

**HOME**   **ESCAPE**   **INFO**

Menu: 59 APARLST2

Analyzer Parameter List

Primary Variable Parameters						
Control mode:	000.0					
Output delay time:	000.0					
Range 1 upper limit:	000.0					
Range 2 upper limit:	000.0					
Range 3 upper limit:	000.0					
Range 4 upper limit:	000.0					
Range 1 lower limit:	000.0					
Range 2 lower limit:	000.0					
Range 3 lower limit:	000.0					
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Menu: 60 APARLST4

Analyzer Parameter List

Primary Variable Parameters						
Range 1 t90 time:	000.0					
Range 2 t90 time:	000.0					
Range 3 t90 time:	000.0					
Range 4 t90 time:	000.0					
Linearizer on range 1:	000.0					
Linearizer on range 2:	000.0					
Linearizer on range 3:	000.0					
Linearizer on range 4:	000.0					
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Menu: 61 APARLST5

Analyzer Parameter List

Calibration Parameters						
Calibration averaging time:	000.0					
Calibration failure alarm:	000.0					
Cal failure error allowed:	000.0					
Calibration time out:	000.0					
Ranges zeroed:	000.0					
Calibrate ranges:	000.0					
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Menu: 62 APARLST6

Analyzer Parameter List	
Calibration Gases	
Zero gas - range 1:	000.0
Zero gas - range 2:	000.0
Zero gas - range 3:	000.0
Zero gas - range 4:	000.0
Span gas - range 1:	000.0
Span gas - range 2:	000.0
Span gas - range 3:	000.0
Span gas - range 4:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>FIRST</b>	<b>BACK</b>
<b>INFO</b>	

Menu: 63 DISPLAY

Displayed parameters	
First line's parameter:	000.0
Second line's parameter:	000.0
Third line's parameter:	000.0
Fourth line's parameter:	000.0
May be displayed on the appropriate line of the single analyzer display screen.	
<b>HOME</b>	<b>ESCAPE</b>
<b>INFO</b>	

Menu: 64 MPARMS

Current measurement parameters	
Analyzer gas measured:	000.0
Measurement range number:	000.0
Range change control:	000.0
Linearization mode:	000.0
Analyzer operational state:	000.0
Analyzer alarm state:	000.0
Alarm reporting level:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>MORE</b>	<b>INFO</b>

## Menu: 65 MPARMS2

<b>Current measurement parameters</b>	
Response time:	000.0
Sample flow:	000.0
Sample pressure:	000.0
Detector temperature:	000.0

**HOME**   **ESCAPE**   **INFO**

## Menu: 66 MPARMS1

<b>Current measurement parameters help</b>	
Shows the main measurement parameters. These can be controlled in the various set up menus.	

**HOME**   **ESCAPE**   **INFO**

## Menu: 67 BAROM\_PARMS

<b>Barometric pressure parameters</b>	
Pressure transducer:	000.0
Barometric pressure compensation:	000.0
Measured pressure:	000.0
Transducer offset:	000.0
Transducer slope:	000.0
Transducer PGA gain:	000.0

**HOME**   **ESCAPE**   **INFO**

Menu: 68 BAROM\_PARM1

**Barometric pressure parameters**  
Shows whether the optional pressure transducer is installed or not. Also this screen allows you to set the transducer. Use the offset at atmospheric pressure, and pull a vacuum of about 25cm H2O on the transducer, and use the slope to make it read correctly.

Choose whether to enable barometric compensation, and whether to allow the analyzer to emit the pressure value. Only one analyzer at a time in a

**HOME**   **ESCAPE**   **INFO**

Menu: 69 TLIMITSIA1

**Temperature limits**  
The limits on the temperatures beyond which the analyzer will send a warning message.

They also act as end points to the bar graph display.

The various temperatures are controlled to values set up in the diagnostic menus

**HOME**   **ESCAPE**   **INFO**

Menu: 70 SW\_DIAG

**Software diagnostics**

Last message:	000.0
And:	000.0
And:	000.0
And:	000.0
And:	000.0
And:	000.0
And:	000.0
And:	000.0
Edit to reset:	000.0

**HOME**   **ESCAPE**   **INFO**





Menu: 74 CALI1

**Calibration info**  
Use the calibration parameter screen to choose to calibrate ranges together or not. If together, zeroing or spanning will go through each range one by one. If the change is too great, it will fail, and send an alarm if warning alarms are enabled. In this case, disable calibration limit checking and try again.

If you use non-zero zero gases, or the changes are

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Menu: 75 LINFUNCT

**Linearization functions**  
Polynomial set up...  
Midpoint correction set up...

Use the polynomial set up to generate a linearizing polynomial from up to 20 gases. With more than 6 gases it will produce a fourth order polynomial linearizer. Use the midpoint correction for a piecewise-linear final correction, to bring up to three points precisely onto

**HOME** **ESCAPE** **INFO**

Menu: 76 POLYSETUP

**Polynomial set up**

Range to be linearized:	000.0
Current span gas:	000.0
Calculated polynomial order:	000.0
Gas values shown as:	000.0
Gas concentrations...	

**HOME** **ESCAPE** **CALC** **INFO**

## Menu: 77 MIDPOINT1

Midpoint correction set up	
Range 1	
Correction:	000.0
Point being measured:	000.0
Point 1 gas concentration:	000.0
Point 2 gas concentration:	000.0
Point 3 gas concentration:	000.0
Point 1 reading:	000.0
Point 2 reading:	000.0
Point 3 reading:	000.0
Span gas value:	000.0

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## Menu: 78 POLYGAS1

Gas concentrations	
Point 1	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 2	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0

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## Menu: 79 POLYSET11

Polynomial set up	
Select the range to linearize.	
Make sure that the span gas value is correct.	
Choose whether to define the gas concentrations as absolute values or as a percent of the span gas.	
Use percent if you are diluting the span gas for this.	
Get into the gas concentration screens, and set the concentration for as many points as you want.	
At each point, flow the gas of the correct value, and when the reading is stable, press	
The analyzer will store the gas value and the reading	

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Menu: 80 POLYGAS2

Gas concentrations	
Point 3	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 4	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

Menu: 81 POLYGAS3

Gas concentrations	
Point 5	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 6	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

Menu: 82 POLYGAS4

Gas concentrations	
Point 7	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 8	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

## Menu: 83 POLYGAS5

Gas concentrations	
Point 9	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 10	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

## Menu: 84 POLYGAS6

Gas concentrations	
Point 11	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 12	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

## Menu: 85 POLYGAS7

Gas concentrations	
Point 13	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 14	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

Menu: 86 POLYGAS8

Gas concentrations	
Point 15	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point16	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

Menu: 87 POLYGAS9

Gas concentrations	
Point 17	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 18	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>NEXT</b>
<b>INFO</b>	

Menu: 88 POLYGAS0

Gas concentrations	
Point 19	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point 20	
Gas value:	000.0
Raw reading:	000.0
Linearized value:	000.0
Point to be measured:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>DATA</b>	<b>BACK</b>
<b>INFO</b>	

Menu: 89 MIDPOINT2

Midpoint correction set up	
Range 2	
Correction:	000.0
Point being measured:	000.0
Point 1 gas concentration:	000.0
Point 2 gas concentration:	000.0
Point 3 gas concentration:	000.0
Point 1 reading:	000.0
Point 2 reading:	000.0
Point 3 reading:	000.0
Span gas value:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>SET</b>	<b>NEXT</b>
<b>INFO</b>	

Menu: 90 MIDPOINT3

Midpoint correction set up	
Range 3	
Correction:	000.0
Point being measured:	000.0
Point 1 gas concentration:	000.0
Point 2 gas concentration:	000.0
Point 3 gas concentration:	000.0
Point 1 reading:	000.0
Point 2 reading:	000.0
Point 3 reading:	000.0
Span gas value:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>SET</b>	<b>NEXT</b>
<b>INFO</b>	

Menu: 91 MIDPOINT4

Midpoint correction set up	
Range 4	
Correction:	000.0
Point being measured:	000.0
Point 1 gas concentration:	000.0
Point 2 gas concentration:	000.0
Point 3 gas concentration:	000.0
Point 1 reading:	000.0
Point 2 reading:	000.0
Point 3 reading:	000.0
Span gas value:	000.0
<b>HOME</b>	<b>ESCAPE</b>
<b>SET</b>	<b>BACK</b>
<b>INFO</b>	

Menu: 92 EXP\_CAL  
Zero/span calibration

Measurement range number:	000.0
Zero gas concentration:	000.0
Span gas concentration:	000.0
Sample flow:	000.0
Raw measurement signal:	000.0
Ranges with valid calibration:	000.0
Status:	000.0
Result...	

HOME FACTORS ZERO SPAN INFO

Menu: 93 EXP\_CAL\_DAT  
Zero/span diagnostic data

Date of last zero:	000.0
Error message for last zero:	000.0
Error percentage for last zero:	000.0
Raw signal at last zero:	000.0
Last zero gas would read:	000.0
Date of last span:	000.0
Error message for last span:	000.0
Error percentage for last span:	000.0
Raw signal at last span:	000.0

HOME FACTORS INFO

Menu: 94 EXP\_CAL\_DATI  
Zero/span diagnostic data

Shows what happened at the last calibration.  
The errors are expressed as a percentage of range.  
The last zero and span readings are how the analyzer would read on those gases with the current calibration factors.

HOME ESCAPE INFO



## Menu: 95 UNITS

Units	
Gas measurement units:	000.0
Pressure measurement units:	000.0
Temperature measurement units:	000.0
ppm to mg/Nm <sup>3</sup> conversion factor:	000.0
Lower explosion limit (LEL):	000.0
Upper explosion limit (UEL):	000.0
<b>HOME</b>	<b>ESCAPE</b>
	<b>INFO</b>

## Menu: 96 UNITS1

Units	
Select the units in which you want the values to be displayed. This does not affect the variable contents, it merely affects how the control module displays them.	
Note that all analyzer ranges will be set as percent or ppm, you can't set some as ppm and others as percent.	
<b>HOME</b>	<b>ESCAPE</b>
	<b>INFO</b>

## Menu: 97 POLYSET12

Polynomial set up	
When you have entered the desired number of points, return to the polynomial set up screen, and press	
polynomial, and store it as the coefficients in the current range's linearizer function.	
The order of the polynomial is optimized based on the number of data points provided. You need at least 7 points for a fourth order polynomial correction.	
You can modify the results with the piecewise linear correction also provided in this section.	
<b>HOME</b>	<b>ESCAPE</b>
<b>MORE</b>	<b>BACK</b>
	<b>INFO</b>

Menu: 98 POLYSETI3

**Polynomial set up**  
**WARNING: the linearization curve must be monotonic. If it is not, the calibration routine will fail and the analyzer will not calibrate.**  
**Test this by copying the values of the linearization coefficients into a spreadsheet program and plotting the result.**  
**The analyzer does test for monotonicity when it spans, but this test may not catch all possible errors.**  
**Monotonic means that the curve does not roll over and start going back down as the gas concentration**

**HOME**   **ESCAPE**                      **BACK**   **INFO**

Menu: 99 RESET

**Reset**

**Are you sure?**

**RESET will erase ALL the configuration and manufacturing data, including serial numbers and everything else.**

**If you are sure, press RESET again.**

**HOME**   **ESCAPE**                      **RESET**   **INFO**

Menu: 100 STORE

**Store historical data**

**Are you sure?**

**STORE will copy current diagnostic data into the historical ( currently there.**

**If you are sure, press STORE again.**

**HOME**   **ESCAPE**   **STORE**                      **INFO**

Menu: 101 RFHIST1A

Range 1 Factors	
<b>Manufacturer's settings.</b>	
Zero offset:	000.0
Span factor:	000.0
<b>Stored settings</b>	
Zero offset:	000.0
Span factor:	000.0
<b>HOME</b>	<b>NEXT</b>
<b>RSTR MN</b>	<b>RSTR ST</b>
<b>INFO</b>	

Menu: 102 RFACTORSA

Range Factors	
Shows the calibration factors for this range.	
Modify the zero factor for zero calibration, and the span factor for spanning this range. They take effect as soon as you press the enter key.	
With zero gas, the zero factor should be the same as the raw reading.	
RSTR MN restores the manufacturing values.	
RSTR ST restores the	
<b>HOME</b>	<b>ESCAPE</b>
	<b>INFO</b>

Menu: 103 RFHIST2A

Range 2 Factors	
<b>Manufacturer's settings.</b>	
Zero offset:	000.0
Span factor:	000.0
<b>Stored settings</b>	
Zero offset:	000.0
Span factor:	000.0
<b>HOME</b>	<b>NEXT</b>
<b>RSTR MN</b>	<b>RSTR ST</b>
<b>INFO</b>	

Menu: 104 RFHIST3A

**Range 3 Factors**

<b>Manufacturer's settings.</b>	
Zero offset:	000.0
Span factor:	000.0
<b>Stored settings</b>	
Zero offset:	000.0
Span factor:	000.0

**HOME** **NEXT** **RSTR MN** **RSTR ST** **INFO**

Menu: 105 RFHIST4A

**Range 4 Factors**

<b>Manufacturer's settings.</b>	
Zero offset:	000.0
Span factor:	000.0
<b>Stored settings</b>	
Zero offset:	000.0
Span factor:	000.0

**HOME** **FIRST** **RSTR MN** **RSTR ST** **INFO**

Menu: 106 TWEAK11

**Midpoint correction set up**

This function allows you to set up to three midpoints that the analyzer will use to correct the reading. It does this with a piece-wise linear algorithm. This is a polynomial linearization. First disable the correction. Set the correction to ON. Then enter the first midpoint gas value, run the gas, and when stable, press SET. The analyzer will then display the actual reading, but the analyzer will

**HOME** **ESCAPE** **MORE** **INFO**

## Menu: 107 ANALSETI3

**Midpoint correction set up**

Then go to the second set point, and repeat.  
You can use up to three midpoints.

When you are done, set the correction to  
**WARNING:** make sure that you do not have excessive  
corrections. If the correction is too odd, the  
calibration routine will fail, and you will not be able to  
calibrate the analyzer. In this case, try it again.

You can perform this correction individually for each  
range.

**HOME****ESCAPE****BACK****INFO**

## Menu: 108 ACALSETI1A

**Calibration Parameters**

Disable the limits to recover from calibration failure  
Calibration averaging time sets the time used by the  
analyzer to average its reading. Longer times will give  
a better calibration.

Calibration failure alarm will issue a **WARNING** if the  
analyzer has to change calibration by more than the  
Cal failure error, if warning alarms are enabled.  
Calibration time out sets how long the analyzer will wait  
for the signal to stabilize before issuing a **WARNING**.  
You can zero or span the ranges all at once or not.

**HOME****ESCAPE****INFO**

## Menu: 109 INIT

**Re-initialize the analyzer**

Are you sure?

**INIT** will erase ALL the configuration data, including  
manufacturing data, serial numbers etc.

If you are sure, press **INIT** again.

**HOME****ESCAPE****INIT****INFO**

Menu: 110 SWDIAGI1

**Software Diagnostics**  
Shows the first detected software error since the variable on the bottom line was reset.  
Please report any errors to your service representative. They may mean nothing.

The analyzer has a lot of error recovery code. Errors may therefore correct themselves.

**HOME**   **ESCAPE**   **INFO**

Menu: 111 STOREDPVA

**Trend display control**

The analyzer stores 24 hours of 15 minute averages. These values are only accessible via a PC. Use the variables DATA\_INDEX and DATA\_POINT to access them.

**HOME**   **ESCAPE**   **INFO**

Menu: 112 ZERO\_NOW

**Analyzer zero**

Are you sure?

You must have zero gas flowing through the analyzer.

This control does NOT control any auto-calibration module bound to this analyzer!  
If you are sure, press ZERO again now.  
Press the left arrow key when you are done.

Calibration status: 000.0

**HOME**   **ESCAPE**   **ZERO**   **INFO**

Menu: 113 SPAN\_NOW

**Analyzer span**

Are you sure?

You must have span gas flowing through the analyzer.

This control does NOT control any auto-calibration module bound to this analyzer!  
If you are sure, press SPAN again now.  
Press the left arrow key when you are done.

Calibration status: 000.0

**HOME**   **ESCAPE**   **SPAN**   **INFO**

Menu: 114 CALFAIL

**If it won't calibrate...**

Check that you are flowing the correct gas, and the gas concentration is what it is supposed to be.  
Make sure that the reading is stable before starting.  
If you have enabled or disabled the linearizer, you may have made it hard for the analyzer to calibrate.  
If so, go to the calibration parameters screen under Expert controls and set up, under Analyzer set up, and disable the limits checking. Recalibrate, and then enable the limits checking again.  
If all else fails, manually adjust the calibration factors

**HOME**   **ESCAPE**   **INFO**

Menu: 115 ABOUT

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**Measure**   **Back...**   **More...**

Menu: 116 ABOUT1

**-- Analyzer Module Version Information --**

Serial number:	000.0
Manufacturing date:	000.0
Hardware revision:	000.0
Software revision:	000.0
Revision date:	000.0
Revision time:	000.0

**Measure** **Back...**

Menu: 117 ALARM1

**Concentration Alarm Setup**

Alarm generation is:	000.0
Level for Low-Low alarm:	000.0
Level for Low alarm:	000.0
Level for High alarm:	000.0
Level for High-High alarm:	000.0
Alarm delay:	000.0
Low-Low alarm:	000.0
Low alarm:	000.0
High alarm:	000.0

**HOME** **ESCAPE** **ACKN**

Menu: 118 MANDATA

**-- Manufacturing data...--**

Serial number:	000.0
<b>Set manufacturing date!</b>	
Actual date:	000.0

**Measure** **Back...**