



The Original Electric Boat Company

INBOARD USER MANUAL: EP-6 EP-12 EP-20 EP-25 EP-40

elcomotoryachts.com | 1-877-411-3526



Since 1893

Thank you for purchasing an Elco Electric Inboard Motor.

Your trust in our company and products is greatly appreciated.

Elco electric inboard motors are powerful, economic, safe and assembled in the USA with advanced technology. Please read this manual carefully before operating your inboard motor. A thorough understanding of the manual will help you to safely operate the product and perform the required maintenance and care. By following the information contained within this manual, your inboard motor will operate for many years.

Elco seeks continuous improvement in product quality. Therefore, while this manual contains the most current product information available at the time of printing, there may be minor discrepancies between your motor and this manual. If there is any question concerning the manual, please consult your local dealer or Elco directly.

Data, illustrations, or explanations in this Operators Manual do not constitute the basis for any legal claim against our company. Please read our limited warranty, which is contained in this manual.

Elco Motor Yachts, LLC



General Safety

Read and understand all the instructions prior to installing or starting your electric propulsion system. Failure to follow instructions could lead to system damage, serious injury, or death.

Before performing any maintenance on the system, ensure the area is non-hazardous and disconnect operating power source.

In case of an emergency originating from the system or conditions in the surrounding area, shut off system immediately, if it is safe to do so.

Only qualified and trained personnel should be involved with installation, inspection, and repairs of this system.

Ensure all national, provincial, and local safety codes are followed when installing this equipment.

Make sure all operators of this equipment are trained for safe working practices. Operators must wear safety glasses and any other personal protective equipment necessary.

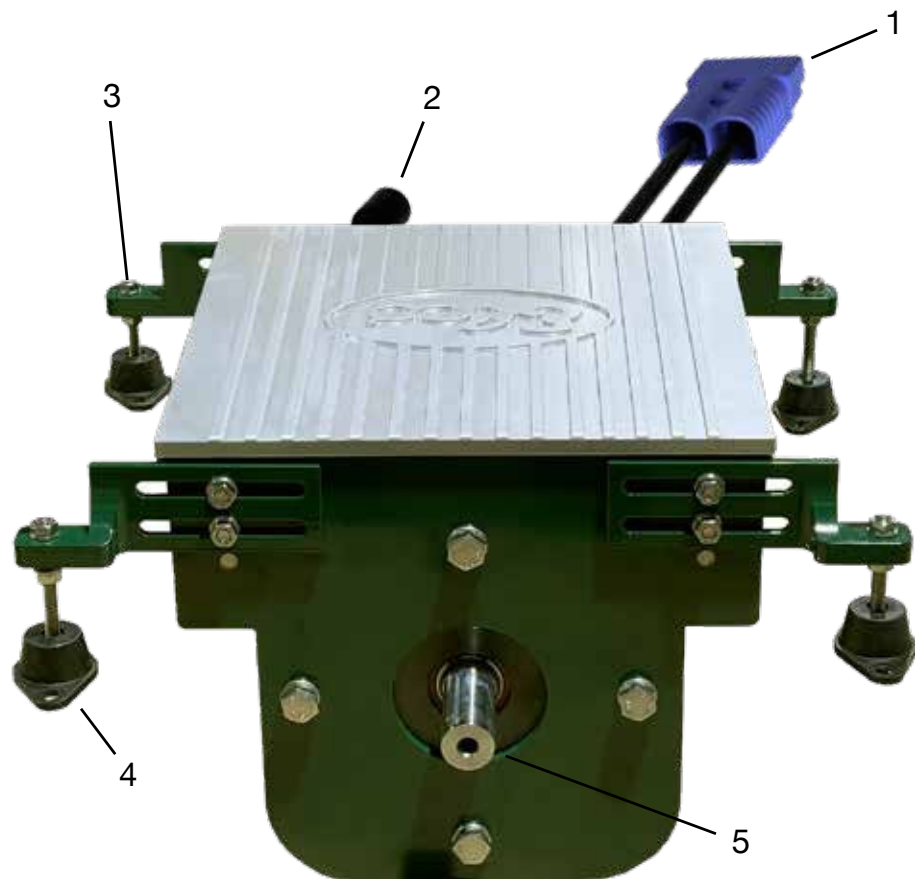
Excessive voltage can cause personal injury, system damage, or property damage.

Safe handling procedures for all hazardous chemicals must be followed. Safe handling practices must comply with local and national laws and safety code requirements.

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1 Main Components



- 1 Battery Input Connector
- 2 Remote Throttle/Key/Kill Connector
- 3 Adjustable Mounting Flanges
- 4 Isolation Mounts
- 5 Motor Output Shaft

Throttle Control
Side Mount, Top Mount, Dual Top Mount

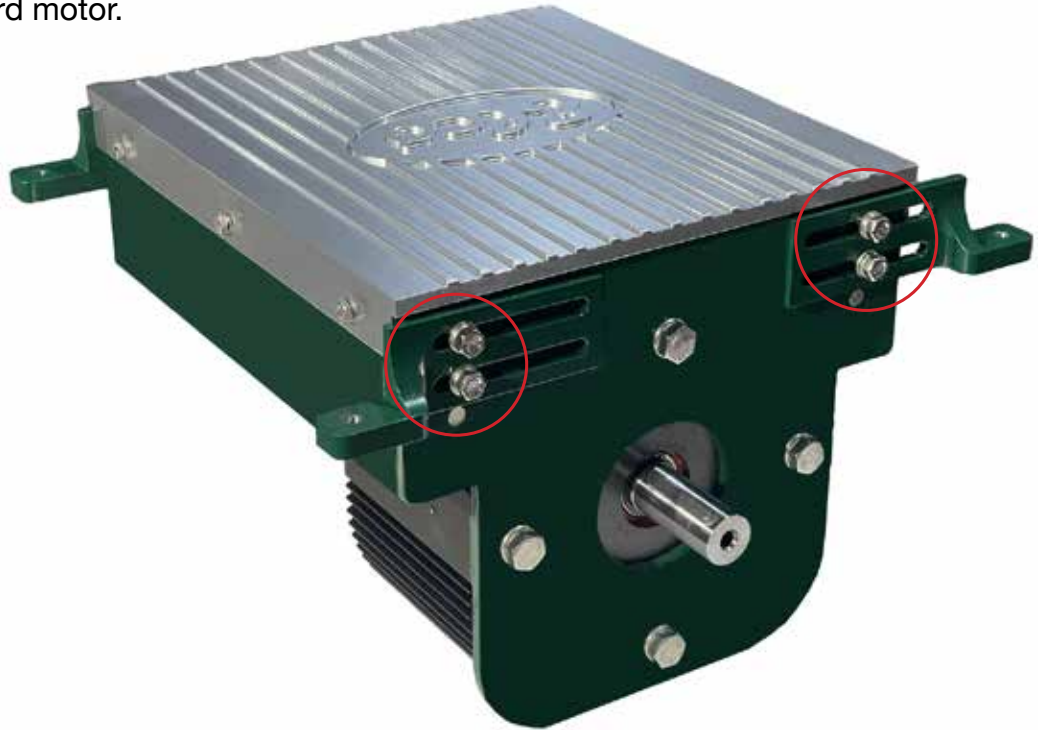


Initial Assembly Instructions

Please follow the below pictural reference in order to properly install the mounting arms included with your inboard motor.

Install mounting arms and fasten with M8 bolts to secure. Final installation and torque will occur at a later step when inboard is installed.

See page 7



The process is the same on the front and back of the motor.

3 Initial Assembly Instructions

Add height adjusting bolt, locknut, and isolation mount to all four adjustable mounting arms.



Propeller Selection

The performance of your inboard motor will be critically affected by your choice of propeller, as an incorrect choice could adversely affect performance. Elco dealers stock a range of propellers and can advise you and install a propeller on your vessel that is best suited to your application.

For a greater boat load and a low motor speed, a smaller-pitch propeller is more suitable. Conversely, a large-pitch propeller is more suitable for a smaller operating load as it enables the maximum motor speed to be maintained.



Elco *DASH* Bluetooth Interface

If you purchase the Elco *DASH* bluetooth interface separately, it will be pre-installed in your Elco outboard. Since operating voltage ranges vary for any/all types and sizes of batteries, it is important to know the specific ranges for your batteries. As such, unless your monitor is hard wired to the batteries, state of charge percentages are estimates and observing battery voltage during use may be the preferred method of estimating remaining run time and current battery state of charge based on the applicable voltage ranges of your batteries.

App Name: Elco Motors



Elco NMEA 2000 Gateway

If you purchase the Elco NMEA 2000 gateway separately, it will be pre-installed in your Elco outboard. To ensure everything works smoothly, make sure your depth finder or chart plotter supports NMEA 2000, as features can vary by model. You'll also need to buy a complete NMEA 2000 starter kit for installation. For the best results, consider consulting a marine professional for setup help.



To Download the Elco Motors App

Elco NMEA 2000 Gateway power requirements:

- a. Voltage Range: 5Vdc-40Vdc LEN1 (<50ma)

List of supported PGNs:

- a. 126983 - Alert - Manual
- b. 126985 - Alert Text - Manual
- c. 126993 - Heartbeat - Manual
- d. 126996 - Product Information - Manual
- e. 126998 - Configuration Information - Manual
- f. 127488 - Engine Parameters, Rapid Update - Manual
- g. 127489 - Engine Parameters, Dynamic - Manual
- h. 127490 - Electric Drive Status Dynamic
- i. 127505 - Fluid Level - Manual
- j. 127506 - DC Detailed Status - Manual
- k. 127508 - Battery Status - Manual
- l. 128002 - Electric Drive Status
- m. 128003 - Electric Energy Storage Status



WARNING

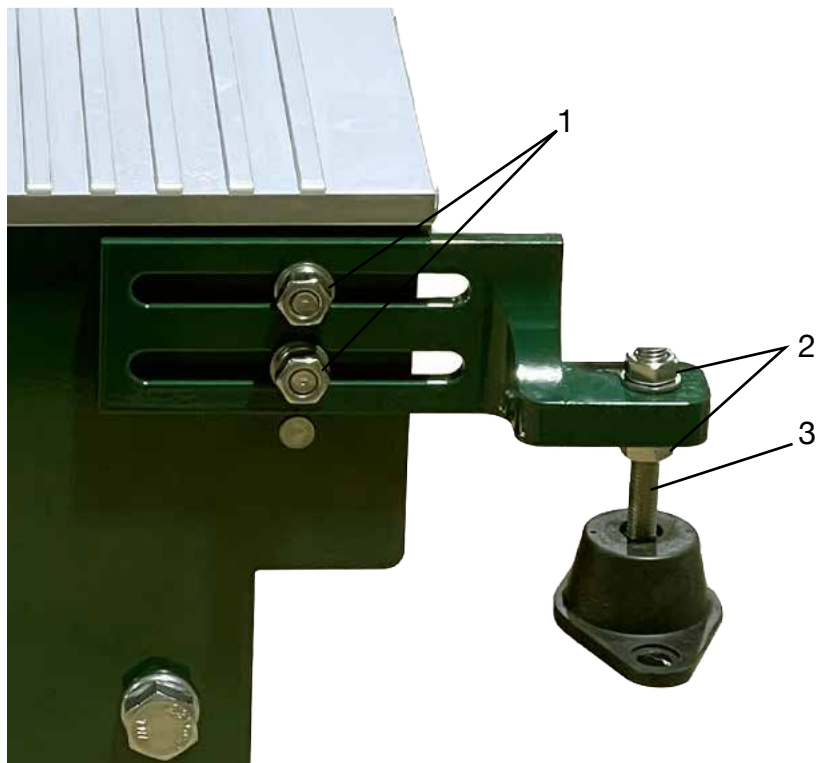
Overpowering a boat could cause severe instability. Do not install an inboard motor with more horsepower than the maximum rating on the capacity plate of the boat. If the boat does not have a capacity plate, consult the boat manufacturer.

Improper mounting of the inboard motor could result in dangerous conditions and injury. For permanently mounted models, your dealer or other expert experienced in rigging should mount the motor. If you are mounting the motor yourself you should be trained by an experienced person.

The information presented in this section is intended as reference only. Proper mounting depends in part on experience and the specific boat and motor combination.

Adjusting Mounting Height/Width

The new Elco inboard motor has the unique capability to adjust the mounting width and height for non-standard installations. Please follow the below instructions to adjust and fasten your new inboard.



NOTE:

To adjust mounting width, loosen the two nuts (1) and bracket will slide in/out to vary width. When width is proper add a few drops of Loctite Red 271, and re-torque nuts to 13 ft-lbs.

To adjust mounting height, loosen (2) nut and turn (3) bolt CW to increase height, CCW to lower height. When height is correct re-tighten (2) nut.

NOTICE:

Occasionally verify tightness of fasteners (1) and (2).

8 Drive Shaft Coupling | Throttle Control Options

1. The coupler needed for shaft connection can be purchased separately. Please contact your Elco sales representative for availability.

Heat Drive Shaft Coupling for ease of installation.



SIDE MOUNT



TOP MOUNT



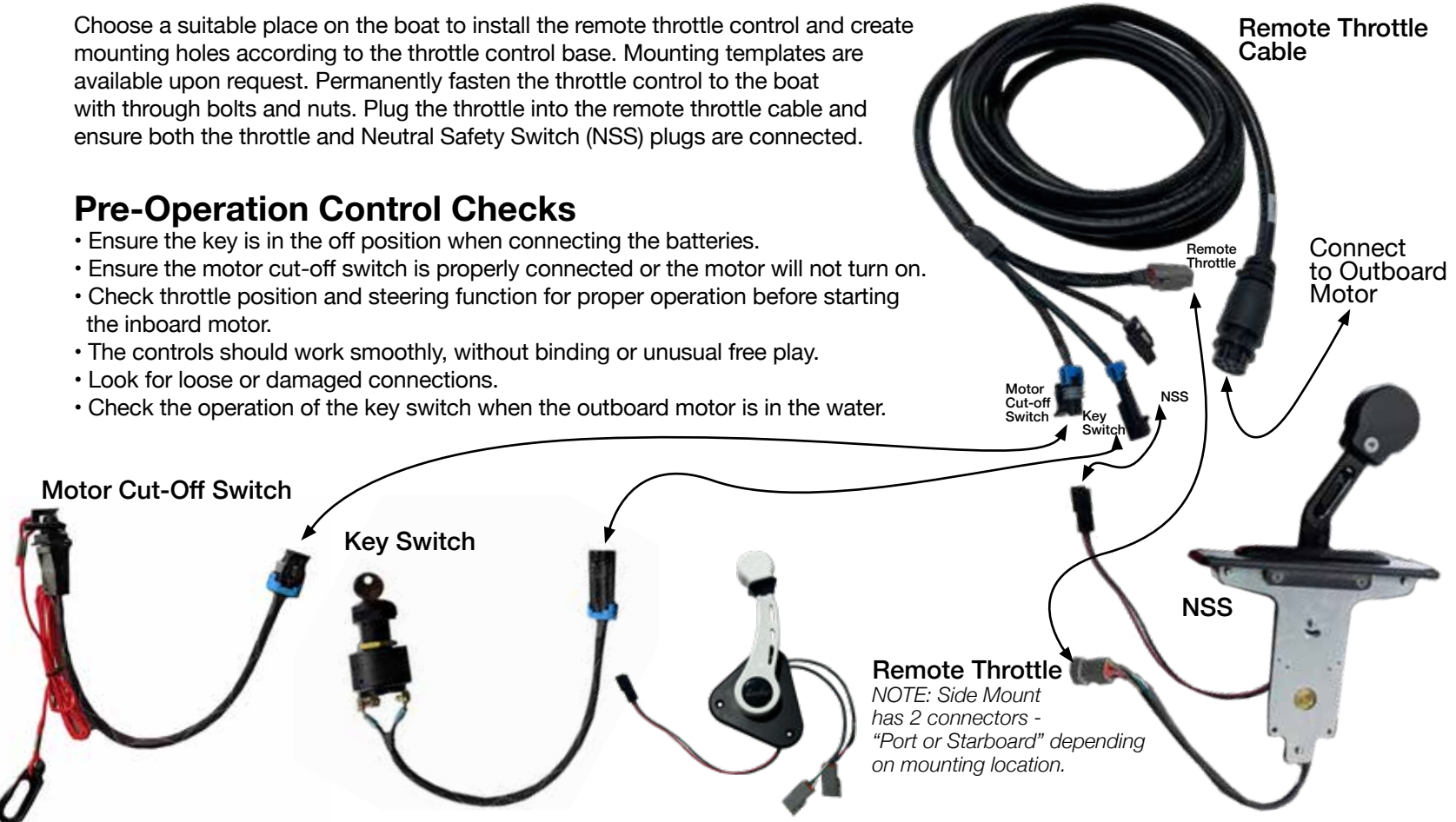
DUAL - TOP MOUNT

9 Remote Control Mounting | Pre-Operation Checks

Choose a suitable place on the boat to install the remote throttle control and create mounting holes according to the throttle control base. Mounting templates are available upon request. Permanently fasten the throttle control to the boat with through bolts and nuts. Plug the throttle into the remote throttle cable and ensure both the throttle and Neutral Safety Switch (NSS) plugs are connected.

Pre-Operation Control Checks

- Ensure the key is in the off position when connecting the batteries.
- Ensure the motor cut-off switch is properly connected or the motor will not turn on.
- Check throttle position and steering function for proper operation before starting the inboard motor.
- The controls should work smoothly, without binding or unusual free play.
- Look for loose or damaged connections.
- Check the operation of the key switch when the outboard motor is in the water.



Starting the Inboard

1. Check to see that the key switch is in the off position.
2. Attach the motor stop switch lanyard to a secure place on your clothing, or your arm or leg. Then install the lock plate on the other end of the lanyard into the inboard stop switch.
3. Connect the blue power cable to the inboard.
4. Verify the throttle lever is in the neutral position.
5. Turn the key switch to on by rotating clockwise.
6. Depress the handle switch on the throttle lever and rotate the throttle lever forward (for forward direction) or Reverse (for the reverse direction)
7. Carefully and slowly move the throttle lever to increase or decrease the inboard speed.

WARNING:

- Before changing direction, make sure there are no swimmers or obstacles in the water near you.
- Shifting from forward to reverse or vice versa is possible at any time, but care must be taken to prevent people and equipment from shifting in the boat.

Changing Direction/Stopping the Inboard

1. Place the remote throttle in the upright position for neutral.



TOP MOUNT



SIDE MOUNT



DUAL - TOP MOUNT

2. Rotate the remote throttle forward for the forward boat direction and rotate the remote throttle backwards for the reverse direction.

Stopping the Inboard

1. Return the remote throttle to the neutral position.
2. Turn the key switch to the off position.

NOTE:

The inboard motor can also be stopped by pulling the lanyard. In emergency situations, the main power cable connector can also be removed to disconnect power from the inboard.

Maintenance Table

Frequency of maintenance operations may be adjusted according to the operating conditions, but the following table gives general guidelines.

The “●” symbol indicates the check-ups which you may carry out by yourself.

The “○” symbol indicates work to be carried out by your Elco dealer.

NOTE: When operating in salt water, turbid or muddy water, then engine should be flushed clean after every use.

Item	Operations	Initial		Every	
		10 hours (1 month)	50 hours (3 months)	100 hours (6 months)	200 hours (1 year)
Propeller and cotter pin	Check/replacement		●	●	
Shift link/shift cable	Check/adjustment				○
Throttle link/throttle cable/ throttle pick-up timing	Check/adjustment				○

CHECK FILE

[illegible]

Emergency Situations

Treatment of Submerged inboard

If the inboard is submerged, immediately take it to an ELCO dealer. Otherwise some corrosion may begin almost immediately.

CAUTION:

Do not attempt to run the inboard motor until it has been completely inspected.

Low Battery Shutdown

You should wait a few minutes for the battery voltage to rise, restart the inboard, and proceed slowly to shore. You can go much farther with a low throttle setting than if you use a full throttle setting.

Over-current Protection

A fuse must be placed at the source of power (batteries) for each circuit or conductor except:

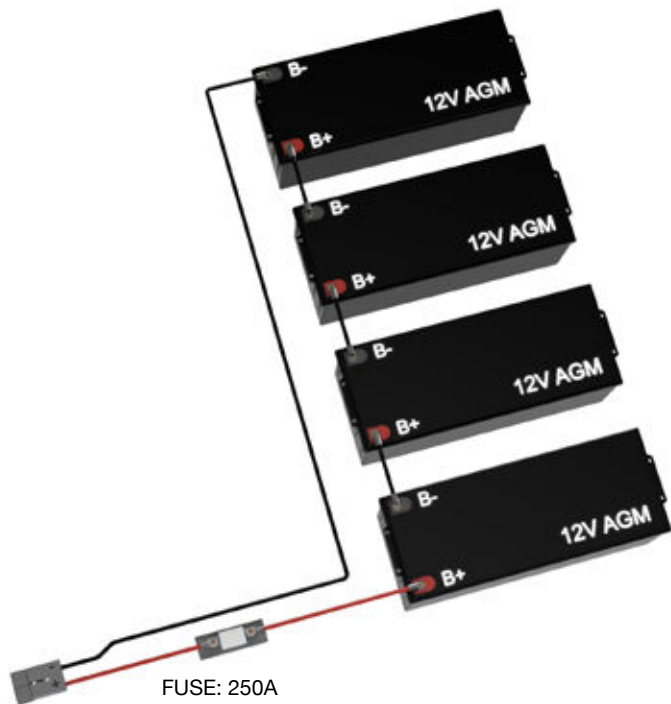
- 1.If it is physically impractical to place the circuit breaker or fuse at the source of power, it may be placed within seven inches of the source of power for each circuit or conductor, measured along the conductor.
- 2.If it is physically impractical to place the circuit breaker or fuse at or within seven inches of the source of power, it may be placed within 40 inches of the source of power for each circuit or conductor, measured along the conductor, if the conductor is contained throughout its entire distance between the source of power and the required circuit breaker or fuse in a sheath or enclosure such as a junction box, control box, or enclosed panel.

Battery Installation

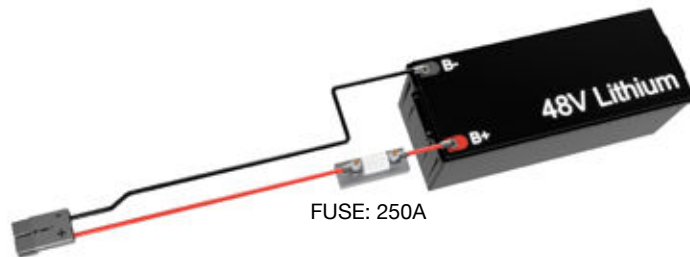
These diagrams are intended for reference only. Please keep propulsion battery bank separate from house bank. It is highly recommended that batteries be mounted in rugged, covered boxes designed for this purpose.

Consult an ABYC certified marine electrical professional for system design and circuit protection. Additional circuit protection devices may be necessary to meet ABYC standards.

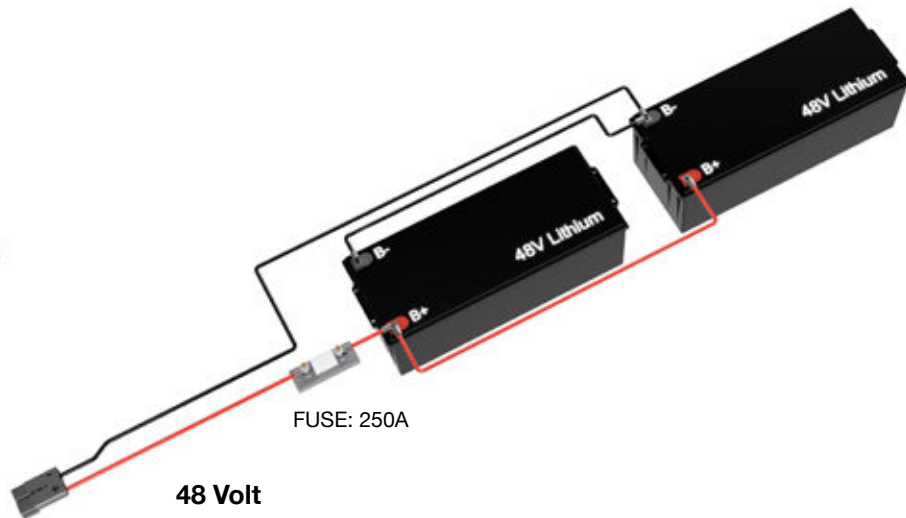
Model	Voltage	Suggested Battery Capacity
EP-6	24	90-120Ah (ampere-hour)
EP-12	48	90-165Ah
EP-20	48	130-225Ah
EP-25	72	130-225Ah
EP-40	108	165-225Ah
EP-70	108	220-275Ah
EP-100	144	220-300Ah
EP-200	144	590Ah
EP-250	350	210-600Ah



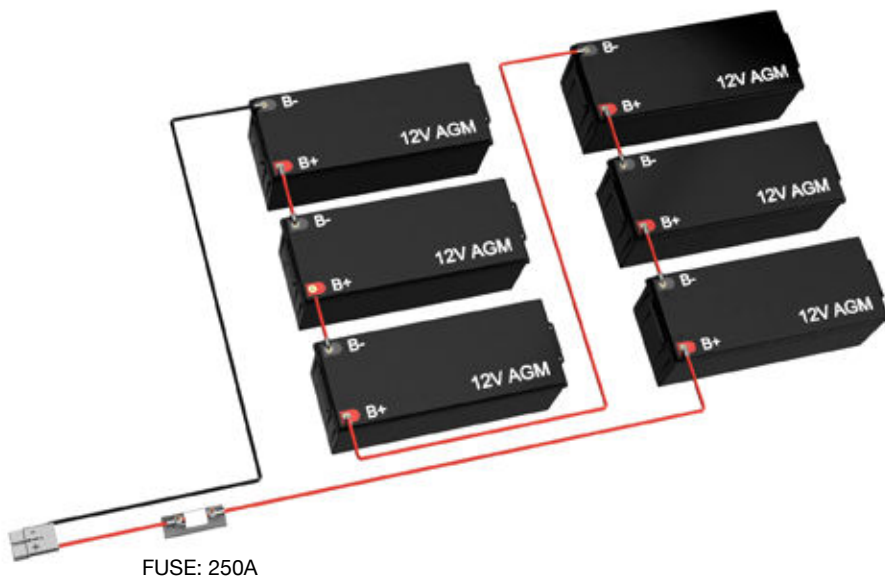
**48 Volt
Series AGM Battery Configuration**



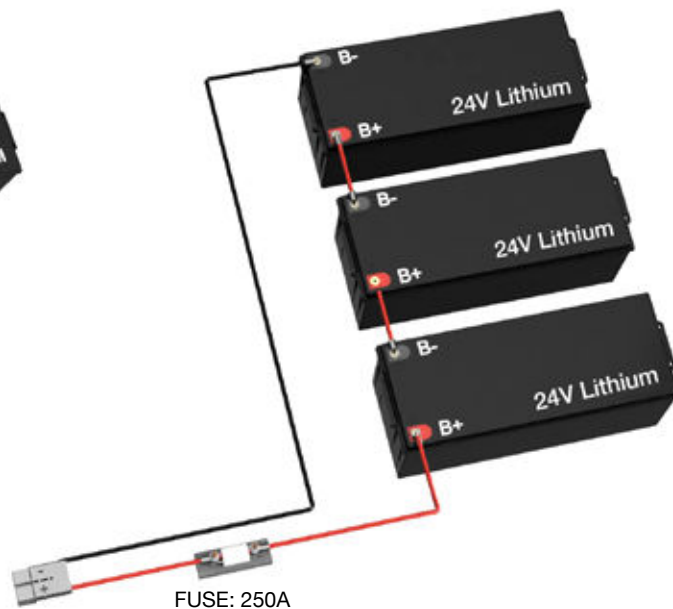
**48 Volt
Lithium Battery Configuration**



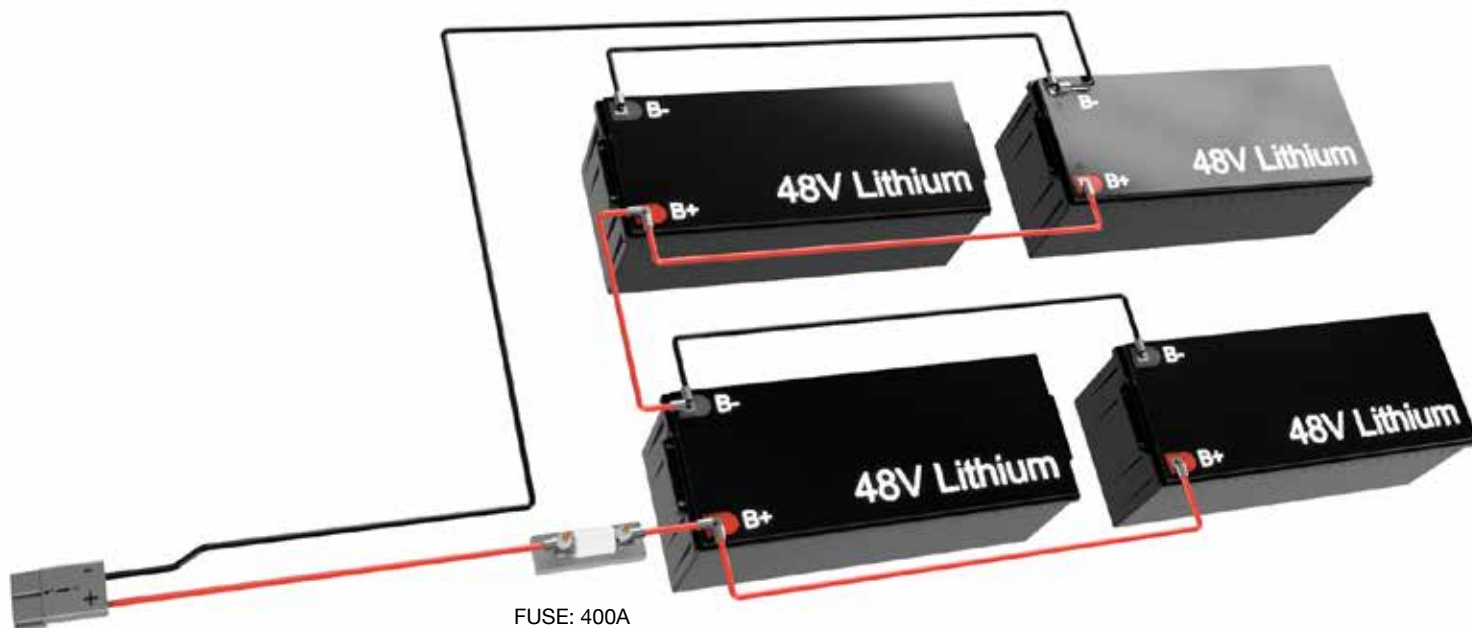
**48 Volt
Parallel Lithium Battery Configuration**



**72 Volt
Series AGM Battery Configuration**



**72 Volt
Lithium Battery Configuration**



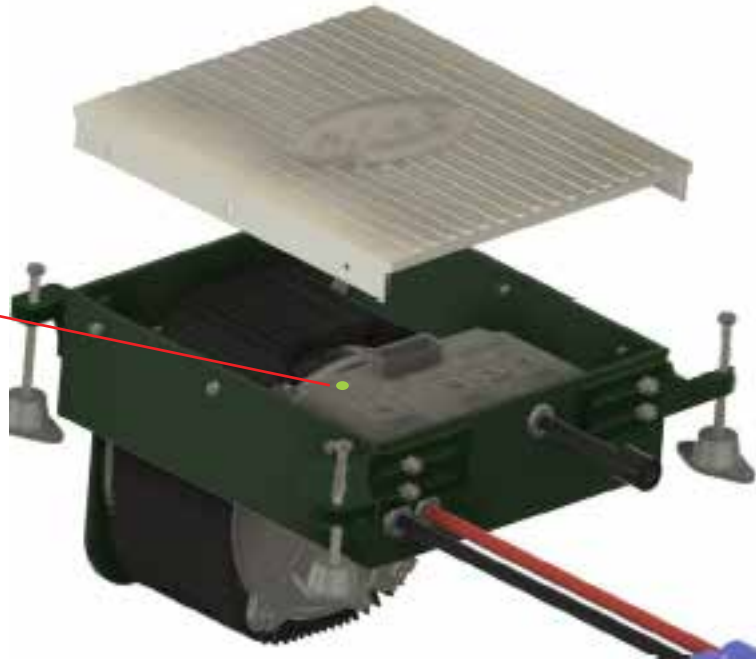
96 Volt

Series - Parallel Lithium Battery Configuration

Troubleshooting

Should any issue in operation become present, the motor controller has an LED indicator which will assist you to diagnose the fault condition. In order to view this, please disconnect the battery connector then remove the enclosure lid. Carefully inspect the internal conditions then if safe, reconnect the battery connector and inspect the LED status. The following pages list troubleshooting information and possible causes for any active faults.

LED Indicator



Troubleshooting: Faults & Warnings

Use the table below to determine the type of fault from the number of LED flashes. The LED flashes a preset number of times in repetitive sequence (e.g. 3 flashes – off – 3 flashes – off – and so on). Possible operator action is listed in the right hand column of the table.

Optional Elco DASH App: Faults are displayed and easily diagnosed from the App.

LED flashes	Fault	Set Conditions	Operator Action
2	Throttle control fault	Throttle sensor fault	Disconnect throttle cable and check for damage
3	Hardware over current trip activated	Hardware over current circuit activated	Check motor load and wiring
4	Contactor fault	Contactor did not close or is welded closed	Inspect/replace contactor
5	Motor open circuit	Unable to establish current in motor	Check motor condition/wiring.
6	Throttle pressed at power up	Throttle demand is greater than 20% at power up	Reduce demand
6	Analog input wire-off	Analog input voltage is outside allowable range	Check analog input wiring
6	Analog output fault(over/under current, failsafe, short circuit driver)	Analog output fault caused by over current (>4A), under current if actual current <50% target (current mode only), failsafe circuit fault, short circuit driver MOSFET	Check analog output wiring

21 Troubleshooting: Faults & Warnings

LED flashes	Fault	Set Conditions	Operator Action
7	Battery low/high voltage protection	Battery voltage is below or above the appropriate voltage level for your outboard motor	Using a volt meter verify battery voltage and or charge battery
8	Controller too hot	Controller has reduced power to motor(s) below maximum specified by user settings due to controller over temperature	Allow controller to warm up
8	Controller too cold	Controller has reduced power to motor(s) below maximum specified by user settings due to controller under temperature	Reduce load to motor to allow it to cool down
8	Motor over temperature	Controller has reduced power to motor(s) below maximum specified by user settings due to motor over temperature	Reduce load to motor to allow it to cool down
8	Motor too cold	Motor thermistor reports less than -30°C.	Allow motor to warm up, check motor thermistor
10	Pre-Operational	Unit is in Pre-operational state	Consult Elco dealer

LED flashes	Fault	Set Conditions	Operator Action
11	Current control fault	Software is unable to control currents on PMAC motor	Check motor load and wiring. Check motor parameters are correct
13	Current sensor auto-zero fault	Current sensor voltage out of range with no current	Check controller wiring to ensure there are no short circuits between B+ and B-
13	DSP Parameter error	Motor parameter written to while motor control is operational	Recycle key switch to allow parameters to be reloaded correctly

23 Limited Warranty

LIMITED WARRANTY

The Elco Motor Yachts, LLC ("Elco") Electric Propulsion System ("EPS" or "product") is warranted to the original retail purchaser to be free from defects in material for a period of three years and/or workmanship for a period of two years from the date of purchase, each under normal operating conditions. Provided that the original purchaser has a copy of the proof of purchase. This non-transferable limited warranty shall begin on the date the EPS is sold to the original retail purchaser or the date on which the product is first put into service, whichever occurs first.

This limited warranty does not cover product damage due to abuse, accidents, modifications, misuse, excessive wear, or damage caused by an owner's failure to provide reasonable and necessary installation and care. Purchasing of the unit from anyone other than an Elco authorized dealer and/or having the product serviced or repaired by anyone other than an Elco authorized repair facility will void this warranty. Pursuant to the terms of this limited warranty, during the applicable warranty period, Elco will repair or replace any defect arising from imperfect material or workmanship, without charge, provided that such defective or imperfect part when discovered shall be immediately reported in writing and returned to an Elco authorized repair facility at the owner's expense.

Use of the EPS in any manner other than its intended use (i.e., in marine craft only) will void this warranty.

The EPS must be inspected to make sure no damage has occurred during shipping. Any damage must be reported to Elco immediately in writing. In addition, the allegedly defective EPS must be delivered to the nearest Elco authorized repair facility at the owner's expense. The aforementioned notification shall state, (1) the EPS is an Elco product and shall include a copy of the proof of purchase (i.e., the receipt or invoice), (2) warranty consideration is requested and (3) the name and address of the Elco authorized repair facility holding the allegedly defective product. Elco will promptly consider all such warranty claims.

As stated above, Elco's sole obligation under this limited warranty is (at its sole option and discretion) to repair or replace any defective component or product in part or whole. Elco shall be the sole arbiter of such action. In the event that Elco elects to replace the EPS, Elco shall supply such replacement F.O.B. Elco factory or authorized repair facility, as Elco may elect in its sole discretion.

Elco will only accept warranty obligations for product repairs approved by Elco and completed by an authorized repair facility. This limited warranty does not cover cost of removal, transportation to and from repair facilities, or re-installation.

Elco products requiring service not covered under the terms of this limited warranty may be repaired or replaced by Elco for a fee to be determined by Elco at the time of such repair or replacement.

Save the receipt or invoice from date of purchase of your EPS. It is the proof of purchase and it must be produced before Elco will honor the limited warranty.

Elco makes no warranty other than that stated above, either express or implied and expressly disclaims same.

ALL INCIDENTAL AND/OR CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM THIS WARRANTY. IMPLIED WARRANTIES ARE LIMITED TO THE LIFE OF THIS WARRANTY. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS WHICH MAY VARY FROM STATE TO STATE.

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