

# SOLAHD

**Uninterruptible Power Systems**

**S1K Series**



**Instruction Manual**



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# 1.0 IMPORTANT SAFETY INSTRUCTIONS

## SAVE THESE INSTRUCTIONS

Congratulations on your choice of the SolaHD S1K Series Uninterruptible Power System (UPS).

This manual contains important safety instructions that should be followed during the installation and maintenance of the UPS. Please read this manual thoroughly, including all safety, installation, and operating instructions before attempting to install or operate this UPS. Please adhere to all warnings on the unit and in this manual and follow all operating and user instructions.

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

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.

## 1.1 Safety Precautions

### **WARNING**

- 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 (including the battery). For service, contact a qualified technician.

**NOTE:** Some components are live, even when ac power is disconnected.

- To reduce the risk of fire, use the proper rating when replacing the fuse.

### **CAUTION**

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

- Turn off the 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 the UPS on an unstable cart, stand, or table.

- Do not place the UPS under direct sunlight or close to heat emitting sources.
- To allow proper ventilation of the UPS, do not block or cover the top and/or bottom sides of the unit.
- Do not place the 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
- Do not dispose of batteries in a fire; they may explode.
- Do not open or damage the battery. Released electrolyte is harmful to the skin and eyes and may be toxic.
- The battery can present a risk of electrical shock and high short-circuit current.
- To reduce the risk of fire, connect only to a circuit provided with 20 A maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.

### **ATTENTION**

Turn off and unplug your UPS from the outlet and contact SolaHD Technical Support at (800) 377-4384 if

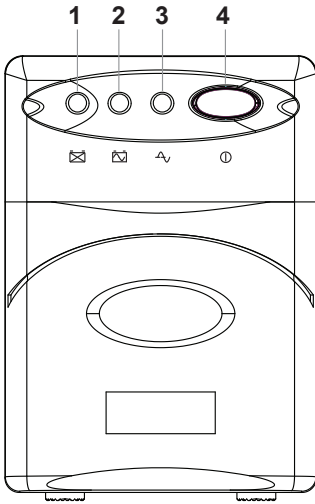
- the power cord or plug is damaged;
- liquid has been spilled on the UPS;
- the fuse blows frequently;
- the UPS does not operate even when the user follows the operating instructions.

## **1.2 Conditions of Use**

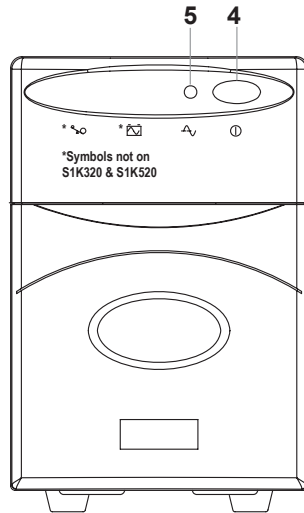
- The input receptacle must be within 6 feet (1.8 meters) of the UPS.
- Your UPS provides conditioned power to connected equipment. Maximum load must not exceed that shown on the UPS rating label. If uncertain, consult your distributor or SolaHD Technical Support at (800) 377-4384.
- Placing magnetic storage media on top of the UPS may result in data corruption.

# 2.0 System Description

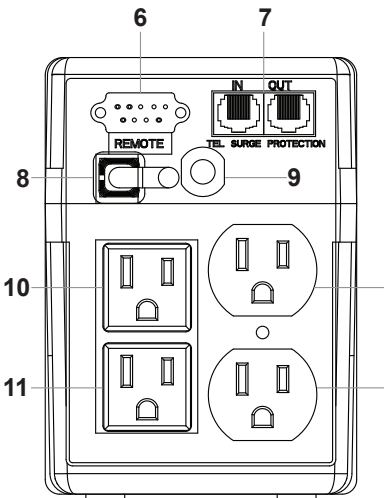
## 2.1 Front & Rear Panel



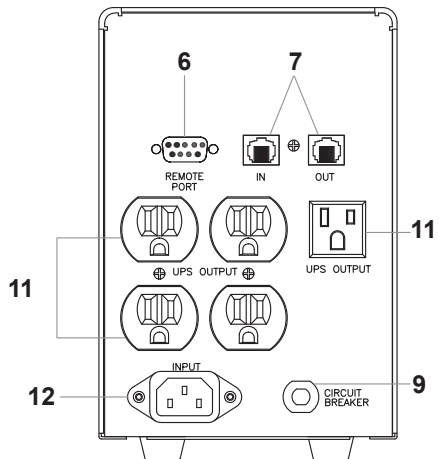
S1K650, S1K850, S1K1200



S1K320, S1K520, S1K1500



S1K320-S1K1200




S1K1500

## 2.2 Front & Rear Panel Descriptions

### For Models S1K650, S1K850, and S1K1200:

1. Battery Fault indicator (red LED): The red LED illuminates when the UPS battery is no longer useful.

 **CAUTION:** Do not attempt to open the UPS or replace the battery; call SolaHD Technical Support at (800) 377-4384.

2. Backup indicator (yellow LED): The yellow LED illuminates when the UPS is supplying battery power to the loads.
3. Line Normal indicator (green LED): The green LED illuminates when the line input voltage is normal.

### For All Models:

4. On/Off/Test button: Press the button for more than 1 second to turn the UPS on; press for more than 2 seconds to turn the UPS off. Press the button for less than 1 second to activate the UPS self-testing.

### For Models S1K320, S1K520, and S1K1500:

5. LED indicator: The LED indicator indicates the UPS status. The indicator is illuminated continuously when the UPS is supplying utility power to the loads. The indicator flashes slowly (about once every 2 seconds) when the UPS is supplying battery power to the loads. The indicator flashes rapidly (about once every half second) when the loads connected to the UPS exceed capacity.

### For All Models:

6. Remote Port (computer interface): Provides both RS-232 and relay signals to support Windows applications and other OS compatible solutions. Please refer to “9.3 Remote Port” for details.
7. Tel/Surge Protection (In/Out): Provides surge suppression for telephones and modems.

### For Models S1K320, S1K520, S1K650, S1K850, and S1K1200:

8. Ac input power cord

### For All Models:

9. Circuit Breaker: Provides protection from ac overload and short-circuit current.
10. Surge protected outlet only (white)
11. UPS protected output outlets (black)

### For Model S1K1500:

12. Ac input receptacle

## 3.0 Preinstallation

### 3.1 Inspection

Inspect the UPS upon receipt. Damage that may have occurred in transit is not covered under the warranty. If shipping damage is present, please contact your local carrier and SolaHD distributor immediately.

**NOTE:** The packaging material is recyclable. Please reuse or dispose of it in a responsible manner.

### 3.2 What's Included

- CD with UPSMON monitoring software
- Instruction Manual
- (1) DB-9 RS-232 cable
- (1) RJ-45 cable

### 3.3 Optional Accessories

- S1K-PMBRK Wall/panel mount bracket kit (Not applicable for Models S1K650 and S1K1500)

## 4.0 Installation

### 4.1 Placement

Install the UPS in a protected area with adequate airflow and free of excessive dust. Do not operate the UPS outdoors.

### 4.2 Connect to Utility Power

To power up the UPS, connect the ac input connector to utility power.

### 4.3 Charge the Battery

The UPS charges its battery whenever it is connected to utility power. For best results, charge the battery for 4 hours before initial use.

### 4.4 Connect the Loads

Connect the loads to the UPS protected output outlets on the rear of the UPS.



## 5.0 Operating Instructions

### 5.1 UPS Protected Output Outlets

The output outlets will provide protection from surges and power failures. Plug your computer, monitor, and other “data critical” devices into these outlets.

### 5.2 Surge Protected Outlet Only

The surge protected outlet can offer protection against surges and transients typically caused by lightning or disruptive loads in the building. In the event of utility power failure, this outlet will not provide backup power to the load. Utilize this outlet with less critical devices such as printers, scanners, fax machines, or external speakers.

### 5.3 Switch On

With the UPS plugged in, press and hold the On/Off/Test button for more than 1 second until the Line Normal LED is lit. The UPS will perform self-testing each time it is switched on.

### 5.4 Switch Off

Press and hold the On/Off/Test button for more than 2 seconds until the Line Normal or Backup LED turns off.

### 5.5 Self-test

Use the self-test function to verify both the operation of the UPS and the condition of the battery. In normal utility power, press the On/Off/Test button for less than 1 second to perform a self-test function. During the self-test, the UPS runs in Backup Mode. If the UPS passes the self-test, it returns to Line Normal operation.

### 5.6 Green Mode

If a load of <20 watts is connected to the UPS and the ac power fails or is disconnected, the UPS will enter the Green Mode. At this time, the green LED on the front panel will flash every 3 to 5 seconds. After approximately 3 minutes, the UPS will shut down, preventing a deep discharge of the battery. The UPS will return to Line Normal operation when ac power returns.

If the UPS is in the Battery Backup Mode and the load is decreased to <20 watts, the UPS will again enter the Green Mode and will shut down within 3 minutes. Application of ac power will return the UPS to Line Normal operation.

If the Green Mode of operation is not desired, it can be disabled by holding down the On/Off/Test button until two beeps are heard. The Green Mode will be disabled and will remain in this mode until the UPS is turned off.

## 6.0 Alarms

### 6.1 Backup (slow beeping)

#### **For Models S1K650, S1K850, and S1K1200:**

When in Backup Mode, the yellow LED illuminates and the UPS sounds an audible alarm. The alarm stops when the UPS returns to Line Normal operation.

#### **For Models S1K320, S1K520, and S1K1500:**

When in Backup Mode, the green LED flashes slowly and the UPS sounds an audible alarm. The alarm stops when the UPS returns to Line Normal operation.

### 6.2 Low Battery (rapid beeping)

#### **For All Models:**

In Backup 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.

### 6.3 Overload (continuous alarm)

#### **For Models S1K650, S1K850, and S1K1200:**

When the UPS is overloaded, it sounds a continuous alarm. Remove non-critical loads from the UPS protected output outlets to eliminate the overload.

#### **For Models S1K320, S1K520, and S1K1500:**

When the UPS is overloaded, it sounds a continuous alarm and the green LED flashes rapidly. Remove non-critical loads from the UPS protected output outlets to eliminate the overload.

## 7.0 Troubleshooting

**TABLE 1: TROUBLESHOOTING**

PROBLEM	CAUSE	SOLUTION
UPS is not on; green LED will not illuminate	UPS is off or On/Off/Test button was not pushed long enough	Press the On/Off/Test button for more than 2 seconds
	Battery voltage is less than 10 V (20 V for S1K1500)	Recharge the UPS for at least 4 hours. If it still does not start, check the input fuse.
	Other failure	Call SolaHD Technical Support
	Load less than 20 W in Backup Mode	Normal condition
UPS is always in Backup Mode	Power cord is loose	Plug in the power cord
	Input ac power is not available	Check fuses/breakers
	Other failure, PCB, etc.	Call SolaHD Technical Support
	Line voltage too high, too low, or blackout	Normal condition
Backup time is too short	Battery is not fully charged	Recharge the UPS for at least 4 hours
	Other failure	Call SolaHD Technical Support
Continuous beep	Overload condition	Remove the non-critical loads
Red LED is illuminated	Battery failure	Call SolaHD Technical Support
<b>TECHNICAL SUPPORT</b>		
For further assistance, please contact SolaHD Technical Support at (800) 377-4384/(847) 268-6651 or by e-mail at <a href="mailto:solahd.technicalservices@emerson.com">solahd.technicalservices@emerson.com</a> .		

## 8.0 Storage

### 8.1 Storage Conditions

**NOTE:** Before storing, charge the UPS for at least 4 hours.

Store the UPS covered and upright in a cool, dry location with its battery fully charged. Remove any accessories from the accessory slot and disconnect any cables connected to the Remote Port to avoid unnecessary draining of the battery.

### 8.2 Extended Storage

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

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

# 9.0 Software & Interface

## 9.1 Power Monitoring Software

UPSMON software (or other power monitoring software) utilizes a standard RS-232 interface to perform monitoring functions and an orderly shutdown of the protected equipment in the event of power failure. UPSMON displays all the diagnostic symptoms on the monitor, including voltage, frequency, and battery levels. UPSMON is available for Windows applications and other OS compatible solutions. Please contact SolaHD Technical Support for more information.

## 9.2 Interface Kits (optional)

Interface kits include a required interface cable to convert status signals from the UPS into signals which an individual operating system will recognize. The interface cable must be connected to the Remote Port on the rear panel of the UPS and to the host computer (either COM 1 or COM 2). Refer to the "READ.ME" file for further instructions.

## 9.3 Remote Port (computer interface)

The Remote Port on the rear panel of the UPS may be connected to a host computer to allow for UPS status monitoring and operation control. Functions include: broadcasting a warning when power fails, closing any open file before the batteries are exhausted, and turning off the UPS.

TABLE 2: REMOTE PORT PIN CONFIGURATIONS	
PIN	SIGNALS DESCRIPTION
2	Transmitted data (TD) RS-232
3	Received data (RD) RS-232 remote shutdown. The UPS will shut down when a high RS-232 level is sustained on PIN 3 for 0.5 seconds. <b>NOTE: This feature is not applicable for Models S1K320 &amp; S1K520.</b>
4	Data terminal ready (DTR) +12 V
5	Signal ground
6	Ac failure. PIN 6 generates a high to low signal when there is an input line failure. PIN 6 is an open collector output that must be pulled up to a common referenced supply no greater than +40 V dc. The transistors are capable of a maximum load of 25 mA; only PIN 5 can be used as the common. <b>NOTE: Models S1K320 and S1K520 are designed without open collector signals.</b>
7	Request to send (RTS) -12 V
8	Battery low. PIN 8 generates a high to low signal when the internal battery of the UPS has less than 5 minutes of backup time remaining. PIN 8 is an open collector output that must be pulled up to a common referenced supply no greater than +40 V dc. The transistors are capable of a maximum load of 25 mA; only PIN 5 can be used as the common. <b>NOTE: Models S1K320 and S1K520 are designed without open collector signals.</b>
9	Transmitted data (TD) RS-232
NOTES	
(1) Switch rating is +40 V dc, 25 mA non-inductive. (2) PIN 5 should be connected to signal ground only. (3) Models S1K650, S1K850, S1K1200, and S1K1500 provide open collector signals.	

# 10.0 Specifications

TABLE 3: TECHNICAL SPECIFICATIONS						
PARAMETERS	MODEL					
	S1K320	S1K520	S1K650	S1K850	S1K1200	S1K1500
Capacity, VA/W	320/240	520/360	650/390	850/600	1200/720	1500/900
<b>INPUT</b>						
Voltage (Single phase)	115 V $\pm$ 25%		115 V $\pm$ 20%			115 V $\pm$ 25%
Frequency	50 or 60 Hz $\pm$ 10% (auto sensing)					
<b>OUTPUT</b>						
Voltage (on battery)	Step sine wave at 115 V					
	$\pm$ 10%			$\pm$ 5%		
Frequency (on battery)	50 or 60 Hz					
	$\pm$ 0.3 Hz					$\pm$ 1 Hz
Transfer Time	4 ms typical					
Auto Voltage Regulation (AVR function under Normal Mode)	AVR automatically increases output voltage 15% above input voltage if 91% to 75% of nominal is detected. AVR decreases output voltage 13% below input voltage if +9% to +25% of nominal is detected.		AVR not available			AVR automatically increases output voltage 15% above input voltage if 91% to 75% of nominal is detected. AVR decreases output voltage 13% below input voltage if +9% to +25% of nominal is detected.
<b>PROTECTION</b>						
Unit Input	Fuse or circuit breaker for overload & short circuit protection					
Overload Protection	UPS automatically shuts down if overload exceeds 105% of nominal at 20 seconds, 120% at 10 seconds, 130% at 3 seconds.					UPS automatically shuts down if overload exceeds 110% of nominal at 60 seconds, 130% at 3 seconds.
Short Circuit	UPS output cuts off immediately or input fuse protection					
<b>ENVIRONMENT</b>						
Operating Temperature	0°C to +40°C					
Humidity	0 to 95% non-condensing					
Maximum Elevation	10,000 ft. (3,000 m)					
Audible Noise	<40 dBA (1 m from surface)					
<b>PHYSICAL</b>						
Dimensions, in. (mm) W x D x H	3.8 (97) x 12.6 (320) x 5.3 (135)	3.8 (97) x 12.6 (320) x 5.3 (135)	3.8 (97) x 10.4 (265) x 5.3 (135)	3.8 (97) x 12.6 (320) x 5.3 (135)	3.8 (97) x 12.6 (320) x 5.3 (135)	5.11 (130) x 15.0 (382) x 7.5 (192)
Net Weight, lb. (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)
<b>BATTERY</b>						
Type	Sealed, maintenance-free, lead acid batteries					
Typical Recharge Time	4 hr.			6 hr.		
Backup Time	See Table 4 on page 14					
<b>AGENCY APPROVALS</b>						
Safety	UL 1778, cULus Listed, FCC Part 15, Subpart B, Class A					

**TABLE 4: TYPICAL BATTERY BACKUP TIMES**

LOAD	MODEL					
	S1K320	S1K520	S1K650	S1K850	S1K1200	S1K1500
<b>BACKUP TIMES (HR:MIN:S)</b>						
10%	02:18:00	01:35:00	01:36:00	00:54:00	00:45:00	01:16:15
20%	01:03:30	00:42:00	00:58:00	00:30:00	00:27:00	00:28:00
30%	00:35:45	00:21:00	00:36:00	00:21:00	00:19:00	00:12:30
40%	00:22:30	00:12:30	00:20:00	00:17:00	00:14:00	00:07:30
50%	00:15:00	00:08:00	00:14:00	00:11:00	00:08:00	00:04:30
60%	00:11:45	00:06:00	00:10:00	00:08:00	00:05:00	00:04:30
70%	00:08:15	00:04:30	00:08:00	00:05:30	00:04:30	00:02:15
80%	00:06:00	00:03:30	00:06:00	00:05:00	00:03:30	00:01:45
90%	00:04:45	00:02:15	00:04:00	00:04:00	00:02:00	00:01:30
100%	00:04:00	00:01:45	00:03:00	00:03:00	00:01:30	00:01:00
<b>NOTES</b>						
Backup times are based on a fully charged battery						

## 11.0 Registration & Warranty

### 11.1 Product Registration

To register your product for updates and information on service and support, visit our Web site at: <http://www.solahd.com/support/registration.htm>.

### 11.2 Warranty Information

Please see the “Terms & Conditions of Sale”.



# SOLAHD

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Industrial Automation

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