

- 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.

URB12400-U1-SMB USER MANUAL



ULTRALiFE[®]

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THE SMART CHOICE FOR LEAD ACID REPLACEMENT



ULTRALIFE's URB12400-U1-SMB, 12.8V 38.4Ah Lithium Iron Phosphate smart battery offers incredible performance in a wide range of transportable and stationary equipment, including medical carts, delivery robots and uninterruptable power supply systems.

The inclusion of SMART CIRCUIT™ battery management electronics and RJ45 communication port allows host devices to communicate with the battery via SMBus. Important battery information such as Average Runtime to Empty (minutes), Relative State of Charge (%) and Cycle Count (#) is available enabling the battery to be an active part of any host device's power management system. The URB12400-U1-SMB is fully compliant with the requirements of inverter/chargers used in many medical carts and application advice is available for OEMs wishing to design it into a new application.

WARRANTY INFORMATION

The URB12400-U1-SMB (the "Product") has been manufactured under the most stringent of quality standards and is designed to provide outstanding performance over its life.

ULTRALIFE Corporation ("ULTRALIFE") warrants the Product such that it will be free from defects in materials and workmanship and will furnish eighty percent (80%) of its rated capacity after the earlier of 2,000 cycles or 24 months from the date the Product was first shipped to the customer.

ULTRALIFE will repair or replace, at ULTRALIFE's sole discretion, any Product which does not meet this warranty within the applicable period, provided the Product is delivered intact and prepaid to the location authorised by ULTRALIFE, and subject to the following:- This warranty does not extend to equipment utilised with the Product, or to any Product which ULTRALIFE determines, in its sole discretion, is not intact, on which seals have been broken or attempted to be broken, or which has been subjected to misuse, neglect, accident, tampering, alteration, augmentation, use with incompatible equipment or inconsistent with these instructions, or improper installation, or storage conditions, including, but not limited to, moisture or liquid exposure, proximity or other exposure to heat, or misapplication. The foregoing is in lieu of all other warranties expressed, implied, statutory or otherwise. In no instance, whether within or outside the warranty period or under any circumstance, is or will ULTRALIFE be liable for any loss, damage, injury or expense of any kind or nature caused, directly or indirectly, as a result of having delivered a Product that does not perform as warranted, including, without limitation, any such loss, damage, injury or expense arising from use of the Product or any interruption or service or for any loss of business whatsoever or however caused, including but not limited to any lost profits or any indirect, special, punitive or consequential damages. The sole remedy shall be the repair or replacement of the Product.

The customer is responsible for the proper packaging and shipping of the Product to ULTRALIFE, together with proof of purchase, for review under this warranty. Shipping containers may be purchased from ULTRALIFE. Repaired or replaced Product will be shipped to the customer at no charge; however, any expedited shipping charges are the responsibility of the customer.

The ULTRALIFE URB12400-U1-SMB Lithium Iron Phosphate battery contains a sophisticated battery management system (BMS) which constantly monitors the operation of the battery during charge, discharge and storage. This system ensures the battery remains safe under foreseeable abuse conditions. The BMS tracks and keeps a permanent record of pertinent electrical and environmental data for validating warranty claims.

The warranty shall be void if:

- The date on which the customer notifies ULTRALIFE (or its affiliates) of a possible warranty claim exceeds 24 months from the date the Product was first shipped to the customer.
- The Product has been cycled more than 2,000 times. The BMS tracks discharge activity and increments the cycle count when the cycle count threshold of 90% of design capacity has been reached. Cycle count is therefore an aggregate of all discharge activity.
- The voltage across the terminals of the Product exceeds 14.6V. Do not use any charger which has a charge voltage which exceeds this value. If the battery is to be used in a non-cyclic (float) application, then the charge voltage should not exceed 13.6V.
- The internal cell voltage falls below 2V per cell. The BMS tracks minimum cell voltages to ensure proper battery storage conditions have been maintained. Do not store the battery in a discharged state. It should be fully charged before being put into storage.
- The charge current exceeds 20A. The Product can be safely charged at currents up to 20A however the recommended charge current is 8A.
- The discharge current exceeds 20A. The Product can be safely discharged at currents up to 20A. The battery is not suitable for high current applications such as engine starting.
- The Product is charged at a temperature below 0°C or above a temperature of +45°C. The recommended charge temperature is +20°C.
- The Product is stored for more than 6 months (regardless of its state of charge) without any use. It is recommended that the battery is fully charged every 6 months.
- The Product is stored at a temperature below -40°C or above +60°C. The recommended storage temperature is +10°C to +30°C.
- Liquid or any other foreign material has entered the Product. Note that the communication port is not sealed and care should be taken to prevent ingress at this point.
- The Product label is removed, covered or tampered with. The Product label includes the date of manufacture and serial number which is required for warranty validation purposes.
- The Product shows signs of damage from mechanical abuse or modification.
- The Product has been opened or if any attempt has been made to open it. The Product contains no user serviceable parts.
- The communication port on the Product has been modified or damaged in any way. Access to the electronic system via this connector is required for validating warranty claims.
- Damage to the positive or negative terminals of the Product has been caused by incorrect connection of external electrical terminals. Only ring terminals designed for 1/4" studs should be used and the supplied screws must be tightened to a torque of 50 Foot-pounds (67.8 Newton Meters). The use of fork terminals is not recommended. Do

TECHNICAL SPECIFICATION

PART NUMBER		URB12400-U1-SMB	
CHEMICAL SYSTEM	Common Name	Rechargeable Lithium Iron Phosphate	
	Short Names	LFP, LiFePO4	
ELECTRICAL	Voltage	Average	12.8V
		Maximum	14.6V ^{Note6}
		Minimum	10.0V
	Capacity	Typical	38.4Ah ^{Note1}
	Energy	Typical	492Wh ^{Note1}
	Energy Density	Gravimetric	91Wh/Kg
		Volumetric	93Wh/l
	Cycle Life	Minimum	2000 ^{Note3}
	Charge Current	Recommended	8A
		Maximum	20A ^{Note6}
	Discharge Current	Continuous	20A ^{Note6}
		Pulsed	110A ^{Note2}
	Internal Resistance	Maximum	35mΩ
	Self-Discharge	Maximum	5% per month at +23°C
	Over-charge protection	Typical	3.75V per cell
	Over-discharge protection	Typical	2.50V per cell
Over-current protection	Typical	210A ± 5A (>800μs)	
Over-temperature Protection	Typical	+65°C ± 5°C	
Fuel Gauging Communications	Physical Layer	SMBus	
Fuel Gauging Protocol	SBD V1.1 ^{Note5}		
PHYSICAL	Dimensions	Length	208.5mm ± 2mm
		Width	136.4mm ± 2mm
		Height	182.1mm ± 2mm
	Battery Case Format	U1	
	Weight	Net	5.44Kg ± 0.2Kg
	Housing Material	Polycarbonate	
Terminal Size	¼"-20 Screw		
ENVIRONMENTAL	Temperature	Charge	0°C to +45°C ^{Note6}
		Discharge	-20°C to +60°C ^{Note6}
		Storage	-40°C to +60°C ^{Note6}
REGULATORY CERTIFICATION	IEC Designation	4IFR27/66-12	
	IEC 62133:2012 (Safety)	Complies ^{Note7}	
	UN38.3 (Transportation)	Complies ^{Note4}	

Note 1: Discharged at a 0.2C rate at +25°C to 10.0V.

Note 2: Maximum pulse width of between 800μs and 15ms.

Note 3: Number of consecutive 0.2C rate discharges and recommended charges at +25°C until the battery reaches 80% of initial capacity.

Note 4: The battery meets the requirements of ST/SG/AC.10.11 section 38.3. Details of battery transportation regulations are available on the ULTRALIFE website

Note 5: Contact ULTRALIFE for a complete list of available smart battery data fields and commands.

Note 6: Do not exceed this level.

The URB12400-U1-SMB is specifically designed to replace and outperform lead acid batteries. The tough, UL94V-0 flame retardant polycarbonate case ensures internal cells and electronics are protected at all times and unlike a lead acid battery the URB12400-U1-SMB can be mounted in any direction and does not require charging in a vented area. When used in a cyclic application more than 2000 cycles are possible, making it a truly 'fit & forget' proposition for many applications.

As safety is paramount, the URB12400-U1-SMB is designed with internal protection against over-charge, over-discharge, over-current and over-temperature while a cell balancing system ensures the internal battery cells operate in unison, promoting a higher degree of safety, longer runtime per cycle and more cycles over life.

The URB12400-U1-SMB can be continuously discharged at currents up to 20A and pulsed at currents up to 110A making it ideal for high power motor driven applications. Regulatory compliance is assured as the URB12400-U1-SMB meets the requirements of ST/SG/AC.10.11 section 38.3 (transportation) and is certified to IEC 62133:2012 (safety). This means it can be easily incorporated into medical equipment certified to IEC 60601-1.

KEY FEATURES

- Uniform voltage during discharge
- No need for trickle charge to retain charge
- Significantly lighter than lead acid batteries for the same amount of energy
- Does not become gaseous during use
- Nominal voltage maintained over a wider temperature range
- Can be properly charged using a 2-phase sealed lead acid charger
- IEC 62133, 2nd edition compliant
- Designed to work with industry standard inverters used on medical carts
- SMBus communications interface

USER INFORMATION

FIRST TIME USE

- Remove the battery from its original packaging. RETAIN ALL PACKAGING AND PRINTED INFORMATION FOR FUTURE USE.
- Inspect the battery. Do not use a battery which shows signs of mechanical or other damage.
- Fully charge the battery using a charger that meets the requirements described in this manual.

INSTALLATION PROCEDURE

In the absence of instructions from the device manufacturer, follow the installation procedure below:

- Install the battery into your device. Ensure the battery is securely held in place. If metallic securing brackets are used, ensure that these cannot come into contact with the battery terminals. Do not exert excessive pressure on the battery casing as this may cause damage to the battery.
- Connect the battery negative (-) terminal followed by the battery positive (+) terminal. The battery accepts ring terminals designed for 1/4" studs. The supplied screw terminals should be tightened to a torque of 50 Foot-pounds (67.8 Newton Meters). The use of fork terminals is not recommended.
- If applicable, take the RJ45 connector from the equipment and plug it into the communications port on the battery.
- Note that the disconnection procedure is the reversal of the connection procedure.

An umbilical wiring harness (ULTRALIFE part number UCA0152) is available as an accessory. This part is compatible with most medical carts and allows connection to the cart via an Anderson connector.

The URB12400-U1-SMB is designed to be used on its own. Do not connect the battery in series or parallel with any other battery.



ASSEMBLED IN THE USA

CHARGING RECOMMENDATIONS

The battery can be charged using any good quality 2-stage charger which is intended for either Lithium ion phosphate or lead acid batteries. The charging voltage should never be allowed to exceed 14.6V and the charging current should never be allowed to exceed 20A. Never attempt to use a constant-current charger such as those intended for Nickel Cadmium or Nickel Metal Hydride batteries. Never attempt to charge a battery which is physically damaged. Never use a charger which is damaged or has been used improperly. Never charge the battery if the temperature is below 0°C or above +45°C. If in doubt, contact ULTRALIFE for advice.

The following advice is provided for both cyclic and standby applications:

Charging for cyclic applications

Connect the battery to a DC power source using correct polarity and apply a maximum of 14.6V. Limit the current to the recommended rate of 8.0A and hold 14.6V until the current declines to 0.8A. The maximum charge current is 20A.

Charging for standby applications

Connect the battery to a DC power source using correct polarity and apply a maximum of 13.6V. Limit the current to the recommended rate of 8.0A and hold indefinitely to maintain the battery in a continuous standby state of charge of between 80% and 90%.

STORAGE RECOMMENDATIONS

If the battery is to be stored for prolonged periods (>3 months) then it should be fully charged prior to being placed into storage. Although the battery may be safely stored at temperatures between -40°C and +60°C it is recommended that the battery is stored between +10°C and +30°C to maximise storage life. Provision should be made to fully charge the battery every 6 months. Recharge is required every 3 months if stored outside the recommended temperature range. It is not necessary to discharge the battery prior to being charged. When the battery is removed from storage it should be fully charged prior to use. Never store a battery in a discharged state. Never store a battery whilst still connected to equipment.

DISPOSAL RECOMMENDATIONS

When the battery as is at the end of its useful life, please ensure that it is properly disposed of in accordance with local regulations. Contact ULTRALIFE for additional information.