

Nitro Pro

N₂ Purity Tester



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INTRODUCTION

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

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

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 Nitrogen Tester must become thoroughly familiar with the information contained in this manual. 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 performance. Repair or alteration of the Nitrogen Tester 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 Nitrogen Tester weekly, when in operation, or if environmental conditions change significantly (Elevation, Temperature, Pressure, Humidity — refer to "Factors Influencing Accurate Readings").

WARNING: Use of the Nitrogen Tester 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 greater than 150^o F (70^o C).

WARNING: Dropping the device can adversely affect its performance.

CLASSIFICATION

Protection against electric shock: Internally powered equipment.

Protection against water: IPX4 – Splash-proof

Mode of Operation: Continuous

NITROGEN TESTER FEATURES AND FUNCTIONS

LCD Display: A three-digit display provides a direct readout of nitrogen concentration in the range of 0 - 99.9 percent. The display is blank when the Nitrogen Tester enters its sleep (power off) mode. The Nitrogen Tester will automatically enter the sleep mode after 2 minutes from the last time the Nitrogen Tester was energized. Manually turn off the Nitrogen Tester by pressing the on/off switch.

ON Button/Auto OFF: Use this button to turn the Nitrogen Tester on or off. When the Nitrogen Tester is in the Sleep (power off) mode, the LCD display is blank. When the ON button is pressed once, the Nitrogen Tester will display the nitrogen concentration for two minutes. Pressing the ON button during this two minute "window" will prolong the ON period to two 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 Nitrogen Tester is reading in excess of 99.9 percent.

Examples: 0.0.0 = 100%

0.0.1 = 101%

0.0.2 = 102% (etc).

Calibration Key: This key is used to calibrate the Nitrogen Tester. 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 Nitrogen Tester is connected to determine nitrogen concentration.

PRE-USE CHECKOUT / CALIBRATION

Follow these steps before using the Nitrogen Tester:

1. Prior to turning on the Nitrogen Tester, 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 Nitrogen Tester is in the power ON mode.

4. Press and hold the Calibration Key for three seconds until the display reads “CAL”. This will calibrate the Nitrogen Tester to room air. Thereafter, calibration is recommended on a weekly basis.

A new calibration is required when:

- The measured N₂ percentage in 79.1 percent N₂ is above 80.1 percent N₂
- The measured N₂ percentage in 79.1% N₂ is below 78.1 percent N₂
- If unsure about the displayed N₂ percentage (see Factors influencing accurate readings).

5. The Nitrogen Tester 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 percent of reading per 250 feet.
- In general, calibration of the Nitrogen Tester should be performed when elevation at which the product is being used changes by more than 500 feet.

Temperature Effects

The Nitrogen Tester will hold calibration and read correctly within ± 3 percent 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 Nitrogen Tester 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 Nitrogen Tester 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 Nitrogen Tester 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 Nitrogen Tester 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 percent, 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 percent relative humidity.

CALIBRATION ERRORS AND ERROR CODES

The Nitrogen Tester has 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 percent 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 RTI 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 Nitrogen Tester in a temperature similar to its ambient environment of daily use. The instructions given below describe the methods to clean the instrument, sensor and its accessories:

Instrument

- When cleaning or disinfecting the exterior of the Nitrogen Tester, 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.
- It's not recommended to use spray disinfectants because they can contain salt, which can accumulate in the sensor membrane and impair readings.

Accessory

- The threaded barbed adapter may be cleaned by washing it with a 65 percent 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