



**SOLA/
HEVI-DUTY**



**SOLA/
HEVI-DUTY**

Technical Services

U.S.A..... (800) 377-4384

International..... (847) 268-6000

www.solaheviduty.com

While every precaution has been taken to ensure accuracy and completeness in this manual, Sola/Hevi-Duty assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

© 2007 Sola/Hevi-Duty. All rights reserved throughout the world.
Specifications are subject to change without notice.

® Sola/Hevi-Duty name and logo are registered trademarks of EGS Electrical Group, LLC. All names referred to are trademarks or registered trademarks of their respective owners.

P/N: A272-067
Rev. 12 (May 8, 2007)

S1K UPS

**Off-Line UPS
320VA - 1500VA (115V)**



Instruction Manual

Product Registration

To register your product for updates and information on service and support:

- Visit the Technical Support section of our Web site at:
<http://www.solaheviduty.com/support/warranty.htm>
- Click on the Product Registration link and fill in the form.
This will register your product with Sola/Hevi-Duty.

Warranty Information

Please see enclosed “**Terms & Conditions and Sales Policies & Procedures.**”

Table of Contents

Important Safety Instructions.....	2
Storage.....	3
Introduction & System Description.....	4
Front Panel Description (320VA - 1200VA & 1500VA).....	5
Rear Panel Description (320VA - 1200VA & 1500VA).....	5-6
Installation Instructions.....	6
Operating Instructions.....	7
Troubleshooting.....	7
Alarms.....	8
Software and Interface Port (Option).....	9
Specifications.....	11
Product Registration and Warranty Information.....	12

Important Safety Instructions

Save These Instructions

This manual contains important safety instructions that should be followed during the installation and maintenance of the UPS and batteries. Please read this manual thoroughly before attempting to install or operate this UPS.

Read all safety, installation and operating instructions before operating the UPS. Adhere to all warnings on the unit and in this manual. Follow all operating and user instructions.

This equipment is designed for Industrial or Commercial use. This equipment can be installed and operated by individuals without previous training.

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from battery.



WARNING

SAFETY PRECAUTIONS

- To prevent the risk of fire or electric shock, install the UPS in a temperature and humidity controlled room, free of conductive contaminants.
- Operate the UPS only from a properly grounded (earthed) AC supply.
- To reduce the risk of electric shock, do not remove the cover, as it has no user-serviceable parts inside. Some components are live, even when AC power is disconnected. For service, contact a qualified technician.
- To reduce the risk of fire, use the proper rating when replacing the fuse.



CAUTION

To reduce the risk of fire, connect only to a circuit provided with 20 amperes maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.

Turn off and unplug your UPS from the outlet and contact qualified service personnel if:

- The power cord or plug is damaged.
- Liquid has been spilled on the UPS.
- The fuse blows frequently.
- The UPS does not operate even when user follows the operating instructions.

Specifications

MODEL		S1K320	S1K520	S1K650	S1K850	S1K1200	S1K1500
INPUT	Capacity VA/Watts	320/240	520/360	650/390	1000/600	1200/720	1500/900
	Voltage (Single phase)	115V +/-25%		115V +/-20%		115V +/-25%	
	Frequency	50 or 60Hz +/- 10% (auto sensing)					
OUTPUT	Voltage (on battery)	Step sine wave at 115V					
		+/- 10%		+/- 5%			
	Frequency (on battery)	50 or 60Hz					
		+/- 0.3Hz				+/-1 Hz	
	Transfer Time	4 milliseconds, Typical					
PROTECTION	Auto Voltage Regulation(AVR function under Normal mode)	AVR automatically increase output voltage 15% above input voltage if 91% to 75% of nominal. AVR decrease output voltage 13% below input voltage if +9% to +25% of nominal		N/A		AVR automatically increase output voltage 15% above input voltage if 91% to 75% nominal. AVR decrease output voltage 13% below input voltage if +9% to +25% of nominal	
	Unit Input	Fuse or Circuit Breaker for overload & short circuit protection					
	Overload Protection	UPS automatic shutdown if overload exceeds 105% of nominal at 20 seconds, 120% at 10 seconds, 130% at 3 seconds				UPS automatic shutdown if overload exceeds 110% of nominal at 60 seconds, 130% at 3 seconds	
BATTERY	Short Circuit	UPS output cut off immediately or input fuse protection					
	Type	Sealed, maintenance-free lead acid batteries					
	Typical Recharge Time	6 hours					
ALARM	Backup-Time (minutes) (a PC with 15" monitor)	10-20	25-35	15-30	25-40	30-45	70-80
	Battery Back-up	Slow beeping sound					
	Battery Low	Rapid beeping sound every second					
ENVIRONMENT	Overload	Continue beeping sound					
	Ambient operation	0-95% humidity non-condensing, 0-30°C up to 10,000 ft (3000 m)					
	Audible noise	< 40 dBA (1 meter from surface)					
PHYSICAL DIMENSIONS	Net Weight lbs (kg)	12.4 (5.6)	14.3 (6.5)	8.1 (3.7)	10.8 (4.9)	10.8 (4.9)	30.0 (13.6)
	W (mm/in.)	97(3.8)	97(3.8)	97(3.8)	97(3.8)	97(3.8)	130 (5.11)
	D (mm/in.)	320(12.6)	320(12.6)	265(10.4)	320(12.6)	320(12.6)	382 (15.0)
	H (mm/in.)	135(5.3)	135(5.3)	135(5.3)	135(5.3)	135(5.3)	192 (7.5)

Software and Interface Port (Option)

PIN-Out Information of DB9 Female Connector on S1K Series

UPS DB9 Female Connector Pin No.	Signals Description
2	TX RS-232
3	RD RS-232 Remote Shut Down
4	DTR (+12V)
5	GND
6	AC Failure
7	RTS (-12V)
8	Battery Low
9	TX RS-232

PIN Description

- PIN 6 and 8 are open collector outputs that must be pulled up to common referenced supply no greater than DC +40V. The transistors are capable of a maximum load of DC25 mA, only pin 5 can be used as the common.
- Pin 8 generates a high to low signal when the internal battery of the UPS has less than 5 minutes back up time remaining.
- Pin 6 generates a high to low signal when there is an input line failure.
- Pin 3 is the RS 232 data input.
- The UPS will shut down when a high RS-232 level is sustained on Pin 3 for 0.36 seconds; this feature is not applicable to the S1K320 and S1K520 units.
- Pin 2 and Pin 9 are the RS 232 data output.



NOTE

1. Switch rating +40V, 0.25A non-inductive.
2. Pin 5 should be connected to ground only.

RS232 Signal Interface Cable:

You can use the UPS Communication Interface Cable to connect UPS RS232 Port to a Computer RS232 Communication Port.

Open Collector Signals:

The S1K320, S1K520, S1K650, S1K850, S1K1200 and S1K1500 provide open collector Signals.

Important Safety Instructions

Save These Instructions



CAUTION:

Although your UPS has been designed and manufactured to assure personal safety, improper use can result in electrical shock or fire. To ensure safety, please observe the following rules:

- Turn off UPS and disconnect the AC supply before cleaning. Do not use liquid or aerosol cleaners. A dry cloth is recommended to remove dust from the surface of your UPS.
- Do not install or operate your UPS in or near water.
- Do not place UPS on an unstable cart, stand, or table.
- Do not place UPS under direct sunlight or close to heat emitting sources.
- To allow proper ventilation of UPS, do not block or cover top and bottom sides of unit. Do not place UPS power cord in any area where it may get damaged by heavy objects.
- Follow all warnings and instructions marked on the UPS. Do not attempt to service the UPS, as it has no user-serviceable parts inside. Refer all repairs to qualified service personnel.
- Do not dispose of battery or batteries in a fire. The battery may explode.
- Do not open or damage the battery. Released electrolyte is harmful to the skin and eyes. It may be toxic.

CONDITIONS OF USE: The input receptacle must be within 6 feet (1.8 meters) of the UPS. Your UPS provides conditioned power to connected equipment. Maximum load must not exceed that shown on UPS rating label. If uncertain, consult your distributor or Sola/Hevi-Duty. Placing magnetic storage media on top of the UPS may result in data corruption. This equipment can be operated by individuals without previous training.

Storage

Storage Conditions

Store the UPS covered and upright in a cool, dry location, with its battery fully charged. Before storing, charge the UPS for at least 4 hours. Remove any accessories in the accessory slot and disconnect any cables connected to the computer interface port to avoid unnecessary draining of the battery.

Extended Storage

- During extended storage in environments where the ambient temperature is -15 to +30 °C (+5 to +86 °F), charge the UPS battery every 6 months.
- During extended storage in environments where the ambient temperature is +30 to +45 °C (+86 to +113 °F), charge the UPS battery every 3 months.

Introduction & System Description

Congratulations on your choice of the Sola Series S1K Uninterruptible Power System (UPS). It provides conditioned power to microcomputers and other sensitive electronic equipment.

The S1K Series is a compact, "Off-Line" UPS. It supplies connected equipment with stepped approximation to sinewave power to simulate the power generated by the utility.

The S1K is a powerful, microprocessor controlled UPS. Input voltage range is 75% to 125%, ideal protection for the critical connected loads. Battery charging occurs automatically when AC power is applied, no need to switch ON the UPS. When power fails, the UPS can be automatically turned OFF if none of the connected loads are operating to save the battery energy. The S1K includes an automatic self-test feature tests the UPS function and battery. If the battery is found to be no longer useful, the unit will alarm and an LED indicator will illuminate.



NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in an industrial installation. This equipment uses, generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the UPS and the receiver.
- Connect the UPS into a circuit different from that which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Software and Interface Port (Option)

Power Monitoring Software

The UPSMON series software (or other power monitoring software) is applied standard RS-232 interface to perform monitoring functions, and then provides an orderly shutdown of a computer in the event of power failure. Moreover, UPSMON displays all the diagnostic symptoms on monitor, such as Voltage, Frequency, Battery level and so on. The software is available for DOS, Windows 3.1x, Windows 95, Windows 98, Windows 2000, Windows ME, Windows XP, Windows NT or later, Novell Netware, Linux, and others. Call your dealer for more information on computer OS compatible solutions.

Interface Kits

A series of interface kits is available for operation systems that provide UPS monitoring. Each interface kit includes the special interface cable required to convert status signals from the UPS into signals which individual operating system recognizes. The interface cable at UPS side must be connected to REMOTE PORT, at computer side can be either COM 1 or COM 2. The other installation instructions and powerful features please refer to READ.ME file.

Characteristics of Computer Interface Port

The computer interface port has the following characteristics:

The communication port on the back of the UPS may be connected to host computer. This port allows the computer to monitor the status of the UPS and control the operation of the UPS in some cases. Its major functions normally include some or all of the following:

- To broadcast a warning when power fails.
- To close any open file before the battery is exhausted.
- To turn-off the UPS.

Some computers are equipped with a special connector to link with the communication port. In addition, special plug-in cord may be needed. Some computers may need special UPS monitoring software. Contact your dealer for the details on the various interface Kits.

Attention: The standard RS-232 cable (pin to pin D-SUB 9 pin cable) can be connected between UPS REMOTE PORT and computer COM port for the UPSMON series software.

Alarms

1. “BACK UP” (slow beeping)

When in BACK UP mode, the YELLOW LED illuminates and the UPS sounds an audible alarm. The alarm stops when the UPS returns to LINE NORMAL operation.

2. “LOW BATTERY” (rapid beeping)

In BACK UP mode when the battery energy runs low, the UPS beeps rapidly until the UPS shuts down from battery exhaustion or returns to LINE NORMAL operation.

3. “OVERLOAD” (continuous alarm)

When the UPS is overloaded (the connected loads exceed the maximum rated capacity), the UPS sounds a continuous alarm and LED to warn of an overload condition. Remove non-critical loads from the battery power outlets to eliminate the overload.

Front Panel (320VA-1200VA and 1500VA)

- 1) “REPLACE BATTERY “ indicator (RED LED):
The LED illuminates when the UPS’s battery is no longer useful and must be replaced.

Caution: Do not attempt to open the UPS or replace the battery. Call technical support (800-377-4384) when battery replacement is required.

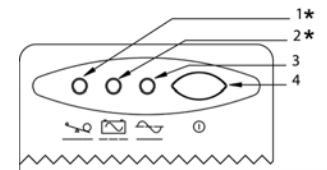
- 2) “BACK UP” indicator (YELLOW LED):
The LED illuminates when the UPS is supplying battery power to the loads.

- 3) “LINE NORMAL” indicator (GREEN LED):
The LED illuminates when the line input voltage is normal.

- 4) “ON/OFF/TEST” button:
Press the button more than 1 second to turn the UPS on or off, press the button less than 1 second to activate the UPS’s self-testing. Press for more than 2 seconds to turn off.

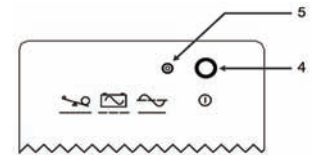
- 5) “LED indicator:
The LED indicator indicates the UPS’s status. The indicator is illuminated steady when the UPS is supplying utility power to the loads. The indicator flashes slowly (about once every 2 second) when the UPS is supplying battery power to the loads. The indicator flashes rapidly (about once every 0.5 second) when loads connected to the UPS exceed the UPS’s capacity.

320VA - 1200VA



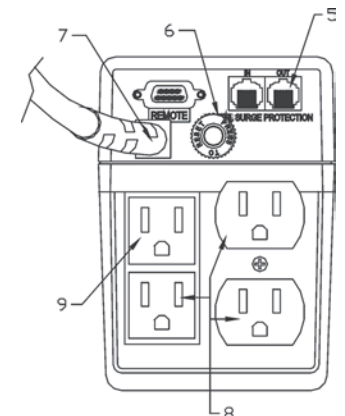
* 650 VA and above models

1500VA



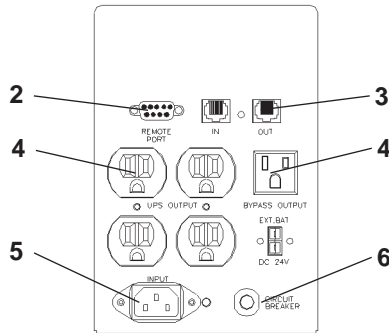
Rear Panel (320VA-1200VA)

- 5) TEL/SURGE PROTECTION
- 6) INPUT CIRCUIT BREAKER: Protection from AC overload and Short-circuit.
- 7) AC INPUT POWER CORD
- 8) UPS OUTPUT OUTLETS (Black)
- 9) SURGE PROTECTED OUTLET (White)



Rear Panel (1500 VA)

- 2) Remote Port (option)
- 3) Phone Jack (option)
- 4) UPS Output Outlets
- 5) AC Input Receptacle
- 6) AC Fuse Breaker



Installation Instructions

- 1) **Placement**
Install the UPS in a protected area with adequate airflow and free of excessive dust. Do not operate the UPS outdoors.
- 2) **Connect to Utility**
Connect the AC input connector to utility power to power up the UPS.
- 3) **Charge the Battery**
The UPS charges its battery whenever it is connected to utility power. For best results, charge the battery for 4 hours in the initial use.
- 4) **Connect the Load**
Connect the loads to the output connectors on the rear of the UPS.

Operating Instructions

- 1) **Battery Power Outlets**
The Battery Power output outlets will provide protection from surges and power failures. Plug your computer, monitor, and other “data critical” devices into these outlets.
- 2) **Surge Protected Outlet**
The outlet can offer protection against surges and transients (typically caused by lightning or disruptive loads in the building). In the event utility power failure, this outlet will turn off. Utilize this outlet with less critical devices such as a printer, scanner, fax, or external speakers.
- 3) **Switch On**
With the UPS plugged in, press and hold the on/off/test/silence button more than 1 second until “LINE NORMAL” LED lit to switch the ups on. The UPS will perform self-testing each time when it is switched on.
- 4) **Switch Off**
By pressing and hold the on/off/test button more than 2 seconds until the “LINE NORMAL” or “BACK UP” LED off to switch the UPS off.
- 5) **Self-test**
Use the self-test to verify both the operation of the UPS and the condition of the battery. In normal utility power, push the on/off/test button less than 1 second and UPS performs a self-test function. During the self-test, the UPS runs in back up mode. If the UPS passes the self-test, it returns to “LINE NORMAL” operation.

Troubleshooting

PROBLEM	PROBABLE CAUSE	ACTION TO TAKE
UPS not on, LED will not light	UPS is off or On/Off/Test button not pushed long enough.	Press the Power On/Off/Test button more than 2 seconds.
	Battery voltage less than 10V (20V for S1K1500)	Recharge the UPS at least 4 hours. If unit still does not start, check the input fuse.
	Other failure	Call Technical Services
	Load less than 20W in back-up mode	Normal condition
UPS always in back-up mode	Power cord loose	Re-plug the power cord
	AC Fuse opened	Replace the AC Fuse
	Line voltage too high, too low, or black out	Normal condition
	Other failure, PCB, etc.	Call Technical Services
Back-up time too short	Battery not fully charged	Recharge the UPS for at least 4 hours
	Other failure	Call Technical Service
Continuous BEEP	Overload condition	Remove the non-critical loads
Red LED Illuminated	Battery failure	Call Technical Services