



## **NAVY BATTERY USER MANUAL**

May, 2018 Version 1.2

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# Acknowledgements

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Thanks for choosing ePropulsion products, your trust and support in our company are sincerely appreciated. We are dedicated to providing high performance and reliable lithium batteries as well as accessories. Welcome to visit our website [www.epropulsion.com](http://www.epropulsion.com) and contact us if you have any concerns.

# Using This Manual

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Before use of the product, please read this reference manual thoroughly to understand the correct and safe operations of NAVY Battery. By using this battery, you hereby agree that you have fully read and understood all the contents of this manual. ePropulsion accepts no liability for any damage or injury caused by operations that contradict this manual.

Due to ongoing optimization of our products, ePropulsion reserves the rights of constantly adjusting the contents described in the manual. ePropulsion also reserves the intellectual property rights and industrial property rights including copyrights, patents, logos and designs, etc.


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This manual is multilingual, in the case of any discrepancy in interpretation of different language versions, the English version shall prevail.

# Symbols

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The following symbols will help to acquire some key information.

 Important instructions or warnings

 Useful information or tips

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# Product Identification

Below picture indicates the position of product labels. Please record the serial number from the label on the right side of NAVY Battery for access to maintenance or other after-sale services.

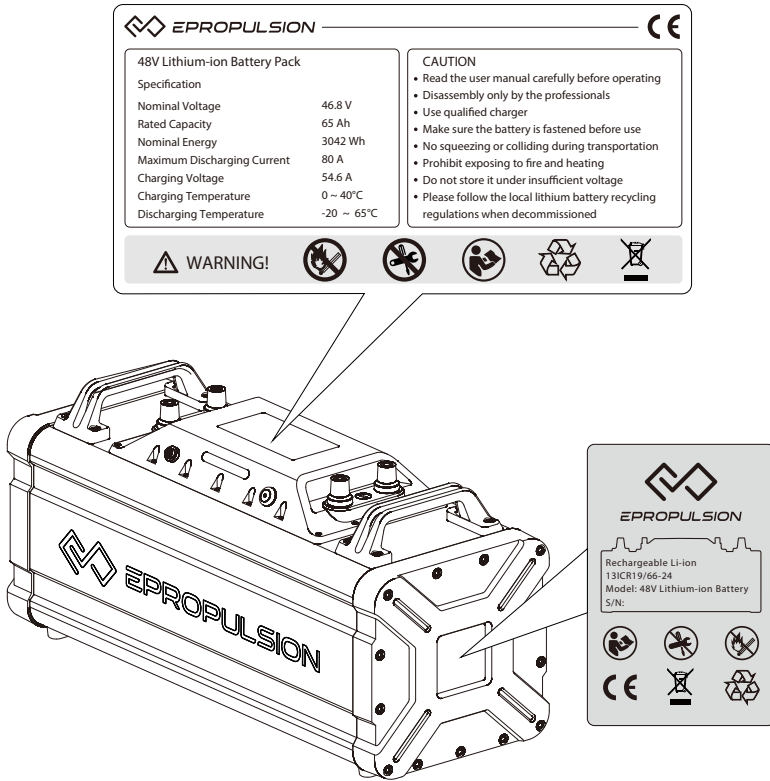


Figure 0-1

# 1. Important Instructions

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This user manual contains important information with regard to equipment installation and safe operations. Before you start to use the battery, please read the following instructions carefully:

## **Before Use**

- Only adults who have fully read and understood this manual are allowed to operate this product.
- Before each use, check the condition and functionality of the battery.
- Pay attention to all the warning marks before using this product.

## **Discharging**

- Do not operate the battery at too high or too low temperature for a long time despite the discharging temperature is from  $-20^{\circ}\text{C}\sim 65^{\circ}\text{C}$  ( $-4^{\circ}\text{F}\sim 149^{\circ}\text{F}$ ), otherwise its service life will be shortened.
- When the battery needs to be moved or reconnected, turn the power off to make sure the power output is shut down.
- Never discharge the battery below 39V. In any case of emergency, please stop discharging the battery immediately.

## **Charging**

- Only use ePropulsion specified chargers. Do not use any third party chargers.
- Only charge NAVY Battery at temperature from  $0^{\circ}\text{C}\sim 40^{\circ}\text{C}$  ( $32^{\circ}\text{F}\sim 104^{\circ}\text{F}$ ).
- Avoid water contact and direct sun or rain exposure during the charging process.
- Keep the battery away from flammable substance like a carpet or wood during charging process.
- In any case of emergency, please stop charging the battery immediately.

## **Storage**

- It is not suggested to immerse the NAVY Battery in water or store in moist environment.
- Avoid direct sun/rain exposure or damp environment during operation or storage.
- Before long-term storage, ensure the battery level is around 50%, and store the battery in suggested temperature range of  $-20^{\circ}\text{C}\sim 20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}\sim 68^{\circ}\text{F}$ ).
- During long-term storage, activate the battery every 3 months by charging the battery to 50% around. This activation is very important to keep the

battery in good condition.

- After long-term storage, fully charge the battery before use.

### **Transportation**

- Check and ensure the package is intact without any damage.
- Avoid violent vibration, strike or squeeze during transport. Get adequate damping protection measures before transport.
- Do not expose the battery to the sun or rain during transport.
- Check the applicable local, national or international laws and regulations before transport.

### **Handling**

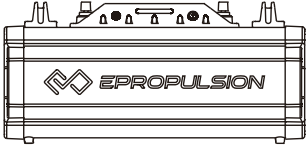
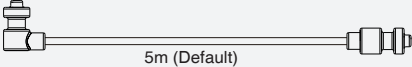

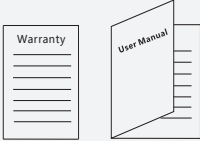
- Place the battery in a well-ventilated area with enough safety distance.
- Keep it away from water, flammable gas, corrosive and other dangerous substance.
- Dispose of unusable or damaged batteries in a container reserved for this purpose and follow applicable local, national or international guidelines and regulations. For further information, you can contact your local solid waste collecting point or your dealer.
- Never discard the battery as general household waste or in fire.
- Do not place metal tools or metal parts on the batteries in order to avoid short-circuit.
- Do not wear watch, ring or other similar metal jewelry when installing or maintaining the battery to avoid potential accidents like shock hurts.
- Do not repair it on your own or by any other unauthorized third party.
- In case of fire, use powder extinguisher to put it out. Water extinguisher may cause electric shock.


## 2. Product Overview


NAVY battery is a Lithium-ion battery with 3042Wh capacity and 46.8V rated output voltage, specially designed for NAVY electric outboards, combining high quality with creative design. NAVY Battery adopts 18650 cells together with the protective battery management system (BMS), ensuring its high performance, safety and reliability.

### 2.1 In the Package

Unpack the package and check if there is any damage caused during transport. Check all the items inside the package against the below list. If there is any transport damage or lack of any listed item, please contact your dealer immediately.

No.	Items	Qty./Unit	Figure
1	NAVY Battery	1 set	
2	Communication Cable	1 piece	 5m (Default)
3	M8 Hexagon Wrench	1 set	
4	User Manual & Warranty Claim Form	2 copies	

 Other accessories mentioned in this manual are not included in the package. Please place additional order if you need them.

 Save the ePropulsion package for battery transportation and storage.



# 2.2 Product View

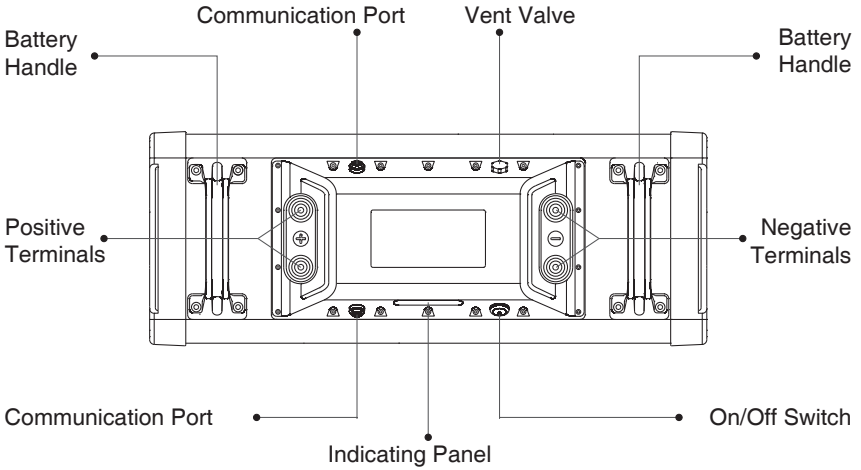


Figure 2-1 Top View

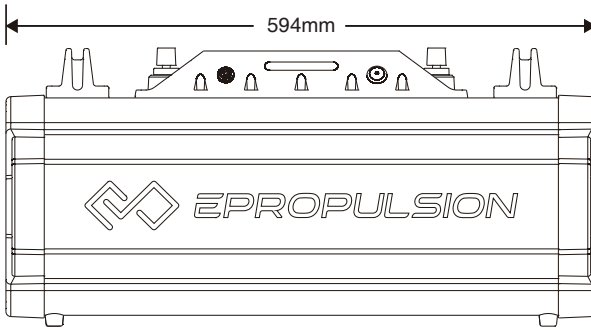


Figure 2-2 Front View

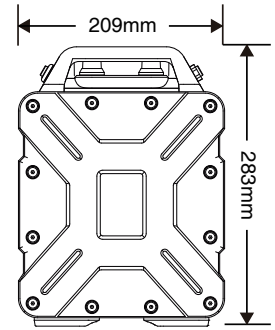


Figure 2-3 Side View

## 2.3 Technical Data


<b>Charging and Discharging Characteristics</b>	
Standard Charging Method	Constant current constant voltage
Charging Voltage	54.6 V
Charging Cutoff Current	1.5 A
Discharging Cutoff Voltage	39 V
Maximum Charging Current	30 A
Maximum Continuous Discharging Current	80 A
Charging Time	~3 hrs
Parallel	Support max 8 NAVY Batteries


<b>Protective Features</b>	
Charging Overcurrent Protection	35 A
First-Class Discharging Overcurrent Protection	The output power is cut off if the current is over 85A for 15 seconds.
Second-Class Discharging Overcurrent Protection	The output power is cut off if the current is over 100A for 3 seconds.
Resume from Overcurrent Protection	System resumes automatically after 2 seconds. Two consecutive protections require restart.
Short-circuit Protection	The system triggers short-circuit protection with 400 $\mu$ s delay if the current surpasses 200A.
Resume from Short-Circuit Protection	The output power is cut off. System resumes automatically after 10 seconds. Three consecutive protections require restart.
Intelligent Power Adjustment	If battery temperature is high, it triggers power limitation function automatically.


Charging Over-Temperature Protection	$\geq 55^{\circ}\text{C}$
Discharging Over-Temperature Protection	$\geq 65^{\circ}\text{C}$
Charging Low-Temperature Protection	$\leq 0^{\circ}\text{C}$
Discharging Low-Temperature Protection	$\leq -20^{\circ}\text{C}$

Operating Environment	
Charging Temperature	$0^{\circ}\text{C}\sim 40^{\circ}\text{C}$ / $32^{\circ}\text{F}\sim 104^{\circ}\text{F}$
Discharging Temperature	$-20^{\circ}\text{C}\sim 65^{\circ}\text{C}$ / $-4^{\circ}\text{F}\sim 149^{\circ}\text{F}$
Suggested Storage Temperature	$-20^{\circ}\text{C}\sim 20^{\circ}\text{C}$ / $-4^{\circ}\text{F}\sim 68^{\circ}\text{F}$
Operating Humidity Range	10%RH~90%RH
Suggested Storage Humidity	$\leq 70\%\text{RH}$
Suggested Storage Capacity	45%~50% (ex-factory capacity is approximately 50%)

NAVY Charger	
Rated input Voltage	90~264 V AC
Input Frequency	50 Hz / 60 Hz
Maximum Input Current	10 A
Output Power	1474 W
Temperature Range	Operation: $-10^{\circ}\text{C}\sim 40^{\circ}\text{C}$ / $14^{\circ}\text{F}\sim 104^{\circ}\text{F}$ Storage: $-40^{\circ}\text{C}\sim 70^{\circ}\text{C}$ / $-40^{\circ}\text{F}\sim 158^{\circ}\text{F}$
Maximum Output Voltage	54.6 V DC
Maximum Output Current	27 A
Cutoff Current	1.35 A
Efficiency	$>92\%$

 Before storage, make sure the battery level is around 50%.

 Battery lifespan will be shortened if it works in extreme temperature range (such as below  $0^{\circ}\text{C}$  or above  $50^{\circ}\text{C}$ ).

 As the maximum discharging power of NAVY Battery is 3000W, so when used with NAVY 6.0 outboard motors, it's suggested to connect two NAVY Batteries in parallel to provide 6000W of output power.

# 3. Operation

## 3.1 Connecting NAVY Battery to NAVY Outboard

When connecting an ePropulsion NAVY Battery to the outboard, make sure the battery switch and the main switch on the power cable are both off. Then refer to Figure 3-1 and follow the below procedures:

- ① Connect the main switch cables to the battery. Refer to Figure 3-1.
- ② Connect the main switch cables with the power cables from the outboard motor.
- ③ Using the 5m communication cable to connect NAVY 6.0R outboard motor with NAVY Battery.

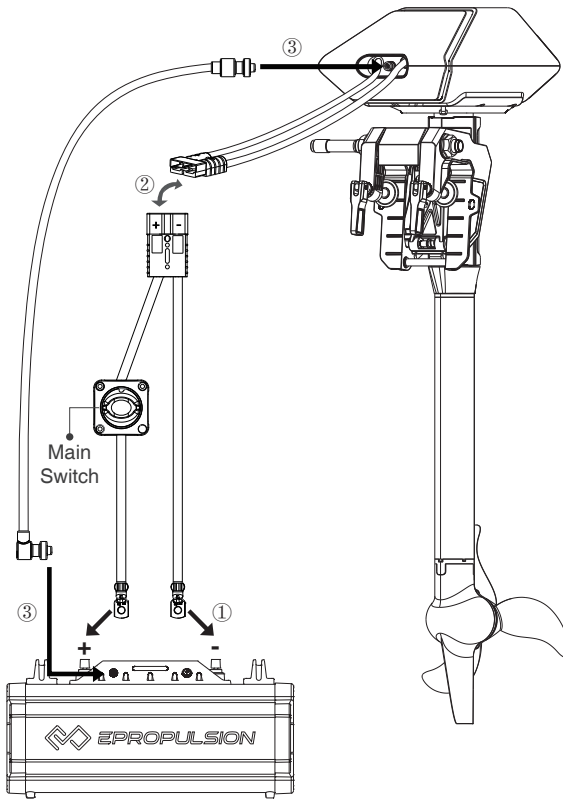


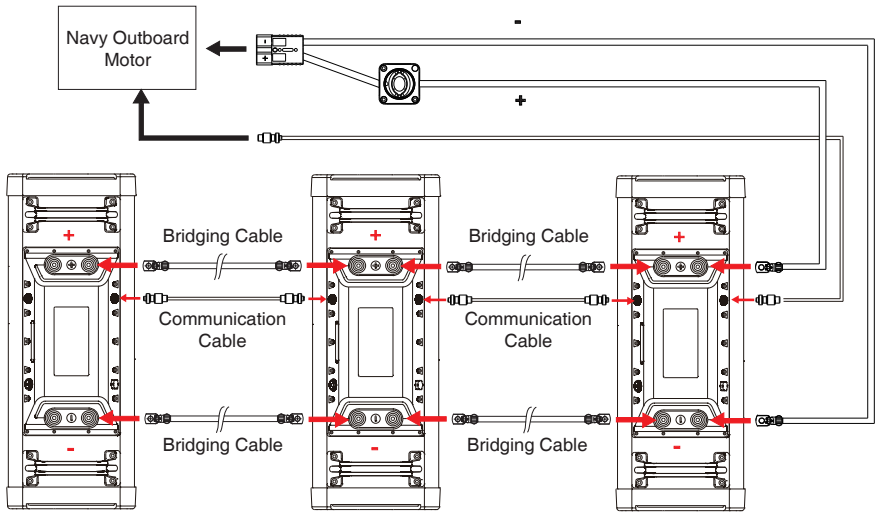
Figure 3-1

- ⚠️ Avoid battery short-circuit during connection.
- ⚠️ The outboard motor will stop working once the communication cable or power cable disconnects.

### 3.2 Parallel Connection of NAVY Batteries

Connecting two or more sets of batteries in parallel can greatly extend the duration time. The parallel strategy supports connecting up to eight NAVY Batteries simultaneously in parallel. Remember to connect the communication cable(s) to every NAVY Batteries in parallel connection by referring to Figure 3-2.

- ⚠ Never mix up the positive terminals with negative terminals.
- ⚠ Before installation, make sure the battery switch and the main switch of power cable are both off.
- ⚠ Make sure the NAVY Batteries are of the same condition associated with discharging cycles, aging, etc. Performance may reduce in case NAVY Batteries of different conditions are connected in parallel.



Connect Up to 8 Navy Batteries in Parallel

Figure 3-2

- 💡 If communication between two NAVY Batteries disconnects, the outboard motor only gets 3000W output from one battery since communication to the other battery is lost.
- 💡 If battery charge levels of the NAVY Batteries connected in parallel vary too much, it's suggested to get the batteries fully charged first.

### 3.3 Switching On/Off the NAVY Battery

To switch on the NAVY Battery, press the on/off-switch on the NAVY Battery and the indicator on the button will light up. To switch off the NAVY Battery, press on/off-switch button again, and the indicator is light off.

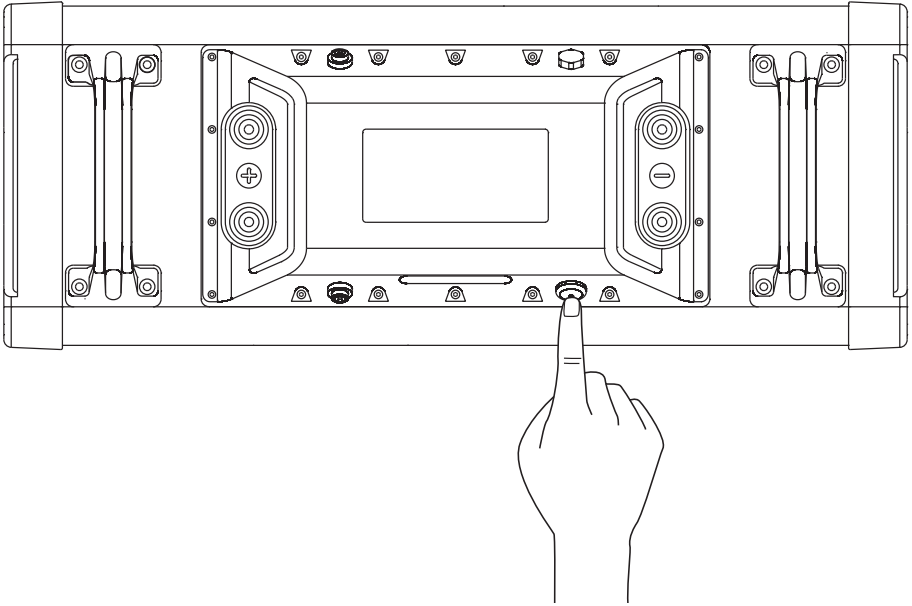


Figure 3-3

## 3.4 Charging the NAVY Battery

Read the following notes before charging a NAVY Battery:

- ⚠ Only use ePropulsion specified chargers. Do not use any third party chargers.
- ⚠ Only charge NAVY Battery within temperature range from 0°C~50°C (32°F~122°F).
- ⚠ Avoid water contact and direct sun/rain exposure during the charging process.
- ⚠ Avoid touching the charger while charging as the high temperature metal surface may burn your skin.
- ⚠ Do not plug the charger into a power strip to avoid overload.
- ⚠ Do not overcharge the battery.

### A. Charging procedures for a single NAVY Battery

1. Turn off both battery switch and main power cable switch.
2. Connect the NAVY Battery with its charger, then plug the charger into a wall socket.
3. Press on/off-switch to turn on the battery. The running indicator (refer to figure 3-6) illuminates constantly while the battery level indicators will blink when it starts to charge.
4. When the four battery indicators all illuminate constantly, it indicates the battery is fully charged. First switch off the charger then the battery. Disconnect the charger output cable from the battery afterwards.

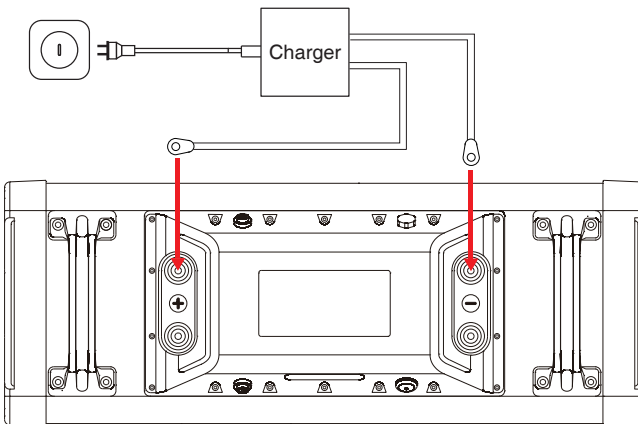


Figure 3-4

💡 Self-discharge may occur in the process of transportation and storage. Therefore, it is advised to fully charge the battery before each use. It is recommended to charge the battery for 3 hours or more to make sure enough backup time.

💡 Turn off the battery when the battery is fully charged.

## **B. Charging procedures for NAVY Batteries connected in parallel**

1. Turn all the NAVY Batteries off.
2. Connect all the NAVY Batteries (maximum 8) in parallel with both battery communication cable(s) and bridging cables.
3. Connect one of the NAVY Batteries with an ePropulsion specified charger with the charger in off state.
4. Connect the charger input plug to a wall socket and then turn on the outlet. The running indicator will be constantly on and battery level indicators will blink when the charging process start.
5. When the four battery indicators on all the NAVY Batteries light up constantly, it indicates the batteries are fully charged. Now the charger can be plugged out.

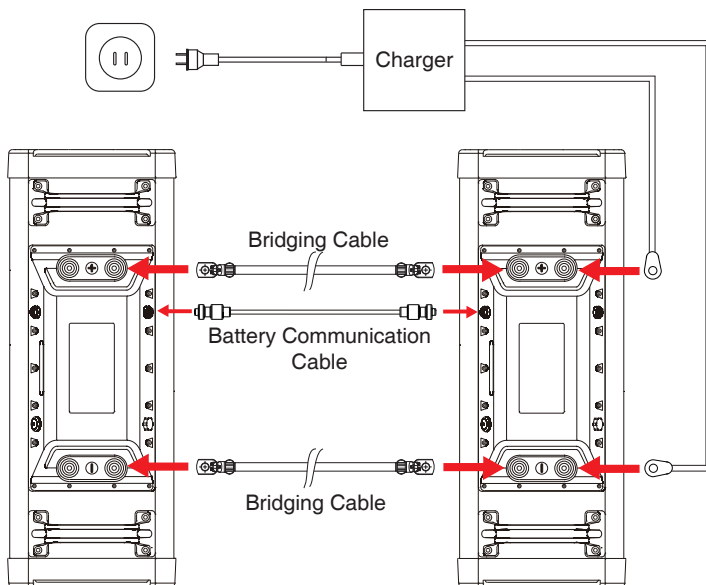


Figure 3-5



### 3.5 LED Indicators

Below Figure 3-6 displays the six LED indicators on the indicating panel of NAVY Battery: one running indicator, one alarm indicator and four battery level indicators.

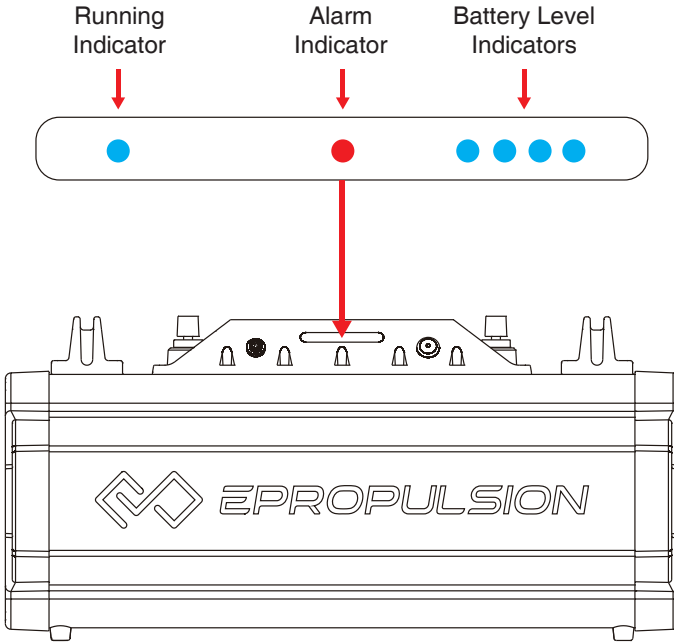


Figure 3-6

Battery Condition	Description	Run	Alarm	Battery Level (L-H)			
Power off	All lights are off						
Standby	Normal: indicating power-saving status	•					
	Alarm: low-battery		★				

Battery Condition	Description	Run	Alarm	Battery Level (L-H)			
Charging	0%~25%	●		★			
	26%~50%	●		●	★		
	51%~75%	●		●	●	★	
	76%~99%	●		●	●	●	★
	100%	●		●	●	●	●
	Overvoltage protection: either single cell overvoltage or battery pack overvoltage	●	●	●	●	●	●
	Charging over-temperature protection	●	●			●	
Discharging	0%~25% battery	●		●			
	26%~50% battery	●		●	●		
	51%~75% battery	●		●	●	●	
	76%~100% battery	●		●	●	●	●
	Under-voltage protection: either single cell undervoltage or battery pack undervoltage		●				
	Discharging over-temperature protection		●			●	
	Discharging overcurrent protection		●			●	●

**Note:** ● refers to steady light and ★ refers to flashing light with flashing frequency of 1Hz.

# 4. Troubleshooting

If the system fails, consult the following troubleshooting table for common problems and corresponding solutions. If the problem persists, or repairs are required, please consult the ePropulsion authorized dealer for further assistance.

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
No Response by Pressing On/Off-Switch	Internal failure	Please contact your dealer for assistance.
Short Discharging Time	Lack of enough battery	Please fully charge the battery before use.
	Battery aging, capacity loss	Replace a battery. Please contact your supplier for support.
Charging/Discharging Failure	Internal failure	Please contact the dealer.
	Battery over-temperature	Rest the battery in proper temperature until the battery over-temperature protection resumes.
<b>Error Code</b>	<b>Cause</b>	<b>Solution</b>
E01	Battery voltage exceeds the operating range.	Replace a battery based on suggested operation specifications.
E06	Battery voltage level is too low.	Charge the battery as soon as possible.
E56	Communication between NAVY Battery and NAVY outboard is broken.	Power off and reconnect the communication cable.

E57	Overcurrent protection is triggered in one or more NAVY Batteries.	Power off and check the battery level for all the batteries. If there exists a large difference in battery levels among the batteries, fully charge all of them before use.
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If the battery level displays on the LCD panel of throttle and NAVY Battery are different, it may result from failure to connect the communication cable between NAVY Battery and NAVY outboard. In this case, power off the system and connect the communication cable to solve the problem. However, if the NAVY Battery and NAVY outboard have good communication, it can be regarded as a normal phenomenon, as the battery level displays on throttle is the average value of all the batteries connected in parallel, therefore, the average value may differ from actual value of each battery.



The error codes in the above table display on the throttle screen once the error occurs.



Also check if the failure is caused by other possible factors.

# 5. Transport and Storage

## 5.1 Transport

Below Figure 5-1 displays how to pack a NAVY Battery with ePropulsion original packing material. For long-distance transport, it's recommended to apply ePropulsion original package to pack the outboard prior to delivery.

- ⚠ Check and ensure the package is intact without any damage.
- ⚠ Avoid violent vibration, strike or squeeze during transport. Get adequate damping protection measures before transport.
- ⚠ Do not expose the battery to the sun or rain during transport.
- ⚠ Check applicable local, national or international laws and regulations before transport.

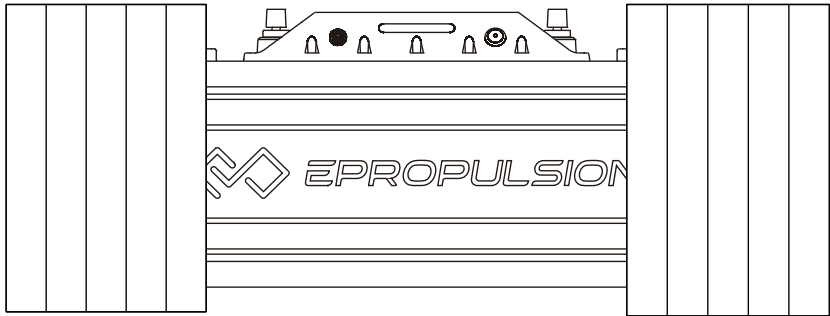










Figure 5-1

## 5.2 Storage

If you are not going to use the battery for a long time, it is advised to contact your dealer to clean and check the battery before storage. It's suggested to pack the battery with ePropulsion original package for storage.

-  Get adequate damping protection measures before storage.
-  For long-term storage, ensure the battery residual charge is around 50%. As slow discharge may occur during long-term storage, therefore, check the battery level regularly and charge the battery to 50% when the battery level is low. Usually, it is advised to charge the battery every 3 months.
-  Store the battery in a clean, dry and well-ventilated area without direct sun exposure, where the relative humidity is no more than 70% and the ideal ambient temperature is from  $-20^{\circ}\text{C}\sim 20^{\circ}\text{C}$  /  $-4^{\circ}\text{F}\sim 68^{\circ}\text{F}$ .
-  Avoid contact with corrosive substance which may cause permanent damage, weaken or destroy the plastic of your battery pack.
-  Keep the battery away from any sources of fire, sparks, open flame or heat .
-  Use contact oil to keep battery contacts and screw connectors in good condition on a regular basis, usually at least three months a time.
-  Charge the battery before use after long-time storage.
-  Keep the battery pack away from children or pets.

## 6. Routine Maintenance

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Various factors like operation environment (such as temperature, humidity, dust, etc.), aging and wear of internal components, will increase the possibilities of battery failure. In order to avoid this, keep your battery in optimal operating state, and eventually extend the service lifespan of NAVY Battery. Therefore, routine maintenance is very important.

- Before the first time use or reuse after long-term storage, charge the battery to its full capacity in order to achieve the best performance. Only use ePropulsion charger designed for NAVY Battery. Other chargers may lead to shortened runtime, premature battery failure, or even fire or explosion. Avoid over-charging, which may cause fire or explosion.
- Use the battery in moderate temperature to avoid negative effects of extreme temperature posed on battery lifespan and useful cycles. Apply contact spay after use to keep the battery contacts in good condition.
- Once a fault occurs, deal with the problem in time to avoid any further damage. If necessary, consult the ePropulsion authorized dealer for repair or parts replacement.
- During storage, strictly follow the instructions in section 5.2 Storage. Pay special attention to the residual charge and check the battery state in a regular manner. Also remember to apply contact spay at least once every 3 months.
- Use clean & dry towel to keep the battery surface away from oil, dirt and water. Avoid touching metal contacts. All the contacts need to be kept clean for best performance. When carrying batteries around, do not touch the contacts with metal objects such as keys or tools to avoid short circuit, battery damage, and potential fire or explosion.
- Always follow the instructions provided with the battery manufacturer. Refer to this user manual and find the latest version available at [www.ePropulsion.com](http://www.ePropulsion.com).
- To improve functionality and prolong lifespan of NAVY Battery, avoid direct sunshine or radiation exposure. Meanwhile, avoid liquid, dust or mud entering the battery.
- When the battery is getting low, please stop discharging and charge the battery as soon as possible. It's advised to check the battery level on a regular basis.






# 7. Warranty Claim

The ePropulsion limited warranty is provided for the first end purchaser of an ePropulsion product. Consumers are entitled to a free repair or replacement of defective parts or parts which do not conform with the sales contract. This warranty operates in addition to your statutory rights under your local consumer law.

## 7.1 Warranty Policy


ePropulsion keeps its products free of defects in material and workmanship for a limited period since the date of purchase. Once a fault is discovered, the user has the right to make a warranty claim under the ePropulsion warranty policy.

Product	Warranty Expiry Date
NAVY Battery	<b>One year</b> after the date of purchase
Repaired/ Replaced Parts	<b>Three months</b> since the date of maintenance. Note: 1.If the three-month period overlaps with the original warranty period, the warranty against the repaired/replaced parts still expire one year after the date of purchase. 2.If the three-month period exceeds the original warranty period, the repaired/replaced parts expire by the end of the third month since date of maintenance.

-  In order to validate the warranty, users are required to fill the Warranty Claim Card in advance.
-  Keep the product label on top of battery in an intact state and record the serial number on the label. Never tear the label off the battery. A NAVY Battery without the original product label will not be applicable to warranty services provided by ePropulsion.
-  The warranty is valid only when the information on the Warranty Card is filled in correctly and completely.
-  Free warranty is only validated upon the presentation of the legal serial number, Warranty Claim Card, and evidence of purchase from an authorized ePropulsion dealer.
-  Valid date of purchase should be established by the first-hand purchas-



er with original sales slip.


 Free warranty is not transferable and will not be reissued.


## 7.2 Out of Warranty

Make sure the product is properly packed during delivery, the original ePropulsion package is recommended. If the product got further damaged due to improper packing during delivery, the furtherly damaged part will be deemed as out of warranty coverage.

In addition, faults or damages caused by the following reasons are also excluded from warranty scope within the covered period:

- Dropping, improper care or storage.
- Any improper operation contradicts the user manual.
- Accident, misuse, wishful abuse, physical damage overcharging or unauthorized repair.

 You should be noted that minor faults like normal wear and tear that pose no influence on the intended function of the product are also not covered by the warranty.

 The communication cables supplied with the NAVY Battery belong to consumables, which are also out of warranty scope.

## 7.3 Warranty Claim Procedures

If you find your product defective, you can make a claim to your dealer following below procedures:

1. Fill in the Warranty Claim Card correctly and completely in advance. Then make your warranty claim by sending it to your authorized ePropulsion service partner together with valid proof of purchase. Usually these documents are required when making a warranty claim: the Warranty Claim Card, ex-factory serial number, and evidence of purchase.
2. Send the defective product to your authorized ePropulsion service point after getting the confirmation. Note that the label should be kept intact. You can also deliver the product to your authorized ePropulsion dealer after getting confirmation.
3. The defective components or parts will be either repaired or replaced according to the diagnosis made by the ePropulsion authorized service partner.
4. If your warranty claim is accepted, the equipment will be repaired or re-

placed free of charge.

5. After careful examination and confirmation by ePropulsion authorized dealer, the defective or faulty components will be repaired or replaced with brand new ones against the actual condition.
6. In case your warranty claim be rejected, an estimated repair charge with round trip delivery cost included will be sent for confirmation. ePropulsion authorized service point will conduct maintenance accordingly only after your confirmation.



If warranty expires, you can still enjoy fee-based maintenance services from authorized ePropulsion service partners with minimum maintenance charge.



Thanks for reading this user manual.

If you have any concerns or find any problems while reading, please don't hesitate to contact us. We are delighted to offer service for you.

Dongguan ePropulsion Intelligence Technology Limited

Website: [www.epropulsion.com](http://www.epropulsion.com)

Email: [service@epropulsion.com](mailto:service@epropulsion.com)