



LiFT Pack M24

User Guide

Part # 990843 v1.3

LiFT Pack M24 User Guide

Safety Precautions

The Flux Power LiFT Pack is a lithium-ion battery and is classified as Class 9 (miscellaneous) Hazardous Material. Precautions to correctly handle the Flux Power Lithium Battery include:

- The battery should only be handled by authorized personnel familiar with handling, storing and installation of a Lithium Battery.
- Do not open the battery – Only authorized technicians should perform service on a Lithium Battery.
- Do not mount or store the battery upside down or on its side.
- Upon receipt, check the battery for damage during transportation.
- Always use a lifting device when installing a battery.
- Never recycle lithium-ion batteries with lead-acid batteries, please consult Flux Power or your local recycler for more information on how to recycle a Lithium Battery.
- **WARNING – Risk of Fire – No User Serviceable Parts**

Please also refer to the Safety and Reliability Section of this User manual for more information.

IMPORTANT WARRANTY NOTICE **PROPERLY MAINTAINING THE BATTERIES CHARGE AND STORAGE**

Allowing the battery to discharge below 24V, extended use or storage after the low SOC alarm goes off due to non-charging or improper storage will result in an “over-discharge” condition and the battery will no longer charge. **Failure to properly maintain the battery will void the battery’s warranty.**

For technical assistance and additional troubleshooting and technical documentation visit our website at www.fluxpower.com. Support is also available at 877-505-3589 or support@fluxpower.com.

Warranty Notice

This User Guide is not a warranty. Do not use or attempt to use this product until you have read this User Guide in its entirety. Improper installation or usage of this product may be hazardous and may cause damage to other electrical equipment and will void warranty.

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1.0 Introduction

The LiFT Pack M24 is a lithium-ion battery specialized for the material handling industry. This User Guide is intended to provide information on how to operate and care for a LiFT Pack M24.

Specifications	M24
Base Length (in)	30.8
Base Width (in)	13
Base Height (in)	31
Available Capacities (Ah)	400 / 576 / 600
System Voltage (V)	24
Max Charge Current (Internal) (Amps)	47
Max Charge Current (External) (Amps)	280
Operational Charge Temperature (Fahrenheit)	32° to 113°
Operational Discharge Temperature (Fahrenheit)	-4° to 131°
Charger Input (Vac)	85 to 270
Charger Output (Vdc)	24
Cable Length and Location (in)	24 Top Right Of Pack
Weight (lbs)	980
Approvals	-

2. Flux LiFT M24 Battery Basics

2.1 Construction

The main components consist of lithium-ion cells, a Battery Management System (BMS), internal charger (optional), a State of Charge (SOC) gauge, On/Off switch, and counterweights (if needed). The components are encased in a steel enclosure. A schematic of the LiFT Pack M24 can be seen in Figure 1.

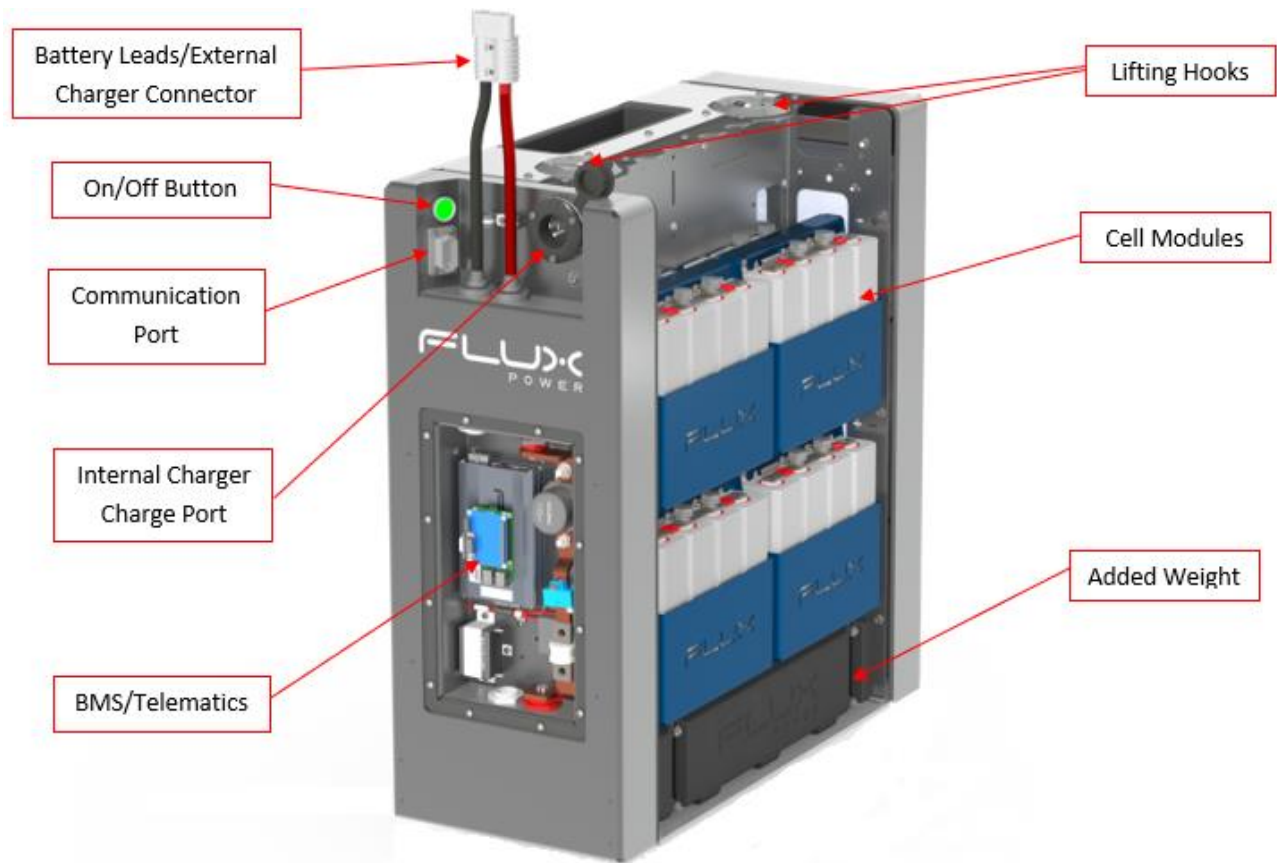


Figure 1: A drawing of the Flux LiFT Pack M24

The lithium cells are lithium iron phosphate (LiFePO₄) large format cells. They are contained in hard plastic or metal and mounted in buckets.

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2.2 Initial Startup

With the battery off, use straps or a chain and attach them to the retractable lifting hooks located on top of the battery. Lift the pack using a forklift or other lifting device and slowly place the pack into the battery compartment. Use shims to prevent the battery from moving in the compartment.

To turn on the battery, use the push button I/O switch. When turned on, the battery will close the main contactor and supply power to the truck.

2.3 Charger

The pack can be charged using the optional internal charger or an external charger. The following table shows the charge time for each method of charging. Charge rates should remain below 280A continuous.

	400Ah	576Ah
50A Internal Charger	8 hours	11.5 hours
280A External Charger	1.4 hours	2 hours

Internal Charging: To charge the LiFT Pack M24 with the internal charger, simply plug it into any 110V outlet.

External Charging: To charge using an external charger, disconnect the pack from the truck, and then plug the pack into the external charger using the standard SB 2/0 connector. Make sure your charger has the appropriate lithium charging profile loaded.

The pack will suspend charging if cell temperatures are above 45 °C (113 °F) or below 0 °C (32 °F) to maintain the optimal health. If you need to charge in colder conditions, integrated heaters are an option.

2.3.1 Opportunity Charging

Opportunity charging reduces wear and tear on the pack and increases the lifetime of the pack. There are no sulfation, acid stratification, or heating issues, and the pack can be charged anytime, anywhere. To maintain pack health and longevity, it is recommended to fully charge the battery once per week, as noted in section 2.5.

2.4 Battery Management System (BMS)

All of Flux Power's energy storage solutions use our patented Battery Management System (BMS) which monitors and protects the life of the battery and provides valuable information to the end user.

A state of charge LED indicator connected to the BMS tells the end user how much energy is left and warns the user of any issues the battery may be experiencing.

2.5 Cell Balancing

Cell balancing is managed by the Flux BMS and is automatically performed whenever the pack is fully charged. If the pack is being used in an opportunity charging application, and is not given time to fully charge, we recommend the pack be allowed to fully charge and balance once per week. Leave the pack plugged in overnight and it will be charged, balanced, and ready to use the following day.

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2.6 State of Charge (SOC) Gauge

The primary function of the SOC gauge is to display the amount of energy in a Flux LiFT Pack M24. It has a secondary function displaying Device Trouble Codes (DTCs) which provide information to the end user in case there is a problem.

To check the amount of energy available, refer to the SOC gauge on the Flux LiFT Pack M24. The SOC gauge on the truck will also give you the correct SOC if it is integrated with the truck.

When the pack is unplugged from charging, the SOC gauge will be steadily illuminated and display the SOC. If the pack is plugged in and charging, the SOC LEDs will light up in sequence indicating it is charging. Once all six (6) lights are steadily illuminated, the pack is fully charged and balanced.

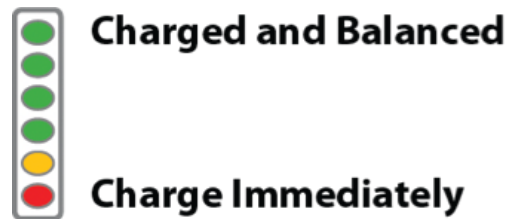


Figure 2: SOC gauge

2.7 Temperature

Discharge temperature range: -20 °C to 55 °C (-4 °F to 131 °F)

Charge Temperature Range: 0 °C to 45 °C (32 °F to 113 °F)

The BMS will prevent operation outside these limits. Integrated heaters are available for cold storage applications.

3. LiFT Pack M24 Early Warning System And Troubleshooting

The SOC gauge will display Device Trouble Codes (DTCs) which warn the user if there is an issue with the LiFT Pack M24. Table 1 is a matrix of possible issues, the resulting SOC gauge activity, and how to resolve the problem. Figure 3 shows which LEDs blink for each issue.

OEM Version - There are some cases where the LiFT Pack may need to cut power to the truck.

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Table 1: Situations where the LiFT Pack M24 will cut power to protect the battery.

Fault Description	Cause and Required Duration to Cut Power	Fault Protection	LED Indicator	Service Required?	Fault Resolution
High Cell	>3.60V	Contactors Opens	NONE	No	Wait 30 seconds until Contactor closes
Low Cell	<2.8V	Contactors Opens	LED1	No	Connect Appropriate Charger
Low Cell Imminent	<2.9V,	Beeper Sounds (Remote SOC only)	LED6	No	Charge Battery
Over Temperature (Discharge)	>55C	Contactors Opens	LED4	No	Allow pack to cool
Under Temperature (Discharge)	<-20C	Contactors Opens	LED4	No	Allow pack to warm
Over Temperature (Charge)	>45C	Contactors Opens	LED4	No	Allow pack to cool
Under Temperature (Charge)	<0C	Contactors Opens	LED4	No	Allow pack to warm
0% State of Charge	Immediate	Contactors Opens	LED1	No	Connect Appropriate Charger

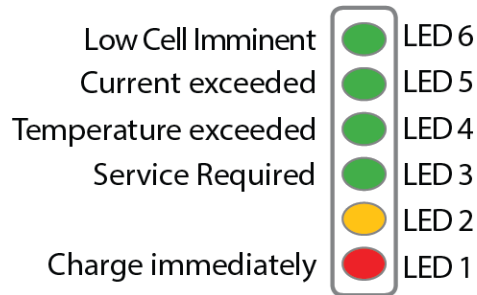


Figure 3: Device Trouble Codes (DTC)

3.1 When To Charge The Pack

When the battery reaches 5% SOC, the battery must be charged. It is highly recommended that the LiFT Pack M24 be charged whenever it is not in use to keep the pack balanced, charged, and at maximum health.

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3.2 Storage

Do not store the pack upside down or sideways. Make sure the LiFT Pack is turned off whenever it is being stored. This dramatically increases the storage time. The following table shows the storage times of a fully charged pack before it needs a recharge. If the pack is partially discharged, storage times are reduced.

Table 2: The number of days a fully charged LiFT Pack M24 can be stored before needing a recharge.

LiFT Pack M24 Capacity	400	576
Storage Time (on)	15 days	20 days
Storage Time (off)	1 year	1 year

IF A LiFT PACK M24 IS ALLOWED TO DRAIN COMPLETELY WHILE IN STORAGE, IT WILL DAMAGE THE LITHIUM-ION CELLS AND VOID THE WARRANTY.

3.3 Troubleshooting

See Table 1 for a list of possible issues and how to resolve them.

If you have additional problems, contact Flux Power Product Support at 877-505-3589

4. Safety And Reliability

Flux LiFT Packs are completely sealed and require no watering. No electrolyte must be added and there is no danger of acid spills or explosive vapors during normal use. In addition, the Flux LiFT Pack M24 is designed to pass the UL 2580 standard.

4.1 Hazardous Material Information

Lithium-ion batteries are considered HazMat Class 9 - Miscellaneous. There are no reporting regulations required for Flux LiFT Packs federally (specifically under the Resource Conservation and Recovery Act of 1976 (RCRA) and the Emergency Planning and Community Right-to-Know Act (EPCRA)). There are hazmat regulations when shipping lithium-ion batteries.

There are sometimes state or city regulations which differ from federal law, however generally speaking, a Flux LiFT Pack M24 under normal use has no danger of leakage, spilling, outgassing, or presenting any danger to the end user. Federal regulations are very strict when dealing with lead-acid batteries due to the environmental impacts of heavy metals (lead) and inherent dangers present: acid spills, explosive gases, and lead poisoning.

For more information on local regulations, contact your local EPA and fire department or contact FLUX Power and we will do our best to assist you.

4.2 What To Do If A Cell Breach Occurs

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Please refer to the Safety Data Sheet (SDS) on what to do in the event of an emergency. The SDS is available on the Flux Power website at www.fluxpower.com.

The damaged pack and cleaning materials should be placed in a sealed plastic or steel container and disposed of or recycled using the measures required by your local EPA.

4.3 Heavy Water Spray

The Flux LiFT Pack M24 should not be used in equipment where there is excessive water spray, such as applications that require power washing. The pack should also never be submerged in water. In the event that a LiFT Pack M24 is submerged, please do not attempt to use or charge the pack. Please contact Flux Power Product Support at 877-505-3589.

5. Recycling/Disposal

5.1 Disposal

Flux Power is committed to the environment. Lithium-ion batteries are not specifically discussed in the Federal Resource Conservation and Recovery Act (RCRA). However, given the federal requirements for hazardous materials, a completely discharged lithium iron phosphate cell is considered non-hazardous material. States and cities may have more stringent regulations in place, some of which blanket all lithium-ion batteries as hazardous waste, while others classify them as normal waste. The Flux LiFT Pack M24 End of Life Guide and Guarantee ensures full compliance with laws and the highest environmental standards. The guide is available on the Flux Power website at www.fluxpower.com.

5.2 Re-Use

When a LiFT Pack M24 no longer holds enough charge, there are already several options, such as:

- Cells can be deployed into alternate second life usage, such as grid storage or emergency power.
- The steel case and electronics can be refurbished into a new pack or be recycled.

5.3 Recycle

Lithium-ion batteries are recyclable and there are lithium-ion recycling plants nationwide. **Do not** include lithium-ion batteries in shipments of lead-acid batteries being sent for recycling. Sending a lithium-ion battery to a lead-acid recycler could cause damage to equipment and personnel. Contact Flux Power if you need assistance. If you are unable to locate a lithium-ion recycler in your area, Flux Power agrees to take back any battery that is at its end of life.

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6. Shipping Information

When shipping Flux LiFT Packs, the products are classified as UN 3480 Dangerous goods - Part II - Class 9 (miscellaneous) and can only be shipped ground. The battery must be secured to a pallet or in a wooden crate. There must be nonconductive material between multiple batteries, and they cannot be stacked. If it's being shipped in equipment it must be securely installed and protected against heat, short circuit, movement, and accidental activation of the equipment. Shipping declarations, hazmat shipping documentation, and hazmat shipping training are all required. Please see the Flux LiFT Pack Shipping and Reporting Guide for more information. It is the responsibility of the shipper to obey all regulations when shipping a Flux LiFT Pack M24.

This guide is available on the Flux Power website at www.fluxpower.com.

7. Contact Information



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