

BASIC RESIDENTIAL COMBUSTION ANALYZER FORENSICS DETECTORS™

BASIC RESIDENTIAL COMBUSTION ANALYZER

Model: FD-4A



**FORENSICS
DETECTORS** 

CONFIGURATION & COMPONENTS INCLUDED

Serial #:

CO Sensor	
O2 Sensor	
Detector 4A	
Pump	
NOx Filter	
Water Trap + Magnet	
Hose Assembly	
Calibration Cap	
Cap Screw	
Stainless Probe	
Hard Carry Case	
110V Wall Charger	
Charger USB Cable	
Magnet Attachment	
QC/CAL Certificate	
User Manual	
Other	

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PRODUCT FEATURES

- Measures CO (ppm) & O2 (%)
- Calculates COAF (air free) & EA (excess air)
- Comes with a Water Trap, Particle & NOx filters
- For residential combustion AND / OR ambient applications
- Strong magnet for easy mount on appliances
- Rechargeable Lithium-ion battery via easy USB charger
- Professional aluminum hard-case
- Electronic Pump with Stainless Steel Probe

PRODUCT COMPONENTS

1. Analyzer - CO & O2 sensors with a niobium magnet for mounting.
2. Electronic Pump with Stainless Probe.
3. Hose assembly. 3 feet of silicone tubing, Water trap, particle and NOx filters with sensor cap. The NOx filter removes cross-interfering acid gases to minimize CO sensor interference.
4. Aluminum Hard-case
5. Screw to mount sensor cap to the Analyzer
6. USB Charging cable
7. USB Charger
8. Analyzer and Pump Aluminum Case
9. Calibration Certificate
10. Manual (this document)

USER TIPS

- Ensure the analyzer and pump are stored well within specifications.
- When using the analyzer, condensation may occur and the water trap will slowly fill with water. Keep track of this. Empty as necessary. Always empty before storing and retiring the unit after working. Some condensation may occur in the electronic pump. Run the pump with fresh air to ensure condensation within the pump has been removed.
- The NOx filter will last for the life of the detector.
- The sensors have a rated life of 2 years. If well taken care of, they can last longer (up to 3 years) but will require more frequent calibration.
- Please email FORENSICS DETECTORS if any part requires replacement.
- FORENSICS DETECTORS does not offer sensor replacement. Given the price point of the detector and cost of the sensor parts, shipping and calibration, it is simply not economically viable to allow for customer sensor replacement – and easier to replace the detector. Both pump and detector can be separately purchased, email us.
- If unsure, always ask. Email us: forensicsdetectors@gmail.com

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1. INTRODUCTION

You have purchased the **BASIC RESIDENTIAL COMBUSTION ANALYZER** by **FORENSICS DETECTORS**. The detector is factory calibrated. This product is a BASIC analyzer - no frills, simple use, designed to simply get the job done with no messing around. Turn ON and GO. This detector is made with a robust design using high quality electrochemical sensors made in the UK. This detector was made for RESIDENTIAL use for HVAC technicians, contractors, engineers, energy inspectors, plumbers and others that need to analyze combustion and flue gases (from natural gas or propane). In addition, the detector can be used as an ambient air quality detector. The analyzer contains both CO and O2 sensors. The analyzer calculates COAF (CO Air Free) and Excess Air (EA) only when O2 is less than 20%. COAF & EA equations are calculated as follows:

$$\text{COAF} = (\text{CO}_{\text{measured}} \times 20.9) / (20.9 - \text{O2}_{\text{measured}})$$

$$\text{EA}\% = [(20.9 / (20.9 - \text{O2}_{\text{measured}})) - 1] \times 100$$

2. QUICK SETUP

1. Ensure all components included.
2. Ensure analyzer/pump are fully charged.
3. Connect silicon tube with bottom of pump (pump outlet). Connect pump probe. Attached sensor cap on the analyzer with screw.
4. Double check all tubing is well connected and in place.
5. Check water trap, ensure it is empty of water, if not, open and dry it out.
6. Turn ON pump and detector. When ready to sample press the ON/OFF button on the pump and gas will be drawn from the probe point.
7. Read this manual and familiarize yourself with the operation of the devices & components.
8. Follow best practices when selecting combustion gas sample location for residential appliances. Follow local codes and appliance manufacturer instructions.



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3. SPECIFICATIONS

ANALYZER SPECIFICATIONS

Warranty:	1 year limited warranty
Sensor:	Electrochemical Sensor CO & O2
Calculated COAF:	CO Air Free (COAF) only when O2 < 20%
Calculated EA:	Excess Air (EA) only when O2 < 20%
Sensor CO & O2 Life:	2 years
Detection Range:	CO (0-1000ppm), O2 (0-30%vol)
Error:	<±5% of reading
Response Time:	<60 seconds
Storage/Operating Temp:	0-122F
Storage/Operating Humidity:	<95%RH
Battery:	DC3.7V Li-Ion battery 2000mAh
Operation Time:	>12 hours
Dimension/Weight:	5 x 2.7 x 1.7 inches, 230grams (7.8 oz.)
Rating:	ATEX certified EXIallCT4. IP65 certified.

PUMP SPECIFICATIONS

Warranty:	1 year limited warranty
Storage / Operating Temp:	32°F - 140°F
Storage / Operating Humidity:	<95%RH
Operating voltage:	DC3.7V Li battery 1500mAh
Flow rate:	0.5 LPM, 500 cc/min
Weight:	186g (6.6 oz.)
Probe Length:	8 inches
Pump Device:	9 x 2.5 x 1 inches
Noise:	<60dB

CARRY CASE SPECIFICATIONS

Weight:	700g (2lb and 6 oz.)
Dimension:	11 x 7 x 3 inches

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4. ANALYZER OPERATION

When the analyzer turns ON, it shows the main detection screen with CO, O2, COAF and EA measurements. When in this main mode of operation, the options are as follows:

ON/OFF: Press POWER button for 3 seconds. After self-check, gas detection begins and levels are show. Backlight in ON for 15 secs then turns off.

UP ARROW: When pressed will show date, time and battery life remaining. The detector has a built-in lithium battery and can be charged via micro-USB. Before charging, TURN OFF the detector to avoid any potential damage. During charging, the detector cannot detect gas.

DOWN ARROW: No function when not in MENU mode. Press anytime to momentarily turn on the backlight.

MENU MODE: Quickly press POWER button to enter main MENU OPTIONS. Use UP and DOWN buttons to make your selection, then press POWER button to select. Menu option selections are as follows:

- | | |
|-----------------|-------------------------------------|
| - ZERO SET: | User operation for ZERO calibration |
| - ZERO TUNE: | Factory operation only |
| - GAS CHECK: | User operation for SPAN calibration |
| - ALARM RECORD: | User operation for ALARM record |
| - LOW ALARM: | User operation for ALARM setting |
| - HIGH ALARM | User operation for ALARM setting |
| - TIME SET: | User operation for TIME setting |
| - EXIT | Exit to main menu |
| - SHUTDOWN | Shutdown the Analyzer |
| - CHANNEL SET: | Factory operation only |

ZERO SET: Use this option when you need to undertake a ZERO calibration. This enables a ZERO baseline for maximum accuracy. For the CO sensor, simply expose it to fresh air. For the O2 sensor, use a pure Nitrogen gas bottle source with a flow of 0.5 LPM. Expose to ZERO air for 1 minute using a certified gas bottle delivered to the sensor via the sensor cap provided. Select Gas to ZERO with up/down arrow. Then press SAVE to register the Zero reading. If you see the CO sensor is wandering (above 2ppm) after 2 minutes exposed to fresh air, undertake a ZERO calibration of the CO sensor. If the CO sensor wanders 1 or 2ppm, it is normal.

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GAS CHECK (SPAN Calibration): Enter passcode 1 1 1 1. Enter the value of CAL calibration CO gas concentration you will expose. Expose to CAL air for 2 minutes using certified gas. For O₂, simply expose the detector to fresh air, having 20.9% of O₂. For CO gas, maintain a flow of about 0.5L/min when using CO gas bottles and use the sensor cap provided to deliver the gas to the detector. Save to register reading. If you are mostly concerned with low level CO detection, we advise to calibrate using 100ppm. If you undertake detection with the full CO spectrum range (0-1000ppm) we advise to use 500ppm CO calibration gas. Please note if O₂ sensor wanders from 20.9% in a range $\pm 0.4\%$ it is normal.

ALARM RECORD: Shows the time-stamped history of alarm activation.

LOW ALARM: Low Alarm point setting. Follow screen instructions. Move cursor and adjust alarm levels.

HIGH ALARM: High Alarm point setting. Follow screen instructions. Move cursor and adjust alarm levels.

TIME SET: Follow screen instructions. Move cursor and adjust time digits as desired.

ESC: Exits menu options and back to normal operation.

HELPFUL TIPS:

- Analyzer alarms are used predominantly for ambient measurement. They are not commonly used for combustion analysis. If the analyzer is used for combustion analysis, the alarms can be set maximum range to prevent alarming, otherwise simply ignore the LED alarm flash.
- We deliberately made this analyzer easy to use with only "BASIC" features for a non-complex user experience.
- When the detector reads changing CO or O₂ concentration it maintains the backlight ON.
- COAF and EA are only displayed if the O₂ reading is less than 20%.
- Do not use this detector for life threatening CO or O₂ air quality alarming since the detector does NOT have audible or vibration alarming.
- To use the detector as an ambient air quality detector, simply remove the sensor cap and measure ambient levels without the pump/probe assembly. Otherwise keep the sensor cap ON, connect the hose and pump assembly and detect ambient air as normal, just like a combustion analysis.

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MAIN DETECTOR DISPLAY

COAF & EA engages after O2 less than 20% which then confirms a flue gas environment and makes the COAF and EA applicable and relevant.



As measured O2

As measured CO

COAF ppm

Excess Air %



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5. PUMP OPERATION

The pump draws/sucks air from the top (input port) and expels it from the bottom (output port). Screw the stainless probe to the top inlet port. Turn ON. The main pump LCD screen shows temp, time and battery level. A large triangle represents the pump power level. If a pump load is detected that slows down the pump flow, the triangle power level will reduce accordingly.

ON/OFF: Press POWER button for 5 seconds. After self check and warm up, normal pumping begins and pump flow power level is show. Backlight is ON for 20 secs then turns off.

PUMP ON / PUMP OFF: Quickly press POWER button to turn ON/OFF the pump. When the PUMP is OFF, the RED LED with FLASH, indicating PUMP OFF. When ready to sample combustion or ambient air gas, press this button to begin testing.

SET TIME / DATE: Press UP button to edit TIME and DATE. Quickly press ON/OFF button to scroll to next figure for edit. When done, hold ON/OFF button for 3 seconds to SAVE and go back to the main screen.

BACKLIGHT: When the pump operates the backlight will turn off after 20 seconds of no button operation to preserve battery power. To turn ON backlight, simply press any button quickly.

STATUS: Press DOWN button to see operation codes (used by manufacturer technicians).

6. BATTERY CHARGING

The ANALYZER and PUMP have each a built-in lithium battery and can be charged via micro-USB port. Any USB charger will work, ensure >1.0A for fast charging. Before charging, TURN OFF the pump OR analyzer to avoid any potential damage. Charging takes about 4hours for both ANALYZER and PUMP.

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* * WARNING * *

- KEEP DETECTOR **AWAY** FROM ELECTROMAGNETIC & MAGNETIC INTERFERENCES (i.e. PHONES & MAGNETS)
- STORE DETECTOR **WITHIN SPECIFICATIONS**
- IF UNWELL, SEEK CLEAN AIR & MEDICAL ATTENTION.
- **FOLLOW INSTRUCTIONS AS THE DETECTOR IS VERY SENSITIVE**
- **TO ENSURE** ACCURACY, CALIBRATE DEVICE AT LEAST **EVERY 6 MONTHS**
- CHECK AND SET ALARM LEVELS APPROPRIATELY TO AVOID HARMFUL EXPOSURE - CONSULT WITH YOUR SAFETY OFFICER OR WITH STATE/FEDERAL AGENCIES.
- DO NOT TOUCH PROBE AFTER A FLUE GAS MEASUREMENT, IT IS VERY HOT AND BURNING TO SKIN WILL OCCUR
- TAKE ALL PRECAUTIONS WHEN UNDERTAKING COMBUSTION MEASUREMENTS AS TO NOT ALLOW TOXIC GASES INTO YOUR BREATHABLE ZONE
- **KEEP AWAY** FROM DUST & PARTICULATE AND NEVER EXPOSE TO CONCENTRATED VAPORS, HARSH CHEMICALS OR EXTREMELY HIGH CONCENTRATION LEVELS AS IT MAY POISON THE SENSOR
- **SENSOR LIFE IS 2 YEARS FROM RECEIPT.** IF DEVICE HAS BEEN TAKEN CARE OF THE SENSOR CAN LAST LONGER, BUT MAY REQUIRED CALIBRATION MORE OFTEN TO OPERATE WITHIN PERFORMANCE SPECIFICATIONS.
- **DO NOT** USE THIS DETECTOR FOR LIFE THREATENING APPLICATIONS SINCE THIS DETECTOR DOES NOT HAVE BUZZER OR VIBRATION ALARMS, THEY HAVE BEEN DELIBERATELY REMOVED FOR THE COMBUSTION MODEL FD-4A. THIS IS NOT A PERSONAL PROTECTION DEVICE. BE ATTENTIVE.

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WARRANTY DISCLAIMERS

This product is covered by a one year limited warranty.

This warranty does not cover damage resulting from accident, misuse, disassembly, abuse or lack of reasonable care of the product, or applications not in accordance with the user manual. It does not cover events and conditions outside of our control, such as Acts of God (fire, severe weather etc). It does not apply to retail stores, service centers or any distributors or agents. We will not recognize any changes to this warranty by third parties. We shall not be liable for any incidental or consequential damages caused by the breach of any express or implied warranty. Except to the extent prohibited by applicable law, any implied warranty of merchantability or fitness for a particular purpose is limited in duration for 1 year.

THIS PRODUCT CANNOT BE REPAIRED IF THE UNIT IS TAMPERED WITH IT WILL INVALIDATE THE GUARANTEE. IF THE UNIT IS FAULTY PLEASE RETURN IT TO YOUR ORIGINAL SUPPLIER WITH YOUR PROOF OF PURCHASE.

Product Designed in California, USA,
Product Tested, QA/QC in California, USA,
Product Made in China

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Support & Sales

WEB: www.forensicsdetectors.com

Email: forensicsdetectors@gmail.com

