**Quick Start**

1. Press ON/OFF to power on the SOX3.  
2. A 30 second warm up ensues.  
3. Press FUEL to cycle through fuel types.  
4. Insert the barrel of the SOX3 into flue.  
5. Press MEASURE/HOLD to begin taking measurements.  
6. Use the up arrow button to toggle the upper display between %CO₂ and °F.  
7. Use the down arrow button to toggle the lower (right) display between %EA and % (efficiency).  
8. Make sure all holes in the flue are sealed after testing is finished.

**Description**

The SOX3 is a portable hand held automated combustion check designed for the HVAC technician. The SOX3 provides all the essential measurements for checking and tuning combustion equipment. Measure flue temperature and %O₂ directly to view the calculated %CO₂, %Excess Air (%EA) and % efficiency (%). The ergonomic handle and lift hose make for easy flue gas measurements. Use the magnetic strap and the barrel lock to go entirely hands free.

With three common fuel types as well as a custom fuel input the SOX3 allows you to check %O₂, %CO₂, %EA and % efficiency on any combustion equipment you may encounter. Keep your SOX3 up and running longer with the field calibratable thermocouple and replaceable oxygen sensor.

**Testing**

1. Identify manufacturer’s specifications for % efficiency, %EA (% Excess Air), %CO₂, or %O₂ in the flue. If manufacturer’s specs are not available, see Table 2 (on back).  
2. Once combustion equipment has stabilized, insert rifle into flue gas at service port or drilled hole.  
3. Note: Combustion samples should be taken before dilution air enters the system, before components like draft hoods and baromeric dampers.  
4. Testing at least 6” upstream of the breech is the typical location for most equipment. As a general rule, the sample hole should be more than twice the flue diameter away from any elbows.  
5. Press MEASURE/HOLD to start the internal pump and begin taking fuel measurements.  
6. Toggle between %CO₂ and %O₂ with the up arrow button. Toggle between %EA and efficiency with the down arrow button.

**How to Use**

**Pre-Testing**

1. Power on the SOX3 and allow the unit to warm up for 30 seconds.  
2. Calibrate temperature needed (see Field Temp Calibration).  
3. Check that SOX3 water and particle filters are dry and properly sealed.  
4. Thoroughly inspect combustion equipment for damage.  
5. Identify the fuel being combusted and use the FUEL button on the SOX3 to select that fuel. For fuel other than Natural Gas, Oil #2, or Propane see Custom Fuel Setup.  
6. Identify the flue and locate service port for taking flue measurements or, if necessary, drill a hole using a 1/2” bit (12.7mm) within 18” of the breech.  
7. Once your combustion equipment has passed all of your preliminary and visual inspections, turn on the equipment to be tested.

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**Display**

- **Controls**
  - Hold for one second to toggle power.  
  - Toggle backlight on display. (Hold while powering on the SOX3 to double the meter’s life.)  
  - Toggle between MEASURE mode (pump on, live readings) and HOLD mode (pump off, frozen readings).
  - Press for 1 sec to exit.
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### Specifications

#### Sensor Type:
- Highly accurate oxygen sensor.

#### Operating environment:
- 32 to 122°F (0 to 50°C) at <25% R.H.
- Storage environment: 4 to 140°F (-20 to 60°C) at <80% R.H. with battery removed from meter.

#### Temperature Coefficient:
- 0.1% per 1°F from 32°F to 64°F and 86°F to 122°F (0 to 18°C and 28 to 50°C)
- Battery: 9V
- Battery Life: 20 hours typical alkaline.
- Auto Power off: After 15 minutes.

#### Accuracy:
- Stated accuracy at 72°F ± 5°F, <75% R.H.
- Dimensions: 45.6mm(H) x 69.8mm(W) x 211.7mm(D).
- Weight: Approx. 5.79g with battery.

#### Display:
- 4-digit liquid crystal display (LCD) with maximum readings of 9999.

#### Low battery indication:
- The [ ] is displayed when the voltage drops below the operating level.

### Combustion Basics

Combustion is the rapid oxidation of fuel. Oxygen from air (20.9% oxygen & 79.1% nitrogen) is used to burn fuel which produces heat. The appliances installed and serviced by technicians rely on clean efficient flames to provide the energy needed to heat homes, water, etc. Combustion testing is necessary to maximize the performance and life expectancy of the equipment.

A properly tuned natural gas appliance will have between 6-9% O₂ in the flue while an oil appliance will have 3-7% O₂.

Adjustments to the combustion process ensure that the highest combustion efficiency is safely achieved, thereby reducing the overall amount of fuel used in producing the energy needed. It is still necessary to test and adjust the appliance to the manufacturer’s specifications for airflow in the duct system, temperature rise across the heat exchanger and anything else that may need testing. Testing and balancing appliances to meet manufacturer’s specifications helps to ensure maximum system efficiency and equipment longevity.

### Maintenance

Clean the exterior with a dry cloth. Do not use liquid.

Check filter before each use. If the filter looks dirty, wet or has not been changed for an extended period of use, replace with new filter.

It is good practice to empty the water trap after every use. This helps prevent water build up that may damage the sensor or freeze within the hose during storage.

### Battery Replacement

When the meter displays [ ] the battery should be replaced. Turn your SOX3 off and replace with 9V battery.

### 0, Sensor Replacement

The SOX3 uses an oxygen smart sensor. The [ ] icon indicates approximate life remaining on the sensor. When [] is shown replace sensor.

1. Remove sensor cap by twisting CCW slightly and then pulling.
2. Pull out old sensor.
3. Align plug of new sensor and carefully press into place.

To obtain an SOX3 replacement oxygen sensor (model# RS02) contact your local distributor.

### Limited Warranty

This meter is warranted against defects in material or workmanship for one year from date of purchase. Fieldpiece will replace or repair the defective unit, at its option, subject to verification of the defect.

This warranty does not apply to defects resulting from abuse, neglect, accident, unauthorized repair, alteration, or unreasonable use of the instrument. Any implied warranties arising from the sale of a Fieldpiece product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. Fieldpiece shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim of such damage, expenses, or economic loss. State laws vary. The above limitations or exclusions may not apply to you.

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### Typical Recommended Flue Gas Measurements

<table>
<thead>
<tr>
<th>Test % Specification</th>
<th>Condensing Oil</th>
<th>Condensing Natural Gas or LPG</th>
<th>Condensing LPG/ Propane</th>
<th>Fuel Oil Non-Flame Retention Power Burners</th>
<th>Fuel Oil Flame Retention Power Burners</th>
<th>Natural Gas/LPG Power Burners</th>
<th>Oil Condensate Power Burners</th>
<th>Oil Condensate Power Burners</th>
<th>Oxygen (O₂) 3 to 6%</th>
<th>Oxygen (O₂) 3 to 7%</th>
<th>Oxygen (O₂) 6 to 9%</th>
<th>Oxygen (O₂) 9 to 12%</th>
<th>Oxygen (O₂) 9 to 12%</th>
<th>Oxygen (O₂) 9 to 12%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stack Temperature</td>
<td>50 to 140°F</td>
<td>275 to 500°F</td>
<td>325 to 500°F</td>
<td>325 to 500°F</td>
<td>275 to 500°F</td>
<td>400 to 600°F</td>
<td>400 to 600°F</td>
<td>400 to 600°F</td>
<td>50 to 140°F</td>
<td>30 to 140°F</td>
<td>30 to 140°F</td>
<td>30 to 140°F</td>
<td>30 to 140°F</td>
<td>30 to 140°F</td>
</tr>
<tr>
<td>Battery life</td>
<td>20 hours</td>
<td>20 hours</td>
<td>20 hours</td>
<td>20 hours</td>
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<td>20 hours</td>
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</tr>
</tbody>
</table>

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### Combustion Efficiency

Combustion efficiency can typically be increased by creating a more balanced air to fuel ratio. The ratio of air to fuel determines how much CO₂ is produced and how efficient the flame is.

### For Service

In the USA, call Fieldpiece Instruments for one-price-fix-all out of warranty service pricing. Send check or money order for the amount quoted. Send the meter freight prepaid to Fieldpiece Instruments. Send proof of date and location of purchase for one-price-fix-all out of warranty service. Outside of the USA, please visit www.fieldpiece.com for service contact information.