ULTRALiFE®
BATTERY & ENERGY PRODUCTS

URS-X5-01
Power System
Operation Manual by Ultralife Corporation

Equipped with SMART! CIRCUIT™ Technology

Customer Helpline Phone Number:

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URS-X5-01 Operations Manual
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1 ABOUT THIS MANUAL

This manual has been prepared for the purpose of providing an operator / maintenance technician the information necessary to understand and to maintain the URS-X5-01 Battery Management System.

1.1 Symbols Used

The symbols shown in this section appear throughout this manual, the first one shown being the NOTE symbol, below.

NOTE: *Note statements contain important information that may affect how you use this product.*

The other symbols represent important safety advice, and appear throughout this manual and on the URS-X5-01 in the form of WARNINGS and CAUTIONS against possible hazards to people or equipment, respectively. These safety WARNINGS and CAUTIONS must be followed at all times. Ultralife assumes no liability for customer's failure to comply.

WARNING: *Warning statements mean danger. They identify practices, procedures or conditions such as high voltage that could result in injury or loss of life and which, therefore, require extreme care before proceeding.*

CAUTION: *Caution statements denote a hazard. They identify practices, procedures or conditions that could result in damage to or destruction of this product or other equipment or property.*

GROUND: *This symbol is placed adjacent to grounding locations on the unit. These areas are designed to be connected to an earth ground either through a power cable or grounding cable to prevent injury to the user.*

GROUND: *This symbol is placed adjacent to grounding locations on the unit. These areas are designed to be connected to an earth ground either through a power cable or grounding cable to prevent injury to the user.*

DIRECT CURRENT: *This symbol is placed adjacent to the Direct Current (DC) input location on the unit. This connector is designed to be connected to only a DC source.*

DC POLARITY: *These two symbols are placed next to their corresponding DC input connectors to identify positive and negative to the user. The "+" symbol indicates the red positive terminal, and the "-"symbol indicates the black negative terminal.*

CONSULT THE MANUAL: *Refer to the operation manual for additional safety and user information.*

General Safety Instructions

Before using the URS-X5-01 Power Management System, read this manual and follow all of its Safety Rules and Operating Instructions.

Safety is a combination of common sense, staying alert and understanding the use of the equipment that you are operating.

Warning

WARNING: To avoid risk of electric shock, this equipment must only be connected to supply mains with protective earth.

WARNING: connecting electrical equipment to MSO effectively leads to creating an ME SYSTEM, and can result in a reduced level of safety. Consult IEC 60601-1, ANSI/AAMI ES 60601-1 and CAN/CSA C22.2 No. 60101-1 for requirements for ME SYSTEMS.

WARNING: No modification of this equipment is allowed.

WARNING: To avoid mistakes that could cause serious injury, do not install or operate the Power Management System until you have read and understood the following;

WARNING: Use only the hardware provided for mounting accessories.

1. READ and become familiar with this entire operation manual. LEARN the Power Management System's applications, limitations, and possible hazards.
2. Keep all guards in place and in working order.
3. DO NOT use in a dangerous environment. DO NOT use electrical equipment in damp or wet locations, or expose them to rain. Work in a well lit area.
4. Only qualified technicians should install the Power Management System on to the intended application and manipulate connections under the safety guard. Operators may use and manipulate external connections.
5. AC voltages hazardous to life are present inside the unit. DO NOT disassemble, puncture, or damage unit. If found in a damaged state, discontinue use until a qualified technician can verify functionality.
6. Never stand or sit on the Power Management System.
7. DO NOT stack items on top of the Power Management System, or use as a spacing instrument.
8. Prior to assembly, check for damaged parts. DO NOT INSTALL THE URS-X5-01 IF ANY DAMAGE IS NOTED

Caution

CAUTION: Use of this power module in life support applications where failure of this equipment can reasonably be expected to cause the failure of the life support equipment or to significantly affect its safety or effectiveness is not recommended. Do not use this equipment within oxygen enriched atmosphere's, or within 0.3 meters of a point at which oxygen enriched atmosphere is intentionally vented.

Make Sure

- That you understand basic wiring principles prior to installation.
- That you are prepared to take a few minutes to test your work. Ensure that the Power Management System is functioning correctly prior to placing in service.
- The total combined AC and DC power requirement is less than 150W.

Product Photo

Description

The URS-X5 Control System and URB-X5 Battery comprise a Power System that uses battery power and wall outlet power to supply AC and DC power to electronic devices on a mobile cart such as a medication cart or point of care computer cart and others designed and used in a Healthcare setting. The URS-X5 will support both hot-swap battery functions and fixed power system functions. One or two URB-X5 batteries can be used with the system. The URS-X5 supports hot-swap functionality in which no interruption of power occurs when one battery is removed and either a second battery and/or an internal hold-up battery with remaining charge is in place, or the URS-X5 is plugged in to a working wall outlet. This enables hot swap capability in both one battery and two battery configurations.

While mobile, URS-X5 provides a managed channel of power from one or two URB-X5 batteries to one or more powered devices on a mobile platform. When attached to an A/C wall outlet, the URS-X5 switches the load to the wall outlet and charges the URB-X5 batteries.

While attached to a functioning wall outlet, the URS-X5 will charge a URB-X5 battery in approximately 3 hours while simultaneously delivering full power to connected electronic devices. With the addition of the URX-X5 accessory, the URS-X5 provides state of charge information via LED displays.

The URS-X5 communicates with the URB-X5 batteries using the SMBus protocol. Communication with one or two connected batteries is essential for proper operation of the URS-X5. Information, including temperature, voltage, and state of charge, is obtained from any connected URB-X5 batteries as a means of prioritizing charge and discharge, as well as state of charge reporting.

In a two battery configuration, the URS-X5 directs both charging and discharging. When attached to a wall outlet, the battery that provides the highest possible power output is charged until it reaches 100% charge. Then the second battery is charged until it reaches 100% charge. When in discharge mode, the battery with the lower state of charge is depleted first, before the second battery is brought on line. When all batteries reach a level of approximately 20 minutes of useable runtime remaining, the optional State of Charge Indicator display alerts the user by lighting its “Alert” indication.

The URS-X5 is designed to supply power to electronics on a rolling platform for indoor use in institutions whose primary function and business is to provide healthcare services. Such electronics might be computers and power systems used primarily to provide mobile access to a healthcare institution’s or healthcare provider’s Information Systems. This includes mobile carts used for dispensing medication or similar services at the point of care, capturing or otherwise communicating video or audio transmissions, supporting laptop computers, tablets or personal digital assistant (PDA), or displaying radiological images.

The URS-X5 Power System is configurable to support the needs and use of the application. For example, the URS-X5 can be configured to work with one battery, two batteries, fixed mounted cradles for the batteries, and a URX-X5 State of Charge Indicator.

Care should be taken when using the URS-X5 system to ensure that the required application power is properly aligned with the capabilities of the Power System. Call the Customer Help Line for further information.

URS-X5-01-01-01-00 Kit Components

Unit Part Number	Unit Description	Quantity
URS-X5-01	Charger Assembly for URB-X5	1
URB-X5	276Wh Battery (12.8V, 21.6Ah)	1
URB0025	67Wh Hold-up Battery (12V, 5.6Ah)	1
UCA-X5	Battery Cradle for URB-X5	1
Hardware Kit	• 2 SHCS Hd M6x12mm per Side Bracket. • 1 Button Head 8/32x1/2” per Side Bracket. • 1 Button Head 10/23x3/8” per side. • 2 Button Head 10/32x3/8”, Center Bracket	1
56133490	Mounting Bracket (Center)	1
56133500	Cradle Bracket (Left)	1
56133510	Cradle Bracket (Right)	1
56501310	UCA-X5 to URS-X5-01 power cable	1
	AC Input Cable	1
	AC Output Cable	1

Technical / Environmental Specifications

AC Input	100-240VAC~ 50-60Hz, 5.4A – 2.1A	Charging Temp.	0°C to +45°C (32°F to +113°F)
AC Output	120VAC @ 60Hz, 150W (MAX)	Storage Temp.	-20°C to +60°C (-4°F to +140°F)
Battery Charge Rate	14A	Discharge Temp.	0°C to +40°C
		Storage Altitude	2,000m. (6,562 ft.)
Battery Type	12V LiFePO4 batteries	Operating Altitude	5,000m (16,404 ft.)
User Interface	Optional SOC and alert indicators	Humidity	95% relative
		Atmospheric Pressure	79.5kPa
Connectors	AC Input: IEC 320-C14 URX-X5: RJ45 6P4C	Class I (Earthed)	✔
		Ingress Protection	IP21 (Rating)

Installation

Note: Installation or removal of the URS-X5 system should only be completed by a competent technician.

Note: When choosing a location to mount the URS-X5 system, take into account that the AC input and AC Output may need to be inserted and removed. Do not position the equipment such that it is difficult to operate the connection / disconnection plugs of the power supply cord.

Mounting

URS-X5 Battery Control System and URB-X5 batteries must be mounted on moving platforms in a way that their weight is well supported, avoids causing an unsafe tipping condition and protects them from impact. Contact your supplier or the manufacturer for assistance if you do not have mounting instructions or have questions. **Use care also in determining the mounting location of the cradles, to avoid unbalanced weight that can cause a cart to tip.**

Note: When choosing a location to mount the URS-X5 system, take into account that the AC input, AC Output, and DC Output may need to be inserted and removed. Do not position the equipment such that it is difficult to operate the connection / disconnection plugs of the power supply cord.

1. Install the provided mounting brackets to the power system, ensuring the hardware used is capable of supporting at least 50lbs (22.7kg).

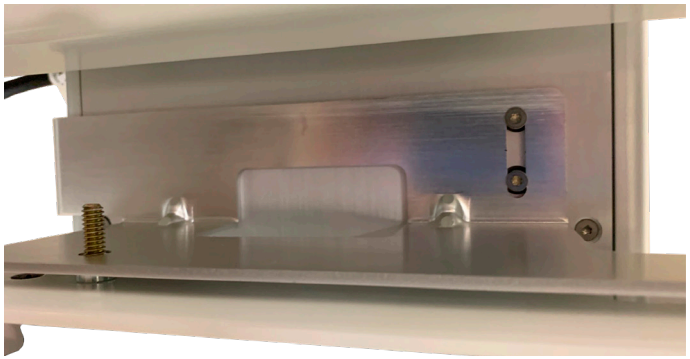


Figure 1: Cart mounting plate

2. Attach the provided mounting brackets (part number 56133490) to the back of the system using the included screws to the location and mounting brackets supplied by the manufacturer of the cart.
3. Attach the two provided mounting brackets to the ends of the system power supply using the included screws.
4. Route the battery charging wire(s) to the battery cradle(s).
5. Torque the screws to 15±1 in*lb.
6. Find the appropriate location(s) for mounting the cradle(s) to the cart and mount each using the provided attachment points. A minimum of two mounting screws must be used for each cradle.

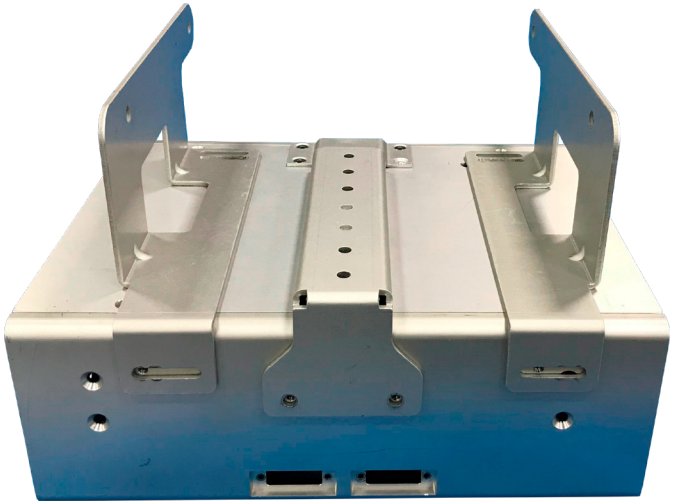
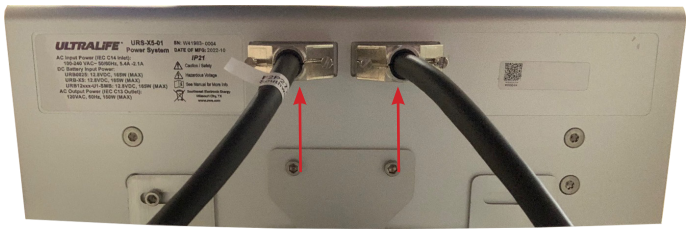


Figure 2: Cradle mounting plates

Note: for mounting cradles directly onto a URS-X5, threaded inserts are installed in the URS-X5. Inserts are in place to support either one or two cradles. Note that for in-line cradles, only one battery is supported.

7. Plug the provided short detachable power cord into the power input connector on the side of the system power supply and secure the cord using the cable clamp.
8. Remove the wiring cover from the side of the system power supply, by removing the two screws from the end plate that hold the cover in place.
9. Install one or two battery power/signal cables corresponding to the configuration of the system that was purchased.



10. If the Remote State of Charge Indicator was purchased as an accessory, remove the faux connector from the SOCI Connection port and install the cable for the Remote State of Charge Indicator.

Note: Leave the faux connector in place for the alert indicator connector.

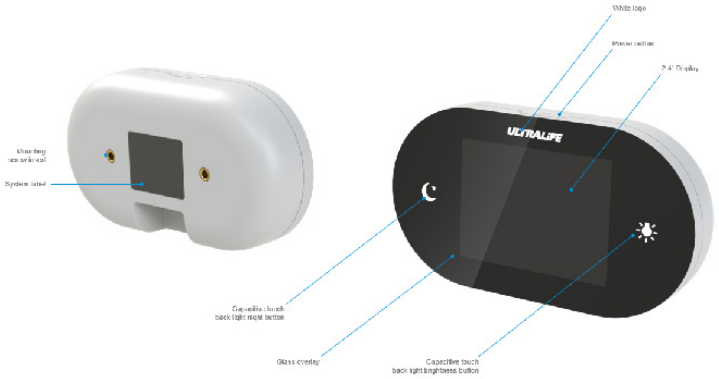


Figure 3: URX-X5 User Display

11. Replace the wiring cover on the side of the system power supply by reinstalling the two screws removed in step 3.

Operation

Once the URS-X5 has been installed by a competent technician, and the unit has been placed in service, the operator will need to know and understand the following.

The URS-X5 provides power usable AC and DC power outputs with no operator interaction required until the battery/batteries run(s) low. The operator can verify the remaining capacity via one of two methods.

Method One:

The operator can visually check the State of Charge on the battery by depressing the push button on the state of charge indicator at the top of the battery. The state of charge indicator is a 10 segment LED display (Figure 1) that indicates 0% to 100% of usable energy remaining, where each LED represents 10% State of Charge. The blue LEDs will be illuminated when the push button is depressed according to the battery's energy level. For example, if the state of charge indicator displays 10 blue LEDs the battery is 100% charged. If 7 LEDs are displayed, the battery is approximately 70% State of Charge. The battery can be replaced with a charged battery or charged by plugging the URS-X5 power cord into an AC wall outlet. See Figures 1 and 2.

Figure 4: Battery State-of-Charge

Method Two:

The URX-X5 is the remote state of charge indicator, which the operator can see the State of Charge on all batteries at a glance. The URX-X5 contains the information shown in the following figure.

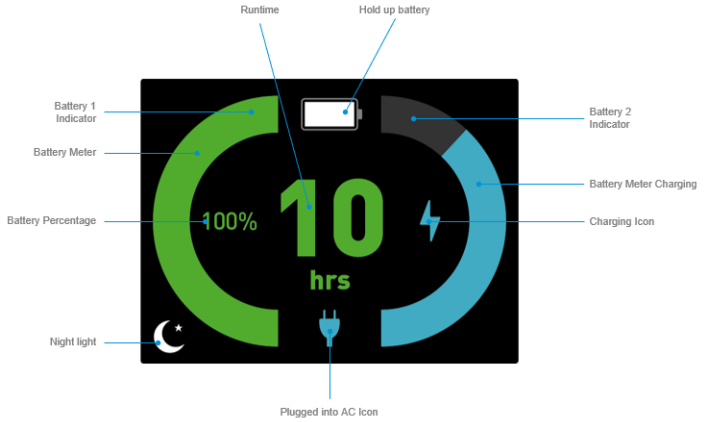


Figure 5: URX-X5 Display

A "Plug" icon displays when the URS-X5 system needs to be plugged in to an AC outlet. The system has less than 20 minutes of runtime remaining in this condition. After that time, the cart will be without power. To avoid this, the operator must take action by replacing one or both batteries or stopping the cart for a charge.

While charging, the URX-X5 user display will show a charge lightning bolt indicating which battery is being charged

Note: In the two battery configuration, when one battery is depleted the second battery will assume the electrical load without any operator action. The depleted battery can then be removed and replaced with a fully charged battery.

To Replace A Battery

1. To remove a battery from the cradle, push up on the battery retaining latch that holds the handle in place. Once the battery retaining latch is lifted beyond the handle, the operator can tilt the battery cradle and lift the battery out of the cradle.

2. To replace the battery, take a fully charged battery and insert into the cradle, the battery can be inserted in either orientation. Once the battery is inserted into the cradle, tilt the cradle back to the upright position by pushing on the front of the battery back towards the battery retaining latch. The battery retaining latch will slide over the handle, locking the battery in place.

To Charge Battery in Place

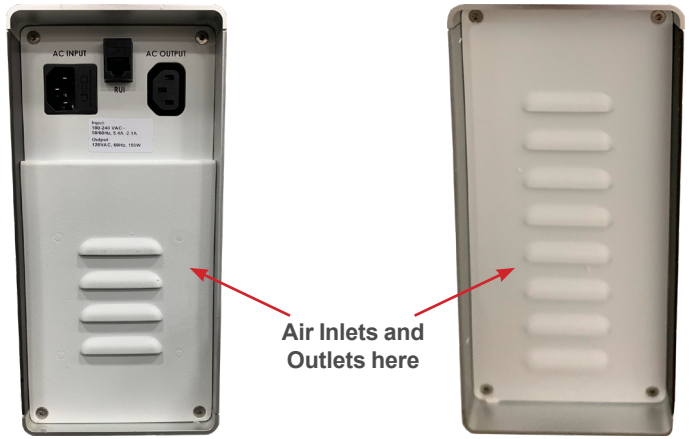
1. To charge the battery while installed in the cradle, attach the AC input cord to the 'AC in' receptacle and then plug the opposite end into a wall outlet to provide charging power to the batteries. The charging time to 100% charge of a single battery is less than 3 hours and will depend on the state of charge of the battery prior to beginning the charge. The operator can verify the charge is complete by checking the state of charge indicator as described above.

To Terminate Operation

1. When use of the URS-X5 is no longer needed and the operator is removing the system from use:
   - **a)** Turn off any electrical equipment that is supported by the URS-X5.
   - **b)** Disconnect the AC Input from the Wall or the URS-X5 from panel.
   - **c)** Remove all batteries from the cradles.
   - **d)** The system is now shutdown and will not function until the batteries or AC Input power is restored.

Maintenance

- There are no user replaceable parts in the URS-X5 System. For troubleshooting and repair, contact the manufacturer.
- Clean air inlet and outlet vents (as needed) by vacuuming the dust and debris from the outside of the unit. Do not blow dust into the case.



Cleaning

- Clean with a cloth moistened with 70-percent isopropyl alcohol (IPA) solution
- Never use aggressive alkaline (basic) or acidic cleaners on the power system. Do not use cleaners containing trisodium phosphate, phosphoric acid, hydrochloric acid, hydrofluoric acid, fluorides, or similar compounds on anodized aluminum surfaces. Always test clean a small area if in doubt.
- Never use an abrasive sponge, cleaning pad or cloth.

Troubleshooting

Note: If the URS-X5 system goes into a low battery fault, the AC output power will not be present with batteries and/or AC in present. If this occurs, remove all input power sources (all batteries and the AC input). Wait 30 seconds. Reload batteries and re-apply input power source.

Note: For any other issue please contact your supplier or the Customer Help line on the front of this manual.

Return/Disposal

- Lithium ion cells and batteries are classified and regulated as Class 9 dangerous goods (also known as “hazardous materials” in the United States) by the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), International Maritime Organization (IMO) and many government agencies such as the U.S. Department of Transportation (DOT). These organizations and agencies publish regulations that contain detailed packaging, marking, labeling, documentation, and training requirements that must be followed when offering (shipping) Lithium cells and batteries for transportation. The regulations are based on the UN Recommendations on the Transport of Dangerous Goods Model Regulations and the UN Manual of Tests and Criteria. These regulations also apply to shipments of cells and batteries that are packed with or contained in equipment. Failure to comply with these regulations can result in substantial civil or criminal penalties. When shipping this product, ensure that all current dangerous goods shipping requirements are followed.
- To arrange a return of material, contact the supplier to make arrangements or contact the customer service line at 281-240-4000 Ext 201. A Return Material Authorization (RMA) is required for all products.
- The URB-X5 battery must be completely discharged prior to disposal and/ or the terminals must be taped or capped to prevent short circuit. Disposal of the URB-X5 battery may be subject to Federal, State, or local regulations. Consult the applicable regulations prior to disposal of these batteries.
- These batteries contain recyclable materials and recycling is encouraged over disposal.
- Similarly, the URS-X5 charger system and accessories may be subject to Federal, State, or local regulations. Consult the applicable regulations prior to disposal as waste electronic equipment
- The system and accessories contain recyclable materials and recycling is encouraged over disposal.

EMC Precautions

The URS-X5-01 POWER SYSTEM requires special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in these accompanying documents. Portable and mobile RF communications equipment can affect medical electrical equipment.

The URS-X5-01 POWER SYSTEM does not have any data cables or transducers that are detachable.

Warning: A risk of increased emissions or decreased immunity may result if any cords are attached.

The URS-X5-01 POWER SYSTEM should not be used adjacent to or stacked with other equipment.

Warning: Observe to verify normal operations if it is necessary to use adjacent to or stacked with other equipment.

Guidance and manufacturer’s declaration – electromagnetic emissions		
The URS-X5-01 POWER SYSTEM is intended for use in the electromagnetic environment specified below. The customer or the user of the URS-X5-01 POWER SYSTEM should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11/EN55011	Group 1	The URS-X5-01 POWER SYSTEM uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11/EN55011	Class A	The URS-X5-01 POWER SYSTEM is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC/EN 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC/EN 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic emissions			
The URS-X5-01 POWER SYSTEM is intended for use in the electromagnetic environment specified below. The customer or the user of the URS-X5-01 POWER SYSTEM should assure that it is used in such an environment.			
IMMUNITY test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC/EN 61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Power frequency (50/60 Hz) magnetic field IEC/EN 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be a levels characteristic of a typical location in a typical commercial or hospital environment.
Electrical fast transient/burst IEC/EN 610004-4	±2kV for power supply lines	±2kV	Mains power quality should be that of a typical commercial or hospital environment
Surge IEC/EN 61000-4-5	±1kV line(s) to line(2) ±2kV line(s) to earth	±1kV line to line ±2kV line(s) to earth	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/EN 61000-4-11	<5% U_T (>95% dip in U_T) For 0,5 cycle 50% U_T (60% sip 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 s	Complies Complies Complies Complies	Mains power quality should be that of a typical commercial or hospital environment. If the user of the URS-X5-01 POWER SYSTEM requires continued operation during power mains interruptions, it is recommended that the URS-X5-01 POWER SYSTEM be powered from an internal hold up battery (short duration) and/or an uninterruptible power supply (longer duration).

Guidance and manufacturer's declaration – electromagnetic immunity			
The URS-X5-01 POWER SYSTEM is intended for use in the electromagnetic environment specified below. The customer or the user of the URS-X5-01 POWER SYSTEM should assure that it is used in such an environment.			
IMMUNITY test	**IEC 60601 TEST LEVEL**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC/EN 61000-4-6 Radiated RF IEC/EN 61000-4-3	3Vrms 3 V/m 80 MHz to 2.5 GHz	3Vrms 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the URS-X5-01 POWER SYSTEM, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance d = [3.5/3] $\sqrt{P}$ d = [3.5/3] $\sqrt{P}$ 80MHz to 800MHz d = [7/3] $\sqrt{P}$ 800MHz to 2.5GHz 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: At 80MHz and 800MHz, the higher frequency range applies.

Note: 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 URS-X5-01 POWER SYSTEM is used exceeds the applicable RF compliance level above, the URS-X5-01 POWER SYSTEM should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the URS-X5-01 POWER SYSTEM.

Recommended separation distances between portable and mobile RF communications equipment and the URS-X5-01 POWER SYSTEM			
The URS-X5-01 POWER SYSTEM is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the URS-X5-01 POWER SYSTEM can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the URS-X5-01 POWER SYSTEM 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)**		
	150kHz to 80MHz $d = [3.5/3]\sqrt{P}$	**80MHz to 800MHz** $d = [3.5/3]\sqrt{P}$	**800MHz to 2.5GHz** $d = [7/3]\sqrt{P}$ **800MHz to 2.5GHz**
0.01	0.117		0.233
0.1	0.369		0.738
1	1.167		2.333
10	3.689		7.379
100	11.667		23.333

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated 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: At 80MHz and 800MHz, the separation distance for the higher frequency range applies.

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

- Specification details are correct at the time of printing.
- For the latest data please refer to published specifications which are available on our website at www.ultralifecorp.com
- Operator & regional variations may apply to the transport of Lithium Ion batteries. Check with your operator.
- ***RETAIN THIS IMPORTANT INFORMATION FOR FUTURE REFERENCE.***

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