N_2 ANALYZER

OPERATING GUIDE

R218M06 Rev. B

TABLE OF CONTENTS

INTRODUCTION

This manual describes the function; operation and maintenance of the N_2 Analyzer. The intent of this manual is to describe the function of the N_2 Analyzer only. The final assembly manufacturer should provide operating instructions for the completed assembly. The N_2 analyzer is engineered for long life, maximum reliability and stable performance.

NOTE: In order to obtain optimum performance from your analyzer, all operation and maintenance must be performed in accordance with this manual. Please read the manual thoroughly before using the analyzer and do not attempt any repair or procedure that is not described herein. We cannot warranty any damage resulting from misuse, unauthorized repair or improper maintenance of the instrument.

WARNING

Never allow an excess length of tubing, or any accessory near a person's head or neck, which may result in strangulation. Before use, all individuals who will be using the N_2 Analyzer must become thoroughly familiar with the information contained in this Operation Guide. Strict adherence to the operating instructions is necessary for safe, effective product performance. This product will perform only as designed if installed and operated in accordance with the manufacturer's operating instructions. Use only genuine accessories and replacement parts. Failure to do so may seriously impair the analyzer's performance. Repair or alteration of the N_2 Analyzer beyond the scope of the maintenance instructions, or by anyone other than an authorized service person, could cause the product to fail to perform as designed. Calibrate the N_2 analyzer weekly when in operation, or if environmental conditions change significantly. (ie, Elevation, Temperature, Pressure, Humidity — refer to "Factors Influencing Accurate Readings").

WARNING: Use of the N_2 analyzer near devices that generate electrical fields may cause erratic readings

WARNING: DO NOT over pressurize the sensor. Doing so may destroy the sensor and void the warranty. To avoid over pressurization only allow 5 psi (or 2 liters per minute) of gas to come in contact with the sensor membrane.

WARNING: Ensure proper tire inflation pressure after use, if required.

WARNING: The oxygen sensor is a sealed device containing a mild acid electrolyte, lead (Pb), and lead acetate. Lead and lead acetate are hazardous waste constituents and should be disposed of properly, or returned for proper disposal or recovery.

WARNING: Do not immerse the device in any cleaning solution, autoclave or expose the sensor to high temperatures (> 70°C).

WARNING: Dropping the device can adversely affect its performance.

 **Do not throw away. Dispose of properly in accordance with local regulations.**

CLASSIFICATION

Protection against electric shock: Internally powered equipment.
Protection against water: IPX4 – Splash-proof
Mode of Operation: Continuous

N_2 ANALYZER FEATURES AND FUNCTIONS

LCD Display: A 3-digit display provides a direct readout of nitrogen concentration in the range of 0 - 99.9%. The display is blank when the N_2 Analyzer enters its sleep (power off) mode. The N_2 Analyzer will automatically enter the sleep mode after 2 minutes from the last time the unit was energized. You can manually turn off the analyzer by pressing the on/off switch.

ON Button/Auto OFF: Use this button to turn the N_2 Analyzer on or off. When the N_2 Analyzer is in the Sleep (power off) mode, the LCD display is blank. When the ON button is pressed once, the analyzer will display the nitrogen concentration for 2 minutes. Pressing the ON button during this 2 minute "window" will prolong the ON period to 2 minutes from the most recent time that the button was pushed.

Over Range Indicator: The appearance of a decimal point after the first digit means that the N_2 Analyzer is reading in excess of 99.9%.

Example: 0.0.0 = 100%
0.0.1 = 101%
0.0.2 = 102% (etc).

Calibration Key: This key is used to calibrate the device. Holding the key for more than three seconds will force the device to enter a calibration mode.

Oxygen Sensor: This is used to measure oxygen concentration in sample gas.

Sample Inlet Connection: This is the port at which the device is connected to determine nitrogen concentration.

PRE-USE CHECKOUT / CALIBRATION

Follow these steps before using the N_2 Analyzer

1. Prior to turning on the unit, a protective film covering the threaded sensor face must be removed. After removing the film, wait approximately 20 minutes for the sensor to reach equilibrium.

2. Pre-assembly, if required.

   - Thread the barbed adapter onto the oxygen sensor.
   - Connect the clear tubing to the barbed adapter.

3. Using the **"ON/OFF"** key, make sure the unit is in the power **"ON"** mode.

4. Press and hold the Calibration Key for 3 seconds until the display reads “CAL”. This will calibrate the N2 Analyzer to room air. Thereafter, we recommend calibration on a weekly basis.

   A new calibration is required when:

   • The measured N2 percentage in 79.1% N2 is above 80.1% N_2

   • The measured N2 percentage in 79.1% N2 is below 78.1% N_2

   • If you are unsure about the displayed N2 percentage. (see Factors influencing accurate readings.)

5. The N_2 Analyzer is ready to use.

OPERATION PRINCIPALS

The instrument display corresponds directly to the oxygen sensor. The oxygen diffuses through the membrane and an electrical current is generated that is proportional to the partial pressure of oxygen in the gas sample. The oxygen percentage is subtracted from 100, with the remainder being displayed as percent nitrogen. The sensor has a minimal response to gases other than oxygen.

FACTORS INFLUENCING ACCURATE READINGS

Elevation Changes

• Changes in elevation result in a reading error of approximately 1% of reading per 250 feet.

• In general, calibration of the instrument should be performed when elevation at which the product is being used changes by more than 500 feet.

Temperature Effects

The N_2 analyzer will hold calibration and read correctly within ±3% when in thermal equilibrium within the operating temperature range. The device must be thermally stable when calibrated and allowed to thermally stabilize after experiencing temperature changes before readings are accurate. For these reasons, the following is recommended:

• For best results, perform the calibration procedure at a temperature close to the temperature where analysis will occur.

• Allow adequate time for the sensor to equilibrate to a new ambient temperature.

CAUTION: “CAL Err St” may result from a sensor that has not reached thermal equilibrium.

Pressure Effects

Readings from the N_2 analyzer are proportional to the partial pressure of oxygen. The partial pressure is equal to the concentration times the absolute pressure. Thus, the readings are proportional to the concentration if the pressure is held constant. Therefore, the following are recommended:

• Calibrate the N_2 analyzer at the same pressure as the sample gas.

• If sample gases flow through tubing, use the same apparatus and flow rates when calibrating as when measuring.

• The N_2 analyzer oxygen sensor has been tested at pressures up to two atmospheres absolute. Calibration or operation above this pressure is beyond the intended use.

Humidity Effects

Humidity (non-condensing) has no effect on the performance of the N_2 analyzer other than diluting the gas, as long as there is no condensation. Depending on the humidity, the gas may be diluted by as much as 4%, which proportionally reduces the oxygen concentration. The device responds to the actual oxygen concentration rather than the dry concentration. Environments where condensation may occur are to be avoided since moisture may obstruct passage of gas to the sensing surface, resulting in erroneous readings and slower response time.

For this reason, the following is recommended:

• Avoid usage in environments greater than 95% relative humidity.

CALIBRATION ERRORS AND ERROR CODES

The N_2 analyzer analyzers have a self test feature built into the software to detect faulty calibrations, oxygen sensor failures, and low operating voltage. These are listed below, and include possible actions to take, if an error code occurs.

E03: No valid calibration data available

Make sure unit has reached thermal equilibrium. Press and hold the Calibration Button for three seconds to manually force a new calibration.

E04: Battery below minimum operating voltage

Unit has reached end of life.

CAL Err St: O2 Sensor reading not stable

Wait for displayed nitrogen reading to stabilize, when calibrating the device at 100% oxygen.
Wait for unit to reach thermal equilibrium (Please note that this can take up to one half hour, if the device is stored in temperatures outside the specified operating temperature range).

CAL Err lo: Sensor voltage too low

Press and hold the Calibration Button for three seconds to manually force a new calibration. If unit repeats this error more than three times, contact Customer Service for possible sensor replacement.

CAL Err hi: Sensor voltage too high

Press and hold the Calibration Button for three seconds to manually force a new calibration. If unit repeats this error more than three times, contact Customer Service for possible sensor replacement.

CLEANING AND MAINTENANCE

Store the N_2 analyzer in a temperature similar to its ambient environment of daily use. The instruction given below describes the methods to clean the instrument, sensor and its accessories:

Instrument

• When cleaning or disinfecting the exterior of the N_2 analyzer, take appropriate care to prevent any solution from entering the instrument. Do not immerse unit in fluids.

Oxygen Sensor

• Clean the sensor with a cloth moistened with a 65% alcohol / water solution.

• We do not recommend use of spray disinfectants because they can contain salt, which can accumulate in the sensor membrane and impair readings.

Do not throw away. Dispose of properly in accordance with local regulations.

Accessory

• The threaded barbed adapter may be cleaned by washing it with a 65% alcohol / water solution. The part must be thoroughly dry before it is re-used.

SPECIFICATIONS

Measurement Range:	0-99.9% Nitrogen
Resolution:	0.1% Nitrogen
Accuracy and Linearity:	1% of full scale at constant temperature, R.H. and pressure when calibrated at full scale.
Total Accuracy:	±3% actual nitrogen level over full operating temperature range.
Response Time:	90% of final value in approximately 15 seconds at 23°C.
Warm-up Time:	None required
Operating Temperature:	15°C - 40°C (59°F - 104°F)
Storage Temperature:	-15°C - 50°C (5°F - 122°F)
Humidity	0-95% (non-condensing)
Sensor Type:	Galvanic fuel cell
Battery Type:	3V Lithium button-cell (Non-replaceable)
Expected Sensor Life:	>900,000 O_2 percent hours minimum 2-years in typical applications
Weight:	Approximately 3 ounces

WARRANTY

The N_2 analyzer is designed for oxygen delivery equipment and systems. Under normal operating conditions, we warrant the N_2 analyzer to be free from defects of workmanship or materials for a period of 2-years from the date of shipment provided that the unit is properly operated and maintained in accordance with our operating instructions. Based on our product evaluation our sole obligation under the foregoing warranty is limited to making replacements, repairs, or issuing credit for equipment found to be defective. This warranty extends only to the buyer purchasing the equipment directly from us or through our designated distributors and agents as new equipment. Our warrants the oxygen sensor in the N_2 analyzer to be free from defects in material and workmanship for a period of 2-years from the date of shipment in a N_2 analyzer. Should a sensor fail prematurely, the replacement sensor is warranted for the remainder of the original sensor warranty period. Routine maintenance items, such as batteries, are excluded from warranty. We and any other subsidiaries shall not be liable to the purchaser or other persons for incidental or consequential damages or equipment that has been subject to abuse, misuse, mis-application, alteration, negligence or accident.

These warranties are exclusive and in lieu of all other warranties, expressed or implied, including warranty of merchantability and fitness for a particular purpose.