







Analytical Industries Inc.

Technical Specifications *

- Application:** Measure Helium in Oxygen and/or Nitrogen and Oxygen in Nitrogen and/or Helium and compute balance gas
- Accuracy He, O₂ :** < ±2% of FS range under constant conditions
< ±5% of FS range at constant pressure over operating temperature range of 0-45°C (0-113°F)
- Analysis Range:** 0-100% Helium, 0-100% Oxygen
- Calibration:** Dual mode: Ambient air or span gas
- Compensation:** Normal use: Temperature and barometric pressure
Calibration: O₂ sensor corrected for temperature, barometric pressure and relative humidity; He sensor corrected for differences in thermal conductivity of oxygen and nitrogen
- Connections:** 1/8" push-on fitting
- Controls:** Water resistant keypad with simple to use one touch keys for Power ON/OFF; Backlight ON/OFF; Cal O₂/Zero He
- Display:** Graphical backlit LCD 2.5 x 2.5"; backlight 30 sec auto OFF
% Helium, % Oxygen, % Balance Gas
Temperature, relative humidity, barometric pressure
Imperial or Metric units
MOD - Maximum Operating Depth @ PO2 1.4 ATA
Low battery warning
- Enclosure:** Watertight IP65, 221 x 190.5 x 96.5 mm (8.7 x 7.5 x 3.8")
- Pressure/Flow:** Very low (<5 psi, 1-2 lpm); open tank slowly until gas is heard to be hissing out of tank outlet
- Power:** Rechargeable battery with 15 minute auto OFF
9 VDC power adapter from 110/220 VAC
Approximately 16 hrs continuous use from a 2 hr full charge
- Resolution:** 0.1% Helium, 0.1% Oxygen, 0.1% Balance Gas
- Response Time:** 90% of final FS reading < 10 seconds
- Sample System:** Flow manifold shown, 1/8" tubing, A-3609 adapter 
- Sensor Model:** He: AII-41-100, O₂: AII-11-75D, Environmental: AII-E3
- Sensor Life:** He: 10 yrs; O₂: 60 mos in air at sea level and 25°C (77°F)
- Temp. Range:** Operating: 0-45°C (32-113°F), Storage: 0-50°C (122°F)
- Warranty:** Analyzer 12 mos; Sensors: He 12 mos, O₂ 36 mos prorated

* Specifications subject to change without notice

- Optional Equip:** 9 VDC cigarette lighter adapter (PWRS-1019)
-  Adapter, BC with Restrictor to 1/8" Tube (A-3673)
-  Adapter, DIN to 1/8" Tube (A-3677)
-  Adapter, A-Yoke to 1/8" Tube (A-3678)



AII 4001 Helium Oxygen Trimix Analyzer

Analyze Dive Mixes . . . learn more back page

Proprietary algorithms and sensors compensate:

- Oxygen value for environmental factors
- Helium value for thermal differences in gases

Accurate calibration + readings = safe dive

Displays MOD PO2 @ 1.4 ATA of gas mix sampled

Large backlit LCD is easily read in poor conditions

Rechargeable battery - 16 hours continuous use

Operates while recharging battery

Built-in battery protection

ISO 9001:2008 Certified
INTERTEK Certificate No. 485





AII 4001 Helium Oxygen Trimix Analyzer

The most advanced analyzer available...

Analyze dive gas mixes confidently, proprietary algorithms* and sensors provide extremely accurate one touch calibration and precise accuracy.

Eliminate possible errors from chart conversion calculations or environmental influences. Did you know failure to account for environmental factors can produce up to 6.7% error.



- ◆ The Oxygen value is compensated for temperature, barometric pressure and relative humidity.



- ◆ The Helium value is compensated for differences in the thermal conductivity of Oxygen and Nitrogen enabling the analyzer to precisely measure any combination of Helium, Oxygen and Nitrogen. Also, the Helium value is automatically zeroed every time the analyzer the oxygen sensor is calibrated with air or 100% oxygen.

The large backlit LCD is easily read even in low light condition and provides additional information to the user:

- ◆ Temperature, barometric pressure and relative humidity values of the sample gas.
- ◆ For added safety, the Maximum Operating Depth (MOD) PO₂ @ 1.4 ATA of the gas mix being sampled
- ◆ Imperial or Metric units at a touch

Rechargeable battery powers the AII 4001 for 16 hours of continuous use.

- ◆ 9 VDC power adapter 110/220 VAC is included, charges the battery in 2 hours
- ◆ The adapter can safely remain connected for bench top operation
- ◆ Optional 9 VDC cigarette lighter adapter is available

Automatically conserves and protects battery life.

- ◆ The backlight turns off after 30 seconds and
- ◆ The AII 4001 completely powers itself off after 15 minutes of non-use
- ◆ The automatic turn-off features are disabled when externally powered
- ◆ The analyzer turns off 2-3 hours after the LOW BATTERY warning is displayed to prevent complete discharge and permanent damage to the battery

The AII 4001 and accessories are packaged in a rugged waterproof plastic enclosure designed specifically for hostile diving conditions. The unmistakable bright red color stands out in the shop, on the boat or in the water. Patent pending



AIII Analytical Industries Inc.



Owner's Manual



ISO 9001:2008 Certified
Certificate No. 485

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consent of Analytical Industries Inc.

AII-4001 **Helium Oxygen** **Trimix Analyzer**

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& He Zero

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& Accessories

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urchased the most advanced portable gas analyzer provides unmatched sophisticated performance in a provides users with significant advantages:

ixes in any environment without charts. Proprietary provide extremely accurate one touch calibration. r environmental factors can produce up to 6.7%

d for temperature, barometric pressure and RH. the oxygen is calibrated with air or 100% oxygen.

Helium value for differences in the thermal con- rogen enabling the AII-4001 to precisely measure Oxygen and Nitrogen.

The large backlit LCD is easily read even in low light condition and provides additional information to the user:

- ◆ Temperature, barometric pressure and RH values of the sample gas.
- ◆ For added safety, the Maximum Operating Depth (MOD) PO2 @ 1.4 ATA of the gas mix being sampled
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* Patent pending

1.1 Contents

Open the red case containing the AII-4001 and confirm you have received the standard accessories and any optional equipment ordered:

- 1) AII-4001 Helium Oxygen Trimix Analyzer
- 2) Flow Manifold (A-3582)
- 3) Adapter, Dome to 1/8" Tube (A-3609)
- 4) Tubing, 1/8" x 3 ft. (TUBE-1018)
- 5) Adapter, 9 VDC 110/220 VAC (PWRS-1003-1)
- 6) Owner's Manual



Safety

Users must familiarize themselves with the instructions of this symbol.

Stand this manual before using the AII-4001 Helium

or MOD or maximum operating depth @ 1.4 ATA of MOD. To prevent oxygen toxicity or even death, do not

diving

Use an accurate mix:
The manifold and all three (3) sensors must be free of oil to calibrate or use the AII-4001 Helium which may cause inaccurate readings. Clean air for several minutes to vent previous mix as described in section 5.4

Guidelines for allowing the mix to cool after each transition.
When the tank is open. Liquid, exposure to direct sunlight, the environment can damage the electronics.

Use a clean, damp soft cloth and a mild cleaner.

Prevent the possibility of absorbing abuse. However, the electronics can be damaged from the excessive shock of being dropped.

The oxygen sensor contains a mildly caustic clear area immediately with large amounts of water and should be cleaned according to Section 10 MSDS for additional information.

When the battery symbol on the LCD becomes empty and is displayed. To prevent complete discharge and battery, the analyzer turns off automatically 2-3 minutes before the LOW BATTERY warning.

Regulate the low pressure and flow rates (or regulate the pressure and flow rate to 1-2 lpm using optional equipment) to prevent damage to the sensors. For example, when the tank is filled and tubing supplied, open the tank very slowly until

4 Specifications **AII-4001 He O₂ Trimix Analyzer**

Application: Measure Helium in Oxygen and/or Nitrogen and Oxygen in Nitrogen and/or Helium and compute balance gas

Accuracy: < ±1% of FS range under constant conditions
< ±5% of FS range at constant pressure over operating temperature range of 0-45°C (0-113°F)

Analysis Range: 0-100% Helium, 0-100% Oxygen

Calibration: Dual mode: Ambient air or span gas

Compensation: Normal use: Temperature and barometric pressure

Calibration: O₂ sensor corrected for temperature, barometric pressure and relative humidity. He sensor corrected for differences in thermal conductivity of oxygen and nitrogen

Connections: 1/8" push-on fitting

Controls: Water resistant keypad with simple to use one touch keys for Power ON/OFF; Backlight ON/OFF; ZERO He/CAL O₂

Display: Graphical backlit LCD 2.5 x 2.5", backlight 30 sec auto OFF
% Helium, % Oxygen, % Bal Gas
Temperature, relative humidity, barometric pressure
MOD - Maximum Operating Depth @ PO2 1.4 ATA
Low battery warning

Enclosure: Watertight IP65, 221 x 190.5 x 96.5 mm (8.7 x 7.5 x 3.8")

Pressure/Flow: <5 psi/1-2 lpm or open tank slowly until hissing is heard

Power: Rechargeable battery with 15 minute auto OFF
9 VDC power adapter from 110/220 VAC or 9 VDC cigarette lighter adapter for continuous use
Approximately 16 hrs continuous use from 2 hr full charge

Resolution: 0.1% Helium, 0.1% Oxygen, 0.1% Balance Gas

Response Time: 90% of final FS reading < 10 seconds

Sensor Model: He: AII-41-100, O₂: AII-11-75D, Environmental: AII-E3

Sensor Life: He: 10 yrs; O₂: 60 mos in air at sea level and 25°C (77°F)

Temp. Range: Operating: 0-45°C (32-113°F), Storage: 0-50°C (122°F)

Warranty: Analyzer 12 mos; Sensors: He 12 mos, O₂ 36 mos prorated

with a waterproof membrane type panel that contains
in keys for operating the analyzer.

the RED key to turn the unit ON or OFF

ey has two functions:

release it to turn the backlight ON or OFF

hold the YELLOW key for 3 seconds to switch the
y between Imperial and Metric units

release the GREEN key to calibrate the oxygen
ero the helium sensor and compute the balance
mix being sampled.

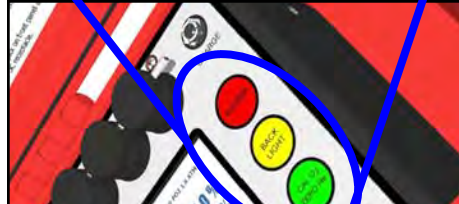
All-4001 automatically:

ter 15 minutes of non-use

HT after 30 seconds.

ppriate RED or YELLOW key to reactivate.

ures are disabled during charging and when exter-



5.2 Power

The All-4001 is equipped with a rechargeable battery that provides approx-
imately 16 hours of continuous from a 2 hour full charge. It is supplied with a 9
VDC power adapter 110/220 VAC for charging the battery and operating the
analyzer from external power. An optional 9 VDC cigarette lighter adapter is
available.

When the battery is in need of charging the LCD displays an empty battery
symbol and a warning that reads LOW BATTERY as shown below:



Recharge the battery when the battery symbol on the LCD becomes empty and
the LOW BATTERY warning is displayed. To prevent complete discharge and
permanent damage to the battery, the analyzer turns off automatically 2-3
hours after the LCD displays the LOW BATTERY warning.

To charge the battery or operate the All-4001 from external power, insert the
male plug into the CHARGE jack located in the upper right hand corner of the
front panel and connect the adapter to the appropriate AC outlet or DC recep-
tacle.



moving parts and other than a periodic wipe down since.

um sensor is 10 years and along with the environment last for the life of the analyzer, unless subjected to excessive shock from the analyzer being dropped.

gen sensor is 5 years in air (20.9%) at 25°C (77°F) minimum sensor life, avoid subjecting the analyzer to more than necessary and expose or flush the Oxygen analysis of high oxygen concentrations.

easily replaced in the field. Dispose of old sensors with local regulations.

n dry environment.

from the sensors, if neces-

securing the front panel

from the case

n the side panel

n the PCB using small thin

e oval illustrated at right

ing the sensor to the front

of the sensor out of the

reverse the steps above

n dry environment.

acement procedure to gain clear access to screws

mp.

red oval illustrated above.

screws, yellow oval illustrated above.

mp to remove.

, reverse the steps above.

y 50% before charging yields approx 500 cycles.

y 30% before charging yields approx 1,200 cycles.

7 Replacement Parts & Optional Accessories

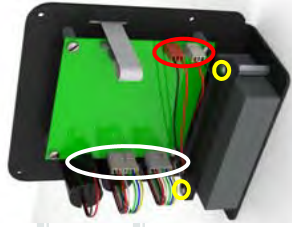
To maintain optimum performance service the AII-4001 using only OEM parts obtained from Analytical Industries Inc.

Replacement Parts

AII-11-75D	Oxygen Sensor
AII-41-100	Helium Sensor
AII-E3	Environmental Sensor
A-1185	PCB Assembly, Main
A-3606	Battery Assembly
A-3582	Flow Manifold
A-3609	Dome Adapter
TUBE-1018	Sample Tubing 1/8" ID 1/4" OD
PWRS-1003-1	9 VDC Charger 110/220 VAC Adapter
MANL-4001	AII-4001 Owner's Manual
A-3607	Charger Wiring Assembly
A-3597	Case Lid Instruction Panel

Optional Accessories

PWRS-1019	9 VDC Cigarette Lighter Adapter
A-3673	Adapter, BC with Restrictor to 1/8" Tube
A-3677	Adapter, DIN to 1/8" Tube
A-3678	Adapter, A-Yoke to 1/8" Tube



Possible Cause	Recommendation
In auto turn off feature Safety protection auto turn off connection component failure	Press red POWER key Charge analyzer for 2 hrs Check battery connection Return to factory
Turn off feature Failure to high temperature component failure	Press yellow BACK LIGHT key Move the unit to cooler place Return to factory
BATTERY warning Electrical connection The LOW BATTERY warning pressure on sensor Electro-mag interference Sensor nearly expired Sensor faulty	Charge battery Check connections Charge or replace battery Check pressure, flow and vent (remove any restriction) Move unit away from source Replace O ₂ sensor Check with known He % mix Replace He sensor
In gas path connections Covering sensing areas The LOW BATTERY warning Temperature change >10°C Sensor nearly expired Sensor faulty	Check connections Remove liquid Replace O ₂ sensor Charge or replace battery Stabilize 30 min at new temp Replace O ₂ sensor Check with known He % mix Replace He sensor
Electrical connection Covering sensing area Oxygen present from being dropped Sensor expired	Check O ₂ sensor connection Remove liquid Expose to air Replace PCB or O ₂ sensor Replace O ₂ sensor
Oxygen required Sensor fault	Perform CAL O ₂ ZERO He Replace He sensor
Oxygen present Sensor nearly expired from being dropped	Expose to air, repeat Replace O ₂ sensor Replace PCB, sensors
Sensor disconnected Sensor faulty	Check He sensor connection Check with known He % mix

9 Warranty

Coverage

Under normal operating conditions, the analyzer and sensors are warranted to be free of defects in materials and workmanship for the period specified in the current published specifications. To make a warranty claim, you must return the item properly packaged and postage prepaid to:

Analytical Industries Inc.
2855 Metropolitan Place
Pomona, Ca 91767 USA

Analytical Industries in their sole discretion shall determine the nature of the defect. If the item is determined to be eligible for warranty we will repair it or, at our option, replace it at no charge to you. If we choose to repair your item, we may use new or reconditioned replacement parts. If we choose to replace your item, we may replace it with new or reconditioned components of the same or upgraded design. This is the only warranty we will give and it sets forth all our responsibilities; there are no other express or implied warranties.

The warranty period begins with the date of shipment from Analytical Industries and is limited to the first customer who submits a claim for a given serial number which must be in place and readable to be eligible for warranty. Under no circumstances will the warranty extend to more than one customer or beyond the warranty period.

Exclusions

This warranty does not cover normal wear and tear; corrosion; damage while in transit; damage resulting from misuse or abuse; lack of proper maintenance; unauthorized repair or modification of the analyzer; fire; flood; explosion or other failure to follow the Owner's Manual.

Limitations

Analytical Industries shall not be liable for losses or damages of any kind; loss of use of the analyzer; incidental or consequential losses or damages; damages resulting from alterations, misuse, abuse, lack of proper maintenance; unauthorized repair or modification of the analyzer.

Service

Telephone 909-392-6900, fax 909-392-3665 or e-mail diveaii@aii1.com between 8:00am and 5:00pm PST Monday thru Thursday or before 12:00pm on Friday. Trained technicians will assist you in diagnosing the problem and determining the appropriate course of action.



II Safety Data Sheet

ical Galvanic Fuel Cell Oxygen Sensor
ee with protective coverings, normally no hazard
- none; Potassium Hydroxide (KOH), Lead (Pb)
soluble in H ₂ O; evaporation similar to H ₂ O
le, non-flammable
d mixing strong acids, emits fumes when heated
ia ingestion - harmful or fatal if swallowed; eye - possible loss of vision; and, skin contact - corrosive, mical burn. Liquid inhalation is unlikely.
n to cause birth defects, but contact unlikely
- burning sensation; skin contact - slick feeling
none; eye - safety glasses; hands - gloves
ove Teflon and PCB coverings; do not probe with
s; avoid contact with eyes, skin and clothing.
gloves, safety glasses and H ₂ O and flush all sur-
edly with liberal amounts of H ₂ O

ould be disposed of in accordance with local regula-

ons prohibit electronic products including the He-
nvironmental sensors from being placed in household

ucts including the Helium and environmental sen-
disposed of in accordance with local regulations.

Advantages of the most advanced portable analyzer available . . .

Precisely analyze dive gas mixes in any environment without charts.

Proprietary algorithms* and sensors provide extremely accurate one touch calibration. Note: Failure to account for environmental factors can produce up to 6.7% error.

- ◆ Oxygen value is compensated for temperature, barometric pressure and RH.
- ◆ Helium value is zeroed when the oxygen is calibrated with air or 100% oxygen.

Algorithms* compensate the Helium value for differences in the thermal conductivity of Oxygen and Nitrogen enabling the AI1-4001 to precisely measure any combination of Helium, Oxygen and Nitrogen.

The large backlit LCD is easily read even in low light condition and provides additional information to the user:

- ◆ Temperature, barometric pressure and RH values of the sample gas.
- ◆ For added safety, the Maximum Operating Depth (MOD) PO₂ @ 1.4 ATA of the gas mix being sampled
- ◆ Imperial or Metric units at a touch

Rechargeable battery powers the AI1-4001 for 16 hours of continuous use.

- ◆ 9 VDC power adapter 110/220 VAC is included, charges battery in 2 hours
- ◆ The adapter can safely remain connected for bench top operation
- ◆ Optional 9 VDC cigarette lighter adapter is available

Automatically conserves and protects battery life.

- ◆ The backlight turns off after 30 seconds and
- ◆ The AI1-4001 completely powers itself off after 15 minutes of non-use
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* Patent pending

