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Power. On Your Terms.

PHI 1310™ BATTERY

INSTALLATION MANUAL

Optimized Energy Storage & Management for Residential & Commercial Applications Utilizing Efficient, Safe, Non-Toxic, Energy Dense Lithium Ferrous Phosphate (LFP) Chemistry.

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SimpliPhi Your Power Security and Independence

and gain control of your own power.

SimpliPhi helps you manage your power as a personal resource. Anytime. Anywhere. SimpliPhi energy storage optimizes integration of renewable power with the grid and protects your home and mission-critical business functions from power outages and intermittency. SimpliPhi storage technology eliminates operating temperature constraints, toxic coolants and the risk of thermal runaway and fire.

SimpliPhi clean storage technology utilizes the industry's most environmentally benign chemistry combined with proprietary architecture and power electronics (BMS) that eliminate the need for cooling or ventilation to create products that provide energy security and resiliency—all with a 98% efficiency rate.

SimpliPhi Power offers proprietary, commercially available energy storage and management systems that are safe, non-toxic, reliable, durable, efficient, highly scalable, and economical over the lifetime of the module.

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The SimpliPhi Power PHI 1310™ Technical Overview:

PHI 1310™ Module Safety Protocol and Protective Features

Safety Protocol:

IMPORTANT NOTE: Circuit Breakers, Disconnects and Fuses should be employed throughout several points of a power storage and generation installation to effectively isolate and protect all components of the system to safeguard against faults, short circuits, polarity reversals or a failure of any component in the overall system. Fuses, breakers, wiring ratings and values should be determined by established standards and evaluated by certified electricians, licensed installers, and regional code authorities. Although each PHI 1310™ Module contains an internal BMS with circuitry that protects the Lithium Ferrous Phosphate cells from overcharge, over-discharge and excessive load amperage, the PHI 1310™ Modules must always be installed with a charge controller and the appropriate settings to protect the PHI 1310™ from open PV voltage and other high voltage charging sources. The PHI 1310™ Module Management System (BMS) alone will not protect the PHI Modules from these extreme electrical phenomena. Failure to adhere to installation protocol will void the Warranty.

CAUTION: Verify polarity at all connections with a standard volt meter before energizing the system! **Reverse polarity at the module terminals will void the Warranty and destroy the Modules.**

PHI 1310™ Modules pose some risk of shock or sparking during the installation and initial wiring and connection process. This is consistent with all other module based storage formats. Be sure any equipment breakers are in the “OFF” position to minimalize the risk of shock or sparks during the installation and commissioning of the system. Use of insulated gloves, clothing and footwear is always recommended when working in close proximity to electrical devices. Cover, restrain or remove jewelry or conductive objects (metal bracelets, rings, belt buckles, metal snaps, zippers, etc.) when working with any electrical or mechanical device. Cover or restrain long hair and loose clothing when working with any electrical or mechanical device.

PHI 1310™ Modules are not capable of thermal runaway. If the cells are severely damaged due to physical abuse incurred outside of warranted specifications, which can cause electrolyte leakage and other failures, as with any module, the electrolyte can be ignited by an open flame. However, unlike other lithium ion Modules (LCO) there are no hazardous or toxic materials in the electrolyte or the material components of PHI 1310™ Modules. See MSDS for chemical analyses (Page 23).

CAUTION: Charging LFP batteries at temperatures below freezing.

Do not attempt to charge the module below 32 F (0 degrees C). Although cold temperatures do not harm PHI Modules, attempts to charge at subfreezing temperatures can adversely affect SOH and cycle life, and will void the Warranty. If the module must be charged below 32 F (0 degrees C), the rate of charge must be at no more than 5% of the module’s rated capacity (C/20).

Only use a SimpliPhi approved LFP charger if ancillary charging is required before installation, testing or troubleshooting. Failure to use a SimpliPhi approved LFP charger will damage the module and void the warranty.

SimpliPhi Power PHI 1310™ Protective Features:

PHI 1310™ Modules are manufactured utilizing Lithium Ferrous Phosphate (LFP) cells, which are produced under exclusive patented licensed technologies, as well as proprietary materials, architecture, assembly methods and module management system (BMS). This assures the highest grade and quality, longest cycle-life, greatest efficiency and freedom from material impurities, toxicity and hazardous risk.

Each PHI 1310™ Module contains circuitry that protects the Lithium Ferrous Phosphate cells from overcharge, over-discharge and excessive load amperage. If the values specified are exceeded, the protective circuitry will shut down the flow of electricity to/from the PHI 1310™ Modules. In some cases, this will result in the need to re-initialize an inverter charger. Often, inverter system settings will be saved within the inverter memory storage and will not need to be reset. This is not an absolute standard but is common amongst most inverter chargers and should be anticipated if the PHI 1310™ Modules go into a state of self-protection and shut down the flow of electricity.

SimpliPhi Power PHI 1310™ Module Performance Parameters and Sizing Calculations:

PHI 1310™ Modules perform at full rated capacity in most operating environments. No increase in sizing, no special compensations, no burying procedure or insulation needs to be considered when determining the size of the energy storage and management system under the following circumstances and conditions.

See specific inverter manufacturer program settings for optimizing system integration

PHI 1310™	12V	24V
DC Voltages – Nominal	12.8V	25.6V
Amp Hours	102.4Ah	51.2Ah
Wh Capacity	1310Wh	1310Wh
Max Output Capacity	50A	50A
Max Charge Current	50A C/2	25A C/2
DC Voltage Range	10 to 14.4	20 to 28.8
Depth of Discharge	up to 100%	
Operating Efficiency	98%	
Operating Temp	-4° to 140°F (-20° to 60°C)	
Charge Temp	32° to 120°F (0° to 49°C)	
Self-Discharge Rate	<1% loss per month	
Cycle Life	10,000+	
Memory Effect	None	
Warranty Period	10 years	
Dimensions	11.25 x 9.25 x 6.25 inches/0.37 cu ft (2131095 x 28.575 x 15.875 cm/0.010m3)	
Weight	32.65 lbs (14.8 kg)	

Note: There is less than 1% loss of energy during charging.

SimpliPhi Modules do not need to be de-rated unless running continuously at more than 90% capacity, at temperatures below 0 degrees Celsius, or above 60 degrees Celsius. To achieve higher cycles of 10,000+, please refer to operating temperatures and inverter settings on page 16 of the manual. Further details are available on request from SimpliPhi Power.

Installation Procedure and Diagrams

System Sizing for Your Installation

The number of PHI 1310™ Modules should be specified in terms of total storage capacity before the initial installation based on the goals and objectives of the project. All PHI 1310™ Modules are balanced during final production and testing stages. Following proper wiring guidelines ensures that a system will not require any manual balancing processes.

DO NOT COMBINE PHI 1310 MODULES WITH OTHER BRANDS OR CHEMISTRIES

DO NOT MIX PHI MODULES FROM DIFFERENT INSTALLATIONS, CLIENTS, OR JOB SITES

System Configuration - Basic Concepts

Safe and reliable installation requires trained and certified technicians. The following discussion of PHI Module configurations is a basic primer. Due to the variety of systems and components in the field, all possible scenarios are not covered. This is not the purpose of this section of the manual. Refer to professional installers regarding your system and its components and specifications. We encourage you or your installer to contact us with any specific questions for technical support. We are committed to working with you and your installation team to achieve a safe, reliable storage system that will provide years of maintenance free service.

Simple Parallel Arrangements

Storage Capacity and total available **Amperage** is increased by **Parallel** arrangements. The following illustration shows two PHI 1310™ Modules in **Parallel**. For example, assume that these are 24V Modules.

Note: the overall Voltage range is not changed. The arrangement remains at 24 Volts, the available AH capacity, or ability to provide 24 Volt power over time, has been doubled. The available amperage from the system has been doubled. The same configuration should be applied to other parallel arrangements, whether they are 12V or 24V. See Figure 1.2.

PHI MODULES ARE DESIGNED FOR PARALLEL OPERATION ONLY - DO NOT ARRANGE IN SERIES FOR INCREASED VOLTAGE

WIRING IN SERIES WILL VOID WARRANTY

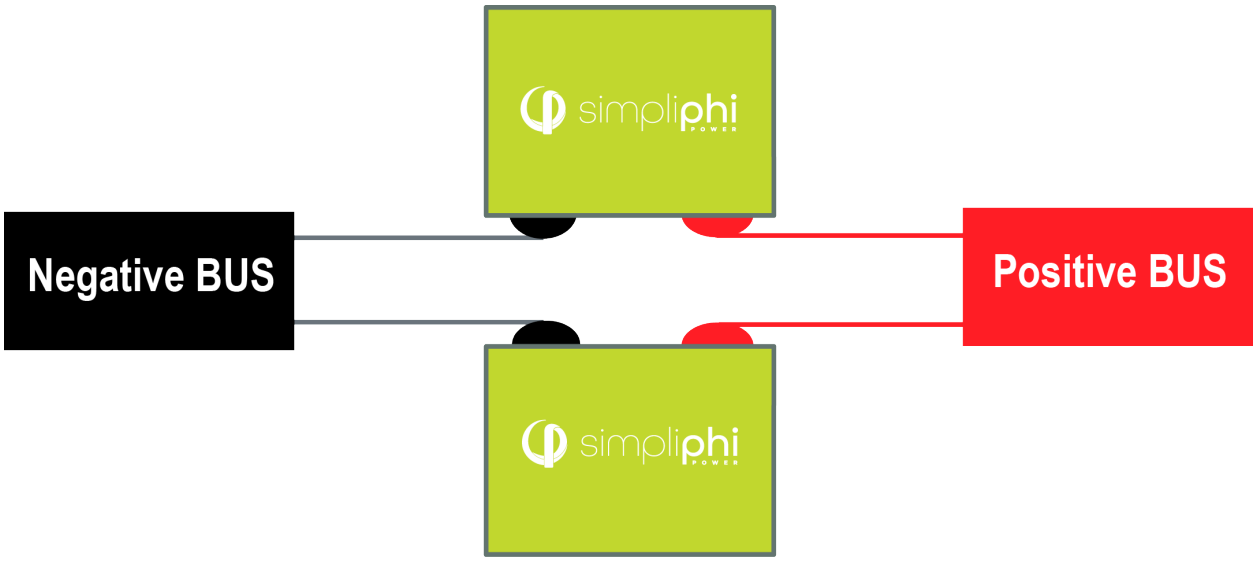
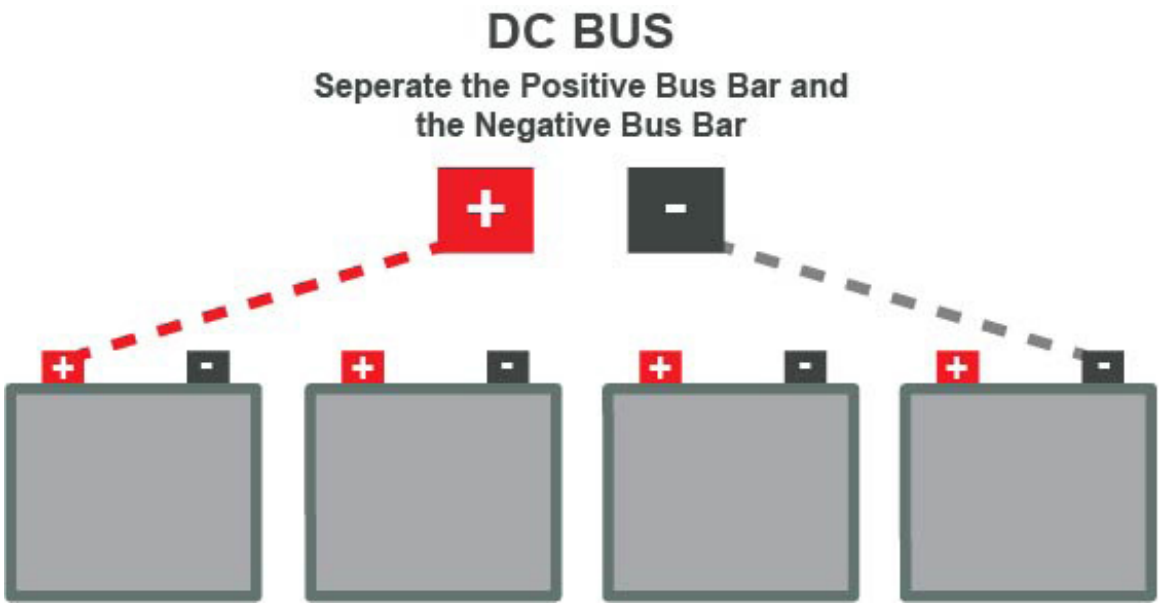


Figure 1.2

Figure 1.2 represents two PHI 1310™ Modules in Parallel. Wire lengths from PHI Modules should be identical in length and gauge in order to balance the load across both (all) PHI Modules in the installation. Identical wiring length is a critical feature of parallel power storage systems that must be adhered to throughout all parallel wiring instructions.

Increasing Capacity with Parallel PHI Module Configurations

Special attention should be paid for parallel installations. Correct wiring is essential to ensure optimum performance and system longevity. All wire “runs” should utilize identical wiring gauge and identical wire lengths between PHI 1310™ Modules and the common negative or positive “Bus” or Load.



Use identical length and gauge wire to balance the load across the Modules.

Helpful Tips:

- **Determine the cable length for the module terminal farthest from the bus.**
- **Make all Module cables a matching length.**
- **Additional cabling or slack that remains with the shorter distance runs can be coiled and secured with Zip Ties.**

Figure 1.3

Figure 1.3 depicts one of four PHI Modules that will have been wired in Parallel. The wiring arrangement will be repeated to connect all four PHI Modules in parallel. The completion of this configuration will require 8 identical lengths of appropriately heavy gauge copper wire.

Alternate wiring schemes are also effective. The “Cross Diagonal” method is perhaps less common but has been evaluated in outside facilities and found to be very effective. The Cross diagonal method can minimize copper wire runs to a degree and can also serve as a tool in complex wiring schemes where space is at a minimum or system layouts are complex or irregular. For more information on cross diagonal wiring methods, and the benefit of correct wiring configurations, refer to:

http://www.smartgauge.co.uk/batt_con.html

KEY POINTS

1. Each PHI 1310™ Module contains circuitry that protects the Lithium Ferrous Phosphate cells from overcharge, over-discharge, excessive charge and load amperage. If the values specified are exceeded, the Modules will enter a protective shut down state. In some cases, this will result in the need to re-initialize the inverter/charger or other pieces of equipment in the installation. Often, inverter system settings will be saved within the inverter memory storage and will not need to be reset. This is not an absolute standard but is common among most inverter/chargers. Check your inverter manufacturer specifications.

2. If PHI 1310™ Modules enter a self-protective mode, negligible voltage readings will be present until the units reset. In some instances, after a prolonged shut down, a charge might need to be manually applied to the energy storage bank. Should this occur, please contact SimpliPhi Power for technical support. The PHI Modules are designed to remain robust and safe under most circumstances.

3. Although each PHI 1310™ Module contains circuitry that protects the Lithium Ferrous Phosphate cells from overcharge, over-discharge and excessive load amperage, the PHI 1310™ the PHI 1310™ from open PV and other high voltage sources. The PHI 1310™ Module alone will not protect the Modules from these extreme electrical phenomena.

4. **GRID TIED SYSTEMS:** Once the PHI 1310™ Modules have been installed, turn on the entire system to test, but **once testing has been completed please disconnect the PHI 1310™ Module Bank from the load center until your local Utility Inspector is ready to turn on the entire system.** The charge controllers and inverter monitoring systems can drain the PHI 1310™ Modules over an extended period of time when the entire system is not fully operational due to the electrical draw of the system components.

5. **OFF GRID SYSTEMS: Do not connect the PHI 1310™ Modules until the entire system is ready to turn on and is fully operational.**

6. See Charge Controller Settings in the Appendix of this manual. PHI 1310™ Modules are compatible with almost all Inverter Chargers and Charge Controllers. Please contact SimpliPhi Power for recommended settings for any device not expressly covered in this manual.

7. Only use a SimpliPhi approved LFP charger if ancillary charging is required before installation, testing or troubleshooting. Failure to use a SimpliPhi approved LFP charger will damage the module and void the warranty.

8. **CAUTION: Charging PHI LFP batteries at temperatures below freezing.**

   Do not attempt to charge the module below 32 F (0 degrees C). Attempts to charge at subfreezing temperatures can adversely affect SOH and cycle life, and will void the warranty.

   If the module must be charged at temperatures below freezing the rate of charge must be at no more than 5% of the module's rated capacity (C/20).

Connecting SimpliPhi Power PHI 1310™ Modules: Terminal Specs and Hardware

PHI 1310™ Module Connection Terminals

The PHI 1310™ Modules are equipped with Anderson connectors. Do not reverse polarity. It will void the warranty. Use a volt meter to check polarity before connecting terminals.

Connecting Cable Leads to the PHI 1310™ Modules:

NOTICE: SPARK MAY BE PRESENT WHEN CONNECTING WIRES TO PHI 1310™

System Configuration - Basic Concepts

A brief small spark is often present when connecting the second of two leads to a module. Example: If the Positive has been connected, a small spark will likely be present when connecting the Negative lead. **This is a normal occurrence.** Complete all connections in a clean, ventilated, well-lit area.

Power Cabling for the PHI 1310™ Module is not included. Your qualified installer or application specifications will determine the wire gauge for your system.

Considerations for Power Cable Terminations

- PHI 1310™ Module Anderson connector SB50
- Power Cable Wire Gauge: Generally, anywhere from 6 AWG or larger.

Protection from the Environment

Anticorrosive compounds or epoxies are occasionally used in harsh or marine climate installations. Please contact your Electrician or Qualified Installer to determine if this is advisable, and if so, what solution best suits your application.

Final Connection of the Installation

Final installation and operation guidelines will be dictated by your Electrician and Installer based on the overall properties of and procedures for the equipment in your installation and any code requirements that apply to your region. SimpliPhi Power, Inc. technicians and sales staff are available to provide any additional information on the PHI 1310™ Module as needed. Please contact SimpliPhi Power for any technical support at your convenience. SimpliPhi Power, Inc. is committed to providing safe, reliable energy storage and management that is maintenance free, non-toxic and long-lasting. This commitment extends to our customers, valued installers, partners, and to the community at large. Please be aware of the potential electrical hazards before interacting with any and all electrical or mechanical devices. Please take all necessary precautions in your projects and installations. Please refer to page 4 for safety guidelines.

PHI Modules feature a Low Module Voltage Cut Off (LBCO). This is a self-protection mechanism that prevents over discharge. The LBCO will cause the module to turn off once Modules approach zero capacity or 100+ percent depth of discharge.

Most, if not all, inverters have related features. These features are often referred to as “Load Disconnect”, “Load Shedding” or similar. These features are there to protect the module bank from excessive discharge. In instances of low module voltage, when there is no incoming energy to recharge the module bank, the inverter will disconnect the load and remain in standby until the module bank is recharged.

For Off Grid installations, where charge energy is only provided by PV arrays, Inverter “Load Disconnects” are generally set at a value that will allow a system to remain online and in standby for at least 24 hours (10% at top of charge and 10% at bottom of charge). This allows a system to stay online until at least one full day of sun can recharge the module bank.

In any application, off-grid or grid-tied, if your PHI 1310™ module bank is reaching the LBCO, load disconnects or load shedding set points may need to be adjusted.

In case of LBCO, cycle the DC Module Disconnect (inverter), in order to reset the system. Only complete this procedure when there is a charge source available, otherwise, the system will simply reach LBCO in a short time period and shut down again.

SimpliPhi Power GUIDE FOR OPERATING PARAMETERS PER WARRANTY

Although SimpliPhi Modules are capable of performing at very high rates and depths of discharge within a very wide temperature range, in order to achieve extended life cycles and to comply with the Warranty, the following guidelines should be followed:

Discharge/Charge Rate: C/2 (2 hour)

Recommended Programmed Voltages of Ancillary Equipment for 5,000 Cycles:

- **Recharge or Low Cut-Off Voltage: PHI 12V: 11.6V; PHI 24V: 23.2V**
- **Absorb or High Cut-Off Voltage: PHI 12: 14.4V; PHI 24V: 28.8V**

Recommended Programmed Voltages of Ancillary Equipment for 10,000 Cycles:

- **Recharge or Low Cut-Off Voltage: PHI 12V: 12.25V; PHI 24V: 24.5V**
- **Absorb or High Cut-Off Voltage: PHI 12V:14V; PHI 24V: 28V**

Rates of Continuous Discharge and Charge For Maxium Cell Life:

	12V	24V
Max Discharge Current	50A	25A
Max Charge Current	50A	25A

- **Storage must be equal to or more than twice the rated output of the Inverter**

Operating Temperature Range Per Warranty:

- **23°F to 120°F (-5°C to 49°C) for 5,000 cycles**
- **32°F to 110°F (0°C to 43°C) for 10,000 cycles**

Cycle Life

- **Equivalent to 80% Retained Capacity**

⚠ Caution: Verify polarity at all connections before energizing system. Reverse polarity at the battery terminals will void the Warranty and destroy

PHI Lithium Ferrous Phosphate (LFP) BMS Features and Specifications

Model Nos: PHI 1310™, 12V, PHI 1310™ 24V

Feature Overview: BMS

- Over Charge Voltage Protection
- Over Discharge Protection
- Over Current Protection for Discharge Via Thermal Control
- Short Circuit Protection
- Cell Balancing

Cell Pack Configuration

- 1310Wh, 12V 102 Amp Hours
- 1310Wh, 24V 51.2 Amp Hours

Cell Voltage Parameters

Max Charge Voltage 3.65V per Cell

- 14.4 Max Charge Voltage for 4s/12V
- 28.8 Max Charge Voltage for 8s/24V

Load Disconnect 2.25V per Cell

- 10V Low Voltage Cut Off for 4s/12V
- 20V Low Voltage Cut Off for 8s/24V

Recommended Output and Input Current Parameters

- 12V: 50A Continuous (C/2), 60A Max
- 24V: 25A Continuous (C/2), 60A Max

Short Circuit Protection Parameters

- <0.5 Millisecond detection, Release upon Load Cut and Clear Short

Cell Balancing Parameters

- 0-100mA per cell Balancing Current

Fault Current Rating

- 12V PHI 1310 1920 Amps
- 24V PHI 1310 960 Amps

All SimpliPhi Power products are designed to work exclusively in parallel.
Never connect in series to achive higher voltages.

PHI 1310™ Module Units

Safety Attributes and Certifications/Green Characteristics

SAFETY ATTRIBUTES AND CERTIFICATIONS

Intrinsically Safe Operation and Installation

The PHI Lithium Ferrous Phosphate (LFP) module cell component is made with an intrinsically safe cathode material (iron phosphate). This creates a strong molecular bond, which withstands extreme conditions, prolongs cycle life, and maintains integrity with little or no maintenance over extended periods of time.

There is virtually no danger of Thermal Runaway, as there may be with Lead Acid, NiCd, and Lithium Cobalt type Modules. No venting or cooling is required. No precautions or special structural considerations are necessary when installing PHI 1310™ Modules.

There are No Safety Hazards due to Off-Gassing, Exposure to Acids or Thermal Runaway as there are with Lead Acid AGM type Modules or NMC and other cobalt based batteries

PHI 1310™ Modules do not vent dangerous gasses, such as hydrogen and oxygen, because there are no chemicals used in the creation of the electrical energy, in contrast to Lead Acid and other module chemistries. There are no dangers of exposure to sulfuric acid because PHI 1310™ Modules do not have caustic electrolytes. Thermal runaway is not an issue with PHI products due to the basic nature of Lithium Ferro Phosphate cell chemistry utilized in all our power storage products.

PHI 1310™ Module Control and Protective Circuitry

SimpliPhi Power Inc. utilizes balancing, voltage regulation, thermal, current controls, as well as other protective measures, in its PHI 1310™ Module Management System (BMS). This protective circuitry is embedded in the architecture of each PHI 1310™ Module.

UN DOT Certified Cells

The Lithium Ferrous Phosphate (LFP) cells are independently certified to withstand the UN DOT T1-T8 testing guidelines with no special circuitry added. These tests include short circuit, over-voltage, overcharging, extreme temperature, high altitudes, shock and extreme vibration testing.

UL Compliance

The Lithium Ferrous Phosphate cells within the PHI 1310™ Modules fully comply with the safety testing parameters of UL 1642.

RoHS Compliant

SimpliPhi Power Modules are RoHS compliant. Any RoHS compliant component is tested for the presence of Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent chromium (Hex-Cr), Polybrominated biphenyls (PBB), and Polybrominated diphenyl ethers (PBDE). For Cadmium and Hexavalent chromium, there must be less than 0.01% of the substance by weight at raw homogeneous materials levels. For Lead, PBB, and PBDE, there must be no more than 0.1% of the material, when calculated by weight at raw homogeneous materials. Any RoHS compliant component must have 100 ppm or less of mercury and the mercury must not have been intentionally added to the component. In the EU, some military and medical equipment are exempt from RoHS compliance.

Green Characteristics, Environmental and Ecological considerations

Materials

The primary materials (lithium, iron, phosphate) that make up PHI 1310™ Batteries are environmentally benign and pose very few polluting or environmentally degrading by-products in the harvesting and refinement processes. This is especially true when compared to those of lead acid, NiCad, and NiMH batteries.

By Products

There are no toxic by-products associated with the assembly or use of PHI 1310™ Batteries, such as off-gassing hydrogen, sulfuric acid spillage, lead contamination, or explosive chemicals.

Operation

There is no need for maintenance, such as adding water or chemicals, nor is there corrosion of terminals or containment facilities, or dispersion of fumes as with other battery types. Once installed, PHI 1310™ Batteries are maintenance free.

Life Cycles

PHI 1310™ Batteries are designed for thousands of cycles while maintaining 80 percent or more of their initial capacity.

Disposal

PHI products are non-hazardous, may be disposed of without damage to the ecosystem, and returned to the earth, while easily recombining with the elements without harmful by-products. The outer casing and brackets contain steel, aluminum, copper, cardboard, and recyclable plastic. Lithium Ferrous Phosphate (LFP) materials can also be recycled through established battery centers if desired**.**

Lithium Ferrous Phosphate Batteries and the Environment

As the use of this battery chemistry in larger batteries becomes more common, questions of sustainability and environmental impact inevitably arise. Of the lithium ferrous phosphate chemistries being considered for large format batteries, SimpliPhi Power believes that batteries based on our proprietary lithium ferrous phosphate chemistry and circuitry offer a clear advantage, not only over alternate Li-ion chemistries (lithium cobalt oxide), but all battery chemistries that are currently commercially available. This belief is based on the minimal environmental impact associated with the manufacturing of PHI 1310™ Batteries, the extended cycle life and the significantly smaller end-of-life footprint that results from the use of PHI 1310™ Batteries.

Summary

The Lithium Ferrous Phosphate (LFP) cells utilized throughout the entire PHI and LibertyPak product lines are classified as non-hazardous by OSHA and WHMIS. They are non-toxic, unlike NiMH, NiCad or Lead Acid types of batteries (including AGM). The PHI 1310™ Batteries contain the least amount of toxic metals, and are the most eco friendly of all common battery types. Lithium easily combines into harmless compounds when disposed of. The PHI 1310™ Batteries are the least polluting rechargeable batteries on the market today – no fumes, leaking, or gas discharge and no chemicals or acids to worry about.

Designed and Assembled in the USA Using Exclusive American Patented Technologies.

Appendix

MATERIAL SAFETY DATA SHEET

SECTION 1 – PRODUCT IDENTIFICATION

Product Name: Electronically Managed Energy Storage Device (Battery)

Models: PHI 1310™

Product Use: Lithium ion storage batteries - Harmony Code #8507.60.0000, Foreign Trade Schedule B

Manufacturer: SimpliPhi Power, Inc., Ojai Ca. U.S.A. 805 640 6700

SECTION 2 - COMPOSITION AND INGREDIENT INFORMATION

Under normal use, this battery dPHI not expose the user to hazardous ingredients.

USA: This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard Requirement.

The information contained in this Material Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Canada: This is not a controlled product under WHMIS. This product meets the definition of a "Manufactured Article" and is not subject to the regulations of the Hazardous Products Act.

SECTION 3 - HAZARDS IDENTIFICATION

Common Chemical Name	CAS #	Percent of Content (%)	Classification & Hazard Labeling
Lithium Ferrophosphate (LiFePO4)	15365-14-7	25-35	Eye, Skin, Respiratory Irritant
Carbon, as Graphite	7440-44-0	12-18	Eye, Skin, Respiratory Irritant
Aluminum metal	7429-90-5	3-7	Inert
Copper metal	7440-50-8	5-9	Inert
Electrolyte		12-17	Mixture:
Ethylene carbonate	96-49-1		Flammable; Reactive; Sensi-tizer;
Dimethyl carbonate	616-38-6		Eye, Skin & Respiratory
Ethyl methyl carbonate	623-53-0		
Lithium Hexafluorophosphate	21324-40-3		

Preparation Hazards and Classification: Not dangerous with normal use. The battery should not be disassembled or incinerated. Exposure to the ingredients contained within or their combustion products could be harmful.

Appearance, Color, and Odor: Solid object, no odor.

Primary Route(s) of Exposure: Risk of exposure will only occur if the battery or cell is mechanically, thermally or electrically abused and the enclosure is compromised. If this occurs, exposure to electrolyte solutions contained within the battery or cell may occur by inhalation, eye contact, skin contact and ingestion.

POTENTIAL HEALTH EFFECTS

Inhalation: Inhalation of material from a sealed battery is not an expected route of exposure. Vapors or mists from a ruptured battery may cause respiratory irritation.

Ingestion: Swallowing of material from a sealed battery is not an expected route of exposure. Swallowing mists from a ruptured battery may cause respiratory irritation, chemical burns of the mouth and gastrointestinal tract irritation.

Skin: Contact between the battery and skin will not cause any harm. Skin contact with positive and negative terminals of high voltages may cause burns to the skin. Skin contact with a ruptured battery can cause skin irritation.

Eye: Contact between the battery and eye will not cause any harm. Eye contact with the contents of a ruptured battery can cause severe irritation to the eye.

Medical Conditions Aggravated by Exposure: Not Available

SECTION 4 – FIRST AID MEASURES

Skin Contact: Wash affected area with lukewarm water for at least 30 minutes. If irritation or pain persists, seek medical attention.

Eye Contact: Wash affected eye with lukewarm water for at least 30 minutes. Rinse with saline solution if possible. Seek medical attention.

Inhalation: Move victim to fresh air and remove source of contamination from area. Seek medical attention.

Caution: In all cases if irritation persists, seek medical assistance at once.

SECTION 5 – FIRE FIGHTING MEASURES

Extinguishing Media: Water, carbon dioxide, dry chemical powder and foam are most effective means to extinguish a Lithium Ferrous Phosphate (LFP) battery fire.

Fire Fighting Procedure: Put on fully protective gear, including self-contained breathing apparatus, goggles, fireproof jacket and gloves.

Unusual Fire and Explosion Hazards: Exposing battery pack or cell to excessive heat, fire or over voltage condition may cause a leak, fire, hazardous vapors and hazardous decomposition products. Damaged or opened cells can result in rapid heating and the release of flammable vapors

SECTION 6 – ACCIDENTAL RELEASE MEASURES

The material contained within the batteries or cells is only expelled under abusive conditions. Use a shovel and cover battery with sand or vermiculite, place in an approved container and dispose in accordance with section 13.

SECTION 7 – HANDLING AND STORAGE

Handling: Do not expose battery or cell to extreme temperatures or fire. Do not disassemble, crush or puncture battery.

Storage: Insulate positive and negative terminals to avoid short circuit. Store in a cool and well - ventilated area and avoid direct sunlight. Elevated temperatures can result in reduced battery life.

SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION

Respiratory Protection: Not necessary under normal use. In case of battery or cell rupture, use a self-contained full-face respiratory mask.

Eye Protection: Not necessary under normal use. Wear safety goggles if handling a ruptured or leaking cell or battery pack.

Hand Protection: Not necessary under normal use. Wear rubber gloves when if handling a ruptured or leaking cell or battery pack.

Skin Protection: Not necessary under normal use. Wear rubber apron and rubber gloves if handling a ruptured or leaking cell or battery pack.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Solid
Odor Type	Odorless
Appearance	Battery
Odor Threshold	Not Applicable
pH	Not Applicable
Evaporative Rate	(n-Butyl Acetate = 1) Not Applicable
Relative Density	Not Applicable
Auto Ignition Temperature(C°)	Not Applicable
Boiling Point	Not Applicable
Flammability Limits (%)	Not Applicable
Melting Point	Not Applicable
Vapor Pressure	(mm Hg @ 20 C°) Not Applicable
Viscosity	Not Applicable
Vapor Density	(Air = 1) Not Applicable
Oxidizing Properties	Not Applicable
Solubility in Water	Insoluble
Flash Point and Method (C°)	Not Applicable
Water/ Oil distribution coefficient	Not Applicable

SECTION 10 – STABILITY AND REACTIVITY

Stability	Stable
Conditions to Avoid	Avoid exposing battery to high temperatures over 452 degrees F. Do not incinerate, deform, mutilate, crush, pierce, short circuit or disassemble
Materials to Avoid	Not Applicable
Hazardous Decomposition Products	Combustible vapors may be released if exposed to fire
Possibility of Hazardous Reactions	Not available

SECTION 11 - TOXICOLOGICAL INFORMATION

Irritation	Risk of irritation only occurs if cells or batteries are mechanically, thermally or electrically abused and the enclosure is compromised.
Neurological Effects	Not Applicable
Sensitization	Not Applicable
Teratogenicity	Not Applicable
Reproductive Toxicity	Not Applicable
Mutagenicity (Genetic Effects)	Not Applicable
Toxicologically Synergistic Materials	Not Applicable

SECTION 12 – ECOLOGICAL INFORMATION

Bioaccumulative potential	Not available
Persistence and degradability	Not available
Mobility	Not available
Ecotoxicity	Not available
Other adverse effects	Not available

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste Disposal Method	Recycling is encouraged. Dispose of in accordance with local, state and federal laws and regulations.
USA	Dispose of in accordance with local, state and federal laws and regulations
Canada	Dispose of in accordance with local, state and federal laws and regulations
EC	Dispose of in accordance with relevant EC Directives

SECTION 14 – TRANSPORT INFORMATION

Hazardous Classifications:
PHI Battery PHI 1310™ is categorized in the following manner and should be packaged, labeled, documented and declared accordingly:

UN3481, Lithium ion batteries contained in equipment, 9, II.

In all cases, the SHIPPER bares the responsibility to prepare all shipments in accordance with the requirements set forth and/or enforced by United Nations Comity of Experts (UNCOE), the International Civil Aviation Organization (ICAO), FAA, U.S. Department of Transportation (DOT), and International Maritime Organization (IMO).

NOTE:

- **Shipping guidelines are updated over time. Please refer to the most up to date requirements.**
- **Parcel Carriers will have their own guidelines and requirements that must be observed. Contact your carrier for specific guidelines and requirements.**

The following website may be helpful for HazMat Guidelines, within the US.

http://www.phmsa.dot.gov/hazmat
http://www.dot.gov/

Please contact SimpliPhi Support for additional documentation, if required.

The battery cells contain no metallic lithium and pass the tests defined in UN model regulation section 38.3. Do not expose to temperatures over 452 degrees F. or direct flame. Lithium Ferrous Phosphate based batteries are incapable of thermal runaway, or spontaneous ignition under any condition and are non-hazardous. The cells in PHI 1310 cases are UN DOT certified regulation 38.3 safe for transport.

California Prop 65	This product does not contain chemicals know to the State of California to cause cancer or reproductive toxicity
Canada	This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contain all the information required by the Controlled Products Regulations
WHMIS Classification	Not Controlled
New Substance Notification Regulations	All ingredients in the product are listed, as required, on Canada's Domestic Substance List
NPRI Substances (National Pollutant Release Inventory):	This product does not contain any NPRI chemicals
EC Classification for the Substance/ Preparation	
Symbol	This product is not classified as dangerous according to Directive 1999/45/EC and it's amendments
Risk Phrases	None
Safety Phrases	S2: Keep out of the reach of children

CONTACTING SimpliPhi

For technical support, please contact us as follows:
805.640.1874
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simpliphi POWER

Power. On Your Terms.

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