



**LION**<sup>®</sup>  
ready for action


**SG4000<sup>™</sup>  
SMOKE  
GENERATOR**

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**[ USER'S MANUAL**

Original User Manual  
Rev 101 06/21



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|---|--|
|  | <p><b>⚠ WARNING</b></p> <p>Read and understand operator's manual before using this machine.</p> <p>Failure to follow operating instructions could result in death or serious injury.</p> |
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|  | <p><b>⚠ WARNING</b></p> <p><b>IMPROPER USE MAY RESULT IN FIRE OR INJURY.</b></p> <p>Read instructions/safety manual before installing, operating or servicing.</p> |
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# 1. INTRODUCTION

## **Congratulations on the recent purchase of your new LION Smoke Generator.**

LION Smoke Generators are industrial-grade, high volume smoke machines designed primarily for firefighter and emergency personnel training. The Smoke Generator is driven by a microprocessor control system that carefully regulates temperature, smoke volume and density. A variety of smoke settings can be programmed with the user interface, allowing you to adjust the timing and intensity of smoke for your particular training needs. Most importantly, LION Smoke Generators allow you to produce **continuous** smoke which is ideal for creating realistic and intense training exercises.

To ensure premium smoke and unit longevity, LION Smoke Generators are designed to be used with LION's specially formulated, water based Smoke Liquid. Using a LION Smoke Generator and LION Smoke Liquid together will provide you with the highest quality smoke available.

This user manual describes how to properly operate and maintain the SG4000™ Smoke Generator for optimal performance.

### **NOTE**

Using smoke liquid other than LION Smoke Liquid, including oil based smoke liquid, may clog the fluid lines and create a hazardous smoke output. Use of smoke liquid other than LION Smoke Liquid will void the warranty.

## FOR YOUR SAFETY

1. Use respiratory protection when in prolonged contact with smoke or when dense concentration of smoke is present.
2. People with respiratory conditions or asthma should avoid exposure to smoke.
3. Do NOT use this appliance without reading the entire "User's Manual."
4. Do NOT alter this appliance in any manner.
5. Always use this appliance on a hard, level, non-combustible surface such as concrete, rock or stone.
6. Only LION Smoke Liquid is approved for use with this product.
7. Keep Smoke Liquid out of reach of children. If Smoke Liquid comes into contact with eyes, immediately rinse with water.
8. Smoke Liquid spill can be removed from most surfaces with clean water.
9. Smoke Liquid is not for human consumption.
10. Use caution when operating in windy conditions as smoke can travel (e.g., do not use in proximity to roadways; smoke may obscure traffic conditions).



### WARNING

11. The outlet nozzle and face of this appliance will become hot when in operation. To avoid burns, do NOT touch appliance until it has completely cooled for at least 15 minutes.
12. Do NOT attempt to move or store a Smoke Generator until it is completely cooled.
13. This appliance should be thoroughly inspected on a regular basis by trained personnel.
14. Do NOT handle Smoke Generators roughly. Should you drop or bang the Smoke Generator, inspect thoroughly before use.
15. **Serious injury or damage to property** may occur if these guidelines are not followed precisely.



### WARNING

Read and understand operator's manual before using this machine.  
Failure to follow operating instructions could result in death or serious injury.

## 2. SPECIFICATIONS

Below is a summary of LION Smoke Generator capabilities and technical information.

### GENERAL

LION Smoke Generators are continuous generators that produce high volumes of consistent training smoke. They are specially developed for firefighter and industrial emergency response training.

The heating element is the core of the generator and is the key to producing high quality smoke. A microprocessor continually monitors and adjusts the smoke generating process. The volume of the smoke fluid flow is automatically checked and adjusted to provide optimal training conditions.

LION Smoke Generators are developed for long term use. All the values are set electronically and new software developments can be downloaded onto the processor at the LION factory.

### CONTINUOUS GENERATOR

Because LION Smoke Generators are continuous generators and the quality of the smoke is regulated at all times, it is possible that the *amount* of smoke production may increase or decrease periodically. Proper temperature control is the most important aspect of LION Smoke Generators. To ensure high quality smoke production, the generator detects temperature fluctuation and self-adjusts to maintain a consistent temperature.

Water based smoke fluids produce the safest training smoke but continued exposure should be avoided. We recommend the use of a filter mask A1/P2 when training involves high concentrations or continuous exposure.

## SPECIAL FEATURES AND TECHNICAL SPECIFICATIONS

### SPECIAL FEATURES

- Electronic timer.
- Variable user-selected smoke quantity and duration.
- Built-in heating elements with substantive thermal conduction.
- Electronic fault indicators provided on the display.
- Fitted with two handles for ease of transport.
- Monitoring of temperature of outer cover.
- Heating element direct temperature sensor.
- Two mechanical temperature sensors.
- High-pressure industrial vacuum pump.
- Asbestos-free insulation.
- **Optional:** remote control with 15 ft. (4.6 m) cable or wireless controller.

| TECHNICAL SPECIFICATIONS                         |   |
|--|---|
| <b>Supply Voltage</b>                            | 115V Version: 115VAC 50-60Hz<br>230V Version: 230VAC 50-60Hz                                    |
| <b>Power Consumption</b>                         | 115V Version: Max 1800W<br>230V Version: Max 2000W  |
| <b>Dimensions</b>                                | 12.5" x 19.25" x 7.5" (32 x 49 x 19 cm)   |
| <b>Weight</b>                                    | 45 lbs. (20.4 kg)   |
| <b>Power Cord</b>                                | 10 ft. (3.0 m)  |
| <b>Tank Capacity</b>                             | 5 litres/1.25 gallons   |
| <b>Consumption of Smoke Liquid at Max. Power</b> | 3 litres/hr.  |
| <b>Operating Temperature</b>                     | 30°F to 90°F (-1°C to 32°C)   |
| <b>Max. Pressure</b>                             | 85 PSI (5.9 bar)  |
| <b>Smoke Production</b>                          | 4000 ft <sup>3</sup> (1219.2 m <sup>3</sup> ) /min of smoke to zero visibility at 3 ft. (0.9 m) |

### 3. OVERVIEW OF THE SMOKE GENERATOR



FIGURE 1: SG4000™ SMOKE GENERATOR USER INTERFACE

Figure 1 is an image of the Smoke Generator's user panel. It contains eight interface buttons and an LCD display. Below is an explanation of each button.

#### **SMOKE (SMOKE ON DEMAND)**

Smoke can be produced manually by pressing the **SMOKE** button. Smoke is continually produced while the button is depressed.

As long as the heater has reached operating temperature **BOOST** will display on the LCD screen and the smoke output will temporarily adjust to 140% density. This higher density output will continue for up to 20 seconds before returning to normal output.

If the system is running a program, the **SMOKE** button will temporarily interrupt the pre-set functions. Once the button is released, the smoke generator will revert back to the original program selected.

#### **CONT. (CONTINUOUS MODE)**

This operating mode is selected by pressing the **CONT.** button. Smoke is produced continuously until the **STOP** button is pressed.



## **RUN**

This button begins the preset programs. Instructions for setting up programs can be found in the “**Using Your Smoke Generator**” section.

## **STOP**

Pressing the **STOP** button will cease all smoke production and/or running programs and the Smoke Generator will automatically maintain the heater core at optimum temperature.

## **UP AND DOWN**

These buttons change the density of the smoke output and navigate menus.

## **MENU**

This button brings up the Smoke Generator’s menu containing programming options and settings.

## **ENTER**

This button is used to confirm settings and change menus.

CONTINUES 



FIGURE 2: DISPLAY SCREEN CLOSE UP

**A FLUID LEVEL SENSOR**

This bar indicates the remaining Smoke Liquid in the tank.

**B HEATER CORE TEMPERATURE**

This number indicates the heater core temperature as a percentage. One hundred percent indicates 660°F (350°C). When operating normally, the system will range between 96 and 103 percent.

**C CURRENT OPERATING MODE**

This section displays the current activity status of the Smoke Generator. In this image, the machine is ready to produce smoke but is not actively generating any, as shown by displaying “Ready”. During warm up, it will display “Heating”.

**D DENSITY OF SMOKE OUTPUT**

This displays the smoke output as a percentage of the maximum smoke output the system can produce. The density can be adjusted with the **UP** and **DOWN** buttons.

**E VOLUME OF SMOKE PRODUCED**

This section displays the current volume of smoke being produced in cubic feet.

**F SUPPLY POWER INDICATOR**

This section displays the power the Smoke Generator is receiving as a percentage of 120V. When using a long extension cord or bad power source, the percentage will drop, causing smoke output to drop as well.

**G REMOTE CONTROL SETTING**

This section indicates which section of the wireless remote control will operate this generator. **A** is the top, **B** is the bottom.

## 4. USING YOUR SMOKE GENERATOR

Turn on the Smoke Generator with the on/off switch located at the back of the unit. When the Smoke Generator is switched on, the heating element will begin to warm up until it reaches the pre-set temperature. Upon reaching the pre-set temperature, various optional settings are available to adjust how the smoke is emitted from the machine.

As discussed, it is possible to begin making smoke as soon as the generator is warmed up by pressing the **SMOKE** or **CONT.** buttons. It is also possible to change the smoke output by adjusting the density using the **UP** and **DOWN** buttons. Releasing the **SMOKE** button or pressing **STOP** will cease smoke generation.

The **RUN** button will operate a preset program. This can be used to conduct training without manually controlling the Smoke Generator.



FIGURE 1: SG4000™ SMOKE GENERATOR USER INTERFACE

## PROGRAMMING THE SMOKE GENERATOR

1. Press the **MENU** button one time to bring up the programming display screen. Use the **UP**, **DOWN** and **ENTER** buttons to navigate this screen.
2. Pressing **ENTER** when the arrow is on the “Initial Delay” setting (as seen in *Figure 3*) will allow you to set the amount of time before the Smoke Generator begins creating smoke. Use the **UP** and **DOWN** arrows to select the time in hours (H) and minutes (M) and press **ENTER** to confirm it.
3. There are two modes available, AUTO and TIMER. *Figure 3* displays the AUTO option which is “Room Size”.



FIGURE 3: PROGRAMMING DISPLAY (AUTO)

4. Use the **UP** and **DOWN** buttons to navigate the cursor down to “Room Size” and press **ENTER** to change the value. Room size options include small, medium and large and the Smoke Generator will, after waiting for the specified “Initial Delay” time, create smoke until reaching its automatic shut-off level. Press **ENTER** again to confirm the changed setting.
5. To use the TIMER settings, use the **UP** and **DOWN** buttons to move the arrow to “Mode” and press **ENTER**, then **UP** or **DOWN** to change the value. When TIMER is selected, the display will appear as seen in *Figure 4*.



FIGURE 4: PROGRAMMING DISPLAY (TIMER)

CONTINUES ➤

6. Use the **UP** and **DOWN** buttons to navigate through the new options and press **ENTER** to change them. The programmable options are:
  - a. **“Smoke”** – Sets the amount of time the machine will produce smoke during the program operation.
  - b. **“Pause”** – Sets the amount of time between repeated “Smoke” operations.
  - c. **“Repeat”** – Choose “On” to utilize the “Pause” time and continuously run the program until **STOP** is pressed.
7. When finished selecting the program options, press **MENU** to return to the standard display.
8. Press **RUN** to begin the designated program.

## OTHER SMOKE GENERATOR SETTINGS

The Smoke Generator offers additional menus that feature more settings and options.

1. Press **MENU** to open the Programming Display, then use the **UP** and **DOWN** buttons to select “Setup” in the bottom right corner. Press **ENTER** to change to the Setup display seen below in *Figure 5*.



FIGURE 3: PROGRAMMING DISPLAY (AUTO)



FIGURE 5: SETUP DISPLAY

2. Use the **UP** and **DOWN** buttons to select “Power”, “Language”, or “Restore Defaults” and press the **ENTER** button to change them. Use the **UP** and **DOWN** buttons to select the desired setting and press **ENTER** again to confirm.
3. The maximum power setting is 1800 watts. Lower settings can be used to reduce power consumption if necessary, but will decrease the smoke output.
4. Use the **UP** and **DOWN** buttons to select “DMX” in the bottom right corner. Press **ENTER** to change to the DMX display seen below in *Figure 6*.



FIGURE 6: DMX DISPLAY

CONTINUES >



FIGURE 7: REMOTE CONTROL DISPLAY AND REMOTE LAYOUT

5. Press **ENTER** and use the **UP** and **DOWN** buttons to change the DMX channel that the Smoke Generator will use.
  - a. This setting will likely only need to be changed if the generator will be operated with a dimmer pack and multiple generators will be controlled by the same pack.
6. Use the **UP** and **DOWN** buttons to select “RC” in the bottom right corner. Press **ENTER** to change to the remote control display seen in *Figure 7*.
7. This display is used to link remote controls to the Smoke Generator and designate which buttons on the remote will operate the machine.
8. As seen at the right of *Figure 7*, a remote can operate two independent Smoke Generators by selecting **A** or **B** on the “Buttons” option. Each set of four buttons on the remote function the same as the buttons on the Smoke Generator control panel, **AUTO** operates the same way as **RUN**.





FIGURE 3: PROGRAMMING DISPLAY (AUTO)



FIGURE 8: REMOTE CONNECTION ICON

9. Use “Learn Remote” to key a remote to the Smoke Generator.
  - a. Press and hold **ENTER** while the cursor is on “Learn (or “Recognize on some models) Remote”.
  - b. The display will read “Learning”. While keeping the **ENTER** button depressed, press and release any button on the remote.
  - c. Release the **ENTER** button, the remote will now be paired with the Smoke Generator.
  - d. Remotes can only be paired one at a time.
10. Use “Erase All” to remove all remotes paired with the Smoke Generator.
  - a. Press **ENTER** while the cursor is on “Erase All”.
  - b. Press **ENTER** to confirm.
11. Use the **UP** and **DOWN** buttons to select “Program” in the bottom right corner (Figure 7). Press **ENTER** to change to the Programming display seen in Figure 3.
12. At any time, pressing **MENU** will return to the standard display screen seen in Figures 1 or 2.
13. On the standard display screen there will be a small icon appear in the upper right corner any time a button is pressed on a paired remote as seen in Figure 8.

## 5. ERROR CODES

The Smoke Generator has the ability to display a variety of error codes which can provide you with information if something is impeding the optimal operation of the device. If one or more errors are detected, no smoke will be produced. The error codes can be cleared from the display by correcting the error. Errors are shown on the display below the standard display as seen in *Figure 9*. If several errors are detected at the same time, these will be shown sequentially at half-second intervals. The error codes are defined below.

| Code | Definition  | Heating | Comments   |
|------|---|---------|--|
| E1   | When the generator is started, the settings are read by the device. Error 1 indicates that the device is unable to read the setting values. | No      | The smoke generator fails to work because the settings are invalid or cannot be read. Correct operation cannot be guaranteed. This error message cannot be removed. Factory calibration is needed. |
| E3   | Heating element 1 has been switched on but there is no feedback.  | No      | There is a problem with heating element 1. This problem could be the drive circuitry, feedback circuitry, or actual heating element. Factory repair is needed.                                     |
| E4   | Heating element 2 has been switched on but there is no feedback.  | No      | There is a problem with heating element 2. This problem could be the drive circuitry, feedback circuitry, or actual heating element. Factory repair is needed.                                     |
| E5   | The fluid level is too low.   | Yes     | More fluid needs to be added and the generator should then be restarted.   |

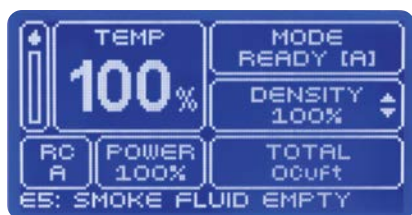


FIGURE 9: STANDARD DISPLAY WITH ERROR MESSAGE

| Code | Definition   | Heating | Comments  |
|------|--|---------|---|
| E6   | The temperature of the heating element casing has risen above the maximum value.     | No      | Wait until the temperature falls. This can take several minutes. If this error occurs regularly, calibration or repair will be needed.                                    |
| E7   | The temperature of the heating element itself has risen above the maximum value set. | No      | Wait until the temperature falls. This can take several minutes. If this error occurs regularly, calibration or repair will be needed.                                    |
| E8   | The temperature of the heating element has fallen below the minimum value set.       | Yes     | The temperature should come up to the required level very quickly. If it does not, something may need to be corrected with the heating element. Factory repair is needed. |
| E9   | Heating element 1 has been switched off but it is still functional.                  | No      | There is an error in the drive of heating element 1. Switch off the equipment IMMEDIATELY to prevent overheating. Factory repairs needed.                                 |
| E10  | Heating element 2 has been switched off but it is still functional.                  | No      | There is an error in the drive of heating element 2. Switch off the equipment IMMEDIATELY to prevent overheating. Factory repairs needed.                                 |

## 6. SERVICE

The Smoke Generator has been designed to require minimal maintenance and/or service.

### ANNUAL MAINTENANCE

Once per year, the Smoke Generator should be flushed with LION Cleaning Solution, comprised of deionized water. The fluid remaining in the tank must first be removed and then approximately 3 quarts of Cleaning Solution should be flushed through the generator. The generator should be run on the Continuous setting until the fluid tank is empty. Any solution left in the tank must be removed.

### NOTE

**Deionized water is NOT regular water.** Using tap, filtered, or even distilled water will damage your heating core.

LION offers economical maintenance packages to keep your generator running at optimal levels. Please contact your sales representative for more information.

### WATER

The Smoke Generator is water-resistant, not watertight. Some residual moisture or incidental splashing should not cause damage, but use caution when using the generator during firefighter training sessions. Always ensure that the generator does not get wet during training operations. Do NOT cover the equipment with a tarpaulin. This may result in a hazardous situation due to built-up heat from the generator that cannot dissipate. Smoke ducting kits are available and can be used to put smoke into areas where hose lines are used.

Pay close attention to the weather when operating the equipment outside to avoid unnecessary exposure to water. The warranty does not cover damage caused by exposure to water.

### MAIN POWER CORD

If the main power cord needs to be replaced, contact LION for assistance.

### OPENING AND REPAIRING

The Smoke Generator may only be opened and repaired by qualified staff.

## 7. IMPORTANT POINTS

- This generator should not be used for purposes other than the production of training smoke.
- The Smoke Generator may only be opened and repaired by trained staff.
- **Do not expose the generator to water.**
- When in use, position the generator horizontally.
- Do not use the generator in extreme temperatures and avoid positioning the generator in direct sunlight when in use.
- The generator contains components that can reach a temperature of 750°F (399°C). Use caution when handling and ensure that the unit is completely cooled before storage.
- Always connect the smoke generator to a grounded power connection that is capable of supplying sufficient current.
- The use of an extension cord is not recommended, but if it proves necessary, only use a grounded extension cable that is at minimum 12 gauge wire.
- For higher concentrations of smoke needed in intense fire department training sessions, we recommend that an A1/P2 filter mask is used.

## 8. WARRANTY INFORMATION

The LION SG4000™ Smoke Generator is covered from manufacturing defect for a period of one year. The warranty begins on the date of product shipment. Parts and labor related to warranty repair are covered free of charge during the warranty period. Return shipping back to LION factor is not included. All warranty claims require prior approval from the LION service team. This warranty does not cover product failure due to neglect, accidents, modifications, or misuse.

The warranty will be voided if smoke liquids other than those supplied by LION Inc. are used.

### CONDITIONS AND LIMITATIONS

LION warrants its products against manufacturing defects to the original purchaser only – i.e., the individual or legal entity (registered customer) whose name appears on the invoice. The LION warranty is nontransferable. Cosmetic damage is not covered under this warranty.

Notwithstanding any provisions contained in this Limited Warranty, LION's responsibility under this warranty is defined as above and it shall not in any event extend to any incidental, consequential, or indirect damages.

This warranty defines the obligations and liability of LION with respect to the LION installed simulation equipment on the training product. This Limited Warranty does not cover damages resulting from the use of components not supplied with the training product. Any damages to simulation equipment due to faulty power supply, weather, long periods of exposure to dampness, condensation, damaging chemicals or cleaners will not be covered.

LION reserves the right to have its representative inspect any product or part prior to honoring a warranty claim.

Some non-LION manufactured components come with separate manufacturer warranties. LION is not liable for these products but will make a good faith attempt to work with the customer to submit warranty claims on defective third-party components.

## 9. CONTACT INFORMATION

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