



Resuscitation System Model 100

Battery Charger User Guide

Notice

About this Guide

The information in this *User Guide* applies to the ZOLL Circulation AutoPulse® Battery Charger designed for the AutoPulse Resuscitation System Model 100. The AutoPulse Power System consists of two main components: the AutoPulse Battery Charger (also known as the *Battery Charger*) and the AutoPulse Battery (also known as the *Battery*).

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Preface

This document describes the operating steps and maintenance requirements for the AutoPulse Power System for use as part of the AutoPulse Resuscitation System Model 100. The AutoPulse Power System consists of two main components: the AutoPulse Battery Charger (also known as the *Battery Charger*) and the AutoPulse Battery (also known as the *Battery*).

Proper use of the AutoPulse Power System requires a thorough understanding of the Power System, and appropriate training and practice using the Power System.

Please read the entire *User Guide* for the AutoPulse Battery Charger and *User Guide* for the AutoPulse System before using the Battery and Battery Charger.

Who Should Read this Guide

This document should be read by personnel who are tasked with the care and maintenance of the Battery Charger and the Battery used to operate the AutoPulse System.

General Warnings and Precautions

Warning:

- Always charge a new Battery. Failure to charge a Battery may cause reduced Battery performance.
- Always charge a stored Battery before placing the Battery in active operation. Battery may self-discharge when not in use. Failure to charge a Battery before use may cause device power failure.

Caution: United States federal law restricts this device to sale by or on the order of a licensed physician.

Caution: The AutoPulse System is designed to be used only with ZOLL Circulation-approved accessories. The AutoPulse System will perform improperly if non-approved accessories are used.

Caution: Only use ZOLL Circulation Batteries specifically designed for use with the AutoPulse System. The use of other batteries may cause permanent damage to the AutoPulse Platform and will void the warranty.


Caution: Do not short the Battery Power leads. Electrical connection (short) between Battery power leads on the connector permanently damages the Battery and renders the Battery inoperable.

Caution: Always charge Batteries at temperatures between 41°F (5°C) and 95°F (35°C). Charging Batteries at temperatures below 41°F (5°C) or above 95°F (35°C) will prevent the Battery from reaching its full capacity (operational time) and may lead to irreversible Battery damage.


- Caution:** Do not use Batteries that have cracks in the Battery case exposing internal components. Mishandling of the Battery may lead to physical damage and present a fire or shock hazard.
- Caution:** Do not immerse any portion of the AutoPulse Battery in water or other fluids. Do not allow fluids to enter the Battery or the Battery connector. Fluid immersion or spillage may permanently damage the Battery or present a fire or shock hazard.
- Caution:** Do not heat, burn, or incinerate a Battery. Exposure to heat above 158°F (70°C) may irreversibly damage the Battery.
- Caution:** Do not attempt to open the Battery. The Battery has no serviceable parts.
- Caution:** Do not block the Battery Charger’s ventilation slots.
- Caution:** Remove the protective plastic cap from the Battery before attempting to charge the Battery.
- Caution:** Do not operate the Battery Charger in a confined space.
- Caution:** Keep the Battery Charger away from moisture.
- Caution:** Do not remove the Battery Charger cover. The Battery Charger has no internal user-serviceable parts.
- Caution:** Use the Battery Charger only with ZOLL Circulation AutoPulse Battery Charger power cord, as supplied.
- Caution:** Grounding reliability can only be achieved when the Battery Charger is connected to an equivalent receptacle marked “hospital only” or “hospital grade.”

Symbols



The symbols below may be found in this *User Guide*, on the AutoPulse Battery Charger, or on the AutoPulse Battery.















With Respect to Electric Shock, Fire, Mechanical
and other specified Hazards Only.
In accordance with CAN/CSA C22.2 NO. 601.1,
(CAN/CSA 601.2XX, If Applicable)
Medical Equipment Certified for Canada
6SA9



With Respect to Electric Shock,
Fire and Mechanical Hazards Only
In Accordance with UL 2601-1
6SA9

	Attention: Consult Accompanying Documents
	Indoor Use Only

	Date of Manufacture
	Manufacturer
	EU Authorized Representative
	Serial Number
	Fuse
	DC Voltage
	AC Voltage
	Charging
	Ready
	Fail
	Start Test
	Power

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1 Introduction of the AutoPulse Power System

The AutoPulse Power System represents a state-of-the-art breakthrough in battery technology and one of the breakthroughs that make the AutoPulse Resuscitation System possible (see Figure 1-1). The AutoPulse Battery communicates with the AutoPulse Battery Charger or with the AutoPulse Platform when it is plugged into each respectively.

The Battery is intended to operate for a minimum of 30 minutes at a rate of 80 compressions per minute.

The Battery uses nickel-metal hydride (NiMH) technology because NiMH delivers one of the highest power outputs of any battery technology. At the same time, NiMH does not have the limiting memory effect inherent with nickel-cadmium (NiCd) batteries or the higher weight associated with the higher mass-to-power ratio of lead-acid batteries. The Battery automatically monitors its readiness state. As a result, no paper battery-management systems are required to track battery status. Finally, the Battery is mechanically keyed to the AutoPulse Platform and Battery Charger to facilitate correct installation.

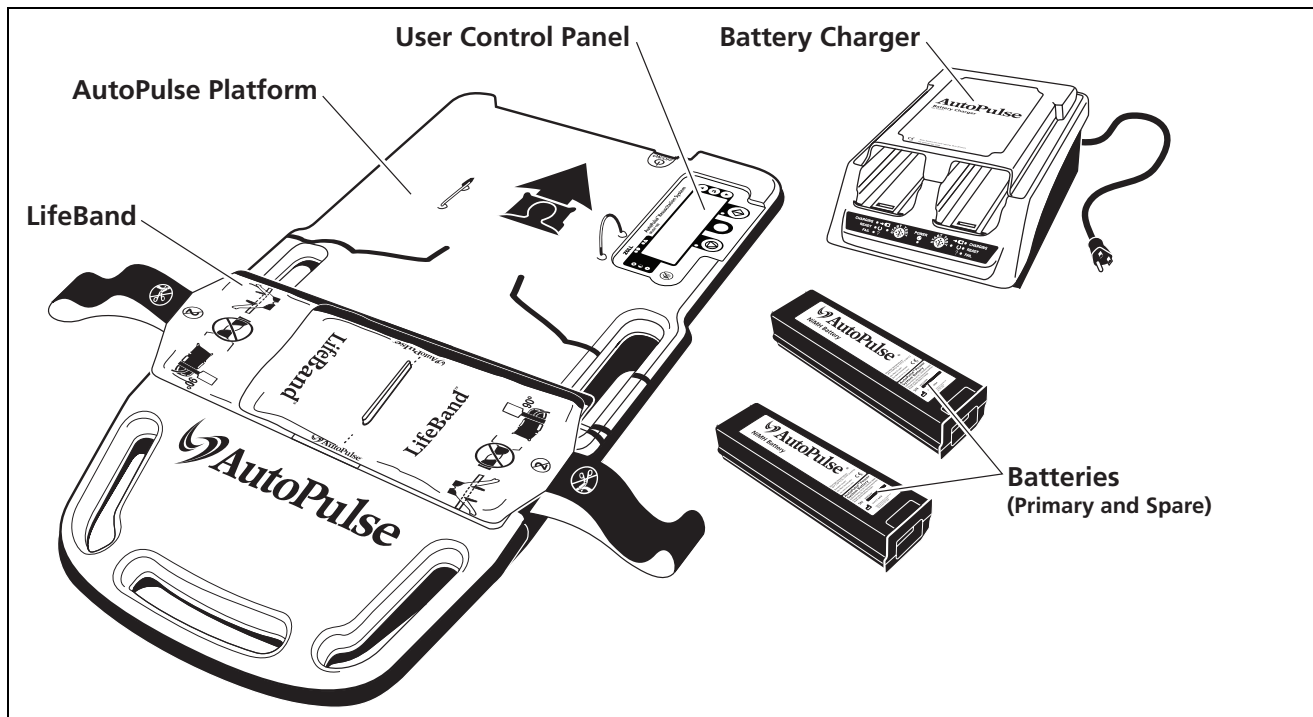


Figure 1-1 AutoPulse System

1.1 Battery Charger Components

Figure 1-2 shows the components of the AutoPulse Power System.

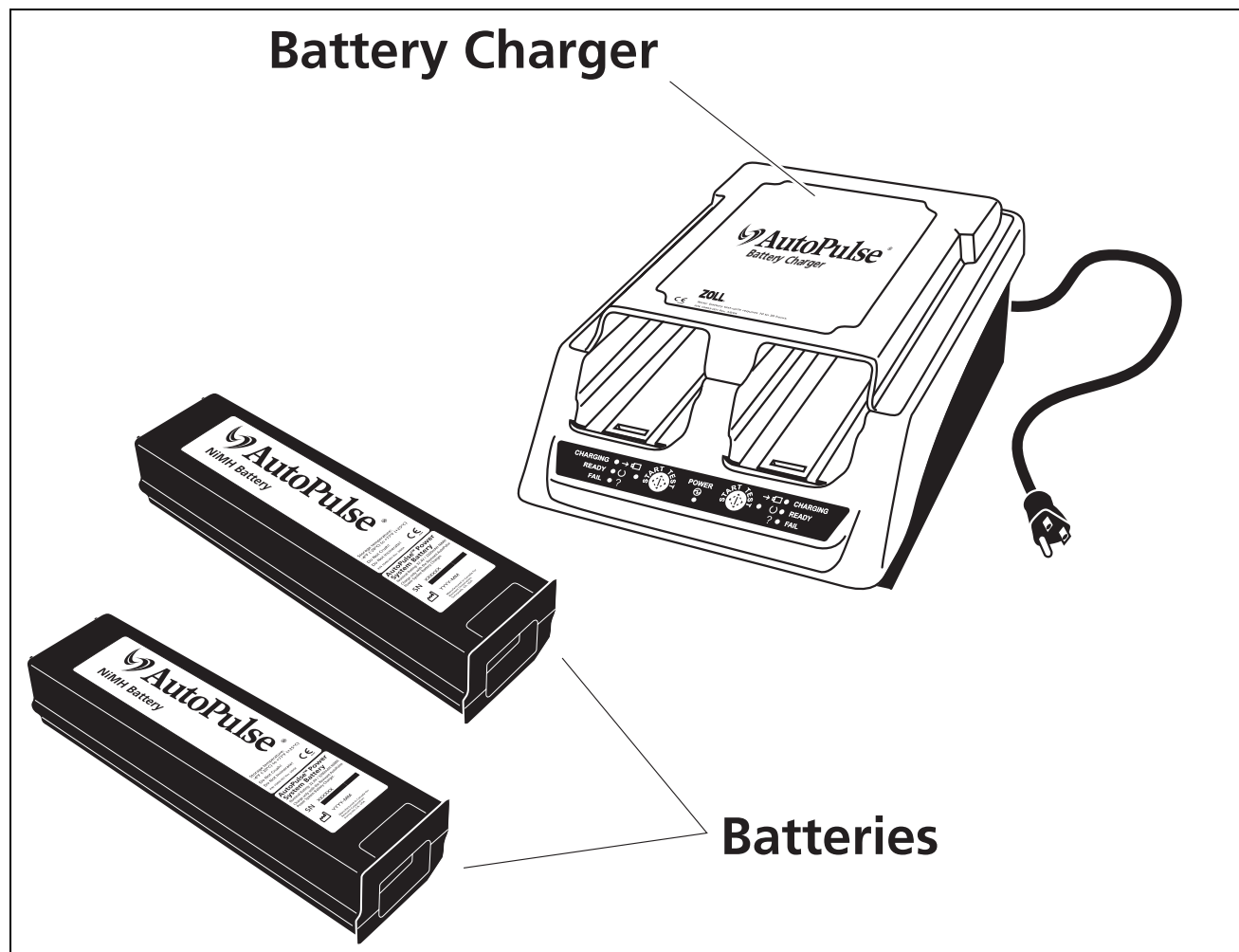


Figure 1-2 AutoPulse Power System Components

The AutoPulse Power System consists of the following components:

- Battery
- Battery Charger, includes power cord

1.1.1 Battery

The Battery (see Figure 1-3) is a removable component that supplies power for the AutoPulse Platform operation. The Battery is a proprietary, rechargeable, nickel-metal hydride (NiMH) battery that is the exclusive power source for the AutoPulse Platform.

The Battery is mechanically keyed to the AutoPulse Platform and Battery Charger to facilitate correct installation. The Battery's back end contains connections for power and communications. A Battery Status Check button illuminates the Battery's status light-emitting diodes (LEDs).

A single Battery may perform as many as 100 charge/discharge cycles before the Battery reaches the end of its service life. The Battery charge/discharge cycle count increments when the Battery Charger detects that the Battery has been discharged more than 1/3 of its capacity (shallow discharge/recharge cycles will not increment the cycle count).

Checking the Battery's status allows you to determine the need for a charge to ensure adequate battery capacity (run time). A green LED ensures that the Battery has the capacity for a minimum run time of 30 minutes on a typical patient. Batteries self-discharge when not in use. Recharge the Battery before use if the amber LED illuminates (see Figure 1-3).

Warning: Always charge a stored Battery before placing the Battery in active operation. Battery may self-discharge when not in use. Failure to charge a Battery before use may cause device power failure.

Caution: Remove the protective plastic cap from the Battery before attempting to charge the Battery.

Caution: Only use ZOLL Circulation Batteries specifically designed for use with the AutoPulse System. The use of other batteries may cause permanent damage to the AutoPulse Platform and will void the warranty.

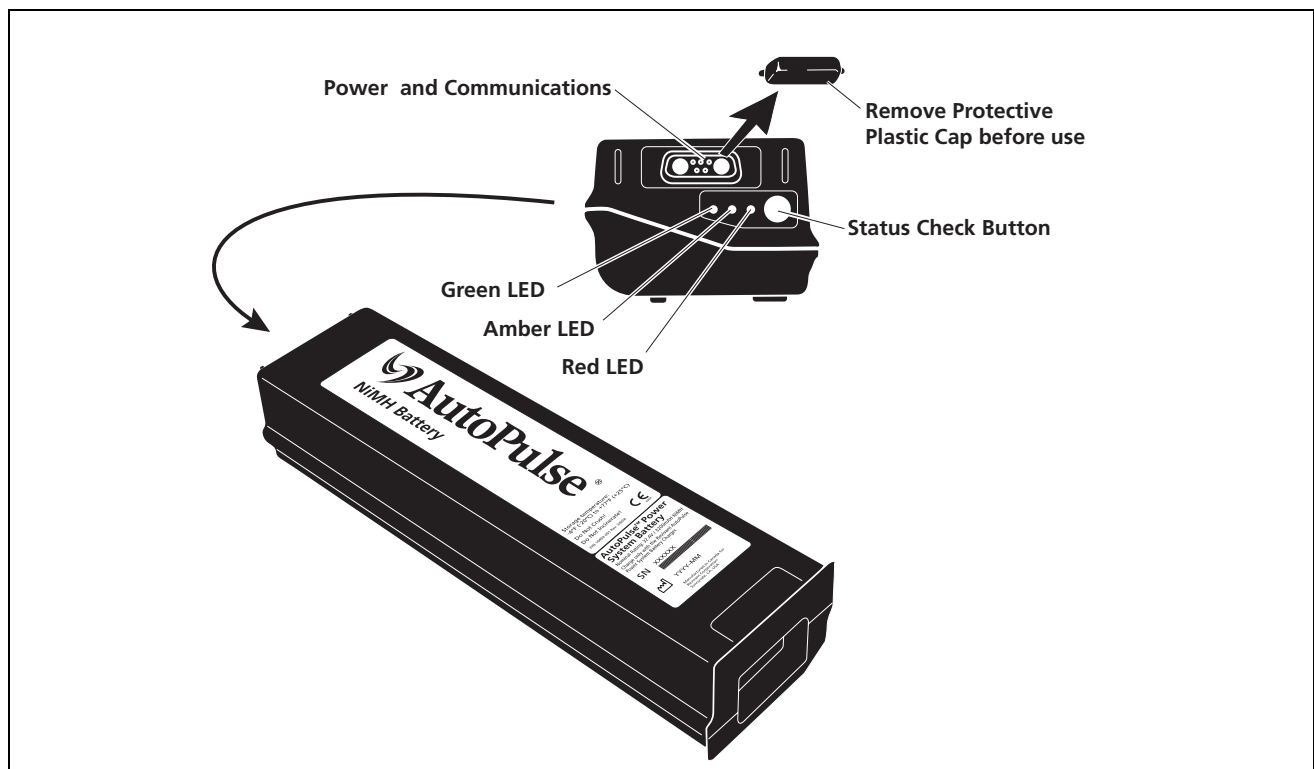


Figure 1-3 AutoPulse System Battery

1.1.2 Battery Charger

The Battery Charger is a stand-alone unit intended to charge and test-cycle the Batteries (see Figure 1-4). The Battery Charger has two charging bays; each with its own indicators. The Battery Charger automatically maintains both the state of charge and tests and maintains the Battery to its highest possible capacity. Batteries should always be fully charged and ready for use before deploying the AutoPulse Platform.

Batteries placed in a charging bay are automatically charged (CHARGING LED illuminated) in less than 4 1/4 hours (maximum).

To maintain the Battery, the AutoPulse Battery Charger design incorporates a test-cycle mode. The test-cycle measures the Battery's charge-holding capability by cycling the Battery through a charge-discharge-recharge sequence.

Batteries that pass the test remain ready for use. Batteries that fail the test undergo additional test-cycles to attempt to restore the Battery. After three test cycles, the Battery either is restored to READY (green LED on Battery) or has failed and should be replaced (red LED on Battery). The normal test-cycle requires approximately **10 hours**. The maximum test-cycle is approximately **30 hours** if all three test-cycles are performed.

The Battery Charger's test-cycle mode is activated in two ways:

- Automatically at every 10th charge.
- Manually when the user presses the Start Test button on the Battery Charger Control Panel during routine charging (amber LED).

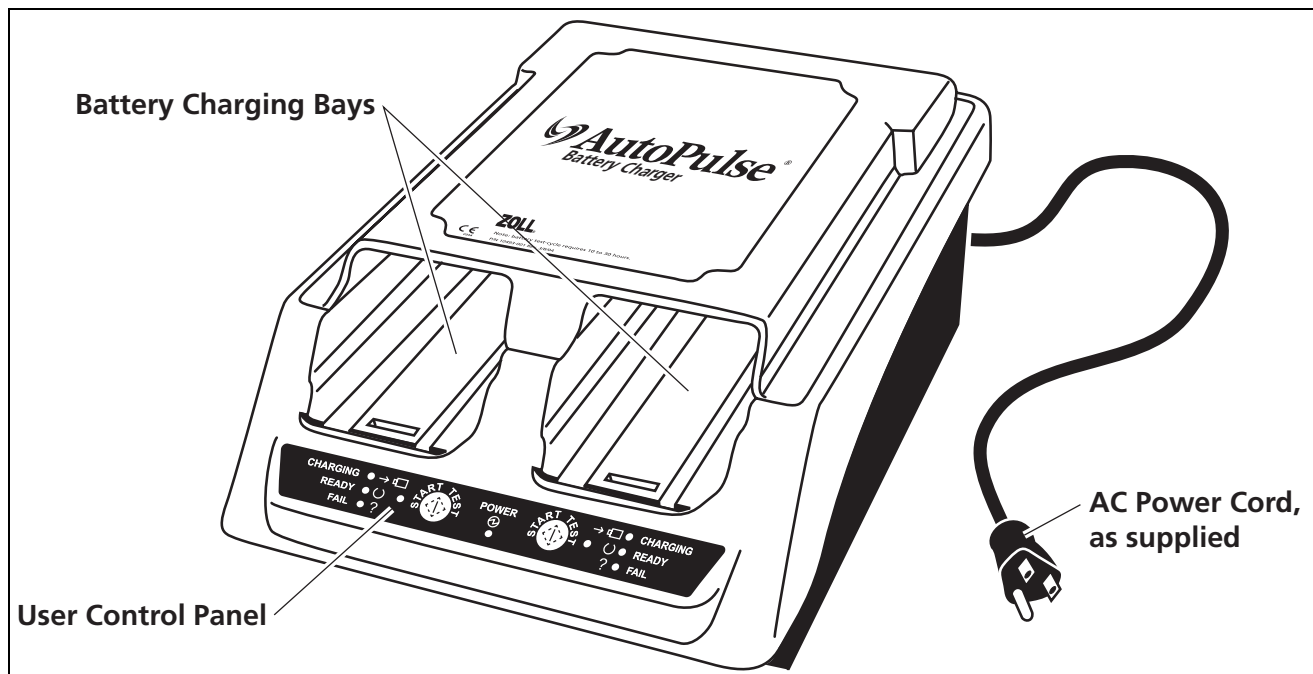


Figure 1-4 AutoPulse Battery Charger

2 Setting Up the AutoPulse Battery Charger

The AutoPulse Battery Charger must be installed near the wall outlet to which it is connected and that outlet must be easily accessible at all times. Unplug the power cord from the wall outlet to remove power from the Battery Charger.

Caution: Do not block the Battery Charger's ventilation slots.

Caution: Do not operate the Battery Charger in a confined space.

Caution: Keep the Battery Charger away from moisture.

Caution: Use the Battery Charger only with ZOLL Circulation AutoPulse Battery Charger power cord.

Caution: Grounding reliability can only be achieved when the Battery Charger is connected to an equivalent receptacle marked "hospital only" or "hospital grade."

To prepare the Battery Charger for use:

1. Plug the alternating current (AC) power cord into the power receptacle on the back of the Battery Charger.
2. Plug the AC power cord into an appropriate wall outlet receptacle.

When the POWER indicator (green LED) on the Battery Charger's Control Panel illuminates, the Battery Charger is ready for use.

If, after properly plugging in the Battery Charger, the green Power light on the Control Panel does not illuminate, read Section 5.3.2, "Replacing a Battery Charger Fuse".

Note: When powering up the Battery Charger, all indicators on the Control Panel will illuminate briefly to provide a visual check that the indicator lights are functioning. If an indicator fails to illuminate, contact ZOLL Circulation.

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3 Performing a Battery Status Check

To determine if an AutoPulse Battery needs to be charged, press the Status Check button on the Battery (see Figure 3-1).

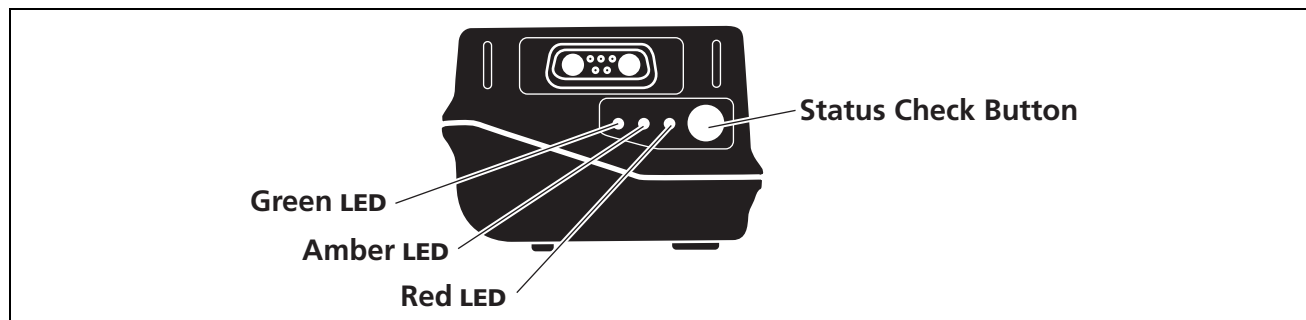


Figure 3-1 Battery Status Check Button and Status LEDs

One of the following Battery status light-emitting diodes (LEDs) will illuminate (refer to Table 3-1).

Table 3-1 Battery Status LEDs

Status LEDs	Definition	Action
Green	The Battery is charged and ready for use.	No action is necessary.
Amber/ amber-flashing	The Battery is partially discharged. Remaining runtime is unknown.	Charge the Battery. Refer to Chapter 4, “Operating the Battery Charger” for more information.
Red-flashing	The Battery has <ul style="list-style-type: none"> Exceeded its service life. Failed a test-cycle. 	The Battery has failed and should not be used. Refer to Section 5.2.3, “Disposing of Nickel-Metal Hydride Batteries” for more information.
None	The Battery voltage is too low because the Battery has failed or has been overused.	Test-cycle the Battery. Refer to Section 4.2, “Understanding Test-Cycles” for more information.

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4 Operating the Battery Charger

4.1 Operating Sequence

You should place the AutoPulse Battery into an available charging bay:

- Following each use.
- When the Battery's amber status light-emitting diode (LED) illuminates or flashes.
- To maintain a charge on any spare Battery.

Warning: Always charge a new Battery. Failure to charge a Battery may cause reduced Battery performance.

Caution: Remove the protective plastic cap from the Battery before attempting to charge the Battery.

One or two Batteries placed in a charging bay are automatically charged (yellow CHARGING LED will illuminate) in less than 4 ¹/₄ hours.

To charge a Battery, follow these steps:

- Note:** For optimal charging, make sure that the Battery and Battery Charger are at room temperature (68° to 77°F [20° to 25°C]).
- Note:** Do not slam the Battery into the Battery Charger because doing so may cause damage to the Battery's connector.
- Note:** The Battery is mechanically keyed so that it can only be inserted in one orientation. Do not force the Battery into the charging bay. If resistance is met, check for appropriate orientation, and check to ensure that there are no obstructions to Battery insertion.

1. Slide the Battery into an available charging bay (see Figure 4-1). Ensure that the Battery locks into place (locking bar engaged). The Battery Charger's status will be indicated on the Control Panel. Table 4-1 shows the information given by the charging status LEDs for each charging bay when the POWER LED is illuminated.

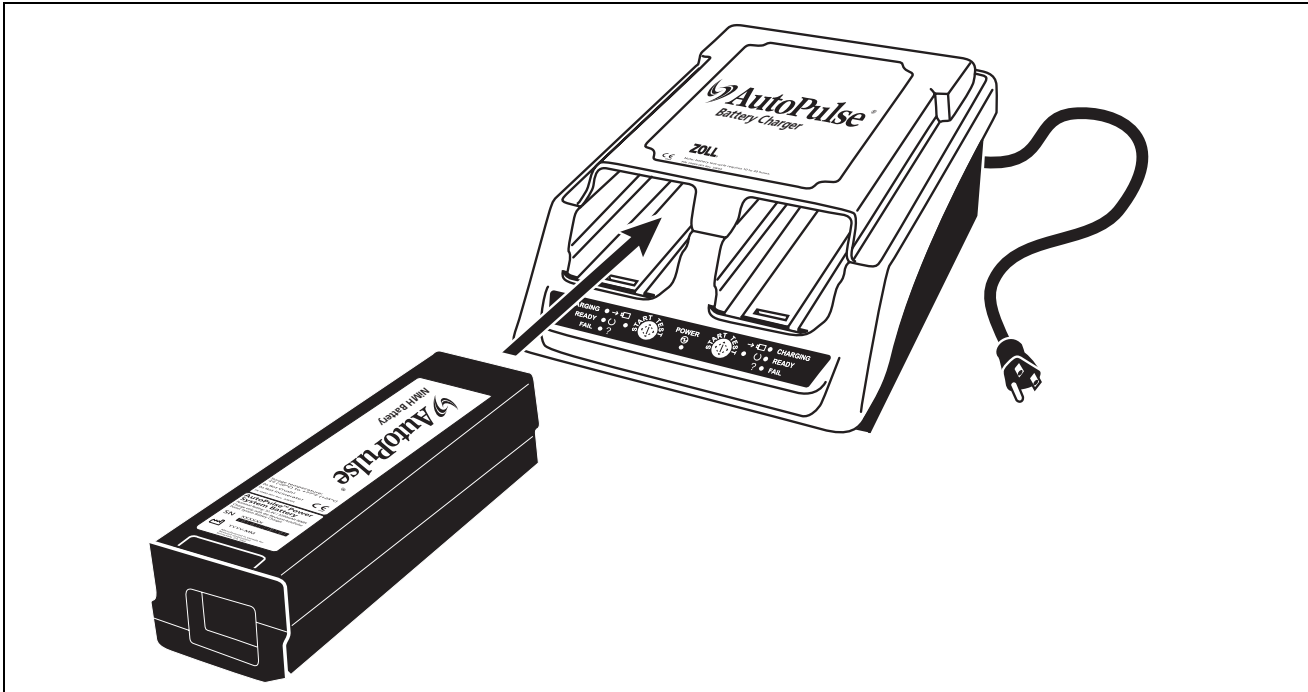


Figure 4-1 Sliding the Battery into a Charging Bay

2. The CHARGING LED will automatically illuminate when the Battery Charger identifies a functional Battery.
Note: If the FAIL LED illuminates following Battery insertion into the charging bay, refer to Appendix A, “Troubleshooting” for more information.
3. The TEST LED will automatically illuminate when a Battery requires a test-cycle. Refer to Section 4.2, “Understanding Test-Cycles” for more information.
Note: To manually start a test-cycle on a Battery, press the Start Test button.
4. The READY LED will illuminate after successfully charging the Battery (4¹/₄ hours maximum).

5. When the READY LED illuminates, either:

- Remove the charged Battery from the Battery Charger by gripping the Battery while pressing up on the finger latch to disengage the locking bar. Pull the Battery straight out until it fully clears the charging bay.
- Leave the Battery in the Battery Charger to maintain peak capacity.

Note: Do not remove a Battery from the Battery Charger until its charging is complete or the Battery's runtime will be reduced.

Note: Recently-charged Batteries can be warm to the touch. This is a consequence of normal operation.

Table 4-1 Battery Charger Status LEDs

Battery Charger Mode	Battery Charger Status LEDs Used	Definition	Action
Charge	CHARGING (yellow Battery Charger LED)	The Battery is charging.	Leave the Battery in the Battery Charger until the READY (green) LED illuminates (less than 4π hours).
Test-Cycle	CHARGING (yellow Battery Charger LED) TEST (amber Battery Charger LED)	Typical test-cycles last approximately 10 hours. If Batteries require additional testing, the test-cycle may take approximately 22 hours.	Leave the Battery in the Battery Charger until the test-cycle completes. At completion, the Battery Charger indicates the Battery's status: READY or FAIL.
Ready	READY (green Battery Charger LED)	The Battery is charged and ready to use.	<ul style="list-style-type: none"> • Leave the Battery in the Battery Charger to ensure that the Battery is fully charged when needed. • Remove and store in the AutoPulse Platform. • Remove and store in a cool location.
Fail	FAIL (red Battery Charger LED)	The Battery Charger is currently unable to charge the Battery.	Refer to Table A-2 for more information.
Idle		The Battery Charger is unable to recognize the Battery.	Remove and re-insert the Battery. If the status is still Idle, refer to Appendix A, "Troubleshooting" for more information.

4.2 Understanding Test-Cycles

A test-cycle measures the Battery's charge holding capability by cycling the Battery through a charge-discharge-recharge sequence. Batteries with a high charge holding capability pass the test cycle and remain available for continued use. Batteries that no longer accept a charge will fail the test-cycle and must be replaced as they can no longer be used in the AutoPulse System.

Note: To maintain a Battery's performance and optimize its life, perform a test-cycle on it each month.

The Battery Charger will automatically perform a test-cycle:

- Every 10th charge/discharge cycle.
- When the Battery Charger detects that the Battery has been severely discharged (no status LEDs will illuminate when you press the Battery's Status Check button).

Test-cycles may be performed more frequently to evaluate the health of the Battery by pressing the Start Test button on the Battery Charger's Control Panel. A full test-cycle typically takes about 10 hours, but its length depends on factors such as ambient temperature and prior charge status.

Note: Do not remove a Battery during a test-cycle or the Battery's runtime will be unknown. Removing a Battery during a test-cycle may cause the Battery Charger to automatically enter a test-cycle mode the next time a Battery is inserted into the Battery Charger.

At the end of one full test-cycle, if the Battery Charger's TEST (amber) LED remains illuminated, the Battery Charger has determined that the Battery's charge capacity remains compromised. In an attempt to restore the Battery, the Battery Charger will perform a second test-cycle (another six hours). If the Battery Charger's TEST LED remains illuminated, the Battery Charger will attempt to perform a third test-cycle (another six hours). Following the third test-cycle, the Battery will either be ready for operation (green READY LED illuminated) or the Battery will have failed the test-cycle and must be replaced (red FAIL LED illuminated).

A Battery will fail a test-cycle following 100 charge-discharge cycles.

Note: Discontinue use of any failed Battery as it will no longer hold an appropriate charge. Dispose of it properly. Refer to Section 5.2.3, "Disposing of Nickel-Metal Hydride Batteries".

5 Managing the AutoPulse Power System

5.1 Battery Management

The AutoPulse System is intended to be deployed on emergency vehicles in a state of high-readiness. Therefore, regular AutoPulse System checks should be integrated into Emergency Medical Service (EMS) rig-check procedures. Regular monitoring of AutoPulse Battery status is vital to ensure adequate run time. Discharged Batteries (amber status light-emitting diode (LED) on the Battery or less than four bars seen on the AutoPulse Platform's display panel screen when the AutoPulse Platform is powered up) will result in shorter Battery run times. Discharged Batteries should be replaced with charged Batteries (green status LED or **four bars** seen on the AutoPulse Platform's display panel screen).

The following essential elements of AutoPulse Battery management should be incorporated into a regular routine:

- Leave a fully-charged Battery installed in the AutoPulse Platform at all times.
- Leave a fully-charged spare Battery on the rig that carries the AutoPulse System.
- Maintain one or two fully-charged Batteries in the AutoPulse Battery Charger.
- Institute regular, periodic checks of the Battery charge status (refer to Table 3-1 for more information):
 - One check at the beginning of each shift.
 - Remove the Battery from the AutoPulse Platform and the spare Battery from the emergency vehicle once each 24-hour interval and swap with the two fully-charged Batteries.

5.2 Battery Maintenance

Caution: Do not short the Battery Power leads. Electrical connection (short) between Battery power leads on the connector permanently damages the Battery and renders the Battery inoperable.

Caution: Do not use Batteries that have cracks in the Battery case exposing internal components. Mishandling of the Battery may lead to physical damage and present a fire or shock hazard.

Caution: Do not immerse any portion of the AutoPulse Battery in water or other fluids. Do not allow fluids to enter the Battery or the Battery connector. Fluid immersion or spillage may permanently damage the Battery or present a fire or shock hazard.

5.2.1 Storing Batteries

You should always have an AutoPulse Battery installed in the AutoPulse Platform ready for use. Additional Batteries should be conveniently stored for easy access when needed.

If it is possible, try to leave any additional Batteries in the AutoPulse Battery Charger. This will ensure that they are fully charged when needed.

Caution: Always charge Batteries at temperatures between 41°F (5°C) and 95°F (35°C). Charging Batteries at temperatures below 41°F (5°C) or above 95°F (35°C) will prevent the Battery from reaching its full capacity (operational time) and may lead to irreversible Battery damage.

If you cannot leave your charged Batteries in the Battery Charger, store them in a cool, dry place. **If stored for more than one month, insert the batteries into the AutoPulse Battery Charger and perform a test-cycle (refer to Section 4.1, “Operating Sequence” for more information) to ensure Battery health.**

Batteries self-discharge when not in use. To check if a Battery needs a charge, press the Status Check button on the Battery (see Figure 1-3). If the green LED illuminates, no recharging is required. However, to maintain peak capacity, you may recharge the Battery. If the amber LED illuminates, place the Battery in the Battery Charger.

Note: *Following prolonged inactivity or storage (no use or charging), a Battery should undergo a test-cycle to ensure adequate Battery health.*

5.2.2 Reaching the End of Battery Service Life

The service life of a Battery is concluded after the Battery reaches 100 charge/discharge cycles.

Note: Once a Battery has reached the end of its service life, you should discontinue use of the Battery as it will no longer hold an appropriate charge. Dispose of it properly. Refer to Section 5.2.3, “Disposing of Nickel-Metal Hydride Batteries” for more information.

Caution: Do not attempt to open the Battery. The Battery has no serviceable parts.

5.2.3 Disposing of Nickel-Metal Hydride Batteries

Do not throw your batteries away or send them to municipal dumps. Call your local waste management officials for proper disposal instructions.

Caution: Do not heat, burn, or incinerate a Battery. Exposure to heat above 158°F (70°C) may irreversibly damage the Battery.

5.3 Battery Charger Maintenance

Caution: Do not remove the Battery Charger cover. The Battery Charger has no internal user-serviceable parts.

5.3.1 Cleaning the Battery Charger

Clean the external surfaces of the Battery Charger at least once a month only with a lint-free cloth that is either dry or slightly damp with water.

5.3.2 Replacing a Battery Charger Fuse

The only user-serviceable parts on the Battery Charger are the alternating current (AC) power fuses. To check if the fuse has burned out, follow these steps:

1. Unplug the power cord from the wall outlet and from the receptacle on the back of the Battery Charger. Wait one minute before going to step 2.
2. The fuse holder is located directly under the power receptacle on the back of the Battery Charger (see Figure 5-1). Open the fuse holder by pressing down on the locking tab and pulling the fuse holder straight out.

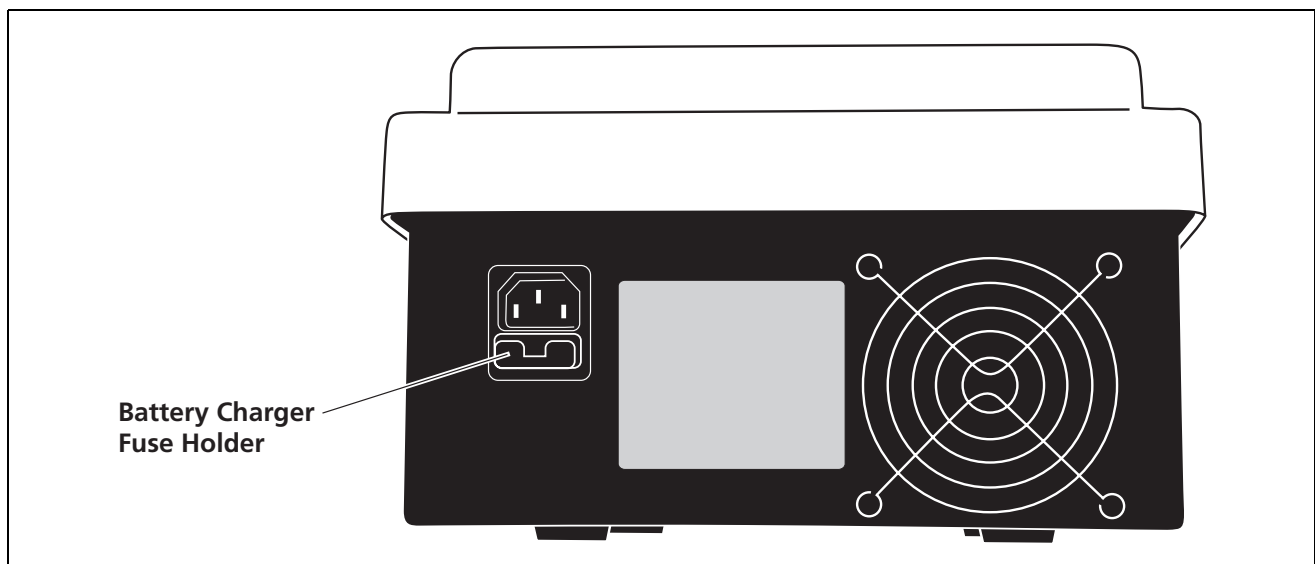


Figure 5-1 Battery Charger Fuse Location

3. Check both of the fuses. If a fuse must be replaced, follow these steps:
 - a) Replace both of the original fuses with T2.0A 250V AC fuses.
 - b) Push in the fuse holder until the locking tab clicks into place.
 - c) Re-attach the power cord.

Appendix A Troubleshooting

This Appendix details symptoms, possible causes, and recommended actions for difficulties you might have with your AutoPulse Power System. Table A-1 provides troubleshooting procedures for the Battery. Table A-2 provides troubleshooting procedures for the Battery Charger.

Table A-1 Battery Troubleshooting Procedures

Symptom	Possible Cause	Recommended Action
Battery Status Check LEDs do not illuminate.	The Battery's status is unknown.	Place the Battery in one of the Battery Charger's charging bays. 1. If the Battery Charger's CHARGING LED is illuminated, the Battery Charger is attempting to restore the Battery. Refer to Chapter 4, "Operating the Battery Charger" for more information. 2. If the Battery Charger's FAIL LED is illuminated, the Battery has failed. Replace the Battery. Refer to Section 5.2.2, "Reaching the End of Battery Service Life" for more information.
Battery will not fully insert into the Battery Charger.	<ul style="list-style-type: none"> Protective plastic cap was left on the Battery. The Battery may be damaged. The Battery Charger's charging bay might be obstructed. 	<ul style="list-style-type: none"> Remove protective cap. Inspect the guide rails around the connector for damage. If the guides are damaged, replace the Battery. Inspect the Battery connector for damage. If the connector is damaged, replace the Battery. Unplug the alternating current (AC) from the Battery Charger. Check the Battery Charger's charging bay to ensure that no debris has accumulated in the bay.
The Battery will not fully insert into the AutoPulse Platform.	<ul style="list-style-type: none"> Protective plastic cap was left on the Battery. The Battery may be damaged. The AutoPulse Platform's Battery compartment might be obstructed. 	<ul style="list-style-type: none"> Remove protective cap. Inspect the guide rails around the connector for damage. If the guides are damaged, replace the Battery. Inspect the Battery connector for damage. If the connector is damaged, replace the Battery. Check the AutoPulse Platform's battery compartment to ensure that no debris has accumulated in the bay.

Table A-2 Battery Charger Troubleshooting Procedures

Symptom	Possible Cause	Recommended Action
Battery Charger's green POWER LED is not illuminated.	Battery Charger's alternating current (AC) power cord is not plugged in.	Refer to Chapter 2, "Setting Up the AutoPulse Battery Charger" for more information.
Battery Charger's green POWER LED is not illuminated.	Blown fuse.	Refer to Section 5.3.2, "Replacing a Battery Charger Fuse" for more information.
Charging a Battery takes much longer than 4 1/4 hours.	The ambient temperature around the Battery Charger is too warm.	<ul style="list-style-type: none"> • Make sure that the Battery Charger is located in an environment where temperatures do not reach above 113°F (45°C). • Make sure that the Battery Charger's vents are not blocked. • Make sure that the Battery Charger has adequate ventilation.
Battery Charger's red FAIL LED is illuminated during the charging cycle.	The Battery has failed the charge cycle.	Press TEST button to start the test cycle. The TEST LED will illuminate and the Battery Charger will attempt to restore the Battery.
Battery Charger's red FAIL LED is illuminated during the test cycle.	The Battery has failed the test cycle.	<p>Remove the Battery from the Battery Charger. Perform a Battery status check:</p> <ol style="list-style-type: none"> 1. If the Battery status LED is flashing red, the Battery has failed. Replace the Battery. Refer to Section 5.2.2, "Reaching the End of Battery Service Life" for more information. 2. If no status LEDs illuminate when you press the Battery's Status Check button, the Battery has failed. Replace the Battery. Refer to Section 5.2.2, "Reaching the End of Battery Service Life" for more information. 3. If the Battery status LED is green or amber, contact ZOLL Circulation.

Appendix B Technical Specifications

The specifications provided in this appendix apply to the AutoPulse Power System.

B.1 Battery Physical

Table B-1 Battery Specifications

Category	Specifications
Size (L×W×H)	11.5 in. by 3.2 in. by 2.2 in. (29.2 cm by 8.1 cm by 5.7 cm).
Weight	5.1 lbs. (2.3 kg).
Type	Rechargeable Nickel-Metal Hydride (NiMH)
Battery voltage (nominal)	32.4V
Capacity	3200 mAh (typical)
Initial Battery runtime (nominal patient)	30 minutes (typical)
Maximum Battery charge time	Less than 4 ¹ / ₄ hours at 77°F (25°C)
Battery test-cycle time	Less than 10 hours per test-cycle session; up to three consecutive sessions possible.
Required replacement interval	100 full charge/discharge cycles. Note: The Battery will not operate after 100 full charge/discharge cycles.

B.2 Battery Environmental

Table B-2 Battery Specifications (Page 1 of 2)

Category	Specifications
Operating temperature	+32° to +113°F (0° to +45°C) ambient installed in device
Charge temperature	+41° to +95°F (5° to +35°C) ambient (68° to 77°F [20° to 25°C] preferred)
Storage temperature	<ul style="list-style-type: none"> -4° to +77°F (-20° to +25°C) ambient for less than six months (may require test-cycle to meet performance characteristics) +77° to +95°F (+25° to +35°C) ambient for less than two months (may require test-cycle to meet performance characteristics)
Operating altitude	0 to 15,000 ft. (0 to 4,572 m)
Enclosure protection	Meets IP22 per IEC 60529
Shock	Meets IEC 60068-2-27 Basic Environmental Testing Procedures – Shock (50g, 11ms pulse, half sine wave)

Table B-2 Battery Specifications (Page 2 of 2)

Category	Specifications
Vibration	Meets IEC 60068-2-6 Basic Environmental Testing Procedures (10 to 150 Hz, 10 m/s ²) Meets IEC 60068-2-64 Basic Environmental Testing Procedures – Random Vibration Broad Band – General Requirements (f1:20, f2:2000, ASD 0.05)
Free fall	Meets IEC 60068-2-32 Basic Environmental Testing Procedures – Free Fall – Procedure 1.

Table B-3 Battery EMI/EMC Specifications

Title	Standard
Electrostatic discharge	IEC 61000-4-2, Level 3
Radiated emissions	CISPR 11/EN55011, Group 1, Class A FCC part 15, Class A

B.3 Battery Charger Physical

Table B-4 Battery Charger Physical Specifications

Category	Specifications
Size (L×W×H)	15 in. by 9.75 in. by 9.1 in. (38 cm by 25 cm by 23 cm).
Weight	10 lbs. (4.5 kg)
Operating input voltage	100 to 240V AC
Operating input frequency	50/60 Hz
Input current	2.0 Amps (maximum)
Maximum Battery charge time	Less than 4 ¹ / ₄ hours (at 77°F [25°C])
Fuses	User-replaceable, T2.0A 250V AC (2 required)

B.4 Battery Charger Environmental

Table B-5 Battery Charger Environmental Specifications (Page 1 of 2)

Category	Specifications
Operating temperature	+41° to +95°F (5° to +35°C) (68° to 77°F [20° to 25°C] preferred)
Storage temperature	-40° to +158°F (-40° to +70°C)
Relative humidity	5% to 95%, non-condensing.
Operating altitude	0 to 10,000 ft. (0 to 3,048 m)
Enclosure protection	Meets IP22 per IEC 60529

Table B-5 Battery Charger Environmental Specifications (Page 2 of 2)

Category	Specifications
Shock	Meets IEC 60068-2-27 Basic Environmental Testing Procedures – Shock (50g, 11ms pulse, half sine wave)
Vibration	Meets IEC 60068-2-6 Basic Environmental Testing Procedures (10 to 150 Hz, 10 m/s ²) Meets IEC 60068-2-64 Basic Environmental Testing Procedures – Random Vibration Broad Band – General Requirements (f1:20, f2:2000, ASD 0.05)
Free fall	Meets IEC 60068-2-32 Basic Environmental Testing Procedures – Free Fall – Procedure 1.
Safety requirements	Safety certified to UL2601, CSA 22.2 No. 601.1-M90, EN60601-1

Table B-6 Battery Charger EMI/EMC Specifications

Title	Standard
Electrostatic discharge	IEC 61000-4-2, Level 3
RF electromagnetic fields immunity	IEC 61000-4-3, Level 2
EFT/burst	IEC 61000-4-4, Level 2
Surge immunity	IEC 61000-4-5, Level 2
Conducted RF disturbances immunity	IEC 61000-4-6, Class A
Dips, interruptions, and variations	IEC 61000-4-11
Harmonics current emissions	IEC 61000-3-2, Class A
Radiated emissions	CISPR 11/EN55011, Group 1, Class A FCC part 15, Class A

B.5 FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

B.6 Limited Warranty for AutoPulse Resuscitation System

ZOLL Circulation warrants to the initial Purchaser only that the “Warranted Product” purchased hereunder will be free from defects in workmanship or materials, when given normal, proper, and intended usage, for a specified period (“Warranty Period”) from the date of its initial shipment to Purchaser. “Warranted Products” consist solely of those products whose description in this price list

expressly states that the product includes a warranty for a specified time period (the Warranty Period for the product). Excluded from this warranty are expendable components and supply items such as the LifeBand® Load-distributing Band.

Warranty Period: The AutoPulse Resuscitation System Platform, Battery, and Battery Charger (collectively and individually referred to as “Product”) are sold with a one year warranty period to the end-user. The warranty period begins at delivery.

ZOLL Circulation’s sole obligations under this warranty are to repair or replace, at its option, any Warranted Product (or part thereof) that ZOLL Circulation reasonably determines to be covered by this warranty and to be defective in workmanship or materials provided that the Purchaser has given notice of such warranty claim within the Warranty Period and the Purchaser has complied with ZOLL Circulation’s Return Material Authorization (“RMA”) procedures. Repair or replacement of Products under this warranty does not extend the Warranty Period.

To request repair or replacement under this warranty, Purchaser should contact ZOLL Circulation at 249 Humboldt Court Sunnyvale, CA 94089, 1-800-321-4CPR or 1-408-541-2140. ZOLL Circulation will inform purchaser of its then-current RMA procedure. ZOLL Circulation shall determine whether to repair or replace Products and parts covered by this warranty and all Products or parts replaced shall become ZOLL Circulation’s property. In the course of warranty service, ZOLL Circulation may but shall not be required to make engineering improvements to the Warranted Product or part thereof.

Exclusions

This warranty does not extend to any Warranted Products or parts thereof that have (a) been subject to misuse, neglect or accident; (b) been damaged by causes external to the Warranted Product, including but not limited to failure of or faulty electrical power; (c) not been used in accordance with ZOLL Circulation’s instructions; (d) been affixed to any nonstandard accessory attachment; (e) had the serial number removed or made illegible; (f) been modified by anyone other than ZOLL Circulation; (g) been used with any software not provided by ZOLL Circulation; or (h) been disassembled, serviced, or reassembled by anyone other than ZOLL Circulation, unless authorized by ZOLL Circulation. ZOLL Circulation shall have no obligation to make repairs, replacements, or corrections which result, in whole or in part, from normal wear and tear.

ZOLL Circulation makes no warranty (a) with respect to any products that are not Warranted Products, (b) with respect to any products purchased from a person other than ZOLL Circulation or a ZOLL Circulation-authorized distributor or (c) with respect to any product sold under a brand name other than ZOLL Circulation.

THIS WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY FOR ZOLL CIRCULATION’S PRODUCTS, EXTENDS ONLY TO THE PURCHASER AND IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES INCLUDING WITHOUT LIMITATION ANY WARRANTY AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ZOLL CIRCULATION’S MAXIMUM LIABILITY ARISING OUT OF THE SALE OF THE PRODUCTS OR THEIR USE, WHETHER BASED UPON WARRANTY, CONTRACT, TORT OR OTHERWISE, SHALL NOT EXCEED THE ACTUAL PAYMENTS RECEIVED BY ZOLL CIRCULATION IN CONNECTION THEREWITH. ZOLL CIRCULATION SHALL NOT BE LIABLE FOR ANY

INCIDENTAL, SPECIAL OR CONSEQUENTIAL LOSS, DAMAGE OR EXPENSE (INCLUDING WITHOUT LIMITATION LOST PROFITS) DIRECTLY OR INDIRECTLY ARISING FROM THE SALE, INABILITY TO SELL, USE OR LOSS OF USE OF ANY PRODUCT (HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY), EVEN IF ZOLL CIRCULATION HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH LOSS. THE FOREGOING LIMITATIONS SHALL NOT APPLY TO ANY CLAIMS FOR BODILY INJURY OR DEATH TO THE EXTENT THAT LIMITATION OF DAMAGES FOR SUCH CLAIMS ARE UNENFORCEABLE OR AGAINST PUBLIC POLICY UNDER ANY APPLICABLE STATUTE OR RULE OF LAW.

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