



Tiger
LITHIUM

PRODUCT MANUAL

Lithium Iron Phosphate (LiFePO₄)
Energy Systems - **MARINE BATTERIES**

Please read this manual carefully before using or installing your **Tiger Lithium® battery, charger, or accessory.**

Be sure to review the **Safety Information section** for important precautions, and retain this guide for future reference.

Working with batteries and electrical systems involves high current and energy levels and can be dangerous if not handled properly.

Tiger Lithium® is not responsible for damage or injury caused by unsafe installation practices, misuse, or failure to follow the instructions in this manual.

Professional Installation Recommended

If you do not feel safe or comfortable working with electrical systems, or if you are not qualified to install a battery or perform any procedure described in this manual, please consult a **qualified electrician, technician, or authorized installer.**

This manual contains important information on how to safely **install, operate, charge, store, and maintain** your Tiger Lithium system to ensure optimal performance and service life.

Please read this manual completely before placing your system into operation.

Contact Information

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Additional diagrams, technical resources, and updated installation references are available at:
www.tigerlithium.com/resources

Customer Service Hours

Monday–Friday: 9:00 AM – 5:00 PM

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1. INTRODUCTION

Applicable Models

This manual applies to Tiger Lithium Lithium Iron Phosphate (LiFePO₄) Marine Battery Systems, including:

- Starting Batteries
- Deep Cycle Batteries
- Dual Voltage Marine Batteries (model dependent)

Refer to the product label or technical specifications to confirm your specific model and configuration.

Intended Use

Tiger Lithium® Marine Batteries are designed for use in marine electrical systems, including:

- Engine starting systems (outboard and inboard)
- House battery systems (electronics, pumps, lighting, accessories)
- Trolling motor systems
- Multi-battery marine installations

These batteries are engineered to replace traditional lead-acid and AGM batteries while delivering improved performance, longer service life, and enhanced system reliability.

Marine Application Overview

Marine electrical systems often include multiple battery banks and charging sources operating simultaneously. Tiger Lithium® batteries are designed to integrate into these environments and support:

- Starting and deep cycle applications within the same vessel
- Alternator and stator-based charging systems
- AC shore power charging systems
- Solar charging systems with MPPT controllers
- DC-to-DC charging between battery banks

Proper system design, installation, and configuration are critical to ensure safe and reliable operation.

System Capabilities

Tiger Lithium® Marine Batteries incorporate advanced features designed specifically for marine environments:

- Integrated Battery Management System (BMS) for protection and system optimization
- Tiger Rescue Reserve™ (TRR) for emergency starting capability (starting models only)
- Hiberstate™ for ultra-low-power storage and reduced energy loss
- Bluetooth® monitoring and diagnostics via the Sentinel-LNX™ App
- Engineered compatibility with modern marine charging systems (model dependent)
- Optional Dual Voltage Outputs for powering multiple onboard systems from a single battery

These features are designed to improve safety, reliability, and ease of use in demanding marine applications.

About This Manual

This manual provides essential information for:

- Safe installation
- System configuration
- Charging and operation
- Maintenance and storage
- Troubleshooting and diagnostics

This manual is intended for both installers and end users.

IMPORTANT

Installation and service of lithium battery systems should be performed by qualified personnel familiar with marine electrical systems, lithium battery safety practices, and applicable

| industry standards.

Final system compliance, installation quality, and vessel integration remain the responsibility of the installer and/or vessel manufacturer.

For the latest manuals, technical updates, and support resources, visit:

www.tigerlithium.com/resources

2. INCLUDED EQUIPMENT

Standard Battery Package

All Tiger Lithium Marine Batteries include:

- Qty. (1) Tiger Lithium® Marine Battery
- Protective terminal covers (installed)
- Terminal hardware (model dependent)
- Product documentation

Some models may include additional accessories or hardware depending on product configuration and application.

Optional Accessories

Depending on system configuration and vessel requirements, additional components may be recommended or required for proper operation:

- AC shore power battery chargers
- Onboard multi-bank battery chargers
- DC-to-DC chargers (for alternator integration or mixed battery systems)
- External alternator regulators (model dependent)
- Solar charge controllers (MPPT)
- Battery monitoring displays or gauges
- Communication cables and adapters

IMPORTANT

Some accessories and charging components shown in illustrations or wiring diagrams may be optional equipment and are not included with all battery models or system packages.

Configuration Variations

Marine battery systems are frequently customized based on vessel design, charging architecture, and onboard equipment requirements.

Included components may vary depending on:

- Battery model
- System voltage
- Battery quantity
- Charging configuration
- Dealer or OEM installation package

Always verify included components against your order documentation before beginning installation.

Installer Responsibility

It is the responsibility of the installer to ensure:

- All required system components are present
- All charging devices are compatible with lithium battery operation
- The electrical system is properly protected
- The installation complies with applicable marine electrical standards and vessel requirements
- The system is configured for the intended application

Additional equipment not supplied with the battery may be required depending on vessel design and system complexity.

Refer to later sections of this manual for installation requirements, approved charging methods, and supported system configurations.

3. IMPORTANT SAFETY INFORMATION

This section contains critical safety information that must be followed when installing, operating, or servicing Tiger Lithium Marine Battery Systems.

Failure to follow these guidelines may result in electric shock, fire, serious injury, equipment damage, or vessel damage.

General Safety Guidelines

Always follow these precautions:

- Read this manual completely before installation or operation
- Use Tiger Lithium® batteries only for their intended purpose

- Keep batteries away from open flames, sparks, and excessive heat
- Do not short-circuit battery terminals
- Do not disassemble, crush, puncture, or modify the battery
- Keep batteries out of reach of children
- Use insulated tools when working around battery terminals
- Remove metal jewelry and conductive objects before performing electrical work

High Current Warning

WARNING — HIGH CURRENT HAZARD

Tiger Lithium® batteries are capable of delivering extremely high discharge current.

Improper installation or lack of system protection may result in:

- Severe electrical faults
- Equipment damage
- Fire or personal injury

To reduce risk:

- Always install properly rated overcurrent protection
- Use correctly sized cables and connectors
- Ensure all electrical connections are secure and properly torqued
- Never operate the battery with loose or damaged wiring
- Keep conductive materials away from exposed terminals

Installation Safety

- Disconnect all power sources before beginning installation
- Verify the electrical system is fully de-energized before working on connections
- Follow all wiring diagrams and installation instructions
- Ensure correct polarity on all connections (positive to positive, negative to negative)
- Use appropriate personal protective equipment (PPE), including eye protection and insulated gloves
- Verify all system components are compatible with lithium battery operation
- Ensure adequate access for service, inspection, and emergency disconnect procedures

IMPORTANT

Improper installation may result in system malfunction, equipment damage, unsafe operating conditions, fire hazard, or personal injury.

Charging Safety

- Use only chargers designed for LiFePO₄ (LFP) battery systems

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- Verify charger voltage and configuration before use
- Do not charge outside approved temperature ranges
- Ensure adequate ventilation during charging
- Disconnect chargers before performing maintenance

If abnormal behavior occurs during charging:

- Stop charging immediately
- Disconnect the charger
- Inspect the system or contact technical support

Temperature Limits

Tiger Lithium® batteries must be operated within approved temperature ranges.

Standard (Non-Heated) Battery Models

- Charging: 32°F to 113°F (0°C to 45°C)
- Discharging: -4°F to 140°F (-20°C to 60°C)

Heated Battery Models (If Equipped)

- Internal heating enables charging in cold environments
- Charging begins once internal battery temperature reaches a safe threshold

IMPORTANT

Charging a non-heated lithium battery below 32°F (0°C) may cause permanent battery damage.

The internal Battery Management System (BMS) automatically prevents unsafe charging; however, users must still follow proper operating guidelines.

Marine-Specific Safety Considerations

Marine environments introduce additional risks that must be addressed during installation and operation.

Fuel Vapor & Ignition Risk

- Do not install batteries in areas where fuel vapors may accumulate unless properly ventilated
- Avoid sparks, open flame, or unprotected electrical connections near fuel systems

Water & Moisture Exposure

- Batteries are not intended for direct water immersion or submersion
- Avoid installation in areas subject to standing water or continuous water exposure
- Install in a dry, protected location whenever possible
- Ensure all connections are corrosion-resistant and properly sealed

Vibration & Movement

- Secure batteries to prevent movement during vessel operation
- Use appropriate mounting hardware designed for marine environments

Corrosion Protection

- Use marine-grade terminals and tinned copper wiring
- Apply appropriate corrosion protection methods such as dielectric grease or terminal protectants
- Inspect terminals and cable connections periodically

Required System Protection

Every installation must include:

- Properly rated fuse or circuit breaker installed close to the battery
- Correct cable sizing for expected current load
- Secure mechanical mounting
- Adequate ventilation and system access

Failure to implement proper system protection may result in:

- Equipment damage
- Fire hazard
- Personal injury

When to Stop Using the Battery

Immediately discontinue use and contact Tiger Lithium® support if the battery:

- Shows signs of physical damage
- Swells, leaks, or emits odor
- Becomes excessively hot
- Exhibits abnormal operation or repeated fault conditions
- Has been submerged or exposed to severe water intrusion

IMPORTANT

Do not attempt to repair a damaged battery or open the battery enclosure. Doing so may void the warranty and result in serious injury, fire hazard, or property damage.

Compliance Note (Marine Applications)

For marine installations, Tiger Lithium® recommends adherence to applicable industry standards, including:

- ABYC E-11 (AC & DC Electrical Systems)
- ABYC E-13 (Lithium Battery Systems)

Installations should also comply with:

- Applicable local regulations
- Vessel manufacturer requirements
- Marine industry best practices

Installation by a qualified marine electrician is strongly recommended.

Additional Information

Refer to:

- Section 4 — Emergency Procedures
- Section 17 — Charging Systems
- Section 18 — Electrical System Protection

4. EMERGENCY PROCEDURES / BATTERY FAULT RESPONSE

This section outlines the actions required in the event of abnormal battery behavior or system faults.

Immediate and appropriate response is critical to reduce the risk of injury, fire, vessel damage, or equipment damage.

Recognizing Abnormal Conditions

Abnormal battery conditions may include:

- Rapid or excessive temperature increase

- Swelling or deformation of the battery enclosure
- Smoke, sparks, or unusual odor
- Visible physical damage
- Unexpected system shutdown or loss of power
- Evidence of water intrusion or severe corrosion

Immediate Actions

If any abnormal condition is observed:

- Stop using the system immediately
- Shut down the vessel electrical system if possible
- Disconnect charging sources and electrical loads
- Disconnect the battery only if safe to do so
- Evacuate personnel from the immediate area if fire, smoke, or overheating is present
- Contact emergency services if the situation cannot be safely controlled

IMPORTANT

Only disconnect or move the battery if it is safe to do so. If there is risk of fire, electrical hazard, or thermal runaway, evacuate the area and contact emergency services immediately.

Battery Stops Supplying Power

If the battery unexpectedly stops supplying power:

- Verify battery operating state (Hiberstate™ vs Shut-Down Mode)
- Check for system faults or overload conditions
- Inspect wiring and electrical connections
- Verify charger compatibility and operation

Refer to:

- Section 10 — Understanding Battery Operating Modes
- Section 11 — Waking the Battery

Overheating

If the battery becomes excessively hot:

- Stop all charging and discharging activity immediately
- Disconnect charging sources if safe to do so
- Isolate the battery from connected electrical systems
- Allow the battery to cool naturally in a well-ventilated area

Do not apply direct water spray to battery terminals or energized electrical connections.

Smoke, Odor, or Swelling

If the battery emits smoke, unusual odor, or shows signs of swelling:

- Immediately discontinue use
- Disconnect the system if safe to do so
- Keep the battery away from flammable materials
- Do not attempt to recharge or reuse the battery
- Monitor the area for escalating heat or fire conditions

A damaged or swollen battery may become unstable without warning.

Battery Fire

WARNING — FIRE RESPONSE

Lithium battery fires may produce intense heat, smoke, and hazardous gases.

If the battery is involved in a fire:

- Use a Class D fire extinguisher if available
- If unavailable, use a dry chemical or ABC extinguisher
- Prioritize evacuation and emergency response over property protection
- Contact emergency services immediately
- Continue monitoring the area for possible re-ignition

Marine installations should maintain appropriate onboard fire suppression equipment in accordance with vessel safety requirements.

Water Intrusion

If the battery has been exposed to water intrusion or submersion:

- Disconnect the battery immediately if safe to do so
- Do not charge or operate the battery
- Inspect the surrounding electrical system for corrosion or damage
- Have the battery inspected by qualified personnel before reuse

Saltwater exposure significantly increases the risk of corrosion, electrical failure, and internal damage.

Post-Incident Handling

After any abnormal event:

- Do not reuse or attempt to repair the battery
- Isolate the battery in a safe location away from combustible materials
- Do not dispose of the battery in household waste
- Contact Tiger Lithium® Technical Support for guidance regarding inspection, transport, or disposal

WARNING — POST-INCIDENT SAFETY

A battery that has experienced a fault condition may remain unsafe even if it appears to function normally.

Additional Information

Refer to:

- Section 3 — Important Safety Information
- Section 31 — Fault Codes & Diagnostic Reference
- Section 32 — Troubleshooting

5. SYSTEM OVERVIEW

This section provides an overview of how Tiger Lithium Marine Battery Systems integrate into marine electrical systems.

Understanding system architecture is essential for proper installation, charging system integration, and reliable operation.

Marine Electrical System Architecture

Marine vessels commonly utilize multiple battery systems to support different onboard functions, including:

- Starting Battery — Engine ignition and cranking
- House Battery Bank — Electronics, pumps, lighting, and accessories
- Trolling Motor Battery System — Dedicated electric propulsion systems (if equipped)

Tiger Lithium® batteries are designed to support one or more of these roles depending on battery type, voltage, and configuration.

System Types

Starting Systems

Designed to provide high current for engine ignition and cranking applications.

Typical characteristics include:

- High short-duration discharge capability
- Direct compatibility with approved marine charging systems
- Support for outboard and inboard engine applications
- Tiger Rescue Reserve™ (TRR) functionality on supported models

Starting batteries are typically charged directly by engine alternators or stator systems within approved operating limits.

Deep Cycle Systems (House Loads)

Designed to provide stable power delivery over extended discharge periods.

Common applications include:

- Electronics and navigation systems
- Pumps and lighting
- Inverters and onboard accessories
- House electrical systems

Deep cycle batteries are commonly charged using:

- AC shore power chargers
- Solar charging systems (MPPT)
- DC-to-DC charging systems

Trolling Motor Systems

Designed to provide continuous power for electric propulsion systems.

Typical configurations include:

- 12V systems
- 24V systems
- 36V systems

These systems may utilize series-connected batteries to achieve higher operating voltage.

IMPORTANT

Only identical batteries approved for series operation may be connected together. Always

| verify system voltage compatibility and configuration requirements before installation.

Power Distribution Overview

The battery system serves as the primary energy source for connected onboard equipment.

Depending on vessel design, power may be distributed through:

- Battery switches
- Fuse blocks
- Busbars
- Circuit breakers
- Distribution panels
- DC conversion equipment

High-current systems such as engine starting and trolling motor circuits typically connect through dedicated overcurrent protection devices and appropriately sized conductors.

Proper system protection and cable sizing are required for all installations.

Refer to:

- Section 18 — Electrical System Protection
- Section 19 — Cable Sizing & Wiring Requirements

Charging System Overview

Marine systems may include multiple charging sources operating simultaneously or independently, including:

- Engine alternator or stator systems
- AC shore power battery chargers
- Solar charging systems (MPPT controllers)
- DC-to-DC charging systems between battery banks

Each charging source must be properly configured and compatible with lithium battery operation.

Refer to:

- Section 17 — Charging Systems

Communication & Monitoring

Tiger Lithium® batteries may include integrated monitoring and communication capabilities, including:

- Bluetooth® connectivity for mobile app monitoring
- Real-time battery status and diagnostics
- Integration with supported monitoring systems and displays (model dependent)

These systems provide visibility into battery performance, operating state, and diagnostic information.

Refer to:

- Section 14 — Monitoring & Diagnostics

Example System Configurations

Typical marine installations may include:

- Starting battery + house battery bank
- Dedicated trolling motor battery bank
- Multi-bank systems with AC, solar, and alternator charging
- DC-to-DC charging between battery banks

A complete system wiring reference is provided in:

→ Section 23 — Complete System Wiring Diagram

6. PRODUCT SPECIFICATIONS

This section provides general electrical and physical characteristics for Tiger Lithium Marine Batteries.

Specifications apply to individual battery units unless otherwise noted.

IMPORTANT

Product labels, technical datasheets, and model-specific documentation supersede generalized examples shown in this manual.

General Specification Notes

- Performance values are based on operation within recommended environmental and electrical conditions
- Actual performance may vary based on temperature, discharge rate, charging configuration, cable sizing, and overall system design
- Specifications may vary between product models and revisions
- Always verify model-specific ratings before installation or system integration

Starting Battery Models

Typical characteristics include:

- High peak discharge current for engine starting
- Optimized compatibility with approved marine charging systems
- Stable voltage delivery during cranking events
- Support for outboard and inboard engine applications
- Tiger Rescue Reserve™ (TRR) functionality on supported models

Starting batteries are engineered for direct alternator charging within approved voltage and current limits described in this manual.

Deep Cycle Battery Models

Typical characteristics include:

- Stable voltage output under sustained load
- High cycle-life performance
- Optimized runtime for trolling motors and house loads
- Support for repeated deep discharge operation

Common applications include:

- Trolling motors
- Electronics systems
- Sonar systems
- House electrical loads
- Inverters and auxiliary systems

Deep cycle batteries are not approved for direct alternator charging unless used with an approved DC-to-DC charging system.

Dual Voltage Battery Models (If Equipped)

Certain models include dedicated secondary output terminals intended for low-current electronics applications.

Typical configurations may include:

- Primary Output — High-current propulsion or trolling motor loads
- Secondary Output — Regulated low-current electronics output

Typical characteristics may include:

- Primary terminals: M8
- Secondary terminals: M5
- Regulated secondary voltage (model dependent)
- Secondary output current limitation (model dependent)

IMPORTANT

Secondary output terminals are intended only for approved low-current electronics loads. Connecting high-current devices to secondary outputs may result in system damage, output shutdown, or Battery Management System (BMS) protection events.

Typical Configuration Characteristics

Typical battery configuration characteristics may include:

- Integrated Battery Management System (BMS)
- Bluetooth® monitoring capability
- Internal overcurrent protection
- Overvoltage and undervoltage protection
- Temperature protection systems
- Short-circuit protection

Available features vary by battery model and product series.

Performance Considerations

Compared to traditional lead-acid batteries, lithium batteries may exhibit:

- Higher operating voltage under load
- Reduced voltage sag during discharge
- More stable power delivery
- Faster charging capability
- Higher usable capacity within the operating range

Battery Management System (BMS) protections may temporarily limit charging or discharge operation outside approved conditions.

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 26 — Temperature Operating Limits

7. Understanding Your Battery

Before installing, charging, or operating your battery, it is important to identify the battery type and understand the information printed on the product label.

Using the correct battery for the correct application helps prevent charging problems, alternator damage, reduced performance, and avoidable warranty claims.

Every Tiger Lithium® marine battery includes a product label with important operating information. This section explains how to identify your battery type and how to use the specification label to ensure safe and reliable operation.

7.1 Identify Your Battery Type

One of the fastest and most important ways to identify your battery type is by counting the number of high-current terminal sets located on the top of the battery.

This determines whether the battery is designed for:

- Engine starting and alternator charging, or
- Deep cycle operation only

IDENTIFY YOUR BATTERY TYPE

The terminal configuration is the fastest way to determine your battery type.

STARTING / DUAL PURPOSE BATTERIES

Designed for high cranking power to start engines and can also support moderate deep cycle loads.

IDENTIFY BY: THREE TERMINAL SETS



TYPICAL USES



Engine Starting



Dual Purpose
(Start + House)



Power Steering
Pumps



BEFORE YOU CHARGE:

- ✓ Identify your battery type (above).
- ✓ Review the battery label.
- ✓ Use the correct charging system for your battery.



WARNING

Using the wrong charger or charging source can damage your battery and create a serious safety risk.



TIP

If you are unsure, refer to the battery label or contact Tiger Lithium® Support.

DEEP CYCLE BATTERIES

Designed to deliver steady power over long periods for house loads and trolling motor applications.

IDENTIFY BY: ONE OR TWO TERMINAL SETS

ONE TERMINAL SET



TWO TERMINAL SETS



TYPICAL USES



House Power
(Electronics, Lights, etc.)



Trolling Motors



Refrigeration
& Appliances



Solar Energy
Storage

Starting Batteries

If the battery has:

Three (3) high-current terminal sets

it is a:

Starting Battery

These batteries are designed for:

- Engine starting
- Alternator charging
- Cranking loads
- Starting + house power applications

Starting batteries are specifically engineered to safely operate with approved marine alternator charging systems.

These batteries may also include features such as:

- Tiger Rescue Reserve™ (TRR)

These batteries are approved for direct alternator charging when installed according to this manual.

Deep Cycle Batteries

If the battery has:

Fewer than Three (3) high-current terminal sets

it is:

NOT a Starting Battery

and is

NOT approved for direct alternator charging

These batteries are designed for:

- Trolling motors
- House electrical loads
- Electronics systems
- Sonar systems
- Deep discharge applications

This applies regardless of:

- Battery voltage
- Battery capacity
- Battery size
- Battery marketing terminology

Even if the battery is:

- 12V
- 24V
- 36V
- Dual-voltage

If it has fewer than three high-current terminal sets, it is a deep cycle battery and must not be connected directly to an alternator.

Use only approved charging methods described in this manual, including:

- AC shore power chargers
- Solar charging systems
- DC-to-DC charging systems

IMPORTANT

Deep Cycle batteries require a DC-to-DC charger for alternator-based charging applications.

7.2 Understanding the Battery Label

Every battery includes a specification label that provides key information required for safe installation and operation.

Always verify battery specifications before:

- Charging
- Connecting accessories
- Configuring series or parallel systems
- Selecting charging equipment

Never assume battery type or capability based solely on battery size, voltage, or appearance.

HOW TO READ YOUR BATTERY LABEL

The specification label on the rear of your battery provides important information about its performance, charging requirements, and configuration limits.

REAR OF BATTERY



THE SPECIFICATION LABEL IS LOCATED ON THE REAR OF THE BATTERY.

SPECIFICATION LABEL (ENLARGED)

	
12V-105AH LITHIUM DEEP CYCLE BATTERY	
1 NOMINAL VOLTAGE	12.8V
2 CAPACITY	105Ah
3 PEAK CURRENT	210A@3s
4 CONTINUOUS DISCHARGE CURRENT	105A
5 CHARGING VOLTAGE	14.4V ±0.2V
6 MAX CHARGE CURRENT	52.5A
7 CONNECTION MAX	4 Parallel / 4 Series
8 SIZE / DIMENSIONS	13.3 x 6.77 x 8.5 in (331 x 172 x 216 mm)
DO NOT EXCEED SPECIFIED LIMITS SEE USER MANUAL FOR MORE INFORMATION	
   	

- 1 NOMINAL VOLTAGE – 12.8V**
Determines system voltage compatibility.
Use the correct charger and equipment.
- 2 CAPACITY – 105Ah**
Determines runtime and total available energy.
Higher Ah = longer run time.
- 3 PEAK CURRENT – 210A@3s**
Important for engine starting and high-load devices.
Critical for starting batteries.
- 4 CONTINUOUS DISCHARGE CURRENT – 105A**
Maximum safe continuous output current.
Protects the battery and BMS.
- 5 CHARGING VOLTAGE – 14.4V ±0.2V**
Incorrect charging voltage may damage the battery. Always verify charger settings.
- 6 MAX CHARGE CURRENT – 52.5A**
Charging above this limit may reduce battery life.
- 7 CONNECTION MAX – 4 Parallel / 4 Series**
Defines the maximum approved battery bank size.
Never exceed this value.
- 8 SIZE / DIMENSIONS – 13.3 x 6.77 x 8.5 in (331 x 172 x 216 mm)**
Ensures correct fit in the installation location.



IMPORTANT



Never charge, install, or configure a battery based on assumptions.
Always verify the battery label first.

Nominal Voltage

Example:

- 12.8V

This is the operating voltage of the battery.

This value determines system compatibility and charger selection.

Your charger, accessories, trolling motor, inverter, and onboard systems must match the correct battery voltage.

Using the wrong system voltage may damage equipment connected to the battery.

Capacity

Example:

- 105Ah / 1344Wh

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This indicates how much energy the battery can store.

Higher amp-hour (Ah) ratings provide longer runtime.

This is especially important for:

- Trolling motors
- House loads
- Electronics
- Inverters

Capacity affects runtime—not starting power.

Peak Current

Example:

- 210A @ 3s

This is the maximum short-duration output the battery can provide for engine starting or heavy surge loads.

This value is especially important for:

- Outboard starting
- Inboard starting
- High-demand short-duration loads

Peak current is not intended for continuous use.

Continuous Discharge Current

Example:

- 180A

This is the maximum continuous power the battery can safely deliver during normal operation.

This is critical for:

- Trolling motors
- Inverters
- House systems
- Large electronics loads

Exceeding this limit may trigger BMS protection or reduce battery performance.

Charging Voltage

Example:

- 14.4V $\pm$ 0.2V

This is the required charging voltage for proper battery charging.

Your charger must be set to the correct lithium charging profile.

Incorrect charging voltage may result in:

- Undercharging
- Reduced performance
- Battery protection shutdown
- Permanent battery damage

Always verify charger settings before use.

Max Charge Current

Example:

- 52.5A

This is the maximum recommended charging current for the battery.

Exceeding this value may:

- Increase battery temperature
- Reduce battery life
- Trigger BMS protection
- Damage charging components

Always confirm charger output before installation.

Size / Dimensions

Example:

- 306 × 173 × 225 mm

This confirms physical fitment inside the battery compartment, tray, or mounting area.

Always verify:

- Battery tray dimensions
- Hold-down clearance
- Cable access
- Ventilation space

before installation.

Connection Max

Example:

- Connection Max: 4 Parallel, 4 Series

This defines the maximum number of identical batteries that may be safely connected together in:

- Parallel (increasing capacity)
- Series (increasing voltage)

This protects:

- BMS operation
- Charge balancing
- System stability
- Warranty compliance

Exceeding these limits may result in:

- Uneven charging
- BMS protection events
- Performance issues
- Warranty denial
- Unsafe operating conditions

Always follow the Connection Max value printed on the battery label.

Never assume all batteries allow the same configuration.

7.3 Before You Charge

Never charge based on assumptions.

Always verify:

- Battery type
- Terminal configuration

- Charging voltage
- Maximum charge current
- Alternator compatibility

before connecting any charging source.

Incorrect charging configuration is one of the most common causes of preventable battery system failure.

7.4 Important Reminder

If you are unsure whether your battery is a Starting model or a Deep Cycle model:

Count the high-current terminal sets

- Three terminal sets = Starting
- Fewer than three terminal sets = Deep Cycle

IMPORTANT

Deep Cycle batteries are NOT approved for direct alternator charging.

When in doubt, verify before charging.

Doing so protects:

- Your battery
- Your alternator
- Connected electronics
- Your warranty coverage

8. BATTERY INTERFACES & CONNECTION PORTS

This section identifies the external interfaces, connection points, and user-accessible features located on the battery enclosure.

Understanding these interfaces is important for proper installation, charging, monitoring, and system integration.

BATTERY INTERFACES DIAGRAM

KNOW YOUR BATTERY. MAXIMIZE PERFORMANCE.

Familiarize yourself with the key interfaces on your Tiger Lithium battery.

1 NEGATIVE TERMINAL (-)

M8 threaded female insert.
Connect negative cables
to this terminal.



3 POWER BUTTON & LEDs

Press to check State of Charge (SOC)
or activate advanced features.
See Section 9 - Battery Control
Functions for additional info.

State of Charge (SOC) Indicator

4 LEDs	76% – 100%
3 LEDs	51% – 75%
2 LEDs	26% – 50%
1 LED	0% – 25%

2 POSITIVE TERMINAL (+)

M8 threaded female insert.
Connect positive cables
to this terminal.



4 VENT

Pressure relief vent.
Located at the front
of this case top.

Do not block or cover.
Ensure the area
around the vent is
clear for proper
operation.



Tighten terminal
connections to
6.5 ft-lb
(8.81 N·m)



Do not short
circuit the
terminals.



Do not
submerge
the battery.



Keep the battery
within operating
temperature limits.
See manual for details.



Keep the vent clean
and unobstructed.
Do not block or cover.

Primary Power Terminals

Positive Terminal (+)

- Primary connection point for system power output
- Used for charging and discharge current flow
- Connects to approved overcurrent protection and vessel electrical systems

Negative Terminal (-)

- Primary return path for system current
- Connects to vessel negative distribution and charging system return paths

IMPORTANT

Always verify correct polarity before making electrical connections. Reversed polarity may result in immediate equipment damage, electrical arcing, or Battery Management System (BMS) protection events.

Power Button & SOC Indicator Panel

The Power Button and LED indicator panel are located on the top of the battery enclosure.

Functions include:

- Battery wake and activation functions
- State of Charge (SOC) display
- Access to advanced battery features
- Battery status and fault indication

Advanced functions may include:

- Tiger Rescue Reserve™ (TRR)
- Hiberstate™ activation
- BMS reset functions

Refer to:

→ Section 9 — Battery Control Functions

Bluetooth® Communication

Tiger Lithium® Marine Batteries include integrated Bluetooth® communication for battery monitoring and diagnostics through the Sentinel-LNX™ App.

Bluetooth communication may provide:

- Real-time battery monitoring
- State of Charge (SOC) information
- Voltage and current data
- Battery temperature information
- Diagnostic and fault information

IMPORTANT

Bluetooth communication availability depends on battery operating state. Bluetooth functionality is not available while the battery is in Shut-Down Mode.

Atmospheric Vent

The battery enclosure includes an atmospheric pressure equalization vent.

This vent is designed to:

- Allow internal pressure equalization
- Maintain enclosure integrity
- Support environmental sealing performance

IMPORTANT

The atmospheric vent must remain unobstructed at all times. Do not seal, cover, modify, or use the vent as a mounting or lifting point.

Dual Voltage Output Terminals (If Equipped)

Certain battery models include dedicated secondary output terminals intended for low-current electronics applications.

Primary Output Terminals

- High-current output connection
- Intended for propulsion or primary system loads
- Typically utilizes M8 terminal hardware

Secondary Output Terminals

- Regulated low-current output
- Intended for electronics such as sonar or navigation systems
- Typically utilizes M5 terminal hardware
- Output current is limited (model dependent)

IMPORTANT

Secondary output terminals are not intended for high-current devices such as trolling motors, inverters, or engine starting systems.

Connecting high-current equipment to secondary outputs may result in:

- Output shutdown
- System malfunction
- BMS protection events
- Equipment damage

Connection Guidelines

- Do not connect or disconnect cables while the electrical system is energized
- Use properly rated marine-grade cables and terminals

- Ensure all connections are clean, secure, and properly torqued
- Protect terminals from corrosion using approved marine protection methods
- Verify all cables are properly supported and protected from abrasion or movement

Additional Information

Refer to:

- Section 19 — Cable Sizing & Wiring Requirements
- Section 23 — Complete System Wiring Diagram
- Section 25 — Cable Torque Specifications

9. BATTERY CONTROL FUNCTIONS

Tiger Lithium® Marine Batteries incorporate an integrated Power Button used to access battery functions and control operating modes.

The Power Button may be used to:

- Display battery State of Charge (SOC)
- Wake the battery from Hiberstate™
- Initiate temporary recovery from Shut-Down Mode
- Activate Tiger Rescue Reserve™ (supported models only)
- Confirm battery operational status

Power Button functionality may vary depending on battery model and current operating mode.

Quick Press Functions

A Quick Press is defined as pressing and immediately releasing the Power Button.

Depending on battery operating mode, a Quick Press may:

- Display battery State of Charge (SOC)
- Wake the battery from Hiberstate™
- Initiate temporary recovery from Shut-Down Mode
- Confirm battery operational status

The battery response to a Quick Press may vary depending on whether the battery is operating normally, in Hiberstate™, or in Shut-Down Mode.

Refer to:

- Section 10 — Understanding Battery Operating Modes
- Section 11 — Waking the Battery

Temporary Recovery from Shut-Down Mode

If the battery has entered Shut-Down Mode due to low voltage or certain protection conditions, a Quick Press of the Power Button may be used to initiate a temporary recovery period.

During this temporary recovery period:

- The battery wakes for approximately 60 seconds
- Charging is permitted
- Battery discharge output remains disabled
- Bluetooth® communication is available
- The battery may appear in the Sentinel-LNX™ App

The temporary recovery period is intended solely to allow a compatible charger that lacks an integrated lithium-wake function to initiate a charge cycle.

If charging current is detected during the 60-second recovery window, the battery will continue normal charging operation.

If charging does not begin within approximately 60 seconds, the battery automatically returns to Shut-Down Mode.

IMPORTANT

The temporary recovery function does not restore normal battery output. Connected loads cannot be powered during the temporary recovery period. The function is intended only to allow charging to begin.

Some chargers may also provide a dedicated Wake, Activate, or Recovery function capable of recovering the battery without using the Power Button.

Refer to:

- Section 11 — Waking the Battery

Long Press Functions

A Long Press is defined as pressing and holding the Power Button until the desired function is activated.

Depending on battery model, a Long Press may be used to:

- Enter Hiberstate™
- Activate Tiger Rescue Reserve™ (supported models only)
- Access other advanced battery functions

Long Press functionality may vary by battery model.

Refer to model-specific product information for feature availability.

Tiger Rescue Reserve™ (Supported Models Only)

Tiger Rescue Reserve™ (TRR) is a reserve-capacity feature available on supported Starting battery models.

TRR is designed to preserve emergency engine-starting capability by reserving approximately 25% battery capacity.

When activated:

- Normal battery operation is restricted
- Reserved battery capacity becomes available
- Emergency engine starting capability may be restored

Refer to:

→ Section 12 — Tiger Rescue Reserve™

LED Status Indicators

The integrated LED indicators provide visual information regarding battery status and State of Charge (SOC).

Depending on battery model and operating condition, LED indicators may display:

- State of Charge (SOC)
- Operating mode status
- Diagnostic information
- Protection event indications

Refer to:

→ Section 14 — Monitoring & Diagnostics

→ Section 31 — Fault Codes & Diagnostic Reference

Additional Information

Refer to:

- Section 10 — Understanding Battery Operating Modes
- Section 11 — Waking the Battery
- Section 12 — Tiger Rescue Reserve™
- Section 14 — Monitoring & Diagnostics

10. UNDERSTANDING BATTERY OPERATING MODES

Tiger Lithium® Marine Batteries utilize multiple operating modes designed to balance performance, safety, storage efficiency, and battery protection.

Understanding these operating modes will help users properly interpret battery behavior and recovery procedures.

The primary operating modes include:

- Normal Operation
- Hiberstate™
- Shut-Down Mode

Each operating mode serves a different purpose and may affect battery output, charging behavior, Bluetooth® communication, and recovery methods.

10.1 Normal Operation

During Normal Operation:

- Battery output is available
- Charging and discharging are permitted
- Bluetooth® communication is active
- The battery appears in the Sentinel-LNX™ App

This is the standard operating condition used during normal vessel operation and charging.

10.2 Hiberstate™

Hiberstate™ is a user-controlled low-power storage mode designed to reduce standby energy consumption during extended inactivity and seasonal storage.

When Hiberstate™ is enabled:

- Battery output is disabled
- Standby energy consumption is significantly reduced
- Bluetooth® communication remains active
- The battery remains visible in the Sentinel-LNX™ App

Hiberstate™ is intended for situations where the battery will not be used for an extended period.

The battery may be returned to Normal Operation using:

- A Quick Press of the Power Button
- The Sentinel-LNX™ App
- A compatible charger

Refer to:

→ Section 11 — Waking the Battery

10.3 Shut-Down Mode

Shut-Down Mode is an automatic Battery Management System (BMS) protective state that may occur when battery voltage reaches critically low levels or when certain protection conditions require battery output to be disabled.

When the battery enters Shut-Down Mode:

- Battery output is disabled
- Bluetooth® communication is disabled
- The battery does not appear in the Sentinel-LNX™ App
- Normal charging and discharge operation are suspended

Shut-Down Mode is intended to protect the battery from conditions that could result in battery damage or unsafe operation.

Unlike Hiberstate™, Shut-Down Mode is not intended as a storage mode and occurs automatically in response to battery operating conditions.

10.4 Temporary Recovery from Shut-Down Mode

A Quick Press of the Power Button may be used to initiate temporary recovery from Shut-Down Mode.

During temporary recovery:

- The battery wakes for approximately 60 seconds

- Charging is permitted
- Battery discharge output remains disabled
- Bluetooth® communication is available
- The battery may appear in the Sentinel-LNX™ App

The temporary recovery period is intended solely to allow a compatible charger to initiate a charge cycle.

If charging current is detected during the 60-second recovery period, the battery will continue normal charging operation.

If charging does not begin within approximately 60 seconds, the battery automatically returns to Shut-Down Mode.

IMPORTANT

The temporary recovery function does not restore normal battery output. Connected loads cannot be powered during the temporary recovery period. The function is intended only to allow charging to begin.

Some chargers may also provide a dedicated Wake, Activate, or Recovery function capable of recovering the battery without using the Power Button.

Refer to:

→ Section 11 — Waking the Battery

HIBERSTATE™ vs. SHUT-DOWN MODE

UNDERSTANDING THE DIFFERENCE



HIBERSTATE™

USER-CONTROLLED STORAGE MODE

VS.

SHUT-DOWN MODE

BMS PROTECTION MODE



How It's Activated

- Long press of the power button – Release when **3 lights flash**
- In the Hiberstate™ app



Power Consumption

Very low self-consumption for extended storage.



Bluetooth® Communication

Remains active. Monitor and wake via app.



Discharging

Disabled. Battery will not discharge while in Hiberstate™.



How to Exit

Wake using any of the following:

- **Power Button** – Press the power button.
- **Compatible Charger** – Connect a compatible charger.
- **Sentinel-LNX™ App** – Wake using the app.



Best Use

Long-term storage, off-season, or when the battery will not be used for an extended period.



How It's Activated

Automatically triggered by the BMS due to low voltage or over-discharge.



Power Consumption

Near zero. All outputs disabled.



Bluetooth® Communication

Disabled. Not visible in the app.



Discharging

Disabled. Battery will not discharge while in Shut-Down Mode.



How to Exit

Wake using any of the following:

- **Power Button** – Press the power button.
- **Compatible Charger** – Connect a compatible charger.



Best Use

Not a user-selected state. Entered automatically to protect the battery and cells.



IMPORTANT: Hiberstate™ is a user choice for storage. Shut-Down Mode is an automatic protection response. Understanding the difference helps ensure proper battery care and reliable performance.



See Section 10 and 11 for complete details.

10.5 Operating Mode Comparison

Feature	Normal Operation	Hiberstate™	Shut-Down Mode
Battery Output Available	Yes	No	No
Bluetooth® Active	Yes	Yes	No
Visible in Sentinel-LNX™ App	Yes	Yes	No
User Initiated	No	Yes	No
Automatic BMS Protection State	No	No	Yes

Recovery via Power Button	N/A	Yes	Yes**
Recovery via App	N/A	Yes	No
Recovery via Charger	N/A	Yes	Yes

* Charging may begin during temporary recovery or charger-based recovery.

** Power Button recovery temporarily wakes the battery for approximately 60 seconds to allow charging to begin. Normal battery output remains disabled until successful recovery occurs.

10.6 Why Operating Modes Matter

Understanding battery operating modes helps users:

- Interpret battery behavior correctly
- Understand Bluetooth® visibility changes
- Distinguish storage mode from protection mode
- Recover the battery properly when required
- Avoid unnecessary troubleshooting or service requests

Many apparent battery issues are simply the result of the battery operating normally within one of its designed operating modes.

Additional Information

Refer to:

- Section 9 — Battery Control Functions
- Section 11 — Waking the Battery
- Section 14 — Monitoring & Diagnostics
- Section 31 — Fault Codes & Diagnostic Reference
- Section 32 — Troubleshooting

11. WAKING THE BATTERY

Tiger Lithium® Marine Batteries may be recovered from low-power operating states using several methods depending on the current battery operating mode.

Recovery procedures vary between:

- Hiberstate™
- Shut-Down Mode

Refer to Section 10 — Understanding Battery Operating Modes for additional information regarding battery operating states.

11.1 Waking the Battery from Hiberstate™

Hiberstate™ is a user-controlled low-power storage mode intended for seasonal storage and extended inactivity.

A battery in Hiberstate™ may be returned to Normal Operation using any of the following methods:

Method 1 — Power Button

1. Press and immediately release the Power Button.
2. The battery will exit Hiberstate™ and return to Normal Operation.

Method 2 — Sentinel-LNX™ App

1. Open the Sentinel-LNX™ App.
2. Connect to the battery.
3. Follow the in-app instructions to exit Hiberstate™.

Method 3 — Compatible Charger

1. Connect a compatible lithium battery charger.
2. Charging activity may automatically wake the battery and return it to Normal Operation.

When recovered from Hiberstate™:

- Battery output becomes available
- Bluetooth® communication remains active
- The battery appears in the Sentinel-LNX™ App
- Normal charging and discharge operation resumes

11.2 Recovering the Battery from Shut-Down Mode

Shut-Down Mode is an automatic Battery Management System (BMS) protective state.

Recovery from Shut-Down Mode may be accomplished using either:

- Power Button Recovery
- Charger-Based Recovery

Method 1 — Power Button Recovery

The Power Button may be used to temporarily wake the battery and allow a charge cycle to begin.

Recovery Procedure

1. Connect a compatible lithium battery charger to the battery.
2. Press and immediately release the Power Button.
3. The battery will temporarily wake for approximately 60 seconds.
4. Allow the charger to initiate a charge cycle.
5. If charging current is detected during the 60-second recovery period, the battery will continue normal charging operation.
6. If charging does not begin within approximately 60 seconds, the battery automatically returns to Shut-Down Mode.

Temporary Recovery Behavior

During the temporary recovery period:

- Charging is permitted
- Battery discharge output remains disabled
- Bluetooth® communication is available
- The battery may appear in the Sentinel-LNX™ App

IMPORTANT

The temporary recovery function does not restore normal battery output. Connected loads cannot be powered during the temporary recovery period. The function is intended only to allow charging to begin.

Method 2 — Charger-Based Recovery

Some chargers provide a dedicated lithium wake, activate, or recovery function.

These chargers may recover the battery without requiring use of the Power Button.

Recovery Procedure

1. Connect a compatible charger.
2. Activate the charger wake, activate, or recovery function if equipped.
3. Allow the charger to initiate charging.

4. Once charging begins, the battery will transition back to normal charging operation.

Refer to charger manufacturer instructions for specific recovery procedures.

11.3 Recovery Verification

After successful recovery:

- Battery charging resumes normally
- Bluetooth® communication becomes available
- The battery appears in the Sentinel-LNX™ App
- Normal operating functions are restored

If the battery repeatedly returns to Shut-Down Mode, inspect the charging system and electrical installation for potential faults.

Refer to:

- Section 31 — Fault Codes & Diagnostic Reference
- Section 32 — Troubleshooting

11.4 If Recovery Is Unsuccessful

If the battery cannot be recovered:

- Verify charger compatibility
- Verify charger voltage configuration
- Inspect all charging connections
- Confirm charger output is present
- Review fault indicators and diagnostic information

If recovery remains unsuccessful, contact Tiger Lithium® Technical Support.

Do not attempt to:

- Open the battery enclosure
- Bypass Battery Management System protections
- Perform unauthorized repairs

Additional Information

Refer to:

- Section 9 — Battery Control Functions

- Section 10 — Understanding Battery Operating Modes
- Section 14 — Monitoring & Diagnostics
- Section 31 — Fault Codes & Diagnostic Reference
- Section 32 — Troubleshooting

12. FIRST USE RECOMMENDATION

Proper initial setup and charging help ensure optimal battery performance, system reliability, and long-term service life.

Initial Charge

Tiger Lithium strongly recommends fully charging the battery before first use.

For initial charging:

- Use a compatible LiFePO₄ (LFP) battery charger
- Verify correct system voltage and charger configuration
- Allow the charge cycle to complete fully
- Confirm charger operation before placing the system into service

IMPORTANT

Batteries are commonly shipped at a reduced State of Charge (SOC) for transportation and storage purposes.

Initial battery charge level may vary by model, shipping condition, or storage duration.

Operating the system without a full initial charge may result in reduced runtime or incomplete system verification.

System Verification

After installation and initial charging:

- Verify battery output voltage is present
- Confirm all electrical connections are secure
- Verify connected systems power on correctly
- Confirm charger operation and charging current flow
- Check for fault indicators or abnormal LED behavior
- Verify Bluetooth® communication and app connectivity (if equipped)

Any abnormal behavior should be investigated before placing the vessel into normal operation.

Performance Expectations

During normal lithium battery operation:

- Battery voltage may remain more stable under load than traditional lead-acid batteries
- Voltage drop during discharge may be reduced
- Charging behavior may differ from AGM or flooded lead-acid systems
- Battery Management System (BMS) protections may temporarily limit charging or discharge operation outside approved conditions

These behaviors are normal characteristics of lithium battery systems.

If Performance Appears Abnormal

If the battery or charging system does not operate as expected:

- Verify charger compatibility and settings
- Verify system voltage and wiring
- Inspect all electrical connections
- Review operating mode behavior described in this manual

Refer to:

→ Section 32 — Troubleshooting

Additional Information

Refer to:

- Section 15 — Installation Requirements
- Section 17 — Charging Systems
- Section 10 — Understanding Battery Operating Modes

13. ACCESSORIES & SYSTEM COMPONENTS

Tiger Lithium Marine Battery Systems may be integrated with a variety of supporting electrical components and charging systems.

Proper selection, configuration, and installation of these components are critical for safe operation, charging system stability, and long-term battery performance.

Battery Chargers

Compatible charging equipment may include:

- AC shore power chargers
- Portable lithium battery chargers
- Onboard multi-bank marine chargers

Chargers must:

- Support LiFePO₄ (LFP) battery chemistry
- Match system voltage
- Be configured according to manufacturer recommendations

Improper charger configuration may result in:

- Reduced battery performance
- Incomplete charging
- Protection shutdown events
- Charging system damage

DC-to-DC Chargers

DC-to-DC chargers provide controlled charging between electrical systems and are commonly used for:

- Alternator-to-lithium charging
- Mixed battery system integration
- House battery charging while underway

DC-to-DC chargers typically provide:

- Voltage regulation
- Current limiting
- Controlled lithium charging profiles
- Isolation between battery banks

IMPORTANT

A DC-to-DC charger is required when charging deep cycle lithium batteries from marine alternator systems.

Alternator Regulators

External alternator regulators may be used in certain applications to:

- Control alternator output voltage
- Limit charging current

- Improve charging system stability
- Reduce alternator stress under high electrical load conditions

Proper system design and charging system compatibility verification remain the responsibility of the installer.

Solar Charge Controllers

Solar charging systems should utilize programmable MPPT (Maximum Power Point Tracking) charge controllers.

Controllers must:

- Support lithium battery charging profiles
- Be configured for correct system voltage
- Have equalization charging disabled

Improper solar controller configuration may result in battery charging issues or system instability.

Monitoring Systems

Monitoring and communication capabilities may include:

- Sentinel-LNX™ Bluetooth® monitoring
- Mobile app diagnostics and system visibility

Available monitoring functions may include:

- Battery voltage
- Charge and discharge current
- State of Charge (SOC)
- Temperature monitoring
- Diagnostic fault reporting

Cables & Installation Components

Marine battery installations should utilize properly rated installation components, including:

- Marine-grade battery cables
- Tinned copper conductors
- Properly crimped terminal connections
- Fuse blocks and overcurrent protection devices
- Busbars and distribution hardware
- Corrosion protection materials

All installation components should be:

- Properly sized for expected load
- Rated for marine environments
- Protected from vibration, moisture, heat, and abrasion

IMPORTANT

Incompatible or improperly installed system components may result in charging instability, overheating, electrical faults, or equipment damage.

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 18 — Electrical System Protection
- Section 19 — Cable Sizing & Wiring Requirements

14. MONITORING & DIAGNOSTICS

Compatible Tiger Lithium® Marine Batteries provide monitoring and diagnostic capabilities through integrated Bluetooth® communication and the Sentinel-LNX™ App.

Monitoring capabilities may include:

- State of Charge (SOC)
- Battery Voltage
- Charge and Discharge Current
- Battery Temperature
- Operating Mode Status
- Diagnostic Information
- Fault and Protection Event Reporting

Available features may vary by battery model.

14.1 Sentinel-LNX™ App

The Sentinel-LNX™ App allows users to monitor battery operation and review system information using a compatible mobile device.

Depending on battery model, available information may include:

- State of Charge (SOC)
- Estimated Runtime (model & load dependant)
- Battery Voltage
- Charge and Discharge Current
- Battery Temperature
- Battery Status
- Operating Mode Information
- Diagnostic Information
- Protection Event Notifications

Bluetooth® range and communication quality may vary depending on installation location and environmental conditions.

14.2 Bluetooth® Communication

Bluetooth® communication availability depends on the current battery operating mode.

Normal Operation

During Normal Operation:

- Bluetooth® communication is active
- The battery appears in the Sentinel-LNX™ App
- Monitoring and diagnostics are available

Hiberstate™

During Hiberstate™:

- Bluetooth® communication remains active
- The battery appears in the Sentinel-LNX™ App
- Monitoring and diagnostics remain available
- The battery may be awakened using the Sentinel-LNX™ App

Shut-Down Mode

During Shut-Down Mode:

- Bluetooth® communication is disabled
- The battery does not appear in the Sentinel-LNX™ App
- Monitoring and diagnostics are unavailable

Bluetooth® communication is intentionally disabled while the battery remains in Shut-Down Mode.

Temporary Recovery from Shut-Down Mode

During the temporary recovery period initiated by the Power Button:

- Charging is permitted
- Battery discharge output remains disabled
- Bluetooth® communication is available
- The battery may appear in the Sentinel-LNX™ App

If charging successfully begins, the battery transitions back to normal charging operation and Bluetooth® communication is restored.

14.3 Diagnostic Information

The Sentinel-LNX™ App may provide diagnostic information relating to:

- Operating Mode Status
- Charging Activity
- Battery Temperature
- Voltage Conditions
- Current Flow
- Protection Events
- Fault Conditions

Diagnostic information should be reviewed whenever abnormal battery behavior is observed.

14.4 Fault & Protection Events

The Battery Management System (BMS) continuously monitors battery operating conditions.

Under certain conditions, the BMS may:

- Restrict charging
- Restrict discharge
- Disable battery output
- Enter Shut-Down Mode

These actions are intended to protect the battery and connected electrical systems.

Many protection events automatically clear once operating conditions return to normal ranges.

Refer to:

→ Section 31 — Fault Codes & Diagnostic Reference

14.5 Monitoring Best Practices

For best monitoring performance:

- Keep the Sentinel-LNX™ App updated
- Maintain reasonable Bluetooth® proximity
- Verify battery firmware compatibility when applicable
- Review diagnostic information if abnormal behavior occurs
- Confirm battery operating mode before troubleshooting

Understanding the current operating mode often resolves apparent battery issues without additional troubleshooting.

Additional Information

Refer to:

- Section 9 — Battery Control Functions
- Section 10 — Understanding Battery Operating Modes
- Section 11 — Waking the Battery
- Section 31 — Fault Codes & Diagnostic Reference
- Section 32 — Troubleshooting

15. INSTALLATION REQUIREMENTS

Proper installation is critical to ensure safe operation, charging system stability, and long-term battery performance.

Tiger Lithium Marine Batteries should be installed only by individuals familiar with marine electrical systems and lithium battery installation practices.

Professional installation by a qualified marine electrician is strongly recommended.

General Requirements

Before installation:

- Verify battery type and system compatibility
- Verify charging system compatibility
- Ensure all electrical components are properly rated for lithium battery operation
- Confirm system voltage and configuration requirements
- Review all installation instructions and wiring diagrams

All installations should comply with:

- Applicable marine electrical standards
- Vessel manufacturer requirements
- Local regulations and safety practices

Mounting Requirements

- Secure batteries to prevent movement during vessel operation
- Install batteries in a stable, protected location
- Maintain adequate service access to terminals and controls
- Protect the battery from impact, excessive vibration, and unsecured movement

Recommended mounting orientation:

- Upright installation preferred
- Do not install upside down
- Side mounting only if specifically approved for the battery model

Improper mounting may result in:

- Mechanical damage
- Electrical connection failure
- Reduced service life

Environmental Considerations

Install batteries in a location that is:

- Clean and dry
- Protected from direct water exposure
- Protected from fuel vapor accumulation
- Away from excessive heat sources
- Accessible for inspection and service

Although lithium batteries do not require ventilation in the same manner as flooded lead-acid batteries, reasonable airflow and thermal management should be maintained.

Avoid installation in areas subject to:

- Standing water
- Extreme heat
- Excessive vibration
- Direct spray or washdown exposure

Corrosion Protection

Marine environments require additional corrosion protection measures.

Recommended practices include:

- Use marine-grade tinned copper conductors
- Apply dielectric grease or approved corrosion protectants
- Use protective terminal covers where applicable
- Inspect terminals and cable connections periodically
- Support cables to minimize vibration-related stress

Corrosion or loose electrical connections may result in:

- Increased resistance
- Heat buildup
- Charging instability
- Reduced system performance

Electrical Requirements

- Use properly sized cables and conductors
- Install appropriate overcurrent protection devices
- Ensure all electrical connections are clean, secure, and properly torqued
- Route cables to avoid abrasion, heat exposure, sharp edges, and moving components
- Verify correct polarity before energizing the system

IMPORTANT

Improper installation may result in equipment damage, electrical faults, fire hazard, personal injury, or charging system instability.

System Compatibility

Before installation, verify compatibility of:

- Battery voltage
- Charging systems
- Alternator systems (if applicable)
- DC-to-DC charging equipment
- Solar charging systems
- Series and parallel battery configurations

Starting batteries and Deep Cycle batteries have different charging requirements and alternator compatibility limitations.

Always verify battery type before installation or charging system integration.

Refer to:

- Section 7 — Understanding Your Battery
- Section 17 — Charging Systems

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 19 — Cable Sizing & Wiring Requirements
- Section 23 — Complete System Wiring Diagram
- Section 24 — Pre-Installation Checklist
- Section 25 — Cable Torque Specifications

16. INSTALLATION PROCEDURE

Follow the procedures below to safely install and verify the battery system.

Tiger Lithium recommends installation by qualified personnel familiar with marine electrical systems and lithium battery integration practices.

BATTERY INSTALLATION – STEP BY STEP

Follow these steps for a safe and reliable installation.

1 PLAN YOUR INSTALLATION



- Choose a clean, dry, well-ventilated location.
- Ensure the battery is secured and cannot move.
- Keep away from heat sources and flammable materials.

Recommended temperature: 32°F – 131°F (0°C – 55°C)

2 INSPECT THE BATTERY



- Inspect for any damage that may have occurred during shipping.
- Ensure terminals are tight and clean.
- Do not install a damaged battery.

3 CONNECT THE BATTERY (DISCONNECT LOADS FIRST)



- 1 Connect the positive (+) cable to the positive terminal.
- 2 Connect the negative (-) cable to the negative terminal.

Use appropriately sized cables and tight, secure connections. Refer to the recommended cable size chart.

4 CHECK POLARITY



Red to Positive (+)
Black to Negative (-)



Red to Negative (-)
Black to Positive (+)

IMPORTANT: Reverse polarity can damage the battery and void the warranty.

5 TIGHTEN TERMINALS

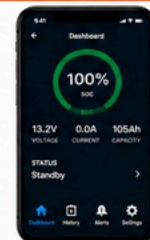


- Tighten terminal bolts to the recommended torque:

6.5 ft.-lbs. /
8.81 Newton-meters (Nm)

Re-check all connections after a few hours of use.

6 POWER ON & VERIFY



- Reconnect loads and power on your system.
- Use the Sentinel-LNX™ app to verify the battery is operating normally.



**SAFETY
FIRST**

- Always wear appropriate PPE.
- Use insulated tools.
- Do not short circuit the terminals.
- Follow all local electrical codes and regulations.



NEED HELP?

Contact Tiger Lithium Support for assistance with your installation.



tigerlithium.com
support@tigerlithium.com
972-698-4437

Step 1 — Prepare the Electrical System

Before beginning installation:

- Turn off all electrical loads and charging sources
- Deactivate the battery by placing it into Hiberstate™ mode
- Remove ignition key and disable engine starting systems (if applicable)
- Verify the electrical system is fully de-energized
- Review system wiring diagrams and installation requirements
- Verify correct battery type, voltage, and configuration

Use appropriate personal protective equipment (PPE) during installation.

Step 2 — Remove Existing Battery

If replacing an existing battery:

1. Disconnect the negative (-) cable first
2. Disconnect the positive (+) cable

3. Remove mounting hardware and restraints
4. Remove the existing battery from the installation area

Dispose of old batteries in accordance with local regulations and environmental requirements.

Step 3 — Inspect Installation Area

Before installing the new battery:

- Verify the installation area is clean and dry
- Confirm sufficient clearance and mounting space
- Inspect wiring, fuse holders, and terminals for damage or corrosion
- Verify adequate cable routing and support locations

Correct any damaged or undersized wiring before proceeding.

Step 4 — Install the Battery

- Position the battery in the intended mounting location
- Verify correct orientation
- Secure the battery using appropriate marine-grade mounting hardware
- Ensure the battery cannot shift during vessel operation

Avoid excessive stress on terminals, cables, or battery enclosure components.

Step 5 — Connect the Electrical System

Before making connections:

- Disable battery output by placing the battery into Hiberstate™ mode
- Verify correct polarity
- Verify all charging sources are disabled
- Ensure overcurrent protection devices are properly installed

Recommended connection sequence:

1. Connect positive (+) cable
2. Connect required fuse or circuit breaker assembly
3. Connect negative (–) cable last

IMPORTANT

Always verify polarity before energizing the system. Reversed polarity may result in immediate equipment damage, electrical arcing, or Battery Management System (BMS)

| protection events.

Install System Protection

Verify installation of:

- Properly rated fuse or circuit breaker
- Required disconnect devices
- Busbars or distribution equipment (if applicable)
- Cable support and strain relief

Primary overcurrent protection should be installed as close to the battery positive terminal as practical.

Connect Additional Systems (If Applicable)

Additional system components may include:

- DC-to-DC chargers
- Solar charge controllers
- Alternator regulators
- Monitoring systems or displays
- External communication equipment

Verify all additional equipment is compatible with lithium battery operation.

Step 6 — Final System Inspection

Before energizing the system:

- Verify all connections are secure and properly torqued
- Confirm fuse installation
- Verify cable routing and support
- Inspect for exposed conductors or loose wiring
- Verify terminals are protected from accidental short circuit

Do not energize the system if any abnormal conditions are present.

Step 7 — Restore System Power

After verifying installation:

- Energize system disconnects and protection devices
- Wake or activate the battery if required
- Restore vessel electrical power

Depending on battery operating state, activation may occur automatically or require user interaction.

Refer to:

→ Section 11 — Waking the Battery

Step 8 — Verify System Operation

After installation:

- Verify battery output voltage
- Confirm connected equipment powers on correctly
- Verify charging system operation
- Confirm no fault indicators are present
- Verify Bluetooth® communication and app connectivity (if equipped)

Monitor initial system operation carefully to verify proper charging and electrical system behavior.

If abnormal behavior occurs:

→ Refer to Section 32 — Troubleshooting

Additional Information

Refer to:

- Section 18 — Electrical System Protection
- Section 19 — Cable Sizing & Wiring Requirements
- Section 23 — Complete System Wiring Diagram
- Section 25 — Cable Torque Specifications

17. CHARGING SYSTEMS

Proper charging system design is critical for safe operation, charging system stability, battery performance, and long-term service life.

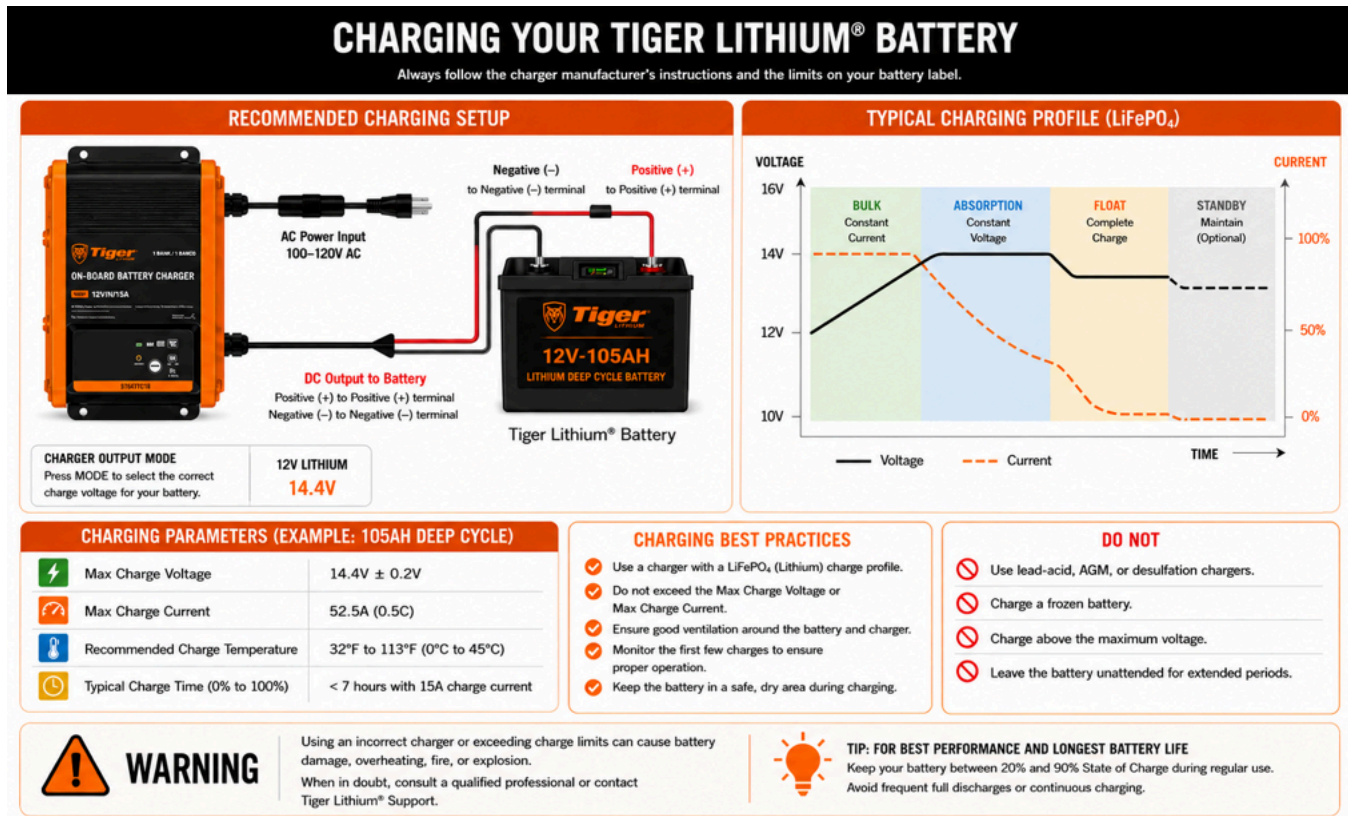
Tiger Lithium Marine Batteries are designed to operate with common marine charging systems when properly configured and used within approved operating limits.

Each charging method must be selected based on:

- Battery type
- System voltage

- Charging source characteristics
- Vessel electrical architecture

17.1 CHARGING SYSTEM OVERVIEW



Tiger Lithium® Marine Batteries may be charged using:

- AC shore power chargers
- Engine alternators (starting batteries only)
- DC-to-DC chargers
- Solar charging systems (MPPT controllers)

IMPORTANT

Incorrect charging system design is the most common cause of system issues, including alternator damage, battery shutdown, and reduced system performance.

17.2 Starting Battery Charging

Tiger Lithium® Starting batteries are designed to accept charging current from properly functioning marine charging systems, including compatible alternator and stator-based charging systems commonly found on marine outboards.

Recommended Charging Voltage

For optimal performance and battery longevity, Tiger Lithium recommends charging Starting batteries using a lithium-compatible charger configured to provide:

- **14.4V $\pm$ 0.2V**

This charging voltage is commonly provided by properly configured AC-powered lithium battery chargers and represents the preferred charging profile for routine charging.

Alternator & Stator Charging Systems

Tiger Lithium Starting batteries are engineered to safely accept charging current from properly functioning marine alternator and stator-based charging systems operating within:

- **14.5V $\pm$ 0.3V**

This operating range accommodates the charging voltages commonly produced by modern marine outboard charging systems during normal operation.

Overvoltage Protection

All Tiger Lithium Starting batteries incorporate Battery Management System (BMS) overvoltage protection.

If charging voltage reaches approximately:

- **15.4V**

the BMS may restrict or interrupt charging to protect the battery from potentially damaging charging conditions.

IMPORTANT

15.4V represents a protection threshold and is not a recommended charging voltage. Charging systems should be configured to operate within approved charging voltage ranges.

Repeated overvoltage protection events may indicate:

- Charging system malfunction
- Regulator failure
- Improper charger configuration

- Electrical system faults
- If overvoltage protection events occur repeatedly, inspect the charging system before continued operation.

Maximum Charge Current

Tiger Lithium Starting batteries are designed to safely accept charging current up to:

- **0.5C (50% of battery Ah capacity)**

Examples:

- 120Ah Battery → 60A Maximum Recommended Charge Current
- 180Ah Battery → 90A Maximum Recommended Charge Current

If the 0.5C charge current limit is exceeded, the Battery Management System (BMS) may activate protective measures that can include disabling further charging, disabling current output, or both until operating conditions return to an acceptable range. Charging current above these values may increase battery temperature and reduce long-term battery life.

Refer to:

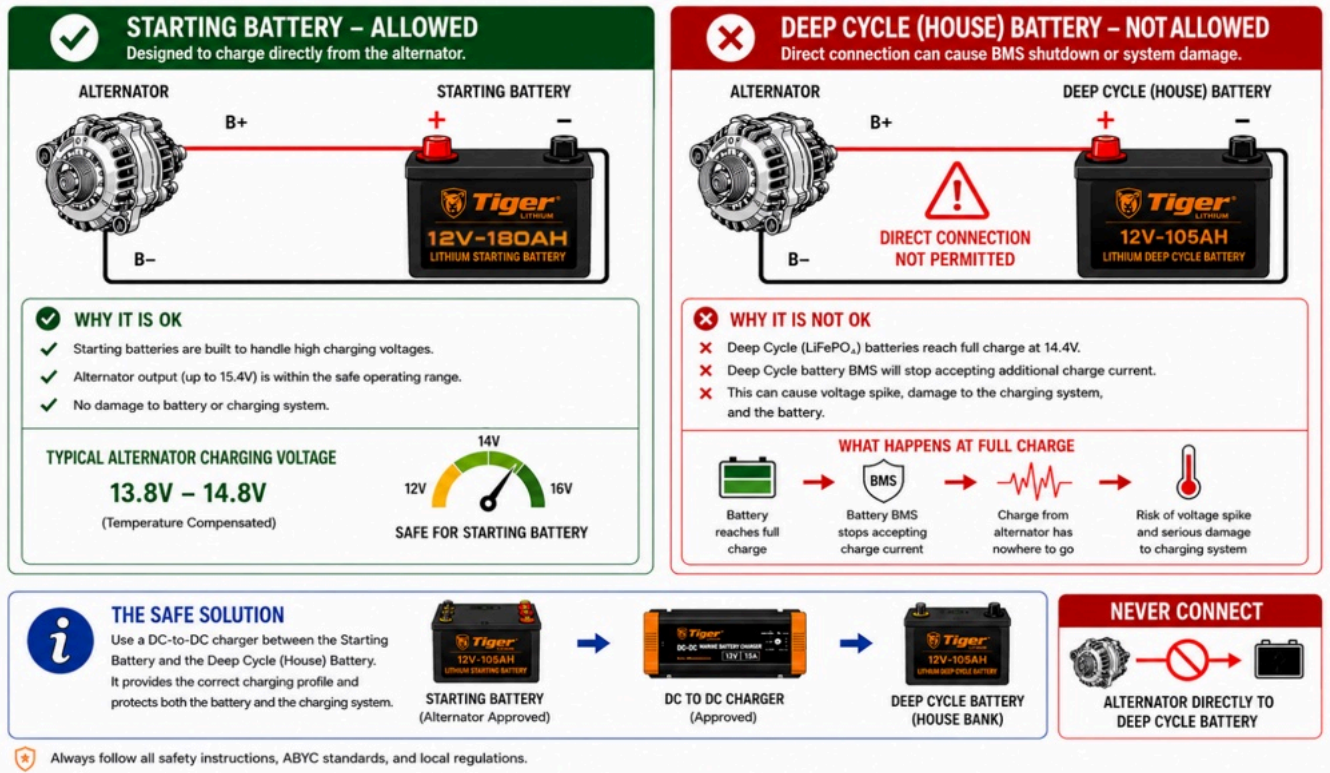
- Section 17.4 AC Charging (Shore Power)
- Section 17.5 DC-to-DC Charging
- Section 23 Complete System Wiring Diagram

17.3 DEEP CYCLE BATTERIES — CRITICAL REQUIREMENT

| WARNING — DIRECT ALTERNATOR CHARGING OF DEEP CYCLE BATTERIES IS NOT PERMITTED

ALTERNATOR vs DEEP CYCLE BATTERY – RISK DIAGRAM

Why the Alternator Must Not Be Connected Directly to the Deep Cycle (House) Battery



Tiger Lithium® Deep Cycle batteries must NOT be connected directly to:

- Outboard charging systems
- Inboard alternators
- Stator-based charging systems

Why This Restriction Exists

Deep cycle lithium batteries are designed to reach full charge at approximately:

→ **14.4V**

Marine alternators commonly operate at:

→ **14.4V and above**

What Happens in This Condition

When a deep cycle lithium battery reaches full charge:

- The Battery Management System (BMS) may stop accepting charging current
- The battery may effectively disconnect from the charging system

System Risk

A sudden loss of charging load while an alternator is actively charging may result in:

- Voltage spikes
- Charging instability
- Alternator damage
- Damage to connected electrical systems

IMPORTANT

This is the primary reason deep cycle lithium batteries must not be connected directly to marine alternator systems.

Why Starting Batteries Are Different

Tiger Lithium® Starting Batteries are specifically engineered to:

- Operate safely at higher charging voltages
- Continue accepting charge within approved limits
- Reduce risk of BMS-triggered disconnect during alternator operation

This behavior helps maintain charging system stability during engine operation.

Approved Charging Methods for Deep Cycle Batteries

If charging while underway is required, one of the following approved charging methods must be used.

DC-to-DC Charging (*Required for Alternator-Based Charging*)

DC-to-DC chargers:

- Regulate charging voltage
- Limit charging current
- Maintain controlled lithium charging behavior
- Reduce charging system instability

Additional Approved Charging Sources

Approved charging sources may include:

- AC shore power battery chargers
- Solar charging systems with MPPT controllers

IMPORTANT

A DC-to-DC charger is required for any alternator-based charging of deep cycle lithium batteries.

17.4 AC CHARGING (SHORE POWER)

When shore power is available, AC charging is generally the preferred charging method for lithium battery systems.

Charger Requirements

Chargers must:

- Support LiFePO₄ (LFP) battery chemistry
- Match the correct system voltage
- Be properly configured for lithium charging operation

Lithium-compatible labeling alone does not guarantee correct charger configuration.

Recommended Settings

Recommended charger configuration generally includes:

- Proper lithium absorption voltage
- Reduced or disabled float charging
- Equalization charging disabled

IMPORTANT

Lithium batteries do not require traditional equalization charging and generally do not require continuous float charging.

17.5 DC-TO-DC CHARGING

DC-to-DC chargers provide a controlled method for charging lithium batteries from alternator-based charging systems.

Key Functions

DC-to-DC chargers may:

- Regulate charging voltage
- Limit charging current
- Reduce alternator stress
- Improve charging stability
- Maintain controlled lithium charging profiles

IMPORTANT

DC-to-DC charging is required when charging deep cycle batteries from marine alternator systems.

17.6 SOLAR CHARGING (MPPT)

Solar charging systems may provide effective supplemental charging when properly configured.

Requirements

Use a programmable MPPT (Maximum Power Point Tracking) charge controller configured for lithium battery operation.

Controllers should:

- Match system voltage
- Utilize lithium charging profiles
- Have equalization charging disabled

Cold Weather Charging

- Do not charge non-heated batteries below 32°F (0°C)
- Heated battery models manage cold-weather charging automatically

17.7 MULTIPLE CHARGING SOURCES

Many marine electrical systems utilize multiple charging sources operating simultaneously or independently, including:

- Alternator charging
- AC shore power charging
- Solar charging systems
- DC-to-DC charging systems

Best Practices

When integrating multiple charging systems:

- Verify all charging devices are configured correctly
- Ensure charging voltages are compatible
- Avoid conflicting charge profiles
- Verify proper fuse and overcurrent protection
- Monitor charging system behavior during initial operation

Complex marine electrical systems may require professional system design and integration.

17.8 CHARGING SYSTEM SUMMARY

Battery Type	Charging Source	Allowed	Notes
Starting	Alternator (Direct)	Yes	Approved for marine charging systems operating within 14.5V $\pm$ 0.3V and up to 0.5C charge current. Overvoltage protection may activate at approximately 15.4V.
Deep Cycle	Alternator (Direct)	No	BMS disconnect and voltage spike risk
Deep Cycle	DC-to-DC Charger	Yes	Required for alternator-based charging
All Models	AC Charger	Yes	Charger must support LiFePO ₄ operation
All Models	Solar (MPPT)	Yes	Proper controller configuration required

CHARGER CONNECTION GUIDE

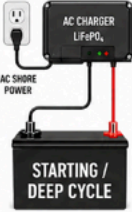
Use approved charging sources to ensure safe, reliable performance and maximize battery life.

APPROVED CHARGING SOURCES

Safe and recommended for lithium starting and deep cycle batteries.

AC SHORE POWER CHARGER

Primary charging method.



STARTING / DEEP CYCLE

DC-TO-DC CHARGER

Required for charging Deep Cycle batteries from the engine alternator.



STARTING / DEEP CYCLE

SOLAR + MPPT CONTROLLER

Approved when configured correctly.



STARTING / DEEP CYCLE

OUTBOARD / INBOARD ALTERNATOR

For charging STARTING batteries only



STARTING BATTERY

FOLLOW BATTERY CHARGING REQUIREMENTS

Use chargers and settings compatible with LiFePO₄ batteries. See your manual for voltage and current specifications.

NOT APPROVED / NOT RECOMMENDED

These methods can damage your lithium battery or create safety risks.



DIRECT ALTERNATOR CHARGING TO DEEP CYCLE BATTERY
Not allowed. Risk of overvoltage damage.



UNREGULATED CHARGER
Not recommended. May overcharge and damage the battery.



LEAD-ACID-ONLY CHARGER
Not recommended. Incorrect charge profile can reduce performance and battery life.



CHARGER EXCEEDING VOLTAGE LIMITS
Not allowed. Exceeding voltage limits can cause permanent damage.

STARTING BATTERIES

Can be charged directly from the alternator.
(Max 15.4V)

DEEP CYCLE BATTERIES (HOUSE / SERVICE)

Must be charged using approved sources:



DC-to-DC Charger



AC Shore Power Charger



Solar + MPPT Controller

IMPORTANT

Always consult your battery manual for full charging specifications and requirements.

IMPORTANT: Using unapproved charging methods can void your warranty, damage your battery, and create a fire or safety hazard. Always follow the instructions in your manual and use high-quality, lithium-compatible charging equipment.

Additional Information

Refer to:

- Section 10 — Waking the Battery
- Section 19 — Electrical System Protection
- Section 20 — Cable Sizing

18. ELECTRICAL SYSTEM PROTECTION

Proper electrical system protection is required to reduce the risk of:

- Electrical fire
- Equipment damage
- Wiring failure
- Short circuits
- Charging system damage
- Personal injury

Tiger Lithium batteries are capable of delivering extremely high fault current and must be installed with appropriate overcurrent protection and properly rated wiring.

18.1 Overcurrent Protection

All battery installations must include properly rated overcurrent protection devices installed on positive conductors.

Overcurrent protection helps protect:

- Wiring
- Connected equipment
- Charging systems
- Vessel electrical systems

from damage caused by:

- Short circuits
- Excessive current flow
- Electrical faults

Requirements

- Install a fuse or circuit breaker in the positive (+) conductor
- Position primary protection as close to the battery positive terminal as practical
- Use devices rated for the system voltage and expected current load
- Verify conductor ampacity exceeds expected operating current

IMPORTANT

Overcurrent protection is intended to protect the conductor and connected system components — not just the connected load device.

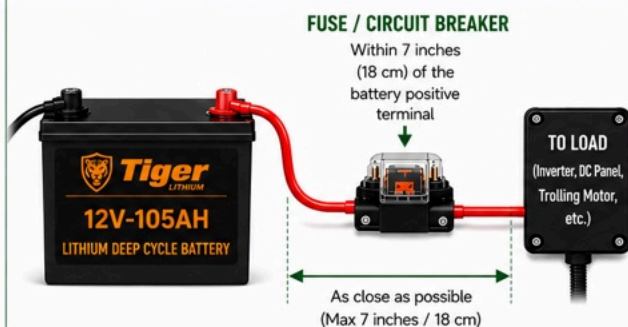
FUSE / CIRCUIT BREAKER PLACEMENT

All fuses and circuit breakers must be installed as close to the battery positive terminal as possible.



CORRECT INSTALLATION

Protect the positive cable as close to the battery as possible.



Short protected run = Safer installation

Meets ABYC E-11 standards for overcurrent protection.



INCORRECT INSTALLATION

Never install fuses or breakers away from the battery.



Long unprotected run = Fire and shock hazard

Not recommended. Does not meet ABYC standards.

ADDITIONAL NOTES



Fuse or breaker size must match the maximum continuous current of the circuit.



Use marine-rated fuse holders or circuit breakers suitable for the environment.



Use ignition-protected components in spaces where flammable vapors may be present.



Protect every positive conductor leaving the battery (including chargers and accessories).



Follow ABYC E-11 standards and all applicable local electrical codes.



EXCEPTION NOTE: Some engine starting circuits may follow manufacturer-specific protection requirements. Always follow the engine manufacturer's installation guidelines.

IMPORTANT

Failure to install proper overcurrent protection may result in fire, equipment damage, or personal injury.

18.2 Fuse Selection

When selecting fuses:

- Match fuse rating to conductor capacity
- Ensure fuse interruption rating is appropriate for the system
- Use marine-rated fuses and fuse holders
- Verify environmental protection appropriate for marine installations

Common marine fuse types may include:

- ANL fuses
- Class-T fuses
- MRBF terminal fuses
- Marine-rated inline fuse systems

Fuse selection should be based on:

- Expected current load
- Cable size
- System voltage
- Installation environment

18.3 Circuit Protection Strategy

Each major electrical subsystem should be independently protected whenever possible.

Typical protected circuits may include:

- Engine starting systems
- House electrical systems
- Trolling motor systems
- Inverter systems
- Charging systems
- Electronics systems

Separating protection zones helps reduce the likelihood that a fault in one subsystem will disable the entire vessel electrical system.

Battery disconnect switches or service isolation devices are strongly recommended for marine installations.

18.4 Short Circuit Protection

Lithium batteries are capable of delivering extremely high short-circuit current.

To reduce short-circuit risk:

- Use insulated terminals and terminal covers
- Protect exposed conductors from accidental contact
- Route cables away from sharp edges and moving components
- Support wiring to minimize vibration and abrasion
- Protect conductors using loom, conduit, or abrasion-resistant sleeving where appropriate

Never place conductive objects on or near battery terminals.

18.5 Grounding & Negative Return Systems

Proper negative return and grounding practices are essential for stable marine electrical system operation.

Recommended practices include:

- Maintain clean, low-resistance negative connections
- Use properly sized negative conductors
- Avoid loose or corroded grounding points
- Verify compatibility of shared grounding systems between connected equipment

Improper grounding or negative return design may contribute to:

- Charging instability
- Voltage drop
- Electrical noise or interference
- Improper system operation

Marine grounding and bonding practices should comply with applicable marine electrical standards and vessel manufacturer requirements.

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 19 — Cable Sizing & Wiring Requirements
- Section 23 — Complete System Wiring Diagram

19. CABLE SIZING & WIRING REQUIREMENTS

Proper cable sizing and wiring practices are critical for safe operation, charging stability, and overall system performance.

Improper conductor sizing or poor connection quality may result in:

- Excessive voltage drop
- Overheating
- Charging instability
- Reduced equipment performance
- Battery protection events

- Electrical fire hazard

Tiger Lithium batteries are capable of delivering sustained high current and require appropriately sized marine-grade wiring systems.

19.1 Cable Sizing Principles

Cable size must be selected based on:

- Maximum expected current load
- Total conductor length
- Acceptable voltage drop
- Installation environment
- Ambient temperature
- Duty cycle of connected equipment

Lithium battery systems may sustain higher operating current for longer periods than traditional lead-acid systems.

Undersized wiring that may appear acceptable in lead-acid installations may overheat or exhibit excessive voltage drop in lithium battery systems.

19.2 Voltage Drop Considerations

Excessive voltage drop may result in:

- Reduced charging performance
- Lower equipment efficiency
- Increased conductor heating
- Reduced trolling motor performance
- Inverter instability
- Erratic electronics behavior

Recommended voltage drop limits:

- ≤3% for critical systems:
 - Engine starting
 - Electronics systems
 - Charging circuits
 - Navigation equipment
- ≤10% for non-critical accessory loads

Longer cable runs require larger conductors to maintain acceptable voltage drop.

19.3 Marine Wiring Best Practices

Marine electrical systems should utilize:

- Marine-grade tinned copper conductors
- Properly rated insulation materials
- Waterproof or marine-rated terminals and connectors
- Properly crimped cable terminations
- Corrosion-resistant installation hardware

Recommended installation practices include:

- Supporting cables at regular intervals
- Protecting conductors from vibration and abrasion
- Routing cables away from fuel systems and heat sources
- Avoiding sharp bends or excessive mechanical stress

19.4 Cable Routing

When routing cables:

- Avoid pinch points and sharp edges
- Keep conductors clear of moving components
- Separate high-current conductors from sensitive signal wiring where practical
- Protect cables using loom, conduit, or abrasion-resistant sleeving where necessary
- Maintain service access to fuse blocks, disconnects, and terminals

Improper cable routing may result in conductor damage or intermittent electrical faults.

19.5 Connection Quality

Electrical connection quality is critical in high-current marine lithium systems.

Poor connections may create:

- Excessive resistance
- Heat buildup
- Voltage loss
- Charging instability
- Intermittent system operation

Recommended practices include:

- Use properly crimped terminals and connectors
- Verify all terminals are clean and secure
- Torque connections to specified values
- Inspect connections periodically for corrosion or looseness
- Replace damaged or overheated terminals immediately

IMPORTANT

Loose, damaged, or improperly crimped connections may generate excessive heat and result in equipment damage, protection shutdown, or fire hazard.

Additional Information

Refer to:

- Section 18 — Electrical System Protection
- Section 23 — Complete System Wiring Diagram
- Section 25 — Cable Torque Specifications

20. MARINE SYSTEM COMPATIBILITY

Tiger Lithium batteries are designed for integration into a wide range of marine electrical systems when installed and configured according to approved operating requirements.

Compatibility depends on:

- Battery type
- System voltage
- Charging system design
- Electrical load characteristics
- Overall vessel electrical architecture

Proper system integration is critical for safe and reliable operation.

20.1 Engine Charging Systems

Tiger Lithium® Starting batteries are designed for compatibility with many modern marine engine charging systems, including:

- Outboard engines
- Inboard engines
- Stator-based charging systems

System compatibility depends on operating within approved charging voltage and current limits described in this manual.

Deep Cycle batteries have different charging requirements and are not approved for direct alternator charging.

Refer to:

→ Section 17 — Charging Systems

20.2 Trolling Motor Systems

Tiger Lithium® batteries are compatible with many marine trolling motor systems, including:

- 12V systems
- 24V systems
- 36V systems

Series-connected battery configurations may be used where approved.

Recommended practices include:

- Use identical battery models and capacities
- Match battery age and State of Charge (SOC) before installation
- Verify trolling motor voltage compatibility
- Use properly sized conductors and overcurrent protection

IMPORTANT

Only approved battery configurations described in this manual may be used.

Improper series or parallel configurations may result in:

- Uneven charging
- System imbalance
- Protection events
- Reduced battery performance

20.3 Electronics & House Systems

Tiger Lithium® batteries are compatible with many common marine electronics and house electrical systems, including:

- Navigation systems

- Sonar and fish-finding equipment
- Pumps and lighting
- Marine communication systems
- Inverters and accessory systems

Proper system design remains important because sensitive marine electronics may be affected by:

- Excessive voltage drop
- Poor grounding
- Improper conductor sizing
- Electrical noise or unstable charging systems

Dedicated electronics outputs should be used only as intended on supported battery models.

20.4 Charging System Compatibility

Compatible charging systems may include:

- AC shore power chargers
- Solar charging systems with MPPT controllers
- DC-to-DC charging systems
- Approved alternator charging systems (*Starting batteries only*)

All charging equipment must:

- Support lithium battery operation
- Match system voltage
- Be properly configured for LiFePO₄ charging profiles

Improper charger configuration may result in:

- Charging instability
- Reduced battery performance
- Protection shutdown events
- Equipment damage

Refer to:

→ Section 17 — Charging Systems

20.5 Industry Standards

Tiger Lithium® recommends marine electrical installations comply with applicable industry standards and vessel manufacturer requirements, including:

- ABYC E-11 — AC & DC Electrical Systems
- ABYC E-13 — Lithium Battery Systems

Compliance responsibility ultimately remains with:

- The installer
- Vessel manufacturer
- System integrator

Professional installation by a qualified marine electrician is strongly recommended.

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 18 — Electrical System Protection
- Section 19 — Cable Sizing & Wiring Requirements
- Section 21 — Approved Battery Connection Configurations

21. APPROVED BATTERY CONNECTION CONFIGURATIONS

This section defines approved battery connection methods for Tiger Lithium Marine Battery Systems.

Proper battery configuration is critical for:

- Safe operation
- Charging system stability
- Proper Battery Management System (BMS) operation
- Balanced charging and discharge behavior
- Long-term battery performance

Improper battery configuration may result in:

- Uneven charging
- System instability
- Protection events
- Equipment damage

- Reduced service life
- Warranty denial

SERIES VS. PARALLEL CONNECTIONS

SERIES CONNECTION (Increase Voltage)

Connect the positive (+) terminal of one battery to the negative (-) terminal of the next battery.
Voltage adds up. Capacity (Ah) stays the same.

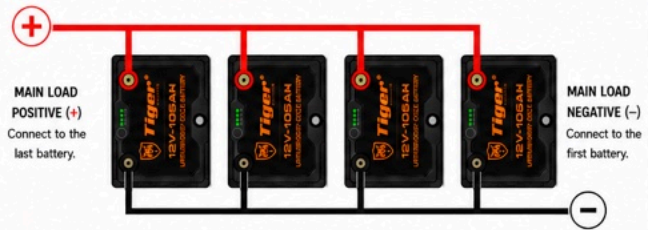


RESULT: VOLTAGE INCREASES
CAPACITY (AH) STAYS THE SAME

Example: 4 x 12V 105Ah in SERIES (4S)
48V 105Ah (Nominal)

PARALLEL CONNECTION (Increase Capacity)

Connect all positive (+) terminals together and all negative (-) terminals together.
Voltage stays the same. Capacity (Ah) adds up.



RESULT: CAPACITY INCREASES
VOLTAGE STAYS THE SAME

Example: 4 x 12V 105Ah in PARALLEL (4P)
12V 420Ah (Nominal)

BEST PRACTICES



Use Identical Batteries
Same voltage, capacity (Ah),
brand, model, and age.



Same State of Charge
Fully charge all batteries
before making connections.



Tight & Proper Connections
Use correct torque and quality
cables. Loose connections
can cause overheating.



Follow Limits
Do not exceed the maximum
series or parallel limits shown
on your battery label.



Monitor Your System
Use a battery monitor to
track voltage, current,
and state of charge.



WARNING

Incorrect connections can cause short circuits, overheating, battery damage, fire, or explosion.
When in doubt, consult a qualified professional or contact Tiger Lithium® Support.



TIP: OPTIMAL PARALLEL LOAD CONNECTION

For best performance and longest battery life, connect the main load positive (+) to the first battery and the main load negative (-) to the last battery.
Avoid connecting both main load lines to the same battery.

21.1 Series Configurations

Series configurations are used to increase system voltage.

Example configurations:

- 2 × 12V batteries → 24V system
- 3 × 12V batteries → 36V system

Series Configuration Requirements

Only identical batteries may be connected in series.

Batteries connected in series must match:

- Battery model
- Voltage rating

- Capacity (Ah)
- Chemistry type
- Firmware or product generation (where applicable)
- Approximate State of Charge (SOC)

Recommended practices include:

- Verify equal cable lengths where practical
- Use properly sized conductors and overcurrent protection
- Verify charger compatibility with final system voltage
- Fully charge batteries before initial series connection

IMPORTANT

Mixing different battery models, capacities, chemistries, or significantly different charge states may result in system imbalance, charging instability, or BMS protection events.

21.2 Parallel Configurations

Parallel configurations are used to increase available capacity (Ah) while maintaining system voltage.

Example:

- 2 × 12V 100Ah batteries → 12V 200Ah system

Parallel Configuration Requirements

Only identical batteries may be connected in parallel.

Batteries connected in parallel should:

- Be fully charged before initial connection
- Be matched in voltage and State of Charge (SOC)
- Utilize balanced cable routing where practical
- Use equal-length primary conductors when possible

Proper parallel balancing helps maintain:

- Even charging behavior
- Balanced current distribution
- Consistent battery performance

IMPORTANT

Significant voltage imbalance between batteries prior to connection may result in high equalization current and potential system damage.

21.3 Maximum Configuration Limits

Always follow the maximum approved configuration limits specified on:

- The battery product label
- Model-specific technical documentation
- Approved Tiger Lithium® product literature

Configuration limits may vary by:

- Battery model
- Battery type
- Voltage configuration
- Internal BMS design

Do not exceed approved:

- Series limits
- Parallel limits
- Current limits
- Voltage limits

21.4 Dual Voltage Battery Considerations

Certain battery models include dedicated secondary outputs intended for low-current electronics systems.

For dual voltage models:

- Use primary terminals only for high-current propulsion or trolling motor loads
- Use secondary outputs only for approved low-current electronics applications
- Do not combine primary and secondary outputs
- Do not parallel regulated electronics outputs unless specifically approved

Improper use of secondary outputs may result in:

- Output shutdown
- System instability
- Equipment damage
- BMS protection events

Prohibited Configurations

The following configurations are not approved unless specifically authorized by Tiger Lithium®:

- Mixing lithium and lead-acid batteries in the same series or parallel bank
- Mixing different battery capacities within the same bank
- Mixing different battery models or chemistries
- Mixing batteries with significantly different State of Charge (SOC)
- Exceeding approved series or parallel limits

Additional Information

Refer to:

- Section 7 — Understanding Your Battery
- Section 17 — Charging Systems
- Section 19 — Cable Sizing & Wiring Requirements
- Section 23 — Complete System Wiring Diagram

22. INSTALLATION OVERVIEW

This section provides a high-level overview of common marine lithium battery system layouts and integration concepts.

Tiger Lithium batteries may be integrated into a wide range of vessel electrical systems depending on:

- Vessel size
- Engine configuration
- Trolling motor requirements
- Electronics demand
- Charging system architecture
- Battery bank design

Proper system planning is critical for safe operation, charging stability, and long-term system reliability.

22.1 Common System Types

Starting + House System

A common marine configuration utilizes:

- Dedicated Starting Battery
- Dedicated House Battery Bank

This configuration helps isolate:

- Engine starting loads
- Electronics and accessory loads

Benefits may include:

- Improved starting reliability
- Reduced risk of accessory-related discharge of the starting system
- Independent charging and load management

House battery systems may be charged using:

- AC shore power charging
- Solar charging systems
- DC-to-DC charging systems

Starting + House + Trolling Motor System

Larger marine systems may include:

- Dedicated engine starting battery
- Dedicated house battery bank
- Dedicated trolling motor battery system

These systems commonly utilize multiple voltages, including:

- 12V house systems
- 24V trolling systems
- 36V trolling systems

Proper system separation and charging system integration are important to maintain stable operation and balanced charging behavior.

Multi-Bank Charging Systems

Modern marine systems frequently incorporate multiple charging sources operating across separate battery banks.

Charging systems may include:

- Engine alternator charging

- AC shore power charging
- Solar charging systems
- DC-to-DC charging systems

Multi-bank charging systems require proper charger configuration and charging-source coordination to prevent charging instability or system conflicts.

22.2 System Integration Considerations

Proper marine lithium battery integration should include consideration of:

- Battery type and application
- Charging system compatibility
- Battery-bank separation
- Proper overcurrent protection
- Cable sizing and conductor routing
- Charging-source interaction
- Service access and maintenance considerations

Complex marine electrical systems may require professional system design or integration assistance.

22.3 Installation Goals

A properly designed and installed marine electrical system should:

- Operate safely under all expected operating conditions
- Maintain stable system voltage
- Provide reliable engine starting capability
- Deliver consistent power to electronics and trolling systems
- Protect conductors and connected equipment from electrical faults
- Support stable charging system operation
- Maintain serviceability and inspection access

Proper installation practices help improve:

- Charging performance
- Battery service life
- Electrical reliability
- Overall vessel safety

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 18 — Electrical System Protection
- Section 19 — Cable Sizing & Wiring Requirements
- Section 21 — Approved Battery Connection Configurations
- Section 23 — Complete System Wiring Diagram
- Section 24 — Pre-Installation Checklist

23. COMPLETE SYSTEM WIRING DIAGRAM

This section provides reference wiring diagrams and system integration examples for common marine lithium battery installations using Tiger Lithium batteries.

The diagrams included in this manual are intended to illustrate:

- Proper battery configuration
- Charging system integration
- Overcurrent protection placement
- Typical conductor routing
- Common marine system architecture principles

These diagrams are intended as general reference examples and may not represent every possible vessel configuration or installation scenario.

23.1 Diagram Overview

The system wiring diagrams included in this manual may illustrate:

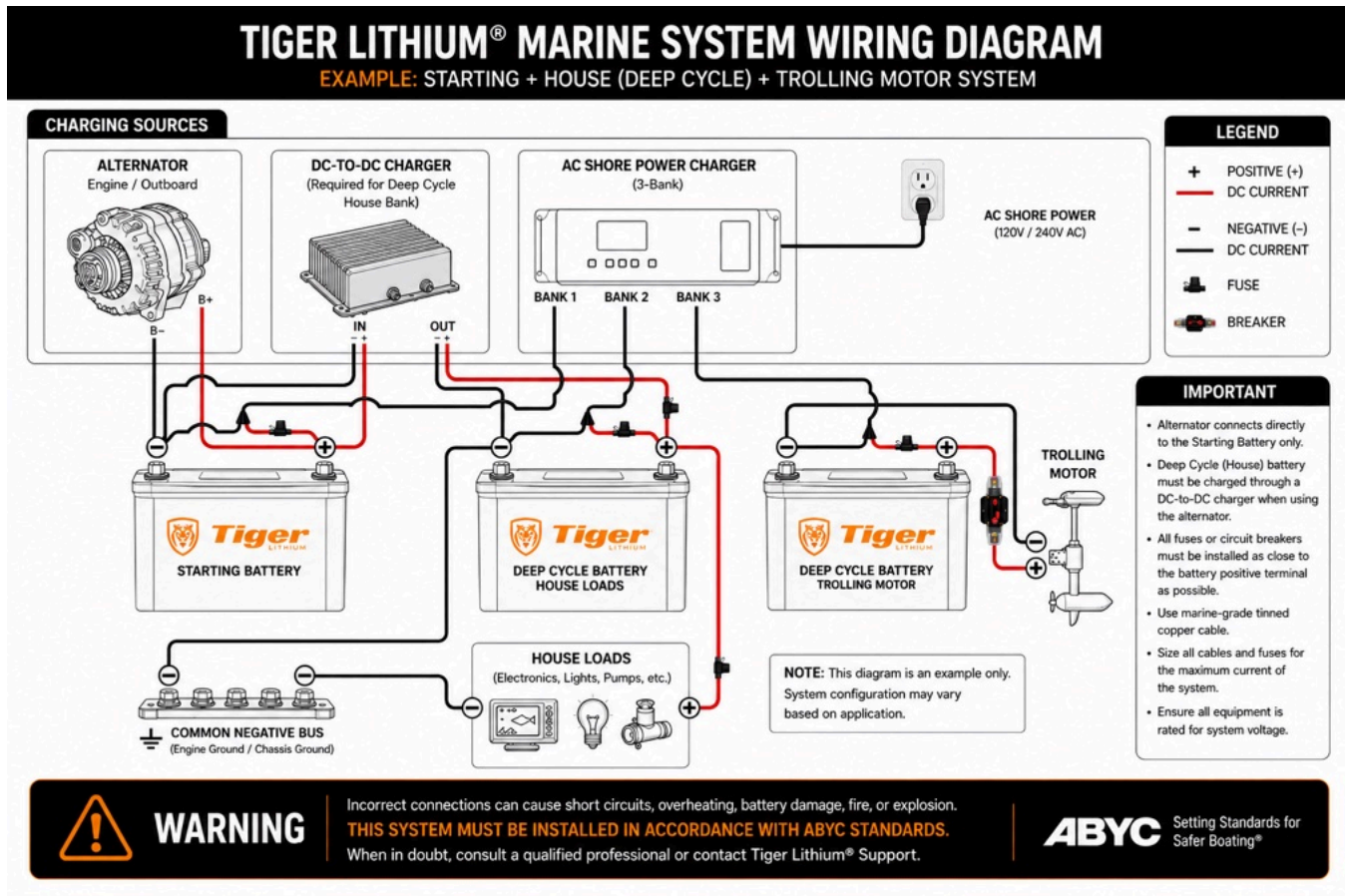
- Starting battery systems
- House battery systems
- Trolling motor battery systems
- Multi-bank charging systems
- DC-to-DC charging integration
- Fuse and circuit protection placement
- Common marine electrical system layouts

IMPORTANT

The primary wiring diagram included in this manual does not illustrate every supported charging method or vessel configuration.

Some supported charging systems — including solar charging integration — are intentionally omitted from the primary diagram to improve clarity and reduce wiring complexity.

Tiger Lithium® batteries support properly configured solar charging systems utilizing compatible MPPT charge controllers.



23.2 Additional Diagram Variations

Additional wiring diagram variations may be provided for specific applications and charging architectures, including:

- Solar charging integration
- Starting + House battery systems
- Starting + House + Trolling Motor systems
- Multi-bank charging systems
- DC-to-DC charging layouts
- Dual voltage battery integration
- Advanced marine electronics systems

These supplemental diagrams are intended to provide clearer application-specific guidance while maintaining readability and installation clarity.

Additional diagrams, technical resources, and updated installation references are available at:
www.tigerlithium.com/resources

23.3 Key Elements

A properly designed marine lithium battery system typically includes:

- Battery bank(s)
- Properly rated overcurrent protection
- Battery disconnect or isolation devices
- Charging systems:
 - AC shore power charger
 - Alternator charging system (*Starting batteries only*)
 - DC-to-DC charging system
- Properly sized conductors and terminals

Additional equipment may include:

- Busbars
- Distribution panels
- Inverters
- Electronics systems
- Monitoring equipment
- Solar charge controllers

Actual vessel wiring requirements may vary depending on:

- Vessel size
- Electrical system complexity
- Engine configuration
- Charging system architecture
- Installed accessories and electronics

23.4 Wiring Best Practices

When using the wiring diagrams provided in this manual:

- Maintain correct polarity at all times
- Install overcurrent protection close to battery positive terminals
- Verify conductor sizing for expected load and cable length

- Support and protect all conductors from vibration and abrasion
- Verify compatibility of all charging equipment before energizing the system
- Ensure all terminals are properly torqued and protected from corrosion

IMPORTANT

Wiring diagrams provided in this manual are reference examples only.

Final system design, conductor sizing, overcurrent protection selection, and installation compliance remain the responsibility of the installer or vessel manufacturer.

23.5 Diagram Reference

Additional diagrams, technical resources, and updated installation references are available at:
www.tigerlithium.com/resources

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 18 — Electrical System Protection
- Section 19 — Cable Sizing & Wiring Requirements
- Section 21 — Approved Battery Connection Configurations
- Section 22 — Installation Overview

24. PRE-INSTALLATION CHECKLIST

Before energizing the system, verify all installation requirements have been completed and inspected.

Proper verification before initial startup helps reduce the risk of:

- Wiring faults
- Charging instability
- Equipment damage
- Improper battery configuration
- Electrical fire hazard
- Battery Management System (BMS) protection events

PRE-INSTALLATION CHECKLIST

Before installing your lithium battery system, confirm the following items are complete. This will help ensure a safe, reliable, and trouble-free installation.

1  BATTERY INSPECTION Check for shipping damage and verify correct model.	2  CHARGER COMPATIBILITY Confirm charger has an approved lithium (LiFePO₄) charging profile and is in good working condition.	3  CABLE SIZE Verify proper cable gauge for current and run length. Use marine-grade cable.	4  FUSE PROTECTION Confirm fuse or circuit breaker is correctly rated and ready for installation.
5  MOUNTING SURFACE Ensure surface is clean, flat, dry, and secure. Verify adequate ventilation.	6  HARDWARE Use stainless steel hardware. Torque all connections to manufacturer specifications. Do not over tighten.	7  BATTERY CONFIGURATION Confirm approved series or parallel configuration only.	8  SYSTEM VOLTAGE Verify system voltage (12V, 24V, or 36V) is compatible with all components.



INSTALLER REMINDER

Do not begin installation until all checklist items are confirmed. This helps ensure safety, performance, and protects your warranty.



Note: Always follow ABYC standards and all manufacturer instructions.

Installation Verification Checklist

Confirm the following before placing the system into operation:

Battery Verification

- Correct battery type installed for intended application
- Battery voltage matches system requirements
- Starting / Deep Cycle application verified
- Approved series or parallel configuration verified
- Batteries matched correctly where multiple batteries are used

Charging System Verification

- Charger compatibility verified for LiFePO₄ operation
- Charger voltage matches system voltage
- Charger configuration/settings verified
- Deep Cycle batteries isolated from direct alternator charging
- DC-to-DC charger installed where required

Electrical System Verification

- Proper fuse or circuit breaker installed
- Overcurrent protection located near battery positive terminal
- Correct conductor sizing verified
- All electrical connections secure and properly torqued
- Correct polarity verified on all connections

Mechanical Installation Verification

- Battery securely mounted
- Cables properly supported and protected
- No exposed conductors present
- Installation area clean and dry
- Battery accessible for inspection and service

Final System Verification

- System inspected for loose wiring or damaged components
- Charging sources verified OFF before energizing
- No tools or conductive objects left near battery terminals
- Bluetooth® communication verified (if equipped)
- No fault indicators present

IMPORTANT

Do not energize the system until all installation checks have been completed and verified.

If abnormal conditions are identified, correct the issue before operating the vessel or charging system.

IMPORTANT

Do not proceed with installation until all checklist items are verified.

Additional Information

Refer to:

- Section 15 — Installation Requirements
- Section 16 — Installation Procedure
- Section 17 — Charging Systems
- Section 18 — Electrical System Protection
- Section 21 — Approved Battery Connection Configurations

25. CABLE TORQUE SPECIFICATIONS

Proper terminal torque is critical for safe and reliable operation of high-current marine lithium battery systems.

Improper torque may result in:

- Excessive resistance
- Heat generation
- Voltage drop
- Intermittent electrical faults
- Terminal damage
- Equipment damage
- Fire hazard

Tiger Lithium batteries should always be installed using properly torqued electrical connections.

TORQUE APPLICATION

Proper torque ensures a secure connection and prevents damage to the battery terminal and components.

**CORRECT TORQUE APPLICATION**

TERMINAL & HARDWARE
All Tiger Lithium batteries feature female M8 threaded terminals.



Most common:
Use included M8 bolt (washers not included).

 Phillips screwdriver

 13mm socket

OPTIONAL ADAPTER:
Included double male terminal bolt adapts the female terminal to a threaded post.



SECURING LUGS:
Use provided M8 nylock nut (washers not included).




Apply straight downward force.

RECOMMENDED TORQUE
M8 Terminal
6.5 ft-lbs
8.81 Nm

 Use a calibrated torque wrench.

 Apply straight downward force.

 Torque to specification. Do not over tighten.

**INCORRECT TORQUE APPLICATION**

**ANGLED APPLICATION**
Applying torque at an angle can loosen the connection, damage the terminal threads, and cause inaccurate torque.

**STACKING MULTIPLE LUGS**
Do not stack multiple cable lugs under one nut. This can cause high resistance and overheating.

**OVER TIGHTENING**
Over tightening can damage threads and terminals, leading to poor performance or failure.

**UNSUPPORTED CABLE STRAIN**
Do not allow cable weight or side force on the terminal. This can loosen the connection, stress the terminal, and cause failure over time.

**INSTALLER REMINDER**

 Never use impact tools on battery terminals.

 Always use a calibrated hand torque wrench.

 Torque to specification. Do not over tighten.

25.1 Terminal Torque Specification

M8 Terminal Connections

Required torque:

6.5 ft-lb (8.81 N·m)

IMPORTANT

Use a calibrated torque wrench when tightening battery terminals.

Under-torqued connections may loosen during operation and generate excessive heat.

Over-torqued connections may damage:

- Terminal hardware
- Threaded inserts

- Battery enclosure components
- Connected cable terminals

25.2 Installation Best Practices

When tightening terminal connections:

- Verify terminals and lugs are clean and free of corrosion
- Ensure cable lugs sit flush against terminal surfaces
- Do not stack excessive terminal lugs unless specifically approved
- Prevent cable strain or side-loading on terminals
- Reinstall protective terminal covers after installation

Avoid:

- Using power tools for final tightening
- Overtightening terminal hardware
- Installing damaged lugs or hardware

25.3 Periodic Inspection

Marine environments subject electrical systems to:

- Vibration
- Thermal cycling
- Corrosion exposure

Periodically inspect all terminal connections for:

- Looseness
- Corrosion
- Heat discoloration
- Damaged conductors or terminals

Any damaged or overheated components should be replaced immediately.

Additional Information

Refer to:

- Section 18 — Electrical System Protection
- Section 19 — Cable Sizing & Wiring Requirements

- Section 32 — Troubleshooting

26. TEMPERATURE OPERATING LIMITS

Tiger Lithium batteries are designed to operate across a wide range of marine environmental conditions.

Operation outside approved temperature ranges may result in:

- Reduced performance
- Charging limitation
- Battery Management System (BMS) protection events
- Reduced battery life
- Permanent battery damage

TEMPERATURE OPERATION GUIDE

Operate with confidence. Protect performance. Extend battery life.

Tiger Lithium marine batteries are built with advanced LiFePO4 chemistry and a smart Battery Management System (BMS) that actively monitors temperature to optimize performance, maximize safety, and protect your investment.

STANDARD (NON-HEATED) BATTERY MODELS Temperature limits for safe operation.		HEATED BATTERY MODELS (IF EQUIPPED) Internal heating enables charging in cold environments.	
 CHARGING (INCOMING CURRENT)	32°F to 113°F (0°C to 45°C)	 ALLOWED Charging is allowed within this temperature range. Outside of this range, charging is disabled.	CHARGING BEGINS ONCE INTERNAL BATTERY TEMPERATURE REACHES A SAFE THRESHOLD. The internal heater warms the battery as needed. Charging starts automatically when the battery reaches a safe temperature.
 DISCHARGING (OUTGOING CURRENT)	-4°F to 140°F (-20°C to 60°C)	 ALLOWED Discharging is allowed within this temperature range. Output capability may be reduced at extreme temperatures.	 ALLOWED Discharging is allowed within this temperature range. Output capability may be reduced at extreme temperatures.

i HOW THE BMS PROTECTS YOU

The BMS continuously monitors cell temperatures and automatically adjusts or disables charging/discharging as needed. These protections help prevent cell damage, ensure safe operation, and extend the life of your battery.

💡 TIPS FOR BEST RESULTS

- Keep battery within the recommended temperature ranges
- Do not charge when battery temperature is below 32°F (0°C) unless the battery has internal heating.
- If charging is disabled due to low temperature, allow the battery to warm before charging.
- Avoid exposing the battery to extreme heat for prolonged periods.

⚠️ IMPORTANT

Repeatedly operating outside the recommended temperature ranges may limit performance and could reduce battery life.
When in doubt, let the battery acclimate to a safe operating temperature.

❄️ COLD WEATHER TIP

In extreme conditions store and use batteries in temperature-controlled compartments.

☀️ HOT WEATHER TIP

Provide ventilation and shade when possible. Avoid direct sunlight and heat-trapping enclosures to keep temperatures in check.

❓ NEED HELP?

Contact Tiger Lithium® Support with any questions.

26.1 Standard (Non-Heated) Battery Models

Approved operating ranges:

Function	Temperature Range
Charging	32°F to 113°F (0°C to 45°C)
Discharging	-4°F to 140°F (-20°C to 60°C)

IMPORTANT

Charging a non-heated lithium battery below 32°F (0°C) may cause permanent battery damage.

The Battery Management System (BMS) automatically prevents charging outside approved limits.

26.2 Heated Battery Models *(If Equipped)*

Heated battery models include integrated internal heating systems designed to support charging in cold environments.

When charging is attempted at low temperature:

- The internal heating system activates automatically
- Battery charging begins once internal cell temperature reaches a safe operating range

No user intervention is required during normal operation.

26.3 High Temperature Operation

Excessive heat may reduce:

- Battery performance
- Charging efficiency
- Long-term battery life

Output capability may be reduced at extreme temperatures.

Avoid installation in areas subject to:

- Excessive engine heat
- Poor ventilation
- Direct prolonged sunlight exposure
- Enclosed compartments with elevated ambient temperature

Reasonable airflow and thermal management should be maintained whenever possible.

26.4 Cold Weather Operation

Cold temperatures may temporarily affect:

- Available output power
- Charging acceptance
- Runtime performance

These effects are normal characteristics of lithium battery systems.

Non-heated battery models must not be charged below 32°F (0°C).

Heated battery models automatically manage cold-weather charging behavior through integrated BMS-controlled heating functionality.

26.5 Storage Considerations

For long-term storage:

- Store batteries in a cool, dry location whenever possible
- Avoid prolonged exposure to extreme temperatures
- Follow storage procedures described in this manual

Refer to:

→ Section 28 — Storage & Seasonal Maintenance

Additional Information

Refer to:

- Section 10 — Understanding Battery Operating Modes
- Section 17 — Charging Systems
- Section 28 — Storage & Seasonal Maintenance

27. TRANSPORTATION

Tiger Lithium batteries are high-energy lithium battery systems and must be transported with appropriate care and handling precautions.

Improper transport practices may result in:

- Terminal short circuits
- Physical damage
- Battery protection events
- Fire hazard
- Regulatory compliance issues

27.1 General Transportation Guidelines

When transporting batteries:

- Protect terminals from short circuit
- Prevent movement or impact during transport
- Keep batteries upright whenever possible
- Avoid crushing, puncturing, or dropping the battery
- Protect the battery from direct water exposure

Do not transport batteries that are:

- Swollen
- Leaking
- Physically damaged
- Exhibiting abnormal odor or heat generation

27.2 Terminal Protection

During transport:

- Install terminal covers where provided
- Prevent contact with conductive materials
- Avoid placing loose metal objects near terminals

IMPORTANT

Battery terminals capable of accidental short circuit may generate extremely high current and create fire hazard or equipment damage.

27.3 Transportation Environment

Avoid transporting batteries in environments subject to:

- Excessive heat
- Open flame
- Standing water
- Severe vibration or impact
- Direct prolonged sunlight exposure

Do not leave batteries exposed inside enclosed vehicles for extended periods during high ambient temperature conditions.

27.4 Shipping & Regulatory Compliance

Lithium batteries may be subject to transportation regulations depending on:

- Battery size
- Watt-hour rating
- Shipping method
- Packaging configuration
- Destination requirements

Commercial shipment of lithium batteries may require compliance with applicable transportation regulations.

Always follow applicable:

- Carrier requirements
- Local regulations
- National transportation regulations
- International shipping requirements

27.5 Preparing Batteries for Extended Transport or Storage

Before extended transport:

- Verify batteries are adequately secured
- Disconnect attached equipment when practical
- Protect exposed terminals

- Enable Hiberstate™ when appropriate for long-duration inactivity

Refer to:

- Section 9 — Battery Control Functions
- Section 28 — Storage & Seasonal Maintenance

Additional Information

Refer to:

- Section 3 — Important Safety Information
- Section 4 — Emergency Procedures / Battery Fault Response
- Section 26 — Temperature Operating Limits
- Section 28 — Storage & Seasonal Maintenance

28. STORAGE & SEASONAL MAINTENANCE

Proper storage and seasonal maintenance practices help maximize battery performance, reliability, and service life.

Tiger Lithium batteries are designed for low self-discharge during storage; however, proper preparation remains important during periods of inactivity.

28.1 Preparing for Storage

Before long-term storage:

- Fully inspect the battery and electrical system
- Verify all terminals are clean and secure
- Disconnect or isolate unnecessary electrical loads
- Verify the battery is adequately charged before storage

Do not store the battery in a fully discharged condition.

28.2 Hiberstate™ Storage Mode

Hiberstate™ is a user-controlled low-power storage mode designed specifically for extended inactivity and seasonal storage.

When enabled:

- Battery output is electronically disabled
- Standby energy consumption is significantly reduced
- Bluetooth® communication remains active
- The battery remains visible in the Sentinel-LNX™ App

Hiberstate™ helps reduce parasitic discharge during storage periods.

Refer to:

- Section 9 — Battery Control Functions
- Section 10 — Understanding Battery Operating Modes

STORAGE / HIBERSTATE™ (STORAGE MODE)

HIBERSTATE™ IS A USER-CONTROLLED STORAGE MODE DESIGNED TO MINIMIZE ENERGY LOSS DURING PERIODS OF STORAGE.

WHAT IS HIBERSTATE™?

Hiberstate™ is a user-activated low-power storage mode designed to minimize energy consumption during periods of inactivity.

- ✓ Battery output is disabled
- ✓ Minimal energy consumption
- ✓ Bluetooth® communication remains active
- ✓ Battery remains visible in the Sentinel-LNX™ App

i Hiberstate™ must be manually enabled by the user. It is not triggered by a period of inactivity.

HOW TO PLACE THE BATTERY IN HIBERSTATE™

METHOD 1: USING THE POWER BUTTON

- 1** PRESS & HOLD

Press and hold the Power Button.
- 2** RELEASE AT 3 LEDS

Release when 3 LEDs illuminate.
- 3** IN HIBERSTATE™

Battery output is disabled. Minimal energy consumption.

i Once in Hiberstate™, the battery will remain in low-power mode until manually awakened.

METHOD 2: USING THE SENTINEL-LNX™ APP

- 1** CONNECT

Connect to the battery using the Sentinel-LNX™ app.
- 2** SELECT HIBERSTATE™

Select "Enter Hiberstate™ (Storage Mode)" in the app and confirm.
- 3** IN HIBERSTATE™

Battery output is disabled. Minimal energy consumption.

i Battery remains visible in the app and Bluetooth® communication remains active.

BEST PRACTICES FOR STORAGE

- STORE AT MODERATE TEMPERATURES**
Ideal storage temperature: 32°F – 77°F (0°C – 25°C). Avoid extreme heat or freezing temperatures.
- STORE AT 50%–80% STATE OF CHARGE**
This is the ideal state of charge for long-term storage. Avoid storing at 100% SOC for extended periods.
- KEEP BATTERY CLEAN AND DRY**
Store in a clean, dry location away from moisture, corrosion, and direct sunlight.
- CHECK PERIODICALLY**
If storing for more than 6 months, check the state of charge every 6 months and recharge if below 20% SOC.

RECOVERY METHODS (HOW TO WAKE THE BATTERY)

The battery may be awakened using:

POWER BUTTON (QUICK PRESS)



Quick press and release the Power Button. The LEDs will illuminate and the battery will wake.

SENTINEL-LNX™ APP



Connect via Bluetooth®, then select "Wake Battery" in the app.

CHARGER CONNECTION (CHARGER-DEPENDENT)



Connecting a charger may wake the battery depending on the charger type. See right.

WAKING VIA CHARGER (CHARGER-DEPENDENT BEHAVIOR)

A battery in Hiberstate™ may also wake when a charger is connected, depending on charger type.

FORCED-CHARGING CHARGERS

Output current without detecting voltage.



Will wake the battery automatically.

VOLTAGE-SENSING (SAFE-CHARGING) CHARGERS

Require detected voltage before output.

- Common in most lithium-compatible chargers.
- These chargers will NOT wake the battery automatically.
- Require one of the following:
 - Manual wake (Power Button or App), or
 - Activation of charger wake / recovery mode.



IMPORTANT If the charger does not begin output when connected, the battery must be manually awakened before charging can begin.

LED INDICATORS

STATE	LED BEHAVIOR
In Hiberstate™ (Storage Mode) (Output Disabled)	 All LEDs OFF
After Quick Press – Temporary Display	 LEDs illuminate to show state of charge and remain lit for 5 seconds.
After 5 Seconds	 LEDs turn OFF.

i You can quick press the Power Button at any time to check state of charge. The LEDs will respond for 5 seconds.

i Hiberstate™ helps protect your Tiger Lithium battery during storage by minimizing energy use while maintaining cell health and protection.

 Manually enable Hiberstate™ before storage and wake the battery using one of the recovery methods when you are ready to use it.

28.3 Parasitic Electrical Loads

Many marine vessels contain equipment that may continue drawing power even when the vessel appears turned off.

Examples may include:

- Bilge systems
- Electronics memory circuits
- Monitoring equipment
- Alarms or security systems

Extended parasitic loads may eventually discharge the battery during storage.

Whenever practical:

- Disconnect non-essential loads
- Isolate battery banks
- Use Hiberstate™ during long-term inactivity

28.4 Storage Environment

For best results, store batteries in a location that is:

- Clean and dry
- Protected from direct water exposure
- Protected from excessive heat
- Protected from freezing conditions when possible

Avoid prolonged storage in environments subject to:

- Standing water
- Excessive humidity
- Direct prolonged sunlight exposure
- Extreme ambient temperatures

28.5 Periodic Inspection

During extended storage periods:

- Periodically inspect battery condition and electrical connections
- Verify no corrosion or moisture intrusion is present
- Verify the battery remains within acceptable charge condition

Inspection frequency may vary depending on storage duration and environmental conditions.

28.6 Returning the System to Service

Before returning the vessel to operation:

- Inspect all electrical connections
- Verify battery voltage and operating condition
- Wake the battery from Hiberstate™ if enabled
- Verify charger operation and system charging behavior
- Confirm no fault indicators are present

Monitor the system carefully during initial operation following extended storage.

28.7 Long-Term Charger Connection

Continuous charger connection practices may vary depending on charger design and configuration.

Chargers used for storage maintenance should:

- Support lithium battery operation
- Utilize proper lithium charging profiles
- Have equalization charging disabled

IMPORTANT

Lithium batteries generally do not require continuous high-voltage float charging during storage.

Improper charger configuration during long-term storage may reduce battery life or result in charging instability.

Additional Information

Refer to:

- Section 9 — Battery Control Functions
- Section 10 — Understanding Battery Operating Modes
- Section 17 — Charging Systems
- Section 26 — Temperature Operating Limits

29. DISPOSAL & RECYCLING

Tiger Lithium batteries contain lithium battery cells and electronic components that must be disposed of properly.

Improper disposal may result in:

- Fire hazard
- Environmental damage
- Regulatory violations
- Personal injury

Lithium batteries must never be disposed of in household trash or municipal waste streams.

29.1 Recycling Requirements

At end of service life, batteries should be:

- Recycled through approved battery recycling facilities
- Processed in accordance with local regulations
- Handled by qualified recycling or hazardous material personnel where required

Many regions maintain dedicated recycling programs for lithium battery systems.

Always follow applicable:

- Local regulations
- State or provincial requirements
- National environmental regulations
- Recycling facility handling procedures

29.2 Preparing Batteries for Disposal

Before disposal or recycling:

- Disconnect the battery from all electrical systems
- Protect terminals from accidental short circuit
- Install terminal covers where available
- Store the battery in a dry, protected location until transport

Do not attempt to:

- Open the battery enclosure
- Disassemble the battery
- Remove internal cells or electronics

29.3 Damaged Batteries

Damaged batteries may require special handling procedures.

A battery should be considered damaged if it:

- Is swollen or deformed
- Shows signs of water intrusion
- Emits odor or smoke
- Has visible physical damage
- Exhibits abnormal heating behavior

IMPORTANT

Damaged lithium batteries may present fire or thermal hazard and should be handled with extreme caution.

Do not transport or dispose of damaged batteries without following applicable safety procedures and transportation regulations.

29.4 Environmental Responsibility

Proper recycling helps:

- Recover valuable materials
- Reduce environmental impact
- Support responsible battery lifecycle management

Tiger Lithium® encourages responsible recycling and environmentally compliant disposal practices for all lithium battery products.

Additional Information

Refer to:

- Section 3 — Important Safety Information
- Section 4 — Emergency Procedures / Battery Fault Response
- Section 27 — Transportation

30. MAINTENANCE

Tiger Lithium batteries are designed for low-maintenance operation; however, periodic inspection and proper system upkeep remain important for safe and reliable performance.

Routine maintenance helps reduce the risk of:

- Loose electrical connections
- Corrosion-related issues
- Charging instability
- Electrical resistance buildup
- Unexpected system faults

30.1 General Maintenance Guidelines

Periodically inspect the battery and electrical system for:

- Loose or damaged wiring
- Corrosion at terminals or connectors
- Signs of overheating or discoloration
- Physical damage to cables or insulation
- Moisture intrusion or contamination

Correct any abnormal conditions before continued operation.

30.2 Terminal Inspection

Inspect battery terminals and cable connections regularly.

Verify:

- Connections remain secure and properly torqued
- Terminal hardware is free from corrosion
- Cable lugs remain properly seated
- Protective covers remain installed where applicable

IMPORTANT

Loose or corroded electrical connections may generate excessive heat and result in equipment damage, charging instability, or fire hazard.

30.3 Corrosion Prevention

Marine environments expose electrical systems to:

- Saltwater
- Humidity
- Vibration

- Temperature cycling

Recommended corrosion prevention practices include:

- Use marine-grade tinned copper conductors
- Apply dielectric grease or approved corrosion inhibitors
- Inspect electrical connections periodically
- Keep battery compartments clean and dry whenever possible

30.4 Battery Cleaning

If cleaning is required:

- Disconnect the battery from the electrical system when practical
- Use a clean, dry cloth to remove dust or debris
- Avoid excessive moisture during cleaning

Do not:

- Pressure wash the battery
- Submerge the battery
- Use solvents or harsh chemicals on the enclosure

30.5 Charging System Inspection

Periodically verify proper operation of:

- Battery chargers
- DC-to-DC chargers
- Alternator charging systems
- Solar charge controllers
- Monitoring systems

Inspect for:

- Abnormal charging behavior
- Fault indicators
- Excessive heat
- Loose conductors or damaged wiring

Improper charging system operation may reduce battery performance or trigger Battery Management System (BMS) protection events.

30.6 Long-Term Performance

To help maximize battery service life:

- Operate the battery within approved temperature limits
- Use properly configured lithium charging equipment
- Avoid prolonged storage in a deeply discharged condition
- Follow approved installation and charging practices described in this manual

Additional Information

Refer to:

- Section 17 — Charging Systems
- Section 25 — Cable Torque Specifications
- Section 26 — Temperature Operating Limits
- Section 28 — Storage & Seasonal Maintenance
- Section 32 — Troubleshooting

31. FAULT CODES & DIAGNOSTIC REFERENCE

Tiger Lithium® Marine Batteries incorporate an integrated Battery Management System (BMS) designed to continuously monitor battery operation and protect the battery from potentially damaging operating conditions.

Under certain conditions, the BMS may temporarily limit charging, limit discharge, or disable battery output to protect the battery and connected electrical systems.

These events may appear as:

- Protection Events
- Fault Conditions
- Diagnostic Alerts

Many protection events are temporary and automatically clear once operating conditions return to approved ranges.

31.1 Diagnostic Indicators

Diagnostic information may be available through:

- LED Status Indicators
- Sentinel-LNX™ App
- Connected Monitoring Systems (model dependent)

Available diagnostic information may vary by battery model and operating mode.

LED Status Indicators

Depending on battery model and operating condition, LED indicators may provide information regarding:

- State of Charge (SOC)
- Battery Status
- Operating Mode
- Protection Events
- Fault Conditions

If abnormal LED activity is observed, inspect battery operating conditions and review diagnostic information.

App-Based Diagnostics

When Bluetooth® communication is available, the Sentinel-LNX™ App may provide information including:

- State of Charge (SOC)
- Battery Voltage
- Current Flow
- Battery Temperature
- Operating Mode Status
- Protection Event Information
- Diagnostic Alerts

Bluetooth® communication availability depends on battery operating mode.

Refer to:

→ Section 14 — Monitoring & Diagnostics

31.2 Common Protection Events

Condition	Possible Cause	Typical BMS Response
Low Voltage Protection	Excessive discharge	Output disabled
High Voltage Protection	Charger overvoltage	Charging disabled
Overcurrent Protection	Excessive current demand	Output limited or disabled
Short Circuit Protection	Electrical short circuit	Output immediately disabled
Low Temperature Charging Protection	Charging below approved temperature	Charging disabled
High Temperature Protection	Excessive battery temperature	Charging and/or discharge limited
Communication Unavailable	Battery in Shut-Down Mode	Bluetooth® disabled

31.3 Understanding Protection Events

Most protection events are designed to prevent battery damage and are not indicators of battery failure.

Common examples include:

- Low-voltage protection after excessive discharge
- Temperature-based charging protection
- Temporary overcurrent protection
- Charger overvoltage protection

Once operating conditions return to approved ranges, many protection events clear automatically.

Some conditions may require battery recovery procedures.

Refer to:

→ Section 11 — Waking the Battery

31.4 Shut-Down Mode Diagnostics

When the battery enters Shut-Down Mode:

- Battery output is disabled
- Bluetooth® communication is disabled

- The battery does not appear in the Sentinel-LNX™ App
- Normal charging and discharge operation are suspended

Recovery may be initiated using:

- The Power Button temporary recovery function
- A compatible charger
- A charger equipped with a Wake, Activate, or Recovery function

Refer to:

→ Section 11 — Waking the Battery

31.5 Temporary Recovery Diagnostics

During temporary recovery initiated by the Power Button:

- Charging is permitted
- Battery discharge output remains disabled
- Bluetooth® communication is available
- The battery may appear in the Sentinel-LNX™ App

The temporary recovery period exists solely to allow a compatible charger to initiate charging.

If charging current is detected during the recovery period, the battery transitions back to normal charging operation.

If charging does not begin within approximately 60 seconds, the battery automatically returns to Shut-Down Mode.

31.6 Troubleshooting Protection Events

If a fault condition or protection event occurs:

- Inspect the charging system
- Verify charger compatibility
- Verify battery operating temperature
- Inspect wiring and terminal connections
- Verify system loads remain within battery specifications
- Review battery operating mode

Do not repeatedly attempt recovery without identifying and correcting the underlying cause.

Repeated protection events may indicate:

- Improper installation
- Charging system incompatibility
- Excessive electrical load
- Wiring issues
- Improper battery configuration

31.7 When to Contact Technical Support

Contact Tiger Lithium® Technical Support if:

- Protection events persist after troubleshooting
- The battery repeatedly enters Shut-Down Mode
- The battery cannot be successfully recovered
- The battery exhibits abnormal heat, swelling, or odor
- Physical damage is present

Do not attempt to:

- Open the battery enclosure
- Bypass Battery Management System protections
- Perform unauthorized repairs

Additional Information

Refer to:

- Section 10 — Understanding Battery Operating Modes
- Section 11 — Waking the Battery
- Section 14 — Monitoring & Diagnostics
- Section 17 — Charging Systems
- Section 32 — Troubleshooting

32. TROUBLESHOOTING

This section provides guidance for diagnosing and correcting common operating conditions that may be encountered during installation, charging, storage, and normal operation.

Many apparent battery issues are caused by:

- Improper charger configuration
- Wiring issues
- Operating mode misunderstanding

- Excessive electrical load
- Environmental conditions
- Improper installation practices

Always inspect the complete electrical system before assuming battery failure.

32.1 Before Troubleshooting

Before performing troubleshooting procedures:

- Turn off connected electrical loads when practical
- Verify correct battery type and system configuration
- Inspect wiring and terminal connections
- Verify charger compatibility and configuration
- Review battery operating mode behavior

Use appropriate safety precautions when working around energized electrical systems.

32.2 Common Operating Conditions

Condition	Possible Cause	Recommended Action
Battery appears inactive	Battery in Hiberstate™	Wake battery using the Power Button, Sentinel-LNX™ App, or compatible charger
Battery not visible in Sentinel-LNX™ App	Battery in Shut-Down Mode	Press the Power Button to initiate temporary recovery and begin charging, or use a charger wake/recovery function
Charger connected but charging does not begin	Charger cannot detect battery voltage	Press the Power Button to initiate temporary recovery and allow charging to begin
Battery returns to Shut-Down Mode after recovery attempt	Charging did not begin during the 60-second recovery period	Verify charger operation and repeat recovery procedure
Battery repeatedly enters protection mode	Excessive load or charging issue	Verify system sizing and charging configuration
LEDs indicate abnormal behavior	Active protection event or fault condition	Review operating conditions and inspect system

Reduced runtime	Battery discharged or excessive load	Recharge battery and verify load requirements
Battery will not charge	Charger incompatibility, configuration issue, or protection event	Verify charger settings and charging voltage
Battery terminals become hot	Loose or improperly torqued connection	Disconnect system and inspect terminals immediately
Bluetooth® communication unavailable	Battery in Shut-Down Mode	Recover battery and allow normal charging operation to resume
Battery output unavailable after storage	Battery in Hiberstate™ or Shut-Down Mode	Perform appropriate recovery procedure based on operating mode

32.3 Charging System Troubleshooting

If charging problems occur:

- Verify charger supports LiFePO₄ battery charging
- Verify charger voltage matches battery system voltage
- Verify equalization charging is disabled
- Inspect charging conductors and fuse protection
- Verify charger output is present
- Verify charging connections are secure

Deep Cycle battery models must not be connected directly to marine alternator systems.

Refer to:

→ Section 17 — Charging Systems

32.4 Shut-Down Mode Recovery Troubleshooting

If the battery has entered Shut-Down Mode:

Step 1

Connect a compatible lithium battery charger.

Step 2

Press and immediately release the Power Button.

Step 3

Allow the charger to initiate charging during the approximately 60-second recovery period.

Step 4

Verify charging current is present.

If charging begins successfully:

- The battery will continue normal charging operation
- Bluetooth® communication will remain available
- The battery will appear in the Sentinel-LNX™ App

If charging does not begin within approximately 60 seconds:

- The battery automatically returns to Shut-Down Mode
- Verify charger compatibility and operation
- Repeat the recovery procedure

Some chargers may provide a dedicated Wake, Activate, or Recovery function capable of recovering the battery without using the Power Button.

32.5 Wiring & Connection Inspection

Inspect the electrical system for:

- Loose terminal connections
- Improper terminal torque
- Corrosion
- Damaged conductors
- Melted terminals or discoloration
- Improper fuse installation
- Reverse polarity

IMPORTANT

Loose or improperly torqued connections may generate excessive heat and result in equipment damage or fire hazard.

Terminal connections should be tightened to:

6.5 ft-lb (8.81 N·m)

Refer to:

→ Section 25 — Cable Torque Specifications

32.6 Temperature-Related Behavior

The Battery Management System (BMS) may temporarily limit charging or discharge operation outside approved temperature ranges.

Examples include:

- Charging disabled below approved charging temperatures
- Reduced output capability at extreme temperatures
- High-temperature protection events

These behaviors are intended to protect the battery.

Refer to:

→ Section 26 — Temperature Operating Limits

32.7 When to Contact Technical Support

Contact Tiger Lithium® Technical Support if:

- Protection events persist after troubleshooting
- The battery repeatedly enters Shut-Down Mode
- Recovery procedures are unsuccessful
- The battery exhibits abnormal swelling, odor, or heat
- Physical damage is present
- The system cannot be safely restored to operation

Do not attempt to:

- Open the battery enclosure
- Bypass Battery Management System protections
- Perform unauthorized repairs

Additional Information

Refer to:

- Section 10 — Understanding Battery Operating Modes
- Section 11 — Waking the Battery

- Section 14 — Monitoring & Diagnostics
- Section 17 — Charging Systems
- Section 31 — Fault Codes & Diagnostic Reference

33. GLOSSARY

BATTERY MANAGEMENT SYSTEM (BMS)

An integrated electronic protection and monitoring system that manages battery operation and helps protect against:

- Overcharge
- Over-discharge
- Excessive current
- Short circuits
- Unsafe temperature conditions

The BMS may temporarily restrict charging, restrict discharge, enter protective operating states, or disable battery output to protect the battery and connected electrical systems.

BLUETOOTH® MONITORING

Wireless communication functionality used by compatible Tiger Lithium® batteries to provide monitoring and diagnostics through the Sentinel-LNX™ App.

Bluetooth® communication availability depends on battery operating mode.

Bluetooth® communication remains active during Normal Operation, Hiberstate™ and temporary recovery modes.

Bluetooth® communication is unavailable during Shut-Down Mode.

HIBERSTATE™

A user-controlled low-power storage mode designed to reduce standby energy consumption during long-term inactivity and seasonal storage.

While in Hiberstate™:

- Battery output is disabled

- Bluetooth® communication remains active
- The battery remains visible in the Sentinel-LNX™ App
- The battery may be awakened using the Power Button, Sentinel-LNX™ App, or a compatible charger

Hiberstate™ is intended for storage and inactivity periods and is not a battery fault condition.

SENTINEL-LNX™ APP

The Tiger Lithium® mobile monitoring and diagnostic application used to communicate with compatible batteries through Bluetooth® connectivity.

Available features may include:

- State of Charge (SOC)
- Voltage Monitoring
- Current Monitoring
- Temperature Monitoring
- Operating Mode Status
- Diagnostic Information
- Fault and Protection Event Reporting

Batteries operating in Shut-Down Mode do not appear in the Sentinel-LNX™ App until recovery has been successfully completed.

SHUT-DOWN MODE

An automatic Battery Management System (BMS) protective state initiated when battery voltage reaches critically low levels or when certain protection conditions require battery output to be disabled.

While in Shut-Down Mode:

- Battery output is disabled
- Bluetooth® communication is disabled
- The battery does not appear in the Sentinel-LNX™ App
- Normal charging and discharge operation are suspended

Recovery may be initiated using:

- The Power Button temporary recovery function
- A compatible lithium battery charger
- A charger equipped with a Wake, Activate, or Recovery function

Shut-Down Mode is intended to protect the battery from conditions that could result in battery damage or unsafe operation.

TEMPORARY RECOVERY

A short-duration recovery state initiated by a Quick Press of the Power Button while the battery is in Shut-Down Mode.

During Temporary Recovery:

- The battery wakes for approximately 60 seconds
- Charging is permitted
- Battery discharge output remains disabled
- Bluetooth® communication is available
- The battery may appear in the Sentinel-LNX™ App

Temporary Recovery exists solely to allow a compatible charger to initiate a charge cycle.

If charging current is detected during the recovery period, the battery transitions back to normal charging operation.

If charging does not begin within approximately 60 seconds, the battery automatically returns to Shut-Down Mode.

VOLTAGE-SENSING CHARGER (SAFE-CHARGING CHARGER)

A charger that requires detected battery voltage before enabling charging output.

These chargers may require:

- Temporary Recovery using the Power Button
- Charger recovery mode
- Charger wake functionality

before charging can begin when the battery is in Shut-Down Mode.

34. WARRANTY INFORMATION

Tiger Lithium products are backed by a limited warranty covering defects in materials and workmanship under normal approved operating conditions.

Warranty coverage periods vary by product category and application.

34.1 Standard Warranty Coverage

Standard warranty periods include:

Product Category	Warranty Coverage
Marine Batteries	5 Years Standard Limited Warranty
Chargers / Voltage Regulators	2 Years
Accessories	1 Year

Certain eligible Marine Battery products may qualify for an additional 1 year of warranty coverage when registered within 90 days of purchase through the Sentinel-LNX™ App or website.

Extended warranty eligibility applies only to Sentinel-LNX™ enabled products with Bluetooth® capability.

34.2 Warranty Registration

To qualify for extended warranty coverage where applicable:

- Product registration must be completed within 90 days of purchase
- Proof of purchase may be required
- Product serial number verification may be required

Warranty registration and support resources may be available at: www.tigerlithium.com/resources

34.3 Expected Product Life

Tiger Lithium® Marine Batteries are engineered using premium lithium cells designed for long service life under normal operating conditions.

Battery life expectancy may vary depending on:

- Depth of discharge
- Charging practices
- Operating temperature

- Application type
- Environmental conditions
- System configuration

Battery products that have reached expected end-of-life due to normal usage are not considered defective under warranty coverage.

The Manufacturer reserves the right to deny warranty claims where inspection determines the product has reached expected service life.

34.4 Conditions That May Void Warranty

Warranty coverage may be reduced or denied if damage results from:

- Improper installation
- Loose or improperly torqued terminal connections
- Reverse polarity connection
- Improper series or parallel configuration
- Improper charger configuration
- Use outside approved voltage or temperature limits
- Direct alternator charging of Deep Cycle battery models
- Use of undersized wiring or improper conductor sizing
- Water intrusion caused by misuse or improper installation
- Physical abuse, crushing, impact damage, or capsizing
- Unauthorized disassembly, modification, or tampering
- Improper long-term storage or maintenance

Improper application includes:

- Using Deep Cycle batteries for engine starting unless specifically approved
- Exceeding maximum discharge current ratings

Commercial or industrial applications may require separate written approval from Tiger Lithium Power.

IMPORTANT

Installation practices that do not comply with the requirements described in this manual may void warranty coverage.

34.5 Lifetime Technical Support

Customers covered under this warranty are entitled to lifetime technical support for as long as they own the product.

Technical support may include guidance related to:

- Charging configuration
- Installation
- Storage procedures
- System operation
- General troubleshooting

34.6 Warranty Claims

To submit a warranty claim:

1. Contact Tiger Lithium® Technical Support
2. Provide proof of purchase and product serial number
3. Provide a description of the issue
4. Follow all inspection and return instructions provided by support personnel

The Manufacturer may require the product to be returned for inspection prior to approving warranty service.

34.7 Inspection & Non-Warranty Service Fees

If inspection determines the issue resulted from:

- User error
- Improper installation
- Improper charging practices
- Physical damage
- Other non-warranty conditions

the customer may be responsible for inspection, repair, and shipping fees.

If inspection confirms a manufacturing defect covered under warranty, standard warranty service will apply.

34.8 Limitation of Liability

To the maximum extent permitted by applicable law:

Tiger Lithium® shall not be liable for:

- Indirect or consequential damages
- Loss of vessel use
- Loss of time
- Loss of revenue
- Damage resulting from improper installation or misuse
- Damage to connected equipment caused by improper system design or installation

Applicable rights may vary by jurisdiction.

34.9 OEM & Third-Party Systems

Warranty coverage does not apply to products incorporated into third-party OEM systems where warranty responsibility is assumed by the OEM manufacturer.

Additional Information

Refer to:

- Section 15 — Installation Requirements
- Section 17 — Charging Systems
- Section 21 — Approved Battery Connection Configurations
- Section 31 — Fault Codes & Diagnostic Reference
- Section 32 — Troubleshooting