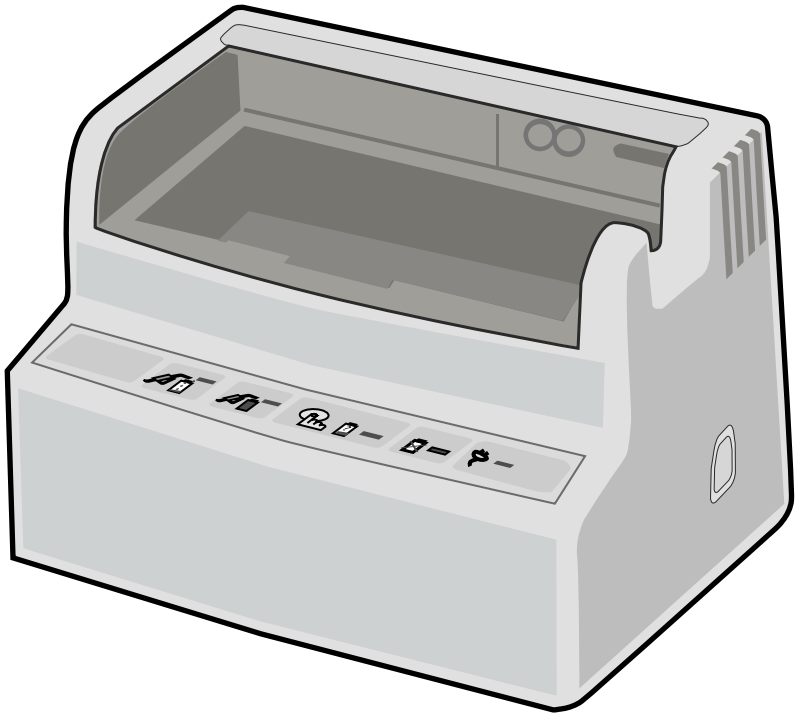
SurePower™ Single Bay Charger
Operator's Guide



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Preface

Chapter 1 Product Overview

Chapter 2 Set Up

Chapter 3 Operation

Preface

This manual describes how to set up, use, and maintain ZOLL Medical Corporation's *SurePower Single Bay Charger* which you use to test, recalibrate, and charge ZOLL's rechargeable lithium ion defibrillator batteries.

It is important that you read and understand the information in this manual. The proper charging and maintenance of ZOLL's rechargeable defibrillator batteries is critical to the reliable operation of your ZOLL defibrillator.

Using this Manual

This section describes the organization of the *SurePower Single Bay Charger Operator's Guide.*

Organization

We organize the manual as follows:

Preface

Provides introductory information about this manual: the manual's organization, the symbols and conventions that the manual uses, and important warnings and notices regarding the *SurePower Single Bay Charger*.

Chapter 1 Product Overview

Provides a general overview of the *SurePower Single Bay Charger.*

Chapter 2 Set Up

Describes how to set up the *SurePower Single Bay Charger.*

Chapter 3 Operation

Describes how to use the *SurePower Single Bay Charger* to test, recalibrate, and charge ZOLL's rechargeable defibrillator batteries.

Chapter 4 Maintenance and Troubleshooting

Describes how to clean and maintain the *SurePower Single Bay Charger* and how to troubleshoot operating problems.

Chapter 5 Battery Management

Provides general information how to run an effective battery management program. This chapter also provides general information on how to set up a battery management program.

Chapter 6 Product Specifications

Provides a detailed list of product specifications for the *SurePower Single Bay Charger.*

Appendix A Manufacturer's Declaration -- Electromagnetic Emissions

Provides information on electromagnetic emissions in regard to the *SurePower Single Bay Charger.*

Symbols Used on the Equipment

This manual, the *SurePower Single Bay Charger*, or the *SurePower* or *SurePower II Battery Pack* may display any or all of the following symbols:

Symbol	Description
	**Attention!** Refer to *Operator's Guide* for important safety-related information, such as Warnings and Cautions that cannot be presented on the device.
	**DANGER** high voltage present.
	Protective (earth) ground terminal.
	Alternating current.
	Temperature Limitation.
	**Conformité Européenne** Complies with medical device directive 93/42/EEC.
	Contains lithium. Recycle or dispose of properly.
	Keep away from open flame and high heat.
	Do not discard in trash. Recycle or dispose of properly.
	Nonionizing electromagnetic radiation.

Symbol	Description
	Return to a collection site intended for waste electrical and electronic equipment (WEEE). Do not dispose of in unsorted trash.
	With respect to electric shock, fire, mechanical, and other specified hazards only in accordance with IEC 60601-1 and CAN/CSA C22.2 No. 601.1, Medical Equipment Certified for USA and Canada 58NA.
IPX2	Equipment that is protected against harmful effects from water ingress of vertically falling water drip when enclosure is tilted up to 15°.
	Manufacturer.
	Authorized representative in the European Community.
	Serial Number.
REF	Catalogue number.
	Consult the Operator's Guide for information on the proper use of this device.

Conventions

This manual uses the following convention:

Warning!	**Warning statements describe conditions or actions that can result in personal injury or death.**
Caution	Caution statements describe conditions or actions that result in damage to the *SurePower Single Bay Charger*.

Note: Notes contain additional information on using and maintaining the *SurePower Single Bay Charger*.

The manual displays button and LED labels in **bold** face type.

Inspection and Service

When unpacking the *SurePower Single Bay Charger*, carefully inspect each container for damage. If the shipping container or cushion material is damaged, keep it until you have checked the contents for completeness and the unit has been checked for mechanical and electrical integrity.

If the contents are incomplete, if there is physical damage, or if the unit does not pass its electrical self-test, North American customers should call ZOLL's Technical Service Department. Customers outside the United States and Canada should contact their ZOLL authorized representative. If the shipping container is damaged, also notify the carrier.

Contacting Technical Service

The *SurePower Single Bay Charger* does not require periodic recalibration or adjustment. You should, however, periodically perform the maintenance that this manual describes to verify proper operation of the unit

If the *SurePower Single Bay Charger* requires service, North American customers should contact the ZOLL Technical Service Department:

Telephone: 1-800-348-9011
1-978-421-9655

FAX: 1-978-421-0010

Customers outside the United States and Canada should contact their ZOLL authorized representative.

When requesting service for the *SurePower Single Bay Charger*, please provide the following information to the Technical Service representative:

- Unit serial number
- Description of the problem
- Department using the equipment
- Purchase order to allow tracking of loan equipment
- Purchase order for a unit with an expired warranty

Returning a unit for service

If you need to send a *SurePower Single Bay Charger* to the ZOLL Technical Service Department for repair, obtain a service request (SR) number from the service representative.

If you are returning a *SurePower Single Bay Charger*, remove all battery packs from the unit, and return the unit in the original containers or equivalent packaging, and be sure to include the service request number with the unit.

For customers	Return the unit to
In the U.S.A.	ZOLL Medical Corporation 269 Mill Road Chelmsford, MA 01824-4105 Attention: Technical Service Department (*SR number*) Telephone:1-800-348-9011 1-978-421-9655 Fax:1-978-421-0010
In Canada	ZOLL Medical Canada, Inc. 1750 Sismet Rd., Unit#1 Mississauga, ON L4W 1R6 Attention: Technical Service Department (*SR number)* Telephone: 1-866-442-1011
In other locations	The nearest authorized ZOLL Medical Corporation representative To locate an authorized service center, contact the International Sales Department at ZOLL Medical Corporation 269 Mill Road Chelmsford, MA 01824-4105 Telephone: 1-978-421-9655

The ZOLL Serial Number

Each ZOLL product displays a serial number that contains information about that product. From left to right, ZOLL serial numbers are structured as follows:

- A two-character product code
- A three-character date-of-manufacture code
- A product serial number of six or more alphanumeric characters.

The product code for the *SurePower Single Bay Charger* is “AT” and one product code for the *SurePower Battery Pack* is “AG.”

The first two characters of the date-of-manufacture code give the last two digits of the year (for example, “05” would appear for products manufactured in 2005). The last character of the date-of-manufacture code gives the month in which the product was manufactured. The month appears in the form of a single alphabetic character: “A” for January, “B” for February, “C” for March, and so on through “L” for December.

The product serial number is a unique set of alphanumeric characters that ZOLL assigns to each individual unit.

Safety

The following sections provide important warnings and notices regarding ZOLL's *SurePower Single Bay Charger*.

Warnings

- Always check that a battery pack's **Ready** light is on before using the battery in a defibrillator.
- Do not use the *SurePower Single Bay Charger* in a patient environment.
- Charge only SurePower and SurePower II battery packs in the *SurePower Single Bay Charger*. Charging other battery packs may cause overheating or damage.
- Accidental sliding or drop of the *SurePower Single Bay Charger* or battery may cause physical injury. Operate the *SurePower Single Bay Charger* on a stable surface and be careful when carrying or moving the unit to avoid injury. Damaged batteries may expose users to a safety hazard. Should the *SurePower Single Bay Charger* or *SurePower Battery Pack* be dropped, inspect and test the unit prior to further use following the procedures described in this manual. Use caution when handling batteries with damaged case.
- Avoid prolonged exposure of the *SurePower Single Bay Charger* Operator's Guide or *SurePower Battery Pack* to direct sunlight to minimize charger and battery heating and the damage that may occur from exposure to ultraviolet light.
- The *SurePower Single Bay Charger* and ZOLL rechargeable defibrillator batteries have been tested against interference from radio frequency emissions typical of two-way radios used in emergency service/public safety activities. Refer to Appendix A to determine recommended operating distances from RF transmission equipment.
- Use only the AC cord supplied with the device. Failure to use the proper line cord could result in excess leakage currents, EMC problems, and reduced safety.
- Do not disassemble the *SurePower Single Bay Charger*. A shock hazard exists. Refer all problems to qualified personnel.
- Do not place anything on top of or beneath the *SurePower Single Bay Charger*, such as blankets or cloths. Doing so may block the vents on the unit, preventing proper dissipation of heat during operation.
- Do not use the *SurePower Single Bay Charger* unit stacked with other equipment.
- Do not use a battery unless the charger's **Ready** LED is lit and the **Fault** LED is off. Failure to do so may result in the use of a fully depleted battery.
- Use the *SurePower Single Bay Charger* only in a well-ventilated area. Should a battery become overheated, the battery can vent gas that is harmful and potentially explosive.
- An insulation or ground failure in the *SurePower Single Bay Charger* can result in dangerous leakage currents. To avoid this, perform periodic inspection following the procedures described in this manual.
- Do not operate the *SurePower Single Bay Charger* in the presence of flammable agents (such as gasoline), oxygen-rich atmospheres, or flammable anesthetics. Using the device in the presence of flammable agents can cause an explosion.
- Do not immerse or set the *SurePower Single Bay Charger* or *SurePower Battery Pack* in liquid. Using the device near or within puddles of water may present a shock hazard to the operator, patient, and nearby personnel.
- A pinch hazard exists when installing a battery into the charging bay.
- If the display indicators on a *SurePower Battery Pack* are not consistent with the indicators on the *SurePower Single Bay Charger* or ZOLL defibrillator, a charging fault condition is present. Remove the battery from service as soon as practical, and verify the correct operation of the charger, defibrillator, and battery.

- Do not use the *SurePower Single Bay Charger* in environmental conditions that fall outside of those specified in Chapter 6, "Product Specifications—*SurePower Single Bay Charger*." Using the *SurePower Single Bay Charger* in environmental conditions that fall outside those described in the product specifications can result in failure of the unit.
- Do not use the *SurePower Single Bay Charger* in the presence of Electrosurical Units (ESU).
- Do not short the power output pins (battery mating pins) of the charger.
- To avoid the risk of electric shock, the *SurePower Single Bay Charger* must only be connected to a supply mains with protective earth.
- Do not use the *SurePower Single Bay Charger* in the rain.

Cautions

- Follow all recommended maintenance instructions. If a problem occurs, obtain service immediately.
- Do not use ketones (MEK, acetone, etc.) to clean the *SurePower Single Bay Charger*.
- Do not sterilize or autoclave the *SurePower Single Bay Charger*.
- Do not touch the exposed pins in the charging bay -- if the pins are damaged, the charging bay won't be usable. These pins do *not* pose an electrical hazard.
- Do not install batteries into Monitor/Defibrillators or a *SurePower Single Bay Charger* that is not plugged into live AC mains when storage may exceed 90 days. Battery damage may occur.
- Do not connect any cables or devices to the covered connector port -- the connector port is only for ZOLL factory use.
- Do not remove or discard the connector port cover.

Notes

- If you are disposing of your *SurePower Single Bay Charger*, contact your local authorities to determine the requirements for the recycling and disposal of electrical equipment and follow those requirements.
- The end-of-life of the *SurePower Single Bay Charger* is determined by the availability of replacement parts and service for the unit. Contact ZOLL's Technical Service Department for information on the availability of replacement parts and service for the *SurePower Single Bay Charger*.

FDA Tracking Requirements

U.S. Federal Law (21 CFR 821) requires the tracking of defibrillators. Under this law, owners of this device must notify ZOLL Medical Corporation if this product is

- received
- lost, stolen, or destroyed
- donated, resold, or otherwise distributed to a different organization

If any such event occurs, contact ZOLL Medical Corporation in writing with the following information:

1. Originator's organization- Company name, address, contact name, and contact phone number
2. Part number, model number, and serial number of the device

3. Disposition of the device (for example, received, lost, stolen, destroyed, distributed to another organization), new location and/or organization (if known and different from originator's organization) - company name, address, contact name, and contact phone number
4. Date when the change took effect

Please address the information to:

ZOLL Medical Corporation

Attn: Tracking Coordinator

269 Mill Road

Chelmsford, MA 01824-4105

Fax: (978)-421-0025

Tel: (978)-421-9655

Notification of Adverse Events

As a health care provider, you may have responsibilities under the Safe Medical Devices Act (SMDA) for reporting the occurrence of certain events to ZOLL Medical Corporation and possibly, in the United States, to the Food and Drug Administration (FDA).

These events, described 21 CFR Part 803, include device-related death and serious injury or illness. In any event, as part of our Quality Assurance Program, ZOLL Medical Corporation should be notified of any device failures or malfunctions. This information is required to ensure that ZOLL Medical Corporation provides only the highest quality products.

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Chapter 1
Product Overview — *SurePower Single Bay Charger*

The ZOLL *SurePower Single Bay Charger* is a single-bay unit that can test, recalibrate, and charge a single ZOLL rechargeable defibrillator battery.

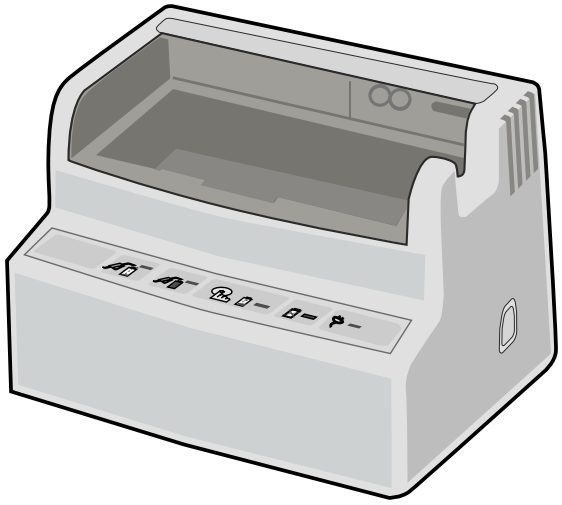


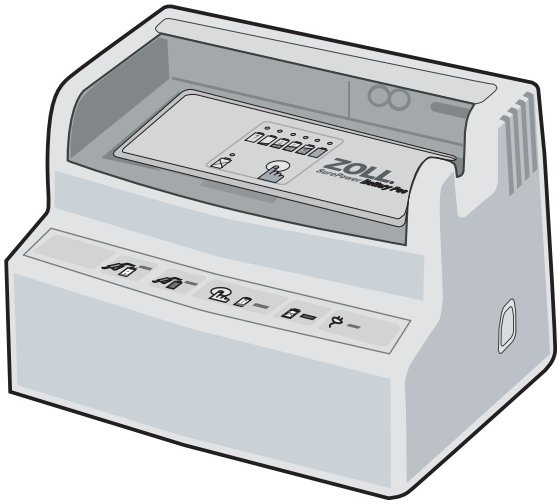
Figure 1-1 SurePower Single-Bay Charger

The charging bay in the *SurePower Single Bay Charger* is designed to accommodate the following ZOLL rechargeable lithium ion batteries:

- SurePower Battery Pack
- SurePower II Battery Pack

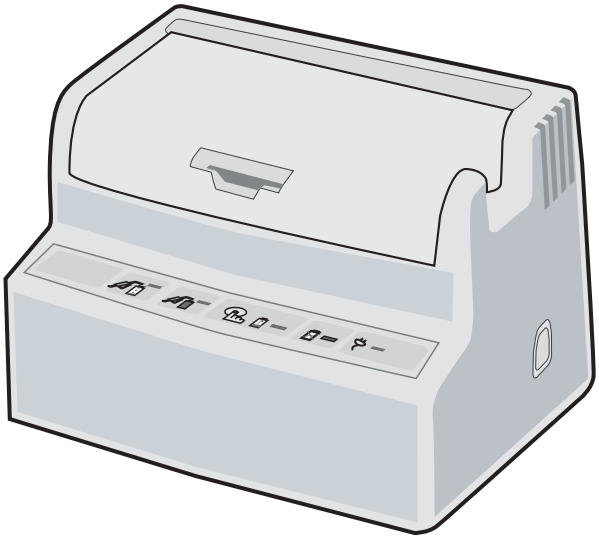
Charger with *SurePower* Battery Pack

The following illustration is of a *SurePower Single Bay Charger* with a *SurePower Battery Pack* installed in it.



Charger with *SurePower II* Battery Pack

The following illustration is of a *SurePower Single Bay Charger* with a *SurePower II Battery Pack* installed in it.



Battery Panel

At the front of the bay is an information and control panel:

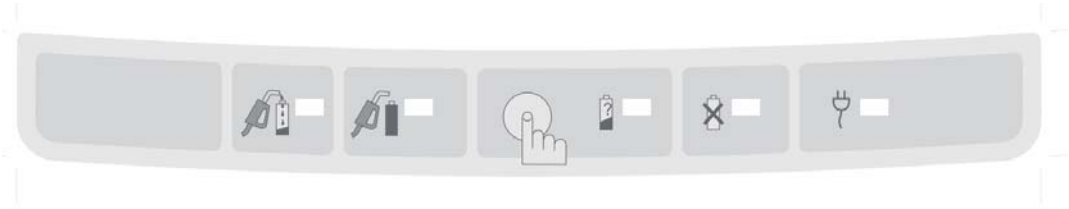
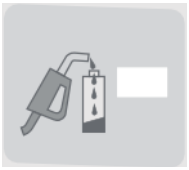


Figure 1-2 Charger Control Panel

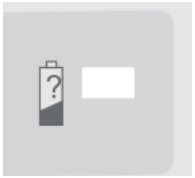
The panel has five LEDs with identifying icons and a **Test** button:



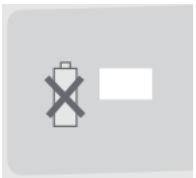
Charging. The LED lights next to this icon to indicate that the battery is charging.

Ready. The LED lights next to this icon to indicate that the battery is fully charged and ready to use.

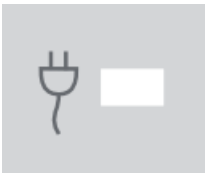
Test button. Pressing this button initiates a manual test of the battery.



Test. The LED light next to this icon to indicate that the charger is testing the battery.



Fault. The charger has determined that there is a charging fault. If there is no battery in the charging bay, the charger has determined that there is a an internal fault with charger.



Power. The LED light next to this icon indicates that the charger is connected to the AC mains.

Charger and Battery Keys

ZOLL's defibrillator batteries and the bay in the *SurePower Single Bay Charger* are keyed to prevent incompatible batteries from seating in the charging bay and damaging the *SurePower Single Bay Charger*. The following illustration shows the key on the *SurePower Single Bay Charger*.

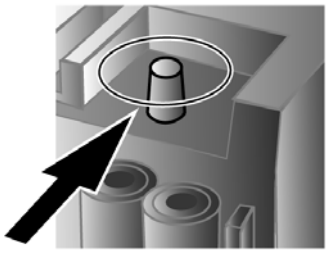


Figure 1-3 Battery Key

Batteries that do not have the correct keys will not seat in the charging bay and cannot be charged and tested by the *SurePower Single Bay Charger*.

Caution Do not use the *SurePower Single Bay Charger* to charge any battery packs which are not designed for use with *SurePower Single Bay Chargers.*

Battery Charging Requirement

Each battery type has its own charging requirements. When you place a battery pack into the bay of a *SurePower Single Bay Charger*, the charger identifies the battery type and the battery communicates its charging requirements to the charger.

Charging Modes

The *SurePower Single Bay Charger* supports two charging modes: **QuickCharge** and **ManualTest**. These charging modes control how quickly the charger brings the battery to full charge and whether or not the battery's runtime indicator is recalibrated.

QuickCharge

The **QuickCharge** charging mode immediately charges the depleted battery.

The **QuickCharge** charging mode is the default charging method for ZOLL's lithium ion batteries, such as the *SurePower Battery Pack*. The **QuickCharge** mode is the quickest way to charge lithium ion batteries, which do not require frequent testing to maintain their usable life.

ManualTest

The **ManualTest** charging mode tests and recalibrates ZOLL batteries.

The *SurePower* and *SurePower II Battery Packs* automatically recalibrate themselves.

We describe how to perform a **ManualTest** in Chapter 3.

In summary, the *SurePower Single Bay Charger* can ensure the availability of fully-charged defibrillator batteries in an emergency situation. *SurePower* and *SurePower II Battery Packs* can be recharged, recalibrated, and tested by this device.

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Chapter 2
Set Up

This chapter describes how to properly set up the *SurePower Single Bay Charger* for use.

Place the *SurePower Single Bay Charger* on a stable, secure surface.

Position the charger so that the control panel and LED's face the area from which you'll be working -- this will make it easier to see the LED's and install and remove batteries.

Make sure that there are *at least* four inches of clear space surrounding the charger. This provides the air circulation necessary for the charger to dissipate the heat that it generates during operation.

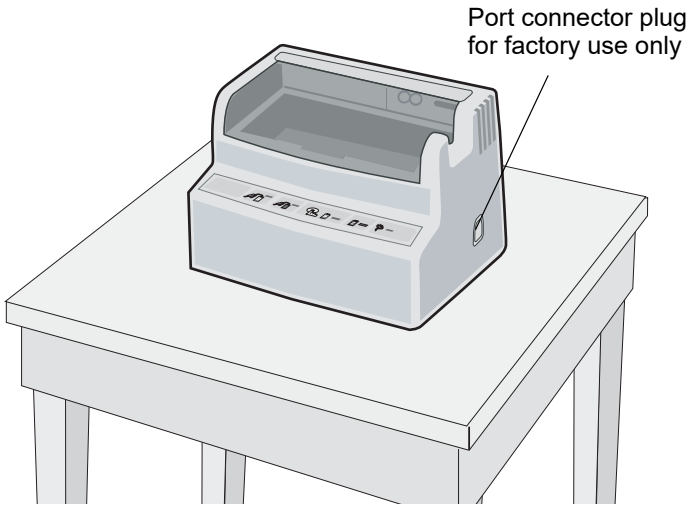


Figure 2-1 ***SurePower Single Bay Charger*** **Setup**

Caution

- Do not place anything on top of or beneath the unit that might block the vents.
- Do not remove or discard the charger's port connector plug -- removal of the plug makes the unit susceptible to water and dust ingress. Do not connect *any* cable or device to the charger's port connector -- the port connector is *only* for factory use.

Warning!

- **Do not place open containers of liquids (drink cups, etc.) on or near the charger. Spilling liquids on the charger can result in an electrical safety hazard.**
- **Do not the use the charger in a patient environment.**
- **Always inspect the charger exterior before use; do not use if the exterior is broken. Cracks or openings caused by damage in the plastic case can result in an electrical safety hazard.**

The charger rests on four rubber feet when you place it on a table top or counter.

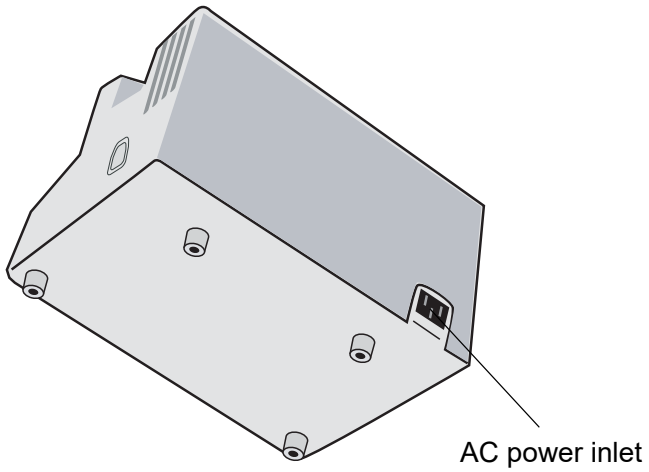


Figure 2-2 *SurePower Single Bay Charger* Bottom View

Powering on the Charger

To power on the charger, plug the AC cord into the power inlet of the charger, and then plug the cord into live AC mains.

Connect the AC cord *only* to a proper hospital grade receptacle.

Use *only* the AC cord that ZOLL Medical Corporation provides.

Note: There is no power switch on the *SurePower Single Bay Charger* -- the unit is powered on at all times it is plugged in and AC power is available.

Position the *SurePower Single Bay Charger* so that the AC cord is easy to disconnect.

Warning! Always inspect the AC cord before use. Do not use the AC cord if it is defective -- for example, the cord's insulation is cracked or the cord is severely kinked.

Self Test at Power On

When you connect to the AC mains, the charger performs a self-test which briefly lights *all* LEDs and then sounds an audible alarm tone. After a few seconds all LEDS, except the **Power** LED to the right of the control panel, will go out. Should the charger detect a fault with its operation, it will light the **Fault** LED

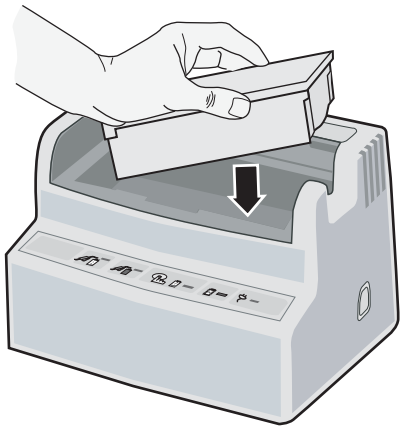
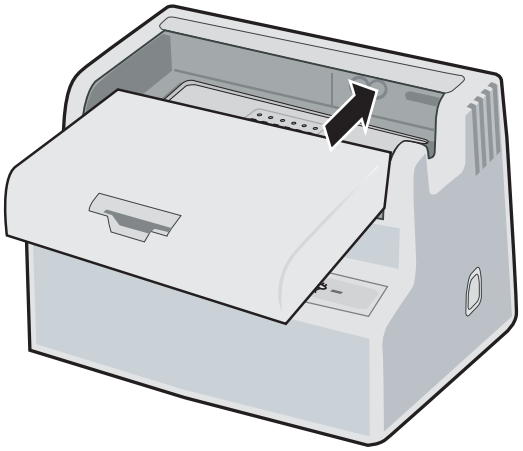
Care in the set up of the *SurePower Single Bay Charger* - correct placement, inspection, and observation of the Self Test - ensures the usability and performance of the unit.

Chapter 3
Operation

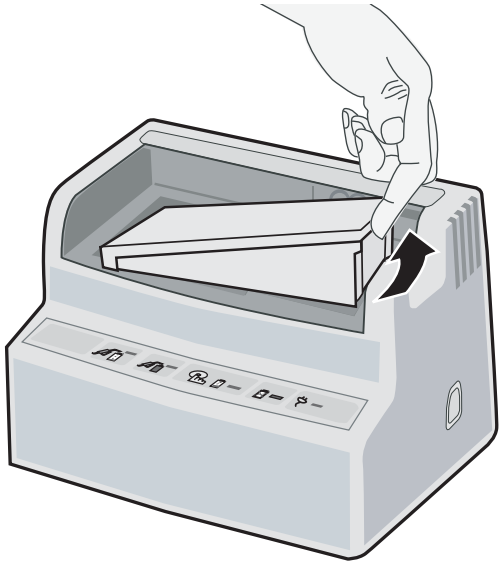
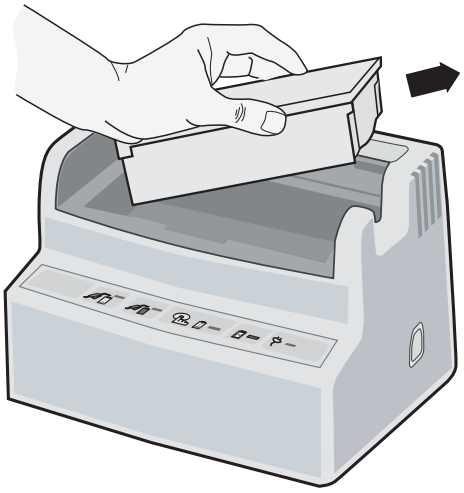
The *SurePower Single Bay Charger* is designed to charge and recalibrate two different types of batteries: the *SurePower* and *SurePower II* Battery Packs.

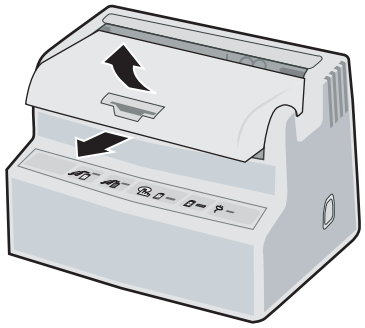
Charging the *SurePower* and *SurePower II Battery Packs*

To charge a *SurePower Battery Pack*, follow this procedure;

Step	Action
1.	Insert the battery pack into the open battery bay. To insert a *SurePower Battery Pack*, place the back end of the battery pack against the back of the charging bay where the pins are not located, and then press the battery down firmly until it clicks.  **Warning! To avoid pinching your fingers, hold the battery by the top edges as shown in the illustration above when inserting the battery into the charging bay.** To insert a *SurePower II Battery Pack*, slide the battery pack into the open battery bay and press it firmly against the back of the charger until it clicks. 

Step	Action
2.	After you insert the battery, the charger begins charging the battery and lights the **Charging** LED.  See the table at the end of this chapter for information on how the charger indicates its operational state after you insert the battery.
3.	Allow the battery time to charge. The charging time will depend on the battery type, how depleted the battery was when you put it into the charger, and which charging method the battery requires. When the battery is fully charged, the charger lights the **Ready** LED.  **Note:** If you remove the battery before it is fully charged, the *SurePower Single Bay Charger* beeps to alert you If the battery fails the capacity test during testing, the *SurePower Single Bay Charger* always lights the **Fault** LED. 

Step	Action
4.	Remove the battery. **Removing the *SurePower Battery Pack*** -- insert a finger into the recess at the semi-circular opening of the charging bay, press the battery's locking clip to disengage it from the latch  ...and then lift the battery out of the charging bay.  **Note:** If the **Fault** LED is on when you remove the battery pack, the charger beeps to alert you that there has detected a *charging fault.* Do not use this battery pack in a defibrillator or monitor until you have confirmed the nature of the charging fault (for more information, see *Troubleshooting Charging Faults* later in this chapter.

Step	Action
	Removing the *SurePower II Battery Pack* -- lift the latch on the *SurePower II Battery Pack.* The battery pack will pop out of the charging bay.  **Note:** If the **Fault** LED is on when you remove the battery pack, the charger beeps to alert you that there has detected a *charging fault.* Do not use this battery pack n a defibrillator or monitor until you have confirmed the nature of the charging fault (for more information, see *Troubleshooting Charging Faults* later in this chapter.

Troubleshooting Charging Faults

If the charger detects a charging fault, you can perform the following tasks to determine the nature of the fault:

1. **Remove the battery pack and inspect it.** If the battery pack's casing or pins are damaged, remove that battery from service.
2. **Inspect the charging bay.** If the charging bay or the its contacts are dirty, unplug the charger from the AC mains, clean it (following the procedure that we describe in Chapter 4), and then reinsert the battery pack. If the charger casing or the charging bay is damaged, unplug the charger from the AC mains, remove it from service, and then test the battery in a clean, undamaged charger.
3. If the battery pack and charger are clean and undamaged, **reinsert the battery pack**.
4. If the **Fault** LED lights after reinserting the battery pack, **remove the battery pack, wait 10 seconds, and then press the battery pack's Test button.** If the battery's **Fault** LED lights, remove the battery pack from service. If the battery pack's fault light does not light, test the battery pack in another charger.

Testing Batteries (Manual Procedure)

The charger's battery test recalibrates the battery and measures the battery's charge capacity to ensure that the battery can hold a charge that is sufficient for effective service, which is at least 60% of its original factory charge capacity.

When should you Test and Recalibrate a Battery?

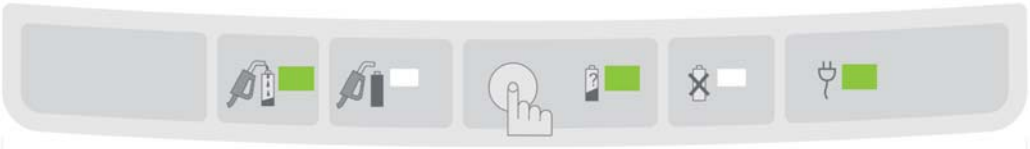
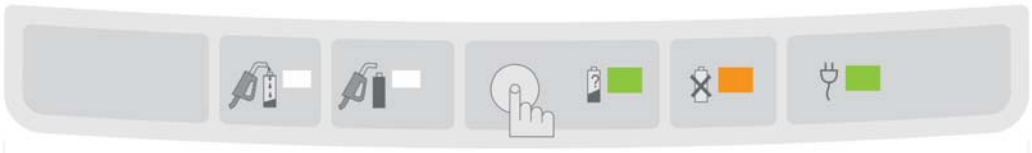
The *SurePower and SurePower II Battery Packs* automatically recalibrate and measure charge capacity after a set service interval (1 year or 500 Amphere-hours discharged). You can also initiate a manual battery test, which recalibrates the battery and measures charge capacity, after a shorter service interval (for example, after a specific number of charge/discharge cycles or less than a year after the last recalibration).

Running a manual battery test resets the interval after which the battery automatically recalibrates and measures charge capacity.

Note: A battery will pass a battery test (the charger lights the **Ready** LED) if the battery can be charged to at least 60% of its original factory charge capacity. If manual test results in a charging fault, you should remove the battery from service and perform additional testing (see the *Troubleshooting* section in Chapter 4.)

Performing a Manual Battery Test

To perform a manual battery test, follow this procedure:

Step	Action
1.	Insert the battery pack into the charging bay and press the **Test** Button on the bay's control panel  The charger lights the **Test** LED and begins testing the battery. The **Test** LED will remain lit for the duration of the test  ...and the **Charging** LED during the charging portion of the test:  When the battery is fully charged and has passed a factory-configured minimum capacity test, the charger lights the **Ready** and **Test** LED's  If the charger determines that the battery has insufficient capacity, it lights the **Fault** and **Test** LED's 

Testing the Battery Bay

In the *SurePower Single Bay Charger*, the control panel's LEDs can be tested to determine if they are working correctly.

To test the control panel's LEDs, follow this procedure:

Step	Action
1.	If there is a battery pack in the charging bay, remove it.
2.	Press the **Test** Button on the battery bay's control panel.  The charger light all four LEDs for several seconds, and then extinguish them.

Charger Operation -- General Information

As you use the *SurePower Single Bay Charger*, the unit will light its LEDs and issue audible beeps to indicate various operational states. Generally, the charger will issue two beeps whenever a fault condition occurs.

The following tables summarize what the LED and alarm activity indicates during different operating modes. The charger light LEDs in one of two ways: **Steady** (persistent) or **brief** (periodic).

Indicators When Powered On or Testing the Unit

Charger Operational State	**Charge LED** 	**Ready LED** 	**Test LED** 	**Fault LED** 	**Power LED** 	**Audible Alarm**
No power to charger.						
Charger powered on.	**On (brief)**	**On (brief)**	**On (brief)**	**On (brief)**	**On (steady)**	**1 Beep**
LED Test initiated (Test button pressed, no battery in charging bay).	**On (brief)**	**On (brief)**	**On (brief)**	**On (brief)**	**On (steady)**	**1 Beep**
Charger Unit Test successful.					**On (steady)**	
Charger Unit Test fails.				**On (steady)**	**On (steady)**	**2 Beeps**

Indicators When Charging a Battery

Charger Operational State	Charge LED 	Ready LED 	Test LED 	Fault LED 	Audible Alarm
Battery in bay (QuickCharge Method—battery charging).	**On (steady)**				
Battery in bay (Manual Test Method—battery discharging).			**On (steady)**		
Battery Test in progress (Manual Test Method—battery charging).	**On (steady)**		**On (steady)**		
Battery Capacity Test successful. (Manual Test Method)		**On (steady)**	**On (steady)**		
Battery Capacity Test successful. (Automatic Recalibration)		**On (steady)**	**On (steady)**		
Battery or charger fault detected when charging.				**On (steady)**	**2 Beeps when battery removed.**
Battery in bay (Automatic Recalibration—battery discharging)			**On (steady)**		
Battery in bay (Automatic Recalibration—battery recharging)	**On (steady)**		**On (steady)**		
Battery end of life. *Remove from service.*			**On (steady)**	**On (steady)**	**2 Beeps when battery removed.**

Indicators When Removing a Battery

Charger Operational State	**Charge LED** 	**Ready LED** 	**Test LED** 	**Fault LED** 	**Audible Alarm**
Battery removed from bay -- **No** charging fault detected.					
Battery removed from bay -- charging fault detected.					**2 Beeps**
Battery removed from bay -- not fully charged.					**2 Beeps**

Understanding the operation of the *SurePower Single Bay Charger* is essential to the effective use of the charger. Knowing how to insert, test, and charge batteries, and understanding the meaning of the LED's and alarms, enables you to provide fully-charged and functional batteries for use with your ZOLL defibrillators and monitors.

Disabling/Enabling the Audible Alarm

You can disable and enable the charger's audible alarm.

To disable or enable the audible alarm, press and hold down the charger's **Test** button for at least 10 seconds.

When you power on the charger, the audible alarm is enabled by default.

Warning! **If the charger's LED's are not working, disabling the audible alarm will prevent you from noticing a charging fault.**

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Chapter 4 Maintenance and Troubleshooting

This chapter describes a series of non-technical operational checks that you should perform annually to ensure the proper operation of the *SurePower Single Bay Charger*.

Inspection

Begin by inspecting the charger to ensure that it's clean (with no fluid spills). Make sure that nothing has been placed on top of the charger and that there are *at least* four inches of clear space around the charger so that it can dissipate heat effectively.

You can then perform the following quick, non-technical operational checks

1. Inspect for cracks or damage to the charger housing.
2. Inspect the AC cord for severe kinks or exposed wires
3. Connect the charger to live AC mains. The charger will beep, turn on the fan, and light all LEDs for several seconds. The **Power** LED will remain lit after the other LEDs go off.
4. With the battery bay empty, check that all LEDs on the control panel except the **Power** LED are off.
5. Press the **Test** button. Veryify that all LEDs are temporarily lit.
6. Inspect the battery pin contacts and the plastic around the battery pin contacts for wear or damage.
7. Insert a battery into the bay. Verify that the appropriate LEDs in the bay immediately illuminate.

Cleaning

Clean the *SurePower Single Bay Charger* with a soft cloth, mild soap, and water.

Note: You can also use the following materials to clean the unit:

- 2% glutaraldehyde solution (Cidex)
- Chlorine bleach (30ml/l water)
- Isopropyl alcohol 99%
- Hydrogen peroxide solution
- Cotton swabs to clear vents

Do not immerse or spray any part of the *SurePower Single Bay Charger* with water. Do not use ketones (MEK, acetone, etc.). Do not autoclave the *SurePower Single Bay Charger*.

Do not use chlorine to clean the battery pin contacts.

Troubleshooting

The following troubleshooting procedures are for use of non-technical personal using the *SurePower Single Bay Charger*. This section addresses many common problems or questions that can arise during operation.

If problems persist after you perform these troubleshooting procedures, contact the ZOLL Technical Service Department or your authorized ZOLL representative

1. **Power** LED does not light.

- Check that the charger is plugged into an appropriate power source.
- Check that the power cord is securely inserted into the charger.
- Check for a defective power cord.
- Plug the charger into a different power source.

2. **Charging** LED does not light when a battery is in the battery bay.

- Check to see if the charger is in the drain phase of the battery bay (**Test** LED is illuminated).
- Check that the battery is properly seated in the bay.
- Check that the contacts are clean and not damaged.
- Use another battery that you know is good.

3. **Test** LED does not light when you press the **Test** button.

- Check that the battery is properly seated in the bay.
- Check that the contacts are clean and not damaged.
- Use another battery that you know is good.

4. Battery fails test cycle (both the **Fault** and **Test** LEDs light).

- Battery end of life. *Remove from service.*

5. **Fault** LED lights when battery pack is inserted into the *SurePower Single Bay Charger*.

- Check that battery pack is seated correctly in charging bay.
- Check that battery contacts are clean and not damaged.

6. Beeper does not sound.

- Try to enable the audible alarm as described in Chapter 3.

Proper maintenance of the *SurePower Single Bay Charger*, and understanding how to deal with operational problems, helps ensure the usability of the unit.

Warning! **There are no user-serviceable parts in the *SurePower Single Bay Charger*. Do not remove the bottom metal plate from the *SurePower Single Bay Charger*—removing the bottom plate from the unit will expose you to dangerous electrical current.**

Chapter 5
Using ZOLL Rechargeable Battery Packs Effectively

This chapter describes how you can use ZOLL rechargeable battery packs most effectively. This chapter also describes what a Battery Management Program is and how you use it to ensure that your ZOLL defibrillators always have adequate battery power.

Getting the Most for Your *SurePower Battery Pack* and *SurePower II Battery Pack*

The *SurePower* and *SurePower II Battery Packs* are lithium ion batteries. You can recharge a depleted *SurePower* or *SurePower II Battery Pack* at any time.

It is very important that you recharge a depleted *SurePower* or *SurePower II Battery Packs* as soon as possible.

Caution

- *Never* store the *SurePower* or *SurePower II Battery Packs* in a fully depleted state -- this will damage the battery.
- *Never* store the *SurePower* or *SurePower II Battery Packs* in a charger that is not powered on.

Developing a Battery Management Program

The safe, reliable use of ZOLL defibrillators requires an adequate, available supply of battery power. To ensure that an adequate supply of battery power is always available, you need to have a well-designed Battery Management Program.

A Battery Management Program requires the following:

1. Have a sufficient number of battery packs and chargers.

   Have a sufficient number of battery packs and chargers to insure that every ZOLL resuscitation device has fully charged main and spare batteries ready at all times.

2. Assign someone to be responsible for the Battery Management Program.

   Assign someone who can oversee all aspects of the Battery Management Program, including the training of staff who use ZOLL's resuscitation devices.

3. Define the battery pack exchange and charging routines.

   Clinical and technical staff should determine desired use patterns and an optimum sequence to insure consistent battery pack exchange and charging routines.

4. Ensure sufficient spare battery pack capability.

   A fully-charged spare battery pack should be immediately available with all ZOLL resuscitation devices. We recommend that you keep more than one spare battery pack available where prolonged or repeated use of the device may be required, such as long transport situations.

5. Develop backup procedures.

   You must develop backup procedures to maintain appropriate life support (such as cardiopulmonary resuscitation) should a battery pack or resuscitation device fail and need to be replaced.

6. Test Battery Packs regularly.

   Develop a testing schedule as part of your organization's Battery Management Program. The appropriate frequency of testing depends on the age of the battery pack and the frequency and type of use. As the battery pack ages, testing should be more frequent since failure may occur rapidly at the battery pack's end-of-life. At a minimum, ZOLL recommends testing every three months.

7. Develop a battery recycling and disposal plan.

   The disposal of used batteries can have a negative environmental impact if it is not done correctly, and there are often regulations specifying how batteries should be disposed of or recycled. You should become familiar with any applicable regulations and develop a plan that satisfies these regulations.

   We encourage you to recycle your used batteries whenever possible.

Chapter 6 Product Specifications — *SurePower Single Bay Charger*

This chapter gives the product specifications for the *SurePower Single Bay Charger*.

Size	8.8 (Length) x 6.8 (Width) x 5.0 (Height) in
	22.4 (Length) x 17.3 (Width) x 12.7 (Height) cm
Weight	4 lb (1.8 kg) without batteries
Equipment Type	IEC Class 1
Power Requirements	100-240 Vac, 50/60 Hz, 125VA
Power Consumption	120 VA
Output	**Voltage:** +6.0 to 13.5 V dc.
	Charging Current: 0 to +3.0 A dc.
	Discharging Current: 0 to 2.5 A dc.
Maximum Thermal Output	70 BTU/HR
Design Standards	Designed to meet or exceed IEC 60601-1 standards for medical equipment safety
Temperature	**Operation:**
	32°F to 122°F 0°C to 50°C
	Storage and Transportation:
	-40°F to 158°F -40°C to 70°C
Humidity	5% to 95% (relative humidity - non condensing).
	Relative humidity for operation at temperatures 40°C - 50°C is limited to a maximum of 57%.
Safety Specification	Stationary, Class, Type
Altitude of Operation	-300 ft through 13,123 ft (below and above sea level)
	-91 m through 4,000 m (below and above sea level)
Ingress Protection	IPX2 (equipment is protected against harmful effects from water ingress of vertically falling water drops when enclosure is tilted up to 15°)

Maximum Charge Time (SurePower and SurePower II Batteries)	4.5 hours at 25°C (77°F) 8.5 hours at 50° C (122°F)
Battery Contact Pins Usage Limit	5,000 removal/insertion cycles

Appendix A
Manufacturer's Declaration — Electromagnetic Emissions and Immunity-Guidance and Manufacturer's Declaration — Electromagnetic Emissions

The *SurePower Single Bay Charger* is intended for use in the electromagnetic environment specified below. The customer or the user of the *SurePower Single Bay Charger* should assure that they are used in such an environment.

RF emissions CISPR 11	Group 1	The *SurePower Single Bay Charger* does not contain any intentional RF transmitters. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The *SurePower Single Bay Charger* is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emission IEC 61000 3-2	Class B	
Voltage Fluctuations/ Flicker Emission IEC 61000 3-3	Complies	

Electromagnetic Immunity Declaration (EID)

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Electrostatic discharge (ESD) IEC 61000 4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000 4-4	± 2 kV for power supply lines	± 2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000 4-5	± 1 kV differential mode ± 2 kV for common mode	± 1 kV differential mode ± 2 kV for common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec.	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the *SurePower Single-Bay Charger* unit requires continued operation during power mains interruptions, it is recommended that the *SurePower Single-Bay Charger* unit be powered by an uninterruptable power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
U_T is the AC mains voltage prior to application of the test level.			

EID for Non-Life-Support Functions

The non-life-support functions of the *SurePower Single Bay Charger* are intended for use in the electromagnetic environment specified below. The customer or the user of the *SurePower Single Bay Charger* should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80 MHz 20 V/m 80 MHz to 2.5 GHz	3 Vrms 20 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the *SurePower Single Bay Charger,* including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance d = 1.2 $\sqrt{P}$ 150 KHz to 80 MHz d = 0.35 $\sqrt{P}$ 80 MHz to 800 MHz d = 0.7 $\sqrt{P}$ 800 MHz to 2.5 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, and *d* is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the *SurePower Single Bay Charger* unit is used exceeds the applicable RF compliance level above, the *SurePower Single Bay Charger*unit should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the *SurePower Single-Bay Charger* unit.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended Separation Distances from RF Equipment for Non-Life-Support Functions

The non-life-support functions of the *SurePower Single Bay Charger* are intended for use in an environment in which radiated RF disturbances are controlled. The customer or the user of the *SurePower Single Bay Charger* can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the *SurePower Single Bay Charger* as recommended below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter (W)	**Separation Distance According to Frequency of Transmitter (m)**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 0.35\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 0.7\sqrt{P}$
0.01	0.12	0.035	0.070
0.1	0.38	0.111	0.221
1	1.2	0.350	0.700
10	3.8	1.110	2.214
100	12	3.500	7.000

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.