

**BATTERY POWER SYSTEM
TYPE 21, with multi-alarm system
12, 24 and 48 volts**

**OPERATION & MAINTENANCE
GUIDE**

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**Installation or Service problems? Call SENS at (800) 742-2326
between 8 A.M. and 5 P.M. Mountain time Monday to Friday.**

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important safety and operating instructions for Stored Energy Systems Battery Power Systems (BPS)

Before using the power system, 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. Do not attempt to install or operate this equipment unless you are certain you are adequately trained.

This equipment contains lead-acid batteries that are live at all times. Operate the system in strict accordance with the guidelines in this manual.

- Do not install or operate BPS if it has been dropped or otherwise damaged. Return it to the factory for repair.
- Install the BPS in accordance with all local codes.
- Do not expose BPS to rain or snow.
- Do not disassemble BPS; return to factory when service or repair is required. Incorrect assembly may result in a risk of electric shock or fire. Use the battery disconnect procedure outlined in the manual.
- 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 a 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
FIRST**

WARNING: The Battery Power System contains live lead-acid batteries. Please observe the following precautions:

- Do not change output float voltage setting without consulting SENS first
- Replace batteries only with the same type as originally supplied
- Follow all installation and use instructions
- Contact SENS at the toll-free number on the front of this document if you have questions

NOTE: Batteries are perishable. If the unit is not put into service within 6 months of its receipt, the charger must be connected to AC service for at least two hours to recharge the batteries. If this is not done, the batteries will be damaged and will not supply the required capacity.

NOTE: Before re-shipping the BPS after test or previous installation, disconnect the battery from the system using the “re-shipment instructions” outlined below in section 3.4.

Changing factory-set potentiometers *voids the warranty*. Contact the factory if you believe that the settings on your charger are incorrect.

Before determining that the charger or power system is not working correctly, check the following:

1. Is AC power available to the charger?
2. Are any fuses blown?
3. Is each battery in the system in good condition? (Check for open circuit and, if possible, behavior of individual batteries on load. Collapse of voltage on load indicates a bad battery).
4. Was the system damaged in transit or installation?
5. If the battery is being over- or undercharged, check whether the output voltage settings have been tampered with. The pots should be covered with either white adhesive paper dots or a hard red varnish.
6. See Section 6 “Battery Maintenance and Check” for additional maintenance information.

**2
System
Description**

2.1 Application

This manual covers the following SENS Battery Power System (BPS) models:

**TABLE 2.1
Model Numbers and Capacities**

Part	Output Charger	Battery
number	voltage	current AH capacity

• 2143F1007104	48	3 amperes	7 ampere hours
• 2123F1007104	24	3 amperes	7 ampere hours
• 2126F1007104	24	6 amperes	7 ampere hours
• 2126F2007104	24	6 amperes	14 ampere hours
• 2113F2007104	12	3 amperes	14 ampere hours
• 2116F4007104	12	6 amperes	28 ampere-hours
• 211BF4007104	12	12 amperes	28 ampere-hours

This product is designed to provide uninterruptible DC power of either 12, 24 or 48 volts to telecommunications or other applications requiring a well-filtered DC source.

The BPS is a fully self-contained uninterruptible DC power system packaged in a wall-mounted aluminum housing. DC power to the load is supplied either from the charger (if AC is available) or from the battery. The battery is connected in parallel with the charger output. This means that changeover from charger to battery power is automatic and instantaneous. No mechanical or electronic switches are required.

The Battery Power System (BPS) includes:

- One ea. filtered battery charger/power supply of the voltage and current indicated above by part number
- One ea. valve-regulated (sealed) lead-acid battery of the voltage and AH capacity listed above
- Automatic low voltage load disconnect
- Automatic connection of battery to charger upon power-up
- Battery disconnect switch for re-shipment of system (if required)
- A NEMA-1 cabinet to house the battery and system electronics
- AC fuse, charger to battery fuse and charger to load fuse.

See the appended dimensional and system schematic diagrams. Total system weight is approximately 40 lbs.

2.2 Upon Delivery

You should receive the following items from SENS:

- One ea system cabinet

Check the system unit for shipping damage. Do not install or operate the system if there is visible damage to the packaging materials or if it otherwise apparent that the system has received a sharp blow. If any damage is discovered, immediately file a claim with the shipper, then contact SENS for assistance.

3 Installation

3.1 Mechanical Installation

See the appended diagram for overall system dimensions and dimensions of mounting holes. Bolt or screw the unit to a solid wall. Locate the system as close to the load as possible to minimize voltage drop in the the output power leads.

Warning: *Ensure that no metal shavings fall into the charger. Metal shavings between electrical components are a potential safety hazard, and could cause the equipment to malfunction.*

3.2 Power Connections

Open the system front door. Run AC and DC wiring through the open side of the unit in separate bundles, and connect to the terminals where indicated on the attached drawing.

3.3 Alarm Connections

The charger includes multi-function alarm system including LEDs and Form C contacts for failure indications. Connection to the Form C contacts is made on the front door of the BPS. Refer to the alarm board for printed terminal identifiers that are silkscreened directly onto the alarm board.

Do not exceed the relay maximum current rating of 2A @ 26 volts DC or 117 VAC.

3.4 Re-Shipment Instructions

When re-shipping the BPS, disconnect the battery from the charger/alarm system by pressing the "BATTERY DISCONNECT" button inside the charger. This will prevent the battery from becoming discharged during shipping.

4 Operation

4.1 Start-up

The unit should start as soon as AC power is applied. The system will automatically supply power to the load and maintain the battery without further attention from the user.

If the charger does not start up as described, check the following:

- a) Check that AC mains power is available, and the main input fuse has not blown
- b) Check that contractor-installed AC connections are correct
- c) Open the charger and check for any components or connections which may have been loosened during shipping from the factory. In particular, ensure that the control card is correctly connected
- d) If the above steps do not solve the problem, contact SENS at the toll-free telephone number on the cover of this document.

4.2 Alarm Indications

The charger contains a multi-alarm system with front panel status indicators and Form C contacts. The meaning of each indication is as follows:

AC POWER ON

Indicates that AC power is being supplied to the charger.

AC FAIL

Indicates that AC power is not available to the charger. The AC either failed, or the charger's input breaker is turned off or has been tripped.

CHARGE FAIL

The charger senses voltage rather than current to detect "failure"; once battery voltage drops approximately 1 volt below nominal the alarm activates. This may occur when:

- The battery becomes discharged
- The AC power has failed
- Excessive load on the charger, causing it to operate in current limit
- The charger has failed

There is a time delay of approximately one minute between the start of the alarm condition and the actual alarm signal. This prevents spurious indications during short-term deep battery discharge.

LOW BATTERY

Indicates that DC voltage has dropped to approximately 8.5% below nominal battery voltage (e.g. 44 volts for a 48 volt system). Probable causes:

- a) The AC power has failed, and the battery has become discharged
- b) The charger has malfunctioned and the battery has become discharged
- c) The battery is defective

There is a time delay in the low voltage alarm which prevents the alarm from activating until approximately one minute after the low voltage condition starts.

HIGH BATTERY

Indicates that the charger's output has exceeded a pre-set threshold level (approximately 20% above nominal battery voltage - e.g. 58 volts for a 48 volt system). If this alarm stays activated for any period of time, the charger should be shut down and serviced. The charger may have malfunctioned, or the alarm card may be misadjusted. The alarm activates immediately upon high voltage condition, but stays activated for approximately one minute after the condition disappears.

5 Adjustments

5.1 Output Voltage Adjustment

WARNING: Working inside the charger exposes you to potentially lethal AC voltages. Exercise extreme caution to not touch fuse holders, transformer terminals, filter capacitors, heat sinks or any other exposed metal surfaces

NOTE: Do not tamper with factory-set adjustments unless you are absolutely sure that adjustment is necessary. SENS control circuits are equipped with temperature-compensation circuitry, designed to optimize battery performance and life, that

continuously adjusts the charger’s output voltage depending on the ambient temperature. See Appendix A for the correct temperature-compensated float voltage.

Conditions under which you should make adjustments are as follows:

- a) To correct a previous unauthorized adjustment
- b) If your battery is consistently being over-charged or under-charged

Adjust the float voltage by acting upon the potentiometer on the large circuit card labeled “FLOAT”. **.5.2 Factory-Set Voltages** (at 20 deg. C)

	12 volt	24 volt		48 volt		
Float voltage	13.56	27.12		54.24		
Boost voltage	Not recommended and not supplied in the BPS 21					
Charge fail	12.00	25.00		50.0		
Low battery	11.00	22.00		44.00		
High battery	14.78	29.56		58.58		
Load disc.	10.50	21.00		42.00		

6 Battery Maintenance and Check

6.1 Battery Maintenance

The battery should perform for several years without attention, provided that:

- the battery is not operated at extreme temperatures and.
- the battery is placed in service within six months of its receipt.

There is no need to periodically re-torque the battery connections.

6.2 Battery Performance Check

The best way to verify condition of the battery is to cause the battery to supply your load by removing AC power from the charger. If the battery performs as expected, assume that it is in good condition, and can be depended on until the next check is made in six months.

If the battery does not deliver the expected performance further investigation is required. Possible reasons for failure to deliver expected performance include additional loads, low battery temperature (capacity reduces about 1% per degree C below 20 C) or a bad battery. Contact SENS for assistance in determining whether

your battery requires replacement.

**APPENDIX
A**

**Temperature-Compensated Charging Voltage --
Maintenance-Free Batteries**

Deg. C	Deg. F	24 V nom.	48 V nom.	.
15 C	59.0 F	27.78	55.56	
17 C	62.6 F	27.65	55.30	
19 C	66.2 F	27.52	55.03	
21 C	69.8 F	27.39	54.77	
23 C	73.4 F	27.25	54.50	
25 C	77.0 F	27.12	54.24	
27 C	80.6 F	26.99	53.98	
29 C	84.2 F	26.86	53.71	