

USER MANUAL

LITHIUM BATTERY MODULE

FM 3 / FN 4





NO OPEN FLAME



**DO NOT EXTINGUISH
WITH WATER**



**EXTINGUISH WITH DRY
POWDER EXTINGUISHER**



**PROHIBIT UNAUTHORIZED
BREAKER RESET**



ELECTRIC SHOCK RISK



FIRE RISK



STUDY MANUAL FIRST



NO RANDOM DISPOSAL

**WARNING: PAY ATTENTION TO FIRE PREVENTION, ONLY SUITABLE FOR
INSTALLATION ON NON- FLAMMABLE SURFACES**

CAUTION: ALL BATTERIES MUST HAVE BEEN TURNED OFF BEFORE SERVICING

MADE IN CHINA

Preface

The SEAL series lithium batteries are specially designed for fishing boats and bass boats, featuring high protection, high performance, high reliability, and an attractive appearance. It has obvious advantages in terms of safety, energy density, service life, and environmental protection. With an intelligent battery management system, it provides customers with a safe and stable one-stop guaranteed power supply service.

This user manual introduces the product structure, parameters, basic procedures, installation methods, as well as operation and maintenance in detail.

Please follow below requests during the procedure of installation, operation and maintenance:

- Please connect wires properly while installation, do not reverse connect. To avoid short circuit, please do not connect positive and negative poles with conductor (wires for instance).
- Please do not mix batteries from different manufacturers, different types or models, nor old and new together.
- The SEAL lithium batteries do not support parallel connection, all series of battery packs are prohibited from being connected in series.
- Please ensure that the electrical parameters of the related equipment are compatible before use.
- If battery is in storage for over 3 months, or battery is not fully charged for 3 months, maintenance work is required before use by charging the battery to 100% SOC, and keeping the charger ON for more than 8 hours. If the battery continues to be in storage, it is advised to adjust the SOC to 20%~80%.
- For your safety, please do not arbitrarily dismantle any components in any circumstances unless a specialist or authorized personnel. Device breakdown due to improper operation will not be covered under warranty.



The product has been strictly inspected before shipment. If you find abnormal phenomena such as swelling of the shell, please contact customer service. The use environment and storage methods have a certain impact on the service life and reliability of this product, so environmental factors must be fully considered before installation and use to ensure that the system works in a suitable environment.

Disclaimer: Due to the continuous update and improvement of products and technologies, the content in this document may not completely match the actual product, please understand. For product updates, please contact customer service.

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1. Safety precautions

1.1 Safety precautions

- Please pay attention to the safety signs on this product and manual.
- During product installation, operation and maintenance, electrical safety regulations and related operating procedures must be observed, otherwise it may cause personal injury or product damage. The safety precautions mentioned in the manual are only a supplement to the safety regulations.
- The manufacturer does not assume any responsibility caused by violation of general safety operation requirements or violation of safety standards for design, production and use of equipment.

1.2 General safety precautions

- Please strictly follow the requirements of this manual to dispose of lithium batteries.
- Do not short-circuit lithium batteries.
- Lithium batteries must be installed in a dry and clean environment. It is strictly forbidden to put the battery in water or fire to avoid explosion or other dangers.
- Please do not stab, hit, trample or strike the battery in any other way. Avoid direct sunlight.
- Please do not remove the lithium battery from the original packaging before use.
- Ensure that the positive (+) and the negative (-) polarities of the lithium battery and the charging and discharging equipment are correctly connected.
- Do not parallel lithium batteries of different manufacturers, models, capacities, and types.
- Do not keep the lithium battery in continuing charging state for a long time when not in use, disconnect the lithium battery when battery is in consistent full SOC state.
- When charge the lithium battery, be sure to use the correct charger and charging voltage. It is recommended to use power supply equipment of Abyss Battery Powered By Hali.
- Before moving or rewiring the system, to avoid a potential risk of electric shock, please CUT OFF the power properly, make sure the system is completely shut down.
- Do not place metal tools on the battery, to avoid sparks or short circuits, which can cause an explosion.
- To avoid fire and electric shock, please ensure that all cables have good electrical characteristics and have suitable wire diameter. Do not use damaged cables.
- When catching a fire, please use a dry powder fire extinguisher to extinguish the fire. Use liquid fire extinguisher may cause secondary hazards.



Lithium batteries shall be kept away from water, dust and pollution sources. And shall be installed in a well-ventilated environment.

1.3 Disposal



After the lithium battery is scrapped, it cannot be discarded at will, and should be sent to a special recycling station for disposal treatment.

2. Product introduction

2.1 Brief introduction

The SEAL series lithium batteries are available in two voltage platforms: 24V (FM3) and 36V (FN4). The positive electrode of the battery is made of lithium iron phosphate (LiFePO₄) material. It configures high-performance and high-reliability BMS to effectively manage the cells, including cell overvoltage, under-voltage, charge over-current, discharge over-current, over-temperature, low temperature, short circuit and other protection functions. It also has built-in cell voltage balance, capacity calculation, SOC calculation, cycle life accumulation and low temperature heating functions.

2.2 Features

- The positive electrode of the battery is made of lithium iron phosphate (LiFePO₄) material, which has good safety performance.
- 4000 cycles @ 25°C (77°F), 0.5C charge and discharge, 80% DoD.
- High-performance BMS with over-discharge, over-charge, over-current, temperature and other protection functions. With automatic charge and discharge management and single cell balance function.
- Built-in thermal aerosol fire suppression system, a pioneering and internationally advanced high-efficiency, eco-friendly fire safety solution.
- Supports maximum 100A discharge current (refer to Chapter 9. Specifications for detailed parameters).
- Self wake-up function, convenient and worry-free. The battery will automatically wake up and enter the charging state, when connected to external charger, even if the battery is turned off.
- One click start on X3 display panel for easy turning battery ON/OFF and monitoring (voltage, current, SOC etc.).
- Low self-discharge rate: FM3 consumes less than 50mA in standby mode when powered ON, FN4 consumes less than 35mA in standby mode when powered ON. When the battery is turned OFF, the idle consumption drops to less than 0.05mA.
- Wide working temperature range: charging/discharging: 2°C~63°C (35.6°F~145.4°F).
- Built-in heater, warm up battery when in low temperature conditions.
- Compact size, light weight and high energy density.

2.3 Product dimensions



Figure 2-1 Exterior View

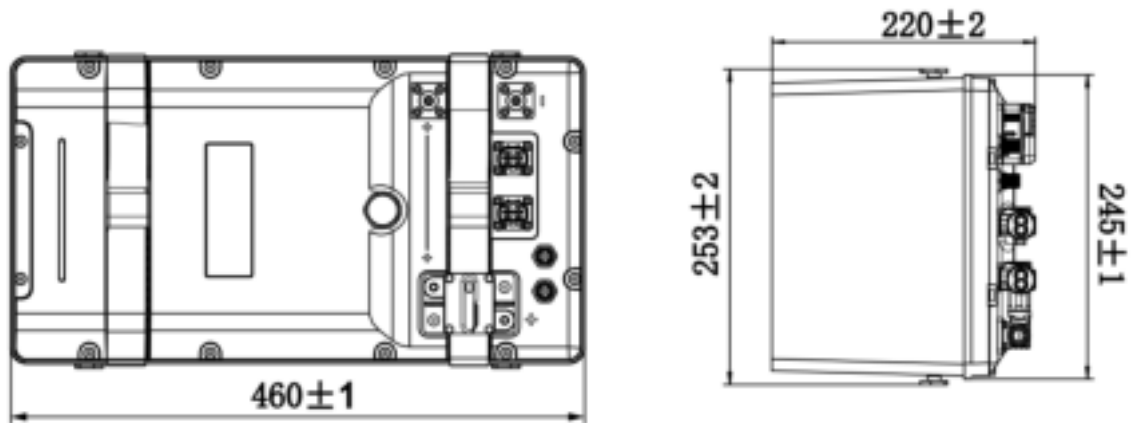


Figure 2-2 Dimensions of FM3

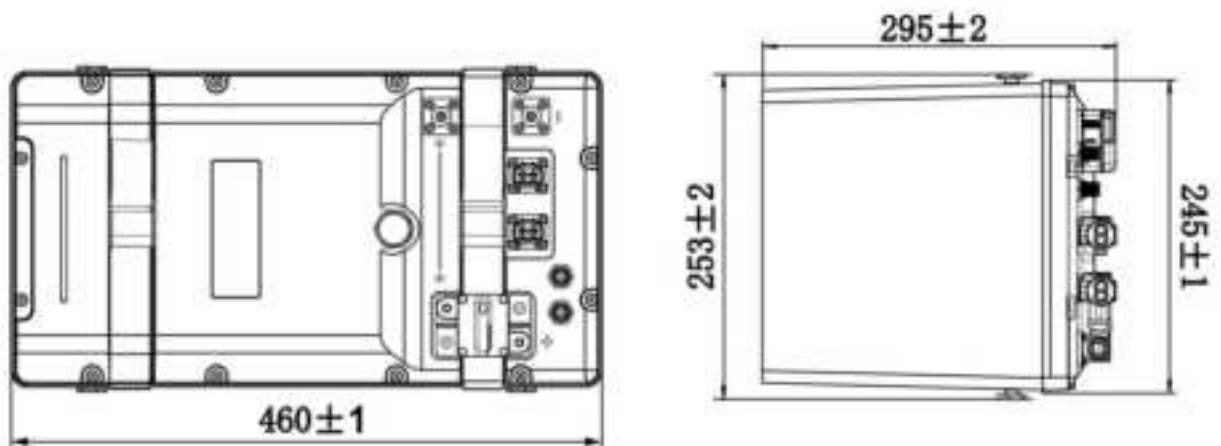


Figure 2-3 Dimensions of FN4

2.4 External interface definition

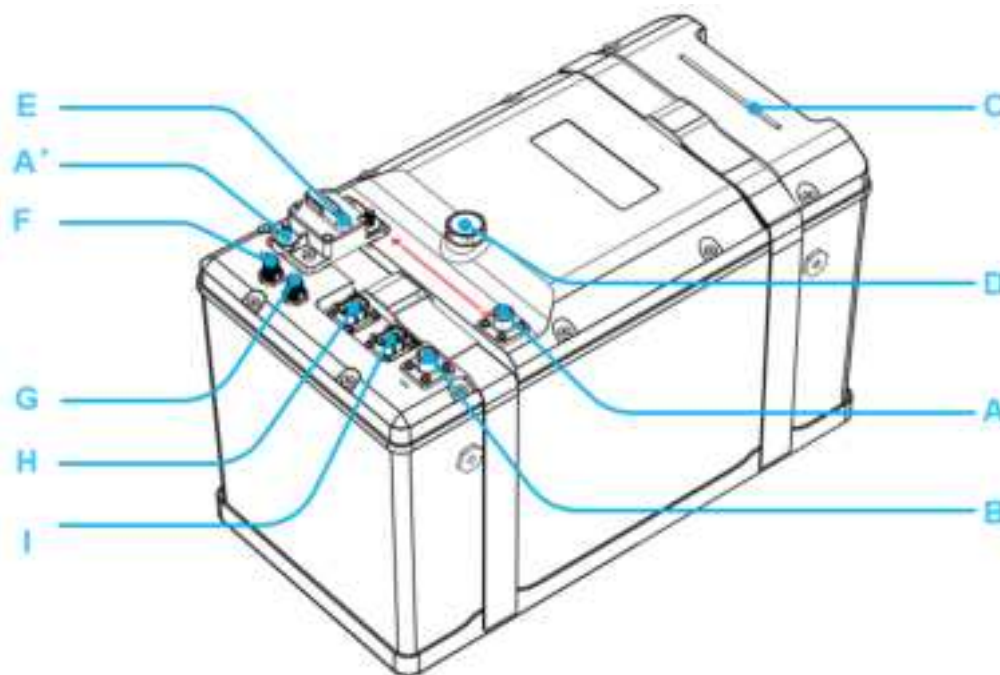




Figure 2-4 External Interfaces

Table 2-1 External Interface Description

No.	Silk screen	Name	Definition
A	+	Positive terminal	Connector for the lithium battery's positive output terminal.
A'	+	Output positive	Battery output positive terminal (used when an optional over current protector is installed).
B	-	Negative terminal / Output negative	Connector for the lithium battery's negative output terminal.
C		Indicator light	Indicates the battery's operating status (refer to section 2.4.3 for details).
D		Explosion-proof valve	Automatically opens to release internal pressure if the battery pressure is too high.
E	Circuit Breaker	Circuit breaker	Automatically trips and disconnects the circuit when the load current exceeds its rated value.
F	CAN	System communication port	CAN communication port for system integration.
G	COM	Remote panel interface	For connecting remote switch (please consult an installer for configuring a remote switch of your own) or X3 display panel.
H	Charger Input 1	Charger input port 1	Input port for AC/DC charger, MPPT charger or DC/DC charger.
I	Charger Input 2	Charger input port 2	

2.4.1 CAN interface definition

Table 2-2 CAN Interface Definition

PIN terminal	Color	Definition
PIN1	Brown	Cable shield
PIN2	White	/
PIN3	Blue	/
PIN4	Black	CAN_H
PIN5	Grey	CAN_L

2.4.2 COM interface definition

Table 2-3 COM Interface Definition

PIN terminal	Color	Definition
PIN1	White	CAN_L
PIN2	Brown	VCC_12V
PIN3	Green	GND
PIN4	Yellow	ON_OFF_OUT
PIN5	Grey	RS485 A+
PIN6	Pink	ON_OFF_IN
PIN7	Blue	CAN_H
PIN8	Red	RS485 B-

2.4.3 Indicator light definition




Table 2-4 Indicator Light Definition

Battery status	Light status	Comment
Charging	Green light constant ON	Constant ON
Discharging	Green light slow flash	ON for 0.5s, OFF for 1.5s
Charging Only	Green light fast flash	ON for 0.5s, OFF for 0.5s

2.5 Optional accessories

2.5.1 Cable kit 1





Table 2-5 Optional Accessory Kit 1

Name	Model/Specification	Illustration	Qty
Positive Output Terminal Connector	Connector CN1P600BPA25-01 (Right-angle, Orange)		1
Negative Output Terminal Connector	Connector CN1P600BPB25-01 (Right-angle, Black)		1
Charging Input Connectors (Input 1 & 2)	Connector FE81A02XB-14F (Right-angle, Black)		2

2.5.1.1 Crimping of positive and negative terminal connectors

The connector consists of four main parts: plug body, cable sealing ring, locking clip and rear cap.

Table 2-6 Positive and Negative Terminal Connectors

Name	Illustration	Qty
Plug Body		1
Cable Sealing Ring		1
Locking Clip		1
Rear Cap		1

Installation Steps:

1. Refer to the diagram for wire stripping. Recommended stripping length: 12 ± 1 mm.



2. Connector Crimping

1) First, remove the rear cap, locking clip and cable sealing ring from the plug body. Then slide them onto the stripped cable in the same order.

2) Insert the stripped copper wire into the crimping terminal and perform the crimping, as shown in the diagram below:




3) Properly position the sealing ring and locking clip, then tighten the rear cap, as shown below:



2.5.1.2 Crimping of charging input connector

The plug consists of the following main components: wire terminals, plastic housing, wire sealing ring, rear cap, and gel core sealing ring.

Table 2-7 Charging Input Connector

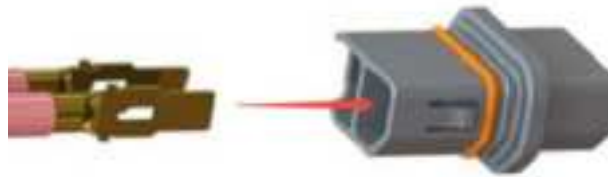
Name	Illustration	Qty
Wire Terminals		2
Plastic Housing Assembly		1
Wire Sealing Ring		1
Rear Cap		1
Gel Core Sealing Ring		1

Installation Steps:

1. Pass the wire through the plastic housing, then the sealing ring, and finally the rear cap, as shown in the figure below.



2. Ensure the terminals are fully and securely inserted into the gel core section, as shown below.



3. Fit the sealing ring into place to ensure proper waterproofing and cable retention, as shown in below diagram.



4. Tighten and secure the rear cap to complete the connector assembly, as shown below.



2.5.2 Cable kit 2

Table 2-8 Optional Accessory Kit 2

Name	Model/Specification	Illustration	Qty
Lithium Battery Output Wiring Kit	2m/5m optional		1
			1
	0.1m		1
Charging Input 1&2 Harness (optional based on requested)	MPPT Charger Wiring Kit, 3m		1
	AC/DC Charger Wiring Kit, 0.8m		1
	DC/DC Charger Wiring Kit, 0.8m/5m optional		1
COM Port Communication Cable	M12-D2-S8/S8, 2m/5m optional		1
CAN Port Communication Cable	M12-D2-S5/A2-P5, 1m		1

2.5.3 X3 display panel

X3 monitor is a 2.8-inch display panel specifically developed for this series of lithium batteries. It displays real-time operating information of the lithium battery. It is equipped with a built-in Bluetooth module, allowing users to monitor the battery status via a mobile APP.

It is ideal for lithium battery systems used in small fishing boats, featuring compact size, high waterproof rating, cost-effectiveness, and high reliability, making it suitable for outdoor installations.



Figure 2-5 X3 Monitor

To use X3 display panel as the lithium battery monitor, please follow these steps:

Step 1: Connect X3 screen to the lithium battery using the included M12-8Pin communication cable.

Step 2: To turn ON the battery: press and hold the round momentary switch on the screen for 3 seconds, then release.

Step 3: Activate Bluetooth function on your smartphone, connect “HALI” APP to X3 panel, and view detailed battery information. APP download please contact the customer service.

For more information about X3 display panel, please refer to X3 user manual.

3. Product installation

3.1 General description



Do not install or use FM3 or FN4 battery in series or parallel!

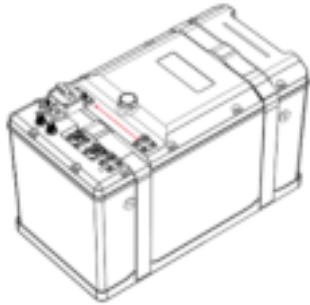


Do not install or use damaged lithium batteries!

Please ensure correct polarity connection between the lithium battery, charger, and load!

3.2 Unboxing

Check whether the lithium battery is in good condition when unboxing. If the lithium battery is damaged, please contact customer service.

Please check whether the accessories are complete according to the packing list. If the accessories are not complete, please contact customer service.

Component name	Specification	Qty	Picture
Lithium Battery (with straps and base tray)	FM3 or FN4	1	
User Manual	Lithium Battery Manual	1	
Self-tapping Screws	M4*15 Screws (stainless steel, zinc- nickel alloy black)	8	

3.3 Positioning and perforation

Please choose a sturdy surface of appropriate size to place the battery tray. Tray dimensions are shown in **Figure 3-1**.

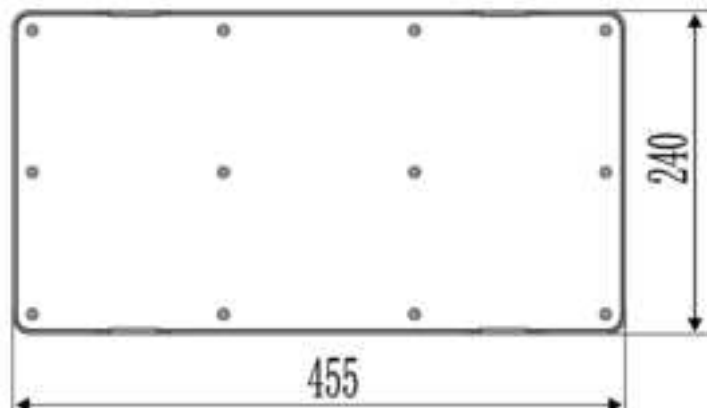


Figure 3-1 Battery Tray Dimensions

3.4 Installation fixed

Use **M4 × 15 self-tapping screws** to secure the tray. Follow **Figure 3-2** for screw locations.

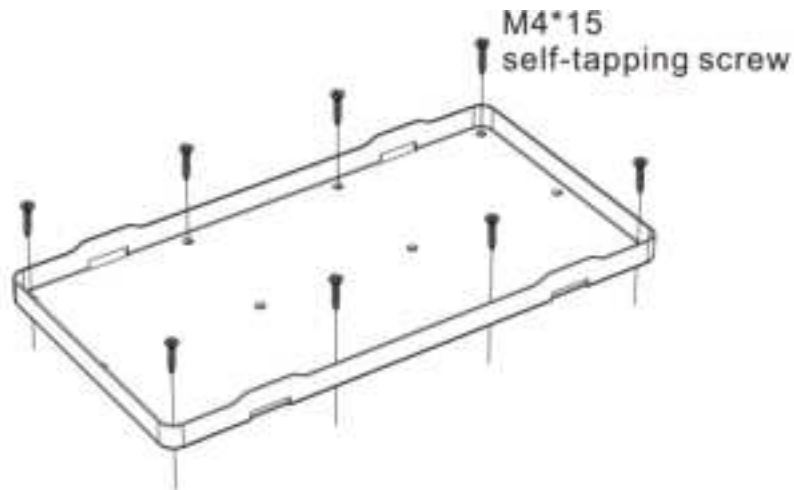


Figure 3-2 Tray Fixing Points for Lithium Battery

Place the battery onto the tray and secure it using the provided **straps**.

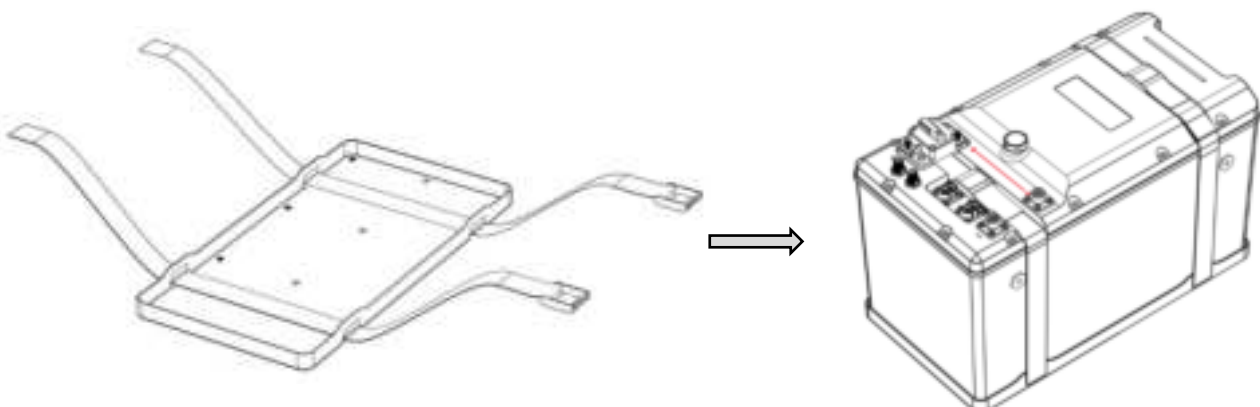


Figure 3-3 Battery Strap Fixing

3.5 Single lithium battery wiring

3.5.1 Typical wiring diagram

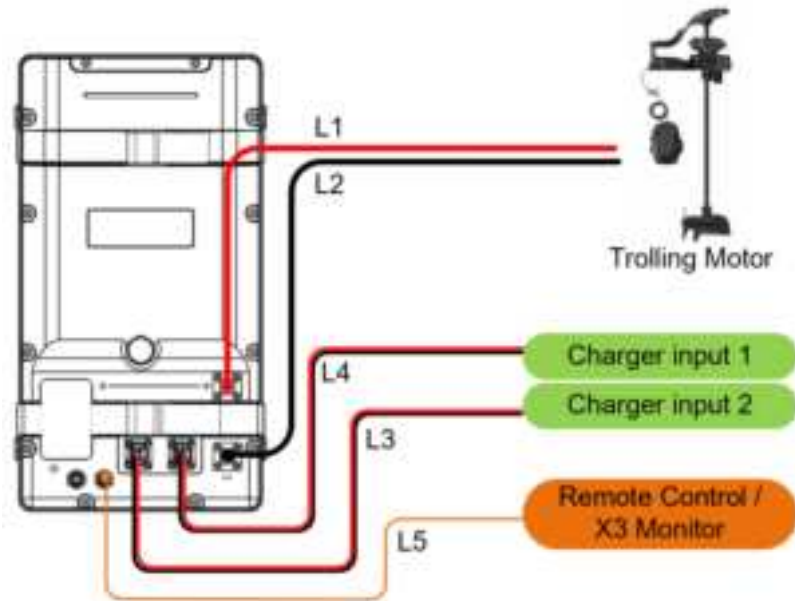


Figure 3-4 Typical Wiring Diagram

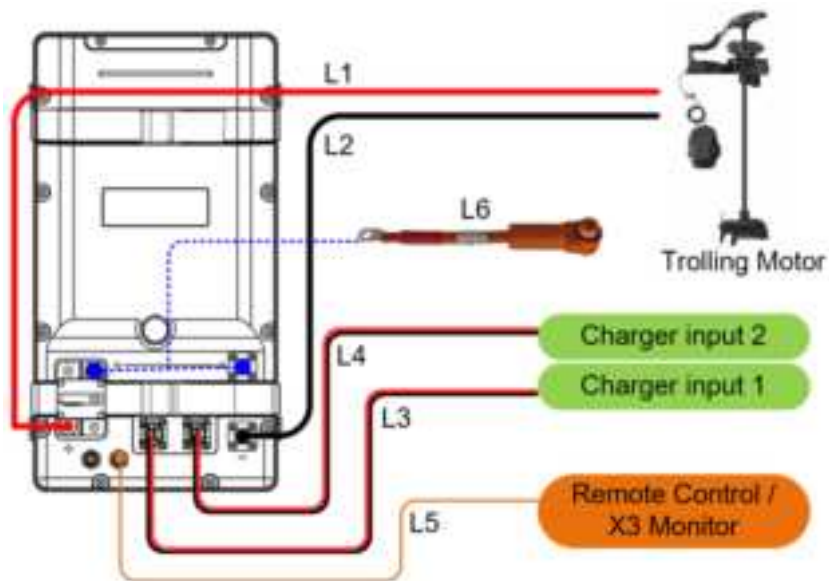


Figure 3-5 Typical Wiring Diagram (with circuit breaker)

Table 3-1 Cable requirements

Cable	Recommended wire diameter	Recommended length	Recommended color	Recommended terminal
L1	16mm ² /25mm ²	≤2m/5m	Red	16-6/25-6 copper terminal
L2	16mm ² /25mm ²	≤2m/5m	Black	
L3	10mm ²	≤1.5m	Black	-
L4	10mm ²	≤1.5m	Black	-
L5	M12 Communication Cable	2m/5m	Black	-
L6	16mm ² /25mm ²	0.1m	Red	16-6/25-6 copper terminal

3.5.2 Power cable wiring



Before wiring, make sure the remote switch or the X3 monitor is disconnected from the lithium battery, and the battery is powered OFF!

Step 1: Remove the black rubber protective cover from the **positive (+)** terminal of the lithium battery.

Step 2: First, connect cable **L6** between the **battery (+) terminal** and the positive side of the circuit breaker. Then, connect cable **L1** between the **(+) terminal** of the lithium battery and the positive input of trolling motor. Ensure all connections are secure and tightened. (If a circuit breaker is installed, connect cable L1 between the trolling motor and the circuit breaker. After wiring is complete, securely reattach the protective cover on the breaker terminals.)

Step 3: Remove the black rubber protective cover from the **negative (-)** terminal of the lithium battery.

Step 4: Connect cable **L2** between the trolling motor's negative terminal and the **battery (-) terminal**. Ensure a tight and secure connection.

Step 5: Connect cable **L3** between the output of external charger 1 and **Charger Input 1** of the lithium battery. Ensure a tight and secure connection.

Step 6: Connect cable **L4** between the output of external charger 2 and **Charger Input 2** of the lithium battery. Ensure a tight and secure connection.

3.5.3 Communication cable wiring

Use the M12-8Pin communication cable (**L5**) to connect the battery COM communication port with the X3 monitor.

3.5.4 Lithium battery power ON and OFF

When using the optional X3 screen, the battery can be powered ON/OFF using the round momentary switch ON the screen. The specific operations are as follows:

Power ON: Press and hold the round momentary switch ON the X3 screen for about 3 seconds and release. The lithium battery will turn ON.

Power OFF: Press and hold the round momentary switch until the shutdown confirmation popup window appears on the screen, then hold for about 3 seconds until the battery powers OFF.

3.5.5 Disconnect the lithium battery

Step 1: Turn OFF all connected loads and chargers.

Step 2: Power OFF the lithium battery.

Step 3: Disconnect the communication cable between the X3 display panel and the battery.

Step 4: Disconnect the cables between the lithium battery terminals (positive and negative) and the trolling motor or other loads.

Step 5: Disconnect the cables between the lithium battery and external chargers.

4. Battery maintenance

4.1 General description

- Before cleaning and maintaining the lithium battery, be sure to disconnect all loads and charging equipment from the lithium battery.
- Before cleaning and maintenance of the lithium battery, please put a protective cover on the terminal to prevent the risk of short circuit caused by contacting the terminal during cleaning and maintenance.



Do not open or disassemble the lithium battery!

4.2 Security check

- Check the battery for cracks, deformations, leaks, or other types of damage. Check if the battery connection points are loose or if the wire insulation is damaged. If the lithium battery is found to be damaged, it must be replaced immediately. It is forbidden to charge or use damaged lithium batteries. Do not touch the liquid leaked from a ruptured lithium battery.
- In order to enable the BMS to calculate the SOC of the lithium battery more accurately and eliminate the cumulative deviation of the SOC, it is recommended to complete a full discharge (0% SOC) and full charge (100% SOC) every 3 months.

4.3 Surface cleaning method

If you need to clean the lithium battery, please wipe the outer surface of the lithium battery with a soft, dry cloth or paper towel. Do not use liquids, solvents or abrasive tools to clean lithium batteries.

4.4 Battery storage (not in use for over 3 months)

When the battery is not in use for over 3 months, it is advised to charge the battery to 20%~30% SOC every 3 months, in order to maintain a healthy status for the battery.



If the lithium battery is not used for a long time, please use the round momentary switch ON X3 monitor or remote switch to turn OFF the lithium battery, and confirm that the lithium battery is OFF.

4.5 Use the battery in a low temperature environment

When the cell temperature drop below 2°C (35.6°F), X3 monitor will send “a low temperature fault” warning. Connect the battery to a charger, then the automatic heating function will activate heating process to warm the battery up to charging state, please be patient since the heating process might take up to 110mins, after this the battery will be in charging mode.

4.6 Over-discharged battery

When the battery is discharged to low voltage protection, if it lasts for 10 minutes without charging, the battery will automatically shut down. Press the remote switch or the round momentary switch ON the X3 monitoring screen for 3 seconds and then release to restart the battery. After restarting the battery, please charge it within 10 minutes! When the battery detects the external charging voltage is greater than the threshold (refer to below table), the battery will automatically wake up and start charging.

Table 4-1 External Charging Voltage Requirement

Model	External Charging Voltage
FM3	28V
FN4	42V



Please charge your battery as soon as possible when battery is in low voltage protection, or it might cause over-discharged and permanent damage to cells without being recharged within 3 months. Using battery with damaged cells might cause fire, explosion or other hazards.

4.7 Charge only mode

The battery supports a charge-only mode. When the battery is in the OFF state, the charger is able to wake up the battery and initiate charging, but the battery will not discharge. The charging voltage needs to follow Table 4-1. When the battery is in charging only mode, the running light on the battery will flash rapidly, as detailed in section 2.4.3.

5. Storage

Please follow the storage instructions in this manual to increase the service life of the lithium battery during storage. Otherwise the lithium battery may be over-discharged and damaged. If the lithium battery is damaged when in inspection, please do not try to charge or use it.

- The optimum storage conditions of the battery are: 0°C~35°C (32°F~95°F), 20%~80% SOC, < 65%RH.
- The acceptable storage conditions for a short time (within one month) are: -20°C~45°C (-4°F~113°F), 20%~80% SOC, <65%RH.
- If the battery storage condition deviates from the short-term storage condition, the cycle life of the battery will be affected.
- The storage self-discharge rate of lithium battery is less than 3%/month.

For longer storage periods, to optimize battery storage and minimize self-consumption, consider the following recommendations:

- For up to 6 months: Adjust the State of Charge (SOC) to 20~30%.
- For up to 1~2 years: Maintain the SOC at 30~50%. Keep an ambient temperature between 0°C (32°F) and 35°C (95°F) to maintain battery health and performance.



When storing the lithium battery, please disconnect the remote switch or X3 monitor from the lithium battery!

6. Transportation

Before transporting lithium batteries, please check all local, national and international applicable laws and regulations. Lithium battery transportation belongs to the ninth category of dangerous goods in the UN3480 standard. In some cases, the transportation of scrapped, damaged or recalled lithium batteries may be specifically restricted or prohibited.

7. Disposal or recycle

Please discharge the lithium battery to 0% SOC before discarding it. Please use electrical tape or other insulating tape to insulate the positive and negative poles of the battery to prevent short circuits.

Disposal and recycling of lithium batteries should comply with local, state, and federal laws and regulations. Lithium batteries can also be recycled to the manufacturer for disposal.

8. FAQ

8.1 Lithium battery failure quick check

Type	Protection type	Suggestion
Protection	Discharge over current protection	<ul style="list-style-type: none"> ➤ Check whether the discharge current of the lithium battery exceeds the rated discharge current. If it exceeds, turn OFF part of the load. ➤ If the battery discharge current does not exceed the rated discharge current, please contact your dealer.
	Charging over current protection	<ul style="list-style-type: none"> ➤ Check whether the charging current of the charger matches the lithium battery. ➤ Check whether the charger is operating normally. ➤ If all the above are normal, please contact your dealer.
	Low voltage protection of the battery	<ul style="list-style-type: none"> ➤ The battery capacity is very low, please connect the charger immediately to charge the lithium battery.
	High voltage protection of the battery	<ul style="list-style-type: none"> ➤ Check whether the charging voltage of the charger matches the lithium battery. FM3 charging voltage should be 28V~28.4V, FN4 charging voltage should be 42V~42.6V. ➤ Check whether the charger is abnormal. ➤ If all the above are normal, please contact your dealer after turning OFF the charger.
	Discharge high temperature protection	<ul style="list-style-type: none"> ➤ Please check whether the ambient temperature of the battery installation location is too high. ➤ Please check whether the battery wiring is tight and reliable. ➤ Please check whether the wire diameter of the battery wiring cable meets the requirements of the manual. ➤ Please check whether the discharge current and discharge time of the lithium battery exceed the specified requirements (see the technical parameter table for details) ➤ If the above is normal, please contact your dealer.

	Discharge low temperature protection	<ul style="list-style-type: none"> ➤ Please check the ambient temperature of the battery installation location. If the FN4 installation location is lower than -30°C (-22°F) or FM3 installation location is lower than -20°C (-4°F), please connect the charger and increase the temperature of the lithium battery by heating the internal heating film of the lithium battery. ➤ If the problem still cannot be solved, please contact your dealer.
	BMS circuit high temperature protection	<ul style="list-style-type: none"> ➤ Please check whether the ambient temperature of the battery installation location is too high. ➤ Please check whether the battery wiring is tight and reliable. ➤ Please check whether the wire diameter of the battery wiring cable meets the requirements of the manual. ➤ Please check whether the discharge current and discharge time of the lithium battery exceed the specified requirements (see the technical parameter table for details) ➤ If the above is normal, please contact your dealer.
	External input overvoltage protection	<ul style="list-style-type: none"> ➤ Check whether the charging voltage of the charger matches the lithium battery. The charging voltage of FM3 should be 28V~28.4V, FN4 should be 42V~42.6V. ➤ Check whether the charger is abnormal. ➤ If all the above are normal, please contact your dealer after turning OFF the charger.
	BMS internal failure	<ul style="list-style-type: none"> ➤ Please contact your dealer.
	Predischarge timeout	<ul style="list-style-type: none"> ➤ Turn OFF part of the load before restarting the battery. ➤ If the above is normal, please contact your dealer.

9. Specification

Model	FM3	FN4
Cell type	LiFePO4	
Rated capacity	100Ah	105Ah
Rated power	2.56kWh	4.03kWh
Rated voltage	25.6VDC	38.4VDC
Charging voltage	28.4VDC	42.6VDC
Recommended charging current	50A	52.5A
Maximum charging current	100A	100A
Charger Input 1 current	30A	
Charger Input 2 current	30A	
Continuous discharge current	100A	100A
Maximum discharge current	100A	100A
Maximum discharge current (with circuit breaker)	60A	
Cell operating temperature (charging)	2°C~63°C (35.6°F~145.4°F)	2°C~63°C (35.6°F~145.4°F)
Cell operating temperature (discharging)	-20°C~63°C (-4°F~145.4°F)	-30°C~63°C (-22°F~145.4°F)
Storage temperature range (<1 month)	-20°C~45°C (-4°F~113°F), 20%~80% SOC, <65% RH	
Storage temperature range (<6 months)	-20°C~35°C (-4°F~95°F), 20%~80% SOC, <65% RH	
Operating humidity range	10%~90% RH	
Dimensions	460*253*220mm	460*253*295mm
Weight	24.5kg (54.01lbs)	33.5kg (73.85lbs)
IP protection	IP67	
Certifications	CE, FCC, UN38.3	
Shipping class	UN3840	
Cycle life	4000 (0.5C charge and discharge, 80% DoD, @25°C)	
Heating element	YES	
Parallel connection	NO	
Display unit (optional)	X3	

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