The Original Electric Boat Company

OUTBOARD USER MANUAL

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Since 1893

Thank you for purchasing an Elco Electric Outboard Motor.

Your trust in our company and products is greatly appreciated.

Elco electric outboard motors are compact, reliable, efficient, and assembled in the USA with advanced technology. Please read this manual carefully before operating your outboard motor. A thorough understanding of the manual will help you to safely operate the product and perform the required maintenance and care.

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 user manual do not constitute the basis for any legal claim against Elco Motor Yachts. Please read the 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 system.

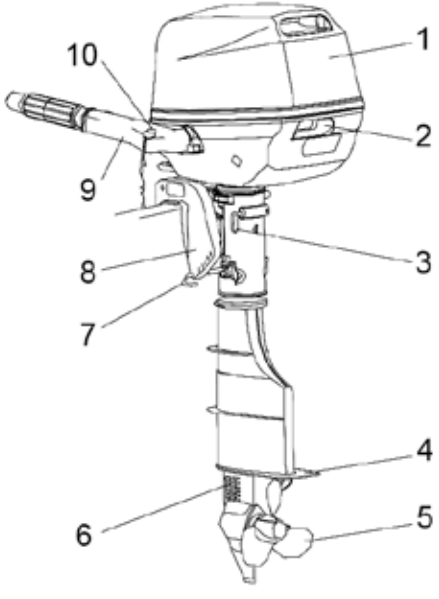
Make sure all operators of this equipment are trained for safe working practices. Operators must wear safety glasses and any other personal protective equipment necessary.

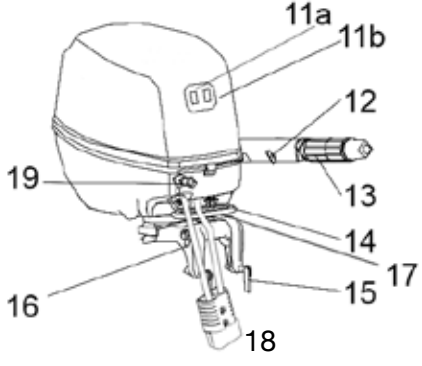
Excessive voltage can cause personal injury, system damage, or property damage.

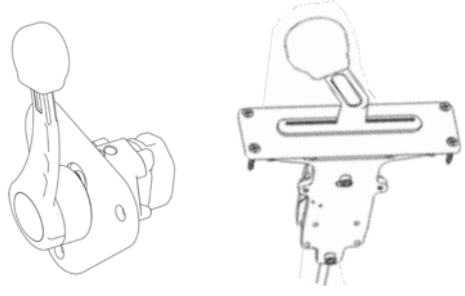
Safe handling procedures for all hazardous chemicals must be followed. Safe handling practices must comply with local and national laws and safety code requirements.

Contents

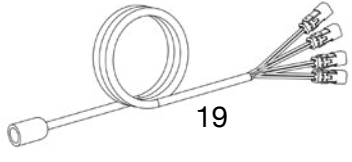
1 Main Outboard Components







20 Remote throttle control options
Side mount, top mount, dual top mount



1. Top cover
2. Top cover lock handle
3. Steering friction screw
4. Anti-cavitation plate
5. Propeller
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8. Clamp bracket
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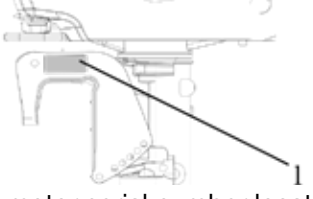
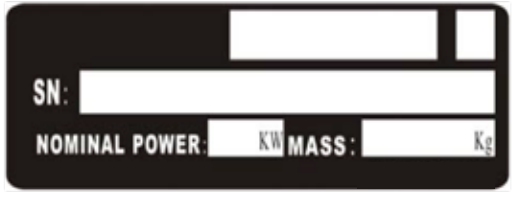
20. Remote throttle options (remote)
21. Key switch (remote)
22. Motor cut-off switch (remote)

Outboard Motor Identification Numbers

The outboard motor serial number is marked on the label. The label can be found on the left bracket assembly or on the upper part of the bracket swivel.

Record your outboard motor serial number in the spaces provided to assist in ordering spare parts.





1. Outboard motor serial number location.

Serial number as follows:

SN ☐ ☐☐ ☐☐☐☐☐☐

Manufacturer's Declaration

The outboard motor complies with the requirements of Directive 2003/44/EC in relation to noise emissions. The following installation and maintenance instructions, if applied, will assist in making sure the outboard motor will remain in compliance with the noise emissions limits under normal conditions of use.

Optional Interfaces/Connecting Elco *DASH* App & NMEA 2000

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.

SCAN ME

To Download the Elco Motors App

App Name: Elco Motors

GET IT ON Google Play

Download on the App Store

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.

Elco NMEA 2000 Gateway power requirements:

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

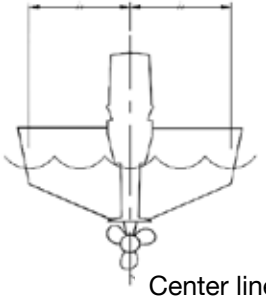
List of supported PGNs:

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

Installation and Operation

Mount the outboard motor on the center line (keel line) of the boat. For boats without a keel or are asymmetrical, consult your Elco dealer.

During water testing, check the buoyancy of the boat when at rest with its maximum load.



Center line (keel line)

WARNING:
Overpowering a boat could cause severe instability. Do not install an outboard 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 outboard motor could result in dangerous conditions and injury. For permanently mounted models, your dealer or other experts experienced in rigging should mount the motor. If you are mounting the motor yourself, you should be trained by an experienced person. For portable models, your dealer or other experts experienced in proper outboard motor mounting should show you how to mount your motor.

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.

Mounting Height Recommendations/Propeller Selection

The mounting height of the outboard motor greatly affects the running efficiency of your boat. If the mounting height is too high, cavitation tends to occur, thus reducing the propulsion. If the mounting height is too low the water resistance will increase and thereby reduce motor efficiency. Mount the outboard motor so that the anti-cavitation plate is in a range between the bottom of the boat and 1 inch below it.

NOTE:
The optimal mounting height of the outboard motor is affected by the boat and motor combination and the desired use. Test runs at different heights can help determine the optimal mounting height. For further information, consult your Elco dealer or boat manufacturer.

Propeller Selection

The performance of your outboard motor will be critically affected by your choice of propeller, as an incorrect choice could adversely affect performance. The outboard motor is fitted with a propeller chosen to perform well over a range of applications, but there may be instances where a propeller with a different pitch would be more appropriate. Elco dealers stock a range of propellers, and can advise you and/or install a propeller on your outboard 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.

Clamping the Outboard Motor

Tighten the transom clamp screw evenly and securely. Occasionally check the clamp screws for tightness during operation of the outboard motor because they could become loose due to the boat's vibration.

WARNING:
Loose clamp screws could allow the outboard motor to fall off or move on the transom. This could cause loss of control. Make sure the clamp screws are tightened securely. Occasionally check the screws for tightness during operation.

When installing the outboard motor with a separate electric trim and tilt unit, the included bonding wire kit must be installed.

Remote Throttle Control Options

SIDE MOUNT

TOP MOUNT

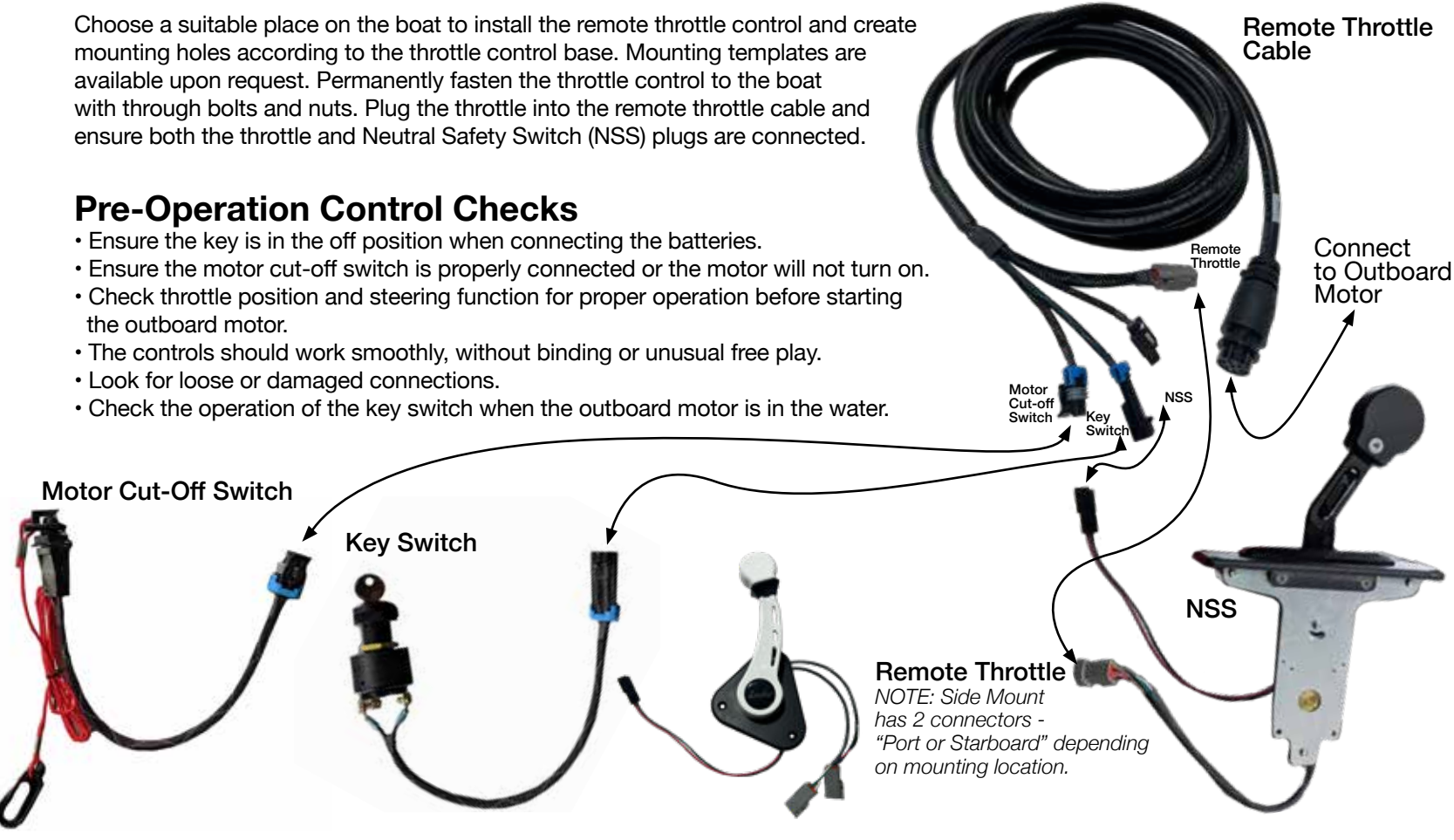
DUAL - TOP MOUNT

Remote Throttle Control Mount/Pre-Operation Checks

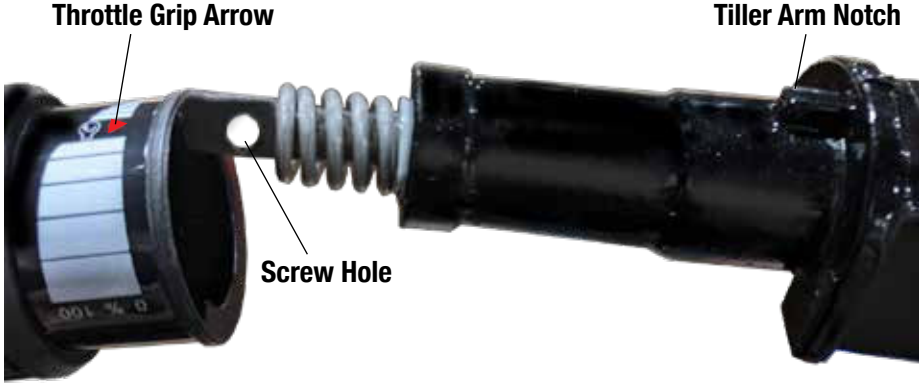
Choose a suitable place on the boat to install the remote throttle control and create mounting holes according to the throttle control base. Mounting templates are available upon request. Permanently fasten the throttle control to the boat with through bolts and nuts. Plug the throttle into the remote 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 outboard 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.



Tiller Grip Installation/Starting the Outboard Motor (Tiller)



When installing the throttle grip, align screw hole perpendicular to the ground. Next align throttle grip arrow with tiller arm notch.

When installed properly the throttle grip should turn fully and rebound to zero when released.

CAUTION

- **Do not start the outboard out of water. Overheating of the water pump can occur.**
- Check the outboard mounting.
- Look for loose or damaged fasteners.
- Check the propeller for damage.

WARNING:

- Do not start the outboard unless the throttle grip is in the minimum position.
- Do not attach the lanyard to clothing that could tear loose.
- Do not route the lanyard where it could become entangled.

Avoid accidentally pulling the lanyard during normal operation. Loss of motor power means the loss of steering control. Also, without motor power, the boat could slow rapidly. This could cause people and objects in the boat to be thrown forward.

Starting the Outboard Motor (Tiller)

1. Check to see that the on/off switch is in the off position.
2. Attach the lanyard from the outboard motor cut-off switch to the operator's life jacket or a secure place.
3. Connect the battery power cable to the outboard motor.
4. Verify the forward-reverse switch is in the neutral position or the motor will not turn on.
5. Move the throttle grip to the minimum position.
6. Push the on/off switch to on.
7. Carefully and slowly move the throttle grip to increase the outboard speed.
8. Check for a steady flow of water from the cooling water outlet.

Changing Direction (Tiller Model)

1. Place the throttle grip in the fully closed position.
2. Move the forward-reverse switch to the desired direction/position.

CAUTION:
The outboard motor can turn 90° to either side of center, which can cause an abrupt, sudden change to boat direction. This can affect boat stability and cause people and objects to shift suddenly. Always keep a firm grip on the tiller arm.

WARNING:
• When operating in reverse, go slowly. Do not open the throttle to more than half speed, otherwise the boat could become unstable, which could result in loss of control and an accident.

Stopping the Outboard (Tiller)

Push the on/off switch to the off position.

NOTE:
The outboard 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 outboard.

Throttle Friction Adjuster

The throttle friction adjuster is on the tiller handle, and provides adjustable resistance to the throttle grip's movement and can be set according to operator preference.

To increase resistance, turn the adjuster clockwise. To decrease resistance, turn the adjuster counterclockwise. When constant speed is desired, tighten the adjuster to maintain the desired throttle setting.

WARNING:
Do not over-tighten the friction adjuster. If there is too much resistance, it could be difficult to move the throttle lever or grip, which could result in an accident.

Steering Friction Adjuster

A slight drag should be felt when turning the outboard with the steering handle. If adjustment is necessary, turn the steering friction knob clockwise to increase friction or counter-clockwise to decrease friction.

Throttle Friction Adjuster

Steering Friction Adjuster

Above: EP-5, 9.9 Below: EP-14,20,30

Starting the Outboard (Remote)

1. Check to see that the key switch is in the off position.
2. Attach the lanyard to the cut off switch to the operator's life jacket or a secure place.
3. Connect the power cable to the outboard motor.
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 remote throttle and rotate the remote throttle forward (for forward direction) or reverse (for the reverse direction).
7. Carefully and slowly move the remote throttle to increase or decrease the outboard motor speed.
8. Check for steady flow of water from the cooling water outlet.

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 Outboard (Remote Model)

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

NOTE:
The outboard 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 outboard.

Tilting Up and Down (Warnings)

If the outboard motor will be stopped for some time or if the boat is docked or stopped in shallow water, the outboard motor should be tilted up to protect the propeller from damage or collision with obstructions and also to reduce corrosion.

WARNING:
Be sure all people are clear of the outboard motor when tilting up and down. Also be careful not to pinch any body parts between the drive unit and outboard bracket.

NOTE:
• Do not tilt up the outboard motor by pushing the tiller handle because this could damage the handle.

Tilting Up and Down

Tilting Up

1. Place the on-off switch in the off position and face the outboard motor forward.
2. If this is a remote throttle outboard, turn the key switch to off and remove the key.
3. Pull the tilt lock lever towards you.
4. Hold the rear handle and tilt the outboard up fully until the tilt support bar automatically locks.

Tilting Down

1. Slightly tilt the outboard motor up.
2. Slowly tilt the outboard motor down while pulling the tilt support bar lever up.
3. Push the tilt lock lever to the lock position.

Cruising in Shallow Water/Salt Water

WARNING:
• The outboard motor can be tilted up partially to allow for operation in shallow water.
• The tilt lock mechanism does not work while the shallow water cruising system is being used. Run the boat at the lowest possible speed to avoid the outboard motor being lifted out of the water, resulting in loss of control.
• Return the outboard motor to its normal position as soon as the boat is back in deep water.

CAUTION:
The cooling water inlet on the lower unit should not be above the surface of the water when configuring for cruising in shallow water. Otherwise severe damage from overheating can result.

Salt Water Use
After operating in salt water, wash out the cooling water passages with fresh water to prevent them from becoming clogged with salt deposits. To flush system, submerge lower leg completely in a freshwater source and operate the outboard motor at low speed for several minutes.

Maintenance Procedures

While using the outboard motor, periodic maintenance is necessary for you to ensure maximum performance of the outboard motor.

WARNING:
• Be sure to disconnect the power cable connector from the outboard motor when you perform maintenance unless otherwise specified. This work should always be done by a qualified mechanic or your authorized Elco dealer.

CAUTION:
If replacement parts are necessary, use only genuine Elco parts.

Removing/Installing the Propeller

WARNING:
• Before inspecting, removing or installing the propeller, always take actions to ensure the outboard does not accidentally start, such as removing the power cable connector, placing the on/off switch in the off position, or remove the key for the remote throttle and disconnecting the lanyard. Serious injury can occur if the outboard motor should start and you are standing too close to the propeller.

Propeller Inspection

1. Check each of the propeller blades for wear, erosion from cavitation or ventilation, or other damage.
2. Check the propeller shaft for damage.
3. Check the splines/shear pin for wear or damage.
4. Verify that fishing line is not tangled around the propeller shaft.
5. Check for damage to the propeller shaft oil seal.

Removing the Propeller

1. Straighten the cotter pin and pull it out using a pair of pliers.
2. Remove the propeller nut, washer, and spacer (if equipped).
3. Remove the propeller and thrust washer.

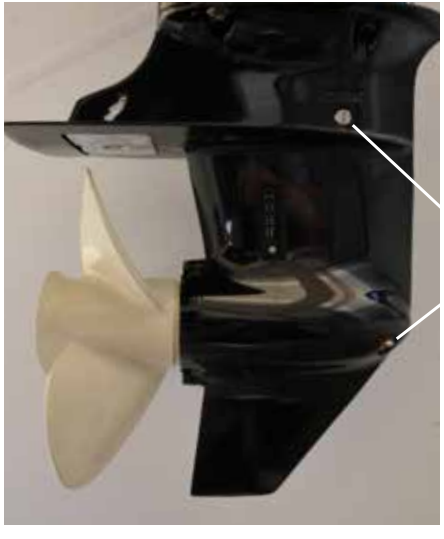
Installing the Propeller

CAUTION:
• Be sure to install the thrust washer before installing the propeller, otherwise the lower case and propeller boss could get damaged.
• Be sure to use a new cotter pin and bend the ends over securely. Otherwise the propeller could come off during operation and be lost.

1. Apply a marine grease or corrosion resistant grease to the propeller shaft.
2. Install the spacer (if equipped), thrust washer, and propeller on the propeller shaft.
3. Install the spacer (if equipped) and the washer.
4. Tighten the propeller nut. Align the propeller nut with the propeller shaft hole. Insert a new cotter pin in the hole and bend the cotter pin ends.

Checking the Propeller/Changing the Drive Oil

• Do not use your hand to hold the propeller when loosening or tightening the propeller nut. Put a wood block between the anti-cavitation plate and the propeller to prevent the propeller from turning.



1. Oil level plug
2. Drive oil drain screw

Changing the Drive Oil (80w-90 Oil)

WARNING:

- Be sure the outboard motor is securely fastened to the transom or a stable stand.
- Never get under the lower unit while the outboard motor is tilted, even when the tilt support lever or knob is locked. Serious injury could occur if the motor falls.

1. Tilt the outboard motor so that the drive oil drain screw is at the lowest point possible.
2. Place a suitable container under the drive case.
3. Remove the drive oil drain screw.
4. Remove the oil level plug to allow the oil to drain completely.

Changing the Drive Oil

CAUTION:
Change the drive oil after the first 10 hours of operation and then every 100 hours or at six-month intervals, whichever comes first.

CAUTION:
Inspect the used oil after it has been drained. If the oil is milky, then water is getting into the drive case which can cause gear damage. Consult your Elco dealer.

1. Use a flexible or pressurized filling device, inject the gear oil into the drive oil drain screw hole. Standard 80w-90 oil is recommended.

2. When the oil begins to flow out of the oil level plug hole, insert and tighten the oil level plug (If necessary, change the seal spacer).

3. Insert and tighten the drive oil drain screw (If necessary, change the seal spacer).

Checking and Replacing the Anode

Inspect the external anode periodically. Remove scales from the surfaces of the anode. Consult your Elco dealer for replacement of external anode.

CAUTION:
Do not paint anodes, as this will render them ineffective and can cause more rapid motor corrosion.

Greasing

The greasing points are shown in diagram A

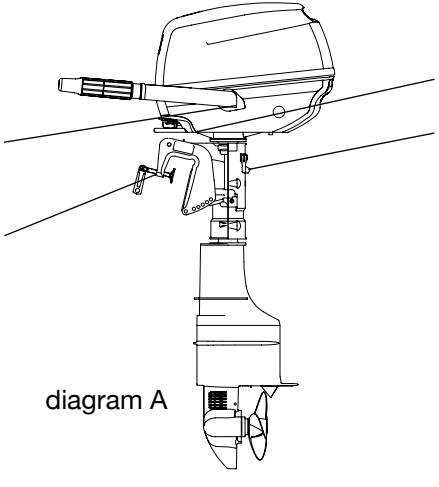


diagram A

General Battery Storage/Charging

Follow your battery manufacturer's storage and charging instructions. Before you start a repair or replacement process, you must confirm the manufacturer's warranty type and coverage for your item.

AGM Short & Long Term Storage
Always charge and store your AGM/Lead-acid battery to 100%.
Ideal storage temperatures are between 0-68F°.

Lithium Short Term Storage <3 Months
Do not store lithium batteries below freezing 32F°.
Reduce the state of charge (SOC) to approximately 50% and turn the battery off via the on/off switch.
Disconnect battery leads in order to eliminate any parasitic battery drain.

Lithium Long Term Storage >3 Months
Do not store lithium batteries below freezing 32F°.
Charge the battery to 100% SOC then discharge to 20% SOC, and then charge it back to 50% SOC.
Repeat the above process every 3 months during long term storage.

Charging
When charging any batteries, it is critical to utilize the correct size extension cord for safe and effective charging. Elco recommends using a heavy duty 10 gauge extension cord. The battery charger used should match your battery's chemistry. A charger designed for lead-acid batteries should not be used for lithium batteries and vice versa. Your Elco dealer can recommend the proper charger for your needs.

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 "O" symbol indicates work to be carried out by your Elco dealer.

NOTE: When operating in salt water, turbid, or muddy water, motor 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)
Anode(s) (external)	Check/replacement		● / ○	● / ○	
Anode(s) (internal)	Check/replacement				○
Cooling water passages	Cleaning		●	●	
Cowling clamp	Check				●
Drive oil	Change	●		●	
Greasing points	Greasing			●	
Propeller and cotter pin	Check/replacement		●	●	
Water pump	Check				○

Transporting and Storing

The outboard motor should be stored and trailered in the normal running position.

WARNING:
If there is insufficient road clearance when transporting, then tilt the outboard motor up and use a motor support device.

CAUTION:
Do not use the tilt support lever or knob when trailering the boat. The outboard motor could shake loose from the tilt support and fall.
WARNING:
• Never get under the lower unit while it is tilted, even if a motor support bar is used.
CAUTION:
• Place a towel or something similar under the outboard motor to protect it from damage.

Checking the Top Cover

Check the fitting of the top cowling by pushing it with both hands. If it is loose have it repaired by your Elco dealer.

Storing

When storing your Elco outboard motor for prolonged periods of time, 2 months or longer, several important procedures must be performed to prevent damage.
It is advisable to have your outboard motor serviced by an authorized Elco dealer prior to storage. However, you, the owner, with minimal tools, can perform the following procedures.

CAUTION:
• Keep the outboard motor in an upright position when transporting and storing it. If storing or transporting the outboard motor on its side (not upright), put it on a cushion.
• Do not place the outboard motor on its side before the cooling water has drained from it completely.
• Store the outboard motor in a dry, well-ventilated place, not in direct sunlight.

Emergency Situations/Over-Current Protection

Impact Damage

If the outboard motor hits an object in the water, follow the procedure below.
1. Stop the outboard immediately.
2. Inspect the control system and all components for damage.
3. Whether damage is found or not, return to the nearest harbor slowly and carefully.
4. Have an Elco dealer inspect the outboard motor before operating it again.

Treatment of Submerged Outboard

If the outboard motor becomes submerged, immediately take it to an Elco dealer, otherwise some corrosion may begin almost immediately.

CAUTION:
Do not attempt to disconnect the power cable connector if there is risk of shock hazard.
Do not attempt to run the outboard motor until it has been completely inspected.

Low Battery Shutdown

You should wait a few minutes for the battery voltage to rise, restart the outboard, 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:

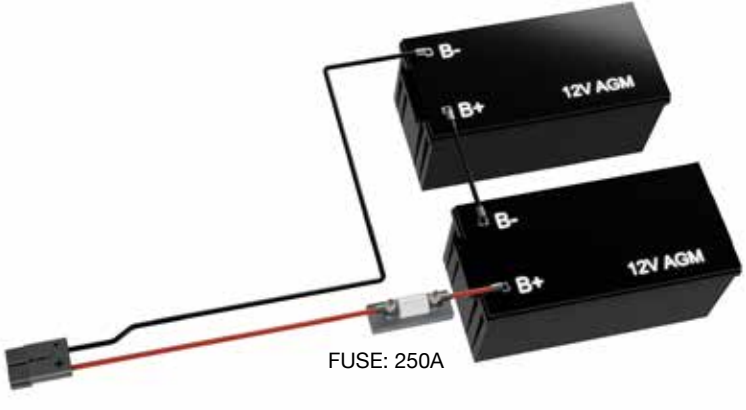
If it is physically impractical to place the circuit breaker or fuse at or within seven inches of the source of power, it may be placed within forty inches of the source of power for each circuit or conductor, measured along the conductor, if the conductor is contained throughout its entire distance 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/Configuration

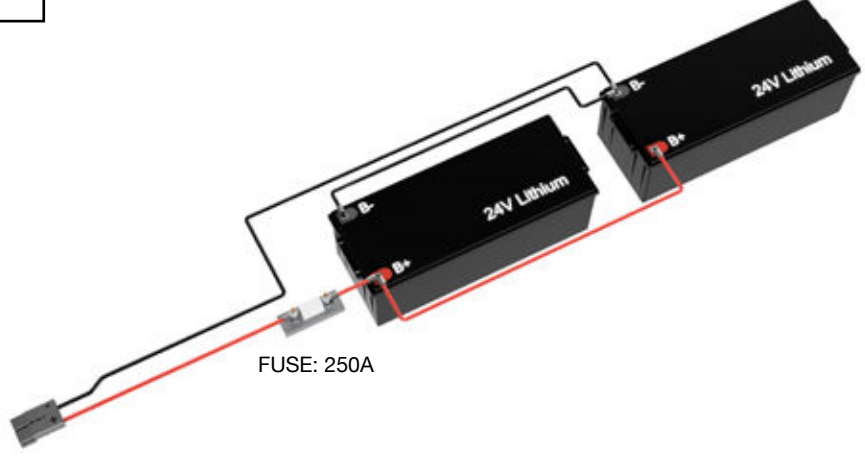
	Voltage	Suggested Battery Capacity
EP-5	24	90-120Ah (ampere-hour)
EP-9.9	48	90-120Ah
EP-14	48	130-225Ah
EP-20	48	165-225Ah
EP-30	96	130-225Ah
EP-50	96	165-400Ah

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 neccessary to meet ABYC standards.

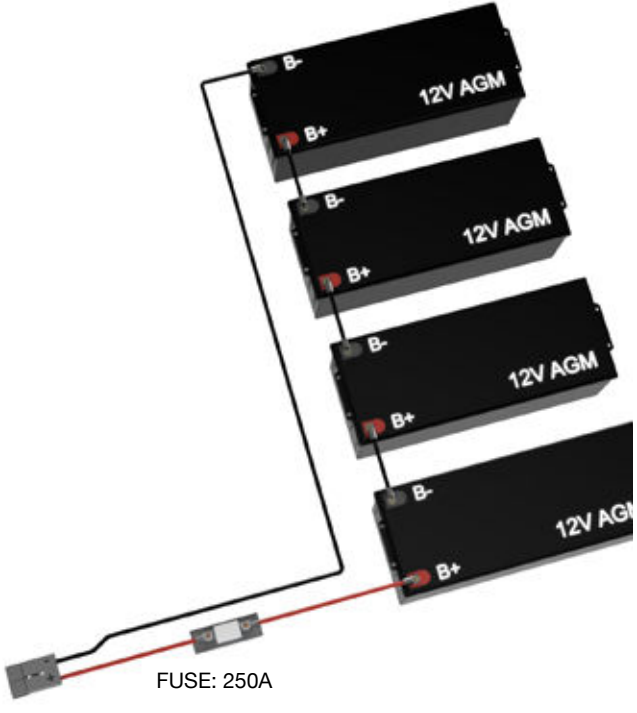


24 Volt
Series AGM Battery Configuration

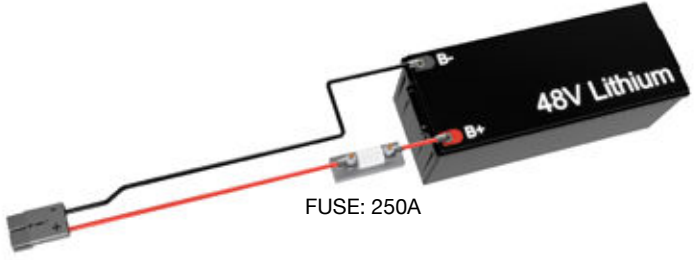


24 Volt
Parallel Lithium Battery Configuration

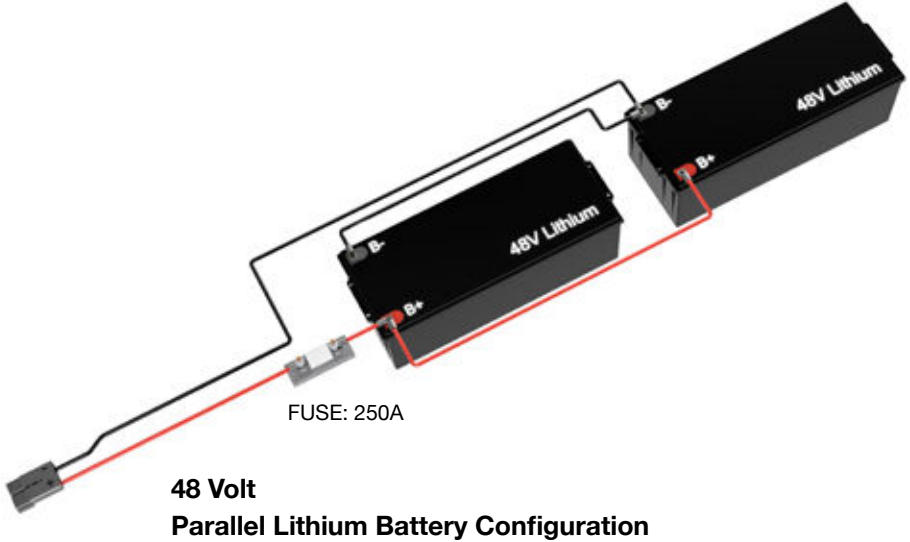
Battery Installation



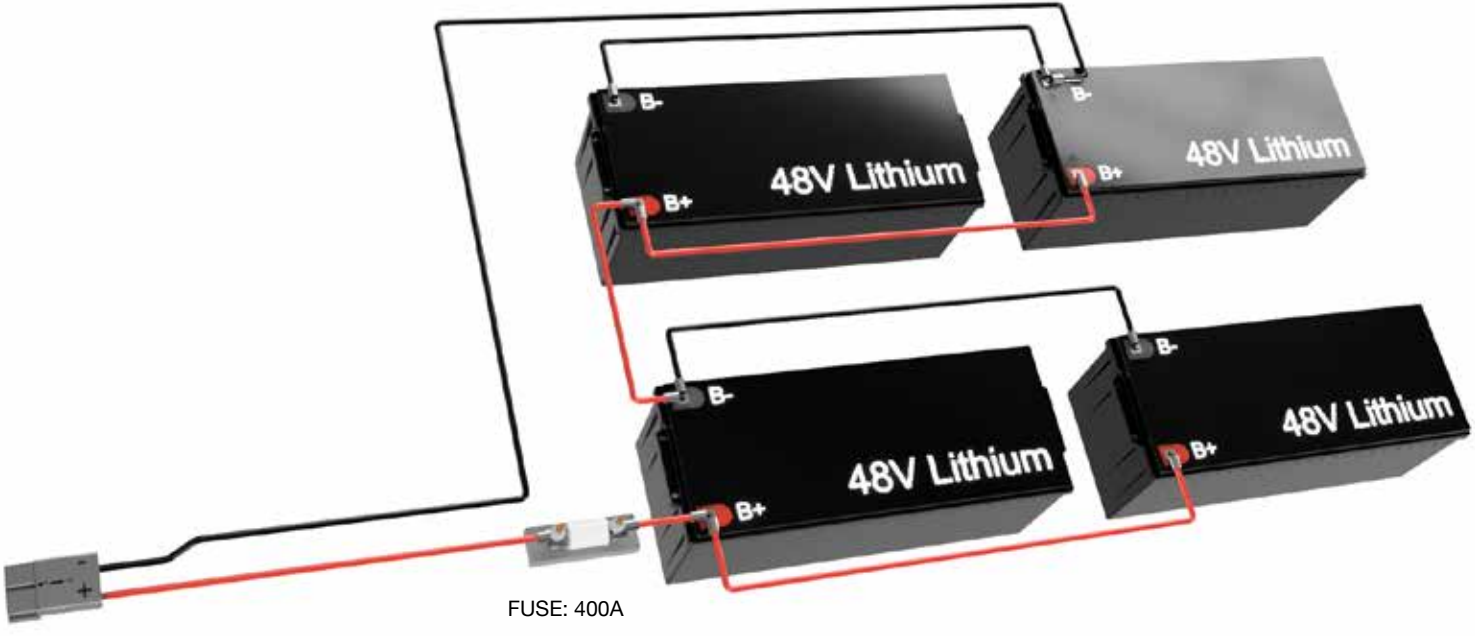
48 Volt
Series AGM Battery Configuration



48 Volt
Lithium Battery Configuration



48 Volt
Parallel Lithium Battery Configuration



96 Volt
Series - Parallel Lithium Battery Configuration

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

Troubleshooting: Faults & Warnings

LED flashes	Fault	Set Conditions	Operator Action
7	Battery low/high voltage protection	Battery voltage is below or above the appro-priate 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	Reduce load to motor to allow it to cool down
8	Controller too cold	Controller has reduced power to motor(s) below maximum specified by user settings due to controller under temperature	Allow controller to warm up
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

Troubleshooting: Faults & Warnings

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
12	Communication error	Unrecoverable network communication error has been detected	Check CANbus wiring and CANopen configuration
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

Limited Warranty

Simply scan the QR code with your phone to see the full warranty details on the Elco website.


Elco
The Original Electric Boat Company