Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
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Саратов (845)249-38-78
Севастополь (8692)22-31-93
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Смоленск (4812)29-41-54
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Тула (4872)33-79-87
Тюмень (3452)66-21-18
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Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

Россия +7(495)268-04-70
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Технические характеристики на системы реанимации AutoPulse компании ZOLL

AutoPulse in the Hospital

When cardiac arrest occurs, high-quality CPR is essential, and the AutoPulse® Resuscitation System automates your CPR when you need it most.

Improving Outcomes

When AutoPulse was deployed as a system of care in combination with ECMO (extracorporeal membrane oxygenation) and therapeutic hypothermia, 60% of patients who suffered in-hospital cardiac arrest survived to discharge.[1]

A study proved that the AutoPulse can be applied in as little as 14 seconds and can reduce interruptions in CPR by over 85% when compared to manual CPR.[2]

High-quality Support

Automated CPR with the AutoPulse Resuscitation System can calm some of the chaos that surrounds a code, providing a level of organisation and time to think.
Outcomes are worse on nights and weekends when qualified staff is limited or otherwise engaged;[3] AutoPulse can provide high-quality compressions to aid in resuscitation efforts.
For Cath Lab staff, AutoPulse helps reduce radiation risk and minimises procedure disruptions with its low-profile design.

When Do You Need Mechanical CPR?

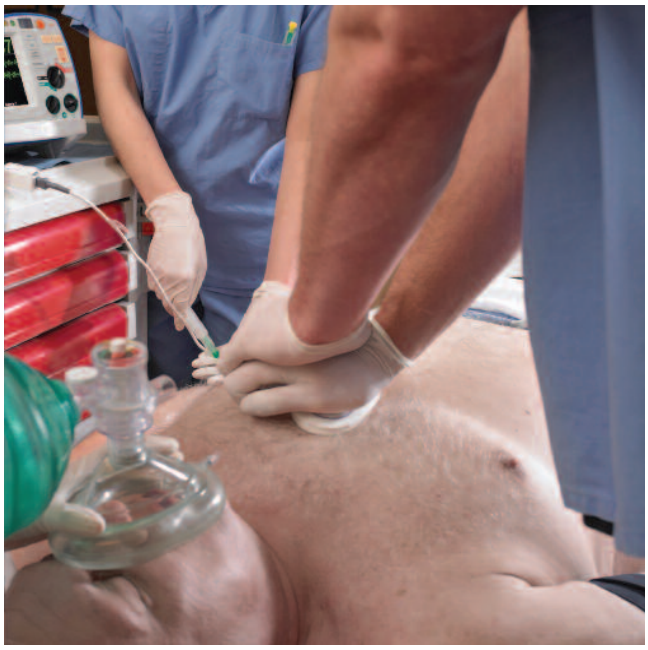
Justifying the use of mechanical CPR in the pre-hospital setting where the number of rescuers is limited and patients must be moved out of buildings and transported in an ambulance is not difficult. But in the hospital, where if anything, too many caregivers respond to most codes, the role of mechanical CPR may not be so obvious. However, there is a definitive need, time, and place for mechanical CPR with in-hospital arrest.

LifeBand® Load-distributing Band (LDB)

Because the AutoPulse uses a load-distributing band that squeezes the entire chest, patients receive consistent, high-quality compressions that drive good blood flow.

When Staff is Limited

The evidence is clear. Outcomes are worse on nights and weekends when qualified staff might be limited or otherwise engaged.[1] Not only may there be a shortage of personnel, but taking staff from their assigned duties upsets flow and can begin to disrupt patient care in other areas. The small hospital ED can be completely upset by a single code in the hospital, even if it's not in the ED.



When Codes Run Long

Long codes strain resources, and the quality of CPR among the many providers can vary considerably. Moreover, a recent review in *The Lancet* reported that many hospitals are terminating CPR too early in asystolic patients: A longer period of CPR can increase survival more than 20%.[2] In addition, patients who are comatose due to hypothermia must be warm before the outcome can be certain. The AutoPulse® Non-invasive Cardiac Support Pump can run that code for as long as necessary while you get the patient warm. And, as a recent case in London showed, cold and comatose need not mean warm and dead—even after three hours if there is sufficient perfusion to maintain major organ viability.[3]

When Manual CPR is Dangerous

Thankfully, codes in the cardiac cath lab are infrequent, but when they happen, in order to protect staff from excess radiation, the procedure must be stopped and the table returned to home position—at the very time when reperfusion of the myocardium is paramount. AutoPulse maintains perfusion, allows vascular access, and supports end organ perfusion.

AutoPulse User Control Panel

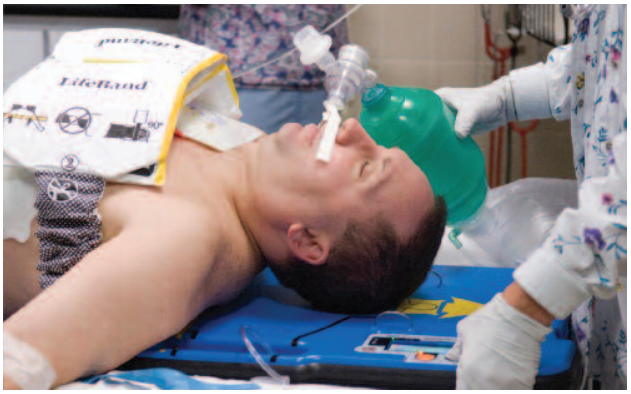
Easy to use, studies show that trained staff can deploy the AutoPulse in less than 30 seconds.

When You Need Time to Think

There are many reversible causes of cardiac arrest, ranging from tamponade in a trauma to a post-surgical thromboembolism or an inadvertent narcotic overdose in a medical patient. The chaos of a code does not provide the optimal atmosphere for thinking, but when automated CPR takes over the perfusion task, calming the entire atmosphere, there is time and opportunity to think and react appropriately.

Who Should Be Responsible for Mechanical Support?

After nearly 10 years of experience with mechanical CPR, it has become evident that just like a dedicated code team, deploying mechanical CPR quickly, appropriately, and effectively benefits from a dedicated team as well. Codes are infrequent enough that maintaining skills across multiple departments is difficult at best. Among the groups usually trained to manage the AutoPulse are respiratory therapy, rapid response team members, and resuscitation officers. The keys to an effective, rapid deployment are training, regular practice, and mock codes. Studies show that trained staff can deploy the AutoPulse in under 30 seconds, minimizing interruptions to perfusion and supporting
a high CPR fraction.[4]



AutoPulse Should Be Your Mechanical CPR Device of Choice

All other mechanical CPR devices replicate the motion of the hands on the sternum by using a piston to compress the heart, and then allow it to fill. AutoPulse, by contrast, delivers a complete thoracic compression, wrapping a band around the chest. This allows the compression force to squeeze the entire chest cavity rather than a point on the sternum, driving perfusion to near-normal levels while maintaining a safe compression.[5]

AutoPulse is Smart

Each patient who requires CPR is unique. That's why AutoPulse delivers a custom compression to each individual; it compresses 20% of the patient's thoracic cavity. AutoPulse measures the chest circumference upon start-up and uses the first six to eight compressions to determine the chest compliance. The force required to achieve adequate compression depth varies from patient to patient, and AutoPulse automatically compensates to deliver the correct compression.

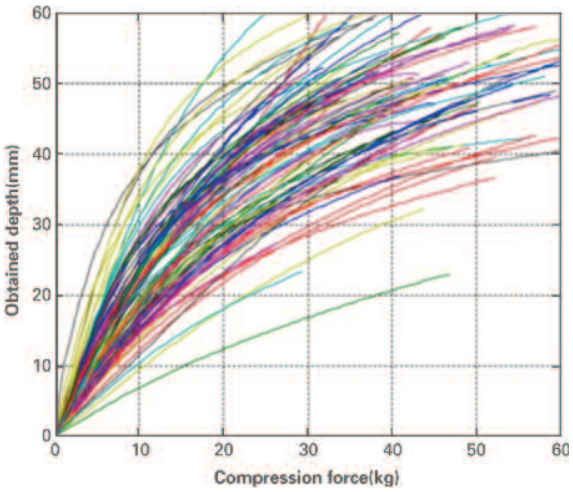
AutoPulse is Sure

AutoPulse is the only mechanical CPR system to show significant clinical benefits in comparative human trials. Multiple comparative studies have demonstrated that vital signs improve in humans because the AutoPulse drives superior blood flow. And AutoPulse consistently shows improved ROSC (return of spontaneous circulation) rates compared to sternal compressions.

Human Studies Show

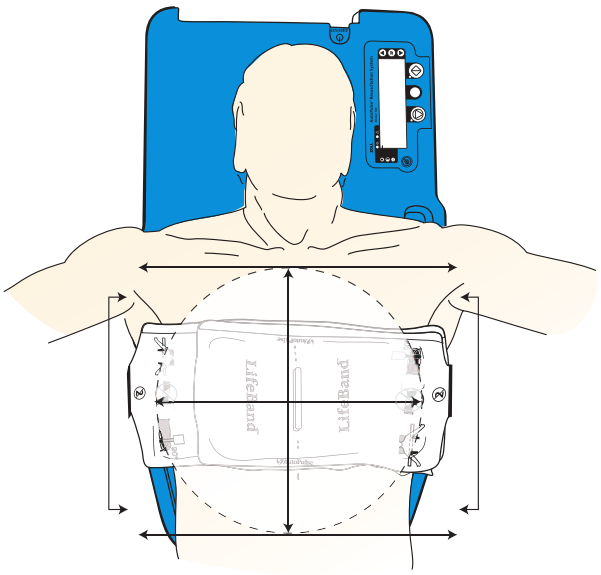
- Systolic BPs > 100 mmHg
- SpO_2 Values Consistently > 90%
- Increased end-tidal CO_2 levels

Compression Force Versus Depth During CPR[6]



Range of Force Required for Target Compression

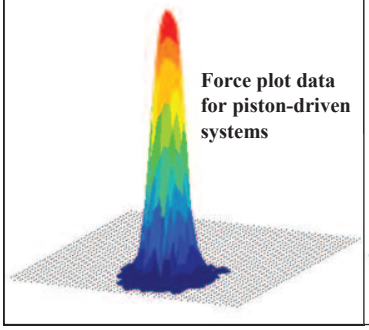
As shown here, the force required to deliver an adequate chest compression can vary by 400%. The AutoPulse load sensor control system adjusts the force applied to ensure that all patients, regardless of size or chest stiffness, get the correct compression.



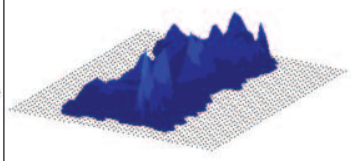
AutoPulse Automatically Adjusts for Patient Variability

After measuring chest circumference and determining chest compliance, the AutoPulse adjusts to compress 20% of the patient's thoracic cavity so that each patient receives custom compressions.

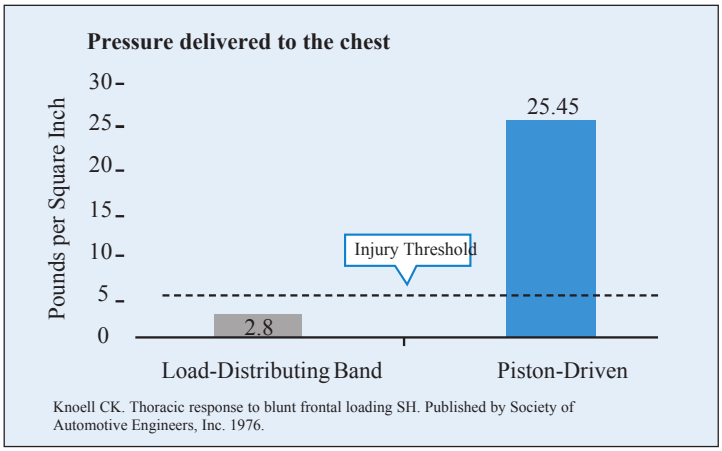
Technology	Compression Force (lbs)	Contact Surface Units (in^2)
Load-Distributing Band	280.0	100.0
Piston-Driven	111.3	4.4



Force plot data for piston-driven systems



Force plot data for load-distributing-band systems



Data from the automotive industry have demonstrated that when pressure on the chest climbs above 6 pounds per square inch, the frequency and severity of compression-related injuries rises. The pressure applied by the AutoPulse is well below the injury threshold.

AutoPulse is Safe

By distributing the compression force over the thoracic cavity, the pressure at any one point on the chest is about one-tenth that experienced at the sternum with a manual compression. Studies show that distributing the force over a wide area drives perfusion to near-normal levels while maintaining safe compression forces well below the threshold for injury.

Although infrequent, there are times when mechanical CPR is needed during in-hospital cardiac arrest. When that need arises, the AutoPulse is sure, smart, and safe.

[1] Peberdy MA, et al. *JAMA*. 2008 Feb 20;299(7):785–92.

[2] Goldberger ZD, et al. *Lancet.* 2012 Sept. 4 (e-pub ahead of print).

[3] *Daily Mirror,* Jan. 14, 2011.

[4] Tomte O, et al. *Resuscitation*. 2009;(80):1152–57.

[5] Halperin HR, et al. *J Am Coll Cardiol.* 2004;44(11):2214–20.

[6] Tomlinson AE, et al. *Resuscitation*. 2007 Mar;72(3):364–70.

AutoPulse®

RESUSCITATION **ON THE MOVE**

Designed for patient movement and transport

The revolutionary ZOLL® AutoPulse® Resuscitation System is an automated CPR device that delivers customized, high-quality CPR whenever—and wherever—it's needed.

High-quality CPR without interruption

With the AutoPulse, rescuers don't need to worry about pausing or potentially compromising CPR through tilts and turns, whether going down steep stairs, around tight corners, or into a cramped elevator. Thanks to its unique stabilizing board, the AutoPulse ensures patients receive nonstop compressions throughout their pre-hospital transport, even at the multiple angles required for rescuers to move the patient.

Increased mobility and maneuverability

To increase mobility, the AutoPulse board can be used with a lightweight soft stretcher. This option offers the flexibility needed to keep high-quality CPR going while maneuvering through challenging spaces. The rescuer also has the option of securing the AutoPulse to a backboard if that's a better choice for the patient.

With the AutoPulse, patients receive high-quality compressions even during transport down steep stairs and through tight spaces.

THE SYSTEM FOR HIGH-QUALITY CPR

" Since we had the AutoPulse, we could carry the patient down three flights of stairs while continuing chest compressions. He survived, but without the AutoPulse, it could have been different."

– Paramedic Alex Klimenko
Richmond Ambulance Authority (RAA)

THE AUTOPULSE **ADVANTAGE**

The AutoPulse Resuscitation System works wherever EMS providers need to go.

At its foundation is the specially designed board. It delivers stability and maneuverability, supporting both patient and rescuer from the scene of the rescue to the hospital. Depending on the situation, the rescuer has the option of securing the AutoPulse board to a soft stretcher or a backboard.

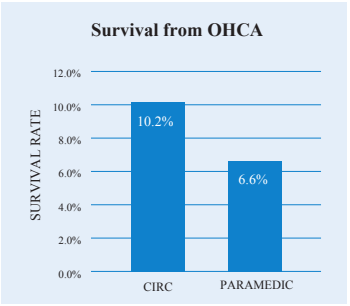
A 2015 study demonstrated the ability of the AutoPulse to limit interruptions in CPR while moving the patient. With regular training, the AutoPulse was applied in as little as 14 seconds, and the median time of overall interruption in CPR during patient movement from scene to the ambulance was reduced by over 85% compared to using manual CPR alone.[1]

IT'S ALL ABOUT **OUTCOMES**

Numerous studies comparing the AutoPulse to manual CPR clearly demonstrate its many benefits for patients. And by every important measure of resuscitation success, the AutoPulse outperforms piston-driven mechanical CPR devices.

Highest reported survival for all rhythms

Among the large prospective clinical trials that have been published using an automated CPR device, the AutoPulse has achieved the highest survival rate. In the CIRC (Circulation Improving Resuscitation Care) trial, the overall survival-to-discharge rate was 10.2%—among the highest ever achieved in an out-of-hospital cardiac arrest (OHCA) trial.[2] The PARAMEDIC trial, which used a piston-driven mechanical CPR device, had a 30-day survival rate of just 6.6%.[3]



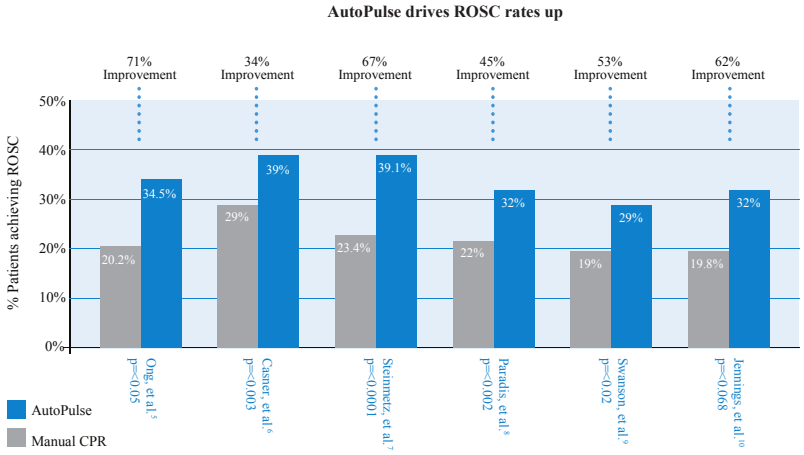
At 10.2%, survival in the CIRC trial was among the highest ever achieved in an OHCA trial.[2] Survival in the PARAMEDIC trial was just 6.6%.[3]

Enhanced circulation

Multiple comparative studies have demonstrated improved vital signs because the AutoPulse drives superior blood flow, resulting in coronary perfusion pressure levels 33% higher than those of sternal compressions, positively impacting ROSC and survival.

Unmatched impact on ROSC

While piston-driven sternal CPR devices have shown no benefit in improving ROSC rates when compared to manual CPR,[4] the AutoPulse has increased ROSC rates in numerous studies.[5-10]



Multiple trials confirm the AutoPulse is superior to manual CPR when it comes to increasing a patient's odds of achieving ROSC.

INTELLIGENT **CPR**

Customized compressions

The AutoPulse delivers compressions to the needs of each patient. Engineered to account for patient-to-patient variability, it automatically calculates the size, shape, and resistance of each patient's chest to achieve 20% anterior-posterior displacement.

Integrated care delivery

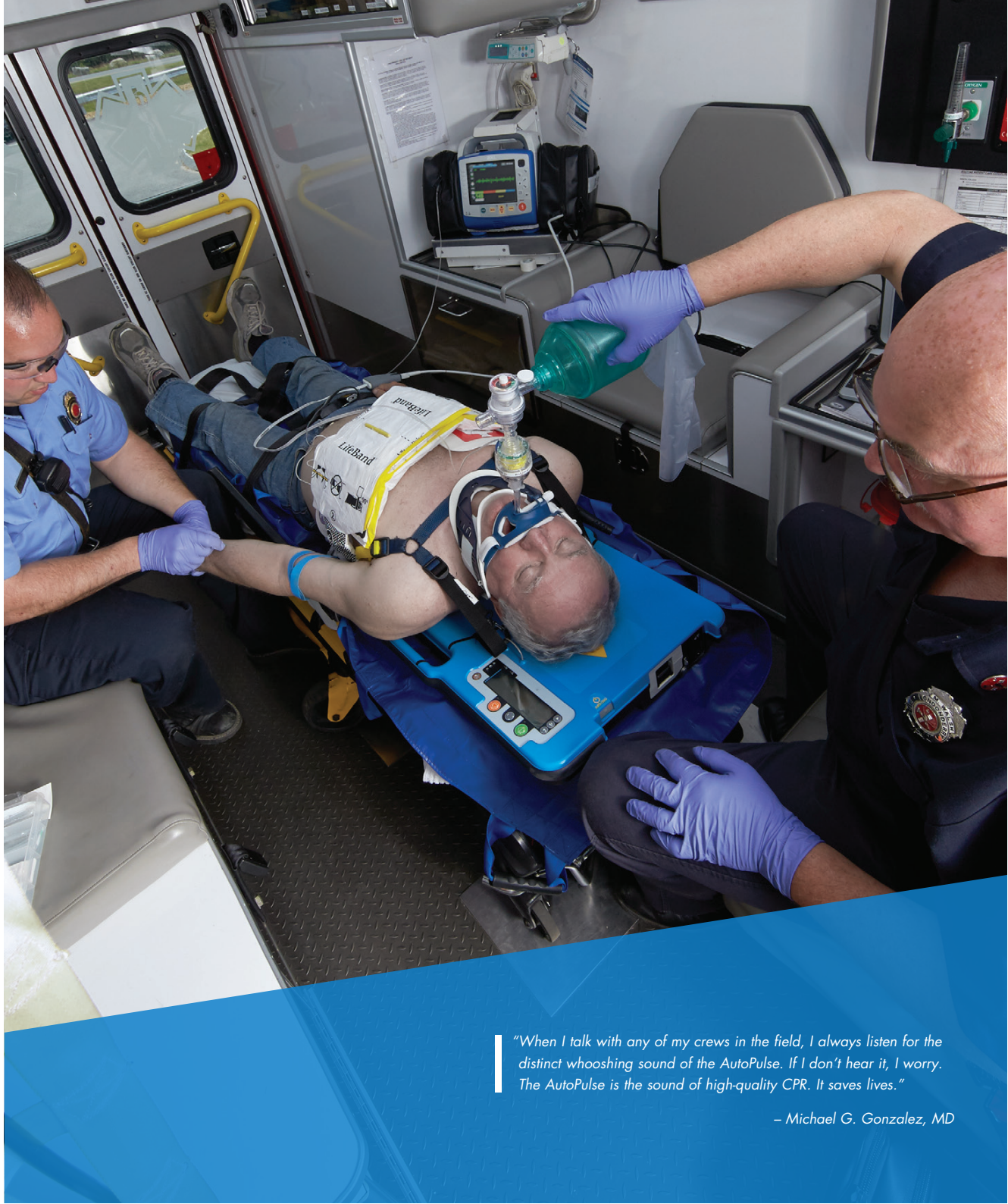
It's clear that the AutoPulse delivers high-quality CPR. And when ZOLL's ResQPOD® ITD (impedance threshold device) is used in combination with high-quality CPR, survival has been shown to increase by 25% or more, due to the reduction in intracranial pressure and increased blood flow to the brain.[11]

Event data access

Through the AutoPulse board, event data is captured and can be downloaded to RescueNet® Code Review for debriefing of resuscitation events to improve future performance.

Designed to overcome the real-life challenges of delivering good CPR, the AutoPulse is made for resuscitation on the move.

The AutoPulse uses a load-distributing LifeBand® that squeezes the entire chest, so patients receive consistent, high-quality compressions that drive good blood flow.



"When I talk with any of my crews in the field, I always listen for the distinct whooshing sound of the AutoPulse. If I don't hear it, I worry. The AutoPulse is the sound of high-quality CPR. It saves lives."

– Michael G. Gonzalez, MD

AutoPulse® Power System

Technical Specifications:

The AutoPulse Power System is based on intelligent technology that is designed to simplify maintenance of AutoPulse batteries by automating conditioning. The system consists of a two-bay charging station and a rechargeable battery pack.

Two-Bay Charger

The AutoPulse Power System simplifies battery management. Rotating AutoPulse batteries through the charger on a daily basis is all that is required. The system automatically charges and tests each battery. When required, batteries are automatically conditioned. The user-friendly interface clearly indicates when a battery is ready for use. Should a battery fail to meet a minimal performance criterion, or be beyond its useful life, it is identified by the charger.

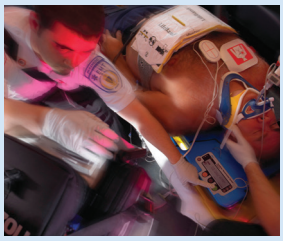
Li-ion Battery

The Li-ion battery is lightweight and designed for busy environments. Each AutoPulse should be equipped with three to four batteries. This allows for two to stay with the device (one for operation and one as a spare) and one or two being charged to support the next shift or replacement after patient use.

Automated Battery Management

Innovative built-in battery test circuit

The AutoPulse is operated with a lightweight Li-ion battery.



Designed for busy environments

AutoPulse Two-Bay Battery Charger	
Size (L x W x H)	16.01 in x 9.60 in x 6.54 in (40.6 cm x 24.1 cm x 16.6 cm)
Weight	7.1 lbs (3.23 kg)
Operating Input Voltage/Frequency	100 to 240 VAC (50/60 Hz)
Input Current	2.0 amps (maximum)
Operating Temperature	41°F to 95°F (5°C to 35°C)
Relative Humidity	5% to 95%, non-condensing

AutoPulse Li-ion Battery	
Size (L x W x H)	11.5 in x 3.2 in x 2.2 in (29.2 cm x 8.1 cm x 5.7 cm)
Weight	3.0 lbs. (1.3 kg)
Type	Rechargeable, lithium-ion (Li-ion)
Battery Voltage	36.3 V
Capacity	2500 mAh (typical)
Operating Temperature	+32 to +113°F (0° to 45°C)
Runtime (new)	30 minutes (50th percentile patient)
Maximum charge time	<4.25 hours
Recommended Replacement	3 years from date of manufacture

1 Introduction of the AutoPulse Power System

The AutoPulse Power System consists of the AutoPulse Li-Ion Battery and Battery Charger.

Battery: The AutoPulse Li-Ion Battery is a proprietary, rechargeable, removable battery that is specifically designed to supply power for AutoPulse Platform operation.

Battery Charger: The Battery Charger is a stand alone unit designed to charge and automatically maintain the AutoPulse Li-Ion Battery.

The AutoPulse Platform is intended to be deployed with other emergency equipment and should always be kept in a state of high-readiness. Customers should integrate an AutoPulse Platform and Battery check into their daily equipment check procedures. Like other life supporting equipment, good battery management practices are essential to provide proper operation, and to avoid problems during use.

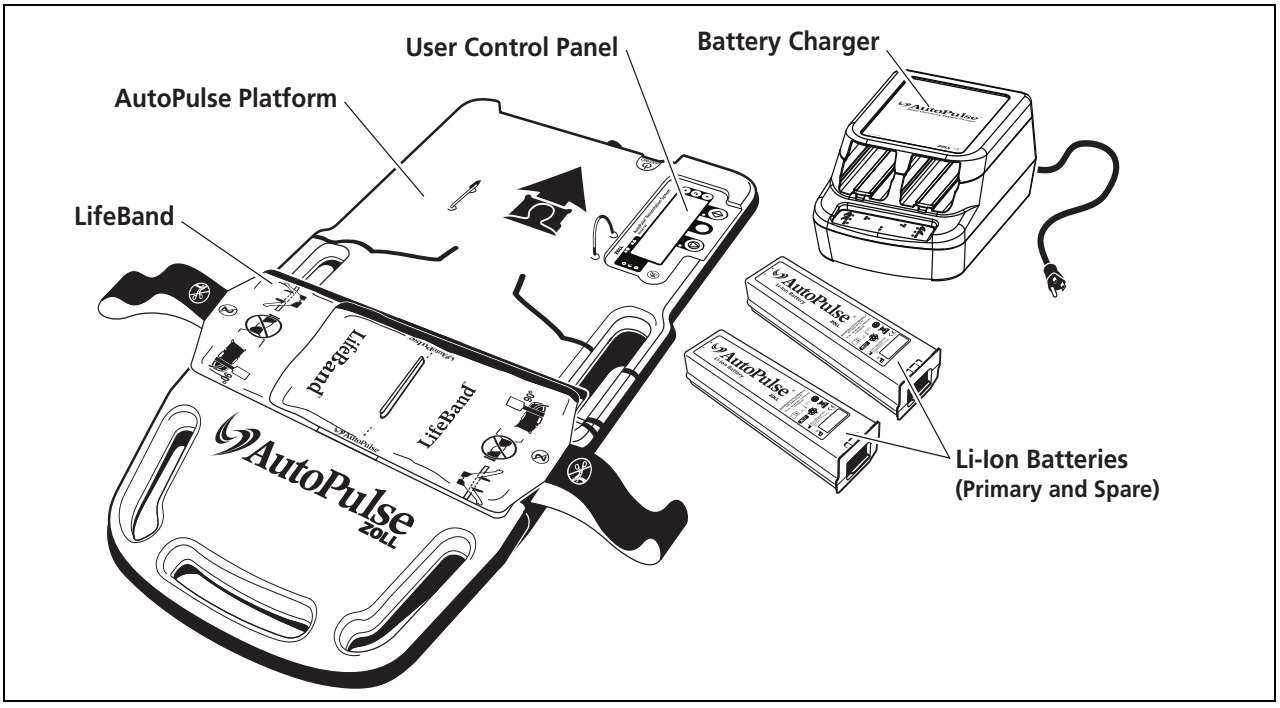


Figure 1-1 AutoPulse System

Appendix C Technical Specifications

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

C.1 Li-Ion Battery Physical and Environmental

Table C-1 Li-Ion Battery Specifications (Page 1 of 2)

Category	Specifications
Manufacturer	ZOLL Circulation, Inc.
Model Number	8700-0752-01
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	3.0 lbs. (1.3 kg).
Type	Rechargeable Lithium-Ion ($LiFePO_4$)
Battery voltage (nominal)	36.3 V
Capacity	2500 mAh (typical)
Current (maximum)	30 A continuous, 48 A pulse (96 ms max)
Initial Battery run time (nominal patient)	30 minutes (typical)
Maximum Battery charge time	Less than 4¼ hours at 77ºF (25ºC)
Battery Test-Cycle time	Less than 12 hours per Test-Cycle session
Recommended replacement interval	3 years from date of manufacture **Note:** The Battery will not operate after 5 years from date of manufacture.
Operating temperature	+32º to +113ºF (0º to +45ºC) ambient installed in device
Charge temperature	+41º to +95ºF (5º to +35ºC) ambient (68º to 77ºF [20º to 25ºC] preferred)
Storage/Transport temperature	-4º to +113ºF (-20º to +45ºC) ambient for up to six months with charging every four weeks, starting with a fully charged Battery.
Operating altitude	0 to 15,000 ft. (0 to 4,572 m)
Enclosure protection	Meets IP24 per IEC 60529
Shock	Meets IEC 60068-2-27 Basic Environmental Testing Procedures – Shock (50 g, 11 ms 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 60068-2-31 Basic Environmental Testing Procedures – Free Fall – Procedure 1.
Electrostatic discharge	Meets IEC 61000-4-2, Level 4

Table C-1 Li-Ion Battery Specifications (Page 2 of 2)

Category	Specifications
Radiated emissions	Meets CISPR 11/EN55011, Group 1, Class A FCC part 15, Class A
Radiated Immunity	Meets IEC-61000-4-3, 80-2500 MHz, Level 3
Safety	Meets IEC-60601-1 including UL310DV.1.1 for Lithium batteries

C.2 Battery Charger Physical And Environmental

Table C-2 Battery Charger Specifications (Page 1 of 2)

Category	Specifications
Manufacturer	ZOLL Circulation, Inc.
Model Number	8700-0753-01
Size (L W H)	16.01 in. by 9.50 in. by 6.54 in. (40.6 cm by 24.1 cm by 16.6 cm)
Weight	7.1 lbs. (3.23 kg)
Operating input voltage	100 to 240 V AC
Operating input frequency	50/60 Hz
Input current	2.0 Amps (maximum)
Maximum Battery charge time	Less than 6¼ hours (at 77ºF [25ºC])
Fuses	User-replaceable, T 2.5 AH, 250 V, 5 x 20 mm fuses (2 required) High breaking capacity: 1500 A minimum
Operating temperature	+41º to +95ºF (5º to +35ºC) (68º to 77ºF [20º to 25ºC] preferred)
Storage/Transport temperature	-40º to +158ºF (-40º to +70ºC)
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
Shock	Meets IEC 60068-2-27 Basic Environmental Testing Procedures – Shock (50 g, 11 ms 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 60068-2-31 Basic Environmental Testing Procedures – Free Fall – Procedure 1.
Electrostatic discharge	Meets IEC 61000-4-2, Level 4

Table C-2 Battery Charger Specifications (Page 2 of 2)

Category	Specifications
RF electromagnetic fields immunity	Meets IEC 61000-4-3, Level 2
EFT/burst	Meets IEC 61000-4-4, Level 3
Surge immunity	Meets IEC 61000-4-5, Level 3
Conducted RF disturbances immunity	Meets IEC 61000-4-6, Class A
Dips, interruptions, and variations	Meets IEC 61000-4-11
Harmonics current emissions	Meets IEC 61000-3-2, Class A
Radiated emissions	Meets CISPR 11/EN55011, Group 1, Class A FCC part 15, Class A
Safety	Meets IEC/EN60601-1

Note: These requirements provide reasonable protection against harmful electromagnetic interference in a typical medical installation. However, high level of radio-frequency emissions from electrical devices, such as cellular phones, may disrupt the performance of this device. To mitigate disruptive electromagnetic interference, position this device away from radio frequency transmitters and other sources of electromagnetic energy.

C.3 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.

C.4 Guidance and Manufacturer's Declaration–Electromagnetic Emissions

Table C-3 Guidance and Manufacturer's Declaration–Electromagnetic Emissions

Emissions test	Compliance	Electromagnetic environment - guidance
RF Emissions CISPR 11	Group 1	The Battery Charger uses RF energy for its internal function only. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby equipment.

Table C-3 Guidance and Manufacturer's Declaration–Electromagnetic Emissions

RF Emissions CISPR 11	Class A	The Battery Charger is suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes, provided the following warning is heeded. **Warning:** This equipment is intended for use by healthcare professionals only. This equipment may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the Battery Charger or shielding the location.
Harmonic Emissions IEC 61000-3-2	Class A	
Voltage Fluctuations / Flicker Emissions IEC 61000-3-3	Complies	
Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to EMC information provided in this document. **Note:** The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.		

Electromagnetic Immunity Declaration (EID)

Table C-4 Guidance and Manufacturer's declaration –Electromagnetic immunity for the Battery Charger

The Battery Charger is intended for use in the electromagnetic environment specified below. The customer or user of the Battery Charger should ensure that it is used in such an environment.			
Immunity test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic environment–guidance**
Electrostatic Discharge (ESD) IEC 61000-4-2	± 8 kV contact ±15 kV air	± 8 kV contact ± 15 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 AC Mains ±1 kV I/O lines 5/50 100 kHz	±2 kV AC Mains ±1 kV I/O lines 5/50 100 kHz	Mains power should be that of a typical commercial or hospital environment
Surge IEC 61000-4-5	±1 kV Line to Line ± 2 kV Line to Earth	±1 kV Line to Line ± 2 kV Line to Earth	Mains power should be that of a typical commercial or hospital environment

Table C-4 Guidance and Manufacturer's declaration –Electromagnetic immunity for the Battery Charger

Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11	>0% U_t,for 0.5 cycle* At 0ºC, 45ºC, 90ºC, 135ºC, 180ºC, 225ºC, 270ºC, and 315ºC	>0% U_t, for 0.5 cycle* At 0ºC, 45ºC, 90ºC, 135ºC, 180ºC, 225ºC, 270ºC, and 315ºC	Mains power should be that of a typical commercial or hospital environment. If user requires continued operation during power mains interruption, it is recommended the Battery Charger be powered from an interruptible power supply
	0% U_T, 1 cycle and 70% U_T, 25/30 cycles Single phase at 0ºC	0% U_T, 1 cycle and 70% U_T, 25/30 cycles Single phase at 0ºC	
Voltage interruptions	0% U_T, 250/300 cycles	0% U_T, 250/300 cycles	
Power frequency (50/60 Hz) magnetic field. IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of typical location in a typical commercial or hospital environment.
Note: U_t is the a.c mains voltage prior to application of the test level.			

* Applicable only to ME equipment and ME systems connected to a single-phase AC mains.

Table C-5 Guidance and manufacturer's declaration – electromagnetic immunity

The Battery Charger is intended for use in the electromagnetic environment specified below. The customer or the user of the Battery 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	3 Vrms 1 kHz 0.15 – 80 MHz	3 Vrms 1 kHz 0.15 – 80 MHz	Portable and mobile RF communications equipment should be used no closer to any part of the Battery Charger, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance d = 1.17 √P 0.15 to 80 MHz d = 1.17 √P 80 to 800 MHz d = 2.3 √P 800 MHz to 2.7 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,* should be less than the compliance level in each frequency range.** Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz 6 V/m in ISM bands*** Spot frequencies 385 MHz – 5.750 GHz Pulse Modulation	3 V/m 80 MHz to 2.7 GHz 6 V/m in ISM bands*** Spot frequencies 385 MHz – 5.750 GHz Pulse Modulation	
Note 1: At 80 MHz and 800 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.			

* 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 Battery Charger is used exceeds the applicable RF compliance level above, the Battery Charger should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Battery Charger.

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

*** The ISM (industrial, scientific, and medical) bands between 0.15 MHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz. The amateur radio bands between 0.15 MHz and 80 MHz are 1.8 MHz to 2.0 MHz, 3.5 MHz to 4.0 MHz, 5.3 MHz to 5.4 MHz, 7 MHz to 7.3 MHz, 10.1 MHz to 10.15 MHz, 14 MHz to 14.2 MHz, 18.07 MHz to 18.17 MHz, 21.0 MHz to 21.4 MHz, 24.89 MHz to 24.99 MHz, 28.0 MHz to 29.7 MHz, and 50.0 MHz to 54.0 MHz.

Note: The following degradations associated with essential performance were not allowed during test: component failure, changes in programmable parameters, resets to factory defaults, changes in operating modes, or data corruption.

Table C-6 Recommended separation distances between portable and mobile RF communications equipment and the Battery Charger

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

Radiated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.17 \sqrt{P}$	80 MHz to 800 MHz $d = 1.17 \sqrt{P}$	800 MHz to 2.5 GHz $d = 2.33 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.70	3.70	7.38
100	11.70	11.70	23.33

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters 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 according to the transmitter manufacturer.

Notes
At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
These guidelines may not apply in all situations. Electromagnetic propagations affected by absorption and reflection from structures, objects, and people.

Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information in this manual.

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Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
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