NAVY 6.0 CONTROLLER USER MANUAL

September, 2017 Version 1.0

Acknowledgement

Thanks for choosing ePropulsion products, your trust and support in our company are sincerely appreciated. We are dedicated to providing highperformance electric outboards, as well as thrusters, reliable lithium batteries and accessories.

Welcome to visit www.epropulsion.com and contact us if you have any concerns.

Using This Manual

Before use of the product, please read this user manual thoroughly to understand the correct and safe operations. By using this product, you hereby agree that you have fully read and understood all 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 case of any discrepancy in the interpretation of different language versions, the English version shall prevail.

Symbols

The following symbols will help to acquire some key information.


Important instructions or warnings


Useful information or tips

Product Identification

Below picture indicates the serial numbers of NAVY 6.0 Controller. Please note the position of the serial numbers (Find serial numbers on the back side for NAVY Tiller, NAVY Remote Control and Dual Remote Control) and keep the label intact for valid access to warranty and other after-sale services.

Figure 0-1 NAVY Remote Control

Figure 0-2 Dual Remote Control

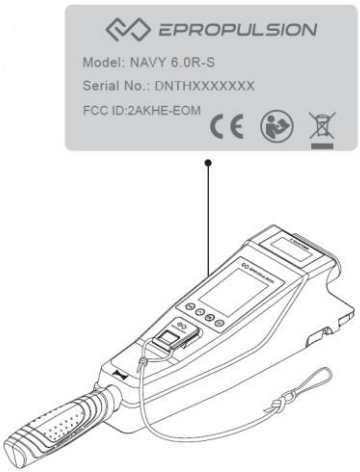


Figure 0-3 NAVY Tiller

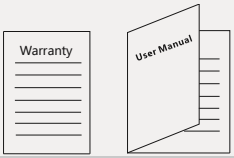
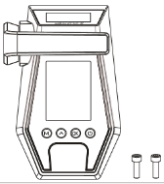
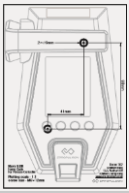
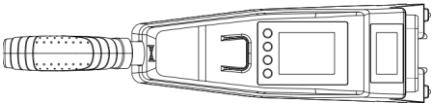
Table of Contents

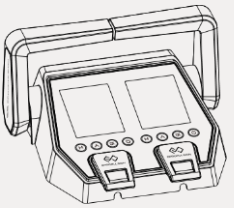
1 Product Overview

The Controller of NAVY6.0 can control the NAVY6.0 main park motor power and display system information .The Controller has three types, include remote control, tiller control and Dual Remote Control. User can chose a suitable type to purchase according to requirement.

The Controller communication with the main part of NAVY6.0 use the wireless communication which is base on the 2.4G protocol. Besides, they also can use the wire communication which is base on RS485 protocol.

1.1 In the Package (R/T)

Items	Qty./Unit	Figure
Kill Switch	2 pieces	
User Manual and Warranty Claim Card	1 set	
Remote Controller (R)	1 set	
Fixing Guide (R)	1 piece	
Tiller Handle (T)	1 set	

Dual Remote Control (R)	1 set	

Choose dual remote control when two NAVY outboard motors are used simultaneously. Choose a Remote Control or a Tiller Handle when only one NAVY outboard motor is used.

1.2 Parts and Diagrams

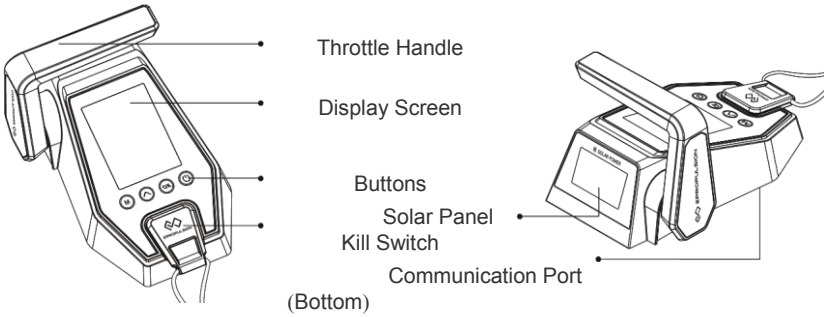


Figure 1-2 Remote Controller

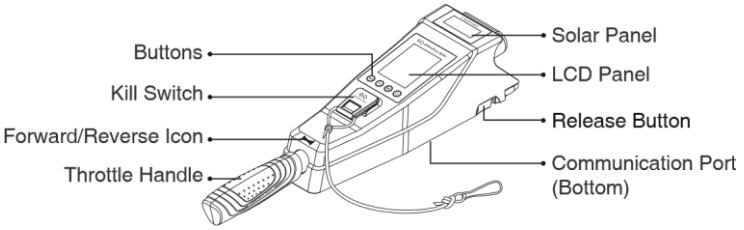


Figure1-3 Tiller Handle

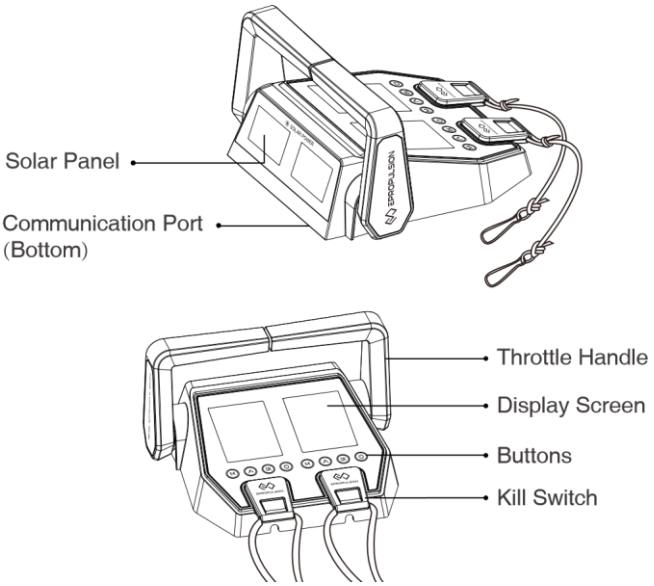


Figure 1-4 Dual Remote Control

1.3 Specifications

NAVY 6.0 Controller	
Communication Type	Wireless/Wired
Wireless Frequency	2402-2476 MHz
Communication Distance	≦10M
Battery Type	Li-ion(14500)
Charge Type	Solar Charge
Display Information	Battery voltage, power, speed ,etc.

1.4 Important Notes

1.The distance and speed value displayed is measured by Global Positioning System (GPS), there may exist small errors due to GPS signal strength degradation or some external environment conditions like currents, winds and change of course.

2.Only adults who have fully read and understood this manual are allowed to operate this product.

3.Stop the outboard immediately if someone falls overboard during the trip.

4.Operate the outboard only when the propeller is underwater.

5.An error code will display on the panel if the outboard malfunctions. Put the throttle to zero position and turn off the main switch, then refer to *Chapter 3.6 Warning Messages* for details and solutions.

1.5 Declaration

ePropulsion Innovation (HK) Ltd.

Rm.1501(682), 15/F Spa CTR 53-55, Lockhart Rd, WanChai, Hong Kong

Declare conformity of design in NAVY 6.0 with the following directives:

EMC-directive

2004/108/EC

MD-directive

2006/42/EC

LVD-directive

95/25/EC

Applied standards:

EN 55014-1:2006+A1:2009

EN 55014-2:1997+A1:2001+A2:2008

EN 61000-3-2:2006+A1:2009+A2:2009

EN 61000-3-3:2008

EN 60204-1:2006

2006/42/EC Annex 1

EN ISO 12100-1:2003

EN ISO 12100-2:2003

EN ISO 6185-2-2001

EN ISO 8665-2006

EN ISO 9093-1-1995

EN 28848-1993

FCC Statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off

and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

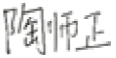
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The original certificate was issued by Global-Standard Testing Service Co., Ltd. in Shenzhen, Guangdong.

Certificate NO.: GST140470225E; GST1404170225M; GST1404170225S; GST1404170225S. Issued Date: May 21, 2014

Signature: 

Mr. Danny Tao,

Chief Executive Officer & Cofounder of ePropulsion Innovation (HK) Ltd.

2 Mounting the Tiller Handle (T)

In the package of NAVY 6.0T, the Tiller Handle is not mounted on the outboard motor prior to delivery. Users can mount it by one simple step:

Align the Tiller to the mounting recess of the outboard motor in the direction of the arrow and plug in the Tiller until a click sound is heard.

Pay attention not to jam the outboard cable while mounting the Tiller.

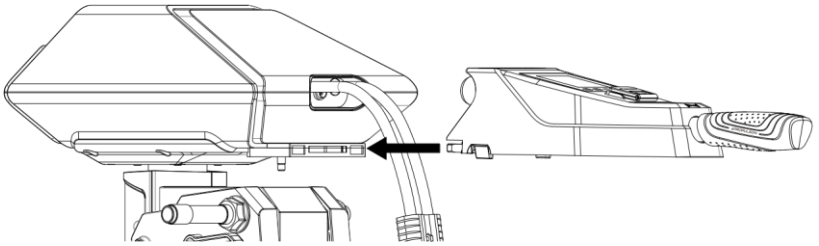


Figure 2-1

To detach the Tiller: press the release buttons (Figure 3-7) on both sides of the Tiller and plug it out.

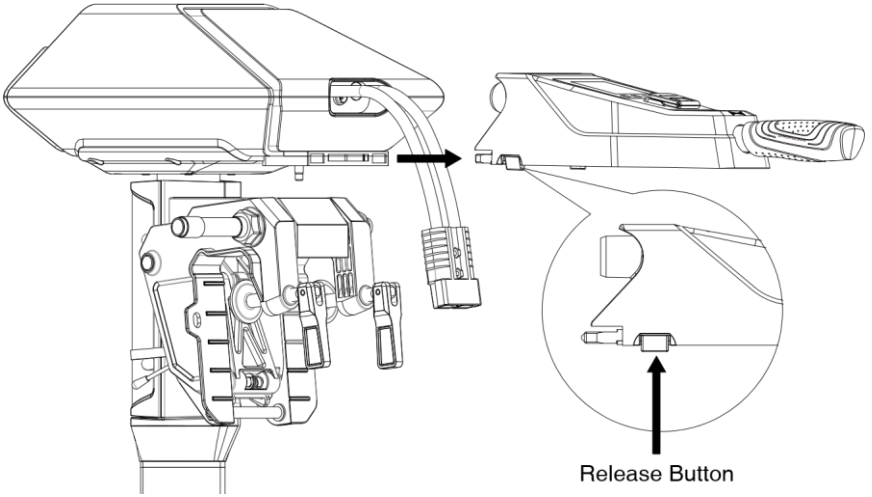


Figure 2-2

3 Remote Controller / Tiller Handle

The Remote Controller/Tiller Handle is used for starting and stopping the NAVY outboard motor, adjusting the motor speed, configuring the battery parameters, displaying the system information and messages, etc. The Remote Controller/Tiller Handle is powered by either solar power or the built-in lithium battery. Both Remote Controller and Tiller Handle wirelessly communicates with the outboard control system built in the main outboard motor. The only functional difference between Remote Controller and Tiller Handle is the steering method: the Tiller Handle itself owns the steering capability, while the Remote Controller requires an additional steering wheel to help steer.

3.1 Displaying

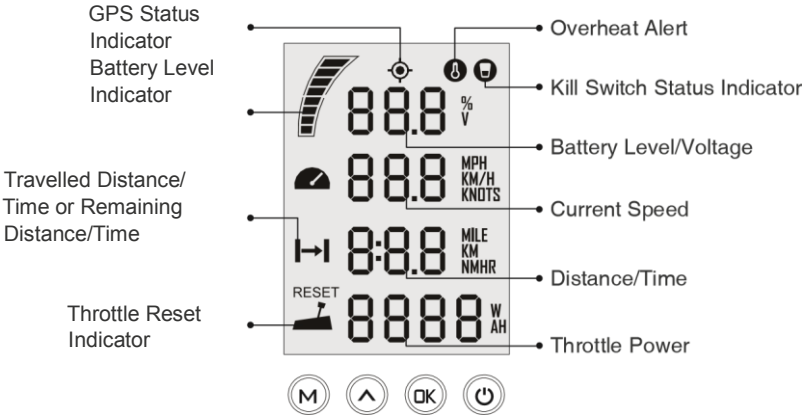
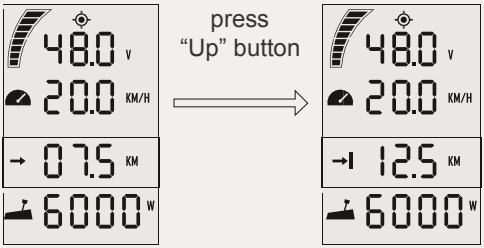
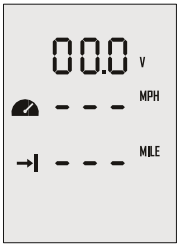


Figure 3-1

Buttons	Functions
“Power”	1. In power-off state, press and hold the power button to power on the Remote Controller/Tiller Handle. 2. In power-on state, press and hold the power button to power off the Remote Controller/Tiller Handle.

Buttons	Functions
“OK”	1. On setting pages, press " OK " button to save the current settings and switch to the next item. 2. On setting pages, press and hold “ OK ” button to save the settings and return to the home page simultaneously. 3. In power-on state, when the home page displays or all the characters display on the page, press “ OK ” button and hold **5s** to enter the remote controller pairing page.
“Up”	1. On any setting page, press “^” button to view options for current setting. 2. If the home page displays in power-on state, long press “^” button for **10s** to enter the throttle calibration page. 3. On home page, press “^” button to switch the travelling distance or time displaying icon between “ →I ” and “ I→ ”.



M “Menu”	1. In power-on state, press and hold “ M ” button to enter the preference setting page.  Preference setting page

2. On preference setting page, press and hold “ M ” button to enter the battery setting page.

battery setting page

3. On any page, press **“ M”** button to return home page.

⚠ If users enter the page without setting any parameters, the current parameters displayed on the page will be saved as user parameters by default.

When powering on, " SYS IN IT " indicates the system is initializing.

Icons	Functions	
	Battery level Indicator	Indicating approximate battery level. The solid blocks represent remaining battery.

	Battery level/ voltage	Indicating accurate current battery level percentage/battery voltage which is configurable in preference setting page. For example:  : indicates current battery level  : indicates current battery voltage. If the voltage is below 42V, the max input power of the outboard motor will be lower than 6KW.
	GPS status indicator	 Hidden: no satellite signal is received or GPS does not work.  Blink: GPS is connecting to satellites. Shown constantly: GPS is in use.

Icons	Functions	
	Over-heat alert	 Hidden: system temperature is in normal range.  Blink: system temperature is a little high and the maximum input power of motor has been lowered than 6KW.  Shown constantly: system is over temperature and the outboard will stop working. The outboard motor can't be started until the system temperature drops to a certain level.
	Kill switch status indicator	 Hidden: kill switch is well attached and works well.  Shown constantly: the kill switch is detached.

	Current speed	Displaying real time cruising speed. Set units (KM/H,MPH or KNOTS) in preference setting page.
	Distance/time display	Displaying real time travel distance/time. Set units (MILE, KM (kilometer) and NM (nautical mile)) in preference setting page. The time unit is HR (hour).
	Travelled distance/time or remaining distance/time	 : Remaining distance or time that outboard can travel. Set units (MILE, KM (kilometer) and NM (nautical mile)) in preference setting page.  : Travelled distance or time.
Icon	**Function**	
	Throttle Power	Displaying real time input power to the system. A blinking "**RESET**" indicating the throttle should be reset to zero position.

3.2 Charging

Both the Remote Controller and Tiller Handle have a built-in lithium battery for power supply. The battery will be charged automatically under normal use: get charged by solar power or wired connection.

3.2.1 Charging by solar power (Recommended)

When the solar panel receives enough sunshine, it will generate electricity to charge the built-in lithium battery. While charging the battery by solar power, it's suggested to face the solar panel of the Remote Controller/Tiller Handle toward sunlight to get better charging effect. (Figure 5-2 and Figure 5-3).

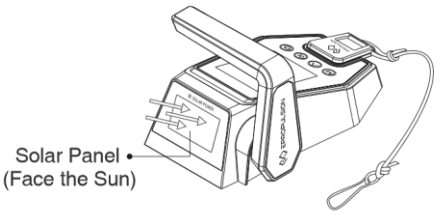


Figure 3-2

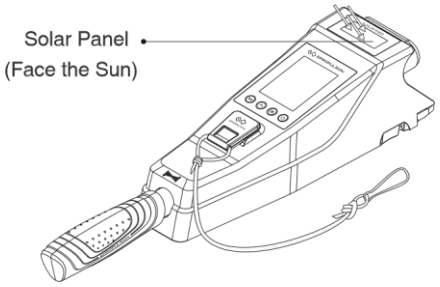


Figure 3-3

It's recommended to charge the Remote Controller/Tiller by solar power.

3.2.2 Charging by wired connection

If the Remote Controller/Tiller can't get enough solar power for a long time, the battery level will run out. In this case, a warning message with an error code E60 (Figure 5-4) will display on the LCD panel to remind you to charge the Remote Controller/Tiller Handle. Now you can connect the outboard and the battery by communication cable to charge the Remote Controller/Tiller.

Figure 3-4

Please follow the below steps to charge the Remote Controller/Tiller Handle by wired connection.

First, connect the Remote Controller/Tiller Handle to the outboard motor by a communication cable first (Figure 5-5/Figure 5-6); Then, connect the outboard motor to the battery. Dual Remote Controller like the Remote Controller.

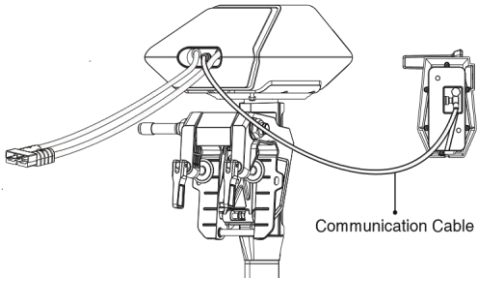


Figure 3-5

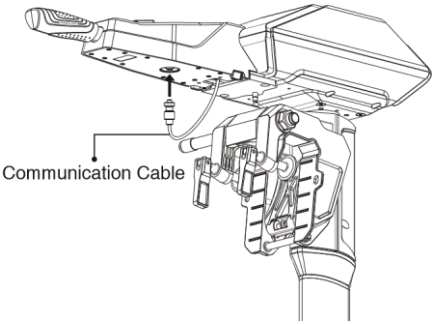


Figure 3-6

⚠ During long-term storage, ensure to charge the Remote Controller battery every 6 months to avoid over-discharge.

After long-term storage, charge the Remote Controller before use.

It's recommended to switch off the Remote Controller/Tiller Handle while connecting the communication cable. When the Remote Controller/ Tiller Handle is switched on while charging, as the outboard main part and Remote Controller/Tiller Handle are in communication, the working outboard motor will stop at once the communication cable disconnects.

The communication cable is not included in this package. Please purchase one from your dealer if you choose this charging method.

3.3 Power Adjusting

3.3.1 Power Adjusting for Remote Controller/Dual Remote Controller

The Remote Controller is mainly used to adjust the input power of the outboard motor. When the battery is well connected and switched on, power on the Remote Controller to start the outboard, then slowly push the throttle forward position to increase the throttle power. The maximum forward power is 6KW and the maximum backward power is 2KW.

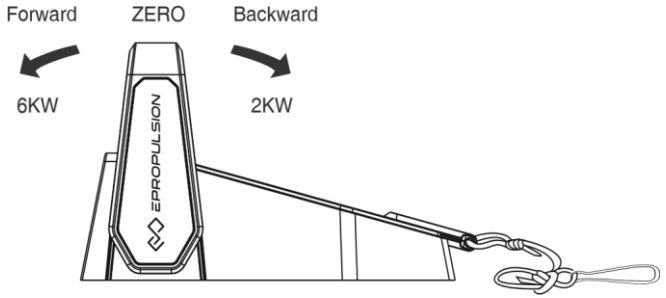


Figure 3-7

Before power on the Remote Controller, please reset the throttle to zero position.

If you find a blinking “RESET” on the display, you are reminded to reset the throttle to zero position.

If you turn the throttle from the forward position to the backward position directly, the motor will first stop shortly, then start turning to the reverse direction.

5.3.2 Power Adjusting for Tiller Handle

The Tiller Handle is mainly used for power adjusting and steering control. When the battery is well connected and switched on, power on the Tiller Handle to start the outboard, then turn the throttle gradually form zero position to the forward direction to start. Please refer to Figure 5-8. Change the heading direction by turning the tiller on horizontal level. The maximum forward power is 6KW and the maximum backward power is 2KW.

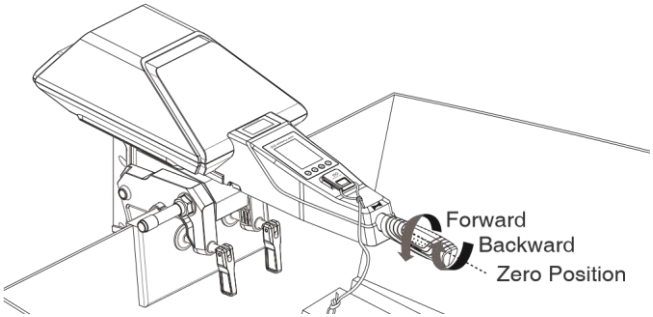


Figure 3-8

Before power on the Remote Controller, please reset the throttle to zero position.

If you find a blinking “RESET” on the display, you are reminded to reset the throttle to zero position.

If you turn the throttle from the forward position to the backward position directly, the motor will first stop shortly, then start turning to the reverse direction.

5.3.3 Recalibration

The throttle position sensor should be recalibrated if the below error code displays.

Figure 3-9

Recalibration process	LCD Displaying
Step1: Long press "^" button for **10s** until "CAL FO" displays.	
Step2: Push the throttle to the maximum forward power position, then press"^" button. "CAL ST" will display and "CAL" will be blinking.	
Step3: Pull the throttle to the middle (zero) position where you can hear a click sound, then press "^" button, "CAL bA" will display and "CAL" will be blinking.	
Step4: Pull/Turn the throttle to the maximum backward power position, then press "^" button. "CAL FO" will display and calibration is completed. A blinking "**RESET**" will display to remind you to reset the throttle to zero position.	
Step5: Push/Turn the throttle to zero position and press " M " button and return to the main page.	

⚠ Carry out the throttle calibration procedures strictly as the above sequence.

When recalibrating a Remote Controller, please “pull or push” the throttle. When recalibrating a Tiller, please “turn” the throttle.

3.4 Use of Kill Switch

Attach the lanyard of kill switch to your wrist or life jacket. Stop the outboard by detaching the kill switch in case of emergency.

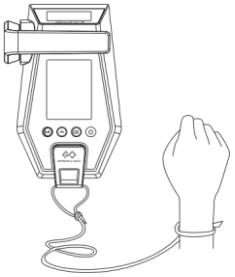


Figure 3-10

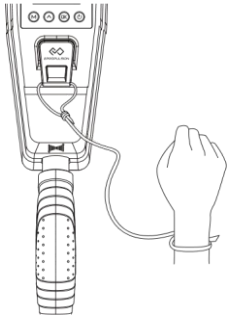


Figure 3-11

⚠ The kill switch generates magnetic field. Keep it 50cm / 20inches away from medical implants like pacemakers and magnetic cards (e.g. credit card) as well as other magnetic media.

⚠ The magnetic field of the kill switch may interfere with some electronic instruments. Keep it away from these electronic instruments.

3.5 Pairing Remote Controller/Tiller Handle to the Outboard Motor

For NAVY 6.0, the Remote Controller/Tiller Handle and the outboard motor are paired before delivery.

However, if the Remote Controller/Tiller Handle or the outboard motor is replaced with a new one, the original wireless link will break and wireless communication failure will occur. The main page of the LCD panel on the Remote Controller/Tiller Handle will display as below. In this case, users should conduct pairing again.

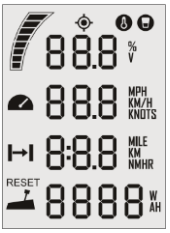


Figure 3-12

However, if the Remote /Tiller or the outboard motor is not replaced, but the LCD panel still displays like this, you should check and:

1) Make sure the Remote is not far from the outboard motor;

2) Make sure all the equipment involved is normally powered on.

If the Remote /Tiller still displays like Figure 5-12 after check, it indicates an error has occurred. Please contact your dealer for repair.

There are two pairing methods. Please choose one proper method and follow the procedures.

a. Wireless Automatic Pairing

Step1: Switch off both NAVY outboard and Remote Controller/Tiller Handle. Hold the remote close to (less than 0.5m) the head part of the outboard，or mount the tiller onto the outboard.

Step2: Pess and hold the “ ⏻ ” button on the remote or tiller to switch on.

Step3: Press “ **OK**” button and hold **5s** to enter the pairing setting page and On this page, you can find blinking “ Add”(address)and “SET”(set),and acountdown timer “060”(60S).

Figure 3-13

Step4: Switch on NAVY power. Wait for them to get paired in a few seconds.

Step5: After pairing, the LCD screen will display as Figure 5-14 for 5s, then returning to home page automatically.

Figure 3-14

If pairing fails within 60s, go back to **Step3** and try again.

b. Wired Automatic Pairing

Step1: Switch off both NAVY outboard and Remote Controller/Tiller Handle.

Step2: Connect NAVY outboard and Remote Controller/Tiller Handle with a communication cable. Please refer to Figure 5-15 or Figure 5-16.

Step3: Switch on both NAVY outboard and Remote Controller/Tiller Handle and wait for them to get paired.

Step4: Pairing succeeds until home page displays. Then disconnect the communication cable.

If “SYS INIT”

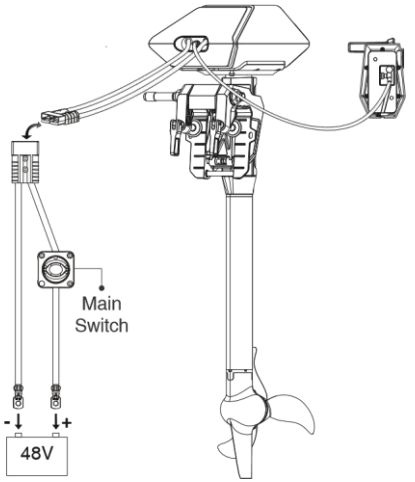


Figure 3-15

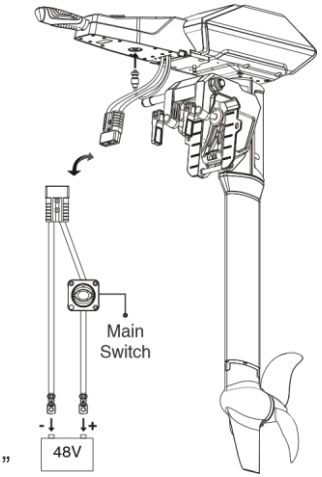


Figure 3-16

shows on start-up, it indicates system initialization.

3.6 Warning Messages

When the outboard motor is running in abnormal conditions or out of order, a warning message with an error code will display on the LCD screen. Figure 5-17 is an example. Please find more error codes and corresponding solutions in the below table.

Figure 3-17

Codes	Causes	Solutions
E01	Battery voltage is over the operating range.	Replace a battery based on suggested operation specifications.
E02	Propeller may be blocked, causing motor overcurrent	Please refer to the solution to E10.
	Motor fails or circuit board fails causing motor overcurrent	Try to turn off the main switch and wait for 10 seconds then turn on the switch again.
	Loosen power cable connector leads to overcurrent	Check if the power cable connector is loosen.
E06	The battery voltage level is too low.	Operate the outboard at low power. Please charge the battery as soon as possible.
E07	Motor idling error - the propeller not immersed in water or detached from the motor shaft.	Mount the outboard properly and check if the propeller has been attached tightly.
E10	Motor stall, which may be caused by blocked propeller	Turn off power, then clean up the things winding around the propeller. Test if the propeller can be rotated by hand before operation.
E11	The temperature of motor is too high.	Stop operating the outboard and wait until the temperature falls within the normal operating temperature range.

E12	The temperature of circuit board is too high.	Stop operating the outboard and wait until the temperature falls within the normal operating temperature range.
E14	Failure was found in the motor temperature sensors.	Try to turn off the main switch and wait for 10 seconds then turn on the switch again.
E15	Failure was found in the circuit board temperature sensors.	Try to turn off the main switch and wait for 10 seconds then turn on the switch again.
E16	Calibration Abnormality of Current Sensor	Please contact the dealer for help.
E22	MCU Communication Abnormality	Please restart to see if the error disappears, if not, please contact your dear for help.
E30	Throttle position sensor failure, should recalibrate the throttle position sensor.	Please refer to section *5.3.3 Recalibration* to recalibrate the throttle position sensor.
E40	System running failure	Please restart the Remote Controller/ Tiller Handle and the outboard.
E56	Communication Error between NAVY outboard and NAVY battery	Check if the communication cable between NAVY outboard and NAVY battery is well connected, if yes, please restart the system.
Code	**Cause**	**Solution**

E57	NAVY battery overcurrent	1. Ensure the paralleled NAVY batteries have similar voltage with pressure difference within 2V. 2. Ensure the power cable and battery are firmly connected to avoid poor contact. 3. Restart the battery when the error occurs and keep the parallel state for 30 minutes to wait for the batteries to selfbalance the voltage. 4. If the error occurs, users can also continue operating after restarting the battery, but do not operate at full power state. The operating power is suggested to be lower than two thirds of full power. Please fully charge the battery after use.
E60	The Remote Controller/Tiller Handle is running out of power.	Please connect the Remote Controller/ Tiller Handle to the outboard by a communication cable. Please refer to section *5.2.2 Charged by Wired Connection*
All characters are displaying	The motor has no power.	Connect the battery to the outboard and then turn on the main switch.
	Device addresses mismatch.	Please refer to section 5.4 *Pairing Remote Controller/Tiller Handle with the Outboard Motor* and pair the Remote Controller/Tiller Handle with the outboard motor again.

⚠ If the problem persists, please consult your ePropulsion authorized dealer for assistance.

4 Configurations

4.1 Preference Settings

It's advised to set display preference by these steps before operation.

Step1: In power-on state, press " M " button and hold to enter the preference setting page as shown in Figure 6-1. Users can choose display items based on personal needs and preference.

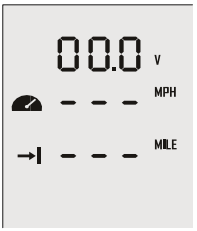


Figure 4-1

Step2: On the preference setting page, the blinking item is the object waiting to be set. Press the " ^ " button to view options for the blinking item. For example, in Figure 6-1, if " **V** " is blinking on the preference setting page, it means that " **V** " has other alternate options. Just press the " ^ " button, and " **V** " will switch to " **%** ", i.e. the displayed item is switched from voltage to battery level.

Step3: Press " OK " button to save setting for the current item and skip to the next item simultaneously.

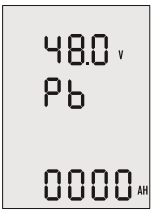
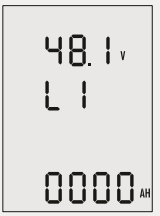
Step4: When all the items have been set well, long press the " OK " button to save all the settings and return to the main page.

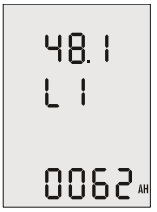
4.2 Battery Configuration

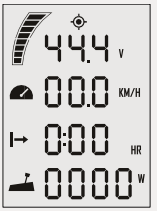
Accurate battery configuration helps achieve precise estimation of the battery's discharging state. When using an ePropulsion NAVY Battery (standard), battery configuration is self-activated by the control system given that all the communication cables are well connected. When not using NAVY Batteries, users should manually configure the batteries via Remote

Controller/Tiller Handle at the first time use, otherwise the batteries may not work properly.

⚠ Battery configuration should be carried out if a battery with different type/capacity/voltage is connected to NAVY 6.0 for the first time.

Battery Configuration Process	LCD Displaying
Step1: First, turn on the main switch and the Remote Controller/Tiller Handle. Then, press " M button and hold to enter the preference setting page. Next, press " M " button and hold again to enter the battery setting page. Users can see the voltage value blinking and it's ready for configuration.	
Step2: Press " OK " button and skip to the next item: battery type. Choose the battery type according to the battery you use. Pressing "^" button to switch the battery type options between Pb, Li and LFE. **Pb:** Lead-acid battery **Li:** Lithium battery **LFE:** Lithium-ion ferrous phosphate battery	

Step3: Press " OK " button to save battery type and skip to the below battery capacity setting item. Press "Λ" button to change the value and set the battery capacity according to the battery you use. Note that the unit of capacity is "Ah", usually the capacity of battery is expressed in "Wh", and we can get the capacity in "Ah" by following the below formula: $\text{Capacity in Ah} = \frac{\textit{Capacity in Wh}}{\textit{Nominal voltage in V}}$ Eg. if users use a 3000Wh Lithium battery with 48.1V nominal voltage, then the battery is about 62.37Ah, so you can set 62Ah as the capacity setting.	
Step4: Press " OK " button to save battery capacity setting and return to the top battery nominal voltage setting item. The voltage options are varied according to the battery types. Press "Λ" button to view the options and select the closest nominal voltage value according to the battery you use.	

Step5: Press " OK " button and hold to save all the settings and return to the main page.	

⚠ Lithium batteries, lead acid batteries and lithium iron phosphate batteries are recommended to use with NAVY 6.0. Other types of battery may fail to make NAVY 6.0 work properly.

⚠ When you use the below batteries, please set battery type and rated voltage value based on the parameters in the following table.

⚠

Battery type	Nominal Voltage options
LI	43.2V 44.4V 45.6V 46.8V 48.1V 49.4V 50.4V 51.8V 53.2V
Pb	44.0V 46.0V 48.0V 50.0V 52.0V 54.0V
LFE	44.8V 48.0V 51.2V

Update the battery configuration is necessary if a different type of battery has been applied.

When using non-ePropulsion batteries, before starting the outboard, users should configure the batteries via the Remote Controller for the first time use, otherwise the batteries may not work properly.

5 Transportation and Storage

5.1 transportation

For long distance transport, please use the ePropulsion original packing materials to pack the controller before delivery.

5.2 Storage

If you are not using the outboard motor for more than 2 months, it's advised to store the outboard in a well-ventilated and dry area without direct sunshine.

Ensure the ambient temperature is proper (-25°C~50°C) during storage to avoid the coolant from freezing.

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.

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