

**LC  
BATTERY CHARGER  
OPERATION & MAINTENANCE  
GUIDE**

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**Installation or service problems? Call SENS at 1-800-742-2326 between 8 a.m. and 5 p.m., (Mountain Time) Monday through Friday, or visit our website.**

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# IMPORTANT SAFETY INSTRUCTIONS

## SAVE THESE INSTRUCTIONS

This manual contains important safety and operating instructions for Stored Energy Systems (SENS) model LC. Before using the battery charger, read all instructions and cautionary markings on the battery charger, battery and equipment connected to the battery system.

**WARNING:**  
Please read these safety warnings and heed them. Failure to do so could result in either severe personal injury or equipment damage.

This equipment uses and generates potentially lethal voltages. The equipment should only be installed and maintained by trained persons.

To reduce the risk of injury, charge only properly sized lead-acid or nickel cadmium batteries. Other types of batteries or under-sized batteries may burst, causing personal injury and damage.

- Do not install or operate charger if it has been dropped or otherwise damaged. Return it to factory for repair.
- Install the charger in accordance with all local codes.
- Do not expose charger to rain or snow.
- Do not disassemble charger; return to factory when service or repair is required. Incorrect assembly may result in risk of electric shock or fire.
- To reduce risk of electric shock, de-energize and disconnect the AC input and the battery from the charger before attempting maintenance or cleaning.
- Use of an accessory not recommended or sold by SENS may result in risk of fire, electric shock or personal injury.
- During normal operation, batteries may produce explosive hydrogen gas. *Never smoke, use an open flame, or create sparks near the battery or charger.*
- Remove jewelry, watches, rings, etc. before installing battery or charger.

### **1** **READ THIS** **BEFORE** **PROCEEDING** **!**

• **Changing factory-set potentiometer voids the warranty (see back page). Contact the factory if the settings on your charger are incorrect.**

• **Do not connect the battery leads to the charger backwards.**

If you feel that the charger is not working correctly, first check the following:

1. Is AC power available to the charger?
2. Is the charger connected to a battery of the correct voltage? (The charger must be connected to a battery for it to operate at the correct voltage.)
3. Was the charger damaged in transit or installation (check for construction debris, particularly metal, inside the charger)
4. If the charger appears not to be working check the battery's state of charge. If the battery is fully charged it is sometimes normal for the charger to indicate zero current flow. Also check the battery for shorted or open cells.
5. If the battery is being over- or undercharged, check whether the output voltage settings have been tampered with. The potentiometers should be covered with either white adhesive paper dots or a hard red varnish.

**Call SENS toll-free service line [800-742-2326] during the hours indicated on the front cover for help if you have any installation or operation questions --this will save you time and trouble.**

### **2** **Installation**

#### Mechanical

Mount charger vertically on a clean, dry, fixed wall protected from extremes of temperature. Allow 6 inches above and below the unit and 3 inches on either side for proper ventilation. If the charger must be mounted on or in a vibrating enclosure, the mounting arrangement must provide full vibration isolation.

Protect the charger from construction grit, metal chips, paint or other debris. Clean away debris after installation.

#### Electrical (LCxx-500-2x- models without factory-supplied cords)

Remove the two screws securing the charger's lower front panel.

**WARNING:** AC input leads and earth ground must enter the charger through the conduit hole on the LEFT side of the charger. DC output leads must exit the charger through the RIGHT side of the charger.

Connect earth ground to the ground lug supplied in the lower left of the charger. Connect mains L and N to terminal block on printed circuit board.

Connect battery positive and negative to the correct terminals on the same terminal block. *Make sure that positive and negative polarity are correct!* Wire should be sized in accordance with local electrical codes. All conductors should be rated for use at 75° C or higher. After making electrical connections, stow the AC input service loop inside the charger's left side (near the AC and ground terminations) and stow the DC

output service loop inside the charger's right side (near DC output terminals).

Electrical (LCxx-501-2x- models with factory-supplied cords)

Connect the attached six-foot 15A three-pronged AC cord to an appropriate 120V AC outlet.

Install customer-supplied DC cord terminated with Anderson 1327 (red, positive) and Anderson 1327G6 (black, negative) to battery terminals. *Make sure that positive and negative polarity are correct!* Connect red Anderson connector from battery to red Anderson connector on charger's six-foot DC cord; Connect black Anderson connector from battery to black Anderson connector on charger's DC cord.

**WARNING:** The battery charger should be connected to a grounded permanent wiring system. A ground terminal is provided for this purpose.

**3  
Operation**

Over current protection should be supplied by the user and included at the battery.

Apply AC power to the charger. Charger should start immediately. The charger will automatically recharge and maintain the battery with no further attention from the user.

Nominal Charger Output Voltage	Float Voltage for Flooded Lead Acid Batteries	Float Voltage for Sealed Lead Acid Batteries
12	13.32	13.56
24	26.64	27.12
36	39.96	40.68
48	53.28	54.24

Float voltage for nickel cadmium batteries is set at 1.43 volts per cell.

**4  
Special Features of This Charger**

The LC charger is equipped with **AUTOBOOST**, which automatically operates at a high charge rate until the current demanded by the battery is below about 50% of the charger's rating. At that point, the charger reverts to the float rate. When this happens it is normal for the ammeter to indicate zero current flow. Boost voltage is fixed at 1% to 8% above float, based on model. An adjustment to the float setting will cause the boost voltage to change in proportion to float. For newer 12V and 24V chargers ordered for use with sealed lead acid batteries, boost will be disabled and resistor R22 clipped out. This will also result in the charger current limiting at 2.5A.

The LC charger is **TEMPERATURE COMPENSATED** to match the negative temperature coefficient of the battery. Float voltage increases slightly as ambient temperature decreases, and decreases as ambient temperature increases.

The LC charger is electronically **CURRENT LIMITED**. When the charger is operating into a fully discharged battery, or is otherwise overloaded, charging voltage reduces so that the charger's rated output power in watts is not exceeded. The charger will operate satisfactorily into a short circuit indefinitely.

**5  
Troubleshooting**

Symptom	Possible cause	Repair procedure
No output	Battery not connected	Connect battery or replace DC fuse
	No AC power	Restore AC or replace AC fuse
	Ammeter disconnected	Reconnect
	Defective control circuit	Call SENS for assistance
Overcharging	Defective transformer	Call SENS for assistance
	Improper voltage setting	Call SENS for assistance
	Defective control circuit	Call SENS for assistance
Undercharging	Battery not connected	Connect battery or replace DC fuse
	Improper voltage setting	Call SENS for assistance
	Defective control circuit	Call SENS for assistance
	Battery not connected	Connect battery or replace DC fuse

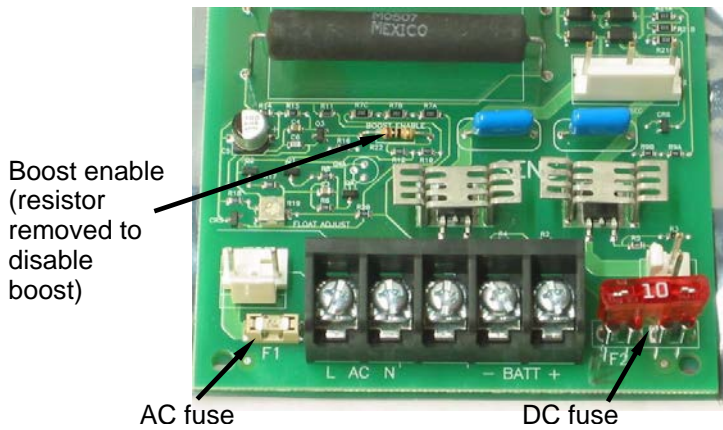
**6  
Specifications**

Model	Input	Input Current	Output
LC12-500-2	115 VAC, $\pm 10\%$ , 57-63 Hz	0.8A	12 VDC (nominal), 3.5 amps***
**LC12-501-2	115 VAC, $\pm 10\%$ , 57-63 Hz	0.8A	12 VDC (nominal), 3.5 amps***
*LC12-500-4	220 VAC, $\pm 10\%$ , 47-63 Hz	0.5A	12 VDC (nominal), 3.5 amps
LC24-500-2	115 VAC, $\pm 10\%$ , 57-63 Hz	0.8A	24 VDC (nominal), 3.5 amps***
**LC24-501-2	115 VAC, $\pm 10\%$ , 57-63 Hz	0.8A	24 VDC (nominal), 3.5 amps***
*LC24-500-4	220 VAC, $\pm 10\%$ , 47-63 Hz	1.0A	24 VDC (nominal), 3.5 amps
*LC36-500-2	115 VAC, $\pm 10\%$ , 57-63 Hz	2.0A	36 VDC (nominal), 3.5 amps
*LC36-500-4	220 VAC, $\pm 10\%$ , 47-63 Hz	2.0A	36 VDC (nominal), 3.5 amps
*LC48-500-2	115 VAC, $\pm 10\%$ , 57-63 Hz	2.0A	48 VDC (nominal), 2.0 amps
*LC48-500-4	220 VAC, $\pm 10\%$ , 47-63 Hz	1.2A	48 VDC (nominal), 2.0 amps

\*No longer available for sale. Spare parts and factory repair may be available.

\*\*Charger includes permanently connected six-foot AC and DC power cords.

\*\*\*Newer chargers ordered for sealed lead acid batteries will current limit at 2.5A.



#### Field replaceable surface mount fuses

LC12-500-2 AC fuse: Littelfuse p/n 045201.5MRL, at F1 on circuit board- replace with needle nose pliers

LC24-500-2 AC fuse: Littelfuse p/n 045202.5MRL, at F1 on circuit board- replace with needle nose pliers

DC fuse (12 and 24V models): Littelfuse p/n\_0287010, located at F2 on circuit board

#### Voltage regulation

Temperature-compensated voltage regulation better than  $\pm 1\%$  from no load to full load when input is within specified range.

#### Current limiting & overload protection

Inherent current limiting at 100% to 110% of rated output.

#### Temperature compensation

Output voltage changes in accordance with negative temperature coefficient of battery (-0.2% per degree C). This maximizes battery performance and life.

#### Protection

Current limited output; sustains short circuit.

#### Indicators

DC ammeter.

#### Controls & adjustments

Adjustment for float voltage; boost voltage is fixed at about 1% to 8% above float voltage. For sealed batteries, boost is disabled by removing resistor R22 (10-ohm, 1/4-watt).

#### Ambient

-10° C to +50° C. Humidity 5% to 95%, non-condensing. Natural convection cooled.

## **SENS Limited Warranty Policy**

### **What is covered:**

This warranty covers any defect in material and workmanship on battery chargers manufactured by Stored Energy Systems, a Colorado Limited Liability Company (SENS).

### **What this warranty does not cover:**

This warranty does not cover damages, defects or failures of your equipment resulting from shipping damage, accidents, installation errors, unauthorized adjustment or repair, unauthorized third-party service, failure to follow instructions, misuse, fire, flood, acts of persons not in our control, and acts of God.

### **For how long:**

Two years from date of shipment.

### **What we will do:**

If your battery charger is defective within two years of date of shipment, we will repair it or, at our option, replace it at no charge to you.

If we choose to replace your charger, we may replace it with a new or refurbished one of the same or similar design. The repair or replacement will be warranted for the remainder of the original two-year warranty period. If we determine that your charger cannot be repaired or replaced, we will refund its purchase price to you.

### **What we ask you to do:**

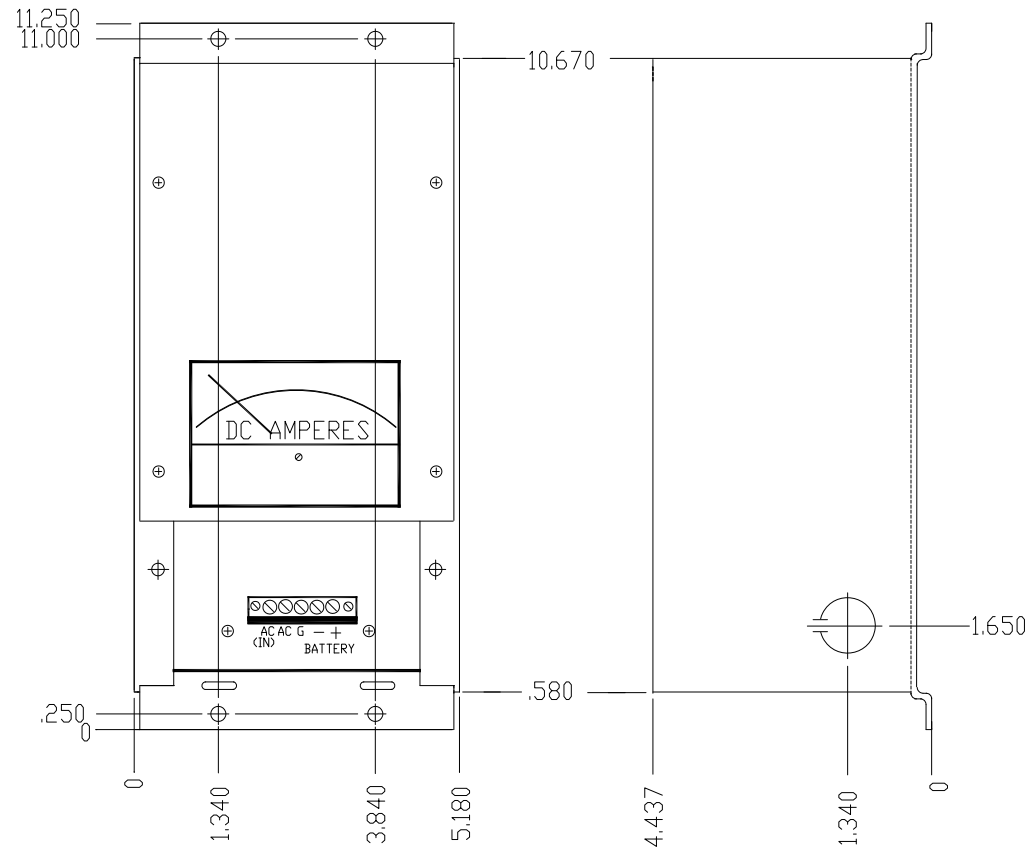
First contact SENS service department to obtain warranty service instructions. To obtain warranty service the product must be returned, freight prepaid, to the factory under a Return Merchandise Authorization (RMA) number provided by SENS. If, in SENS' opinion, the problem can be rectified in the field, SENS may elect to ship replacement parts for customer installation instead of having the product returned to the factory.

### **Limitation:**


This warranty is limited to defects in material or workmanship of the product. It does not cover loss of time, inconvenience, property damage or any consequential damages. Repair, replacement or refund of the purchase price of the equipment is your exclusive remedy.

Form 135-1

revisions				
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 <b>SENS</b> STORED ENERGY SYSTEMS LONGMONT, CO.		description:		
		LC CONN. & MOUNTING DIAGRAM		
engineer:	drawn: KAA	code:	size:	drwg. no.
checked:		10	N/A	DIA\00261
date:	12-20-93	Rev.		
DO NOT SCALE DRAWING page: 1 of 1				